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The Grammar of Space

Soteria Svorou

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THE GRAMMAR OF SPACE

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Volume 25

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List of abbreviations

ABL	ablative
ABS	absolutive
ACC	accusative
ACRS	across
ADES	adessive
ADJ	adjective
ADP	adposition
ADV	adverb
AFF	affix
ALL	allative
ALIEN	alienable
ALON	along
AMH	Amharic
ARAB	Arabic
ARD	around
ART	article
AUX	auxiliary
BAC	back
BOT	bottom
BTW	between
CIRC	circumferential
DAT	dative
DU	dual
DET	determiner
DEM	demonstrative
DIR	drectional
ELAT	elative
ETH	Ethiopic
FEM	feminine
FIN	finite
FRN	front
FUT	future
GEN	genitive
GEND	gender
IMP	imperative
IN	inside
INANIM	inanimate
INCL	inclusive
INESS	inessive
IND	indicative
INF	infinitive
INTER	interrogative
IO	indirect object
LME	Late Middle English
LOC	locative
MARK	marker
ME	Middle English
MED	medial
MIA	Middle Indo-Aryan
N	noun
N-CL	noun class marker
NUM	numeral

OBL	oblique	PROX	proximal
OE	Old English	PRT	particle
OED	Oxford English Dictionary	RECIP	reciprocal
OIA	Old Indo-Aryan	REFL	reflexive
OPP	opposite	REG	region
OUT	outside	SEM	Semitic
PARTCP	participle	SG	singular
PASS	passive	SKT	Sanskrit
PAST	past	STAT	stative
PL	plural	SUBJ	subject
PM	predicate marker	SUF	suffix
POSS	possesive	THRU	through
PREP	preposition	TOWD	towards
PRES	present	TRANS	transitive
PREV	preverb	UNSPEC	unspecified
PRO	pronoun	V	VERB
PROG	progressive	1SG	first person singular
PROLONG	prolongative	1PL	first person plural

Chapter 1

The Conceptual Framework

1. Language and the world

1.1 *Knowledge of the physical world*

We experience this world in ways that are determined by our biological make-up. We are told there is a world out there that abides by the laws of physics, that there is order to everything. But what we experience is not necessarily the orderly world and not at all every aspect of it. We are told there are atoms, but we have never seen them, we are told there is gravity but we have only seen apples falling from trees, we are told the earth is round and constantly moving, but it seems very stable and flat under our feet; we are told the earth moves around the sun, but every morning we see the sun coming up from the horizon, and every evening going down, not the earth moving.

Scientific knowledge about the world does not necessarily enter our belief system, and if it does, it requires the passage of centuries. The effects of gravity on moving objects have been known since Newton's time, but college educated people today, after so many centuries, still believe that if you drop a stone while you are running, it will fall straight down or even backwards from the point you let go (McCloskey, Caramazza, and Green 1980). Our belief system rather is formed by our everyday experiences with the physical world and our cultural environment. We reason and talk about the world using language in ways that reveal our reliance on our beliefs. We describe the sun as "rising" and "setting" with respect to a stable horizon, and the stars as "coming out" at night.

1.2 *Our conceptual world*

The basis of our language, then, is our belief system on one level, our neurophysiology on the other, brought together on the psychological level. We come to the world as children equipped with the necessary neurophysiological apparatus, which predisposes us to learning. Our knowledge acquisition process involves recurrent exposure to situations with physical objects, human beings and their interactions, either physical or linguistic. In addition to what is endowed, we are taught that set of values that our cultural community currently holds. Our experience with the environment and our culture together create our psychology and the way we view and talk about all aspects of the world. This is what makes the New Guinea Danis distinguish lexically only two basic colors, light and dark (Heider & Olivier 1972) compared to all the colors that Gauguin would distinguish and name.

The environments that communities live in preempt different views and beliefs about the world. That contributes to the formation of different cultures. Cultures, however, are not so diverse as not to have anything in common. Commonalities may be thought of as indicating characteristics of the "culture of the species". Such characteristics may be a result of the identity in the neurophysiology of human beings, and their ability to communicate through language.

1.3 *Experience, cognition and language*

Many linguists, psychologists and cognitive scientists agree today that in the relationship between language and the physical or objective world there exists an intermediate level which we call "cognition". The nature of cognition has been the central issue of psychological studies, and the source of many disputes. One point of agreement among many, however, has been that our cognition contains representations although there is a lot of discussion on the nature of such representations. Distinctions of "semantic" from "cognitive" or "mental" representations constitute attempts to separate properties of language from properties of human thought in general, justifying the different ways that the study of language and the study of cognition had taken along disciplinary lines. Furthermore, the nature of the representations per se, whether they are propositional and abstract, or pictorial and imagistic constitutes an additional issue (Kosslyn 1980). While

focusing on a specific object of study is one of our characteristics as researchers and human beings, we should keep in mind that such decisions are only methodological, and do not necessarily constitute delineations of the faculties of human behavior.

Semantic representations in most contemporary semantic theories are treated as propositional and truth-conditional in nature. They represent the relation between linguistic form and states of affairs in the world by manipulating abstract symbols of predicate calculus. Such theories typically assume a view according to which language is a separate faculty of the human mind. The interactions between the linguistic faculty and other faculties is the subject of study of sciences other than linguistics, perhaps psychology. Semantic representations of linguistic utterances, therefore, do not draw upon any other faculty of the human mind, but rather, correspond directly to objective states of affairs in the world.

Recent theories of language and meaning refute the objectivist claims of mainstream semantic theory on the basis of the fact that the human factor is ignored. Lakoff (1987) and Johnson (1987) present an alternative to formal semantic theories. In their view, language is embedded in human cognition. Such manifestations of human cognition as experience, understanding and imagination are necessary not only in order for humans to understand language but in the development of a theory of language as well. Linguistic meaning is embodied in the forms of language and our experience of the world, which is required for the understanding of linguistic forms.

Embracing the latter point of view, I assume that the level between the physical world and language, cognition, is only a way of talking about the fascinating ability we have to receive sensations via the channels of our perceptual apparatus and manipulate one or a combination of them in ways that they either create other sensations or make us respond to them in physical ways. Even more fascinating, however, is our ability to remember these events of perception, manipulation and response. Stored memories are activated by similar situations. The more these memories are activated, the better their chances are to become part of our inventory, even part of our belief system. In this way our memory contains knowledge about the effects of the physical world on us and vice versa, knowledge of the value system that our culture taught us, and knowledge about social interactions among the members of our culture, and, of course, knowledge of our language.

1.4 *On the nature of language*

Every time we perceive a linguistic cue, we scan the relevant part of our conceptual world in order to understand it and respond appropriately. The nature of our memory allows us to understand and respond to what might appear to be incomplete linguistic cues, as compared to the perfect and complete message of the Chomskyan "competence". Often, however, the linguistic cues are "incomplete" only if we ignore the context in which they appear. We use language only as part of our interactions, and language is only one of the cues we are aware of and address our attention to during interactions with other human beings. Gesticulation, facial expression, the physical and social environment, all play a role in our perception of an interaction. In fact, the context, both linguistic and pragmatic, is fundamental in our understanding of language. Thus, language is not a self-contained system of communication, but, rather, requires reference to other faculties of human cognition and behavior.

Students of language have called the user's dependence on context for the interpretation of language the *deictic anchorage* of the linguistic event (Bühler 1934; Rommetveit 1968, Fillmore 1975). Linguistic events are anchored with respect to three dimensions representing the Who, Where and When of the event, the intersection of which has been called the *deictic center* (Fillmore 1975). In the wide interpretation of the notion of deictic anchorage, not only the who, where and when, but also the social and psychological conditions pertaining at the moment are crucial for the understanding and interpretation of the linguistic event. The apparent incompleteness we observe in utterances within a piece of discourse is the effect of deictic anchoring on language. We rely on the context shared with our conversational partners, which is not only the spatio-temporal situation we are in, but also the knowledge about affairs in the world. Such contextual information need not be specified in discourse, but it is assumed. Linguistic utterances, therefore, are incomplete, in the sense that they do not offer all the information needed to communicate. In fact, we should not be surprised by this incompleteness. Rather, in my opinion (and others, e.g. Bühler (1934,1982) and Kuryłowicz (1972)), deictically anchored language is the typical (prototypical) instance of language as a system of communication, the source of the ontogenesis of language, and the basis for all other developments in non-deictic contexts. This view of language constitutes a departure from mainstream contemporary linguistics in the sense that it seeks to understand language by studying more than linguistic structures.[1]

The spatio-temporal anchoring of our language is not only the basis of our understanding of linguistic messages, but also the basis for anticipating certain kinds of linguistic messages. Linguistic material is stored in our memory in conjunction with their recurrent deictic context. Faced with certain situations, we can anticipate the kinds of linguistic messages that may be exchanged, or infer others, relying upon our memory.[2] The more familiar a situation is, the less we need to elaborate on it linguistically. The most familiar situation is the "Here and Now" where information about the deictic center components are readily available. Very familiar situations, the ones we have experienced again and again, come after that, and require some linguistic elaboration, but much less than a new situation or an infrequent one.

1.5 *The linguist's enterprise*

The assumed experiential basis of language and its direct connection to human cognition dictates a level of research which goes beyond the study of individual language forms into the study of human psycho-social behavior. The linguist's enterprise is not only to provide a description of linguistic structure which fulfills the cognitive commitment (Lakoff 1990), but also to explain it. The ultimate goal of explaining the structure of language and, consequently, predicting the patterns of occurrence requires that we study language in many aspects. Not only is it crucial to describe synchronic structures, but also to describe the way they were created; not only to understand how adults use and process language, but also how children acquire linguistic patterns. This kind of research brings together synchronic and diachronic dimensions of language, since it views the present as a product of the past.

In the above introduction I have attempted to lay out my basic assumptions and beliefs about human beings and language. I have stated my views on the nature of our knowledge of the physical world, the structure of our conceptual world, which incorporates cultural and experiential knowledge as is constrained by our perceptual apparatus, the relationship between cognition, language and experience, the nature of language, and finally the task linguists should attend to. Keeping these views in mind, for they will become relevant later on, we will proceed to the discussion of the linguistic encoding of spatial relations.

2. Language and spatial relations

In our everyday interactions we talk about situations locating them in space. The locus of situations together with the participants and their characteristics, and the time during which they occur constitute the three dimensions along which we understand and talk about them. We may say "here", "over there", "behind", "in front of the TV", "to the left as you go towards downtown", "the back door", etc., when we locate situations and entities spatially. Each of these expressions carries a different *degree of explicitness* in the encoding of referents in the world. Explicitness incorporates the weighted relevance of various conceived elements of the situation with respect to the communicative intent of the speaker. "Here" has the lowest degree of explicitness because the speaker simply considers knowledge of his/her position as adequate information for the listener to locate the entity under question, and relies heavily on contextual cues rather than elaborate linguistic specification. Furthermore, "here" simply indicates that the location of an object or situation is in the physical or psychological vicinity of the speaker without making reference to any other features of the situation. In that respect, "here" has a low *degree of specificity*.[3] Degree of specificity refers to the amount of detail with which spatial relations are described. Thus, "on the door" has a lower degree of specificity compared to "on the top left corner of the door". "On the door" makes reference to the entire surface of the door as a potential location of the object ("search domain"), but "on the top left corner of the door" further partitions the door into smaller regions, only one of which is used for locating the object, thus specifying its location with greater accuracy.

The utterance "On the left hand side of Main Street as you go towards downtown, next to the Utica subway station" has a high degree of explicitness because it makes use of surrounding landmarks (namely Main St. and Utica Station). It also has a high degree of specificity since it not only tells us about the surrounding objects, but also the direction of travel of the travelling person (towards downtown), and the side of the street with respect to that direction and the person (left hand side), that is, it employs a lot of detail in the description.

The degrees of explicitness with which we decide to talk about the location of entities depends on our intentions, the addressee, and the communicative context we are in. If we share the "Here and Now" with the addressee and we talk about entities within that context, we can use expres-

sions with a low degree of explicitness ("here", "there", "over there") and be perfectly understood. The need to use expressions with a high degree of explicitness arises in cases in which we talk with the addressee about situations that are removed from the "Here and Now" temporally and spatially (situations of the past or future in other places), or when we do not share the "Here and Now", as it usually happens in written communication, narrations, or even telephone conversations, where, however, we share the temporal but not the spatial aspect of the context.

Furthermore, the degree of explicitness of a spatial expression depends on the kinds of linguistic interactions we have. We locate entities and situations in space when we describe scenes, narrate a sequence of events, give instructions, answer questions ("Where's my purse?"), or when we want to refer to an object contrastively ("the rear window" as opposed to the window in the front, or "the man behind the house" as opposed to men elsewhere). Such interactions are called *linguistic frames.*

Within particular linguistic frames, the degree of explicitness and the degree of specificity with which we describe spatial relations correlate. The detail of description of a spatial relation (specificity) is motivated by the number of partitions of a spatial region that are relevant in the particular situation (explicitness).Thus, descriptions with low specificity tend to be also low in explicitness. In other words, we may mentally partition a spatial scene in regions according to our communicative intent, and then we may provide a linguistic description of the location of an object which is of an equivalent amount of detail. It is when we have explicit mention of the elements of a spatial scene that we can talk about their relations in detail. Which brings us to the question of how explicit linguistic descriptions of spatial relations can be.

Every object in this world is contained in something larger. Making explicit all the elements of the location of one object would entail an extensive list of nested relations. But language does not actually encode that way. When we say "the tennis racket is in the closet" we do not have to mention all the other entities that contain it, that is, "in the hallway, in the house, in Williamsville, in New York, in the USA, in North America, on earth, in the Milky Way, in the universe". Rather, there is a level of linguistic encoding of spatial relations which is adequate. That is, it does not include too much information to be redundant and tedious, and not too little not to be specific enough (Grice 1974). Thus, to describe the location of the tennis racket by specifying all the relations, from the local to the cosmic

level, would be tedious, redundant, and ultimately useless. Similarly, to describe its location by simply saying "there" or "in a closet", without providing any linguistic or contextual antecedents for its interpretation, would be too little information, not specific enough, and ultimately useless.

That level we may call the *basic level*.[4] It is characterized by the fact that there is only one necessary level of nesting. To refer back to the tennis racket example, it is enough to say "in the closet" without the rest of the containers. Of course, we can talk about a location within the closet ("in the closet behind my overcoat"), if necessary, as we may also say "in the closet in the hallway". It appears that we conceive of locations in a hierarchy of containment. The linguistic frame together with considerations about the location of the interlocutors sets the basic level of interaction. So, if I am in my house in Williamsville, I will most likely talk about the location of the racket as "in the closet" but not "in Williamsville in my house in the closet". But if I am in Ellicottville I will probably use the latter description.

2.1 *Locating entities*

In the conceptual act of locating an object for a certain communicative purpose there are some elements which play a fundamental role. It is in our nature to locate objects with respect to other objects, in a *relativistic* way. One could quote a plethora of scholars on that issue, from Plato to Marvin Minsky, from various disciplines. The location of physical objects is detectable, on a psycho-physiological level, and described, on a linguistic level, only with reference to other objects in the vicinity of the first. The consequences of this basic human ability (or, constraint) are fundamental to a theory of spatial relations, as we will see shortly.[5]

Talmy (1983) and Langacker (1986, 1978) among others, have observed, however, that the way we locate objects with respect to one another involves the recognition of some kind of *asymmetrical relation* between the object we want to locate and the object with respect to which we locate it. We may attend to and recognize asymmetrical relations with respect to size, containment, support, orientation, order, direction, distance, motion, or a combination of these. Thus, a possible spatial relation between a book and a desk is when the book is on the desk. Typically, desks are larger in size than books, satisfying the asymmetry condition and making the act of locating the book possible. Specifying the kind of spatial relation that exists between the two requires knowledge (or, perception), at

the very least, of support relations: the larger object supports the smaller object, unless balance is involved.

If there is no apparent asymmetry between the entity we want to locate and the reference entity, then we impose some kind of asymmetry on it.[6] In the most typical way, we take into consideration the location of an observer. Take, for instance, a situation in which we want to locate a building on a street. We may describe it as being located "on the left hand side as you go towards downtown". The left-right asymmetry is imposed on the street by the direction of travel and the left-right asymmetry of the traveller.

In describing the asymmetrical relation between entities in a spatial situation, Talmy (1983) borrowed the terms "figure" and "ground" from Gestalt Psychology (Köhler 1929; Koffka 1935) to label the object to be located (Figure) and the reference object (Ground). Several other terms have been suggested in the literature: "locans" and "locatum", "trajector" and "landmark" (Langacker 1986), "relans" and "relatum" etc. In this study I adopted the labels suggested by Langacker, sharing the conceptualization of the locating event as a metaphor of the perceptual strategy of backgrounding for the sake of perceiving objects in the foreground, i.e. the figure — ground organization of the locating event. A *Trajector* (TR) is the entity to be located. A *Landmark* (LM) is the entity with respect to which the Trajector is located. These terms are used to talk about the location not only of physical objects, but also of persons, sensations (e.g. pain), emotions (e.g. in love), feelings (e.g. hope in the world) and situations (e.g. He kissed Mary behind the barn), and abstract relations of varying content (e.g. temporal relations, possession, comparison, reason, etc.).

A spatial arrangement of two entities may be described linguistically in a number of ways, each of which constitutes a *construal of the spatial arrangement* by the speaker. The speaker's choice to construe a situation in a certain way has some implications. Let me illustrate the point with an example. The spatial arrangement of the bird bath and the table in Figure 1 may be described as "the bird bath is on top of the table". The fact that the bird bath was treated as the TR and the table as the LM, and not vice versa, determines in part the spatial description that will be appropriate for the arrangement. If the table was chosen as the TR, the description would have changed to "the table is under the bird bath". Although these descriptions are motivated by logical entailment, linguistically, they are not equivalent in the sense that they are not interchangeable. While the first is a

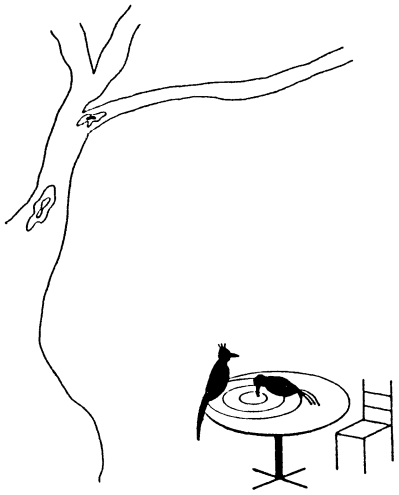

Figure 1

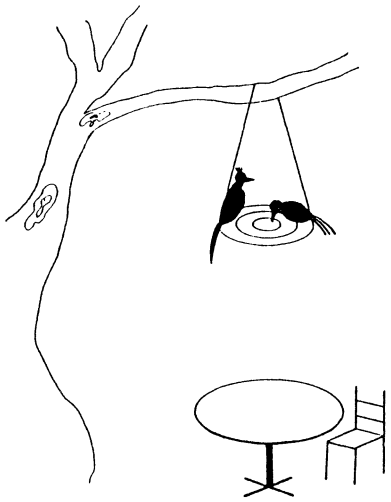

Figure 2

highly probable description, the second is not. The second is an appropriate description of Figure 2, where the bird bath and the table are not in contact. There is, therefore, some characteristic which makes certain entities more probable as TR or LM than others, within specific contexts.

Second, the fact that the bird bath in Figure 1 was described as "on top of" the table, as opposed to "on" it, further indicates the speaker's care for greater precision in locating and his awareness of the up-down inherent orientation of the table. If the speaker had chosen "on" instead, s/he would have simply indicated that the bird bath is supported by the table, which, considering the nature of these two objects, would be the only arrangement where canonical support can be effected. Although both "on" and "on top of" describe the same spatial arrangement, they profile different elements of the arrangement, thus revealing the speaker's conceptualization of the situation.

Specific construals of spatial arrangements are actually determined by the linguistic frame within which they occur. So, while we are unlikely to say "the house near the bicycle", but rather we would say "the bicycle near the house", in a life-size spatial arrangement in everyday life, in the linguistic frame of children's play or stories the former construal might be per-

fectly appropriate. Another example of the determining role of linguistic frames to the way we construe spatial arrangements is suggested by the treatment of LMs as targets, goals or final destinations, as sources and starting points, implying actual and virtual motion, or, finally, as static entities. In scene descriptions, for example, LMs tend to be conceived as static entities. TRs "are located" with respect to LMs. We describe scenes by giving the local relations of entities to the nearest ones, and then those to others. But when we give instructions on how to follow a procedure (as in a cooking recipe), or how to get to some place (e.g. navigation) LMs are "destinations" and "sources" (e.g. We move from one place to the next, or we pour the milk into the flour).[7]

In linguistic frames characterizing adult interactions certain configurations tend to recur, thus allowing a "typical" tendency in the construal of spatial arrangements. Talmy (1983) notes that certain physical objects are more likely to be construed as LMs than others. These are *large, immobile objects*, so that in any spatial arrangement which involves such an object and a relatively smaller and/or mobile/moving object, we can predict that speakers will tend to locate the small object with respect to the large one, the mobile with respect to the immobile. This tendency is very evident in locating entities in cities, for instance. Large buildings or large constructions are good landmarks with respect to which people orient themselves. Large size is not always the determining factor in choosing a LM. Relatively small objects, such as small buildings, may be chosen as LMs because of their *cultural significance*. For example, in a residential area a small grocery store which attracts many local residents as customers may constitute an important landmark, even when the houses in the neighborhood are much larger than the store.

Another parameter that contributes to the tendency of entities being used as LMs is the overall *frequency of encounter* with a particular object. This is particularly obvious in large scale environments where an environmental entity is encountered so often that it becomes a point of reference and, consequently, a LM. For instance, in coastal cities the sea (or body of water) and, by synecdoche, the coast serve as orientation landmarks within the city.

Frequent encounter with an entity provides people with familiarity and fairly good knowledge of it, which, in turn, makes the entity *salient*, in the sense that it is familiar and easily accessible. Salient entities are more likely to be picked out as LMs with respect to which other less salient entities are located.

There is a relation between the last three characteristics of LMs. Culturally significant entities are usually encountered frequently and are salient. But the reverse is not always the case.

The knowledge people have about frequently encountered salient entities may have several aspects. People have a very good idea about objects they encounter in everyday life, their size, shape, texture, and function. Also, they know about their component parts, and especially about the part with which they typically interact. Furthermore, they know about the context within which people or other entities interact with particular entities. I propose that all this knowledge may be incorporated into the notion of *region* of an entity. In the present view of language and spatial relations, regions constitute a fundamental notion incorporating knowledge of the physical and functional character of entities, which in turn determines the linguistic description of spatial relations.

2.1.1 *Region*

The notion of region of an entity is motivated by actual language use. To illustrate it, consider the following figures. In Figure 3 the spatial arrangement of the bicycle and the church may be described by "the bicycle is at the front of the church". The arrangement in Figure 4 may similarly be described by "the bicycle is in front of the church", which seems, however, an improbable description of the spatial arrangement in Figure 5. The

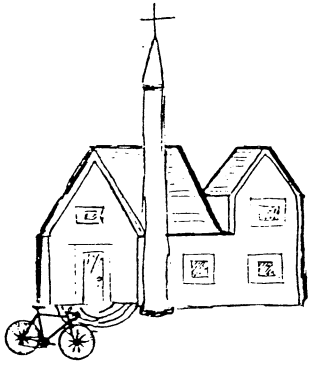

Figure 3

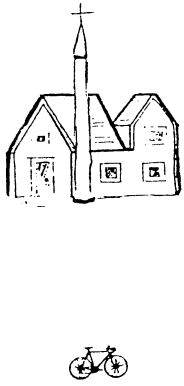

Figure 4

Figure 5

obvious difference in the three arrangements is the distance between the bicycle and the church. While in Figure 3 the bicycle is standing against the front wall of the church, in Figure 4 it is not in contact, but in the vicinity of the front of the church, and in Figure 5 it is far removed from it. Note, however, that and "in front of" description of Figure 5 may be possible under certain conditions, and that is in an aerial view of the arrangement, if nothing, or nothing relevant, intervenes between the church and the bicycle, provided that the church and the bicycle are well distinguished visually. This description is justifiable if we consider the experiential fact that apparent distance between objects reduces with an increase in viewing distance. This description is also possible in a situation in which an observer, the bicycle, and the church are lined up. From the point of view of the observer the bicycle is in front of the church, implying order relations. I will disregard this last possibility for the time being, since it involves a separate use of the spatial preposition.

In the situations just described the bicycle was located with respect to a location adjacent to a part of the church. The particular part of the church gave its name to the location in the first two situations, but failed to do so in the third (in the non-aerial view). This observation implies that there is an area adjacent to a LM (or part of it) in which a specific spatial description is valid. This is one of the contexts in which the notion of region is manifested.

The notion of region underlies several theories of spatial relations, but has not been fully developed in any of them.[8] Miller and Johnson-Laird (1976:59) define the "region of a thing (as)... a rather indeterminate penumbra surrounding it". In their view, regions are thought of as concepts, rather than percepts, since they include functional as well as perceptual experience with the thing. They contrast the notion of region to the Aristotelian notion of "place" (book 4 of "Physics"), which is defined as "that which contains that of which it is the place", and, further qualified as "neither less nor greater than the thing" (:58). They argue that the notion of region is necessary since "place" does not determine how particular places and relations between places are to be identified. If we postulate, as Aristotle did, that each object in the world has its own place, then in order to see a spatial relation among objects and the place they occupy, we have to further postulate the existence of an abstract and absolute coordinate system (i.e Euclidean) which would provide the frame for ascribing relations among objects. While this theory has the merit of precision in describ-

ing certain situations, it has the disadvantage of leaving others unaccounted for, considering them as deviations. Furthermore, if we assume that linguistic descriptions of spatial relations are based upon this theory of space, we are faced with problems, because such descriptions do not correspond to discrete lexical categories.

The fuzziness with which linguistic forms describe spatial relations has been implicit in several theories. Specifically, Fillmore (1982) in the context of discussing assignment of front/back relations, notes that Trajectors and Landmarks have to be close to each other for such relations to exist. Talmy (1983) also considers cases in which what he calls "biasing of parts" (assigning sub-regions, in my terms) does not permit locating objects with respect to them, if such objects are at some distance from the biased part, but it does if they are in contact or adjacent to it.

Herskovits (1982) adopts the Aristotelian "place" which refers to a region of space that an object occupies, neither bigger nor smaller than that. She observes that in some geometric descriptions the boundaries of place of the Landmark are not clear, as for instance in "He swam across the lake" (where the actual boundaries of his path in the lake are not clear). She concludes that the boundaries of geometric descriptions are vague and, consequently, linguistic categories are fuzzy. To account for the observed fuzziness, she postulates the pragmatic principle of tolerance. In her view, tolerance is the degree of deviation from the core meaning of a spatial preposition, the deviation being motivated by naturally vague boundaries of geometric descriptions and the fuzziness of linguistic categories. Moreover, tolerance depends on the nature of the objects involved in the spatial arrangement, the degree to which their positions can be distinguished, visual acuity, viewing distance, and relevance, another pragmatic principle involved in the explanation of linguistic descriptions of spatial arrangements.

I would like to offer an alternative view in which the meaning of a locating expression is not a function of the Aristotelian "place" of the Landmark plus the value of the pragmatic principle of tolerance of the spatial expression, but rather give conceptual priority to the REGION of the Landmark in a locating expression. The postulation of this notion removes the need for a discreet, well-defined, ideal notion of "place" which does not fit the way language treats place, and which has to be supplemented by the postulation of pragmatic principles, such as tolerance, to explain the vagueness of the boundaries of linguistic descriptions.

Langacker (1986) touches upon some aspects of the notion of region in his discussion of the scale and scope of predication, two of the ways in which speakers construe the content of a cognitive domain. Recognizing the fuzziness of concepts, these two notions constitute ways in which concepts are identified and, in the case of concrete entities, perhaps reflect the visual background against which they are identified as such. Scale of a predication, such as "island", refers to the size of the area included, which is determined by the expected size of the real world referent. Whereas a mass of land in a large body of water would be felicitously named an "island", a mass of mud in a puddle of water would not. Scope of predication refers to the type of area included given a scale specification. In the example of "island", scope refers to the area of water that has to surround the mass of land in order for that mass to be called an "island".

The notion of region is relevant within a theory of spatial relations which assumes that people understand space not by a set of coordinates in reference to which objects receive their location independently of other objects, but rather by the relations that exist between objects in that space. Experience with such relativistic space equips people with knowledge and expectation about the *size, mobility*, and *interactional* and *functional* attributes of entities. This knowledge is accessed every time a visual or linguistic cue referring to such objects is perceived, and it is reinforced by it. Assuming that some kinds of knowledge tend to be selected for attention more often than others, then they would be more reinforced, indexed, and consequently, more easily accessible. Furthermore, certain kinds of knowledge would tend to correlate with each other because they are acquired together recurrently within similar chunks of experience. For instance, the size and function of a typewriter correlate, in the sense that if the typewriter gets to be very large, which results in an oversized keyboard with keys spaced at distances not compatible with the size and function of human fingers, it will not be usable and it will seize to be a typewriter. Types of knowledge are, thus, seen to interact with each other in structured ways. Regions are conceptual structures which are determined by our knowledge about physical, perceptual, interactional, and functional attributes of entities.

Combinations of attributes define three basic types of entities with respect to the typical regions they may have. Containers, such as boxes, cans, cups, baskets, tubs, pots, etc., are typically conceived of as having an *interior region.* The concave shape of such objects determines a typical interaction with other entities, and defines their interior as their "use-space".

Other entities are typically treated as having *exterior regions*. Thus, blackboards, tabletops, trees, mountains, and even people, typically interact with other entities with their external boundaries, that is their "use-space" is external and around them.

Entities such as fields, continents, and countries, are typically treated not as having regions, but rather, as *being regions*. The physical boundaries of such entities are also the boundaries of the typical interaction of people with them. These entities are large enough to contain people and their normal interactions.

Entities such as cities, lakes, buildings, rooms, caves, yards, pools, phone booths, etc., due to their physical and functional characteristics may be conceived of in several ways: as regions, since people carry out activities within their boundaries; as having exterior regions, since they may interact with them externally; or, they may even be treated as having interior region, that is, functioning as containers. Theoretically, each entity, in different situations, may be construed as having interior or exterior regions, or as being a region. Empirically, however, such construals are constrained by our typical interactions with entities. Such typicality effects are reflected in the way we handle such entities in language. For instance we may describe our position "in the room" or "out of the room", treating the room as an entity with interior region; or, we may describe it as "in front of the room" treating it as an entity with exterior regions.

The size of regions in entities that are regions, as well as the size of interior regions are defined by the boundaries of the entity. The size of exterior regions, however, is problematic. Determining the front region of the church in the spatial arrangements of Fig. 3-5, for example, presents such a problem.

Exterior regions of entities are defined by a scale which includes parameters of a) *size* of the entity itself, b) *distance* to and/or size of other relevant objects, c) the *larger area* within which the objects are arranged, and d) a functionally determined *use-space* around the object.

Let's go back for a moment to Figures 3, 4, and 5, in which a bicycle is being located with respect to the front of the church. First of all, the front of the church is the side with the main entrance, which typically people use to enter the church. The location adjacent to the front wall of the church (the FRONT-REGION) may have different sizes depending on the configuration of the above mentioned parameters. Naturally, if the front wall of the church has a large extension, as a result of the overall size of the church, the

FRONT-REGION will be larger also. The larger area within which the church is located is very important. A church in a prairie with few other constructions or landmarks in its vicinity may have a larger FRONT-REGION compared to a church in a densely populated area. Churches in densely populated cities, for instance, are surrounded by high-rises, sidewalks, and busy streets, leaving a very small region, including the steps and perhaps part of the sidewalk. The church in the prairie may have a larger use-space surrounding it, since it is not bounded by other landmarks, and allows for activities to take place in such a large area. Such activities would be located with respect to the church, in lack of any other competing landmarks. The church in a city, on the other hand, has a small use-space surrounding it, since activities have to be limited to the area between the walls of the church and the curve of the road, which marks the beginning of another landmark. A bicycle in front of the city church would have to be much closer to the front wall of the church than a bicycle at the prairie church for the relation to qualify for an "in front of" description.

An entity may be only partially included in a region of the Landmark and still be located with respect to that region. For example, we may say "There's a lake in front of my house". This description does not entail that the lake is smaller than my house, or that if the lake is larger than the house, the FRONT-REGION of the house has expanded to include the lake. Rather, the lake is used by synecdoche to refer to the part of the lake that falls within the FRONT-REGION of the house. This description can be used as long as the lake is not too large, perhaps as long as its boundaries are visible. If the lake is very large, it is likely that the house would be the Trajector rather than the Landmark.

The relationship of the parameters to each other and their contribution to the value of the scale for the size of regions is very complex. One of the reasons is that the parameters are not constants for individual entities or classes of entities, but rather take their value contextually. There may be typical, expected values for such parameters determined by recurrent experience, but new contexts may provide new interaction, thus enriching our knowledge about them. To be able to determine the possible and probable descriptions for any spatial arrangement, an algorithm will have to be developed to show the relations among parameters. This enterprise has not been undertaken in this study, since it requires a different methodology than the one adopted here. It is, however, an outstanding question to be approached in the future.

2.1.2 *Locating with respect to interior region*

Locating entities with respect to other entities which are characterized by "interior region", in principle allows for two kinds of relations: either one in which the Trajector is included in the interior region of the Landmark, or one in which the Trajector is located outside of the interior region of the Landmark. Thus, entities having interior regions may be used as reference objects to locate other entities in their INSIDE-REGION or their OUTSIDE-REGION. Note that the OUTSIDE-REGION is different from "exterior region" in that it exists only with entities that have an interior region, while exterior region may exist also with entities that do not have interior region.

2.1.3 *Locating with respect to exterior region*

Several ways of locating entities with respect to the exterior region of a Landmark are possible. Each one represents a different parameter of the mechanism of partitioning the exterior region into sub-regions. One such parameter is the distance that separates a Trajector from an exterior region of the Landmark. Distance relations between the Trajector and the Landmark may range from the contact of the Trajector with the Landmark, to being within the extended region of the Landmark, to being at a large distance from it. Thus, with respect to distance, the general region of an entity may be partitioned into a NEAR-REGION and a FAR-REGION.

In other relations within an exterior region of a Landmark, the external contours delineated by the shape of the Landmark are involved. Since the objects that we typically interact with are all three-dimensional, we do not really want to claim that we experience them as two-dimensional shapes. We may be able to abstract two-dimensional images of them if we are trained to do so and if we are requested to do so, but we do not do that automatically.[9] Moreover, it would be unsubstantiated to claim that we experience three — dimensional objects but we retain two-dimensional abstract images of them (although that was one of the claims of Gestalt Psychology).[10] Since we perceive the shape of objects not only visually but also through tactile perception, it seems intuitively more satisfying to claim that the kind of information we retain has a direct connection to the way we experience objects through our various perceptual channels. If we accept this assumption, then we can further assume that we have an idea of the shape of objects, in addition to seeing them and touching them, by having moved around and along their boundaries, actually or with our eyes. For

large, non-manipulable objects (mountains, buildings, ships, etc) we may have expectations about their shape either by having moved around their external periphery physically, or by extension from our experience with smaller objects.

Several kinds of movement may be experienced in following the contours of an object. Thus, if an object is spherical or close to being spherical, movement parallel to its external periphery delineates a circular path where the beginning and end of the path coincide. If the object is elongated, movement parallel to its external boundaries results in a linear path where the beginning and end never meet. If the object is concave and transversal, movement parallel to its boundaries in the cavity results in a penetrating path. It is also possible to move not parallel but across the boundaries of an object. The movement in that case delineates a crossing path. Such experiential situations may be called upon when locating a Trajector with respect to a Landmark associated with such situations. The Landmark then may have regions established by such experiential situations. I will refer to them as AROUND-REGION, ALONG-REGION, THROUGH-REGION and ACROSS-REGION.

Such relations may exist not only in dynamic situations where movement is involved, but also in static ones as well. In that case the path of movement, or even the end-point of movement, may be idealized as the location in those regions (Talmy 1983, Brugman 1981). The stative notions, however, may be formed only if we have experienced actual movement around, along, through or across entities, and, therefore, have knowledge of the path and end-point of such movements. In accordance, Talmy (1983) also suggests that in such relations motion is more basic than stativity.

Another parameter that is involved in partitioning the external region of Landmarks are its inherent properties. The inherent configuration of entities qualifies them as *symmetrical* or *asymmetrical*. Symmetrical entities, such as balls, do not have any differentiated parts on their exterior. Asymmetrical entities, on the other hand, may be differentiated into several parts. If their asymmetries are distributed along a vertical axis, the entities are said to have a top and a bottom (bottles, candles, cookie jars, trees, buildings). If, in addition, their asymmetries are distributed horizontally as well, they may be distributed along a front-back axis (depth axis) and/or a left-right axis (cars, vehicles, houses, typewriters).

Trees are a classical example, among linguists and psychologists, of entities with only one asymmetrical axis, the top-bottom one. While this

conceptualization is valid among western cultures, it is by no means universal. Heine (1989) reports that among the Chamus group of the Maa people of Eastern Africa (affiliation Eastern Nilotic) trees have intrinsic fronts (and, consequently, backs). The front of a tree is the side toward which the trunk is inclined. If the trunk is straight, then the front is in the direction of either where the biggest branch or the largest number of branches are, in that order. This is an indication that whether an entity is considered symmetrical or asymmetrical, and the number of axes along which the asymmetries are distributed, not only depends on its physical configuration, but also on the way the members of a culture typically interact with it, which triggers the specific "cultural" conception.

Moreover, the inherent mobility status of entities further qualifies them as symmetrical or asymmetrical entities. Totally symmetrical entities such as balls, or partly symmetrical ones such as wheels, may acquire an asymmetrical axis by their direction of movement. In several mobile asymmetrical entities such as cars, planes, rockets, bullets, ships, the inherent front coincides with the typical direction of movement. In others, however, such as crabs, which move sideways from the direction their eyes are pointing, it does not.

Asymmetrical entities contribute to locating other entities with greater precision with respect to them. In a relatively simple spatial arrangement, a Trajector is located in the region of a Landmark. But if the Landmark is an asymmetrical entity, finer specification of the location of the Trajector is possible. The inherent asymmetries of the Landmark partition its region into equivalent sub-regions. Thus, the region of the Landmark may be partitioned into top and bottom, front and back, left and right. Henceforth, I will refer to these sub-regions as TOP-REGION, BOTTOM-REGION, FRONT-REGION, BACK-REGION, LEFT-REGION and RIGHT-REGION.

One might think that such finer specifications of location are possible only with asymmetrical Landmarks. But several researchers (Fillmore 1971; Clark 1973; Hill 1982; Herskovits 1982; Vandeloise 1986; Talmy 1983; Tanz 1980; Zubin and Choi 1984 among others) have pointed out that people specify the location of entities with respect to other static symmetrical entities using the same linguistic descriptions. For instance, we may describe a spatial arrangement of a pen and a vase as "There is a pen in front of the vase", although vases do not have inherent fronts. In such situations, other contextual cues provide the necessary asymmetries for the specification of location. The most common contextual cue is the asymmetries of an observer.

2.1.4 *Reference frames*

The notion which integrates observed behavior with respect to region assignment is the notion of *reference frame* (RF). This notion is fundamental in many theories of spatial relations with regards to projective relations (Fillmore 1971, Talmy 1983; Clark 1973; Herskovits 1982; Mark, Svorou, and Zubin 1987). Assuming that the region of a Landmark has been partitioned for fine specification of the location of a Trajector, a reference frame assigns values to the sub-regions of the Landmark. Most theories distinguish two types of RFs, what I call an *inherent RF* and a *deictic RF*, following Tanz (1980). An inherent RF is constructed with reference to the inherent/default values of the sub-regions of the Landmark. We can find the front and the back of a typewriter irrespective of the situational setting. A deictic RF is constructed by ignoring any existing default sub-region values of the Landmark and seeking values in the environment. These values are situationally (deictically) determined, rather than being inherent to the entity. Thus, we can talk about the front of the trees (as in the cartoon below) when referring to the side facing toward the observer, and the back the side facing away.

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Clifford Hill (1982) distinguishes two types of deictic orientation with respect to the horizontal axis: the "aligned orientation field", in which a symmetrical Landmark receives its sub-region values (in my terminology) by imposing the values of the observer's body's sub-regions, and the "facing orientation field" in which the symmetrical entity mirrors the sub-region values of the observer. He has found that among English and Hausa speakers there is agreement in using the aligned orientation field in dynamic situations, that is, when movement is involved.

The need to postulate such a reference frame arises from the assumption that projective relations are better described statically. Movement plays only a secondary role in theories of perception and meaning of such relations. Miller and Jonhson-Laird (1976:66) observe that "...research on depth perception has been primarily concerned with static observers viewing "frozen" scenes." They attribute this tendency mainly to a historical concern with building perceptions out of simple static elements of sensation, but also to the inability to control experimentally dynamic displays.

I would like to propose that a reference frame such as the "aligned" is a stative interpretation and a consequence of a more general RF, the *movement RF*. This reference frame is established by the direction of movement of a Landmark, and is primarily responsible for assigning front and back values to sub-regions of a Landmark, but consequently, also right and left values (Fillmore 1975; Miller & Johnson-Laird 1976). I consider it as a separate RF, because it cuts across the other two RFs and may give different values to sub-regions. An entity may receive its sub-region values with reference to its movement at the moment of description, ignoring any other contextual or inherent cues. Thus, the driver in Figure 6 may be described as running behind the runaway car, which is moving backwards, although he is facing its front.

It is possible that in a certain spatial arrangement the use of one or the other RF gives rise to different linguistic descriptions. Consider Figure 7. If an inherent RF is considered, then we may describe it as "there is a child behind the car". If a deictic RF is considered then we may describe it as "there is a child to the right of the car". A movement RF is responsible for warnings such as "There is a child in front of the car. Watch it!!"

A movement RF establishes FRONT-/BACK-REGIONS of entities not only by situational movement, but also by typical movement. Thus, the front of most vehicles is the side which we, as passengers, typically experience as changing place or encountering new places first. Furthermore, movement establishes front-back asymmetries not only in automobile entities, but also in certain vessels. Vessels of liquid such as teapots and watering devises (hoses, watering pots), and objects such as shot guns and rifles, receive a "front" by the direction of movement of the contained entity when it is released by pouring out or shooting. The contained entity does not even have to be physical. Viewing devices such as telescopes, microscopes, and cameras, have a front and a back which corresponds to the direction of viewing. Under a "naive" conception of vision, eyesight is something that moves away from the perceiver, and viewing devices are the "vessels of eye

Figure 6

Figure 7

sight". Thus, the part which attaches to the eye of the user is the back of the viewing device, and the part away from it, in the opposite direction is its front. Thus, we talk about "the scientist behind the microscope seeing new worlds".

As the many studies on the topic have shown, the problem of reference frame is very complex, and finding the conditions under which one or the other RF may be employed is just as complicated. In this study, I will not try to resolve the problem by comparing conflict situations and their possible descriptions, a common methodology for approaching the problem. Rather, I approach it from a different angle. Since typically RFs are not coded linguistically in spatial expressions, the only evidence we might find for their existence, as well as the existence of different types, is in the history and evolution of spatial terms.[11] As we will see in Chapter 3, there is plenty of evidence for some of the lexical sources of spatial grams which reflect the reference frames that the speakers of many and diverse languages use in understanding spatial relations.

2.1.5 *Locating with respect to plural entities*

So far, we have discussed only the relations pertaining to locating entities with respect to a single Landmark. It is possible, however, to locate an entity with respect to two or more entities which are taken collectively as Landmarks. The region in which a Trajector in such spatial relation is located is the intersection of the regions of the Landmarks. Determining that region involves not only correlating the parameters of size of the Trajector, distance between Trajector and Landmark, the larger space within which they are included, and the use-space around the Landmark,

but also correlating these parameters with respect to the various entities that collectively constitute the Landmark. This complex operation establishes a MEDIAL-REGION of dual or plural entities.

2.2 *Orienting movements*

People are interested in describing not only the location of entities in their environment, but also the orientation of the movement of entities in space. Movement in space is perceived as having directionality. The perception of directionality of movement is always relative to the background against which it is seen. The visual perception of motion, in general, is also dependent on the background. Motion is the perception of recurrent changes of spatial relations, such as changes of location, orientation, and shape of objects, or change in the angle of regard from which objects are seen (Miller and Johnson-Laird 1976). If there is no apparent change in the spatial relations of objects, we do not perceive any movement. But, as we have seen, location is understood in terms of the spatial relations between objects. In that respect, we perceive motion and orient movements in a way similar to the way we perceive location and orient entities in space.

We may perceive movement of one entity with respect to either a stable environment or another moving entity. In each case we recognize an asymmetrical relation between a Trajector and a Landmark. Such asymmetrical relations exist with respect to situational mobility, direction of movement, path of movement, order between moving entities, or a combination of these. For instance, we perceive movement when a ship approaches the docks, or sails away from the harbor, that is, when there is a change in the spatial relation between the harbor and the ship. Asymmetry arises from the mobility of the ship as compared to the immobility of the harbor. This particular asymmetry is present in all movement situations with respect to a stable environment. Moving entities are the center of attention in scenes, and the focus of our utterances in discourse. In that respect, this asymmetry determines that the moving entity will be taken as the Trajector, leaving the role of the Landmark to the immobile entity. However, in situations where both entities are moving, the decision as to which is the Trajector and which the Landmark may be based on discourse focus or on the relative salience of the entities involved.

In addition to this kind of asymmetry, others may arise from the consideration of the configuration of the Landmark. Inherent or situational partitions in the region of a Landmark may be seen as the source or destina-

tion of a moving Trajector. Thus, the fact that harbors may be seen as entities with an interior region determines the way we perceive the movement of a ship as having its source or destination at the INSIDE-REGION of the harbor ("The ship is going into/ coming out of the harbor"). Partitions in entities with exterior regions provide further asymmetries determining the movement of entities. Thus, movement with respect to FRONT — and BACK-REGIONS may be construed as having its source or destination in such regions.

Directionality is inherent in movement. This is apparent in the way we understand motion, which is by perceiving a change in location or orientation of entities. The fact that motion is understood through perception indicates that there is a point of view which provides a reference frame for specifying the directionality. Thus, we understand the directionality of movement of entities in ways that our visual and conceptual systems allow us to. Entities are directed towards or away from us depending on whether we perceive them as constantly changing position to locations closer or further away from us. Furthermore, the directionality of their movement may be specified on a vertical axis, depending on whether they are constantly changing position to locations closer to the level of our head or to the sky from a lower position, or closer to the level of our feet or the ground from a higher position. The anthropocentric view of directionality constitutes the basis for the perception of direction of movement, but it is not the only point of view we take, since environmental landmarks may play an important role, as we will see below.

Conceptually, motion and direction are very closely related, being dependent on the way we understand them, which is via our perception of asymmetries created by the change of location and orientation of entities. The way we talk about motion and direction reflects the way we distribute our attention during perception of changes of location. As with the description of stative spatial arrangements of entities, the way we describe a specific movement constitutes a particular construal of the situation by the speaker. This has the implication that several other ways of describing it may be possible. Let's look at an example. Suppose that in a situation represented by Figure 8 there is a movement of a person (P), which is represented by the directed line. Several descriptions may be triggered by such an arrangement. For instance, we may say that P went *to the barn*, specifying the ultimate destination of P's movement. We may also describe the scene with respect to the source of P's movement, by saying that P *came out of the house*. Furthermore, we may be more specific by referring not only

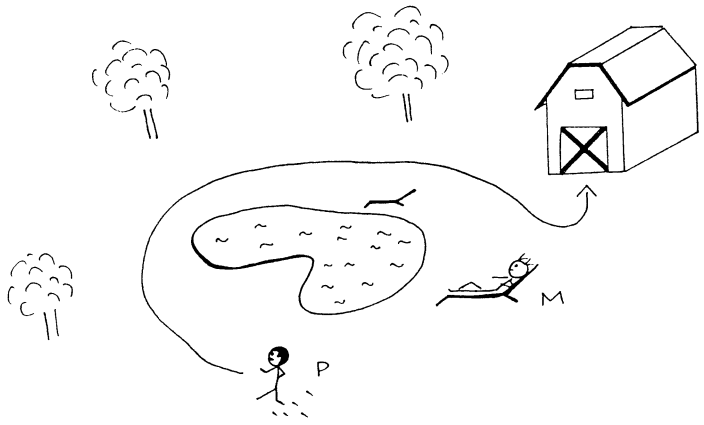


Figure 8

to the destination, but also the path P followed on his way to the barn, by saying that P *went around the pool to the barn*. Taking M's perspective, who is sunbathing by the pool, P's movement may be described by reference to its path if M does not see or know that the ultimate destination of P's movement is the barn. Thus, "P went *around* the pool" specifies only the part of the path which is visible or known to M. If M knows the location of the barn, she may describe P's movement with respect to its directionality as "P went *towards* the barn".

As is apparent from the previous example, the way a movement is described linguistically reflects, on the one hand, the relativistic, perspective-dependent way of perceiving movement, and on the other, various degrees of specificity in the detail with which a movement is described (see also Talmy 1985). Thus, describing a movement with reference to its source and/or destination has a lower degree of specificity than does talking about it with reference to its path, and even lower than talking about it with reference to its path and destination, or source and path. In more specific descriptions, source and destination are always involved, indicating that they constitute simpler notions, and may be considered as basic (see also Fillmore 1975). In the following sections, we will discuss specific ways in which we describe the movement of entities.

2.2.1 *Orienting movements with respect to source, destination and point in path*

Since motion is perceived in case of a change of location of an entity, a particular movement is understood as having a natural beginning, when the entity goes from stativity to motion, and a natural end, when the reverse happens. The beginning and end of a movement are typically associated with specific locations. Such locations may either be people, physical objects or environmental landmarks. We may, therefore, describe a particular movement of a TR with respect to a LM, which may be the source, the destination, or a point (landmark) in the path of movement. If the LM is treated as the source, then the TR has moved in an ABLATIVE motion away from the LM. If the LM, on the other hand, is treated as the destination, then the TR is moving in an ALLATIVE motion in the direction of the LM. In this case, the implication is that the TR has started the movement with the intention of reaching the LM, and, other things being equal, it will reach it. Note that both ALLATIVE and ABLATIVE motion are directed, in the sense that if the direction of movement changes, these descriptions would be reversed. Thus, one may go from the market to the school, but if the direction changes, then s/he goes from the school to the market. Finally, the LM may be treated simply as a point in the path of movement of the TR. This point constitutes neither the beginning and source of a movement, nor the destination and end of it, but rather an intermediate point through which the TR passes, in a VIA motion, and continues its course. These construals of a motion situation refer to different and discrete parts of the movement. In that respect, they may all be present in the description of a particular movement, as in "We went from Buffalo to New York via Albany". Note again that VIA motion is not directed, in the sense that ALLATIVE and ABLATIVE motions are. No matter whether you go from Buffalo to New York, or from New York to Buffalo, you may go via Albany. VIA motion makes reference to the path of movement but only by considering one or more discreet point in the path, without any further specification as to its spatial properties. The path, however, may be further specified to describe particular movements.

2.2.2 *Orienting movements with respect to path*

Paths are courses that moving entities follow from the beginning of their movement until its end. They are interesting because they reflect the way in which we interact with entities while we perform a specific movement and

the experience we extract from this interaction. We describe path with reference to Landmarks and their properties. In fact, in section 2.1.3, I discussed the role of the contours and shape of objects functioning as LMs in the specification of the location of TRs, and I have claimed that such descriptions are based on and derived by implication from our experience with movement following the contours of such objects. Motions, such as ALONG, AROUND, ACROSS, and THROUGH, are thus prototypically understood by reference to elongated objects or objects with an apparent elongated side (ocean: "along the ocean"), spherical objects, concave and transversal objects, or, finally, objects with prominent parallel boundaries, which we may cross. In fact, the object with respect to which such motion is understood may not only trigger a specific construal because of characteristics of its shape, but also its substance (i.e. whether liquid or solid) and the implications of its substance with respect to balance relations. In several languages path adpositions, such as "across", may specifically describe movement with reference to a body of water, such as a river, lake, or creek, or a pathway for crossing them, such as a bridge (ABKHAZ, DAKOTA, HAKA, KAROK).[12]

Paths can also get their reference from the partitions of the exterior region of the LM. Specifically, movement along the TOP-REGION or BOTTOM-REGION of entities is described as OVER motion or UNDER motion respectively.

If the path of movement may be used to specify location of a TR with respect to the contours of the LM, it should also be possible to be used for the specification of source and destination, since they are locations as well. In fact, descriptions of destination in terms of the path of movement are possible, as in "He went across the river", in which the implication is that now he is on the other side of the river at his destination. Similarly, "He climbed over the wall" implies that now he is on the other side of the wall. Similarly, descriptions of THROUGH motion, AROUND motion and UNDER motion may be used to specify destinations.

Certain properties of LMs functioning as the destination or source of a movement may further become relevant in the description. Such properties as the substance and shape of the LM, as well as the inherent orientation (vertical or horizontal), may become relevant in the way movement with respect to the LM is understood and described. Thus, if the LM is treated as an entity with an interior region, the substance of the entity, whether liquid or solid, becomes relevant in the description of movement in which the INSIDE-REGION is the destination or the source. Talmy (1975) reports on the

Atsugewi directional suffixes, which encode movement in such a way. This system includes forms for "into a liquid", "into fire", "into substance of a solid", "into a volumnar enclosure", etc. Abkhaz and Karok encode similar kinds of information about the LM with forms for "into a delimited area", "into a narrow opening", "out through a tubular space", "out through a solid", etc. These languages may also specify properties of orientation of the LM in descriptions of movement to a destination or a source. Such forms indicate notions such as "support on a vertical plane", "onto a vertical plane", "onto a horizontal plane" or "on and across a flat horizontal surface.[13]

In summary, descriptions of paths reflect the association of movement with entities which function as reference frames upon which perception of movement is based. The notion of a path implies that there is a source and a destination associated with it. This implication leads to descriptions of sources and destinations in terms of paths. Furthermore, the close association of sources and destinations with the entities that function as such leads to descriptions which incorporate path specifications and physical characteristics of the sources and destinations.

2.2.3 *Orienting movements in terms of their directionality*

Movement may be described in terms of its directionality with respect to a Landmark, being directed towards or away from it. The Landmark is not treated as the place at which the movement has had its source, or the place at which it has ended. Rather, the LM is a known point in the path of movement, and as such, it may be construed as a possible source or destination if the movement were to be conceived as starting at one LM and continuing to another LM. In reality, the movement may or may not have had such Landmarks as its end-points.

Any physical entity may be thought of as a Landmark in the specification of direction of movement. In that respect, directions may be specified as TOWARDS and AWAY from such entities functioning as Landmarks. Greater salience of certain entities in the environment, however, may lead to descriptions which incorporate such entities. Thus, the sky and the ground, universally salient entities, constitute such entities. The effects of gravity further enhance the salience of the ground, since gravity results in movement towards it. Descriptions of UP and DOWN directions incorporate such salient entities. As gravity enhances the salience of the ground as a LM for DOWN direction, so does canonical movement of humans (and most animals) for directions on a horizontal axis. Thus, a movement in the FOR-

WARD direction corresponds to the canonical direction of movement of humans, while a BACKWARD direction coincides with the reverse.

Certain entities within the environment of a community may be so important and salient that they are used as major orientation points, as LMs, with movements (or locations) oriented with reference to them. Such Landmarks have the characteristic that they are directed. For instance, rivers have an inherent directionality defined by the flow of the water; hills have a directionality because of their asymmetry along the vertical axis, and the direction of movement involved in getting to their end-points (summit and base). Such Landmarks figure in the orientation terms of the Karok and Dakota peoples, who orient their movements with respect to upriver, downriver, uphill and downhill.[14]

Environmental entities, such as hill and river, may also be used as absolute orientation points. Absolute orientation is based on a cardinal system which includes at least four points. Our known descriptions of such cardinal points are "east", "west", "north", and "south", which correspond approximately to the magnetic poles of the earth (north and south) and the directions on each side of an abstracted axis which connects the poles. The use of such directions for absolute orientation represents only one possibility; other systems exist in various communities. Discrete points in the movement of celestial bodies, such as the sun, constitute reference orientation points which correspond to east and west cardinal directions. Cecil Brown (1983) reports on the sources of cardinal directions from 127 languages. Fifty nine of them have terms for east and west for which the lexical source is the "rising sun" and the "setting sun". Movement of celestial bodies, such as the constellation of the Big Dipper, and their position at certain times of the year and day, may give rise to terms for north and south (Navajo). Furthermore, various atmospheric features, such as the weather and values associated with it ("good" or "bad"), the direction of the winds, the temperature or season, are also sources for terms for north and south. In other communities, the direction of flowing waters or the location of environmental landmarks, such as mountains, hills, lakes, cities, the sea, constitute reference points for orientation.

Orientation of movement according to cardinal points is possible as long as the movement directed towards them does not surpass them. This limits the use of some environmental landmarks, such as hills, rivers, cities, and lakes, as reference points. In Karok, for instance, the directions of the flow of the river and the directionality of a hill provide a four-way orientation system, such as "upriver", "downriver", "uphill", "downhill". This sys-

tem is used for orientation within the region bounded by the landmarks. For long distance travel, the system includes the "upriver" and "downriver" directions, but the "rising side" and the "setting side" complement it providing the other two directions.

In summary, directions are understood with reference to the movement of an entity and the environmental entity which it would reach if the movement were to continue. The role of environmental landmarks in the understanding and assignment of directions is evident not only in relative directions, but most obviously in cardinal directions. Cardinal systems of orientation rely on the location of entities within the environment of a community, the location and the movement of celestial bodies and various atmospheric features.

3. The linguistic expression of spatial relations

To talk about space and spatial relations of the kind discussed in the previous sections, languages make use of a relatively small number of elements. By virtue of the size of the group, and the fact that new members to the group are a product not of derivation from other elements, but rather evolution from a similarly small group of elements, they are said to belong to a closed-class, and, consequently, are grammatical elements to a greater or lesser degree. Moreover, their "relational content", as opposed to the "material content" of lexical items (Sapir 1921), constitutes one more reason for considering them as part of the grammar of a language. Thus, adpositions, affixes, case inflections, and even spatial adverbs form part of the grammars of natural languages. From now on, I will refer to all these grammatical forms of language which express primarily spatial relations as *spatial grams*.[15]

Together with other parts of grammar, spatial grams interact with the rest of language in such a way as to structure and organize it. In so doing, they reflect the organization of thought of the speakers of the language. This brings us to the question of the meaning of spatial grams.

3.1 *The meaning of spatial grams*

We have assumed in section 1.3 that language does not constitute a separate faculty characterizing humans, but it is embedded in human cognition. Cognition is seen as an intermediate level between language and the exter-

nal world. An implication of this assumption is that linguistic elements do not "mean" by virtue of their direct relation to the external world. Rather, they "mean" by virtue of their relation to the experience of the external world by human beings (Johnson 1987). Thus, I assume that the semantic content of spatial grams is structured by the relation between the morphosyntactic and phonological conventions of a particular language and the human experience of spatial arrangements of entities. A theory of meaning of spatial grams will have to specify that relation, providing a description of its structure and the mechanisms that motivate that structure.

The need to specify the structure of the relation between the form of spatial grams and the experiential situations they are used to describe arises from the fact that this relation is not a one-to-one correspondence. Objectivist theories of meaning have postulated that forms of language are characterized by a collection of features which are abstracted from its different uses describing several situations in the world. Consequently, the meaning of a form is a list of arbitrary, abstract, binary meaning components representing what is common to the different senses (e.g Bennett's approach to English prepositions (1975)). Non-objectivist approaches to the meaning of spatial grams (e.g. Brugman 1981) have shown, however, that such forms are in fact polysemous, presenting structure in the relation among senses, which is much more complex than what can be accounted for by binary meaning components which are unrelated with each other. Image schemata and core-periphery prototype structures are used to describe cases of polysemy.

The semantic structure of polysemous spatial grams is neither random nor arbitrary in any sense. There are principles that govern the configuration of senses in that structure. I assume that the semantic structure of spatial grams is motivated by general cognitive mechanisms and cultural beliefs, both in the narrow sense of individual cultures and the broad sense of culture of our species. In fact, these mechanisms are so general that one may claim that they are universal.

Beyond the meaning of individual grams, there is the question of the relation among spatial grams and whether there exists structure which defines a semantic domain of spatial grams. In previous sections we discussed various situations of locating entities and we saw that some of them are related. The question is whether spatial grams are related to each other in a structured way that reflects the relation among situations as they are experienced, or whether they are related in an arbitrary way. For instance, pairs of spatial grams, such as "in front of — in back of", "above — below",

have been thought of as constituting poles of an opposition. The oppositional character of their relationship has been attributed to perceptual asymmetry, for the first pair, and gravitational asymmetry, for the second, which are both experienced by humans (Clark 1973). Case inflections, on the other hand, have been considered as constituting a paradigm. The relations among different cases is not based on any semantic similarity, but rather on the structural fact that they are affixes to nouns. Nevertheless, very often case inflections are being referred to as a class, even in discussions of meaning. From a semantic point of view, their conglomeration into a group seems arbitrary, considering the numerous and diverse uses of such forms. In the former case we would conclude that the semantic structure of spatial grams is based on principles pertaining to human cognition. Moreover, the principles that govern language are not purely linguistic, since they reflect our experience with situations, but rather they are embedded in a general system governing human cognition. In the latter case we would conclude that there is nothing about language which reflects any cognitive properties, but rather linguistic categories are based on purely linguistic factors pertaining to the system.

The existence and structure of a cognitive domain of space reflected in the relation among spatial grams, as well as the meaning of individual spatial grams, is a topic for empirical research, not simply theoretical deliberation. While I assume that there is structure in the meaning of spatial grams, the nature of the structure is to be determined empirically. The relation of the semantic domain of space to other domains such as time, causality, possession is yet another research question to be considered.

If we consider that the meaning of spatial grams is determined by the relation between the linguistic form and the experience of spatial arrangements, then the question arises as to whether there is a directly manifested relation between form and meaning, and between meaning and experience. Earlier, we postulated the consequences of including experience in a theory of meaning. It has been argued that unless we specify the experiential factors involved we would not have a good chance of accounting for a particular description of a spatial relation. As far as the relation between form and meaning is concerned, it has been suggested by many analysts that there exist iconic relations between form and meaning that go beyond onomatopoieia (cf. Clark 1973, in a specific application to spatial relations; Haiman 1980; Bybee 1985a, among others). The correlation of form and meaning may become evident in various formal and structural characteristics of a spatial gram. Thus, a morphological theory of spatial grams will

have to take into consideration this semantic characteristic. Morphological structures will make sense and be coherent only in view of their meaning.

3.2 *The form of spatial grams*

Spatial grams may vary in form along two dimensions: their internal structure, and their interaction with other elements in a stretch of discourse. These two dimensions are neither simple nor independent.

3.2.1 *Internal structure*

Spatial grams may be simple, monomorphemic forms, as the English prepositions *in, on, at,* or they may be complex, polymorphemic forms, as the prepositional constructions *in front of, in back of.* The complexity of spatial grams is significant from a theoretical point of view. The hypothesis that makes such observations significant is that the linguistic complexity of spatial grams reflects iconically the cognitive complexity of spatial relations that those grams encode. Thus, I expect variation in the internal structure of grams across cognitive subdomains. For instance, simple topological relations such as contiguity and containment would have simple linguistic expression (monomorphemic grams). Projective relations, on the other hand, which locate entities with respect to regions of other entities, would have complex, polymorphemic expression.

Furthermore, I expect that the iconicity in the complexity of cognitive and linguistic structures is constant across languages. In other words, languages are not expected to differ much in the way they express relations of specific spatial domains.

3.2.2 *Interaction with other elements*

Spatial grams interact with other linguistic elements in a stretch of discourse on both morphosyntactic and semantic levels, creating variation within and across languages. This interaction may be observed in certain morphophonemic phenomena such as fusion, or syntactic phenomena, such as constituency. Structuralist approaches to language have failed to present a coherent picture of the variation simply because their attention is channelled to specific formal phenomena, thus missing the "panoramic view" that attention to semantic properties offers.

Traditionally, locative case inflections (locative, ablative, allative, etc) on nouns are considered the most fused markers of spatial relations and the

ones with the tightest constituency with the noun, so tight as to form an obligatory paradigm together with other case inflections. In synchronic accounts no connection is seen between case inflections and adpositions. Adpositions are free morphemes, which, however, are in constituency with a noun, usually described as its object or complement, forming adpositional constructions.

Certain syntactic peculiarities of languages may cause further variation in the way spatial grams, their complements, and other elements (e.g. verbs) in a stretch of discourse interact. Nichols (1986) argued that this variation is due to the interaction of grams and heads of constructions, which results in the attachment of spatial adpositions either on nouns or on verbs, and has not only synchronic but also diachronic significance.

Considering spatial relations as a semantic domain present in all languages, I propose that their morphosyntactic characteristics vary along a *continuum of fusion*. The basic idea of such a continuum was suggested in Bybee (1985b). She proposed that grammatical forms range along a continuum of the degree of fusion from syntactic juxtaposition of forms at the lowest degree, to lexical expression at the highest, including intermediate degrees of free grammatical, inflectional and derivational expression. Bybee's continuum is general enough to include variation of grammatical forms in general. For specific semantic domains, however, further elaboration is required. The continuum of the degree of fusion of spatial grams I propose has the schematic representation in Figure 9.

low fusion high fusion

embraced agglutinated fused

Figure 9: The continuum of the degree of fusion of spatial grams

Embraced expression refers to adverbial and adpositional constructions in which the spatial gram and its complement are independent phonological units, but still form a unit. An example of an embraced spatial gram is the English "in front of NP" type of construction. *Agglutinated* refers to affixed morphemes which are identifiable across phonological contexts. Examples of this type are the twenty six South Eastern Pomo directional morphemes, mostly prefixes, which retain their form in all contexts. Consider the following examples of the prefix *duy* "through an area, around within an area, along the perimeter".

South Eastern Pomo (Moshinsky 1974:60)

(1) *dúyciya* (*/duy + ci + ya/*)
"he walked through, carrying"

(2) *dúyq̀lòqat* (*/duy + q̀lo + qc + t/*)
"he tipped it over"

Finally, *fused* expression refers to affixed morphemes which are subject to phonological alteration caused by the stem, but also exhibit allomorphy conditioned by morphological categories such as number, gender, noun class or declination class. The dative case inflections *-a/ -ē/ -ō/ -i/ -oi/ -ais/ -ois/ -si*, and the accusative case inflections *-an/ -ēn/ -an/ -on/ -a/ -e/ -ō/ -ās/ -a/ -as* of Ancient Greek, which have adverbial uses encoding locative (dative) and allative (accusative) notions, present great allomorphy conditioned by gender, number, and declination class (Tzartzanos 1968).

Intermediate cases may exist, in which morphemes are attached to their host, but present only phonologically conditioned allomorphy. The Turkish spatial gram *-de / -da / -ta/ -tte* is an example of this type as is illustrated in the examples below.

Turkish (Lewis 1967).

(3) *ev-de kaldi*
house-in he.has.stayed
'He has stayed in the house'

(4) *tarla-da kaldi*
field-in he.has.stayed
'He has stayed in the field'

Lehmann (1985) has proposed a very similar scale which describes the grammaticalization of nominal case role marking. The scale has synchronic and diachronic validity and finds support in many Romance languages.

The continuum of the degree of fusion provides us with a scale of measuring fusion but does not specify the element that spatial grams may fuse with. It is clear from the above examples that spatial grams may exhibit varying degrees of fusion with nouns. One could easily agree that pronouns are similar to nouns in that respect. In some languages, however, spatial grams may attach to the verbal complex. Thus, South Eastern Pomo exhibits 26 directional affixes on the verb. In Yagaria, spatial grams are verbal prefixes as in examples (5) and (6).

Yagaria (Renck 1975:127)

(5) *yo-ti* *p-ou'* *ne'-h-a-ma-**pi'*** *hei-ta*
house-our their-sleep PROG-lie-3PL-PIV-INESS go up-2PL
'Go (pl) into their house where they are sleeping!'

(6) *ni'* *eleni-d-i-ma-**piti'*** *hei-na* *no'-e*
water go.down-PAST-3SG-PIV-ELAT go-up-3SG PROG-come.3SG.IND
'He is coming up out of the water into which he fell.'

To talk about the morphological unit (noun/noun stem, pronoun, verb/verb stem) that spatial grams may attach to, I introduce the term "host". This term refers to linguistic elements which participate in either agglutinated or fused expression types. Thus, in the Turkish examples (3) and (4), the noun stem is the host of the suffix, and in the South Eastern Pomo examples (1) and (2), and Yagaria examples (5) and (6), the verb stem is the host of the directional affixes.

Although spatial grams may form phonological units with material other than nominal, more than the host is in their scope. Also, in the case of embraced expression, where there is no host, the interaction of grams with other elements is on the semantic level. The term "scope element" will refer to the semantic unit which is within the referential domain of the gram. Thus, in the Yagaria examples above, while the host of the grams *pi'* and *piti'* is the verb, their scope includes the nouns *yo-ti* "our house" and *ni'* "water", which refer to the LMs of the spatial relation.

Languages may vary in the kinds of morphosyntactic units they allow as hosts of spatial grams. This variation may be due to typological characteristics of languages, but may also be for semantic reasons. For instance, certain spatial directional grams will tend to have verbs as hosts because their dynamic character is more compatible with the generally perceived dynamic character of verbs (cf. Lyons 1968). Even the lack of hosts of spatial grams in embraced constructions may be attributed to the semantics of the grams. An instance of degree of variation in hosts which is dependent on the semantics of a spatial domain is presented in chapter 4.

Variation in the scope of spatial grams may correlate with the degree of fusion of the gram. Locative case markers representing the fused expression type at the high end of the scale have only the noun they are attached to (their host) in their referential domain. A gram at the embraced, lower end of the continuum, however, may have an entire clause in its

referential domain. Take, for instance, the use of the English preposition "before", which in addition to uses of spatial anteriority and order with respect to a LM, also introduces temporal clauses. (e.g. Before he was elected President, he used to sell pretzels on Wall Street). "Before" places the event of the clause prior to another event in time. Thus, we expect more variation in the scope of spatial grams of the embraced type than of the fused type.

However, since the meaning of case markers is different from that of prepositions like "before", I propose that variation in the scope of spatial grams is also dependent upon the individual meaning of the grams.

So far, I have suggested that the degree of fusion of spatial grams varies not only across but also within languages. I have introduced the notions "host" and "scope" as other dimensions which interact with the degree of fusion. I have proposed that variation along all these dimensions is motivated by the semantic content of individual grams.

An implication of the continuum of the degree of fusion, under the assumption that it is constrained by individual semantic domains, is that the expression type of a specific semantic domain across languages will not be discontinuous on the continuum of degree of fusion. For instance, we do not expect to find anterior relations expressed by embraced type constructions and fused type constructions but not by agglutinated type constructions. It is possible for a spatial relation to be expressed by all three types across languages, but no two discontinuous ones.

	low fusion ⟵		high fusion ⟶
	embraced	agglutinated	fused
ANTERIOR	[X	X]	
*ANTERIOR	[X]		[X]

Figure 10: The non-discontinuity of the means of expression of spatial grams across languages

3.3 *The diachronic dimension of spatial grams*

Most studies of locative expressions have concentrated on a synchronic account of their form and meaning. Studies of spatial prepositions of English (Lindkvist 1950; Bennett 1975; Fillmore 1975; Herskovits 1982; Talmy

1983; Hawkins 1984;), French (Vandeloise 1986), Cora (Casad & Langacker 1985), Tarascan (Friedrich 1969b), and Atsugewi (Talmy 1972) focus on the description of meaning without any consideration of the history of the prepositions, except in the form of speculations as to how language might change as a result of the synchronic organization (Herskovits 1982; Vandeloise 1986). On other occasions, diachronic inferences were drawn if there were transparent similarities between adpositions and lexical items and if there was a plausible meaning relation between them (Friedrich 1969b; Brugman 1983). Kahr's study of locative expressions (Kahr 1975), unique of its kind, extensively explores the history of spatial adpositions in more than 50 languages. Her data suggest that languages are very similar in the way their adpositions develop out of nouns, verbs, adjectives and participles. Her interests, however, do not go beyond the purely linguistic issues involved.

Although it has been considered an interesting question, in none of the studies cited has the history of spatial grams been included either as an integral part of, or as evidence for, a theory of the linguistic expression of spatial relations. An important characteristic of language has been ignored: that language is a "living organism", borne and fed by the interaction among its users, and determined by their cognitive and cultural traits. As all living organisms, language is subject to the time dimension evidenced by changes in its structure, form, and meaning. While all categories of language evolve, some carry the signs of their evolution more than others. These categories constitute the body of grammar of a language. Spatial grams, as other grammatical categories, are, thus, a product of the evolution of linguistic material, and as such, the signs of their history are manifested in their form and meaning at any particular synchronic point.

The diachronic dimension of spatial grams has been approached recently by several researchers under the rubric of grammaticalization (or grammaticization) theory, that is, the study of the emergence and evolution of grammar. Works by Givón (1975,1979), Heine and Reh (1984), Lehmann (1985) and Traugott (1982, 1985 a,b,c) include the evolution of spatial grams as evidence for a theory of grammaticization. But since most of them are interested in grammaticization theory per se, they do not show the significance of grammaticization theory for the understanding of spatial grams. Exceptions include the work by Heine (1989), Claudi and Heine (1986), Heine, Claudi and Hünnemeyer (1987), who are also interested in cognitive issues pertaining to spatial grams and their grammaticization, as well as the work of the present author (Svorou 1986).

Grammaticization theory, as developed by the researchers mentioned above, predicts that spatial grams evolve from lexical material going through various stages during which they progressively lose their lexical characteristics and simultaneously acquire more and more grammatical characteristics. Since individual spatial grams in a language and spatial grams across languages may be at different evolutionary stages at any particular synchronic point, variation in the form and meaning of spatial grams is not only a possibility but an unavoidable consequence of the evolution of language. Determining, therefore, the way to approach variation in the form and meaning of spatial grams within and across languages requires consideration of their history.

A close look at the history of grammatical forms, and especially spatial grams, is necessary not only because it explains a large amount of variation, but also because it reflects deeper aspects of social interaction and aspects of the cognitive make-up of human beings. Studies by Claudi and Heine (1986), Friedrich (1969a, 1969b, 1970), Geeraerts (1985), Radden (1985), Rydzka-Ostyn (1985) and Traugott (1982), among others have yielded substantial evidence pertaining to the validity of such an assumption. The paths that grammatical elements of languages travel over time reflect the beliefs and reasoning processes of the "collective mind" of the linguistic groups that use them, as well as the discourse patterns pertaining to the linguistic interactions among members of a group. Any similarities observed in the comparison of the paths of change of spatial grams across languages would reflect not the nature of a human language (since we would be comparing different ones), not the nature of a culture (since they would be from diverse cultures), but the nature of human cognition as it manifests itself above and beyond specific languages and cultures.

Chapter 3 discusses some of the aspects of the diachronic dimension of spatial grams and the issues raised about cognition.

Chapter 2

General Methodology

0. Introduction

The coherence of a theory depends upon the harmonic binding of the investigator's basic beliefs and assumptions to the research question and the methodology s/he chooses to follow. In a realistic account of the process of theory-building, the binding takes place in several phases, and is not unidirectional, but rather multi-directional. This process makes it difficult to make such assertions as "the research question determines the methodology one uses" in an absolute degree, since the interaction is bi-directional and is supported by a certain argumentation. The above perception of the theory-formation process is the background against which the present study should be viewed.

As I mentioned in the previous chapter, I assumed that the elements of space which are involved in the linguistic expression of spatial relations are not a priori notions which the investigator should presuppose, but rather notions to be discovered in the course of the research. If they were a priori notions, they would be readily available and describable, in this case, using the categories of geometry and physics. Thus, the elements of space would be assumed to be geometrical notions, and the spatial relations encoded by language would be nothing but a reflection of the logical relations between physical objects described by geometry. Based on such assumptions made about the linguistic encoding of spatial relations, we would claim that since geometry is an exact discipline, its premises bear universal truth. Furthermore, if the linguistic expression of spatial relations is nothing but a reflection of the categories of an exact science, the conclusion is that those a

priori elements of space postulated to be determining the linguistic expression of spatial relations are universal. If our goal is to describe the ways in which a priori elements of space are used in the lexicon and grammar of a language, it would be enough to simply study one language and come up with conclusions which, according to our assumptions, would have universal validity.

These are not, however, my initial assumptions. The elements of space that human beings talk about, or use to talk about relations between objects in their world, have to be discovered rather than postulated. In this view, the study of a single language would yield results that have validity only for that language. Or, rather, we would not be able to argue for universal validity without having to assume innateness of certain parameters in our study, and thus obstruct further investigation of those parameters. Any other claim would be unjustifiable.

If, however, we are able to compare data from different languages, the need for an a priori postulation of the innateness of some parameters fades away. We can evade the "innateness" problem by providing evidence for the overwhelming commonality of a phenomenon, and then try to give an explanation for it. This line of thought suggests a study based on cross-linguistic comparison for the discovery of the elements of space encoded in language.

1. Universals and methodology

The two approaches to the study of spatial relations outlined above actually represent the two major approaches to universals of language which have dominated linguistic thought in recent years, namely the quest for *linguistic universals* versus *language universals.*

Linguistic universals, first suggested as a term by Chomsky (1965), refer either to categories which must necessarily be present as definitional properties in each human language ("weak universals"), or a set of categories which represent the total range of potential categories from which languages "select" a subset ("strong universals") (e.g. the set of distinctive features of phonemes). These kinds of linguistic universals are known as *substantive universals.*[16]

Language universals, on the other hand, refer to categories which are likely properties of language. Such properties are claimed to be possessed

by languages in varying degrees of likelihood, rather than absolutely, thus rendering *statistical universals*. Another kind of language universal is the *implicational universal* which states that "if a language is characterized by property X, it must also have property Y". This approach to universals was pioneered by Greenberg and his followers.

A review of these approaches is presented by Comrie (1981), who observes that the two differ with respect to three parameters: the data base upon which claims are made, the level of abstraction chosen for the description of findings, and the kind of explanations offered for the findings. As he suggests, each approach presents a coherent position in language universals, but is not necessarily acceptable to the other. A comparison of the two approaches here seems redundant, and I direct the reader to Comrie (1981). I will, however, discuss my views on what I believe are the sources of such opposing approaches.

Paul Garvin (1978), prompted by discussions in the Gummersbach Conference on Language Universals, suggests that the frame of reference for comparing language universals and linguistic universals should be sought at an epistemological level. On that level, if the investigator is a rationalist, s/he will most likely ask questions which lead to linguistic universals, and if s/he is an empiricist, s/he will ask questions which lead to language universals. I agree with Garvin that such a decision is a matter of personal choice. However, I would like to point out that it is a matter of choice only as long as we, as investigators, are not influenced by the history of scientific inquiry and epistemology. In my view, such influence is unavoidable. It is not only the state-of-the-art of science that determines the kinds of questions we ask, but also our current view of the world which we might share with the rest of the investigating community; nevertheless, the two are not independent from each other.

A brief glance at the history of the investigation for universals of language illuminates the point. The first claim to be made about universals of language was by Roger Bacon in the 13th century. One might wonder why the ancient scholars never considered this as an issue. To a student of ancient thought it is not surprising, however. The Greeks considered the Greek language superior to all other languages, which they classified as "barbaric". Even the most radical thinker would not dare to suggest that the Greek language had anything in common with anything "barbaric". This ethnocentric view of the world, which emanates from intellectual and military superiority, applied to the Romans as well.

Even later, when the issue of universality was addressed by R.Bacon and the Modistae grammarians, such as Aquinas, the only subject of study was the Latin language and philosophy, and the questions were centered around the relation of language to the real world. Language use was seen as a representation of the way the mind abstracts properties from the real world. The underlying assumption was that all humans conceive of the real world alike and represent it alike through language. All languages, therefore, are used to communicate in the same way, despite superficial differences. Questions of the relation between language and the real world were not new. Plato and Aristotle had already addressed them centuries before. This era was different, however. Under the socio-economic conditions of the time, the inherent superiority of one nation could not be claimed, and other languages could not be excluded as "barbaric". Yet, the scholastic study of the classics had to continue because there lay the spirit of intellectual freedom previously denied by the mysticism of the Middle Ages. It was not, therefore, that the scholastic philosophers chose to study Latin assuming it to be representative enough to reveal what the essence of language was, but rather it was a consequence of the general philosophy towards life that characterized that era.

New horizons opened when the empiricists entered the scene after the Renaissance. The belief that truth comes out of observation urged a number of scholars to focus on the study of different languages and discover their diversity. This new line of thinking sprang out of new discoveries in the physical sciences, discoveries of new continents, and the strengthening of the belief that humans may be able to discover the essence of the world around them without attributing all unexplainable phenomena to supernatural powers.

Discussions between empiricists and rationalists are still going on, and will continue until there are answers to questions of human existence and nature. Even though philosophers may never agree on the goal and nature of science, science itself provides us with the tools that enable us to ask new questions. Presently, in the age of information, the tendency is to collect as much information as possible and analyze it as efficiently as possible. What would be a lifetime project for a Franciscan monk in the Middle Ages can now be accomplished in a matter of a few months.

Actually, I see the recently renascent interest in research on language universals as a direct result of the possibilities that technology has created for scientists. Lest I appear negligent of the contribution of the thousands

of field workers who have learned and described languages from every part of the world, if it was not for them, today we would not have even known of the existence of approximately 5000 languages. It is, I believe, the best time ever to involve oneself in the comparison of languages in search of universal tendencies.

The study of spatial relations in language has a lot to gain by cross-linguistic comparison. Systematic investigation of the spatial categories different languages create will provide us with unique evidence for the universality of certain phenomena, both cognitive and morphosyntactic, and thus allow us to make generalizations about a crucial area of language and cognition. Moreover, in an ever-growing global interaction amongst different peoples, now more than ever, there is a need to stress the commonalities people have with respect to the ways they experience and understand the world around them, and communicate their experiences.

I will proceed to a detailed description of the methodology by first discussing the data base, the procedure for sampling languages, the coding of the data, and finally the frame of data analysis.

2. The data base

The definition of the data base exhibits two levels. First, since the study is based on a comparison of languages, we have to consider which languages and how many should be included in the study. Second, we have to consider which forms from each language and what kind of information about the forms will be coded. These two levels are discussed under Sampling and Coding respectively.

2.1 *Sampling*

Generalizations about a universe of cases based on a sample are directly related to the relationship of the sample to the universe. Although the validity of this statement has been recognized and taken into consideration in other social sciences, in linguistics this awareness is still in its infancy. Most language samples that have been used in cross-linguistic studies are non-probabilistic samples, the selection of which was based either on the investigator's knowledge of languages and the extent of the subject of his/her study ("judgement samples"), or, they were convenience samples that were

selected upon availability of sources in the investigator's library or upon the presence in the languages of a phenomenon that the investigator was currently studying (e.g. the samples that Greenberg 1963, Comrie 1976, Bell 1978, Hyman 1977, Stassen 1985 used).

The major disadvantage of such samples, from a statistical point of view, is that there is no measure of variation of observations from one sample to another, so that generalizations about one sample may not necessarily be verifiable by another selected with the same technique.

Another kind of sampling error that occurs commonly is bias, either genetic bias among languages or areal bias, that such samples exhibit. The result is that certain families or geographical areas tend to be overrepresented, thus biasing the testing of hypotheses.[17]

A recent effort by the Gramcats Group at SUNY at Buffalo to create a language sample for the study of grammatical categories in the languages of the world has focused on the problems mentioned above.[18] The Gramcats sample regards all the languages of the world, existing, extinct or possible, as the universe, and is based on a list of approximately 5000 languages as classified by Voegelin and Voegelin (1978), as its frame. It is a stratified sample selected randomly, while controlling for genetic relationships at the same time.[19]

The Gramcats sample consists of 94 languages, which reflects the minimum number of languages required to assure statistical significance and avoid interdependence of cases on which statistics are applied. Language isolates and pidgins and creoles are represented in the sample also. All the language isolates were grouped together as were pidgins and creoles. An appropriate number of languages was selected which reflected the ratio of those languages to all languages in the frame. These characteristics contribute to the avoidance of sampling errors and guarantee the representativeness of the sample.

The sample used in the present study, the SpaceCats sample, was based on the Gramcats sample and it is a subgroup of the latter. Although a smaller sample does not guarantee representativeness of the universe of languages, it is, however, more manageable since it allows for a more in-depth analysis of the data. Furthermore, because it is expected that spatial relations are expressed in every language, and the different means of expression for them fall into a small set, eventual variation which may arise as to the number of distinctions and the means of expression of spatial relations would be restricted, and the possibility of finding too few examples of

a phenomenon to draw conclusions would be small, and, if so, the phenomenon would be marginal.

The SpaceCats sample was selected from the 94 languages of the Gramcats sample. One language was randomly selected from each major classification group of languages in the Gramcats sample. If the group had more than one language in the Gramcats sample, a table of random numbers was used to select one language out of the group's representatives. The SpaceCats sample does not pretend to be representative of the languages of the world. Some major classification groups have two or more major subgroups. A representative sample would have to go one step further, thus selecting one language from each subgroup. That would have doubled the number of languages in the sample, making the now feasible in-depth analysis unrealistic.

Twenty six genetically unrelated and randomly selected languages constitute the SpaceCats sample. Twenty four of them reflect major higher level classifications. One is a language isolate and the last a pidgin. A list of the languages in the sample together with their family affiliations are presented in Appendix A.

2.1.1 *Sources*

Materials for the 26 languages in the sample were all available in the Gramcats library. The bibliographic search undertaken collectively by the members of the group over a period of more than a year yielded materials that range from descriptive grammars of individual languages, to journal articles concerning aspects of the grammar of languages, to collections of texts and dictionaries.

Despite the effort exerted in the search for materials, the number of materials found and available for each language are not comparable. Some languages have been very well described, and not only are there good descriptive grammars available, but also glossed texts and dictionaries. For some others, only a pedagogical grammar was available. In any case, the best effort was undertaken to extract as much information as possible from the combination of sources available. In addition, each source was evaluated for adequacy with regard to the present research project, as well as for some factors which might contribute to the differences in quality in the reference materials in general. Such factors were the nature of the document (reference grammar, pedagogical grammar, journal article, etc.), the author's profession (linguist, missionary, etc), the author's theoretical

orientation (traditional, generative, functional, etc.), the length of time s/he spent in the field and the number of consultants s/he had. All this information will eventually be used as another check on the reliability of the results, since they might be affected by the quality and quantity of the sources available.

2.2 *Coding*

One of the serious problems I had to solve while doing this kind of universals research turned out to be defining the second level of the data base, that is, developing a set of criteria according to which comparable forms would be selected for coding from each language. The problem was partly due to the fact that the main criterion for selecting the appropriate forms was a semantic one, namely selection of forms which express a spatial relation. In fact, that should have been the only criterion if the purpose of this study was to discover all the principles that govern the linguistic expression of such relations in the languages of the world. Such a study is very ambitious and it can be a never-ending lifetime project. So, I succumbed to the fate of every researcher with deadlines and tried to narrow down the range of my investigation. That brought me face-to-face with basic questions about language and its internal structure, language and its use, and more specifically the deictic and non-deictic uses of language. My consideration of the possibility of making unreasonable or unsupported assumptions about the criteria I should be using led me to conduct a preliminary study which helped me define the coding criteria.

2.2.1 *The pilot study*

The pilot study was based on a convenience sample of 13 languages which were different from the languages of the Spacecats sample. It was based upon availability of materials, and, partially, knowledge of languages on my part. The pilot study languages are presented in Appendix A.

Although some of the languages are genetically related (3 Indo-European, 2 Niger-Congo), each is from a different subgroup. Genetic relationship was only partially taken into consideration. The main idea underlying the collection of this sample was to include languages for which I personally had good knowledge of (Greek and English), languages that were well-described, and languages that were fairly well-described. In that way I could form an idea of the cost of collecting data from sources of varying

degrees of reliability (with respect to comparability) and at varying depths of analysis. That allowed me to identify the kinds of information I could extract from the sources, knowing at the same time how reliable that information is, and what I should not expect to find in such sources.

The preliminary study was conducted as an informal survey of the 13 languages. The results of the study, in conjunction with received knowledge, helped establish: 1) criteria for the selection of forms from each language, 2) some of the formal characteristics of spatial grams, and 3) a preliminary list of meaning categories which would be used to describe the uses of spatial grams at an initial level.

2.2.2 *Selection criteria*

The domain of the present study is primarily defined on semantic grounds. The basic criterion for the selection of the appropriate forms is that the form should be used primarily to express a *spatial relation* which holds between a Trajector and a Landmark. Note, however, that according to my assumptions all spatial relations are conceived of with reference to LMs, irrespective of whether they are explicitly mentioned or understood from context.

A data base the selection of which is based upon this criterion has two disadvantages: first, it would be enormous, and second, it would not be homogeneous with respect to the linguistic categories involved in the expression of such relations. These are due to the fact that there are various kinds of spatial relations which receive a variety of linguistic expressions in the world's languages, but also within a language.

For the purpose of acquainting the reader with the issues, I will illustrate with some English examples. Movement of a Trajector toward or away from the deictic center can be expressed in various ways, each one of which profiles a different aspect of the spatial scene. The verbs *come* and *go* express movement of an entity towards or away from the deictic center, respectively. A particular spatial relation, direction with respect to the deictic center, appears to be lexicalized in those two verbs.[20] If the container-like shape of the Landmark is profiled, in addition to the directionality of movement with respect to the deictic center or other Landmark, then it can be expressed either lexically with the verbs *enter* and *exit*, or with the verbal complexes *go in (to)* and *go out (of)* (or, *come in(to)* and *come out*), respectively. The elements *in* and *out* are used as satellites to the verbs.[21] If, however, not only the movement of a Trajector to the deictic center and the

directionality of movement with respect to a reference frame is profiled, but also the Landmark, then the linguistic expression takes a different form, namely, *go/come in (to) the house* or *go/come out of the house*. In the first example in functions as a preposition, whereas in the second out functions as an adverb and requires the co-occurrence of the preposition *of*. The English language lexicalizes a plethora of spatial relations in the form of verbs (e.g. ascend, descend, proceed, cross, pass, etc.). Talmy (1985) presents a brief account of the lexicalization patterns of the motion event in English and other languages, in conjunction with the conflation patterns of semantic categories. In addition, English has many adpositions also expressing spatial relations. Thus, spatial relations may be expressed by both open-class items (e.g. verbs) and closed-class items (e.g adpositions).

Open-class elements, such as nouns, verbs and adverbs, differ from closed-class elements, such as inflections, adpositions, auxiliaries and particles, not only structurally, but also semantically (Bybee 1985; Talmy 1983). While the former provides the flesh of the linguistic message, the latter are part of the skeleton which supports the flesh and gives it shape, which, in turn, allows it to function appropriately in a communicative situation. Although this difference seems intuitively factual, the criterion which has been used for determining the characterization of a class as open or closed is that of the role of derivational processes in the creation of a new member. While new members of an open class can be formed by derivational processes (e.g. 'create' v. → 'creative' adj.), new members of a closed class can not be formed synchronically via derivation, but rather they are the product of evolutionary processes (e.g. articles developing from pronouns). Open-class items are considered lexical elements while closed-class items are considered grammatical elements. This difference has been used to provide some criterion for the distinction between lexical and grammatical elements. Though it has been proven useful to some extent, there are certain problems with its applicability in all and every case. Fillmore 1983, for example, points out that classes like the extensional adjectives (e.g. tall, short, thick, long, narrow, etc.) constitute a closed class by the criterion of formation by derivation in any language. To add to that observation, the class of spatial adverbs also constitute a closed class. Adverbs and adjectives, however, have been traditionally classified as lexical classes, and, therefore, not part of the grammar of a language.

This latter fact is simply a result of the fact that lexicon and grammar are not sharply distinct but rather form a continuum (c.f. Bybee 1985;

Langacker 1991, among others). Adjectives and adverbs have elements of open-class items (i.e. contribute some content to the utterance), but they also have some elements of closed class (i.e. express some kind of relation). As we will see in the next chapter, adverbs are indeed in the grammaticalization path from nouns to adpositions, and are the product of evolution of certain nouns.

Consideration of both kinds of elements would yield data that would be incomparable. Open-class elements are considered lexical categories, and, as such, their semantics are characterized by idiosyncrasies which would make comparison across languages difficult. Closed-class items, on the other hand, are the grammatical elements of language and are characterized by regularity in the kinds of meanings they express across languages (Bybee & Pagliuca 1985). These categories are ideal for comparison across languages. Relying on this justification, I coded only for closed-class items. I have called these forms "spatial grams".

Spatial adverbs occurring only in intransitive constructions were excluded from the data base. As we saw in chapter 1, adverbial uses appear in certain linguistic frames which require knowledge of the deictic field for the interpretation and understanding of the spatial relations. As such they are not considered suitable for inclusion in this study. Furthermore, the contribution of Landmarks, which are linguistically present only in transitive constructions, is crucial in this study, as we saw in chapter 1.

In the beginning of the data selection the three criteria, (a. encoding of a spatial relation, b. membership into a closed-class and c. explicit mention of the Landmark) seemed to be appropriate in yielding comparable forms. As the coding proceeded, however, I was faced with situations where it was unclear whether a certain form should be coded or not. Consider as just one instance, the preverb *-k'ə+d(ə)* in Abkhaz. Abkhaz has a plethora of forms expressing spatial relations, and they are among the most fascinating ones in the entire sample. The preverb *-k'ə+d(ə)* is attached as a prefix to a verb stem and is described as expressing an essive relation of lateral contact. It is restricted in use to objects hanging on a wall when the hook or string by which they are suspended is hidden from view. This use is illustrated in (7). Hewitt (1979) notes that in this example the mirror need not in fact be hanging on the wall at all, but could, for example, be glued there.

Abkhaz (Hewitt 1979:137)

(7) *a-sàrk''a a-tjàmc yə-**k'ə̀+də**- w+p'*
the-mirror the-wall it-on-(STAT)
'The mirror is on the wall'

(8) *à-c°x'a a-tjàmc a-ç'ə̀ yə-**k'**+**nə-ħa**-w+p'*
the-horn the-wall it-at it-on-hang-(STAT)
'The (drinking) horn is hanging on the wall'

The preverb *-k'ə+d(ə)* contrasts with another preverb, *-k'+na*, most probably related to it. The latter is used for suspended objects in general. But when the object is suspended against a vertical plane, *k'+na* will be used if the means of suspension are not hidden. This use is illustrated in (8).

This is only one of the fascinating, unexpected forms that Abkhaz exhibits. Initially, I considered these preverbs too idiosyncratic to be coded, and I expected no other language to have a similar spatial gram. Later, I discovered that languages do make such idiosyncratic distinctions, and by including them we may learn a lot about the boundaries between lexicon and grammar. Such forms were eventually included in the data base.

2.2.3 *Coding of formal characteristics*

This section describes the kinds of information about the formal characteristics of spatial grams recorded for each form. It is only an outline of all the recorded information; a more detailed description is presented in the form of a coding manual, which is included in Appendix B.

Spatial grams, because of their relational nature, are always in constituency with another element, which I have called *scope element*. Certain syntactic peculiarities of languages, however, may cause variation in the way spatial grams, their scopes and other elements in an utterance (e.g. verbs) interact. In addition, variation within and across languages may be due to the internal structure of the gram. Thus, languages are assumed to vary along four parameters:

a) The *category of the scope element* that spatial grams are associated with. Nouns, pronouns, verbs, or whole clauses may be in the scope of a spatial gram, each one of which creates different conditions affecting the formal and semantic properties of grams.

b) The *fusion* that takes place between the spatial gram and its scope element. In the previous chapter, I argued that spatial grams vary across semantic domains and across languages with respect to the degree of fusion

with the material within their scopes. In order to determine the degree of fusion of individual grams, several characteristics of the grams and of their interactions with other elements are taken into consideration. The existence of allomorphy conditioned by phonological, morphological or lexical environments is an indication of fusion. The different conditioning environments provide finer distinctions in degrees of fusion, with phonological indicating a low degree, and lexical the highest. The existence of phonological processes across the boundaries of the gram and its host further contribute to the determination of the degree of fusion. In addition, the possibility of occurrence of other closed-class or open-class items between the gram and its scope element is an indication of a low degree of fusion. These variables are considered to be diagnostics of fusion. It is the interaction of these diagnostics that determines finer distinctions on the continuum of degree of fusion.

Consideration of these diagnostics also helps to decide cases in which the authors of grammars have analyzed spatial grams as adpositions (i.e. free forms), but for which we have doubts that the analysis is correct. It is possible that the authors have considered the grams as free forms only by analogy to languages such as English and not because that is the case in the language in question.

c) The *order* of the spatial gram and its scope element. It is a well-known fact that in the languages of the world there are prepositions and postpositions, reflecting a preceding and following order of the relational particle, respectively. Spatial grams also follow that distinction. In English, Greek, Serbo-Croatian (among other IE languages), and Fula, spatial grams precede nominal scope elements, whereas in Djirbal, Vai, Yokuts, Kannada and South Eastern Pomo the order is the reverse. The predominance of prepositions in the most familiar languages has led to the use of the term "preposition" to refer to all relational elements. As a consequence, questions as to whether the order is significant, whether it correlates with certain meaning distinctions, whether there is any preference among languages with respect to the order, and what might be possible explanations, have been generally neglected, with the exception of Greenberg (1963), who refers to some of these issues as they bear on the general order of elements in the sentence.

d) The *shape* of the gram. Prepositions in English are either simple, consisting of one element only (*in, on, at, toward*), or complex, constituting a prepositional expression (*in front of, in back of*, etc). But this is not a

characteristic of English only. Other languages such as Greek, Serbo-Croatian, Vai, Kannada, among others, also exhibit complex expressions. Moreover, complex expressions may vary with respect to how fused their component parts are. In English, for instance, *inside* is more fused than *in front of* is. Some diagnostics of the degree of internal gram fusion have been developed, such as whether the stress pattern of the individual parts has changed, and whether there are any phonological processes (consonant or vowel assimilation or loss) at the boundaries of the component parts. These diagnostics help us evaluate the judgments of authors of grammars on how "compact" grams are in cases where they are cited as separate components.

Consideration of each of the elements of an expression separately is bound to yield facts about the nature of such expressions, as well as the factors that contributed to its coalescence. Indeed, the existence of complex spatial expressions across languages is patterned and predictable on the basis of their meaning, as the analysis of one subtype, discussed in Chapter 4, suggests.

While the complexity of spatial grams and the degrees of fusion are parameters of variation, I do not expect to find cases in which a gram does not have separate phonological realization from its host in any environment. Thus, I expect no spatial gram to appear in the form of reduplication of the stem, stem change, zero expression or stress or tone change of its host. I may, however, find cases of portmanteau expression, where a spatial gram may be a nonsegmental unit with a morpheme that has separate expression elsewhere, especially in cases in which the spatial gram is an obligatory case inflection.

Another observation that led me to create another category in my data collection was that some spatial grams were related to other forms in the language to various degrees. Obvious examples in English are *inside* (in + side), *in front of*, and *on top of*. In Serbo-Croatian the forms *povrh* and *navrh* "above, over, on top of" are related to the noun *vrh* meaning "top, summit", and *kraj* "beside, near" and *pokraj* "alongside" are also related to the noun *kraj* "district, edge, end".[22] In Vai the form *mà*, which is used in the sense of "on top of something", is homophonous with the noun meaning "surface". Similarly, *fɛ* "along" is homophonous with the noun meaning "area alongside of", *te* "between" with the noun meaning "area between or among". Yagaria, Vietnamese, and Kannada also exhibit similar homophonies. As we will see in chapter 3, the similarity of spatial grams to nominals has been attributed by many scholars to historical derivation of

the former from the latter. Since historical relationships are considered proper kinds of explanation of variation and universals, information about any synchronically or diachronically related items becomes crucial.

The kinds of information mentioned above constitute the frame of data collection that concerns the formal characteristics of spatial grams. The coding of meaning is described in the following section.

2.2.4 *Coding of meaning*

The description of meaning is the most exploratory part of this study. It is the goal of this study to discover some of the parameters along which the meaning of spatial grams unfolds.

Since most studies of spatial relations have concentrated on a single language, it is hard to adopt any one of the existing levels of description of meaning. Cross-linguistic studies of spatial relations have tended to focus on a specific meaning (e.g. Kahr 1978 on the locative adpositions glossed as "in, on"), thus making the adoption of that level inappropriate as well.

A crucial property of a method for describing meaning based on cross-linguistic data is that it should yield comparable data. Comparability can be achieved if the level of description is concrete. To illustrate this sense of concreteness, consider the English preposition *in*. There are at least two ways to describe the meaning of this preposition. One can consider the different uses that the preposition has, and then try to extract a common abstract meaning of all the uses and consider that as the meaning of the preposition (Form-content analysis, Waugh 1976). Or, one could list each individual use separately, the conjunction of which would constitute the meaning of the preposition ("the dictionary approach"). These two approaches constitute opposing views of meaning. There are other approaches, which occupy intermediate positions. Prototype theory, for instance, applied to meaning has created a number of related approaches represented by the works of Brugman (1981), Lakoff (1987), Langacker (1986), Herskovits (1982,1986), Vandeloise (1986) and others. The basic idea of these approaches is that the meaning of an element consists of a core and a periphery of uses which are structured according to the relationships that hold among the uses of a form.

From the approaches to meaning mentioned above, the "dictionary approach" was chosen, as the most appropriate for data collection from a cross-linguistic sample. Although this approach by itself does not directly reveal any interesting facts about meaning, it creates a flexible data base

upon which to test numerous hypotheses. If, for instance, two forms which have a different core meaning happen to share a use, this fact would be recorded in the data, thus allowing the investigator to compare languages along this particular line. By contrast, if an abstract meaning for each form was recorded such comparison would have been impossible.

Furthermore, the level of "use" seems to be the most concrete not only for the linguist, but also for the "naive" speaker of a language. In a study of Dutch spatial prepositions, Colombo and Flores D'Arcais (1984) indicate that Dutch native speakers were able not only to give an account of the uses of each of the prepositions in the study, but also indicate the relationships among the various uses. The level of use, as a descriptive level, was also adopted by Talmy (1985), who refers to it as a morpheme's "usage" and defines it as "a particular selection of its semantic and syntactic properties" (:59).

Separate uses of a spatial gram were coded if the author of the grammar indicated so, or if it was clear from the examples that different meanings were expressed. Metaphorical uses, that is cases in which spatial grams expressed temporal relations or mental states, were coded as separate uses as well.

While the number of uses of a form reveal the range of meanings it covers, each individual use needs to be further explored, since different uses appear under different semantic and syntactic contexts. In order to explore the contexts in which uses emerge, certain co-occurrence restrictions may be important. Co-occurrence restrictions are basically semantic restrictions. For instance, the English preposition *into* always occurs with verbs that express motion or virtual motion. Sometimes, semantic restrictions take the form of a morphological category. For example, if a morpheme is used to express location at a region defined by several entities ("among the trees") a plural marker will appear on the scope element (if the language marks number distinctions). If the language makes a singular/ dual/ plural distinction in number, we would expect *dual* as a co-occurrence restriction of the *medial* use (i.e. "between"), but *plural* as a co-occurrence restriction of the *medial-plural* (i.e. "among") use. In other cases, a gram might be used to express a relation that pertains to a class of Landmarks with a specific characteristic. For instance, it can be used to express location within a container with a particular shape (say, cylindrical).

In addition to co-occurrence restrictions, each use is characterized by meaning components (MCs). Meaning Components can be thought of a

predicates which encode a particular semantic configuration of a Trajector, a Landmark, a region specified with respect to the Landmark, a direction, or some other relation that may be specified. Each use can be characterized by one or more meaning components, which collectively describe the use. If a use is characterized by more than one meaning component, each MC belongs to a separate category. For instance, one of the uses of the English preposition into refers to movement to the interior of an object. This use is characterized by MC ALLATIVE, which belongs to the general category of directionals, and INTERIOR which belongs to the category of locationals.

The pilot study yielded a list of meaning components which was enriched and modified in the course of the research. Appendix C presents a complete list of meaning components and their tentative definitions, as they were used to describe the uses of spatial grams.

2.3 *Data base design*

Research based on large quantities of information requires a certain organization of the data to insure efficiency. An efficient data base organization provides a way of recording and storing data and a convenient way of retrieving them. Such an organization was not only required for the present study, but it constituted one of the factors that made it a feasible piece of research.

Since this research was designed on the assumption that the information would be managed and retrieved via a computerized data base, the coding of data was organized in a fashion that would be compatible with entering the data into a computer data base. That required a systematic coding procedure to assure for comparable coded information, as it was extracted from the language materials. In designing the coding procedure, I followed the basic guidelines used in the Gramcats project, but modified it and enriched it for my purposes. The coding procedure is described in detail in the coding manual appearing in Appendix B. Here, only a brief summary of the organization of the coding sheet is presented.

The data was organized in tables. Each table consisted of columns containing specific kinds of information. For example, there was a table for the coding of meaning components and the coder's degree of confidence (number 15 on the coding sheet). Another table, for related strings (number 10), included columns for the shape of the string, its morphosyntactic category, the meaning of the string, the coder's degree of confidence

of the relatedness of the form and string, and, finally, the morphological relationship between the two. All the tables were related to each other by language and by form, although some tables had further relations with others, as is the case with the tables which include information characterizing a use (numbers 13-16), and the tables that include information about an element of an expression (numbers 5-10).

The advantage of the relational organization is that any kind of information from any form of any language can be retrieved. But, more importantly, any kind of information and its distribution in the sample can be retrieved efficiently.[23]

3. The frame of data analysis

As discussed earlier, the major criterion for the selection of the data was semantic; only forms which were used to express spatial relations were coded. It is only natural, therefore, to base the analysis of the data on a frame constructed on the basis of meaning as well.

In chapter 1, I hypothesized that a cognitive domain, such as space, manifests itself in several semantic domains, such as position, direction, path, etc., each one of which is further exemplified by other subdomains. In other words, a semantic domain has a hierarchical structure which is imposed by the relations of low-level meanings to other low-level meanings, on the one hand, and to higher-level meanings, on the other. Furthermore, each subdomain is coherent with respect to the relationships among its members, both in terms of meaning and of form.

The boundaries of spatial subdomains were not delineated a priori, but are rather one of the goals of this research, since, as I argued earlier, that is the appropriate level on which universals of language may be formulated.

Considering all of the above factors, the data analysis was based on the following frame:

a) *Delineation of a subdomain.* The investigation of subdomains was guided by the conceptualization of space as presented in chapter 1. For instance, with respect to orientation, grams describing the relations FRONT-REGION, BACK-REGION, TOP-REGION and BOTTOM-REGION were investigated. For each region, the meaning component with the greater frequency in the data base was selected as a starting point of investigation.

I hypothesized that each subdomain has a structure which consists of bits of experience that uses of individual grams encode, and the relations among them. Some uses are closer to each other than others in terms of semantic distance (cf. Anderson 1982). A measurement, therefore, of semantic distance will give us a topographic structure of the subdomain.

If two uses are similar in the sense that they encode similar semantic notions, then they should co-occur as uses of the same form. If the same two uses co-occur within a form with great frequency across languages, it suggests that such uses are very close cognitively. We, then, may form hypotheses for universals relating to such subdomains.

b) *Structural properties of the subdomain.* After a specific subdomain has been delineated, formal properties of grams expressing notions in that subdomain are compared. This procedure is based on the hypothesis that generalizations about structural properties of spatial grams such as boundedness, phonological size and complexity of expression can be coherent only within specific semantic (sub)domains.

c) *Generalizations about the semantic domain.* After having sketched the subdomains within the semantic domain and, perhaps, found correlations with the formal characteristics, generalizations about the whole domain are at issue. The hypothesis is that there are concentrations of semantic subdomains, which partition the domain into smaller zones, and which are again coherent with respect to formal and semantic properties. Concrete hypotheses about proposed concentrations of semantic fields will be tested (For example: Within the semantic domain of space I expect that projective relations with respect to front/back-region and up/down-region will be similar as opposed to topological relations of the "in", "on" and "at" type). Furthermore, based on the cross-linguistic generalizations, hypotheses about the way linguistic phenomena relate to more general cognitive characteristics in the conceptualization of space may be formulated.

The goal of our tour through the data is to try to make sense out of the complexity of the domain, to approximate an intuitively satisfying explanation of the patterns languages exhibit, and to predict, on the basis of such patterns synchronic and diachronic states and processes.

Despite all the precautions taken in an attempt to keep the size of the data base small and manageable, at the end of the data collection from the twenty six languages, 563 forms were coded for 1184 uses illustrated by 1815 examples. The information gathered turned out to be very rich. I decided to concentrate on the analysis of two subtypes of spatial grams,

FRONT-REGION and BACK-REGION grams, which amounted to 73 forms. The rest 490 forms still remain to be analyzed. Furthermore, the collection of related strings produced a good base for formulating hypotheses about the sources of spatial grams.

Since only a small part of the data was analyzed, generalizations about the semantic structure of the domain of spatial relations are yet to be postponed, until the rest of the data have been considered. Thus, I have confined the discussion to the semantic and morphological properties of a specific subdomain, namely FRONT-/BACK-REGION.

Chapter 3

The Evolution of Spatial Grams

1. Universals and diachrony

Linguists have long been interested not only in the history of individual languages and language families, but also in the structural similarities among languages. It is only recently, however, that they have undertaken the task of searching for similarities in the history of languages on a large scale. Although discussions of the universals of natural language have been going on, with occasional interruptions, since the Scholastics of the Middle Ages, the main interest of the 19th and early 20th century linguists in Europe was in the history of the Indo-European languages. Both of these research channels fell out of fashion with the rise of descriptivism in the Bloomfieldian and Post-Bloomfieldian era in American Linguistics, and that of structuralism in Europe. Linguists were involved in describing individual languages (a valuable enterprise in itself) but ignored questions of universals, convinced by Boas' and Whorf's exaggeration of the diversity of languages. Furthermore, it was assumed that the history of a language does not play a role in the way it is articulated, structured and carries meaning at any particular point in time, because the principles guiding language change are different from the principles that guide speakers in speech situations.

In recent years, with the renascent interest in universal grammar, several cross-linguistic studies have concluded that languages have similarities not only in their synchronic structure, but also in their diachronic development. Pioneered by Greenberg (1978), *diachronic typology*, the typology of language change, has received a lot of attention as evidenced by numerous studies. Studies by Traugott (1975, 1978, 1982), Heine and Reh (1984), and

Lehmann (1985) have shown that language change is controlled by very general principles, and more daring claims by Givón (1975,1979), Bybee (1985b) and Bybee and Pagliuca (1985,1987) elevate such principles to a universal level. This perspective on language opens new research routes by eliminating the dichotomy between synchrony and diachrony by reinterpreting synchronic language states as states in a diachronic process. Moreover, in this view, speakers do not simply possess a language in their mind but rather are seen as active participants in processes in a dynamic language (Croft, Denning, and Kemmer 1990).

A common characteristic of most diachronic typological studies has been an emphasis on form. In such studies, linguists attempt to discover processes and parameters which would explain diachronic changes of form. Changes in meaning, specifically as far as grammatical elements are concerned, have been seen as accompanying or following formal changes. Such studies conclude that languages are similar with respect to the mechanisms that drive their change as far as the structural aspects of language are concerned. Little attention had been given to similarities with respect to semantic change primarily because of claims, such as Weinrich's (1963), that semantic universals do not exist. The structuralist-descriptivist tradition is mostly responsible for the road diachronic linguistics has taken over the years.

Challengers of the latter tradition claim that if there are any universals at all, these are *substantive* universals, and the similarities of form are being subsumed under the similarities of meaning. Givón (1975,1979, 1983), Bybee (1985a,b), Bybee and Pagliuca (1985, 1987), and Bybee, Pagliuca, and Perkins (1991) have provided evidence that languages develop grammatical material similarly, within specific semantic domains, going through similar semantic paths. Apparent formal differences are due to the different developmental stages that forms of languages are at in a particular synchronic slice. Specifically, Bybee & Pagliuca (1985, 1987) and Bybee, Pagliuca, and Perkins (1991) present evidence for their claim from the development of futures and other grammatical categories in various languages. Such evidence opens new paths for research leading, on the one hand, to the discovery of universal principles, and on the other, to explanations of variation in natural languages.

1.1 *The emergence of grammatical forms*

It has long been claimed that grammatical morphemes derive from lexical forms. European philologists of the 18th century (E.B. de Condillac, J. Horne Tooke, among others) engaged in discussions of the origins of language, argued, among other things, that inflectional and derivational elements in words are fragments of earlier independent words, which have been agglutinated to the root words (Robins 1967). J. Horne Tooke distinguished only two parts of speech, nouns and verbs, and considered every other word as the result of "abbreviation" or "corruption". In particular, he thought of conjunctions, adverbs and prepositions as the result of the "mutilation" of nouns and verbs.[24]

German historical linguists of the early 19th century (Bopp, Von Humboldt, Schleicher, among others), and later on, the Neo-grammarians (Paul, Breal, Meyer-Lübke, Wright, Meillet) presented evidence from Indo-European in support of the claim that inflections are the result of the earlier affixation of formerly separate auxiliary words. The process of creating new affixal forms from independent words was called by Meillet (1912) "Grammaticalisation", a term which has been used henceforth, in parallel with the term "Grammaticization".

In recent years, grammaticization theory has attracted the interest of several scholars. Their studies have provided substantial evidence in support of the claim that not only grammatical forms emerge from lexical forms, but also grammatical meaning evolves from lexical meaning in particular ways along universally determined paths. For instance, Bybee and Pagliuca (1987) and Bybee, Pagliuca, and Perkins (1991) presented cross-linguistic evidence for the evolution of future grams from verbs of desire and intention. They have claimed that differences in the distribution of futures across languages are due to the different lexical sources they have; these sources, furthermore, constitute a very small class of verbs. The consistency in the kinds of verbs that evolve into futures further suggests that the particular semantic content of words chosen for grammaticization, as well as the progress of their development is not language specific, but rather is governed by more general principles. Other studies by Givón (1975), Heine and Reh (1984), Heine (1989), Lehmann (1982, 1983), and several other studies presented in Traugott and Heine (1991) among others, have similarly provided cross-linguistic evidence for grammatical material evolving from lexical material, and have suggested the universality

of such processes. Although much attention has been given to the lexical sources of grammatical forms, discussions on grammaticization do not stop there. Starting with Hopper (1979, 1991), attention is given to the processes involved in the progression of grammatical forms into more and more grammaticized stages. In his view, such changes are motivated and driven by various discourse processes.[25]

2. Issues of grammaticization of spatial grams

Most research on grammaticization has focused on the emergence of primarily linguistic categories, such as tense, aspect, modality, etc. Studies of spatial grams have dealt only with adpositions or case inflections, providing evidence for lexical sources only incidentally (Friedrich 1969a,1969b; Li & Thompson 1973,1974; Givón 1975; Kahr 1975; Brugman 1983; Heine & Reh 1984; Miller 1985); only a few (Lehmann 1985; Svorou 1986, 1988; Heine, Claudi, and Hünnemeyer 1987; Heine 1989) have attempted a comprehensive account of the grammaticization of spatial grams. In fact, spatial grams are an ideal domain to explore this process, since, as we will see below, they exhibit various degrees of grammaticization across semantic subdomains. On the other hand, the developmental nature of grammaticization theory provides a frame for analyzing the differences in form and meaning of spatial grams across languages. Thus, adpositions, spatial affixes, and case inflections, may be studied together under the assumption that they represent different stages on a grammaticization scale. Furthermore, since spatial grams are used extensively in discourse not only to communicate the locus of situations, but also to express notions in other grammatical domains, such as tense, aspect (Traugott 1978), and causality (Radden 1985), their developmental history across languages may reveal interesting facts not only about the understanding and structuring of spatial relations in language, but also about the understanding of other linguistic categories which emerge out of spatial grams, thus unveiling basic principles of discourse and human cognition.

Based on the assumption that languages are similar in the way they encode spatial relations, the hypothesis I will investigate states that:

> Synchronic similarities in the way languages express spatial relations are due to the history of spatial grams encoding such relations. Similar lexical sources and paths of evolution of spatial grams across languages suggest

> the postulation of universal principles governing the linguistic encoding of spatial relations, relating both to the form and the elements of space that are relevant in linguistic communication. The gradual emergence of spatial grams out of lexical sources is evidenced throughout their evolution, through their lexical characteristics, which, at later stages tend to disappear and give way to more and more grammatical characteristics. Differences are due to the degree of grammaticization of specific grams, which is not only a result of their age, but also of their specific meaning characteristics.[26]

This hypothesis raises many issues that are central in any discussion of grammaticization. The majority of them have to do with the nature of the input to grammaticization and its relation to the output.

First, assuming that spatial grams develop out of lexical sources, the question arises as to the nature of such lexical sources, and to their homogeneity with respect to their semantics, as far as a particular kind of gram is concerned.

Second issue is the relation of the source concepts to the outcome spatial grams, both on the semantic and the morphosyntactic levels. On the semantic level, questions have to do with how similar a gram is to its source, whether the gram constitutes a simplified or "bleached out" version of its source (Bybee and Pagliuca 1985, 1987), and whether the full range of uses of a spatial gram can be attributed to the semantics of its source. Furthermore, assuming different types of lexical sources (for example, nouns and verbs), the issue arises as to whether differences in the categorial status of the source are reflected in the semantics of the spatial gram, and to which degree. On the morphosyntactic level, questions relating to the difference between source lexical items and outcome spatial grams involve issues of syntactic dependence, morphological marking, as well as the processes that bring about changes of that sort.

Another central question has to do with the mechanism that motivates and drives grammaticization, and that results in semantic change. Recent proposals about metaphor (Bybee and Pagliuca 1985; Heine and Claudi 1986; Sweetser 1988, 1990; Heine et. al. 1991), and metonymy and implicature (Traugott and König 1991; Heine et. al. 1991) as being mechanisms involved in semantic change bring about the question of whether semantic change is effected by one of those mechanisms, or whether different phases of the process are attributed to different mechanisms. Related to this is the question of the pace of grammaticization, whether it involves gradual change or abrupt, immediate change, and the simultaneity of semantic and morphological change (Lichtenberk 1991; Givón 1991)

In this study I will attempt to provide some answers for the above important questions as supported by cross-linguistic data on spatial grams.

2.1 *Lexical sources*

The motivation for hypothesizing that spatial grams are the product of the evolution of independent lexical items emerges out of numerous examples of synchronic affinities between spatial adpositions and lexical items in many languages. The degree of phonological and syntactic similarity between certain lexical items and spatial grams varies across languages, from total identity to vague similarity. Affinities of spatial grams with nouns are the most numerous. Some examples will illustrate them.

In Abkhaz, a NW Caucasian language, the noun *a-ç'ə̀* "mouth" is used as a postposition with locative meaning as in (9). Similarly, in !Kung, a Khoisan language of Africa, the noun *!x'a* "heart" is used as a postposition with locative meaning, as in (10). In both of these languages the spatial gram and the noun are identical in phonological substance and autonomy, i.e. that each is a free form.

Abkhaz (Hewitt 1979:125)

(9) *a-vok'zàl a-ç'ə də-q'o-w+p'*
the-station 3SGPRO-mouth he-be-(STAT)
'He is at the station'

!Kung (Snyman 1970:109)

(10) ||*'Eu ge-ya g!u !x'a*
fish live-tr water heart
'The fish live in the water'

Partial identity of spatial grams and nouns is exemplified by the following. In Car, an Austroasiatic language, the noun *kú:y* "head" appears as part of the prepositional construction *i kú:y* "on top of" in combination with a very general preposition, which is optional, as in example (11). In a similar way, in Halia, an Austronesian language, the noun *kopi* "bottom, buttocks, underside" seems to constitute the root of the prepositional construction *i kopiyna* "under", as in (12).

Car (Braine 1970:126)

(11) *mɨ́k patí:? cin fé:n, i kú:y ř̃ɔ́:ŋə*
see house I four on head hill
'I see four houses on top of the hill'

Halia (Allen & Allen 1965:26)

(12) *ema kaney i kopi-y-na luwma*
not is LOC underside-ADV house
'It isn't under the house'

Basque, a language isolate, illustrates another pattern of spatial gram and noun similarity. The noun *aitzin* marked for locative case functions as a postposition as in (13) below. Similarly, Bari, a Nilo-Saharan language, illustrates yet another pattern where a noun participates in a construction with a general preposition and a marker of possession to signify a spatial relation, as in (14).

Basque (N'Diaye 1970:86)

(13) *elize aitzin-ean bildu ziren*
church front-LOC
'Ils s'etaient reunis devant l'eglise'
("They were reunited in front of the church")

Bari (Spagnolo 1933:211)

(14) *ŋa sɪsɪ'da i kɔmɔŋ na kadi?*
who stay in face POSS house
'Who is staying in front of the house?'

All of the patterns presented so far involve simple juxtaposition of a noun or a construction including a noun, and its scope element. It is possible, however, to have such juxtaposition without a syntactic boundary. Thus, in Shuswap, a Salish language, the noun *-ep* "buttocks" functions as a spatial gram in (15). Similarly in Papago, an Aztec-Tanoan language, the nouns *koa* "forehead" and *ba:ˋco* "breast" appear as suffixes (or, second in a compound) to other nouns to signify a spatial relation, as is illustrated in (16) and (17) below.

Shuswap (Kuipers 1974:67)

(15) *ʔəmət-ép*
sit-tree-buttocks
'sit under a tree'

Papago (Mason 1950:39)

(16) *'aˋki-ˋkoA*
arroyo-forehead
'at the edge of the arroyo'

17) *ki:-ba·ˋcO*
house-breast
'in front of the house'

Finally, Abkhaz exemplifies the case where a polymorphemic spatial gram is hosted by a noun as in (18) and (19).

Abkhaz (Hewitt 1979:130)

(18) *a-y°n-a-ç'+àpx'a* *də-t°'ò-w+p'*
the-house-3SGPRO-at+front he-sit-(STAT)
'He is sitting in front of the house'

(ibid.:131)

(19) *a-y°n-à-šta+x'* *dà-q'o-w+p'*
the-house-3SGPRO-trace+LOC he-be-(STAT)
'He is behind the house'

Affinities of spatial grams with verbs and verb roots are far less common. Consider, however, the following examples from Halia. (20) demonstrates the spatial use of *tara* as "to", and (21) the use as a verb, "see".

Halia (Allen & Allen 1965:34)

(20) *ara e soata-mena-liyleyen tara tarak*
we PM carry-1PL-it to truck
'We (INCL) carried it to the truck'

(ibid.:39)

(21) *none e tara-ramo-liymiyuw*
she PM see-3SG-you
'She saw you.'

Also in Bihari, an Indo-European language, the postposition *bhir*[a] "near, in contact of" (sic, Jha 1958:341) resembles the verb *bhirab*[a] "to touch".

In addition to nouns and verbs, spatial grams may have affinities with other linguistic elements, such as adverbs, adjectives (e.g. English the *back* wall; Haka *hmai lé* "the preceeding, antecedent": *hmai lé ya* "in front of"; Kui *senḍoni* "the above": *senḍo* "above"; Guaymi *kúnken* "wild": *kúnken* "outside"), participles (Data from Kahr 1975: Bengali *thākiyā/thēkē* "having stopped": *thākiyā* "from"; Bikol *pa-siring* "approaching": *pasiríng* "toward"), conjunctions (Abkhaz *aa+nja* "until, before": *nja* "up to, until"; Guaymi *nióboto* "why, wherefore", *áboto* "or, by": *boto* "beside, on, against, by"), and even numerals (Abkhaz *àpx'a-t°'ə+y* "first": *àpx'a* "in front of"; Anc. Greek *prōtos* "first": *pro* "before").

The relationship between spatial grams and such linguistic elements may be either synchronic derivational or historical. Cross-linguistic regularities of formal and semantic changes occurring between spatial grams and such elements will help us determine, on the one hand, the status of such relationships on the time axis (whether short-term derivational or long-term historical), and on the other, the directionality of such changes.

The similarities of spatial grams to nouns and verbs has been studied the most, and it is generally accepted that certain similarities are due to the historical development of nouns and verbs into spatial grams (Kahr 1975; Givón 1975; among others). Moreover, the relationship of spatial grams to certain subordinate conjunctions has also been attributed to the historical evolution of spatial grams (Moravcsik 1972; Hinds 1973; Washabaugh 1975; Joseph 1975; Genetti 1986, 1991; Craig 1991). Adverb to adposition diachronic change has also been documented for several languages (Miller 1985), while participles have only been found as sources of spatial grams in a few languages (Kahr 1975). Developments of particular grams from each of the above sources have been treated as isolated phenomena, and the principles that govern such changes have generally not been seen as related, although some attempts have been made to show their relationship (Miller 1985). As a result of the general trend which stresses structural diversity, we are presented with a fractured picture of the evolution of spatial grams. Discovering the motivation of such developments becomes very difficult since, by failing to see the relations among sources and paths, we have missed the generalization. This argumentation led me to hypothesize that:

> There are mainly two core sources of spatial grams, namely nouns and verbs, and all other alleged sources constitute stages in the paths of evolution. The semantic and morphological changes that occur during the evolution of spatial grams are viewed as a result of the nature of the source, that is, as a result of both the different semantic content, formal characteristics, and the different evolutionary paths that nouns and verbs follow.

This hypothesis is based on the claim that nouns and verbs are basic, not only as lexical categories on the discourse level (Hopper & Thompson 1984), but also as semantic categories (Langacker 1986, 1988), for which all languages make morphological distinctions (Sapir 1921; Hockett 1968). Furthermore, the fact that children acquire nouns and verbs before other lexical categories has been interpreted (see Gentner 1982) as reflecting a basic cognitive distinction into things and activities, a claim which goes all the way back to Plato and Aristotle.

In the next section a presentation of the nominal sources of spatial grams will be followed by a discussion of all the relevant questions pertaining to the semantic and morphosyntactic changes that take place in the development of such sources into spatial grams.

3. Nominal sources

Nouns are by far the most common related string to the spatial grams in my data base, amounting to 128 occurrences. For most of them, the authors of the grammars have indicated that they constitute the sources of spatial grams. For the rest, although it was not specifically mentioned by the author, related strings of the nominal type were taken as representing the sources of the respective spatial grams motivated by the number of studies that have shown the relationship of nouns to spatial grams (Meillet 1912; Givón 1975; Kahr 1975; Heine 1989) to be genetic on the one hand, and unidirectional from the noun to the spatial gram on the other. Such nouns fall into four major classes with respect to their meaning:

* the body-part class (face, head, chest, back, waist, buttocks, etc.)
* the environmental landmark class (sky, canyon, river, field, etc.)
* the relational object-part class (front, edge, side, middle, back, etc.)
* the abstract spatial notion class (proximity, length, direction, etc.)

Nouns from more than one class may give rise to the same kind of spatial grams in the same or across languages. As we will see below, however, this variation is to a certain extent predictable. In the sections that follow, I will show that semantic and morphological characteristics of such nominal sources are present to a greater or lesser degree in the spatial grams they evolve into.

3.1 *Body parts*

Data from 55 languages (22 from my sample and 33 from other studies) are being considered here. A small number of body-part terms gives rise to an even smaller number of spatial grams. Table 1 presents all the body-part terms and the spatial notions they give rise to. (see also Appendix E)

The most common spatial notions that body-part terms give rise to have to do with spatial relations that emerge out of the partitioning of

Table 1: Body parts as sources of spatial grams.

	frn reg	bac reg	top reg	bot reg	side reg	med reg	in reg	edge	all	abl	prox reg
forehead	4							1			
eye	2								1		
mouth	5						1	3			
ear					2						
face	12								1		
head	2	12									
neck							1				
breast/chest	4					1					
heart					1		3				1
stomach							2				
flank					2						
ribs					3						
abdomen					1						
belly				1							
waist						1					
loins		1									
hips				1							
back		15	3	1							
buttocks		3		3							
anus		2									
foot/leg				1							
blood							1				
hand										1	
bones		1									
body											1

exterior regions of entities. Thus, FRONT-REGION and BACK-REGION, TOP-REGION and BOTTOM-REGION, as well as a general SIDE-REGION relations are expressed by the grams which evolve out of specific body-part terms.

Terms naming body-parts such as eye, face, forehead, mouth, head and breast or chest may evolve into FRONT-REGION grams as in the following examples: (see Appendix E for more)

Halia	*i matana* "in front of"	< *i* "in,at" + *mata* "eye + *-na* (ADV SUF)
Bari	*i kɔmɔŋ ŋɑ* "in front of"	< *i* "in, at" + *kɔmɔŋ* "face" + *na* (POSS PREP)
Melanesian	*fɔrɛd lɔŋ* "forward"	< *fɔrɛd* "forehead" + *lɔŋ* "in,to"
!Kung	*ts'i* "in front of"	< *ts'i* "mouth"
Navajo	*bi-tsi* "in front,at	< *'atsii'* "head"the head of"
Papago	*-ba:ˋcO* "in front of"	< *ba:ˋcO* "breast"

BACK-REGION grams emerge from body-part terms such as back, buttocks, anus, loins, as in the following examples: (see Appendix E for more)

Basque	*gibelean* "in back of"	< *gibel* "back" + -ean (LOC)
Isl.Carib	*t-éde-giẽ* "behind"	< *t-* (POSS FEM) + *éde* "bottom" + *-giẽ* "from,at"
Papago	*-'a'ai* "in back of"	< *'a'at* "anus"
Tigre	*haqo* "after"	< *haqw* "loins"

Terms for head and back may give rise to TOP-REGION grams, while terms for buttocks and hips may give rise to BOTTOM-REGION grams, as in the following examples:

Abkhaz	*-xə+x'* "above"	< *a-xə̀ "head* + *-x'* "at"
Shuswap	*-ikn* "on top of"	< *ikn̓* "upper back, top surface"
Navajo	*bitł'ááh* "underneath"	< *bi-* (3SG POSS PRO) + *'atł'áá'* "rump, buttocks"
Bari	*i mukök na* "beneath"	< *i* "in, at" + *mukök* "hips" + *na* (POSS PREP)

SIDE-REGION grams ("beside", "on the side of") may have their source in body-part terms such as flank, ribs, abdomen, but also heart and ear, as in the following examples:

Abkhaz	*a-vara* "beside"	< *àvara* "flank"
Basque	*aldean* "at the side of"	< *alde* "ribs" + *-an* (LOC)
Bari	*i...nupɛlɛ'* "on that side of"	< *i* "in,at" + *nu* "that" + *pɛlɛ'* "abdomen"
	i swöt lɔ "at the side of"	< *i* "at" + *swöt* "ear" + *lɔ* (POSS MASC)
Papago	*hu:ta (huda)* "on the side of"	< *huḍ* "heart"
Margi	*ár mnyá* "beside,at the edge"	< *ár* "at" + *mnyá* "mouth"

Grams expressing location on the EDGE of a landmark have their source in terms naming mouth or forehead, as in the following examples:

Margi	*ár mnyá* "at the edge of"	< *ár* "in, at" + *mnyá* "mouth, edge"
Tarascan	*mi* "at the edge of"	< *mi* "mouth"
Papago	*-koA* "at the edge of"	< *koa* "forehead"

Spatial grams which specify relations of the interior region of entities may also develop from certain body-part terms. These are terms for heart, stomach, blood, mouth and neck, as in the following:

Abkhaz	*-a-g°ə +la* "inside"	< *a-g°ə "heart"* + *-la* "in"
	-a-γra- "inside"	< *a-γra* "stomach"
	-ç'ə̀ "inside"	< *a-ç'ə̀* "mouth"
	-a-x°+la "inside"	< *à-x°da* "neck" + *-la* "in,at"
Papago	*-?eḍa`* "inside"	< *?e?eḍa`* "blood"

Furthermore, in two languages, grams expressing medial relations develop from terms for chest and waist, as follows:

Margi	*ár kátlá* "in the middle of"	< *ár* "in,at" + *kátlú̥* "chest"
Ossetic	*astaey* "among, between"	< *astaey* "waist"

Finally, a few languages have developed directional grams from body-part terms as in PAPAGO and IGBO, while, in two other languages PROXIMAL grams are derived from combinations of body-part terms and other elements as in:

Papago	*wui* "to, towards"	< *wui* "eye"
Chalc.mixtec	*nūū* "to"	< *nūū* "face"
Igbo	*naka* "from"	< *na* "in,on" + *ka* "hand"
Abkhaz	*zàayg°ara* "near to"	< *a-g°ə* "heart"
Margi	*údzə̀(r)* "near,beside"	< *ú* "in" + *údzú̥* "body"

3.1.1 *Two models for the evolution of body-part terms to spatial grams*

Body-part terms referring to the same part of the body may evolve to become spatial grams of different types. In contrast, several body-part terms, each referring to different parts of the body, may evolve to become spatial grams of the same type. Thus, variation arises in the evolutionary relation of body-part terms and spatial grams, which may be evidenced within a single language and across languages. This variation leads us to hypothesize that there are alternative ways according to which languages model the development of spatial grams from body-part terms. The different models represent coherent configurations of evolutionary patterns of spatial grams from body-part terms. The cohesion of the configurations is motivated by our experience with naturally occurring configurations of bodies in the world. Let's consider the cases of variation.

Terms for "head" may give rise either to FRONT-REGION or TOP-REGION grams, whereas terms for "back" may give rise to either BACK-REGION or TOP-REGION grams. Furthermore, "buttocks" and "anus" are used for BACK-REGION and BOTTOM-REGION relations. Note, however, that the term "back" which gives rise to TOP-REGION grams does not refer to the human back, but rather to the back of a four-legged animal. This observation motivated Heine (1989) to postulate a "pastoralist" model, in addition to a human body-part model, according to which animal anatomy provides the correspondence between body-part terms and spatial relations. The pastoralist model predicts the following:

TOP-REGION gram < "back"
FRONT-REGION gram < "head"
BACK-REGION gram < "buttocks" or "anus"

He has found this model to describe the evolution of spatial grams in the languages of several pastoralist societies of Eastern Africa, i.e. nomads whose survival depends primarily on animal husbandry.

The pastoralist model applies to very few languages. In Heine's sample only 6 out of 46 languages derive FRONT-REGION grams from "head". The rest of the languages develop TOP-REGION grams from "head", which is the major source of TOP-REGION grams. Finally, only 2 languages develop TOP-REGION grams from (animal) "back". Grams deriving from buttocks or anus are divided 22/22 among BOTTOM-REGION and BACK-REGION. Similarly, in the data I have considered only 2 out of 14 languages derive FRONT-REGION grams from "head" and only 3 out of 19 languages derive TOP-REGION grams from "back". "Buttocks/anus" give rise to 5 BACK-REGION grams out of the total of 8 grams that derive from it. In addition, in one language, Chalcatongo Mixtec (Brugman 1983) the body-part term "belly" is used to describe BOTTOM-REGION relations, thus adding more evidence for this model.

Some of the societies in which languages with such developments are spoken are not pastoralist, however. It would be, therefore, more appropriate to name this model the *zoomorphic model*.[27]

Despite the low frequency of the zoomorphic model, its significance is great because it shows that it is not only the human body that is the source of undestanding of space, but also other entities with great cultural significance, such as animals and, as we will see later on, various environmental landmarks.

Differences in the canonical orientation (Clark 1973) of the human body and the four-legged animal body provide the basis for two models for the development of spatial grams from body part terms. The human body is still the major source, not only because most languages use it as a model, but also because more kinds of spatial grams evolve from human body-part terms. The *anthropomorphic model*, which corresponds to the configuration of human body parts, and the zoomorphic model, which corresponds to the configuration of the four-legged animal body, make a number of predictions, which are presented below.

An implication of the zoomorphic model is that languages which possess distinct lexical items for human body parts and animal body parts

would more readily develop spatial grams according to the zoomorphic model, for those parts for which they have lexical distinctions, and whose potential evolutionary path is predicted by the model. One such language is Chalcatongo Mixtec, in which the human back (*yata*) is lexically distinct from the animal back (*siki*). *yata* is used for BACK-REGION relations while *siki* for TOP-REGION relations (Brugman 1983). For languages that do not make lexical distinctions for human and animal body parts the zoomorphic model may be present as a schema according to which different body-part terms may give rise to different spatial relations. Thus, in Shuswap *ep* "buttocks, bottom" gives rise to *-ep* "behind", but *ikn̓* "upper back" gives rise to *-ikn* "on top of", adhering to the zoomorphic model. The Shuswap terms may refer either to human or animal body parts.

The anthropomorphic and the zoomorphic models may pattern the evolution of different types of spatial grams within the same language. Thus, in PAPAGO, FRONT-REGION, SIDE-REGION and INSIDE-REGION grams develop according to the anthropomorphic model but the BACK-REGION gram according to the zoomorphic model. However, while the anthropomorphic model may exist without the zoomorphic model, the opposite is not true. Heine (1989) also notes that in none of the African languages he investigated is the zoomorphic (his "pastoralist") model the only model existing.

The Anthropomorphic Model

Body parts	Spatial grams	Example languages
face, eye, forehead mouth, breast/chest	> FRONT-REGION	Abkhaz, Bari, Bihari, Car, Halia, Haka Isl. Carib, Karok, Papago, Melanesian Pidgin, Tigre, !Kung
back	> BACK-REGION	Bari, Basque, Guaymi, Haka, Halia, Island Carib
head	> TOP-REGION	Abkhaz, Car, Chalcatongo Mixtec, Ewe, Finnish, Tigre
buttocks, hips, foot	> BOTTOM-REG	Bari, Chalcatongo Mixtec, Halia, Navajo, Shuswap
ear, flank, ribs, heart, (abdomen)	> SIDE-REGION	Abkhaz, Bari, Basque, Korean, Papago, Tigre
breast/chest, waist	> MEDIAL-REGION	Margi, Ossetic
heart, stomach,blood	> INSIDE-REGION	Abkhaz, !Kung, Papago, Tubatulabal
forehead, mouth	> EDGE	Ewe, Margi, Papago, Tarascan

The Zoomorphic Model

Body parts	Spatial grams	Example languages
head	> FRONT-REGION	Navajo, Maasai
buttocks, loins	> BACK-REGION	Papago, Maasai, Shuswap, Vai, Isl.Carib
back	> TOP-REGION	Chacobo, Chalcatongo Mixtec, Shuswap
belly	> BOTTOM-REGION	Chalcatongo Mixtec

The basis of the evolution of specific body-part terms to express particular spatial relations is the relative location of the body parts that the terms name to the rest of the body, whether human or animal. Anatomical asymmetries, canonical orientation (Clark 1973) (upright, if human, or horizontal, if animal), as well as differences in the ability of specific areas of the body to attract more attention than others (e.g. the face) define several regions on the body. The relation of these regions to each other, framed by an orientation field provided by our vertical and horizontal eye movement and depth focusing, as well as our personal kinesthetic space (Miller & Johnson-Laird 1976) distinguish an upper front region from head to and including chest, an upper back region from neck to and including loins, a top region from head to shoulders, and a bottom region from hips to the feet. Within each region several body parts may be distinguished. Each one of them may be seen in a spatial relation to other body parts from other regions.

Languages develop spatial grams to specify relations of FRONT-REGION or BACK-REGION, for instance, from terms that refer to body parts which are located within the regions of the body discussed above. Since several body parts exist within such regions, variation arises in the source term for a specific gram. The characteristic of body parts within a region is that they are contiguous to each other.

Spatial contiguity constitutes the basis not only of cross-linguistic variation in body-part term to spatial gram evolution, but also polysemy and derivation of body-part terms as lexical items. In a cross-linguistic study of body-part terms, E. Andersen (1978) found that many body-part terms are polysemous, in the sense that they refer to more than one part of the human body, while others are derived from other body-part terms. She attributes the polysemy and the derivational relations to two principles which emerge from the physical relations between body parts: a) *structural*

similarity, according to which properties of shape are common to the lexically related body parts (e.g both are long and thin, or roundish), as is the case of the Tarascan *-cz* used to refer to head and knee and *-ča* used to refer to neck and calf of leg (Friedrich 1969b), and/or the referents of the term are located at anatomically parallel positions, as for example the Hebrew *etzbaot* used to refer to finger and toe; b) *spatial contiguity*, according to which the lexically related body parts are adjacent to one another, as with the Tarascan *nari* "eye, face" or the Russian *ruka* "arm, hand".

For our present purpose, spatial contiguity seems to have some significance. One of the most common occurrences of polysemy in body-part terms is the conflation of "eye" and "face". In fact, both principles seem to apply in this case: eyes and face are both roundish, and spatially contiguous. Andersen (1978) cites Tarascan, Sango, Huastec and several Mayan languages where this polysemy occurs.[28] I have found several other polysemous terms in the languages of my investigation, which are presented in Table 2 below.

Spatial contiguity motivates not only polysemy, on a synchronic level, but also derivational relations among body-part terms. Thus, terms for "face" derive from terms for "eye" in several languages. In Greek, for instance, *prosōpo* "face" (lit. before the eyes) derives from *pro* "in front" and *ōpa* "eyes". In Gothic, *andangi* "face" (lit. along the eye) comes from *angò* "eye" (Andersen 1978:359). Furthermore, Heine (1989) considers the eye > face conceptual transfer as one of the most common among African languages. Moreover, according to the Oxford English Dictionary (OED), the Old English *frons*, which itself is an import from Latin, was first used to refer to the forehead, and later on to the entire face.

Table 2: Polysemy of Body-Part Terms

Referents named by term	Form	Languages
eye/face	*mata*	Halia
mouth/face	*múkha*	Sanscrit
forehead/face	*frons*	Old English
head/hair	*'atsii', -ci*	Navajo, Tarascan
breast/chest/heart	*iθvá:y, -ŋ*	Karok, Tarascan
back/torso	*ki'diŋ*	Bari
spine/back	*enk-orioŋ*	Maasai

Such derivations suggest that the directionality of evolution is from a smaller body part to a larger one. In that respect, and considering their spatial contiguity, the derivation involves an expansion of the region that the term referred to originally to include the next largest bounded area. Note that there is no term found to refer to eyes and nose, or mouth and chin, although they are spatially contiguous. The polysemy discussed above, may, thus, also be viewed as a conceptual expansion of the region that the body-part term refers to, from the region of a smaller body part to a region which includes a larger one. In some languages (e.g. Greek and Gothic) the derivations involve spatial prepositions which specify the region of expansion. In section 3.5 we will see the significance of the expansion of the region of body-part terms and spatial grams, in general.

Spatial contiguity, thus, seems to motivate not only lexical organization and lexical derivation of body-part terms, but also cross-linguistic variation in the body-part term sources of specific spatial grams.

If we consider the relative location of body parts as the only determining factor of the source of specific spatial grams from terms referring to those body parts, then some cases remain unexplained, namely the rise of directional grams from terms such as "eye" (> to,towards) and "hand" (> from), the rise of INSIDE-REGION grams from terms such as "mouth" and "neck", and the rise of BACK-REGION grams from a term such as "bone". I propose that such cases involve functional properties of body parts which motivate the rise of specific spatial grams. Although these by no means constitute the majority of the cases, they are worth discussing, for they may enlighten our understanding of the evolution of spatial grams and spatial relations.

In the evolution of the Papago term *wui* from originally referring to eye to expressing direction TOWARDS or movement TO, it is clearly not the particular location of the eye with respect to the body that motivates this development. We could explain this development, if we accept the following: eyesight, in a naive view, emanates from within the human body, and is directed towards the outside world. The eyes, as the organ of vision, may be metonymically used for eyesight. In fact, phrases such as "She could see no living soul as far as her eyes could reach" are not uncommon. Thus, the conceived directedness of eyesight makes eye terms eligible as lexical sources of directional grams.

Similarly, "hand" is eligible as another source of grams. The Igbo "hand", *ka*, combined with a general locative gram is used to express abla-

tive relations, such as source of movement. "Hand" is more commonly a source of instrumental grams, but it is not a big step away to think of the instrument with which one carries out an activity as the source of the activity. In fact, we commonly associate instruments with agents (who are initiators of actions and can be thought of as the source of the action) in expressions like "the knife cut my finger".

Moreover, "mouth" and "neck", the gate and route to the interior of the human body, which we use to swallow food, constitute sources of two Abkhaz INSIDE-REGION grams, *-a-ç'ə* (< *à-ç'ə* "mouth") and *-a-x°+la* (< *à-x°da* "neck"). These contrast with "doorway", another kind of orifice, which is the source of OUTSIDE-REGION grams, as we will see in section 3.2.

Finally, the basic function of bones as supporters of soft parts of the body is the source of BACK-REGION and BOTTOM-REGION spatial grams, as the Island Carib evolution of *l-àbu* "bones" > *l-àbu* "behind, under, supporting" suggests. In nature, we experience support relations when one entity is on top of another or when one is behind another and attached. Then, the one on the bottom or in back is understood as supporting the other. Thus, bones support soft parts of the body by being behind or under them.

In summary, location with respect to the (human or animal) body, and, less commonly, functional properties of body parts, provide the motivation for the evolution of body-part terms to grams expressing spatial relations (see 3.5 for elaboration).

3.2 *Environmental landmarks*

The human body is not the only source of our understanding of spatial relations. We saw that the four-legged animal body may figure prominently also. Animals have great cultural, socio-economic and/or religious significance in certain societies. Our inanimate environment may also have great cultural significance. Fields, rivers and the sea may be sources of food. Roads, tracks, rivers may be routes leading to places of importance. Mountains, hills, rivers and coasts may be points of reference for navigation. Such environmental entities serve as Landmarks for the understanding of not only large scale but also small scale spatial relations.

In the languages I have investigated, several types of spatial grams have developed from terms which name various landmarks. These are presented in Table 3.

Table 3: Environmental landmark terms as sources of spatial grams

	top reg	bot reg	out reg	in reg	frn reg	bac reg	opp reg	med reg	side reg	towd	alon	acrs	via	thru
sky/heaven	2													
summit	2													
cape	1													
ground		1												
field			6		1									
doorway			4		1									
shore/land				1							1			
house				1										
further bank							1							
track/trace						6								
canyon								1						
road										1			1	1
dam												1		
riverside									1					

Among spatial grams that have their source in environmental landmarks, TOP-REGION, BACK-REGION and OUTSIDE-RESION are the most frequent. Nouns for sky or heaven, summit, mountain top or peak evolve into TOP-REGION grams, as in the languages below.

Guaymi	*koin* "up, of" *kointa* "above, overhead"	< *koin* "heaven
Ewe	*dzi* "on"	< *dzi* "sky"
Basque	*gainean* "on top of"	< *gain* "summit, roof" + *-ean* (LOC)

In the following languages, BACK-REGION grams evolve from a noun which refers to track, trail, trace or footprint:

Abkhaz	*a-šta+x'* "behind"	< *à-šta* "track, footprint" + *-x'* "in, at"
Navajo	*bikéé'* "behind, following"	< *bi-* (3SG POSS PRO) + *'akéé'* "trail"
Tigre	*'asär* "after, following"	< *'atr/'asr* "trace"
Mid.Welsh	*ar ol* "after"	< *ar* "on" + *ol* "track".

"Field" and "doorway" may develop into OUTSIDE-REGION grams, although Heine (1989) reports on the development of "field" into a FRONT-REGION gram in one African language. Also, in Middle Welsh *ar dwrs* "in front of" is composed of *ar* "on" and *dwrs* "door". Examples of such nouns developing into OUTSIDE-REGION grams are the following: (see Appendix E for more)

Abkhaz	*-a-d°ə+l* "out of"	< *a-d°ə* "field + *-la* "in,at"
Gallic	*i maes* "outside"	< *maes* "field"
Anc.Greek	*θüraze* "outside"	< *θüra* "door" + *ze* "at"
Latin	*foris* "outside"	< *fora* "door" + (ABL)

An interesting case in Abkhaz, which parallels the "field > outside" development is the involvement of the noun a-*y*°nə "house" to express INTERIOR-REGION relations in the grams *-a-y°na-* and *a-y°nə+c'q'a* "inside".

"Road" is another interesting case in that it may give rise to different spatial grams encoding VIA, THROUGH or direction TOWARDS relations, as in the following cases:

Abkhaz	*my°a* "motion past"	< *à-my°a* "road"
Palantla Chinantec	*hwu*^{12} "through, with"	< *hwu*^{12} "road"
Chalcat. Mixtec	*ičí* "towards"	< *ičí* "road"
Latin	*via* "by way of"	< *via* "road"

Each development is motivated by one of the ways we experience roads: roads lead to places and, thus, are directed towards them; they go through regions and pass by other landmarks.

Other nouns which refer to landmarks, such as "shore", "coastline", "riverside" and "dam", may develop into ALONG and ACROSS spatial grams, or even SIDE-REGION grams, as in the cases below.

Guaymi	*jateta* "along the coast"	< *jate* "shore, land, interior"
Karok	*iθya-* "across"	< *iθya:h* "fish dam, weir"
Basque	*bazterrean* "at the side of"	< *bazter* "riverside, edge" + *-ean* (LOC)
Bihari	*para* "opposite to"	< *SKT pará* "the further bank"
Papago	*ca:gi'D* "between"	< *ca:gi'D* "canyon".

Their position relative to a major landmark, such as a body of water, motivates such developments. In Bihari, a gram expressing OPPOSITE TO relations is a development from a noun for "the further bank". In this case not only is the position of the landmark with respect to the larger environment relevant, but also the position of an observer. Finally, the inherent configuration of a landmark such as a canyon seems to motivate the development of MEDIAL-REGION grams, as in the Papago case above.

One more landmark is reported by Heine (1989) to be a major source of grams — the ground. Fifty African languages they have investigated have developed BOTTOM-REGION grams from nouns meaning "ground", "earth" or "soil". Only one of the languages that I have data for, Hausa,

also an African language, has a similar development, namely the noun *ƙàsá* "ground", which, when reduplicated (*ƙàrƙashî*) means "lower part", from which *ƙàrƙashín* "under" develops.

The data I discussed above suggest that the development of spatial grams from terms for environmental landmarks is basically motivated by the relative location of such landmarks within the environment of activities of a community. Such developments may also be motivated by other kinds of information we have about landmarks. For instance, the motivation for "track" or "trace, footprint" to develop into a BACK-REGION gram is justifiable through an inference that their creator was at that position at an earlier time, then moved away forward, leaving them behind. This inference is based on experience with our own footprints which are behind us as we move forward creating them. Other examples are the different types of grams that "road" gives rise to. The motivation of such developments as VIA or TOWARDS could be found only in our experience with using roads when we take them to go places.

As with body-part terms, the motivation for the development of environmental landmark terms into spatial grams emanates not only from the location of the landmarks relative to other such entities, but also from their use. Sketching an environmental landmark model is more difficult than was sketching an anthropomorphic one, since there are far more landmark terms available as potential sources than there are body part terms. The constraining factor as to which types of landmarks become relevant seems to be the different physical environments that communities live in. A first attempt at constructing such a model follows.

An important observation should be made here concerning the nature of this model: it represents the development of spatial grams, which by definition encode relations, not absolute notions. Thus, environmental landmarks here are to be distinguished from environmental landmarks which give rise to absolute orientation terms. The sea, lakes, rivers and the direction of their flow, mountains, villages, cities and specific places, in addition to celestial entities, such as the sun and constellations (e.g. the Big Dipper), and, finally, the direction of the winds, constitute major reference points for orientation in large-scale environments and long-distance travel. Terms describing such landmarks are used like cardinal points. In fact, terms for "north", "south", "east", "west" have their origin in the description of the position of the sun (east,west) or the names of winds (e.g Md. Greek *vorias* "north wind, north" and *notias* "south wind, south"). (For a more detailed discussion see Brown 1983; Mark, Svorou and Zubin 1987).

The Environmental Landmark Model

Landmarks	Spatial grams	Example languages
sky/heaven, summit, peak/ maintain, top/roof, cape	TOP-REGION	Basque, Ewe, Halia, Guaymi
ground, earth, soil root	BOTTOM-REGION	Hausa (50 other African languages: Heine 1989)
shore/land, house, hole	INSIDE-REGION	Abkhaz, Car
field, doorway	OUTSIDE-REGION	Abkhaz, Armenian, Breton, Gallic, Irish, Lithuanian, Latin, Greek, Persian
field, doorway	FRONT-REGION	Middle Welsh, (1 African lang.: Heine 1989)
track, trail, trace, footprint	BACK-REGION	Abkhaz, Guaymi, Island Carib, Navajo, Tigre, Middle Welsh
further bank	OPPOSITE TO	Bihari
fish dam	ACROSS	Karok
shore/land	ALONG	Guaymi
canyon	MEDIAL-REGION	Papago
road	VIA	Abkhaz
road	THROUGH	Palantla Chinantec
road	TOWARDS	Chalcatongo Mixtec
riverside	SIDE-REGION	Basque

3.3 *Relational object parts*

Nouns which refer to parts of objects constitute another major source of spatial grams. These object parts may not be individuated and separated from the object itself. They are not like a leg to a chair or table, or a handle to a door, which are inherent parts but may be individuated. Rather, they are relational object parts. Fronts, tops, sides, centers, interiors and exteriors of entities are relational parts of objects, in the sense that they make reference to our experience of the inherent properties of objects. Several such relational object-part terms are the sources of spatial grams. Table 4 presents all the object-part terms that were found to evolve into spatial grams, and the types of grams each evolves into.

Table 4: Relational object-part terms as sources of spatial grams

	frn reg	bac reg	top reg	bot reg	side reg	med reg	in reg	out reg	ard reg
front	7								
back*		1							
tip, end		1							
top			11						
underside				2					
surface, area under				4					
side					12				
edge					1				1
middle, center						8			
interior, inside							8		
exterior, outside								3	
circumference									2

* the exact number of grams which have developed from "back" as an object-part term is not determinable from my bibliographic sources because of the homophony of the English term offered as translation.

The relation of the meaning of object-part terms to the meaning of the spatial grams that they give rise to is evident from the table and does not require much discussion. The data that this table refers to are included in Appendix E.

In addition to the grams and their sources presented in Table 4, several other grams evolve from nouns which may refer to either body parts or relational object parts, as is shown in Table 5, or to environmental landmarks and relational object parts, as is shown in Table 6.

The diachronic relationship of the meaning of such polysemous terms has been suggested to be unidirectional going from body part to object part, and from environmental landmark to relational object part (Svorou 1986, 1988; Heine 1989). Thus, reference to the relational part of an object is seen as an extension of the meaning of body-part terms and landmark terms, respectively. This suggests that in the languages in which such diachronic relation exists, the understanding of relational parts of objects depends on the understanding of the relations of the parts of the body (human or animal) or relations among landmarks in our environment, which, as we discussed in the previous sections, depends on our experience with bodies, our perception of their asymmetries and their canonical orientation, and our experience with our environment. Since all human beings

Table 5: Body-part term and relational object-part term polysemy

Term	*Body Part*	*Relational Object Part*	*Spatial Gram*	*Example Lgs*
mata	eye, face	front	FRONT-REGION	Halia
áŋwà	face	front	FRONT-REGION	Margi
frons	forehead,face	front	FRONT-REGION	English
kú:?	face	surface	FRONT-REGION	Car
muri	back	backside	BACK-REGION	Halia
ikn̂	upper back	top surface	TOP-REGION	Shuswap
tà	head	top, peak	TOP-REGION	Ewe
pää	head	top	TOP-REGION	Finnish
ep	buttocks	bottom	BOTTOM-REGION	Shuswap
kopi	buttocks	bottom, underside	BOTTOM-REGION	Halia
avara	flank	side	SIDE-REGION	Abkhaz
mnyá	mouth	edge	SIDE-REGION	Margi
nu	mouth	edge	FRONT-REGION	Ewe
ár kátlá	chest	middle, center	MEDIAL-REGION	Margi
?e?eḍa`	blood	interior	INSIDE-REGION	Papago

Table 6: Environmental landmark term and relational object part polysemy

Term	*Landmark*	*Object Part*	*Spatial Gram*	*Example Lgs*
ƙàsá	ground	lower part	BOTTOM-REGION	Hausa
jate	shore,land	interior	INSIDE-REGION	Guaymi
bazter	riverside	edge	SIDE-REGION	Basque

share the same perceptual processes, linguistic phenomena based on them should be considered universal. We may, therefore, argue that relational object-part concepts arise from our understanding of the relations among body parts, on the one hand, and environmental landmarks (to a lesser degree), on the other. Any term used to describe relational object parts is a historical development either from a body-part term, or a landmark term. This development has been attributed to metaphorical extension (Brugman 1983; Svorou 1986, 1988; Heine 1989). This point will be discussed later on.

In summary, we have seen that languages provide diachronic and synchronic evidence that relational object-part terms constitute historical developments from body-part terms and environmental landmark terms.

Such diachronic developments are the first step towards their grammaticization, as we will see in section 3.5.

3.4 *Abstract spatial notions*

In several languages spatial grams are similar to nouns which express abstract spatial notions such as length, proximity, direction, circumference, etc., as in the following examples.

Tigre	*šankat/šanak* "towards"	< *šänäk* "direction"
Melanesian Pidgin	*lɔŋ hæf* "towards"	< *lɔŋ* "in, to, at, etc" + *hæf* "direction,place, etc"
Kui	*bahta* "from"	< *baha* "place"
Bihari	*sacchaṛ* "in front of, before"	< ~ *SKT sakaça* "presence"
Mid.Welsh	*ar hyt* "along"	< *ar* "on" + *hyt* "length"
Md.Greek	*kata mikos* "along"	< *kata* "in, concerning" + *mikos* "length"
Basque	*ondoan* "near"	< *ondo* "proximity" + *-an* (LOC)
Bihari	*bhare* "on,dependent on"	< *SKT bhará* "burden"
Basque	*artean* "between"	< *arte* "interval" + *-an* (LOC)
Bihari	*bica* "between"	< ~ *OIA vyacah* "wide space"
Hungarian	*között* "between"	< *köz* "space in between"

In some of these cases the directionality of the relationship is known, namely in the Basque, Tigre, Hungarian, Modern Greek and Melanesian Pidgin grams. The Bihari forms are related to Sanskrit forms, and we do not know whether in early Maithili (a Bihari dialec) the nouns had the abstract spatial sense. The Mid.Welsh and Md.Greek are clearly derived from the combination of an abstract spatial noun and a preposition. The Kui derivation is far less clear.

Development of spatial grams from such abstract notions is obviously not common. From the few cases I have found it is not determinable what the motivation of such developments might be. It may have to do with the stage of evolution a language is at, or the level of education of its speakers.

To summarize this section, three models describe the findings and make predictions about the nominal sources of spatial grams. The anthropomorphic model is the most common, while the zoomorphic and landmark models complement it (and sometimes compete with it). All three models make predictions about the development of FRONT-REGION, BACK-REGION, TOP-REGION and BOTTOM-REGION grams. The anthropomorphic model is by far the most common source of such grams, as is shown in

Table 7: The distribution of the sources of spatial grams

	frn reg	bac reg	top reg	bot reg	side reg	med reg	in reg	out	ard	alon	abl	towd	btw
anthropomorphic	27	19	12	6	13	2	8	–	–	–	1	–	–
zoomorphic	2	3	3	1	–	–	–	–	–	–	–	–	–
landmark	3	6	4	1	1	1	2	10	–	1	–	–	–
relational object	7	2	11	6	13	8	8	3	3	–	–	–	–
abstract notions	1	–	1	–	–	–	–	–	–	2	1	2	3

Table 7, while the zoomorphic model is the least common one. SIDE-REGION, MEDIAL-REGION and INSIDE-REGION grams develop most frequently according to the anthropomorphic model. The presence of the landmark model as the source of such grams is almost negligible, while no case was attested that develops according to the zoomorphic model. The landmark model is exclusively present as the source of several directional and path grams, such as ACROSS, ALONG, VIA, THROUGH, although only single cases were attested.

The motivation for the development of specific body-part terms into specific spatial grams lies mainly in the location of body parts relative to the body. Similarly, relative location of environmental landmarks motivates developments from such sources. In addition to location, functional properties of body parts and other forms of experience with landmarks play a role in the kinds of spatial grams that they give rise to. Relational object-part terms were found to develop from body-part terms and, less often, landmark terms, constituting the first step towards grammaticization.

Heine, Claudi and Hünnemeyer (1991) have proposed an implicational scale which makes predictions about the distribution of the body part (anthropomorphic and zoomorphic collapsed into one category) and environmental landmark models in a particular language. Following Fillmore's (1982a) observation that the up/down axis is recognized by the direction of the pull of gravity, whereas the two orientational distinctions, left/right and front/back, are essentially anthropocentric, they present an implicational scale which has the structure

UNDER > IN/ON > FRONT > BACK

and represents a scale of increasing "centricity" where UNDER has the lowest centricity and BACK the highest. This scale is supported by their data

from 125 African languages, and translates into a predominance of the landmark model for UNDER concepts, a single occurrence of a landmark term for IN and FRONT adpositions, and an absolute no occurrence of landmark terms as BACK adpositions. The implication that this scale involves has been formulated as "if any of these spatial concepts is derived from the body part model, then none of the concepts to its right may be derived from the landmark model." (ibid.:130).

While both their data and their cognitive explanation are very convincing for the viability of this implicational scale, in checking with my data I have found several exceptions which would make the implicational scale a less than universal hypothesis.

First, there are languages that develop FRONT-REGION, BACK-REGION, and TOP-REGION grams from landmark terms (see Table 7). We will look at how specific languages support or do not support the claims of this scale, starting with Abkhaz.

Abkhaz has four INTERIOR-REGION grams all deriving from body part terms, and one developing fron an environmental landmark.

-a-g°ə+la "inside"	< *a-g°ə* "heart" + *-la* (preverb)
-a-γra- "inside"	< *a-γra* "stomach"
-ç'ə "inside"	< *a-ç'ə̀* "mouth"
-a-x°+la "inside"	< *à-x°da* "neck" + *-la* (preverb)
a-y°nə+c'q'a "inside"	< *a-y°nə̀* "house"

It has one TOP-REGION gram which develops from a body part term (*a-xə+x'* "above" < *a-xə̀* "head" + *-x'* "in, on, at"), and two grams for FRONT-REGION also developing from body part terms (*a-ç'ə* "in, in front of" < *a-ç'ə̀* "mouth"; *-a-la-* "in, at, in front of" < *a-là* "eye"). The distribution so far supports the hypothesized scale. However, the development of the BACK-REGION grams does not support the scale since it evolves from an environmental landmark term (*a-šta+x'* "behind" < *à-šta* "track, footprint" + *-x'* "in, on, at").

In Tigre, the TOP-REGION gram *ra'as* "on, above, on top of" developed from the body part term *ra'as/r's* "head", the FRONT-REGION gram *'ət 'af* "before" also from a body part term, *'af* "mouth", but the BACK-REGION gram *'asär* "after, following" from an environmental landmark *'ats/'asr* "trace". There is another BACK-REGION gram which has developed from a body part term (*haqo* "after" < *haqw* "loins").

In Navajo, the BOTTOM-REGION gram *bitł'ááh* "underneath, on the bottom" involves the body part noun *'atł'áá'* "rump, buttocks", the FRONT-REGION gram *bi-tsi* "at the head of" involves development from the body part noun *'atsii'* "head, hair", but the BACK-REGION gram *bikéé'* "behind, following" develops from the noun *'akéé'* "trail", an environmental landmark.

In Halia, the BOTTOM-REGION gram *i kopiyna* "under" involves the body part noun *kopi* "buttocks", the TOP-REGION gram *i yeluwna* "on top of, on" comes from the landmark noun *oluna* "cape".

The data from the above four languages make the implicational scale as a universal hypothesis problematic. In fact they reveal a more complex picture because within the same language it is possible to have more than one gram for the same type of region which develop according to different models exploiting body part terms and environmental landmark terms, as is the case in Abkhaz and Tigre.

Now that we have discussed the nominal sources of spatial grams we will proceed to the discussion of the evolutionary path of grammaticization. First we will talk about the evolution of meaning, and then the consequences on the morphosyntactic development.

3.5 *The path of semantic evolution*

In the preceding sections, I have identified two major classes of lexical sources, whose phonological and semantic characteristics are evident in the emerging spatial grams. Partitions of the referential domain of body-part terms and landmark terms correspond, on the one hand, to natural partitions of the human and animal body and the physical environment, and on the other, to partitions of the relational domain of spatial grams.

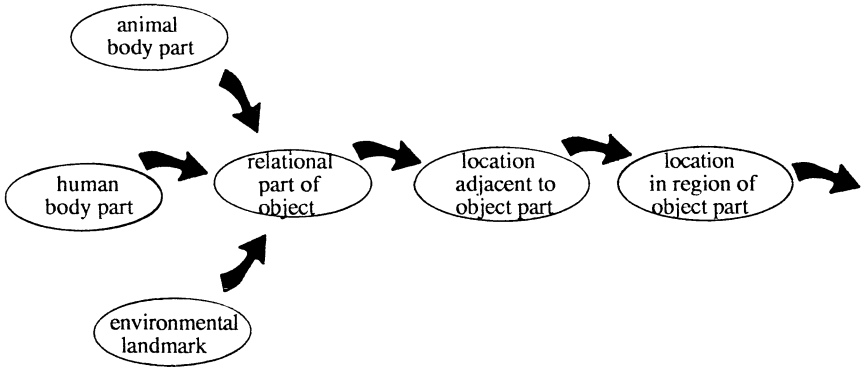
The process by which body-part terms come to encode spatial relations has been described by Brugman (1983) as a semantic extension, by which semantic properties of such terms are abstracted and transferred for the encoding and understanding of other domains. Other accounts consider the nature of this process as metaphorical, consisting of a gradual and continuous transfer from the conceptual domains of body parts and environmental landmarks to the conceptual domain of spatial relations (cf. Heine, Claudi & Hünnemeyer 1987; Heine 1989).

A common treatment of the relation of lexical sources to the emerging spatial grams is the consideration of lexical sources as referentially concrete, having "material content", while the emerging spatial grams as

abstract and non-referential, having "relational content" (Sapir 1921). The development of spatial grams, thus, involves a change in the semantic content of material. Furthermore, this change is gradual and continuous, in the sense that there are no conceptual jumps or gaps. This viewpoint has been adopted for both synchronic (Brugman 1983) and diachronic accounts (Heine 1989), thus showing the conceptual cohesiveness of this developmental process.

Having considered such views, in this section I will attempt a description of the relationship of the lexical sources to the emerging spatial grams on the semantic level, and the process by which such change is effected. Since I see the two questions related I will start by looking at the whole picture of the evolution of spatial grams. Thus, I would like to propose an evolutionary path for spatial grams having their sources in nouns. A schematic representation is shown in Figure 11.

The development of the English locative expression *in front of* will illustrate the various stages. According to the OED, the noun *front* was borrowed from Latin in the 13th century with the meaning "forehead". A century later it was found used in a possessive construction *the front of* to denote the foremost part of objects, for instance in buildings where the inherent front is the entrance side, and later on to denote any side of the



(A) (B) (C) (D)

Figure 11: The evolutionary path of spatial grams from nouns

building depending on the viewer's perspective. Not until the 17th century is it found in a locative expression (*in the front of*) to denote a location in contact with the front part of an object. And only later, in the 18th century, it was used to specify a location near the front part of an object, finally acquiring the meaning of its present form *in front of*.

Heine, Claudi and Hünnemeyer (1987) present evidence from the development of the Ewe noun *megbe* to encode BACK-REGION spatial relations in space and time, and Heine (1989) presents the historical development of the Swahili gram *mbele* "in front" from the now extinct noun **bele* "breast". Both provide further evidence for the succession of the stages proposed in Figure 11.

This path is primarily thought of as pertaining to the diachronic dimension, but since many of the points in its range may be present at a synchronic level as well, we may describe it as a panchronic path. It is represented by a continuum, for every point in its course may be seen as a consequence of a previous one. Nevertheless, ordered stages may be identified. The move from one stage to another does not necessarily eliminate the uses accounted with intermediate stages. The stages of the continuum are not discrete, in the sense that we cannot isolate any particular temporal point at which an evolving form has lost all properties that characterized it at a previous stage. Each stage is characterized by polysemy and the semantic content of the form is structured around a core-periphery schema of uses. The most frequent uses at a particular point in the evolution of a form define the core. Peripheral uses, in time, may become core, thus advancing the evolution of a form. Recurrent use of forms in new contexts provides them with new peripheral uses. Thus, context is seen as one of the factors involved in acquiring new uses (see also Givón 1989).

The properties of the proposed evolutionary path are characteristic of the evolution of grammatical forms in general, according to current grammaticization theory. Let's consider the various stages in more detail.

Lexical items referring to three major classes of entities in our environment, human body parts, body parts of four-legged animals, and environmental landmarks, are beginning points on the path. At a first stage, they are used to indicate relational object parts. The motivation for the acquisition of such uses, as we saw in section 3.3, is the exploitation of perceived similarities between bodies or places and objects. Natural partitions in the human and animal body on the one hand, and the physical environment on the other, correspond to partitions in the region of objects. The basis for

such partitions seems to be the location of functionally relevant parts relative to the whole, as well as certain functional properties without consideration of the relative location. This same basis becomes apparent in the partitioning of regions of objects. Thus, for instance, the relative location of the face with respect to the body, and its communicative importance, corresponds to the relative location and function of fronts of objects: usually, the front of an object is the part which people confront in their interactions with it (e.g the front of a telephone set is the side with the dial). It is important to point out that the face (or eye, chest, or forehead) stands for the FRONT-REGION of the body by synecdoche. Moreover, this partition is meaningful because of its function. It reflects the type of interactions we have with each other and with objects in the world. It is because we interact canonically with each other face-to-face, and not back-to-back, that the FRONT-REGION is partitioned in our bodies. Of course, one reason we normally interact with each other face-to-face is our physiological make-up. When terms for face or eye or forehead are extended to partition and name a FRONT-REGION in objects, not only is reference to the relative location of the body part to the rest of the body extended in the new context, but so are all the functional characteristics of a FRONT-REGION. So the front of a refrigerator is the side with the door that provides access to its interior, i.e. the side we interact with.

The importance of functional characteristics of body parts in the extension of body part terms to refer to parts of other objects is further supported by the consideration of the equivalencies according to the zoomorphic model. Terms for back are being used to partition the TOP-REGION of objects not simply because the back of a four-legged animal is its topmost part (actually the head is still the topmost part), but because the back is the most salient part functionally. Certain four-legged domesticated animals are used as beasts of burden carrying loads on their backs. Their back, therefore, figure prominently as areas of interaction with humans. One further fact that strengthens this position is that, according to Lyle Cambell (personal communication), in several languages of the Mesoamerica terms for human back are used for TOP-REGION concepts as well. In those societies, interestingly enough, humans are used as beasts of burden carrying loads on their back.

The relationship between stage A and stage B has been identified as semantic extension of the meaning of body-part terms (and landmark terms), which is based on a metaphor from the conceptual domain of bodies

to the conceptual domain of objects (cf Brugman 1983; Lakoff 1987; Heine 1989). Since such extensions characterize the evolution of many body-part terms on their way to grammaticization, it has been thought of as a process which characterizes a whole category of concepts, and therefore, constitutes a categorial metaphor (Heine, Claudi & Hünnemeyer 1987).

The nature of such semantic (or metaphorical) extensions has recently received extensive attention (cf. Lakoff & Johnson 1980; Lakoff 1987; Johnson 1987). It has been claimed that metaphorical extensions not only characterize specific conceptual domains, but are the basis of all our linguistic manipulations. I will present some of my views concerning the motivation of such a process, as it pertains to the use of body-part terms and landmark terms as relational object-part terms.

The fact that such extensions appear to characterize the whole domain of spatial relations among entities may be an indication that we understand spatial relations in terms of the domain of body parts or environmental landmarks. Alternatively, the fact that we understand both body parts and object parts in the same way may be due to other factors (e.g. similar cognitive/perceptual processing), and that the use of body-part terms to talk about object parts is a result of purely linguistic evolution which has nothing to do with understanding. These two views make different claims about the interaction of language and understanding, raising many complex issues. The proof of the ultimate validity of one or the other claim should be based upon extensive research, much more extensive than this study reports on. In pursuit of such an ultimate goal, I would like to offer some thoughts on the issue.

Several reasons may be offered to explain why we use the names for the parts of the body to talk about both body parts and object parts. Most frequently, we give names to entities which provide us with concrete sensory experience. Thus, we refer to people, landmarks and artifacts using nouns. Paivio, Yuille and Madigan (1968) report that highly concrete nouns exceed abstract ones at every frequency level in the word population they investigated. Parts of our bodies not only provide us with concrete sensory experience, but also are very salient. Their salience is enhanced by the high rate of interaction with them, which, in turn, motivates high frequency of linguistic reference to them. Our frequent interaction with our bodies and our physical environment gives rise to images from such entities. This claim is supported by the experimental results from English reported in Paivio, Yuille and Madigan (1968). Their study provided subjects' ratings of 925

nouns for concreteness (directness of reference to sense experience), imagery (a word's capacity to arouse non-verbal images), and meaningfulness (mean number of written associations in 30 sec.). Nouns with a high concreteness rating which received a low imagery rating refer to entities such as "armadillo", "chloride", "surtax", etc., with which we interact very infrequently. In contrast, nouns with high concreteness ratings and high imagery ratings refer to entities with which we interact very frequently. Among them were body-part terms and landmark terms.

While several kinds of images may be aroused by body-part terms, the most prevalent one, one may argue, seems to be motivated by the association of specific body parts to the rest of the body as a whole. The prevalence of the particular image is evidenced in the frequency with which it manifests itself in discourse. As Hopper and Thompson (1984) have indicated, body parts very frequently appear in discourse as non-individuating, non-manipulable entities, as part of a whole. This treatment has repercussions on the morphosyntactic status of body-part terms which in many languages carry possessive markers (e.g. Navajo, Island Carib), or appear incorporated into the verbal complex. Woodworth (1986), in a Tuscarora text count of 1000 incorporated items, reports that human and animal body-part terms exhibited the highest percent of incorporation into the verbal complex, although inanimate nouns had the highest n value.

The association of particular body parts to other body parts is spatial. This spatial association is relevant to the way languages create terms for specific body parts, as Andersen's (1978) study has shown. It is basically the spatial association of body parts which provides the body-part term with a relational character. Consequently, the images which represent body parts in our mind are configurations presenting specific part-whole spatial relations. Body parts, however, are further characterized by the different functions they perform in a person's existence and interaction with his/her environment. Such functions are asymmetrically distributed, and almost always correspond to spatial asymmetries. Thus, the upper front part of the body is the locus of most perceptual activity and the locus of all the organs with which people communicate (eyes, mouth, gesticulation space). Such important functional asymmetries not only cannot be ignored, but are central to the way we understand our bodies and their parts. The particular images, therefore, that emerge from the association of body parts to other body parts have a schematic character which includes functional characteristics. They are not simple visual image schemata, but rather draw upon other kinds of knowledge, such as their function, that we have about body parts.[29]

Similar image schemata may emerge from the knowledge people have about particular landmarks. Not only is their relative location with respect to other landmarks in the region of activities of a community relevant, but also information about the kinds of activities such places are associated with. Thus, a house is associated with an image schema of interior not only because it is an enclosed space, but also because it is the most important enclosed space within which indoor-type of activities take place. This contrasts with a field, which is associated with an image schema for exterior. Fields are not only open spaces, but the spaces where important, life-sustaining activities, such as cultivating, take place in rural, agricultural communities. The particular kinds of image schemata emerging from landmarks tend to be culture-specific, more so than the ones emerging from body parts, due to differences in the geographical environment in which cultures are developed and exist, and the existing socio-economic conditions. Some landmarks, such as the sky or the ground, however, are universal, and are therefore expected to be associated with similar image schemata, such as the up and down directions.

Since all people share the experience of bodies, image schemata emerging from relations among body parts should be part of their conceptual inventory. Similarly, members of the same community may share the experience of landmarks, and consequently, image schemata emerging from them. Considering their continued reinforcement by recurrent experience, they should be easily manipulable. One kind of manipulation is the exploitation of such image schemata for the spatial understanding of other physical entities in the world. Thus, a specific image schema which emerges from the relation of the face to the rest of the body may be used for the understanding of other entities which have, or may be construed as having, asymmetries similar to those of the human body.

The spatial relations which underlie the structure and content of specific image schemata represent the interaction of: a) the size of the body part or landmark; b) its distance to, and/or size of other body parts or landmarks; c) the larger area within which it is included, which in the case of body parts is, of course, the body, but in the case of landmarks is the next largest, relevant area surrounding it; and, d) a functionally determined use-space around the body part or landmark.

Let's consider one body part example. We saw that in several languages terms for eyes, face, mouth, forehead and chest are used to refer to FRONT-REGION of objects. A front image schema is the intersection of the

perceived size and distance of each of these body parts relative to the rest of the body, and other parts, such as the back or the feet, and their use-space. Their use-space is determined by their prominence and salience as the parts involved in the canonical face-to-face interaction of humans among themselves and with other entities, and by the fact that they are the locus of most perceptual activity, and are facing in the canonical direction of motion.

These parameters, which underlie the structure of specific image schemata emerging from body parts, are the same ones which underlie the specification of partitioned exterior regions of entities (see chapter 1, section 2.1.1). We can conclude, then, that the image schemata represent natural partitions of the human body into regions. The exploitation of specific image schemata to understand parts of other objects involves, therefore, partitioning of regions of those objects in such a way as to correspond to the partitioning of the human body (and similarly, the four-legged animal body).

Such image schemata are used not only for partitioning of objects with inherent asymmetries, but also for symmetrical objects. In such case, not only are the relevant partitions imposed, but so are certain asymmetries. These asymmetries do not emerge from the spatial configuration of the object (for it is symmetrical), but from the situational interaction with the observer (see chapter 1, section 2.1.4, Reference frames). Thus, the front of a ball is the part facing the observer at the moment of observation, and its back the part which is out of his/her sight, according to one strategy.

The process by which we understand spatial partitions of objects according to spatial partitions of the human body or the physical environment constitutes an example of a metaphor. This particular metaphor is reflected in the use of a body part term to refer to an object part on its way to grammaticization.

To this point, we have explored the nature of the process by which body-part terms (and, less often, landmark terms) are used to refer to object parts, and have considered some of the consequences. According to the proposed evolutionary path, the next identifiable step in the evolution of spatial grams is the use of relational object-part terms to specify the location of an entity contiguous or adjacent to the referred relational object part. The transition from one stage to the next may be justified and motivated if we consider for a moment the theory of locating entities in space, as it was presented in Chapter 1, section 2.1. — i.e. that we locate entities

with respect to other entities in a relativistic way and not absolutely. The basis for the assignment of specific spatial relations is the perception of asymmetries between entities. Perceived asymmetries also define relational parts in objects, which are framed by specific image schemata.

Entities interact with one another in a number of ways. If two entities are contiguous to one another, their relation may be simply specified as one of contiguity. Desired higher degrees of explicitness, however, may require further specificity in the way the relation of the two entities is described. If one of them has identifiable asymmetries which may be framed by a specific image schema then the entity to be located may be seen in a relation to the particular region of the object, as opposed to the whole object. Thus, image schemata arising from asymmetries of bodies (and landmarks) motivate corresponding partitions of regions in other entities, which, in turn, provide the asymmetries required for locating other entities.

The extension of a term which describes a relational object part to describe a spatial relation has been claimed by Heine (1989) and Heine, Claudi, and Hünnemeyer (1991) to be yet another example of a categorial metaphor from OBJECT to SPACE, thus recognizing the existence of two separate conceptual domains, the domain of objects and the domain of space and spatial relations.

The next stage of the evolution of spatial grams identifies the use of locative terms to specify location of a Trajector with respect to a Landmark to which it is not contiguous, but in the vicinity of. Entities may be seen in a spatial relation even if they are not contiguous. Asymmetries not only in distance, but also the configuration of other entities may determine specific construals of spatial arrangements. In order for a partitioned region of an object to specify the location of other entities in its vicinity, its relevant region should be expanded. Expansion of regions is an outcome of recurrent interaction with entities. In that respect, region expansion causes the modification of image schema which originated in the recurrent interaction with bodies.

The transition from a stage where a term is used to specify location of a Trajector which is contiguous to a part of the Landmark to the stage where the term is used to specify location when the Trajector is not adjacent to a part of the Landmark involves a different type of conceptual process. Although metaphor seems to be the driving force of the chain of changes in the first two stages, in this last one it cannot be justified because it also involves the same conceptual domain as its predecessor. Rather,

another process seems to be responsible for this latter development. Conceptually expanding the region of an object (here, the Landmark) from the boundaries which coincide with the boundaries of the object itself to boundaries that go well beyond its physical domain is accomplished by a process which is reflected in the linguistic process of metonymy, i.e. using a term that refers to an entity to refer to another entity contiguous with the first. The use of spatial terms to refer to locations in regions of objects metonymically is motivated by our ability to recognize spatial relations among entities even though they are not in contact.

There have been several suggestions regarding the relation of the source to the outcome of grammaticization (see Heine, Claudi, and Hünnemeyer for a comprehensive account). Among them, the suggestion that grammaticization is metaphor-driven offered by Sweetser (1988, 1990) is relevant to the current discussion. According to Sweetser, grammaticization involves metaphorically transferring an image-schematic structure from one conceptual domain to another preserving its structure. If we apply that idea to the grammaticization of spatial grams, then the implication is that the image schema that is associated with a body part term or environmental landmark term as the beginning of the grammaticization path will be preserved throughout the path to the later stages. The idea of image-schema preservation seems to find support in the stages of grammaticization that are affected by metaphor, that is stages A through C in Figure 11. The image schema motivated by the relative location of body parts or landmarks within the body or the larger physical environment respectively and its function is retained and is responsible for our conceptualization of an equivalent relational object part, and it is, furthermore, present in the conceptualization of a location adjacent to that relational object part. The structure of the image schema is, however, affected at the next stage of grammaticization, which is not effected by metaphor, but rather metonymy.

A clear example of how certain characteristics of an image schema are affected is provided by the grammaticization of body part terms such as "blood", "stomach", or "heart" to specify INSIDE-REGION relations (see the anthropomorphic model, section 3.1.1). An image schema of such body part terms at the beginning of a grammaticization path would be based on the relative location of such body parts to the rest of the body. The relevant relation of blood, stomach or heart to the body is that of inclusion, whereby those organs are located within the boundaries of the body, and are con-

tained by it totally. INSIDE-REGION grams, although they may evolve from such terms, may be used at stage D in the continuum (Fig. 11) to specify location of the Trajector within the INSIDE-REGION even when there is no implication that the relation of the Trajector to the landmark is that of topological inclusion. In Papago, the noun *?e?eḍa`* "blood" is metaphorically related to *?eda`* "interior, inside, pulp, kernel" and is also used as a spatial gram specifying INSIDE-REGION relations as in the following example:

(22) Papago (Mathiot 1978:405)
...c ?an hadadx ?an g?eda hega?i kox...
...and he puts them (the eggs) in that nest...

The gram, in specifying the spatial relation between the eggs and the nest, does not have any implications as to the total inclusion of the Trajector within the landmark. Furthermore, from what we know about eggs in nests, it is required that they are not totally enclosed in the nest so that the birds will have access to them.

For the image schema of inclusion supported by the source body part "blood" to apply to a spatial relation which holds between a Trajector and a Landmark in which the Trajector cannot be claimed to be topologically included in the Landmark, certain modifications have to take place which entail that the original image schema is not preserved unchanged throughout the grammaticization path.

In summary so far, the evolution of spatial grams from nominal sources involves a continuous path in which several stages can be identified. Two processes, metaphor and metonymy, have been held responsible for advancing grammaticization, the former operating at early stages of the process, and the latter at later stages. Grammaticization has been described as a rather complex process which involves semantic changes by transferring image-schematic structures from one conceptual domain to the next via metaphor, and by transforming image-schematic structures within the same domain via metonymy.

The two processes, metaphor and metonymy, have different implications for the pace of grammaticization. A common claim is that grammaticization is a process in which a lexical form advances gradually to full grammatical status, both in terms of semantics and in terms of morphosyntax, passing through identifiable stages (Bybee and Pagliuca 1985, 1987). It would, however, be rather unfounded to claim that metaphor-driven changes are gradual when all that is involved is a recognition of similarities

between two domains and the recruitment of the linguistic means for describing one to describe the other. Cognitively, this process seems to be basic, and human minds are organized around such analogical structures (Lakoff and Johnson 1980; Lakoff 1987). Any gradualness in change should be due not to the conceptual leap that has to be made, but rather to the process of conventionalization within the linguistic community.

A metonymy-driven change may be considered to be more gradual because it involves considerations of context. In order for a spatial gram encoding location adjacent to the front part of an object to be extended to encode location in the FRONT-REGION of an object, the FRONT-REGION has to be specified. Region partition involves recurrent interaction with entities and is based on knowledge of both the physical and functional characteristics of an entity. Furthermore, since it is not only the specification of the FRONT-REGION by one speaker that has to take place but this specification has to be conventionalized combining the common experiences of speakers with particular entities, the position on the gradualness of such changes is further reinforced. In chapter 4 we will see another example in support of the gradualness of metonymy-driven changes.

The semantic stages identified in the continuum of the evolution of spatial grams constitute the core of uses that grams have at particular synchronic slices. Several peripheral uses may be present in each one of the stages. The motivation for the various peripheral uses emerges from conceived implications of specific construals of spatial arrangements. Such conceptions may give rise not only to other spatial uses, but also several nonspatial uses. Inferential mechanisms may be postulated to mediate the core and the periphery of uses. A detailed discussion of issues related to the relation among uses is presented in chapter 4, for FRONT-REGION and BACK-REGION grams from 18 languages (see section 4).

3.5.1 *Morphosyntactic consequences*

Current grammaticization theories (Bybee & Pagliuca 1985, 1987; Bybee, Pagliuca and Perkins 1988; Givón 1975; Heine & Reh 1984; Heine, Claudi, and Hünnemeyer 1991) hold that the emergence of grammatical forms out of lexical items entails changes not only in the semantic content, but also morphosyntactic status of those forms. Lexical items on their way to grammaticization gradually lose their lexical characteristics giving way to more grammatical ones. Considering such claims, a continuum of the morphosyntactic evolution of spatial grams may be proposed, which may be rep-

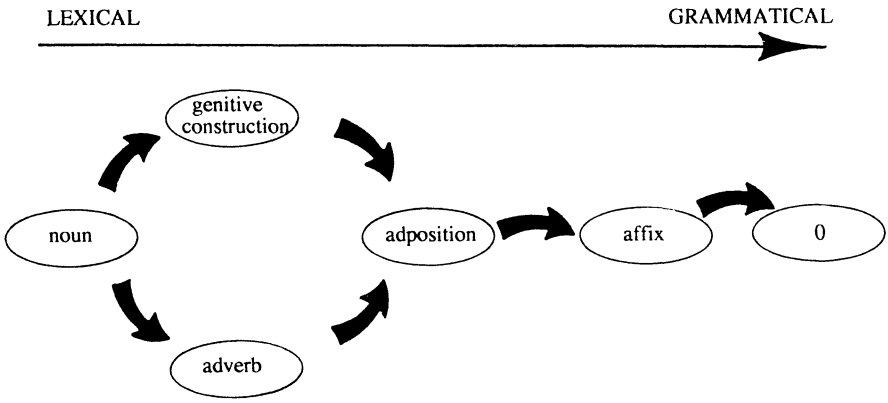


Figure 12: The continuum of morphosyntactic evolution of spatial grams.

resented schematically as in Figure 12. It constitutes an adaptation of the continuum proposed in Svorou (1986).

According to this continuum, lexical material in the form of a noun becomes grammatical, after passing through a stage at which it is frequently used in a genitive construction encoding the part of a whole, a stage at which it assumes adpositional functions but is still an independent form, and subsequently arriving at a stage at which it is bound to another form as an affix. The continuum branches off after the first stage to another series of morphosyntactic changes which includes a stage at which adverbial uses figure frequently, before the adpositional stage is reached.

Several changes occur in the course of the evolution of a gram. These changes affect the autonomous character of its source, which becomes dependent on some other lexical item and assumes a fixed position. In addition, they affect the freedom with which the form receives modifiers, and finally, its phonological resemblance to its source. Such changes are gradual, affected by the frequency with which new uses of a form occur in accordance with the typological characteristics of a particular language.

The evolution of a lexical item, such as a noun, into a grammatical item entails many changes in its formal properties. Nouns are syntactically free forms, which may be found in many positions in a stretch of discourse; they may be modified by possessive and descriptive adjectives, demonstratives, definite and indefinite articles, and numerals; finally, they may carry mar-

kers of gender, number, case or noun class. To qualify for grammatical status, a lexical item should have lost its ability to be modified by free and bound elements and its independence in appearing in different positions within the sentence, and assumed a fixed position. Such changes are radical, and we would not expect them to happen arbitrarily to any noun. As we have already seen, the sources from which spatial grams emerge constitute cross-linguistically a very small class of nouns, referring to body parts and environmental landmarks (we ignore for the moment the abstract spatial notions). The small size of this class indicates, on a semantic level, the centrality of the referents of such nouns to our understanding of space. If the non-arbitrariness of the sources of spatial grams is to be fully supported, the class of nominal sources should share morphosyntactic characteristics which would facilitate their evolution into spatial grams. In fact, as Hopper and Thompson (1984) suggest, body-part terms do share morphosyntactic characteristics, which are due to their relational character. Body parts are typically treated in discourse as dependent entities, reflecting their physical attachement to the body of their "possessors". In many languages, as they show, body part terms are treated as inalienably possessed, receive the appropriate possessive pronouns, and require an additional marker of alienable possession if they are talked about as detached entities. Furthermore, in languages with noun incorporation, body parts are most frequently incorporated to the verb (Mithun 1984, Woodworth 1986). In addition, body-part terms are usually deprived of certain modifiers, such as descriptive and possessive adjectives, and demonstratives. These characteristics of body-part terms, evidenced across languages, suggest a low degree in categoriality as nouns (Hopper & Thompson 1984). In other words, they are peripheral members of the category of nouns, and as such, constitute good candidates for grammaticization.

At the first stage of their semantic evolution, body-part terms are used to refer to relational object parts. This transition does not create much morphosyntactic activity. In fact, in most of the attested cases in which there is evidence for a relational object-part term deriving from a body-part term, the form is the same. Some examples are:

Abkhaz	*avara*	"flank, side"
Basque	*bazter*	"riverside, edge"
Car	*kú:?*	"face, surface"
Guaymi	*jate*	"shore, land, interior"

Halia	*mata*	"eye, face, front"
	muri	"back, backside"
	kopi	"buttocks, bottom, underside"
Shuswap	*ikn̓*	"upper back, top surface".

In two languages, grams which are compounds of a body-part term and a noun glossed as "side" constitute exceptions:

Guaymi	*trokiri* "back"	: *trö* "back" + *kiri* "side"
Karok	*ʔá:vkam* "front"	: *ʔá:v* "face" +*-kam* "side"
	vásihkam "back"	: *vásih* "back" + *-kam* "side"
	iθvá:ykam "front"	: *iθvá:y* "chest" + *-kam* "side"

Frequent use of a relational noun in genitive constructions to show a part-whole relationship advances the grammaticization to the next stage. The existence of this stage has been suggested by several researchers (Givón 1975; Heine & Reh 1984; Heine 1989; Lehmann 1985; Kahr 1975) for many languages. The precedence of this stage to the adpositional stage is evidenced by the existence of genitive markers on adpositions or on adpositional constructions. A parallel development leads to the adpositional stage via an adverbial stage.

The necessity to postulate alternative routes to the adpositional stage initially arose from the consideration of certain data which cannot be accounted for if the genitive construction stage and the adverbial stage are on the same path, irrespective of their ordering. In particular, according to Heine (1989), a development from a genitive construction to an adverb cannot be justified for Ewe, in which a noun such as *megbé* "back" is used as an adverb ("behind"), and there is nothing to support a claim that it necessarily goes through a genitive construction stage. Moreover, a hypothetical sequence of stages from genitive construction to adverb to adposition is refuted by Swahili and Hausa data. In these languages, the existence of genitive markers in adpositional constructions but not in adverbial constructions, indicates that an adpositional stage is a direct step from the genitive construction stage.

Data from the languages of my sample support the hypothesized alternative routes from noun to adposition. They are divided according to the route they follow: some develop adpositions from genitive constructions, others from adverbial constructions. In pursuit of an independent motivation for the observed variation, I hypothesized that whether a language develops adpositions from genitive constructions or whether it develops

them from adverbial constructions may be predicted by the morphosyntax of the adpositional constructions and the position of genitive markers (GEN) within them in that language. Specifically, the following predictions were made:

If adpositional constructions are patterned as

PATTERN 1 { PREP GEN N / or / PREP-GEN N } or { N GEN POSTP / or / N GEN-POSTP }

then adverbs do not figure in the evolution of the adpositions, and the previous evolutionary stage is a genitive construction.

Alternatively, if adpositional constructions are patterned as

PATTERN 2 { PREP N-GEN / or / PREP N } or { N-GEN POSTP / or / N POSTP }

then the previous evolutionary stage is an adverbial construction. In these languages, we find adpositions consisting of a combination of an adverb and an adposition.

Note that Pattern 1 corresponds to head-marking, and Pattern 2 to dependent marking, as suggested by Nichols (1986).

Twenty languages from my sample provide support for the predicted regularities. Specifically, in the first case, when a genitive marker occurs between the adposition and the noun in either a prepositional or a postpositional construction, either as a free form or as an affix on the adposition, the adverb corresponding to the adposition does not carry any possessive markers. The data are summarized in Table 8.

The pattern PREP-GEN N was not attested in the languages of my sample, but it characterizes the Hausa adpositional constructions, as Heine (1989) reports. Furthermore, the N GEN POSTP pattern has not been attested at all.

In Abkhaz, a few other adpositions are reported to have adverbial uses, in addition to those shown in Table 8, including *a-y°ə+c'q'a* "inside", *àpx'a* "in front of", and *à-štax'* "behind". The form of the adverb in these cases is the same (Hewitt 1979:54).[30]

Table 8: Languages for Pattern 1

Pattern	Language	Adverb	Adposition
PREP GEN N	Bari	*i swöt* "at the side" *i mukök* "finally, afterwards"	*i swöt na* "beside" *i mukök na* "behind"
PREP-GEN N	Hausa	*cíkì* "inside"	*cíkí-n* "inside" (stomach-gen)
GEN-PREP N	Isl.Carib	*ónabu-giẽ* "down, below"	*ónabu-giẽ* "below"
N GEN POSTP	—	—	—
N GEN-POSTP	Abkhaz	*xəx'* "upstairs, above" (head-on) *c'a*+q'à "downstairs, below" *àayg°a* "near"	*a-xə+x'* "above" (3SG POSS PRO-head+on) *a-c'a+q'à* "under, below" *a-z-àayg°a-ra* "near to"
	Navajo	*yaa* "down" *de* "up" *naa* "across, on the side"	*bi-yaa* "under" (3SG POSS PRO-down) *bi-de* "up, above" *bi-naa* "across"

In Navajo, only the three adpositions shown in Table 8 may function as adverbs, in which case, the possessive pronominal prefix *bi-*, which accompanies all postpositions in the language, is not present (Young & Morgan 1980:73).

Finally, the Island Carib preposition *ónabu-giẽ* is the only preposition which has an adverbial function, and the only one which does not carry a possessive pronominal prefix, *l-* (MASC)/*t-* (FEM), which appears on all adpositions (e.g. *l-anágagiẽ* "behind"; *t-áubagiẽ* "beside").

These cases show that adpositions are evolutionarily related to genitive constructions, but that adverbs constitute another development. The low frequency with which adpositions may have adverbial functions in Abkhaz, Navajo, and Island Carib is an additional indication that adverbs do not figure prominently in the evolutionary path, but constitute peripheral uses.

The rest of the languages are characterized by the fact that genitive markers are either non-existent in the adpositional constructions, or, if present, are suffixes/ case markers on the nouns in the scope of the adposition. The data are summarized in Table 9.

The PREP N-GEN pattern was not attested in the languages of my sample, but evidence is provided from Ancient Greek, in which such adverbs as

anō "up" and *katō* "down", when associated with nouns marked for genitive, constitute adpositional constructions.

In languages with PREP N patterns, adpositional constructions do not have any genitive markers. The adpositions are either the same as the adverbs they correspond to (Halia), or consist of the adverb plus an adposition with general locative meaning (Tigre, Melanesian Pidgin). In Mwera, the adposition carries a locative noun class marker, while the adverb does not. Other languages in which this pattern was attested are Car and Palantla Chinantec.

The N-GEN POSTP pattern is exemplified by Bihari and Basque. In both cases, adpositions correspond to adverbs either identically (Basque), or partly (Bihari). The nouns in the scope of the adpositions are marked for genitive case (Bihari), or some other case required for such constructions in the language (Basque requires nominative). Kui exhibits this pattern also.

Finally, the N POSTP pattern, with no genitive marking, figures in the majority of the languages. The correspondence of the adposition to the adverb is either identical (Guaymi, Karok), or partial with an additional adposition forming the adpositional construction. The Haka postposition *pin lé ya* "on the other side, opposite to" is of particular interest. It consists of *pin* (a nominal for which no gloss was provided), plus *lé* "side", and an adposition *a* "in, into". The adverb corresponding to it, *pin lé*, contains the nouns for "side", but not the adposition *a*. This constitutes evidence not only of the adverb > adposition development, but also for the precedence of the stage in which a noun such as "side" is used, reflecting the encoding of relational object parts. Other languages exhibiting this pattern are Chacobo and !Kung.

The languages in Table 9 present evidence in support of the proposed route to adpositions via an adverbial stage. Moreover, the existence of genitive markers in adpositional constructions, as well as their position and fusion with either the adposition or the noun, is consistent with the way genitive constructions figure in a particular language. A detailed description of the correspondence of some of the languages of my sample is given in the next chapter, in conjunction with the morphology of FRONT-BACK-REGION grams.

Considering such a correspondence, the alternative routes to the adpositional stage represent, perhaps, typological differences among languages, as indicated by the independent and non-arbitrary developments.

Table 9: Languages for Pattern 2

Pattern	Language	Adverb	Adposition
PREP N-GEN	Anc.Greek	*anō* "up" *katō* "down"	*anō* N-GEN "above" *katō* N-GEN "under"
PREP N	Halia	*i yelesala* "outside" *i lehana* "far"	*i yelesala* "outside of" *i lehana* "far from"
	Mwera	*nkati* "to the middle" *mujo* "in front" *nani* "outside"	*kukati* "to the middle of" *kumujo* "in front of" *kunani* "outside of"
	Tigre	*la`al* "upwards" *tahat* "downwards"	*mən la`al* "above, over" *mən tahat* "under, below"
	Melanesian	*ənənit* "underneath"	*ənənit lɔŋ* "underneath"
	Pidgin	*antap* "above" *arade* "at the edge" *awtsajt* "outside"	*antap lɔŋ* "above" *arade lɔŋ* "beside" *awtsajt lɔŋ* "outside of"
N-GEN POSTP	Basque	*beiti* "down *goiti* "up"	N-NOM *beiti* "below" N-NOM *goiti* "above"
	Bihari	*upári* "upon, above" *andar* "within"	N-GEN *upara* "upon" N-GEN *andara* "inside"
N POSTP	Dakota	*hakáp* "after" *héktab* "back" *kuk'úl* "downward" *k'iyéla* "near" *t'okáp* "ahead" *t'ākál* "outside"	*ihákab* "behind, after" *ihéktab* "behind" *ihúk'ul* "under" *ik'íyela* "near to" *it'ókab* "in front of" *it'ánkal* "on the outside of"
	Guaymi	*ngabare* "lengthwise"	*ngabare* "along, beside"
	Haka	*pin lé* "to the opposite side" *chún* "inside" *luk* "in the middle"	*pin léya* "on the opposite side of" *chún na* "in, into" *luk ka* "in, into, through"
	Karok	*iθvá:ykam* "in front" *vásihkam* "behind" *?á:vkam* "ahead" *pi:mač* "next"	*iθvá:ykam* "in front of" *vásihkam* "behind" *?á:vkam* "in front of" *pi:mač* "next to"
	Papago	*mia* "nea by"	*miabi'Dk* "near, close to"

The emerging adpositions may exhibit varying morphological structure across languages. Adpositions may be monomorphemic, or polymorphemic, further presenting various patterns. The internal structure of the emerging adposition depends not only on the source it derived from and the route it followed to its current status, but also its semantic content. This point has been investigated for two types of spatial grams, FRONT-REGION and BACK-REGION, and is discussed in Chapter 4, section 5.

Adpositions may retain their status as independent units in a language for a long time, or they may become gradually bound. It is generally accepted, for example, that the Indo-European case affixes were free adpositions at one point, which were reduced and became bound. In order for affixation to occur, there should be no obligatory elements (case markers, gender/number markers) intervening between the adposition and the noun, and the number of optional elements, such as modifiers, allowed in that position should tend to zero. Thus, in Papago, the postpositions have affixal form, such as *cai-webi'G* (bush-behind) "behind the bush", and *mo'o'be'dame-dagio* (hunters-in.front.of) "in front of the hunters". The only element which may intervene between an adposition and a noun is an inalienable possession marker, which is optional, and, furthermore, infrequent. Frequency of co-occurrence of an adposition with specific elements may further facilitate affixation. Thus, in several languages (Abkhaz, Chacobo, Dakota, Haka, Navajo, Papago, Tigre, among others), adpositions are affixed to pronominal scope elements, but are free with respect to nominal scope elements. This is an effect of both high frequency of occurrence of such grams with the pronouns and the very small number of elements intervening between the gram and the pronoun, modifying the pronoun (For a more detailed discussion of this point, with reference to FRONT-/BACK-REGION grams, see Chapter 4, section 5.1.2).

Another process leading to affixation of grams has been described by Nichols (1986) as "headward migration". In such a case, the gram is affixed not to the noun, which is in its scope, but rather to the verbal complex. Two languages in my sample, Navajo and Abkhaz, provide evidence for this process. This is a complex process, the investigation of which has not been undertaken in this study.

The process of affixation has not been investigated in depth in this study. It constitutes one of the crucial points for the full consideration of the grammaticization process. It concerns not only how it happens, but also whether all spatial grams may be affixed, fused and reduced to the same

degree. From what we know, they do not grammaticize to the same degree; one reason may be their semantic properties. If we compare the meaning of locative case markers, for instance, to the meaning of spatial grams such as FRONT-REGION, TOP-REGION, etc., the differences in the degree of specificity in encoding spatial relations is obvious. From such considerations we may hypothesize that grams encoding such relations as FRONT-REGION, BACK-REGION, etc. do not grammaticize enough to become obligatory and assume case marking roles.

Having considered various aspects of the grammaticization process of spatial grams which have their source in nouns, we now proceed to the consideration of some issues pertaining to the development of spatial grams from verbs.

4. Verbal sources

The verb has been extensively identified in the literature as another core source of spatial grams. Kahr (1975), investigating a number of languages, offers examples of adpositions deriving from two distinct morphosyntactic modes of the verb: from participles, and from serial-verb constructions. While her discussion of the development of adpositions from serial verbs is quite extensive, she has very little to say about participial sources except that they involve a semantic shift "which disrupts the normal derivational relationship between the participle and the verb"(:33). A similar shift, she notes, occurs in the verb-serializing constructions.

Discussions of the development of spatial grams from verbs have been primarily concerned with the structural changes that take place in the path from a verb to a grammatical form. The alleged intermediate stages named serial-verb constructions and participles are basically descriptions of the formal properties of the items involved. The semantic import of such constructions to the grammaticization process of spatial grams has not been explored, to my knowledge. In this section I discuss the verbal path of the evolution of spatial grams from the point of view of such constructions, and then make some preliminary hypotheses on the semantic change involved in the evolution of grams from verbs.

4.1 *Serial-verb constructions*

Serial-verb constructions have been found to characterize only certain language families, such as Niger-Congo languages (Kwa:Ewe, Twi, Yoruba, Igbo, Nupe, Ga-Adanme, and Gur, Kru, Ijo), Sino-Tibetan (Chinese), and Altaic (Turkish), and other languages such as Vietnamese and Korean. Verb serialization has been treated as a syntactic phenomenon with consequences in morphology and semantics. In that view, serial-verb sentences consist of a subject followed by two or more predicates, where the first nominal is the subject of both predicates (Li & Thompson 1973). Serial-verb type constructions are very common in the languages they occur in, and express a variety of relationships among the events described by the verbs in the series such as purpose, simultaneity, consecutiveness. The relation of verb serialization to spatial notions is confined, however, to constructions labeled "Co-verb constructions" (Sino-Tibetan), "Converb constructions" (Altaic) or "Verbid constructions" (Niger-Congo). Each one of these terms is traditional among researchers of the particular language family cited. I will use the label "Co-verb".

Ansre (1966) describes "verbids" as morphemes which combine with a nominal group to form an adverbial group, while Li & Thompson (1973,1974) agree that "co-verbs" in Chinese are words which always take an object.[31] In other words, they behave just like adpositions. Both agree that co-verbs form a closed class of morphemes which have similar characteristics: they are homophonous with a verb, but fail to exhibit verbal properties; grammatical notions relevant to verbs such as person, number, tense, aspect are not marked on them, despite their obligatoriness in the language. This is an important characteristic that distinguishes serial-verb constructions, which may accept person-number and/or tense-aspect marking, from co-verb constructions, which may not.

While most co-verbs present synchronic affinities with verbs, there are cases where this is not true. In such cases, there is historical evidence, however, that there was a similar verb in a previous stage in the language. Such evidence is considered by Li & Thompson (1974), Givón (1975), and Heine and Reh (1984) as indicative of a diachronic process according to which certain verbs occurring in serial constructions were gradually "reanalyzed" as adpositions. Some of the co-verbs have phonological similarities with some verbs, while others do not.

Unfortunately, the information available about the languages in my sample did not yield any data on serial verb constructions. This is one of the disadvantages of random samples of this size. On the other hand, it shows that the phenomenon is not very widespread among the languages of the world, but rather, it is a characteristic of certain language families, and not a defining one, since it appears in only some of their members. Despite that, I believe that it deserves some attention. I consider the data available from the studies of Li & Thompson (1973,1974), Givón (1975) and Kahr (1975) in an attempt to create some hypotheses about the development of adpositions from verbs and the principles that govern it.

Givón (1975:82-84) used three criteria in identifying what he considered verb to preposition "reanalysis": (a) *semantic,* which "...involves the *depletion* of some semantic material out of the erstwhile verb", (b) *morphological*, which involves "...the loss of ability to take normal verb affixes, such as modalities, subject agreement or object pronouns", and, finally, (c) *syntactic*, "when a verb is semantically reanalysed as a preposition ..., quite often it remains, for a long time afterwards, at its original serial-verb position". He stressed, however, that the "reanalysis" is gradual. As a result, it is possible to evidence cases where a verb loses its characteristics in certain environments only, cases where it functions as an adposition most of the time, but can be found in its predicate function ("co-verb"), and cases where that function has been completely lost ("adposition"). We can, therefore, identify three stages in the evolution:

VERB > SERIAL-VERB > CO-VERB > SPATIAL GRAM

Gradual structural changes, although very indicative of evolutionary activity, do not provide all the information required to discover the motivation for such changes. In order to discover what motivates such an evolution, we should look at the semantics of the source verbs in comparison to the resulting spatial grams. A preliminary classification of the available data according to the meaning of the grams is presented in Table 10.

An important observation about these data is that all but one of the notions expressed by the grams are *directional*, i.e they express dynamic spatial relations between a Trajector and a Landmark. For instance, in Krio the allative gram *go* comes from the homophonous verb *go* "to go". In Ijo, the gram for "down", *kóro*, comes from the verb *kóro* "to fall". In Korean *puthę* "from" comes from the verb *putta* "to pass by". The only non-dynamic notion expressed by the grams is that of conveying a regional

Table 10: Data on the development of spatial grams via verb serialization.[32]

Language	*Spatial Gram*	*Related verb*
REGIONAL < "to be at", "to sit", "to live"		
Ewe	*le* "at"	*le* "to be located/at"
Twi	*wɔ* "at"	*ɔwɔ* "to be at"
Chinese	*zái* "at, in"	*zái* "to be at"
Korean	*-da* "at"	*ida* "to be"
Yoruba	*ka* "in, at"	*ka* "to rest"
ALLATIVE < "to see", "to take", "to go", "to come"		
Krio	*go* "to"	*go* "to go"
Korean	*poda* "to, than"	*poda* "to see"(Prs.Ind)
	tere "to, IO,	*tere* "to face, turning towards"
Ijo	*àkɻ* "to"	*àkɻ* "to take"
Ewe	*dé* "to"	*dé* "to reach"
ABLATIVE < "to exit", "to leave", "to go"		
Korean	*puthę* "from"	*putta* "to pass by"
Ijo	*dùo* "from, along"	*dùo "to go"*
Krio	*kam ət* "from"	*kam ət* "to come out"
Turkish	*kal-a* "from, remaining"	*kal* "to remain"
(used in frozen expressions:Kahr 1975:37)		
Ewe	*tsó* "from, by"	*tsó* "to come from"
VIA < "to pass"		
Turkish	*geç-e* "past"	*geç* "to pass"
Ewe	*tó* "via, by, because"	*tó* "to pass by"
DOWN < "to fall", "to descend"		
Ijo	*kóro* "down"	*kóro* "to fall"
UP < "to rise", "to climb" (no examples)		
INTERIOR < "to enter" (no examples)		

meaning. Consider the following: the Ewe *le* "at", which comes from a homophonous verb meaning "to be located at", and the Chinese *zái* "at, in", which comes from the verb *zái* "to be at".

In each case, there is a parallelism in meaning between the verb and the gram with respect to the static / dynamic distinction: dynamic motion verbs evolve into directional or path grams, and stative verbs into locative grams. There is, however, an asymmetry in the meaning of grams developing from static verbs and the ones developing from dynamic verbs: while there is a variety of notions which make specific distinctions within the semantic space of DIRECTION, there is only one locative notion, which develops from a general locative verb and expresses regional meaning. This asymmetry suggests that there is a restriction as to what adpositional mean-

ings can develop from which serial verbs, and perhaps verbs in general: I expect spatial grams developing from verbs to tend to express a variety of directional notions. Such verbs are usually motion verbs. In other words, I hypothesize that in the languages of the world there will be a correspondence between verb-derived spatial grams, motion verbs and directional meanings, whereas locative notions will tend to derive mostly from nominals, or, less frequently, from stative verbs. Furthermore, if in a language there are spatial grams which present affinities with synchronic verbs, or even obsolete verbs, we can predict on the basis of the semantics whether or not they have an evolutionary relationship. I will return to this hypothesis in section 4.3.

4.2 *Participles and spatial grams*

Participial forms of verbs often function just like spatial grams. For instance, in English the present participles *preceding* and *following* have such a function, as in examples (23) and (24).

English

(23) Preceding the parade, there will be a famous New Orleans band.
(24) A big crowd came following the funeral procession.
(25) Before the parade, there will be a famous New Orleans band.
(26) A big crowd came after the funeral procession.

In these examples, although the participles function like spatial grams, they have not acquired all the semantic properties of spatial grams such as *before* and *after*. In fact, if we replace the participles with the latter we get different meanings: the procedural sense of order we get with the use of participles is not present in the utterances with *before* (25) and *after* (26). This suggests that *following* and *preceding* retain the motion sense inherent in their meaning as verbs, and thus, differ from before and after, which entail order rather that motion.

In several other languages, however, participles have evolved to a more grammaticized stage as spatial grams. Kahr (1975) reports on three languages in which spatial grams had such development:

Bengali	*thākiyā* "from"	< *thākiyā/thēkē* "having stopped"
Igbo	*sitɛna* "from, through"	< (participle, but not cited)
Bikol	*pasiríng* "toward"	< *pa-* (Inf/Part. marker) + *siring* "approach, do, like"
	pala?ug "into"	< *pa-* (Inf/Part marker) + *la?ug* "enter"

These data lead us to hypothesize another grammaticization channel for spatial grams from verbs via a participial stage:

VERB > PARTICIPLE > SPATIAL GRAM

This path of evolution finds support in the development of several spatial grams in at least two of the languages in my sample. Thus, in Bihari, five grams are clearly developments from participial forms. Two grams, namely *oh^{i}ṭ^{h}ām^{a}* "near to, at the place of" and the related *ṭhamā/ṭhā̃* (with the same gloss) are related to the Sanskrit participial form *sthāna-* "standing, abiding", which is also the Old Indo-Aryan form (Jha 1958:325,329). Furthermore, the form *dhàr^{i}/dhari* "up to, by the time of" is analysed as the present absolutive of the verb *dhar* "to catch, to hold" (OIA *dhar*). In addition, the gram *dà/dàkà/dane* "through, via" consists of *dà/da-*, the absolutive of the verb *dà* "to give" plus *kà-* the absolutive of the verb *kṛ* "to do". Similarly, *hoit^{a}* "via" is the same as the present participle of the verb *ho* "to be". In fact, in Bihari, the development of postpositions from absolutive participles is quite frequent.[33] Although my sources have not provided a detailed account of the development of the other four grams from verbs, we can predict on the basis of the generality of this pattern of development in the language that they too have derived from participial forms of verbs.

Two of the Tigre grams may also be analyzed as developing from participial forms of verbs, although the author of the grammar have simply mentioned the verb as the source without any mention of the relation to the participial form of it (Leslau 1945:197). Thus, *ʿət qābəl/qəblāt* "in front of, opposite" are related to the present participle forms for masculine, *qābəl*, and feminine, *qāblat*, meaning "former", of the verbal root *qbl* "to advance" (Raz 1980:27). Similarly, the preposition *qadam* "in front of" may be analyzed as the present participle of the verbal root *qdm* "to advance" (a common root in Semitic languages), since it has a similar ending to the plural masculine form of participles, *-m*. For the rest of the Tigre grams there is no indication as to how they may have developed from the verbal roots, but I would predict that they followed a similar path.

As with the grams which developed from serial-verb constructions, the majority of the spatial grams which developed via grammaticization of participial forms of verbs express dynamic directional notions (e.g. ABLATIVE, ALLATIVE, TOWARDS, THROUGH, VIA, etc.). Their sources are also dynamic verbs, such as "to approach", "to enter", "to catch", "to advance", etc. The only stative notion found, PROXIMAL, developed from a stative verb "to stand" (Bihari).

In addition to the grams of the languages discussed above, other spatial grams were found to be related to verbs in three more languages, bringing the number up to 24 grams. Unfortunately, the authors of the grammars of those three languages do not provide any further evidence, or intuitive description of the relationship between spatial grams and the verbs, but simply point out the similarity. In some cases even that does not occur. The data are presented by language in Table 11.

4.3 *The verbal model*

From the brief discussion of the meanings of spatial grams which develop from verbs or verbal constructions, as well as the meanings of verbs that are the sources of such grams, we can deduce certain similarities. Irrespective of the formal properties of the intermediate stage of development, whether it is via verb serialization or participial construction, similar spatial grams emerge out of similar verbal sources. The majority of spatial notions expressed by such grams specify directions (ALLATIVE, ABLATIVE, TOWARDS, UP, DOWN, INTERIOR-ALLATIVE), path of movement (OVER, CIRCUMFERENTIAL, VIA), or end point of movement (END-POINT LOCATION). The only non-dynamic grams found to develop in this way specify either REGIONAL or PROXIMAL-REGION notions. Furthermore, five other verb-derived grams express FRONT-REGION relations, while three others specify BACK-REGION relations. These observations support the hypothesis proposed in 2.1.

The verbs that give rise to the same kind of spatial grams also share properties of meaning. Thus, TOWARDS grams develop from verbs such as "to see" "to look", "to point out to", "to approach", which share the fact that the activity they describe is conceived of as inherently possessing a certain directionality. Similarly, DOWN grams develop from verbs such as "to fall" or "to descend" which share the fact that the activity they specify is directed according to the pull of gravity towards the ground from a higher position. Along similar lines PROXIMAL grams develop from verbs like "to approach", "to touch", "to abide", which share the fact that the activity they describe brings entities together so that their respective regions partially overlap. Finally, FRONT-REGION and BACK-REGION grams emerge from verbs such as "to advance", "to precede", "to get ahead" and "to be last", "to follow", "to draw behind", respectively. Such verbs express order relations among entities as they participate in the activities described by the verbs. The directionality of movement of one participant entity with respect

Table 11: Spatial grams deriving from verbs

Bihari		
oh^{i}ṭ^{h}am^{a} "near, to, at the place of"	~ <	*SKT. sthāna* "standing, abiding"
ṭhāma/ṭhā "near, to, at the place of"	~ <	*SKT sthāna* "standing, abiding"
taka "up to, by, for"	<	*tak* "to see"
takā/takae "at, on" (when one strikes at body of animal)	<	*tāk* "to see"; OIA *tarka* "to aim, to see"
dis^{a} "towards, on the side of"	<	*dísà* "point out to, give direction" SKT. *diç* "to point, direct, show"; *diç* "point" (n)
dhar^{i}/dhari "up to, by the time of"	<	*ABS of dhar* "to catch/hold" (OIA *dhr*)
bhīr^{a} "near,in contact of"	~ <	*bhīrab^{a}* "to touch"
dà/dàkà/dane "through,via"	<	*dà, da-* (ABS of *dā* "to give") + *-kà* (ABS of *kṛ* "to do")
hoit^{a} "via"	<	PRES PARTCP of *ho* "to be"
Chacobo		
ka "from"	~ <	*ka* "to go"
Halia		
tara "to, towards, than, etc."	~ <	*tara* "to look, to see"
tsilo "over"	~ <	*-tsilo* "see from a vantage point; - *tsil* "move on the surface of the water; ride a wave"
-la "at, in"	~ <	*la* "to go, to move, to walk, to leave"
Papago		
-oi'Dk "behind, following,through"	<	*'ol* "to follow"
miabi'Dk "near, close to"	<	*mia'bi'D* "to approach", *mia* "nearby"
ba'i'tc "in front of, ahead, beyond"	<	*ba'ivi'tcɪ* "to get ahead"
Tigre		
(*mən*) *la'al* "above,over"	<	SEM *'ly* "to be over"
qadam "in front of"	<	SEM/ETH *qdm* "to advance"
qabəl/qəblāt "in front of, opposite"	<	PRES PARTCP *qābəl/qāblat of v. qbl* "to advance"
mən rahar/har "behind, after"	<	SEM *'hr* "to be last,behind"
gərra "behind, after"	~ <	SEM *grr* "to draw behind"
fənge "between"	~ <	ARAB *flg* "to separate"
dəwar "around"	<	SEM *dwr* "to go around"
šəbab "opposite"	<	*šbb* "to look out"
(*saləf* "before"	<	ARAB *salafa* "to precede")

to another determines the order relations, and consequently, assigns meaning to such verbs.

The development of FRONT-REGION and BACK-REGION grams from such verbs constitutes evidence for the proposed Movement reference frame (Chapter 1, section 2.1.4), according to which sub-regions of Landmarks get partitioned. The fact that languages develop such grams out of motion verbs shows that dynamic relations among entities constitute an important part of our conception of space. Such dynamic relations should be represented in the descriptions of language and should not be reduced to static elements.

The data discussed so far suggests a verbal model of development of spatial grams. This model is presented below.

The Verbal Model

Verbal notions	Spatial meaning	Example languages
to be at, to rest, to see, to go (to sit), (to live)	REGIONAL	Ewe, Twi, Chinese, Korean, Yoruba, Halia, Bihari
to go, to see, to face, to take, (to come)	ALLATIVE	Halia, Ijo, Korean, Krio
to see, to point out, to look, to approach	TOWARDS	Bihari, Bikol, Halia
to go, to pass by, to come out, to remain, to stop	ABLATIVE	Bengali, Chacobo, Ijo, Krio, Korean
to enter	ALLATIVE-INTERIOR	Bikol
to be over, to see from a vantage point, to rise, (to climb)	TOP-REGION (up, over)	Halia
to tall, (to descend)	BOTTOM-REGION (down)	Ijo
to advance, to proceed, to look out, to get ahead	FRONT-REGION	Papago,Tigre (also in 6 African lgs reported by Heine 1989)
to be last, to follow, to draw behind	BACK-REGION	Papago, Tigre
to separate	MEDIAL-REGION	Tigre
to go around	CIRCUMFERENTIAL	Tigre
to approach, to touch, to stand/abide	PROXIMAL-REGION	Bihari, Papago
to see, to catch/hold	END-POINT LOCATION	Bihari
to pass, to give, to be	VIA	Bihari

(the verbs in parentheses were cited by Givón 1975, but no specific language examples were given)

5. Evolution and the acquisition of spatial grams

The path of evolution of spatial terms and expressions which have their sources in nouns presents an example of a very basic principle of human thought, the fact that we use concrete notions to express more abstract ones. Another context in which linguistic behavior can be seen in a diachronic perspective is the process of language acquisition. If that principle is indeed basic, young language learners should follow it as well.

Parallels between historical change and language acquisition have been noted for other domains as well. Hooper (1979) and Andersen (1980) discuss such parallels between children's morphophonemic changes and morphophonemic changes observed in the history of languages. Studies on English spatial terms by Clark (1973), Kuczaj & Maratsos (1975), Tanz (1980), Johnston (1981,1984), Gopnik and Meltzoff (1986), and spatial terms in other languages (Italian, Serbo-Croatian and Turkish) by Johnston & Slobin (1979) reveal certain facts about children's acquisition of terms such as "front", "back", "in", "out", "up", "down", "there", which, in several respects, seems to be directly parallel to the evolution of such terms. Several similarities may be pointed out:

Objects before Locations. Johnston (1981) reports that in non-verbal spatial tasks 15 to 18-month-olds exhibit behavior which leads her to infer that they conceive of physical objects as having an independent and relatively permanent existence. When they reach two years of age, they start to construct relationships among objects that are the natural consequences of their inherent properties. During the 30 to 42-month period they start constructing relationships that do not depend on specific object properties, but rather take into consideration frames of reference and Landmarks. At first these relationships involve only whole objects which are likely to be in actual contact. Later on, children can make use of object parts as Landmarks and understand that objects might be related even if they do not touch.

The cognitive development of children, as proposed by Johnston, is paralleled by their linguistic development. Gopnik and Meltzoff's (1986) children use *there* first to point out objects. Later on, when they move objects or point to the spot in which they intend to place an object, they use *there* to point out the location of objects. Only much later do they use the deictic to point out the location of stationary objects, when no motion is involved. Kuczaj and Maratsos (1975) also report that their children in

comprehension tasks understood the terms *front* and *back* first with reference to their own fronts and backs and those of objects with inherent orientation, and only later succeeded in tasks where they were requested to place objects in front or back locations with respect to other objects.

The directionality of children's cognitive and linguistic development according to which reference to objects precedes reference to the location of objects resembles the directionality of the path of spatial terms which evolves from reference to body parts and object parts to locations and regions associated with those parts.

Egocentricity before "Object-centricity". In the same study, Kuczaj and Maratsos also report that children understand the notions "front" and "back" first with respect to their own bodies, then the fronts and backs of familiar things, which include other humans, household objects and toys, before they are able to identify fronts and backs of novel objects. However, as Gopnik and Meltzoff (1986) reports, before children acquire notions such as "front" and "back", their egocentricity is reflected in other notions. Her children used *up* and *down* first in requests to climb up or down themselves. They used *up/down, in/out* and *on/off* later when they made an object move in up/down directions, in and out of containers, or become attached or detached from another object. Much later, the children used these terms to encode, not their involvement with them, but rather static spatial relationships between objects.

The notion of egocentricity is apparent in the body part sources of spatial terms, although in that context rather has the appearance of anthropocentricity. Even in later stages of development, egocentricity seems to play an important role. According to the OED, the first recorded cases of the prepositional uses of *before* and *behind* in Old English were with reference to humans encoded by personal pronouns (beforan him, behindan him).

Inherent Reference before Deictic Reference. Johnston (1981,1984) and Kuczaj and Maratsos (1975) have found that children understand spatial set-ups in which the location of an object is determinable by the inherent properties of a reference object before they are able to understand such locations with reference to relations between themselves and the objects involved. This seems to be parallel to the precedence of the uses of spatial terms in which inherent reference frames are inferred over their uses with deictic interpretation.

Motion To before Static relations. I mentioned earlier Gopnik and Meltzoff's (1986) findings with respect to the spontaneous production of *there, up, down, in, out, on, off.* In all cases, they note that the terms were used in situations where motion was involved, and more specifically, when the children moved or caused to move objects to the respective locations. That happened much earlier than their using those terms to refer to static locations.

Interestingly, the first recorded uses of *before* and *behind* as adverbs and, later on, as prepositions, described motion situations, in contrast to stative uses attested later on, as is illustrated by example (27).

Old English (OED (Beowulf 1000:1412)27)

(27) *Hē fēara sum beforan gengde wīsra monna*
'With a few wise counsellors the king rode ahead to search out the way'

Spatial Relations before Temporal Relations. It is well-known that children acquire spatial concepts before they are able to reason about temporal order. Their language follows similar direction, as scholars inform us, in that children acquire spatial terms before they do tense and aspect categories. The spatial basis of temporal concepts is also well-known (Traugott 1975; Lakoff and Johnson 1980), and temporal uses of spatial terms are a later development.

The similarities between language acquisition and language evolution presented here might appear to suggest that language, as a system, interacts with time in a consistent, principled way, in developing from zero to a system (in language acquisition) and in evolving from one stage to another (language change). The nature of the basis of this interaction, however, seems not to be linguistic, but rather a more general cognitive characteristic that children and linguistic communities share.

An explanation that some linguists have proposed is that the young language learners are actually responsible for historical change in languages. Although this may seem a plausible hypothesis for parallel development within a particular language, when children's order of acquisition parallels universal paths of change it would be odd to suggest that children in all languages instigate the evolution of spatial grams. After all, as Bybee and Slobin (1982) have shown, that is not true even within a single language.

While I do not have an explanation for the observed similarity, except that that is the way we are made, such observations give us confidence that there is a level at which human behavior makes sense and is principled. In addition, they suggest that continuous discussions of researchers of different aspects of human behavior become crucial in attaining the common goal, the explanation of human behavior.

Chapter 4

The Front — Back Axis

0. Introduction

Human beings in orienting themselves in space, use their bodies' inherent orientational properties, one of which is the basic distinction between the front and the back plane. Languages capture this basic distinction by providing terms that reflect this asymmetry. In English, the terms *front* and *back* are used in a variety of linguistic contexts to describe situations in the real world that require an orientational axis for their understanding or interpretation.

Several studies on the linguistic and psychological reifications of spatial terms treat FRONT-BACK terms as an antonymous set with opposite values, with respect to certain defining properties of positive and negative polarity respectively (Clark 1973; Clark & Clark 1978; Bennett 1976). In this view the terms appear to be symmetrically opposite and, consequently, describing symmetrically opposite situations. Other studies have stressed the fact that the apparent antonymy of terms is not an inherent property of the linguistic entities, but rather it reflects the way humans are cognitively constructed (Miller & Johnson-Laird 1976; Fillmore 1975; Herskovits 1980, 1987; Vandeloise 1986; Hall 1982). According to this view the terms *front* and *back* are not necessarily characterized by opposite polarities of properties, thus allowing for nuances which derive from the cognitive representation of one term not to be present or relevant to the other.

The basicness of the FRONT-BACK asymmetry on a cognitive level predisposes us to assume that all people have linguistic means of referring to that asymmetry, and furthermore, utilize it for communicating the locus of

situations. In other words, I expect that all languages in the world have terms encoding distinctions between FRONT and BACK utilizing a basic cognitive and physiological distinction.

The issues with respect to FRONT/BACK-REGION grams that this study addresses are centered around the following questions:

(a) Is there a FRONT-BACK semantic subdomain reflecting a basic cognitive distinction, and how is it structured?
(b) What kinds of spatial situations (static, dynamic ?) can be described by F-/B-REGION grams?
(c) Do languages use this distinction to describe domains other than the spatial one?
(d) What does the structure of the semantic subdomain reveal about the grammaticization status of the grams, and issues of grammaticization, in general?
(e) Assuming the cognitive basicness of this distinction, how similar are languages with respect to the lexical and morphosyntactic devices they use?

In an attempt to provide some answers to these questions, this chapter presents a detailed account of the FRONT-REGION (F-REGION) and BACK-REGION (B-REGION) spatial relations, and a discussion of the range of uses that such grams were found to have.

1. FRONT-REGION spatial relations

In describing the frame of analysis of the data in chapter 2, I stressed that in comparing cross-linguistic data regularities of form should follow from regularities of meaning and this conviction leads me to follow an analysis procedure starting with the comparison of meaning.

Several meaning components have been found to describe situations either locating them in or with respect to the FRONT-REGION of Landmarks. Of these situations, the most frequent one in the data base, ANTERIOR, was selected as the starting point of discussion.

1.1 *ANTERIOR definition*

In an ANTERIOR spatial relation between a Trajector and a Landmark the following have been assumed to hold:

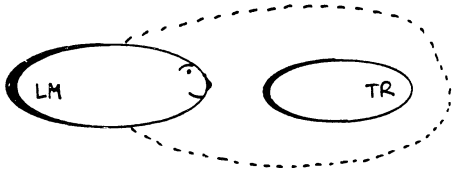


Figure 13

(a) the Landmark is treated as an asymmetrical object with a FRONT-REGION and a BACK-REGION.
(b) an inherent, deictic or movement reference frame assigns values to the regions of the Landmark.
(c) the Trajector is located in the FRONT-REGION of the Landmark.

The following examples from different languages describe an ANTERIOR situation in which Trajectors are located with respect to a house (an object with asymmetries concerning our typical access to it), in its FRONT-REGION, described by a spatial gram.

Abkhaz (Hewitt 1979:130)
(28) *a-y°n-[a]-àpx'a* *də-t°'o-w+*p'
ART-house-[it]in.front.of he-sit-STAT
'He is sitting in front of the house'

Bari (Spagnolo 1933:211)
(29) *ŋa sɪsɪ'da i kɔmɔŋ na kadi?*
who stay in front of house
'Who is staying in front of the house?'

Halia (Allen & Allen 1965:26)
(30) *aliya e hake-guw-leu i matana luwma*
I PM put-1SG-it LOC front house
'I put it in front of the house'

Karok (Bright 1957:290)
(31) *xás ?ás ?uθθívahiti ?iv-íθva:ykam*
then rocks were.laid house-in.front.of
'And rocks were laid in front of the house'

Papago (Zepeda 1983:48)
(32) *Husi 'o 'am ki: ba:ṣo ke:k*
J. AUX DET house front stand
'Joe is/was standing in front of the house'

!Kung (Snyman 1970:129)
(33) *'xwã abasiya tš'u ts'i*
'xwã packs house in.front
''xwã packs in front of the house'

1.2 *ANTERIOR distribution in the sample*

Eighteen languages were found to have spatial grams to describe ANTERIOR situations. Some languages have more than one way of expressing such relations, involving lexically different grams. Some of them have ANTERIOR as their only use, others as one of many uses. The total number of grams with ANTERIOR uses was 37. In some cases ANTERIOR participates as a meaning component together with other ones in the description of situations, while in others it describes a situation by itself. That brought the number of uses that ANTERIOR appeared in to 51. The distribution of ANTERIOR as a meaning component in the sample is presented in Table 12, which includes the languages it appears in, the number of grams with the meaning component, the number of uses within each language, the number of grams with ANTERIOR as a single use and the number of grams with ANTERIOR as one of many uses.

The fact that only 18 out of 26 languages of the sample were found to have forms expressing this relation is only a consequence of the poor descriptive quality of the materials of the remaining six languages. Actually, in the better described languages, alternate ways of expressing this relation were found. For instance, Abkhaz has 6 different ways of expressing spatial anteriority.

Compared to the distribution of other meaning components in the sample, ANTERIOR was one of the most frequent ones, ranking fourth after ALLATIVE, INTERIOR and ABLATIVE. (See Appendix D for frequency of meaning components in the sample)

Table 12: ANTERIOR distribution in sample

Language	# of grams w/Meaning Component	# of uses in language	# of grams w/ ANTERIOR as single use	# of grams w/ ANTERIOR and other uses
Abkhaz	6	14	3	3
Bari	3	5	1	2
Basque	1	1	–	1
Bihari	4	4	1	3
Car	1	1	1	–
Chacobo	1	1	1	–
Dakota	2	2	1	1
Guaymi	1	1	–	1
Haka	3	4	–	3
Halia	1	1	1	–
Island Carib	1	1	–	1
Karok	2	3	1	1
Melan.Pidgin	1	1	1	–
Mwera	1	1	1	–
Navajo	3	3	–	3
Papago	3	5	1	2
Tigre	2	2	1	1
!Kung	1	1	1	–
Tallies 18	37	51	15 (in 13 lgs)	22 (in 12 lgs)

1.3 *ANTERIOR and other uses*

The majority of grams with ANTERIOR uses had other uses as well. As Table 12 shows, 22 out of 37 forms in 12 out of 18 languages had grams with ANTERIOR as one of their uses, whereas only 15 out of 37 forms in 13 out of 18 languages had ANTERIOR as their only use. Note that in 6 of the languages where ANTERIOR appeared as a use of the single gram with that meaning, it was also the only use of that gram.

While it is possible that the 15 forms which had ANTERIOR as a single use have more than one use, due to lack of such information I will concentrate for the time being on the forms with more than one use. Based on the assumption that the meaning of cross-linguistic categories, such as ANTERIOR, can be found in the range of uses of the grams which encode such notions in each language compared to each other, I will proceed to the discussion of those uses that co-occur with ANTERIOR.

I hypothesized that there will be a small number of uses that tend to co-occur with ANTERIOR. These uses are similar to each other in a way that provides a central core to that particular spatial domain. The differences among uses reflect different construals of situations or even situations in other than spatial domains which are understood in terms of spatial relations.

The distribution of uses of 22 forms in 12 languages actually provides some evidence for the above hypothesis. Table 13 presents all the uses of

Table 13: ANTERIOR and co-occurring uses

Co-use	*# of occur*	*Languages*
anterior-allative	13	Abkhaz, Bari, Basque, Bihari, Haka, Halia, Isl. Carib, Navajo, Papago
anterior-deictic	6	Abkhaz, Bari, Haka, Karok
anterior-away	4	Abkhaz
opposite	4	Abkhaz, Bari, Bihari
vis-a-vis	4	Abkhaz, Navajo, Haka, Guaymi
anterior-order	4	Basque, Bihari, Navajo
before	3	Bari, Basque, Tigre
anterior-temporal	3	Abkhaz, Isl. Carib, Palantla Chinantec
anterior-via	3	Abkhaz
ulterior	2	Haka, Papago
interior	2	Abkhaz, Haka
direction towards	2	Guaymi, Papago
interior-allative	2	Abkhaz
regional	2	Abkhaz, Haka
comparative	2	Bihari, Navajo
anterior-towards	2	Abkhaz, Melanesian Pidgin
interior-temporal	1	Haka
interior-temporal-landmark=lifetime	1	Bihari
obstruction	1	Navajo
comitative	1	Haka
allative	1	Haka
edge	1	Dakota
along	1	Dakota
near	1	Dakota
continuous	1	Abkhaz
contiguous	1	Abkhaz
ablative	1	Abkhaz
Tallies 27	69	12

spatial grams that co-occur with ANTERIOR, the number of co-occurrences, and the languages in which they were found.

1.3.1 *Other spatial uses*

FRONT-REGION grams very frequently have not only ANTERIOR uses but also other spatial uses. Four of such uses (OPPOSITE TO, DIRECTION TOWARDS, ULTERIOR, AT THE EDGE) will be discussed here.

OPPOSITE (TO). Objects with inherent fronts, such as humans, animals and buildings, may be located (as Trajectors) so that they are in an ANTERIOR relation with a Landmark, but typically it is not specified whether their inherent fronts are facing the LM or whether they have a different orientation. In English, if such a situational line-up is communicativelly relevant, a different expression is used, such as "Jack is facing the fireplace", where the orientation of the TR is profiled, as opposed to "Jack is in front of the fireplace" where Jack, the TR, could be facing in any direction. In three of the languages in my sample, however, the same grams that express ANTERIOR relations were also used to express OPPOSITE relations.

In an OPPOSITE spatial relation the following is assumed to hold:

(a) the LM is treated as a partitioned or an unpartitioned entity depending on whether it has inherent FRONT-REGION and BACK-REGION or not, respectively.
(b) the TR is treated as an asymmetrical (partitioned) entity with inherent FRONT-REGION and BACK-REGION, and its FRONT-REGION is profiled.
(c) the FRONT-REGION of the TR is located with respect to the LM either in its FRONT-REGION or in its general REGION.

Compare the examples from Bihari. The same form *sām^{a}ne* is used to express ANTERIOR relations in (34), but OPPOSITE relations as in (35) with a partitioned LM (house), and an unpartitioned LM (tree) as in (36).

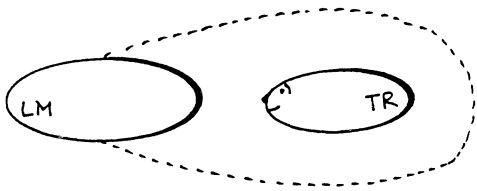


Figure 14

Bihari (Jha 1958:348)

(34) *ham^a-rā sām^{a}ne*
me-OBL in.front.of
'in front of me'

(35) *gharà-k^a sām^{a}ne*
house-GEN opposite
'opposite to the house'

(36) *gāch^a sām^{a}ne*
tree opposite
'facing the tree'

Similarly, the Abkhaz grams *a-ç'ə* and *àpx'a*, and the Bari gram *i kɔmɔŋ* have both ANTERIOR and OPPOSITE uses.

The fact that ANTERIOR and OPPOSITE meanings can be encoded by the same gram in the above mentioned languages is an indication that such meanings are related. In other languages, however, different grams encode these two meanings, as is the case with English *in front of* and *opposite (to)*.

The degree of relatedness or semantic distance of ANTERIOR and OPPOSITE may be determined by comparison of the overlap between the cases in which they are encoded by the same gram and the cases in which each is expressed by a different gram. Table 14 presents the distribution of OPPOSITE in the sample.

This data suggests that although ANTERIOR and OPPOSITE are semantically related, languages tend to express them by separate grams. Whether they are expressed by the same or different grams is not a characteristic of a particular language. As the Bihari data show, a language may have a number of grams, some expressing ANTERIOR (*āge, sojhā*), others OPPOSITE

Table 14: OPPOSITE distribution in sample

Language	# of grams w/ meaning component	# of grams w/ OPPOSITE as single use	# of grams w/ OPPOSITE and other uses	# of grams w/o ANTERIOR as co-use
Abkhaz	2	–	2	–
Bari	1	–	1	–
Bihari	3	–	3	2
Dakota	1	1	–	1
Island Carib	2	2	–	2
Navajo	2	2	–	2
Papago	1	–	1	1
Tigre	1	1	–	1
Tallies 8	13	6	7	9

(*para*), and still others expressing both (*sam^{a}ne*). The explanation for the observed alternatives should, therefore, be based on other factors (see below).

The difference between ANTERIOR and OPPOSITE on a cognitive level is based on the following: while in an ANTERIOR spatial relation an unpartitioned TR is located in the FRONT-REGION of a partitioned LM, in an OPPOSITE spatial relation the opposite is true: a partitioned TR is located with respect to an (un)partitioned LM, so that the LM is in the FRONT-REGION of the TR. This difference may be characterized according to whether the act of locating is carried out in terms of the TR's inherent regions or the LM's inherent regions. The inherent symmetry status of entities and their interactions as Trajectors or Landmarks is responsible for the construal of a spatial situation as one described by ANTERIOR or by OPPOSITE. Symmetrical TRs are not likely to be construed in an OPPOSITE relation. The lack of an inherent front makes such a set-up difficult to conceive. For instance, "the tree is facing/opposite the sea" is an unlikely utterance, but "the house is facing the sea" is a possible scene description. On the other hand, if both TR and LM are asymmetrical entities, an OPPOSITE description is appropriate if they are facing each other, that is if their respective FRONT-REGIONS overlap. Of course, the same situation could be described by an ANTERIOR form, but the interpretation and the context would be different.

DIRECTION TOWARDS. One of the ways FRONT and BACK REGIONS of entities are partitioned is by the typical (or, situational) direction of movement whereby the region facing the direction of movement is the front and the opposite is the back (see Chapter 1, section 2.1.4). Direction towards an entity and anteriority, therefore, are connected at the experiential level. They are also found to be uses of the same gram in two languages, Guaymi and Papago.

DIRECTION TOWARDS involves movement, actual or hypothetical, of a TR so that if the movement were not to cease, it would reach the LM. The typical implication is that the TR does not reach the LM. Examples (37) and (38) from NAVAJO, and (39) from BIHARI illustrate the use.

Figure 15

Navajo (Young & Morgan 1980:81)

(37) *shighan bi-ch'ị'* *yisháál*
home 3SG PRO-toward walk
'I'm walking toward home'

(38) *łéechąą'í 'al-ch'ị'* *dah 'ahidí'níilchéél*
dogs REFL-towards started.running
'The dogs started running towards each other.'

Bihari (Jha 1958:332)

(39) *hun[a]-kā dīs[a]* *tākū*
him-OBL towards look
'Look towards him!'

DIRECTION TOWARDS was a fairly frequent meaning component occurring in 23 forms of the data base. In all but one of these forms it described one of many uses, suggesting that the English case of having a separate form for this use is not typical among languages.

The Guaymi postposition *kukuore* and the Papago postposition *dagio'* have both ANTERIOR (42, 46) and DIRECTION TOWARD (40, 41, 43, 44, 45) uses as illustrated in the following examples:

Guaymi (Alphonse 1956:54)

(40) *niarawe nearbare ti* *kukuore*
he.PAST run.PAST me towards
'He ran towards me'

(41) *ti bi nikien mo* *kukuore jétebe*
I be.going you towards tomorrow
'I am going in your direction tomorrow'

(42) *nunankoba* *ti* *kukuore* *brare erere*
stand.PAST.3SG me in.front.of man like
'He stood before me like a man'

Papago (Mason 1950:38)[34]

(43) *'eme-dagio*
you-in.front
'in your direction'

(44) *si'ali'ge-dagio`*
east-towards
'eastwards'

(45) *va`koliwe-dagio*
south-towards
'southwards'

(46) *mo'o'be'dame-dagio`*
hunters-in.front
'before the hunters'

As discussed earlier, ANTERIOR and DIRECTION TOWARDS are very similar in their basic meaning. If we consider direction of movement as the RF which partitions regions of entities, then the front region points to a direction away from the TR and towards another entity, perhaps the LM, in which case moving forward implies that the TR is moving towards the LM. The construal of a situation as one of ANTERIOR or of DIRECTION TOWARDS depends on the static (inherent, deictic) or dynamic (direction of motion) character of the F-/B-REGION partitioning.

ULTERIOR. The Haka postposition *hmai lé ya* and the Papago postposition *ba'i`tc*, in addition to their ANTERIOR uses, are also used to express an ULTERIOR relation. In an ULTERIOR situation the following is assumed to hold: the LM is treated as a 1-D entity; the TR is located at the region which extends away from that point and away from an observer. Examples (47) and (49) illustrate the ULTERIOR uses of the Haka and Papago postpositions, as contrasted to the ANTERIOR uses illustrated by examples (48) and (50).

Haka (Newland 1897:18)

(47) *Shurkwa hmai lé yā*
Sh. face side in
'It is beyond Shurkwa'

(ibid.:17)

(48) *kema hmai lé yā a kal"*
me face side in went
'He went before (in front of) me'

Papago (Mason 1950:39)

(49) *ha-ba'i`tc*
them-beyond
'beyond them'

(Zepeda 1983:48)

(50) *Mali:ya 'o 'am Klist:na ba'ic ke:k*
M. DET K. in.front.of stand
'Mary is/was standing in front of Cristina'

The assumed treatment of the LM as a 1-D entity (i.e a point) assures that the LM is a symmetrical entity and, therefore, does not have any orientational properties of its own. In fact, it is hard to think of locations such as cities (as in (47)), plazas, squares (entities which are regions) as having

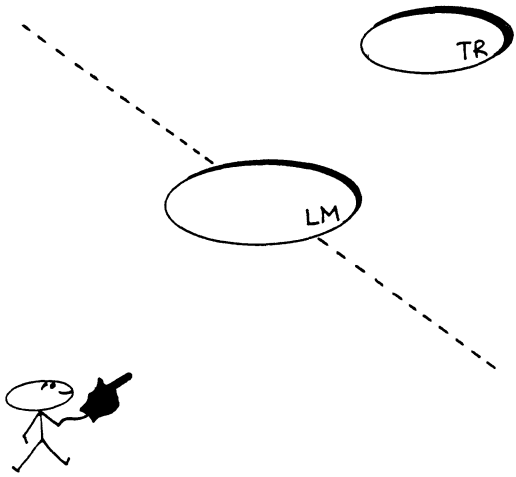


Figure 16

inherent horizontal or vertical orientation. Since the observer's point of view is crucial for the understanding of an ULTERIOR relation, a deictic RF is required.

Hill's (1982) "aligned orientation field", which as we saw in Chapter 1, section 2.1.4, is a consequence of the movement RF, may be called upon for the explanation of the ULTERIOR uses of FRONT-REGION grams. In a construal of a spatial arrangement which is based on an "aligned" RF, the observer's inherent orientation and the direction of actual or imagined movement of the LM coincide, assigning the region that faces away from the observer, and in the direction of movement of the LM, the value of FRONT-REGION. In an ANTERIOR spatial arrangement in which the LM is an unpartitioned entity (=symmetrical and partitioning not relevant), the construal of such an arrangement as an ULTERIOR is easy, since the implications are the same: in both, the region in which the TR is located is in the direction away from the observer and the LM.

If the use of a deictic RF is considered responsible for the connection of ULTERIOR with ANTERIOR, one would expect that using a different deictic RF, that is Hill's "facing" deictic RF, would result in a connection of ULTERIOR with POSTERIOR situations, as far as language use is concerned. This is in fact the case with the Margi gram *áyir* [*a* "in" + *yi* "back" + *-r* (GEN)] which is used to express both POSTERIOR and ULTERIOR relations

(Kahr 1975). Similarly, in Navajo the postposition *bine'*, which is used primarily as a POSTERIOR gram as in (52), also has an ULTERIOR use, as in (51). (see also 2.3.1 UNDER, for more comments on this gram)

Navajo (Pinxten et al. 1983:101)
(51) *tsé bit'a'í bine'di shighan*
Shiprock beyond live
'I live beyond/behind Shiprock'

(Young and Morgan 1980:85)
(52) *'ahił-ne' na'azhch'id*
RECIP-behind search
'They searched behind each other'

AT THE EDGE. In Dakota the postposition *'aglagla*, in addition to an ANTERIOR use, is also used to locate a TR at the edge of the LM, as in example (53).

Dakota (Buechel 1939:113)
(53) *wakpála aglágla*
creek in.front.of
'at the edge of the creek'

The edges of a physical object are its boundaries, that is, the parts that most typically interact with the external world, and consequently, its outermost parts. For many objects their front part is the typical access to the world and the side humans most typically interact with. The construal of the front part of an object as its edge is, consequently, natural.

There is evidence also from other languages that fronts can be construed as edges. Kahr (1975) notes that in Ewe the postposition *nu* "in front of" is homophonous with a noun which refers to mouth and edge. As we have seen in chapter 3, "mouth" is one of the sources of FRONT-REGION grams. Similarly, in Ancient Greek the noun *stoma* "mouth" was used in Homer in the sense of "point", after being used for "front," and in Aeschylus in the sense of "the edge of a weapon" as in *stoma maxairas* (mouth knife-GEN) "knife edge" (Buck 1949). In Modern Greek the metaphor is carried on: the expression *sto xilos tu gremu* (at-ART lip ART-GEN precipice-GEN) "on the brink of the precipice" illustrates the use of part of the mouth, the lip, for "edge" or "brink". Moreover, in English, the compound "waterfront" refers to the edge of the water.

The Dakota postposition *'aglagla* has two further uses, one describing location or motion ALONG a LM, and the other describing PROXIMAL distance. Both of these uses seem to be derived from the AT THE EDGE use. Entities with edges are extended in at least one dimension (i.e. are not spherical). Motion with respect to their edge may be construed as the path a TR follows, delineating an ALONG motion. Note that this construal of the arrangement of the TR and the LM requires an expansion of the EDGE-REGION of the LM, since movement along the edge may be contiguous with it, but need not be. Region expansion is also involved in the construal of an AT THE EDGE arrangement as representing a PROXIMAL relation. If a TR is at the EDGE-REGION of the LM, it is beside it, and, therefore, close to it. Thus, these uses of the FRONT-REGION gram *'aglagla* are seen as deriving from its use to describe location at the EDGE-REGION of the LM, by the implications such a construal has, which are based on the way we interact with entities with edges.

All four uses, each one of which co-occurs with ANTERIOR among the uses of the same gram, are seen as implications of the way we experience fronts of entities, and their spatial interaction with other entities. In the first case, if the TR has an inherent FRONT-REGION, which is relevant within a particular linguistic frame, then the FRONT-REGION partition of the LM may be ignored. In such a case, the TR's asymmetries make the assignment of spatial relations possible. The result is a construal of the relation as an OPPOSITE TO one. In the second case, the typicality which characterizes the fact that FRONT-REGIONS face the canonical direction of movement, results in construing a motion situation in which the fronted entity is involved in terms of its directionality (i.e. direction TOWARDS). In the third case, the possibility of partitioning entities into regions inherently, deictically, or by direction of movement, results in the assignment of different values to the partitions. The implications each one of them has allows for the various construals observed. Thus, the use of an aligned RF triggers the construal of the situation as ULTERIOR, if the observer's perspective is taken into account. Finally, if the characteristic of fronts to be conceived as the outermost part of an object and the part which interacts with the world becomes important, then the situation is construed as locating the TR with respect to the edge of the LM. The way we experience spatial arrangements and the knowledge we have about the entities involved in them, concerning their inherent characteristics and the way they move in space, allow us to see the implications such spatial arrangements have to the way we structure our

ideas, which are reflected in the forms we use to talk about them. Implication, then, becomes one of the mechanisms of the acquisition of new uses by the forms of a language.

1.3.2 *Non-spatial uses*

Several FRONT-REGION grams, in addition to spatial uses, also have a number of non-spatial uses. The most frequent ones were temporal uses, which I will discuss later. The other non-spatial uses cover a variety of meanings which are not from the same domain but do have similarities, as we will see in the following.

VIS-A-VIS. Four FRONT-REGION grams in four languages, when used in dynamic contexts which involve movement, encode a VIS-A-VIS relation. In such a relation the TR is assumed to carry out the activity of the verb in the presence of the LM. Examples (54)-(56) illustrate the use.

Abkhaz (Hewitt 1979:131)

(54) *sə-w+pà-lo-yt'*
I-you-before-go-FIN
'I'm going to meet you'

Haka (Newland 1897:217)

(55) *kema she na, rúk" pú*
me in.front, bring him
'Bring him in my presence'

Navajo (Pinxten et al. 1983:101)

(56) *ni-másáni bi-dááh ní-nááh*
2SG POSS PRO-grandmother 3SG POSS PRO-in.front you-come
'You go to meet [come in front of] your grandmother'

Note that the situations described by the above examples involve movement of one person (TR) to in front of another (LM). Typically, when people come to such a spatial arrangement with respect to each other, that is, when they face each other, it is for the purpose of a social interaction (conversation, fight, game playing, etc.) In other social encounters which involve larger groups such as the audience and the actors in theater, or the stands and the players in ball games, the judges and the defendants in court, one group of participants faces the group in action. Having this typical experience in mind, it is natural to infer from carrying out an activity in front of a person that the activity is being carried out in his/her presence and with his/her mental participation. It is easy to infer also that if you go in front of a person you will probably meet this person.

COMPARATIVE. The Bihari postposition *āge* and the Navajo postposition *bítsé*, in addition to an ANTERIOR use, also have a COMPARATIVE use as is illustrated in (57) and (58).

Bihari (Jha 1958:324)

(57) *ahā-k^{a} āg^{u}, āgū, hàm^{a} kī thikàh^{ũ}*
you-GEN before before I what be
'What am I before you?'

Navajo (Young & Morgan 1980:86)

(58) *t'áá bí-tsé naashá*
him his-in.front I-go
'I'm older than he is'

This meaning has occurred as a use of very few grams in my data. COMPARATIVE has been assumed to refer to a situation in which a participant or an action performed (TR) is compared to another participant or action (LM) and is found better or worse. The Bihari example does not offer any values for the comparison, but rather asks for them.

Stassen (1985), in his typological study of comparatives from 110 languages, cites only one language in which the comparative marker also means "in front of, before". He classified this kind of marker together with the ones that come from allative markers under the Allative comparative type, which occurred in 7 languages altogether. The language with the "before" comparative marker that he cites is Jacaltec. Examples (59) and (60) illustrate this use.

Jacaltec (Craig 1977:65)

(59) *ka' icham hin s-sataj naj Pel*
more old I him-before he P.
'I am older than Pel'

(ibid.:40)

(60) *ka wohtaj naj sataj haca hach wohtaj-ni*
more I-know him before how you I-know-PARTCP
'I know him better than I know you'

Modern Greek also exhibits such a polysemy in the uses of the anterior gram *brosta s'* as in the following example:

Modern Greek

(61) *to nefos tis aθinas brosta sto nefos tis polis*
the smog of-the A. in.front of-the smog of-the city
tu meksiku ine asimando
of-the M. is negligible
'The smog of Athens compared to the smog of Mexico City is negligible'

The similarity between an ANTERIOR situation and comparison lies on several experiential facts as well. Typically, in any situation where a comparison has to be made the participants are physically and spatially juxtaposed. In situations where people are the participants (e.g. in competitions, fights, etc.) they usually face each other. A more convincing account of their similarity is the following: The front is the most typical side of encounter and the side which characterizes the object (i.e. the one the object is recognized by). To compare them entails comparing their characteristic parts, that is their front sides. This explanation would account for situations as in example (57) and (61). But for situations such as the ones illustrated by examples (58)-(60) the following explanation seems more adequate: the positive value in comparisons expressed as "I'm in front of you" meaning "I'm better" is an inference based on our experience with the order of entities moving to a goal. In situations such as races, lines, or any other situation which involves linear movement to a goal, the one closer to the goal is in the front, and is, therefore, "better".

OBSTRUCTION. One of the Navajo postpositions, *bidaah*, in addition to an ANTERIOR use, when combined with a verb as its prefix in the form of *da*, connotes obstruction or closure as in the following examples:

Navajo (Young & Morgan 1980:90)

(62) *kin diiltła-go shi-dá-ho-diník'ąą'*
house burn-PARTCP 1SG PRO-obstruction-3SG PRO-PROLONG-
'I was cut off by fire in the burning building'

(63) *nihi-má kin góne' nihi-dá-di'nílkaal*
1DU PRO-mother house in 1DU PRO-Obstruction-
'Our mother locked us in the house' (i.e. she closed the entrance on us)

(64) *'a'áán dá-di-'-ní-'ą*
burrow obstruction -POSS-3IOPRO-PROLONG-
'I closed the burrow (with a rock)'

At first sight this might seem an idiomatic use of the Navajo postposition. The connection between the two meanings, however, is found in our experience with the world. If we want to obstruct access or close a container we place a barrier at the entrance. Entrances or place of access define inherent FRONT-REGIONS in objects. Therefore, we place a barrier in front of the object in case we want to close or obstruct access. Consequently, it is

easy to infer that if we put a TR in front of a LM, where the TR is larger than the LM, our access is obstructed. Of course, that can be further extended to non-physical obstruction.

COMITATIVE. The Haka postposition *she na*, in addition to its ANTERIOR uses, is also used to express COMITATIVE relations between a TR and a LM as in example (65). In a COMITATIVE relation a human TR performs an action along with another human LM.

Haka (Newland 1897:591)

(65) *kema she na, n'hún" lai maw?*
me in.front.of you.come FUT INTER
'Will you come with me?'

The connection between ANTERIOR and COMITATIVE can best be captured if we consider the following: performing an action in front of a person typically attracts the attention of that person and, consequently, his/her mental participation to the action. The physical participation of the second person, then, is only a step away.

The last four uses of FRONT-REGION grams which involve non-spatial situations are seen as construals of actual physical situations in terms of ANTERIOR situations. Situations such as performing an action in the presence of another person, or with another person, comparing two entities, and obstructing access to entities can be seen as consequences of an anterior physical arrangement considered together with our shared knowledge of the social context in which they occur. Such uses, therefore, are seen as deriving from the ANTERIOR via inferential mechanisms.

1.3.3 *Temporal uses*

That spatial grams are used to encode temporal relations, and that we conceptualize time in terms of space is a well-known fact (cf. Traugott 1975; Lakoff & Johnson 1980). This fact is also evidenced in my data for FRONT-REGION grams. Grams from eight languages in the sample also have temporal uses.

ANTERIOR ORDER. The Bihari postposition *āge* and the Navajo postpositions *bítsé* and *bitsi* are used to express order relations, in addition to spatial anteriority, as in the following examples:

Bihari (Jha 1958:324)

(66) *hàm*^{a} *ahã̀-sà* *agã̀* *pah*^{ũ}*càb*^{a}
I you-ABL before arrive
'I shall arrive before you'

Navajo (Young & Morgan 1980:86)

(67) *t'áá* *bítsé (bí'áłtsé)* *hooghandi* *nánísdzá*
3SGMASCPRO 3SGPRO-before home 1SGPRO-return
'I got back home before he did'

(68) *t'áá* *bi-tsi-jį'* *níyá*
3SGMASCPRO 3SGPRO-before arrive
'I arrived before he did'

In an ANTERIOR ORDER situation the following have been assumed to hold: the TR and the LM are moving along a path in the same direction, as if in a procession. The TR precedes in order the LM.

Talking about the temporal order of entities in terms of spatial order reflects the way we experience such situations in the world. If direction of movement determines the FRONT-REGION of objects, then direction of movement can also determine the FRONT-REGION of a procession. Also, the front of a procession reaches a goal first.

Similar relations are extended to situations in which the TR is moving with respect to a stable LM. The first one to be encountered in the course of movement is considered the front one, and, therefore, the first one in order.

BEFORE. Temporal order is expressed by FRONT-REGION grams not only when the TR and the LM are persons, but also when they are situations. In this case the anterior gram introduces embedded adverbial clauses and as such it functions as a subordinator. Grams of three languages provided examples of such uses, which are illustrated below.

Bari (Spagnolo 1933:257)

(69) *i ŋerot* *na* *pɔti* *katɔbyanit (na),* *nan* *gwɔn* *a gilo*
before of came doctor I was sick
'Before the doctor came, I was ill'

Basque (N'Diaye 1970:86)

(70) *zer bizi gaten zuen mutiko orrer oi ebatsi* *aitzin-ean*
front-LOC
'Quelle vie menait ce garçon avant de voler cela?'
(What life was this boy leading before he stole this?)

Tigre (Raz 1983:121)

(71) *ka-'əb-bəlla 'əbrat hye qadam*
and-with-this needle however before
ma-traggāz-ka la-'əbrat...
PRT-being.pierced-2SGMASC the-needle
'And before you're pierced with this needle, the needle...'

BEFORE as a meaning component was defined as follows: the TR is a situation (expressed by a main clause); the LM is a situation (expressed by a subordinate clause). The TR is temporally ordered before the beginning of the LM situation (in present, past or future).

Viewing situations in the same way as objects requires a certain degree of abstraction which, when reached, allows for the use of spatial orientation and ordering devices for temporal order.

ANTERIOR-TEMPORAL. Temporal order in terms of spatial order is expressed not only when situations are involved, but also when the LM is a conventional temporal unit, such as hour, month, week, or temporal points, such as noon and midnight. In two languages FRONT-REGION grams are used in this sense, as in examples (72), (73).[35]

Abkhaz (Hewitt 1979:147)

(72) *y°ə-sàat-k' r-àpx'a*
2-hour-1 them-before
'two hours ago'

Island Carib (Taylor 1956a:36)

(73) *l- ubára-giẽ*
3SGPRO-before-to
'before (sooner than)'

The temporal uses of FRONT-REGION grams have one property in common: the conceptualization of situations as physical objects moving in space. This conceptualization has been described as a metaphor (Lakoff & Johnson 1980, Lakoff 1987, Traugott 1978, among others) from space to time assuming two such separate experiential domains.

Metaphorical uses of FRONT-REGION grams differ from the other uses described above in that they involve the use of imagination for their creation. The other uses arise either from manipulation of spatial elements, or via inferential mechanisms based on experience with the consequences of spatial situations on a social level. As such, they are based on reasoning. (see 4 for more on metaphor)

DURING THE LIFETIME. In Bihari, the postposition *sojha*, in addition to an ANTERIOR use as in (74), is also used metaphorically to indicate the occurrence of an event within a temporal interval which is defined as the lifetime of a person, as in (75).

Bihari (Jha 1958:349)

(74) *ham^a-rā sojhā̃ āu*
me-OBL in.front come
'Come in front of me'

(75) *ham^a-rā sōjhā̃ je kar^{a}bāk^a he se kà līà*
me-OBL in.front
'Whatever you have to do, do it during my lifetime'

This use seems to be the result of a series of inferences we may draw from an original ANTERIOR situation. This series of inferences involves the following: "be in front of X" > "do in front of X" > "do in the presence of X" > "do in the presence of X on earth" > "do during X's lifetime". The series of inferences seems to have its source in the fact that "in front of" may be used to specify the location not only of entities but of actions as well. This entails that the particular location is relevant only during the time period in which the event occurs. In that respect, there is a temporal dimension associated with the notion of "in front of". Based on that, we can easily infer from carrying out an action in front of a person that we are carrying out the action in his/her presence, or while s/he is present, and furthermore, while s/he is present on earth, i.e. alive.

1.3.4 *ANTERIOR as a derived use*

In the previous section I argued that all the uses of FRONT-REGION grams presented there derived from the basic spatial use of ANTERIOR via some mechanism. It is, however, possible for a gram which is not used primarily in ANTERIOR situations to have such a use. This is the case with the Abkhaz postposition *a-ç'ə* "at" and the Haka postposition *a* "in, on, at".

The Abkhaz postposition *a-ç'ə* has a number of uses encoding the location of the TR inside, at the region of, or in contact with the LM (INTERIOR, REGIONAL, and CONTIGUOUS, respectively). In addition, when prefixed to stative verb roots, it describes the situation of the verb as continuing (CONTINUOUS). With certain motion verbs it encodes the source of motion (ABLATIVE). In one case, however, it is used in an ANTERIOR relation, as in example (76).

Abkhaz (Hewitt 1979:143)

(76) *a-waǰàq' w-a+ç'ə-c'*
ART-fireplace you-it+in.front.of-go
'Move away from in front of the fireplace'

Similarly, the Haka postposition *a* has a variety of uses expressing INTERIOR and REGIONAL spatial relations with containers and regions, respectively; ALLATIVE with "go" motion verbs, and INTERIOR-TEMPORAL relations with temporal units as LM. In addition, it has an ANTERIOR use as in example (77).

Haka (Newland 1897:10)
(77) *mé a, k'ém" lai*
fire before, I-dry FUT
'I will dry this before the fire'

Incidentally, in both Abkhaz and Haka the ANTERIOR examples involve a fire and a fireplace as the LM. Since the rest of the uses of both grams provide no indication for it being a FRONT-REGION gram, but rather a more general locative gram involving topological spatial relations (and temporal metaphorical ones), we should seek the explanation for this use elsewhere.

I propose that such grams may have ANTERIOR uses in the case of certain Landmarks. The typical way we interact with certain entities such as fire and fireplaces is by being in their external region (unless we want to burn something!), either facing them or placing a non-flammable object (e.g. cooking pot) on top of them. If this is true, then interactional experience with certain entities may motivate an ANTERIOR use of non-projective grams.

ANTERIOR co-occurs with several other uses, which express directions or kinds of motion with respect to anterior situations. Such uses are discussed in section 3. Furthermore, adverbial uses of FRONT-REGION grams (described as ANTERIOR-DEICTIC) are not discussed in this study.

2. BACK-REGION spatial relations

A number of meaning components were found to describe spatial situations in which a Trajector is located in or with respect to the BACK-REGION of a Landmark. Among them, POSTERIOR was the most frequent one, and for that reason, it was considered a core meaning component of the BACK-REGION domain, and was chosen to be discussed first.

2.1 *POSTERIOR definition*

In a POSTERIOR relation between a Trajector and a Landmark , the following have been assumed to hold:

a) the LM is treated as an asymmetrical object with a FRONT-REGION and a BACK-REGION.
b) an inherent or a deictic reference frame assigns values to the regions of the LM.
c) the TR is located at the BACK-REGION of the LM.

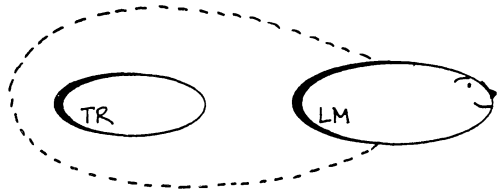


Figure 17

The following examples illustrate the use of BACK-REGION spatial grams to express a POSTERIOR spatial relation in different languages. In these examples Landmarks, such as "house" (Abkhaz, !Kung, Halia, Navajo) and "me" (Haka) (referring to a person) are inherently asymmetrical entities, whereas "mountain" (Papago) is treated as one, by the imposition of a deictic reference frame.

Abkhaz (Hewitt 1979:131)

(78) *a-y°n-à-šta+x'* *də-q'o-w+p'*
ART-house-it-behind he-be-STAT
'He is behind the house'

!Kung (Snyman 1970 :128)

(79) *mi #hwe-ya tš'uwa !'on!eng*
I uproot-TRANS house behind
'I uproot behind the house'

Haka (Newland 1897:17)

(80) *k'-hnú lé ya, htút" lo*
me-back side at, sit IMP
'Sit behind me'

Halia (Allen & Allen 1965 :26)

(81) *ema kaney i murina luwma*
not is LOC behind house
'It isn't behind the house'

Navajo (Young & Morgan 1980:85)

(82) *tsin bi-ne'dęę' sézį*
house 3SGPRO-behind stand
'I'm standing behind the house'

Papago (Zepeda 1983:50)

(83) *Hegam 'o 'odham 'o 'am do'ag we:big ki:*
those AUX people AUX DEM mountain behind live
'Those people are/were living behind the mountain'

2.2 *POSTERIOR distribution in the sample*

The notion of spatial posteriority is also intuitively a universal notion, expected to be found in every language. Data from only 16 languages of the sample are being discussed here, since the sources for the rest of the lan-

Table 15: POSTERIOR distribution in sample

Language	# of grams w/meaning component	# of uses in language	# of grams w/ POSTERIOR as single use	# grams w/ POSTERIOR and co-uses
Abkhaz	3	8	–	3
Bari	5	6	1	4
Basque	1	1	1	–
Bihari	2	2	1	1
Chacobo	1	1	1	–
Dakota	4	4	4	–
Guaymi	2	2	1	1
Haka	1	3	–	1
Halia	1	1	–	1
Island Carib	4	5	2	2
Karok	2	2	2	–
Navajo	2	3	1	1
Papago	2	2	–	2
Shuswap	1	1	–	1
Tigre	4	4	2	2
!Kung	1	1	1	–
Tallies 16	36	46	17	19

guages did not provide appropriate information. Table 15 presents the distribution of POSTERIOR in the sample. It includes information about the number of grams with the meaning component in each language, the number of uses, the number of grams with POSTERIOR as the single use, and the number of grams with POSTERIOR and other uses. Overall, 36 grams in 16 languages had POSTERIOR use(s), and 19 of these grams also had other uses.

2.3 *POSTERIOR and other uses*

As with ANTERIOR, I hypothesized that a small number of uses will tend to co-occur with POSTERIOR as uses of the same form. Nineteen forms in 11 languages had other uses in addition to POSTERIOR. These uses are presented in Table 16. Interestingly, the most frequently co-occurring uses were temporal ones. Other spatial uses occurred only once or twice.

Table 16: POSTERIOR and co-occurring uses

Co-use	*# occur.*	*Languages*
posterior-order	6	Bari, Bihari, Guaymi, Melanesian Pidgin, Papago, Tigre
posterior-allative	4	Abkhaz, Haka, Island Carib, Navajo
after	4	Abkhaz, Bari, Halia, Guaymi
posterior-temporal	3	Abkhaz, Basque, Bihari
posterior-deictic	3	Abkhaz, Bari, Haka
under	4	Island Carib, Shuswap, Navajo, Bari
posterior-via	2	Abkhaz
after-deictic	1	Tigre
posterior-ablative	1	Abkhaz
posterior-away	1	Abkhaz
back to	1	Island Carib
base	1	Bari
state commences	1	Shuswap
ulterior	1	Navajo
circumferential	1	Papago
through	1	Papago
every	1	Papago
benefactive	1	Bihari
instrumental	1	Island Carib
comitative	1	Island Carib
lateral-proximal	1	Bari
interior	1	Guaymi
Tallies 22	41	12

2.3.1 Other spatial uses

BACK-REGION grams, in addition to posterior uses, also exhibit other spatial uses such as UNDER, BASE, THROUGH, CIRCUMFERENTIAL and BACK-TO. Below I will discuss each one of them, in an attempt to show the possible connections with POSTERIOR.

UNDER. In four languages, Island Carib, Shuswap, Navajo, and Bari, the BACK-REGION grams were also used to express UNDER location, as in examples (84), (86), and (88), in addition to POSTERIOR uses as in (85), (87), and (89).

Island Carib (Taylor 1956a:36)

(84) *l-ábu-giẽ*
him-under-at
'beneath him'

(85) *legelécuni béna l-ábu iráho láa*
his-locking door it-behind this lad
'his locking the door behind this lad'

Shuswap (Kuipers 1974:61)

(86) *ʔəmət-ép*
-under
'Sit under a tree'

(87) *x-kx-ep-m*
-behind-
'chase'

Navajo (Pinxten et al. 1983:101)

(88) *níłch'i nahasdzáán bine'jį́ ádin*
no earth 3SGPRO-behind air
'There is no air on the backside/behind/under the earth'

(89) ké 'ádí-ne' 'yoo'nil
shoes REFL-behind put
'He put the shoes behind himself' (Young & Morgan 1980:85)

In an UNDER relation the following have been assumed to hold:

(a) the LM is treated as an asymmetrical entity with a TOP-REGION and a BOTTOM-REGION.
(b) an inherent or a deictic reference frame assigns values to the REGIONS of the LM.
(c) the TR is located at the BOTTOM-REGION of the LM, so that the region of the TR is included within the BOTTOM-REGION of the LM. (Figure 18)

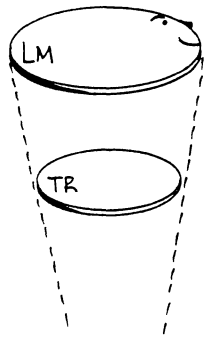


Figure 18

FRONT-REGION, BACK-REGION, TOP-REGION, BOTTOM-REGION, LEFT-REGION and RIGHT-REGION forms make up a contrastive set of terms that refer to the axes that humans use to orient themselves in space (Miller & Johnson-Laird 1976:409). Since this distinction is so basic, the use of the same gram to express BOTTOM-REGION and BACK-REGION relations is not expected. As we saw in chapter 3, however, one possible explanation lies in the lexical sources of such grams. The two models of the evolution of spatial grams, the anthropomorphic and the zoomorphic, may make different predictions about the semantic evolution of body-part terms such as "buttocks", "loins", and "hips". According to the anthropomorhic model, such body-part terms evolve to express BOTTOM-REGION relations, while according to the zoomorphic model, they evolve to express BACK-REGION relations. This is the case with the Shuswap gram *-ep*, which as a noun means "buttocks".

Whatever cognitive structure may underlie the similarity of BOTTOM-REGION and BACK-REGION relations, also seems to be deeply founded among the beliefs of certain cultures. Commenting on the use of the Navajo postposition *biné'*, Pinxten, Van Dooren & Harvey (1983:101) observe that "This postposition, and its various derivatives, denotes the rear of anything. The direction is unimportant: the back of the earth is under the earth (in traditional belief) while the back (or far side) of Shiprock is further to the east than Shiprock (from the point of view of Arizona citizens)." (see also 1.3.1 ULTERIOR, for more on this gram)

Linguistic data from other lexical domains of space paint a similar picture. Zubin and Choi (1984), discussing the set of Korean orientation terms

kalo and *selo*, note that when these terms are used in the comparison of extension of objects, *kalo* refers to the side-to-side extension (S-S), irrespective of the inherent orientation of the object, while *selo* describes either the front-back (F-B) or the up-down extension. So, in example (90), if a blackboard is substituted for the table, *selo* refers to its up-down extension.

Korean (Zubin & Choi 1984:337)

(90) *i siktak-in kalo-ka selo-pota kilta*
this table-top S/S-SUBJ F/B-than long
'This table is longer side-to-side than it is front-to-back.'

One would wonder whether the use of BACK-REGION grams to express BOTTOM-REGION relations also implies the use of FRONT-REGION grams to express TOP-REGION relations. I have no cases in my data in which a gram has both ANTERIOR and SUPERIOR uses. Heine (1989), however, reports that in Dinka, a Western Nilotic language, the noun *nhom* "head" is used as a spatial gram to express both ON (="on", "above", "on top of") (TOP-REGION in my terms) and FRONT (FRONT-REGION in my terms) relations.

The lexical sources of grams describing such situations provide further evidence for their connection, and an explanation for their co-occurrence as uses of the same gram. As we saw in chapter 3, the body-part term "head" is the most common body-part source for TOP-REGION grams. In a few languages (Navajo, Bari, Maasai) this term is also a source for FRONT-REGION terms. In Bari *i kwe* (*kwe* "head") expresses adverial notions such as "at the head of", "in front of", and "above". Such developments are predicted by the anthropomorphic and zoomorphic models; according to the first one, "head" evolves to express TOP-REGION relations, but according to the second one, it evolves to express FRONT-REGION relations.

Other languages provide more evidence for the connection of these relations. In Sanskrit the form *agra-* refers to both top and front (also point, beginning) (Buck 1949). In English, the beginning of a queue can be described as both the top of the queue or the front of the queue (but only the back of the line!).

Some interesting correspondence to the use of the same gram to express relations of the vertical and the horizontal front-back orientation axes are reported by Zubin and Choi (1984), who compare their findings on the use of the Korean orientation terms to findings in neurophysiological research by Hubel and Wiesel (1970). Hubel and Wiesel have found that binocular depth cells, those which are sensitive to the front-back orienta-

tion of a stimulus, also show a strong tendency to prefer vertical lines. These findings are suggestive of a biologically based explanation of the conflation of FRONT-BACK and TOP-BOTTOM notions.

Lexical sources provide evidence for the existence of the different models according to which grams evolve. Such developments suggest a cognitive explanation. In light of the neurophysiological findings, however, the question arises as to the level at which we should seek explanations for such linguistic regularities: at a low, neurophysiological level, or, at a high, cognitive, level. This question is central to current research in cognitive science, and there are no answers for the moment.

BASE. Related to the discussion above, BASE appears as a use of the Bari preposition *i mukök* (91), which also encodes other BACK-REGION relations.

Bari (Spagnolo 1933:233)

(91) *köji kata i mukök na mɛrɛ*
village be at hip of mountain
'The village is at the foot of the mountain'

In a BASE situation the LM is treated as an asymmetrical object with TOP-REGION and BOTTOM-REGION. An inherent or a deictic reference frame assigns values to the regions of the LM. The TR is located at the BOTTOM-REGION of the LM so that it is contiguous with it. (Fig. 19)

BASE situations differ from UNDER situations in the positioning of the TR with respect to BOTTOM-REGION: in the first, the TR is contiguous with the LM region, whereas in the second it is included in the BOTTOM-REGION of the LM with no implication of contact. In either case, the same mechanism is responsible for their connection to POSTERIOR situations.

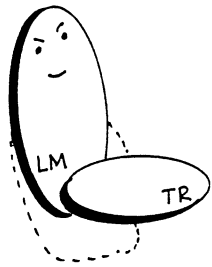


Figure 19

CIRCUMFERENTIAL. The Papago postposition *webi'G*, in addition to the POSTERIOR use, is also used to describe a CIRCUMFERENTIAL situation as in examples (92) and (93).

Papago (Mason 1950:38)
(92) *doa'G-webi'G*
mountain-around
'around the mountain'

(Mathiot 1973:252)
(93) *?i bij ?an kii veegaj*[36]
house around
'He circled around the house'

In a CIRCUMFERENTIAL situation the LM is treated as a spherical object, either because of its shape or because of the path a moving entity follows when it starts from a specific point and moves along the boundaries of the LM till it reaches the same point. The TR is moving/located at the circumference of the LM, i.e the AROUND-REGION. (Fig.20)

In a situation in which the TR and the LM are facing each other, and especially when the LM is larger than the FE, to go behind the LM requires to follow a path which goes along its circumference to its BACK-REGION. In the Papago usage the ultimate destination (BACK-REGION) of the movement of the TR is described in terms of the path of movement. (Fig.21)

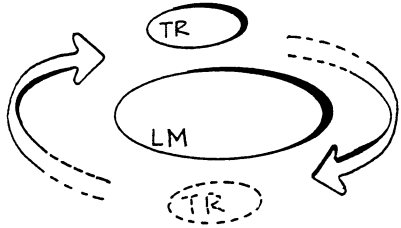


Figure 20

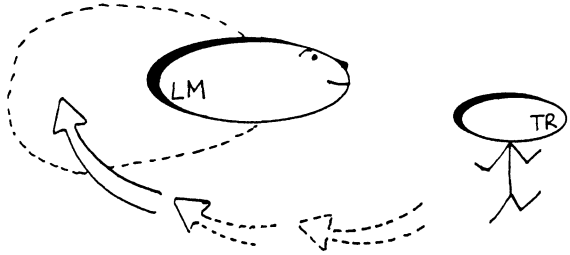


Figure 21

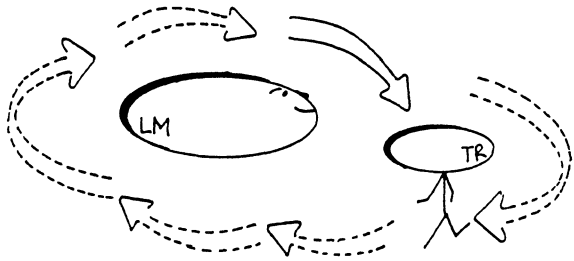


Figure 22

If the movement does not stop at the BACK-REGION but continues along the circumference, the TR moves along in a circular fashion till it reaches the point of departure. (Fig.22) This is the sense we get in example (93). Again, this connection requires the postulation of experiential knowledge for its understanding and explanation.

THROUGH. Path of movement is relevant in another Papago postposition, *oi'Dk*, which in addition to a POSTERIOR and an AFTER use, is also used to express a THROUGH situation as in (94). In such a situation the LM is treated as a penetratable entity and the TR is moving following a path that penetrates the LM.

Papago (Mason 1950:39)
(94) *do'a'G-oi'Dk*
mountain-through
'through the mountain'

Similar to the CIRCUMFERENTIAL use, POSTERIOR situations may be construed as THROUGH situations if access to BACK-REGION requires movement through the LM. (Fig.23)

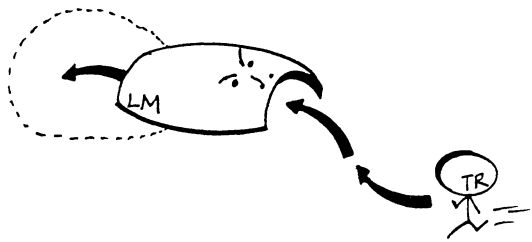


Figure 23

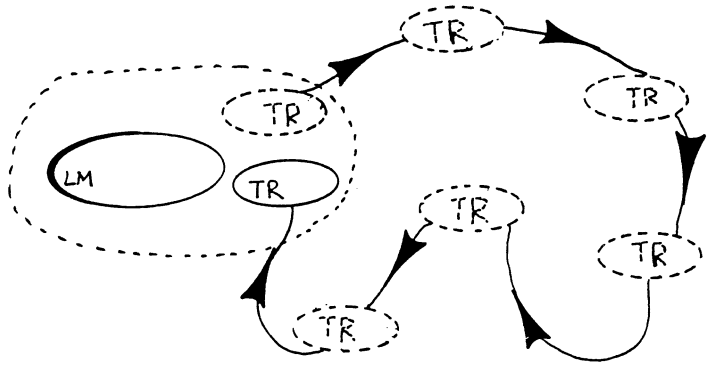


Figure 24

BACK-TO. In Island Carib the preposition *l-árigi*, in addition to a POSTERIOR use, is also used to describe a BACK-TO relation, as in (95).

Island Carib (Taylor 1956a:36)
(95) *l-árigau* (*árigi* + *-u*)
him-back-to
'back to an earlier position or condition'

In such a relation the TR is treated as moving to the LM. The LM is implied to have been the point of an earlier departure of the TR, and the TR is now returning to the LM.

Direction of movement determines the FRONT-REGION of entities and, consequently, their BACK-REGION, as its opposite. Movement to a BACK-REGION of an entity (described as POSTERIOR-ALLATIVE) determines the location with respect to the LM. Instead, if attention is focused on the movement itself, with respect to previous movements, and not on the BACK-REGION of a LM, then the situation is construed as a BACK-TO situation.

Note that this situation has to do more with the action itself than with regions of the LM. This is reflected in the structure of the grams. BACK-TO occurs as a use of a number of other grams in other languages. In all cases the grams are associated with the verb, either by being fused with it (Cheyenne, Abkhaz), or in an adverbial function (Zuni, Melanesian Pidgin). In those languages the grams do not have any POSTERIOR uses.

LATERAL/LOS-PROXIMAL. Two Bari prepositions, all with a POSTERIOR use, were also used to express LATERAL-PROXIMAL relations. This use has

been described by a combination of meaning components. In a LATERAL relation the following have been assumed to hold:

a) the LM is treated as an asymmetrical entity with a TOP-REGION, BOTTOM-REGION, FRONT-REGION, BACK-REGION, and an undifferentiated SIDE-REGION.
b) an inherent or a deictic RF assigns values to the regions.
c) the TR is located at the SIDE-REGION of the LM.

A LOS-PROXIMAL relation holds if the TR is relatively close to the LM, which is deictically defined as the location of speech event. The combination of these three meaning components does not result in a compositional meaning, but in a modified meaning. The deictic anchoring of the description determines a deictic RF for assignment of a SIDE-REGION value.

The Bari prepositions which have such a use are *i napɛlɛ'* and *i...napɛlɛ'*. These consist of the general locative preposition *i*, the deictic pronoun *na* "this", which agrees in gender with the feminine *pɛlɛ'*, a noun which means "abdomen". No examples for these uses were provided, but the author explicitly mentioned that they are used in both POSTERIOR and LATERAL-LOS-PROXIMAL situations.

An explanation for this co-occurrence of uses is plausible if we consider the "aligned" RF proposed by Hill (1982). If such a RF is used in assigning FRONT-/BACK-REGIONS, the FRONT-REGION is adjacent to the side of the LM facing away from the observer, while the BACK-REGION is adjacent to the side of the LM facing towards the observer. In other words, the proximal side is the back side.

If we postulate that the "aligned" RF is available to the Bari speakers, then we can account for the use of the prepositions *i...nupɛlɛ'* and *i nupɛlɛ na* to express HETERO-LATERAL (example 96) and ULTERIOR relations.

Bari (Spagnolo 1933:211)
(96) *i supiri nu-pɛlɛ' somot mɔmɔka joré*
in Nile that-side fish many are.caught
'On the other side of the Nile, many fish are caught.'

As we saw in section 1.3.1, ULTERIOR and ANTERIOR are connected, being uses of the same gram. In that case, I had also postulated the "aligned" RF for assigning values to regions. The "aligned" RF, therefore, is the basis upon which all these uses are related.

Considering the evidence for the existence of two kinds of deictic RFs, an "aligned" and a "facing" (Hill 1982), one would wonder whether HET-

ERO-LATERAL and POSTERIOR may be uses of the same gram, if a "facing" RF is postulated. Indeed, as Kahr (1975) notes, the Margi preposition *ár yá* glossed as "across, on the other side" is a combination of *ár* "in, at" and *yi* "back" marked for genitive *-a*.

The fact that the Bari prepositions include the body-part term *pɛlɛ'* "abdomen", makes the collection of their uses seem unmotivated, considering that "abdomen" has not been attested as the source of either BACK-REGION or SIDE-REGION grams, in either model. Despite that, such a connection is possible in other languages, too. Buck (1949) notes that the Ancient Greek *hüstera*, the most usual technical term for womb in Hippocrates and Aristotle, is related to the adjective *hüsteros* "latter, behind", and Sanskrit *uttara-* "upper", *ud* "upwards", which suggests that *hüsteros* might have indicated "back part" or "upper part". Buck's analysis seems to suggest that the Greek body part term developed from the notion of "behind" or "latter". One could argue, however, that the technical nature of the body part term in the Greek example makes the comparison of that example to the others incompatible. Technical terms are developed by special groups of speakers and become conventionalized within that group at a faster rate than in typical linguistic populations. Their sources and their development does not have to follow the same paths that grammatical developments do. It is not clear to me how "abdomen" could evolve to mean "side" or "back".

2.3.2 *Non-spatial uses*

The most frequent non-spatial uses of BACK-REGION grams are temporal uses. Before I discuss them, however, I would like to make a few remarks about the other non-spatial uses, although they each occur only once.

COMITATIVE AND INSTRUMENTAL. The Island Carib preposition *l-ábu*, which also has a POSTERIOR and an UNDER use, is used to express COMITATIVE (in the sense of carrying) and INSTRUMENTAL relations, as in examples (97) and (98).

Island Carib (Taylor 1956a:36)

(97) *ába fáluma t-ábu tí*
one coconut.tree it-with fruit
'a coconut tree with (bearing) its fruit'

(98) *goráua t-ábu tíu báderugu*
tied it-with hair your-anus-of
'tied with (held by) hair (of) thy anus'

This may seem an odd collection of uses that any general semantic theory would not predict. It indicates that the uses this gram has may be idiosyncratic. One way of investigating the lexical semantics of *l-ábu* is through its history. This preposition is a development from the noun *l-ábu* which refers to bones, and also means "support" (one of the bones' functions).[37] This fact is very illuminating for understanding the consequent uses the word acquired in its function as a preposition. The POSTERIOR and UNDER uses seem to develop out of the idea of support; in nature, most instances of support involve situations where the supporter is under or behind the supported (although fruit on trees are supported from the top!) The notion of support may also give rise to the notion of carrying, since the supporter carries the supported. When someone carries an object, we may infer that the carrier and the carried are in a situation together (=COMITATIVE). The notion of support, viewed from a different angle, may also give rise to INSTRUMENTAL. The supporter is actually the one immediately responsible for carrying out the action. If the supporter is inanimate and the supported animate, the supported may be promoted to an actual agent and the supporter is demoted to a mere instrument (if we assume a Noun Phrase Accessibility Hierarchy type of theory (Keenan & Comrie 1977)).

Actually, INSTRUMENTAL and COMITATIVE (or associative) very frequently are uses of the same form. Schlesinger (1979) provides experimental (from English) and cross-linguistic evidence that comitative and instrumental are cognitive poles on a continuum, even though they may be viewed as semantically discreet. Furthermore, Nilsen (1973) cites several languages which express such notions by the same form.[38] In addition, Lakoff and Johnson (1980) argue that the two notions are linked by a conceptual metaphor.

The notion of "support" is very important for explaining the emergence of a REASON use from a BOTTOM-REGION gram. Brugman (1983) reports on the uses of the Chalcatongo Mixtec body-part noun *čii* "belly" as a postposition meaning "under" and as a complementizer introducing causal phrases. She suggests that the transition from "under" to "because" requires the intervention of a stage in which it signifies "supporting material".

BENEFACTIVE. The notion of support is responsible for another use of BACK-REGION grams. In Bihari, the postposition *pāchū*, in addition to POSTERIOR and POSTERIOR-ORDER uses, is also used to express BENEFACTIVE relations as in (99).

Bihari (Jha 1958:336)

(99) *beta-k*^{a} *paṛhāebā-k*^{a} *pāchā̃ hinàk*^{a} *dhàn*^{a} *naṣṭ*^{a} *bhæ gelainh*^{a}
son-GEN education-GEN for
'His money was wasted on account of his son's education'

BENEFACTIVE can be seen as mental support directed towards a person (with material consequences, sometimes). The lexical sources of this postposition do not provide any enlightening facts (related to Sanskrit *paçca(t)* "behind, later, west"), which may be an indication that the uses related to each other by the notion of support are not idiosyncratic to a specific gram and its history (e.g. Island Carib *l-ábu*), but, rather, reflects a more general relation between POSTERIOR and support. Support, a functional notion, mediates between POSTERIOR on the one hand, and relations such as COMITATIVE, INSTRUMENTAL, and BENEFACTIVE on the other. In other words, functional implications of spatial arrangements are the basis of some conceptual manipulations which result in inferring non-spatial relations.

And now, let's discuss the most frequent non-spatial uses co-occurring with POSTERIOR, the temporal uses.

2.3.3 *Temporal uses*

Fourteen of the thirty-six BACK-REGION grams in ten languages were used to express temporal relations. These temporal relations may be described by four uses: POSTERIOR-TEMPORAL, POSTERIOR-ORDER, AFTER, STATE COMMENCES and EVERY. Each one is discussed below:

POSTERIOR ORDER. This is the most frequent of the temporal uses occurring in six grams in six languages. Unfortunately, only one example is available.

Bihari (Jha 1958:336)

(100) *ham*^{a}*rā-sà pāchū rām*^{a} *ælāh*^{a}
me-ABL after Rama come.PAST
'Rama came after me'

The following have been assumed to hold in a POSTERIOR ORDER situation: the TR and the LM are moving along the same path (or, are engaged in similar activities). The TR follows the LM.

This use is similar to the ANTERIOR ORDER use. Direction of movement determines the FRONT and BACK of the path of motion of TR and LM. If the TR follows the LM in that path, it will most probably reach a goal later than the LM. This use may further be extended to cases in which the LM and the TR are situations. In such cases, reaching a goal translates into completing an event. This use is discussed below.

POSTERIOR TEMPORAL. BACK-REGION grams, in addition to their use for describing spatio-temporal order relations, may also be used to order situations with respect to time intervals. Such intervals have well-defined boundaries, and they may be either conventional time intervals such as a month or a day (101), or situations which have a certain duration, but also a clear end. Thus, situations such as a quarrel (102), a period of rain (104), or a period of sickness (103), may become reference points for ordering other situations.

Abkhaz (Hewitt 1979:148)

(101) *a-š°ax'à* *à-štax'*
ART-Monday it-since/after
'since/after Monday'

Bihari (Jha 1958:336)

(102) *jhag^{a}ṛā pāchū o behāl^{a} chạth^{i}*
quarrel after
'he is very busy after quarrel'

Basque (N'Diaye 1970:86)

(103) *eri egon ondoan bitxi gelditu de*
his illness-GEN after
'Après sa maladie, il est reste bizarre'
'(After his illness, he has become strange)'

(ibid.)

(104) *uriein ondo-tik gain gera kanpo-ra*
rain-GEN after FUT go outside-ALL
'Après la pluie, nous irons dehors'
'(After the rain, we will go outside)'

This use implies that the TR, which is a situation, takes place during a time interval which starts at the end of the temporal LM. In that respect, it indicates the starting point of a situation.

STATE COMMENCES. In a slightly different but related manner it is possible for a BACK-REGION gram to be used to indicate the commencement of a state. In fact, the Shuswap gram *-ep* has such a use, as we see in the following examples.

Shuswap (Kuipers 1974:61)

(105) a. *pl-ep*	b. *cʕ-ep*	c. *hy-ep*
lose-behind	tear-behind	angry-behind
'get lost'	'get torn'	'get angry'

This form is used as a grammatical element which, suffixed to a verbal stem, signifies the commencement of a state and changes the valence of the verb. Although POSTERIOR TEMPORAL constructions and STATE COMMENCES constructions are grammatically and syntactically different, their semantics may be motivated by the notion of order implicit in POSTERIOR situations.

AFTER. In three languages grams with POSTERIOR uses also had an AFTER use, whereby the TR and the LM are situations and the TR is temporally ordered after the end of the LM (in present, past or future).[39] The following examples illustrate the use.

Abkhaz (Hewitt 1979:40)

(106) *d-anə̀-y-ba à-štax' də-cé-yt'*
him-when-he-see it-after he-go-FIN
'After he saw him, he left'

Halia (Allen & Allen 1965:42)

(107) *noriy e laliyla i murina te holraliylen*
they PM left LOC behind PM paid-pass-3
'They left after they were paid'

Bari (Spagnolo 1933:256)

(108) *i mukök na tiri katɔbyanit (na), nan gwɛ a lɔkɛ'*
after of gone doctor (of?) I be.as
'After the time at which the doctor had gone, I grew better'

As with the BEFORE uses of FRONT-REGION grams, an AFTER use requires that situations be conceptualized as objects. This is supported by the fact that situations in AFTER relations are construed as bounded, completed events (perhaps marked for perfective aspect), most commonly expressed by non-finite verb forms (which share properties with nominal forms). The same operation which applies to POSTERIOR ORDER, also applies in the ordering of situations.

EVERY. Earlier, I discussed the CIRCUMFERENTIAL use of the Papago postposition *webi'G*. This postposition also has a temporal use when its complement is a temporal expression such as day, hour, week, etc., referring to conventional temporal units. It indicates reccurrence of events/situations over specified (by the temporal expression) intervals of time. I named this use EVERY. The following examples illustrate the use.

Papago (Mathiot 1973:252-3)

(109) *gi?ik tax veegaj*
four days every
'every four days'

(110) *gook ?oola veegaj*
two hours every
'every two hours'

(111) *gook domig veegaj ?o ?o (<?e) vepegi*
two weeks every
'Every two weeks, there is a show'

This use of the Papago postposition is parallel to an Old English form *eft*. *Eft*, originally a spatial term meaning "behind", evolved to be used to describe iterative actions (Traugott 1985). The Modern English *again* also developed from a spatial adverb of direction to an adverb expressing iteration. Traugott (1985) tracks its evolution from a Proto-Germanic adverb *gag(a)n* "in a straight line, facing", to Old English *ongean* expressing locative opposition and movement in opposite direction, to Middle English *again* expressing concrete return to original position, to implying pluralized eventhood in Late Middle English, to iterativity in Early Modern English.

It is interesting that iterative uses may develop from originally opposite spatial grams, such as the BACK-REGION grams *webi'G* of Papago and *eft* of OE on the one hand, and the FRONT-REGION gram *gag(a)n* of Proto-Germanic (via OE *ongean* "opposite") on the other. In both cases iterative uses presuppose the use of this gram to express movement to FRONT- or BACK-REGION with the implication that the region the movement is directed towards what was the original position. Iterative meaning emerges if the complement of the gram is plural describing either plural events or plural temporal units.

This use of the Papago postposition *webi'G* seems to be a metaphorical extension of the spatial CIRCUMFERENTIAL use into time. The latter describes not only a location but also circular movement around an object. Thus, when circular movement is extended into the temporal domain, we may infer iteration.

3. FRONT-REGION, BACK-REGION and movement

Movement, as an experiential activity, manifests itself in the various mechanisms which provide the connection between core spatial uses of FRONT-REGION and BACK-REGION grams, and peripheral spatial and non-spatial uses. Thus, direction of movement as the reference frame establishing FRONT-REGION is involved in relating ULTERIOR and DIRECTION TOWARDS to ANTERIOR uses. Path of movement to BACK-REGION relates CIRCUMFERENTIAL and THROUGH to POSTERIOR, while point of origin and direction of movement are involved in relating BACK-TO uses to POSTERIOR. Movement is also responsible for establishing order relations, by order of encounter, which in turn lends itself to temporal ordering and the emergence of uses such as ANTERIOR TEMPORAL, POSTERIOR TEMPORAL, BEFORE, AFTER, etc.

Movement, thus, is central to the way we understand and talk about FRONT-/BACK-REGION relations, and, consequently, construe situations in terms of such relations. In this section, I will discuss the linguistic expression of movement in relation to core spatial uses of FRONT-/BACK-REGION grams. The question is whether motion is simply an important experiential notion involved in the understanding of FRONT-/BACK-REGION relations, which is conflated with them in the expression of such relations, or whether it is a notion which receives separate linguistic expression, thus suggesting independent conceptualizations.

Movement to or towards, from or away from the FRONT and BACK REGIONS receives linguistic expression but presents variation. In English one may say:

(112) Jerome came/went to the back of the house
(113) Jerome came from the back of the house
(114) Jerome went in back of the house
(115) Jerome came from in back of the house
(116) Jerome went behind the house
(117) Jerome came from behind the house.
(118) Jerome is behind the house

In the above examples the TR (Jerome) is involved in a dynamic situation (went, came) with the BACK-PART of the LM (the back of the house) (112, 113), or the BACK-REGION of the LM (in back of/behind the house) (114-118). The directionality of movement is specified by a Destination specifier (to), or a Source specifier (from). The verbs in all of these exam-

ples specify the fact of motion, that is, whether the Trajector is involved in a dynamic, motion situation, or a static one. The verbs *go* and *come* further carry specification of the directionality of movement with respect to the deictic center (Fillmore 1975) (hence "deictic verbs"): *go*: away from deictic center, or deictic center moves towards; *come*: towards the deictic center and deictic center remains.

While it seems that destination and source, and, consequently directionality, are central notions in talking about movement, they do not always get specified. So, in examples (114) and (116) the destination is inferred. Note that the examples (115) and (117), which seem to be the parallels of (114) and (116) in source-related movement, do receive Source-Specifiers.

In the following sections I will discuss the consequences of the linguistic expression of various aspects of movement with respect to FRONT-/BACK-REGIONS. Basically, the questions are whether the specification or non-specification is an idiosyncratic rule of a specific language (i.e. English), or whether it has cross-linguistic range; second, whether it depends on lexical properties or on general cognitive properties of perception of movement.

3.1 *Variation in specification of FRONT-/BACK-REGION as destination, source and point-in-path*

Evidence in support of the cross-linguistic range of the variation in specification of destination comes from data from 10 languages of my sample. In examples (119)-(129) dynamic verbs of motion designate motion to BACK-REGION and FRONT-REGION of a LM.

Island Carib (Taylor 1956a:36)

(119) *báiba l-ábu*
go it-in.rear
'Go in the rear of if¡'

Abkhaz (Hewitt 1979:131,132)

(120) *a-y°n-à-šta+x'* *bə-cà*
ART-house-it-behind you-go
'Go up to behind the house'

(121) *a-y°n-[a]-àpx'a* *š°-ne+y*
ART-house-[it]-in.front.of you-go
'Go [up to] in front of the house'

Navajo (Young & Morgan 1980:85)

(122) *ke 'ádí-ne' 'ayoo'nil*
he REFL-back
'He put the shoes behind himself'

(ibid.:86)

(123) *hazhó'ó yiikah ńt'éé' shínnaí 'atsi ni'ádeeltį*
'As we were walking slowly along my older brother took the lead' (lit. placed himself at the front)

Haka (Newland 1897:17)1

(124) *k'-hnú lé ya, htút" lo*
me-back side at, sit IMP
'Sit behind me'

(125) *kema she na, rúk" pú*
me before
'Bring him before me'

(126) *kema hmai lé ya a kal"*
me in.front.of went
'He went before (in front of) me'

Halia (Allen & Allen 1965:26)

(127) *aliya e hake-guw-leu i matana luwma*
I PM put-1SG-it LOC front house
'I put it in front of the house'

Bari (Spagnolo 1933:210)

(128) *ití i ŋerot nio'!*
go in front of-1SGPRO
'Go in front of me!'

(129) *ití köyö ŋerot!*
go in-1SGPRO front
'Go in front of me!'

A common characteristic of all the verbs involved is that they designate telic situations such as orders or completed actions, and that is reflected on the morpho-syntactic shape they appear in (i.e. past tense/ perfective aspect, imperative).

In contrast, dynamic verbs in atelic environments, where activities are being encoded, involve movement of the Trajector within the FRONT/BACK-

REGION of the Landmark. For example, walking behind someone, as in the Tigre (131) and Navajo (135) examples, shooting at targets behind a LM, as in the Karok example (132), or washing behind a LM, as in the !Kung example (134), are activities that happen at a location. They are treated the same as states existing in the BACK-REGION of a LM, as in the Abkhaz (130), Papago (137) and Halia (138) examples.

Abkhaz (Hewitt 1979:131)
(130) *a-y°n-à-šta+x'* *də̀-q'o-w+p'*
ART-house-it-behind he-be-STAT
'He is behind the house'

Tigre (Raz 1983:84)
(131) *ka-darb-u* *ət* *ləgayəs*
and-after-him while walking
'And while walking after him...'

Karok (Bright 1957:296)
(132) *?imá:nkam tasáxxa: kúmma:m kuníšri:mtih*
next.day t. its-behind they.shot.at.targets
'The next day they shot at targets behind tasaxxa:k'

!Kung (Snyman 1970:128)
(133) *mi* #hwe-ya tš'uwa !'on!eng
I uproot-TR house behind
'I uproot behind the house'

(ibid.:129)
(134) *!A* ||*x'a* *euto* *!'on!eng*
servant washes car behind
'The servant washes behind the car'

Navajo (Young & Morgan 1980:84)
(135) *łééchąą'í bi-kéé'* *yi-sháát*
dog it-behind 3SGPRO-walk
'I'm walking along behind the dog'

(ibid.:86)
(136) *shi-łééchąą'í si-tsi-jį'* *yi-lwoł*
1SGPOSS-dog 1SGPRO-front-along 3SGPRO-run
'My dog is running along in front of (ahead of) me'

Papago (Zepeda 1983:50)

(137) *Hegam 'o'odham 'o 'am do'ag we:big ki:*
those AUX people AUX DEM mountain behind live
'Those people are/were living behind the mountain'

Halia (Allen & Allen 1965:26)

(138) *ema kaney i murina luwma*
not is LOC behind house
'It isn't behind the house'

The source and the point-in-path of movement may also remain unspecified, contrary to English, where it is obligatory. Motion from or past the FRONT-/BACK-REGION is found only in Abkhaz, and in that language verbs such as "go" or "pass" are used to convey that the specified region of the Landmark was a point of departure or in the path of motion of the Trajector.

Abkhaz (Hewitt 1979:132)

(139) *yə̀-šta-x' də-yə̀+v-s -yt'*
him-behind he-him-by-pass-FIN
'He passed by behind him'

(ibid.)

(140) *yə-šta+x'* də-y+ày°-sə-yt'
him-behind he-him+by-pass-FIN
'He passed by behind him'

(ibid.)

(141) *yə-sə̀+št-ga*
it-me+from.behind-take
'Take it away from behind me!'

(ibid.:143)

(142) *a-waǰàq' w-a+ç'ə-c'*
ART-fireplace you-it+from.in.front.of-go
'Move away from in front of the fireplace'

In the following languages target, source and point-in-path are specified by the use of an adposition or affix.

Abkhaz (Hewitt 1979:132)

(143) *a-y°n-à-šta+x'ə-n+t°'(-əy) d-aa-c°ər-c'ə-yt'*
ART-house-it-behind-from he-PREV-PREV-move.out-FIN
'He suddenly appeared from behind the house'

(ibid.:131)
(144) *à-šta [a-]àpx'a-n+t°'(-əy)* *š°-aa+y*
ART-yard [it]in.front.of-from you-come
'Come away from in front of the yard'

(ibid.:132)
(145) *a-y°n-à-šta+x'ə+nja* *bə-cà*
ART-house-it-behind+to you-go
'Go up to behind the house'

(ibid.:131)
(146) *a-y°n-[a]àpx'a-nja* *š°-ne+y*
ART-house-[it]in.front.of you-go
'Go [up to] in front of the house'

(ibid.:130)
(147) *a-çẖ°à-la-ra*
ART-front.of.fireplace-motion.into-INF
'to approach the fireplace'

(ibid.:132)
(148) *yə-šta+x'à-la* *də-yə+v-sə-yt'*
him-behind *he-him*+by-pass-FIN
'He passed by behind him'

Basque (N'Diaye 1970:86)
(149) *etzaizte gure gibel-etik ola torri!*
back-to
'Ne venez pas ainsi derrierre toute!'

(150) *tortzen dire esposatu berrien aitzin-era*
GEN front-ALL
'Ils viennent devant les nouveaux epoux'
'(They came before the new spouces)'

Island Carib (Taylor 1956a:36)
(151) *l-ubára-ũ*
him-front-to
'to the front of him'

(ibid.:43)
(152) *-ubárua-gaũ*
-front.to-REFL
'to the front of ...self'

Navajo (Young & Morgan 1980:90)

(153) *nihił yah 'ííyáá dóó nihi-dááh-dóó neezdá*
1DUPRO he came to 1DUPRO-front-to sit.down
'He came in on us and sat down before us'

Several other terms in the languages of my sample showed a similar pattern. In all cases, coincidentally perhaps, the forms encoding motion were suffixes to the BACK-/FRONT-REGION grams.

Language	Source		Destination	
Basque	*gibel-etik*	back-ABL	*gibel-era*	back-ALL
	aitzin-etik	front-ABL	*aitzin-era*	front-ALL
Island	*-abu-giẽ*	back-ABL	*-abũ < -abu + ũ*	back-ALL
Carib	*-anaga-giẽ*	back-ABL	*-ánag-ũ*	back-ALL
	-éde-giẽ	back-ABL	*-éd-ũ*	back-ALL
			-árigau < arigi+ú	back-ALL
	-ubá(ra)-giẽ	front-ABL	*-ubá-ũ*	front-ALL
	-uba-giẽ	opposite-ABL	*-ubad-ũ*	opposite-ALL
Navajo	*kéé-déé'*	back-ABL		
	né-déé'	back-ABL	*-né-góó*	back-ALL
			-tsi-jį'	front-ALL
	dááh-dóó	front-ABL		
			dinínáá-góó	front-ALL
Abkhaz	*a-šta+x'+n+t°'(-əy)*	back-ABL	*a-šta+x'-ə+nja*	back-ALL
	a-šta+x'+q'a+n+t°'(-əy)	back-ABL		
	àpx'a-n+t°'(-əy)	front-ABL	*àpx'a-nja*	front-ALL
	àpx'a-q'ə-n+t°'(-əy)	front-ABL	*àpx'a-q'ə*	front-ALL
	àpx'a-ç'ə-n+t°'(-əy)	front-ABL	*àpx'a-q'ə+nja*	front-ALL
			-çh°a-la	front-ALL
Dakota			*'iha'kap-ya*	back-ALL
	'ila'za-tãhã	back-ABL		

The cross-linguistic evidence provided here suggests that the variation in specification of DESTINATION, SOURCE and POINT-IN-PATH does not depend on language specific idiosyncracies, but rather the reasons should be sought on a different level. In the English examples the variation seems to depend on whether the movement is to a PART (112) or to a REGION (114, 116). In fact Greek seems to work the same way:

Modern Greek

(154) *o jioryos pije sto brostino meros tu*
ART G. went to-ART(ACC) front-ACC part-ACC ART-GEN
spitju
house-GEN
'George went to the front of the house'

(155) *o jioryos pije brosta sto spiti*
ART G. went in.front to-ART(ACC) house-ACC
'George went in front of the house'

In example (154) movement to the designated part of the house is expressed with a complex phrase containing a Region-Designator as an adjective (*brostino*) modifying the part (*meros*) of the LM which appears in genitive (*tu spitju*). In contrast, movement to a location is expressed with an adverbial Region-Designator (*brosta*), whereas the LM appears in accusative (*sto spiti*).

These observations show that source, destination, and point in path may receive separate linguistic expression, but not obligatorily. The optional character of the linguistic expression of Motion, in conjunction with FRONT-/BACK-REGION spatial relations, within a language and across languages, indicates the complexity of the problem. Further investigation is required.

4. The semantic space of FRONT-/BACK-REGION grams and grammaticization

In the two previous sections I described in detail the uses of FRONT-REGION and BACK-REGION grams in the data base in an attempt to map a semantic subdomain for such grams. I tried to provide an explanation of how each use is motivated and could arise from such grams. If we consider the relations among various uses of F-REGION and B-REGION grams, then certain conceptual similarities among them lead to the grouping of uses into semantic neighborhoods within the subdomain. What characterizes each group is a certain experiential context which is responsible for the rise of such uses. Figures 25 and 26 represent semantic maps of F-REGION and B-REGION grams respectively as suggested by the uses of such grams in the cross-linguistic data base.

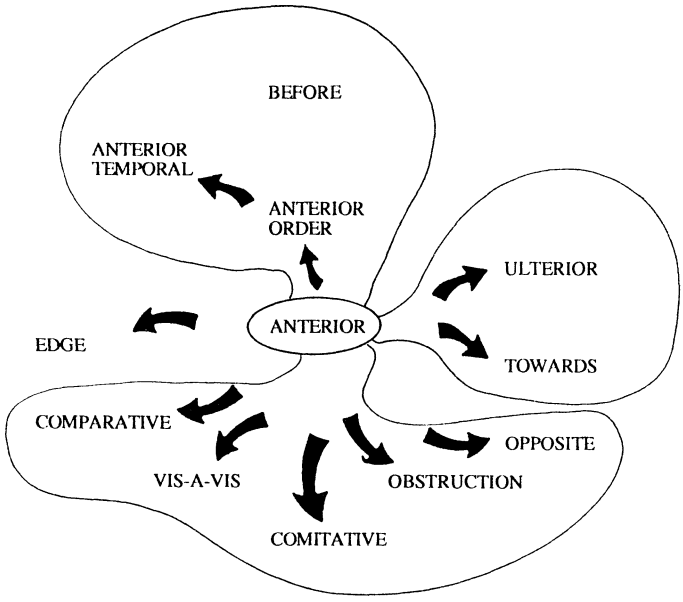


Figure 25. FRONT-REGION semantic map

In both F-REGION and B-REGION semantic maps a neighborhood of temporal relations has been identified. As discussed earlier, the use of spatial terms to refer to time and temporal relations on either lexical or grammatical level has been attributed by many scholars to unidirectional metaphorical extension from the domain of space to the domain of time. According to this map, however, the transition from one domain to the other does not involve a "leap" but rather a relatively smooth transition via the conceptual bridge of ORDER laid down by inferential processes. This means that the uses of ANTERIOR ORDER/POSTERIOR ORDER partake in both spatial and temporal relations and give rise to clearly temporal uses, such as ANTERIOR TEMPORAL/POSTERIOR TEMPORAL and BEFORE/AFTER respectively. The inferential bridge then leads us from being in the F-REGION of a LM, to being between an observer and a LM, i.e. the relation projected on a line, to being before the LM if one moves towards the LM, to occurring prior to a certain temporal LM which can be either a temporal point (ANTERIOR TEMPORAL), or a situation described by a clause (BEFORE). A similar inferential path is proposed for the transition from POSTERIOR to AFTER.

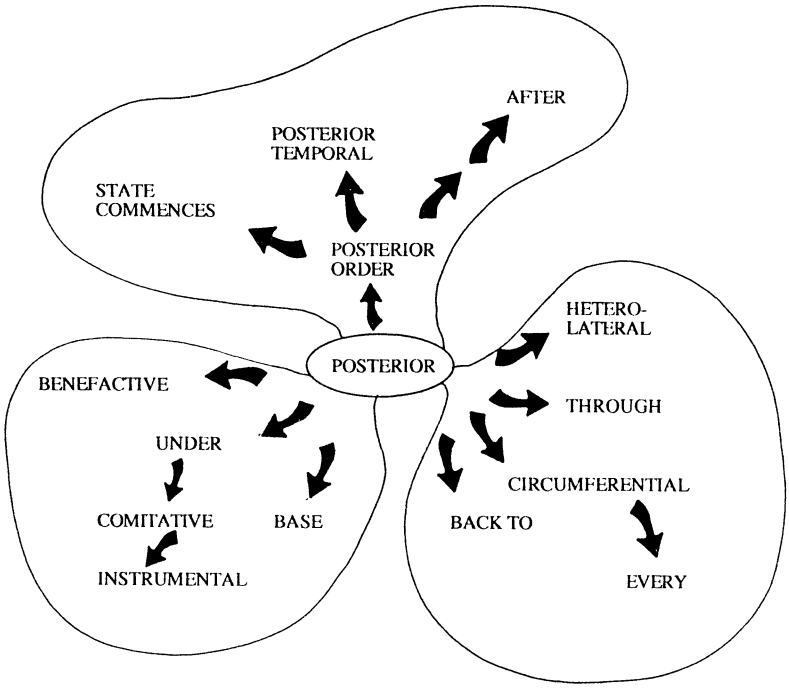


Figure 26. BACK-REGION semantic map

The proposed relation among uses has implications for grammaticization as well. In Chapter 3, a path of semantic evolution of spatial grams, in general, was proposed, and two mechanisms, metaphor and metonymy, were considered as the driving forces of semantic change. Metaphor was postulated as the mechanism operating at the earlier stages of grammaticization, whereas metonymy was responsible for the use of a gram to express location in the expanded region of the LM. I consider this stage in the grammaticization of particular importance, for it is at this point that certain types of implications become available for association with the gram. For example, only if the FRONT-REGION becomes detached from the part of the LM we can project that relation on a line and perceive order. Thus, only if a gram is used to express location in the expanded FRONT-REGION it can be used to express ANTERIOR ORDER relations. Implicature, then, is seen as the driving mechanism of grammaticization from that particular stage on.

Inferential mechanisms are also responsible for the other groups of uses as delineated in the semantic maps. In the F-REGION semantic space the group of uses which includes OPPOSITE, VIS-A-VIS, COMPARATIVE, and OBSTRUCTION owes its existence to inferences that arise from the experiential situation of face-to-face interaction. Similarly, the group of uses which includes ULTERIOR and TOWARDS owes its existence to inferences that arise from situations that involve motion of a TR to the F-REGION of a LM. In the B-REGION semantic space, various aspects of movement of a TR to the BACK-REGION of a LM invites inferences which give rise to uses such as CIRCUMFERENTIAL, THROUGH, BACK-TO, and HETERO-LATERAL. EVERY is seen as an extension of CIRCUMFERENTIAL invited by the repetition of circular motion. Finally, the group of uses which include UNDER, BASE, COMITATIVE, and BENEFACTIVE are all inferences projected on various domains based on the notion of support which seems to underlie the POSTERIOR use as well.

One final observation involves the rise of a COMITATIVE use from both FRONT- and BACK-REGION grams. One would expect that grams from such opposite conceptual domains should iconically have no common uses, if not opposite ones. Furthermore, if one considers that these two types of grams evolve from very different sources and follow very different evolutionary paths, one development which is unexpected is the acquisition of the same use. The only way to explain this particular finding is to allow for inference to operate on the semantic change of grams. Apparently opposite situations may invite similar inferences and thus give rise to the same type of use.

5. The morphology of FRONT-REGION and BACK-REGION grams

It was assumed that the form of spatial grams varies across and within languages according to two dimensions: the internal structure of the gram (that is, whether it is monomorphemic or polymorphemic, and how the components are put together), and its interaction with other elements in a stretch of discourse (nominal, pronominal, clausal; degree of fusion). It was hypothesized that variation is constrained by specific semantic domains. Within such domains the formal characteristics of grams are more similar along the two dimensions mentioned above than they are across semantic domains. Furthermore, if such domains are polarized around two cores which are conceived as opposite, there will be more variation across polar subdomains than within each one of them.

In the previous section we concluded that F-REGION and B-REGION spatial grams designate relations which constitute a semantic domain. If the hypothesis presented above is valid, then we would expect that the form of these grams is similar across languages with respect to their internal structure and shape. Moreover, there will be more similarities in form among F-REGION grams and among B-REGION grams than across regions. With respect to their interaction with their scopes, we expect that they would be similar as to the degree of fusion and the hosts they may have.

Data from the eighteen languages from the sample, for which information about F-REGION and B-REGION grams was available, support this hypothesis in all its parts. In summary, F-REGION and B-REGION grams share many formal properties especially in the interaction with their scope elements. There are, however, some differences in internal structure. Below, the internal structure of grams and their interaction with their scopes are presented for both F-REGION and B-REGION. Differences are pointed out where relevant. Tables 17 and 18 present the F-REGION and B-REGION grams in the data base.

Table 17: FRONT-REGION grams

Language	*Expression Mode*	*Gram*
Abkhaz	POSTP	*a-ç'ə*
	POSTP	*[a-]àpx'a*
	POSTP	*a-p+nə*
	PRE	*-a-pə(+ra)-*
	PRE	*-a-pə+n-*
	PRE	*-a-çh°a-*
Bari	PREP	*i ŋerot*
	PREP...POSTP	*ko...ŋerot*
	PREP	*i kɔmɔn*
Basque	POSTP	*aitzin-ean*
Bihari	POSTP	*a:ge*
	POSTP	*sa:ccha:t^a*
	POSTP	*sa:m^{a}ne*
	POSTP	*so:jhā:*
	POSTP	*para*
Car	PREP	*(i) kú:?*
Chacobo	POSTP	*rikɨ*
Dakota	POSTP	*'a-glágla*
	POSTP	*'i-t'okap*
	POSTP	*aíyopteya*

Table 17: *Continued*

Language	*Expression Mode*	*Gram*
Guaymi	POSTP	*kukuore*
Haka	POSTP	*she na*
	POSTP	*hmai lé ya:*
	POSTP	*a:*
Halia	PREP	*i matana*
Island Carib	PREP	*l-uba(ra)*
	PREP	*l-ubádu*
	PREP	*l-igíbugiẽ*
Karok	SUF	*-ʔá:vkam*
	SUF	*-iθvá:ykam*
Kui	POSTP	*bahta*
Melanesian Pidgin	PREP	*fɔrəd lɔŋ*
Mwera	PREP	*ku-mujo*
Navajo	POSTP	*bí-tsé (/bí-'ítsé/bí'áltsé)*
	POSTP	*bitsi*
	POSTP	*bidááh*
	POSTP	*bidiníaáá*
	POSTP	*binaashii*
Palantla Chinantec	PREP	*nyúʔ*[1]
Papago	SUF	*-dagio*^{h}
	SUF	*-baʔi*^{h}*tc*
	SUF	*-ba:*^{h}*co*
	SUF	*-wui*
Tigre	PREP	*qadam*
	PREP	*('ət) qabəl*
	PREP	*šəbab*
!Kung	POSTP	*ts'i*

Table 18: BACK-REGION grams

Language	*Expression Mode*	*Gram*
Abkhaz	POSTP	*a-šta+x'*
	PRE	*-šta-*
	POSTP	*a-šta+x'-ə-la*
Bari	PREP...POSTP	*ko...bot*
	PREP...POSTP	*ko...mükok*
	PREP...POSTP	*i...napele'*
	PREP	*i ki'diŋ*
	PREP	*i mukök*
	PREP	*i napɛlɛ'*
Basque	POSTP	*gibel-ean*
	POSTP	*ondo-an*

Table 18: *Continued*

Language	*Expression Mode*	*Gram*
Bihari	POSTP	*pāchū*
	POSTP	*bada*
Chacobo	POSTP	*čo*
Dakota	POSTP	*?ihákab*
	POSTP	*?ihéktap*
	POSTP	*?iyahakap*
	POSTP	*?ilázatanhan*
Guaymi	POSTP	*teri*
	POSTP	*tro-kiri*
	POSTP	*biti*
Haka	POSTP	*hnu lé ya*
Halia	PREP	*i murina*
Island Carib	PREP	*l-ábu*
	PREP	*l-anaga-giẽ*
	PREP	*t-ede-giẽ*
	PREP	*árigi*
Karok	POSTP	*ma:m*
	SUF	*vásih-kam*
Melanesian Pidgin	PREP	*bihajn lɔŋ*
Navajo	POSTP	*bi-kéé'(-déé')*
	POSTP	*bi-ne'(-di/-déé')*
Papago	SUF	*-webi'G*
	SUF	*-oi'Dk*
Shuswap	SUF	*-ep*
Tigre	PREP	*darb*
	PREP	*('ət) mən rahar*
	PREP	*har*
	PREP	*('ət) gərra*
!Kung	POSTP	*!?on!en*

5.1 *The degree of fusion of* F-REGION *and* B-REGION *grams*

The expression type of F-REGION and B-REGION grams presents a uniform picture with respect to the degree of fusion, varying along consecutive types on the continuum (see chapter 1, section 3.2.1). These grams participate in embraced and agglutinated types of constructions, while there is no instance of a fused construction. Out of 48 grams, only 7 F-REGION and 4 B-REGION grams in three languages (Abkhaz, Papago, Shuswap) participate in

agglutinated constructions, while the rest are of the embraced type. Two F-REGION grams in two languages (Navajo, Papago) participate in both types of constructions.

The distribution of F-/B-REGION grams along the continuum of the degree of fusion has two implications. First, these grams tend not to have hosts (the morphological units that grams may attach to), but rather be independent of their scope elements (the semantic unit in the referential domain of the gram). Second, the low degree of fusion suggests that other linguistic elements may intervene between the gram and its scope elements preventing it from becoming agglutinated. We will look at these implications in the following.

5.1.1 *The scope elements of F-/B-REGION grams*

Nouns, pronouns, verbs and clauses are found to be in the scope of F-/B-REGION grams. Nouns are the most frequent scope elements, although pronouns are frequent also. It is possible that nouns and pronouns are equally frequent scope elements of spatial grams in actual discourse. Their distribution, I believe, varies according to linguistic frames in discourse. The difference in frequency found in this data may only be phenomenological. Another group of grams may have not only nominals in their scope, but also verbs. And, finally, a few grams may have entire clauses in their scope. Table 19 presents the data.

In Abkhaz, four of the grams appear only within the verbal complex. The forms *pə(+ra), pə+n*, and *çh°a* always appear within the verbal complex in association with stative and dynamic roots. In all their uses, they encode F-REGION spatial relations. The determiner *çh°a* is specialized to relations taking place or existing with respect to a fireplace. The determiner

Table 19: Elements in the scope of F-REGION & B-REGION grams

	N	PRO	V	CL@	Total # of grams
FRONT-REGION	44	42*	5+	3	48
BACK-REGION	38	32**	2	3	40

*: 40 co-occur w/N; 1 w/N & V; 1 w/PRO only
+: 5 (1 co-occurs w/N; 1 w/N & PRO; 3 w/V only
**: there was no data with pronouns for 6 forms
@: mark also nouns and pronouns

itself is also a noun, *a-çh°a*, which refers to the front of the fireplace as a location. Examples (156), (157) and (158) illustrate the use of these grams:

Abkhaz (Hewitt 1979:131)

(156) *a-š°q°'ə sarà yə-s-pə+r-ga*
ART-book me it-me+from-before-take
'Take the book away from in front of me'

(ibid.:130)

(157) *də-s+pə+n-gəlo-w+p'*
he-me+in.front.of-stand-STAT
'He is standing in front of me'

(ibid.:131)

(158) *a-çh°ə-s-ra*
ART-front.of.fireplace-pass-INF
'to pass in front of the fireplace'

(ibid.:143)

(159) *a-ç'a-t°'a-rà*
ART -opposite-sit-INF
'to sit opposite'

The gram *a-ç'ə* encodes FRONT-REGION relations only as one of its uses, the other uses covering a wide variety of spatial relations. It is used both as an adposition and a verbal prefix. As an adposition it encodes regional relations but as a verb prefix it has a variety of uses, including interior, contiguity, elative, continuous aspect and FRONT-REGION relations, as in (159).

The Navajo form *dááh* is both a postposition and a verb prefix. While as a postposition it has various F-REGION uses (160), as a verb prefix it has the very specialized meaning of "obstruction or closure" (161), as we saw earlier.

Navajo (Young & Morgan 1980:89)

(160) a. *shi-lééchąą'í chidí yi-dáah-gi sidá*
1SG-dog car it-front-in is.sitting
'My dog is sitting in front of the car'

b. *shi-zhé'é bi-dááh ní-yá*
1SG-father 3SGPRO-in.front.of 1SGPRO-go
'I went to meet my father'

(161) a. *kin diiltła-go shi-dá-hodiník'ąą'*
house burn-PARTCP 1SGPRO-in.front-
'I was cut off by fire in the burning building'

b. *nihimá kin gane' nihi-dá-di'nílkaal*
1DU-mother house in 1DU-in.front-
'Our mother locked us in the house' (ibid.:90)

The form *-a-šta-* also appears in the verb complex as a prefix (although there are two postpositions that are related to it) and it encodes B-REGION relations as is illustrated in example (162).

Abkhaz (Hewitt 1979:131)
(162) *də-sə̀+što-w+p'*
he-my+track-STAT
'He's looking for me//following me//on my track'

The other B-REGION gram with a verb in its scope is the Shuswap form *-ep* which is illustrated in example (163)

Shuswap (Kuipers 1974:61)
(163) a. *tp'nm-ep* b. *x-kx-ep-m*
back up chase

It is not clear what the difference is between adpositional and verbal-affixal uses of grams. Nichols (1986) has suggested that in Abkhaz, in which grams appear both as postpositions and verb prefixes, the relation can be explained as a diachronic process of "headward migration" where a postposition gets associated with its verbal head. Hewitt (1979) also notes that in cases where this occurs, the construction with the verbal prefix is the preferred one. The attachment of adpositions to verbs has been observed also in several African languages by Heine and Reh (1984). They have described the phenomenon as a process labelled "verbal attraction". This variation seems to be specific to certain languages and requires further investigation for its understanding. It is worth noting, however, that in the cases of affixation of the gram to the verbal complex the meaning of the gram contributes to the lexical meaning of the verb, so that we could consider its agglutination almost like a derivational process. (compare examples (161)-(163))

Three F-REGION grams in Bari, Basque and Tigre, and three B-REGION grams in Abkhaz, Bari and Halia were found to introduce subordinate temporal clauses. The argument that an entire clause is in the scope of the ref-

erential domain of those grams was made in the discussion of their semantics in sections 1.3.3 and 2.3.3 respectively. Here I would like to point out that in all but one gram in one language, the verb of the clause that the gram is associated with is in a non-finite form (e.g. example (164)). In Halia, however, the preposition *i murina* functions as a conjunction and the verb is in finite, fully inflected form, as is illustrated in example (165).

Tigre (Raz 1983:121)

(164) *ka-'əb bəlla 'əbrat hye qadam*
and-with this needle however before
ma-traggāz-ka la'əbrat
PARTCP-be.pierced-2SGMASC needle
'And before you're pierced with this needle, the needle...'

Halia (Allen & Allen 1965:42)

(165) *noriy e laliyla i murina te holraliylen*
they PM left LOC behind PM paid-PASS-3
'They left after they were paid'

5.1.2 *The hosts of F-/B-REGION grams*

We saw earlier that F-/B-REGION grams are characterized by a tendency to be independent from their scope elements, to be hostless. The few cases of grams which have hosts are concentrated around specific kinds of scope elements. First, in all cases in which a gram includes a verb in its scope, the verb is the host of the gram (see previous section). Second, in 37 out of 48 grams, when a pronoun is in their scope, the pronoun is also their host. Finally, in 9 cases grams have noun hosts.

The observation that F-/B-REGION grams tend to be hostless implies that it is possible for other items to occur between the gram and its scope element. The degree to which this is true determines the degree of fusion of those elements. The greater the distance between them and the more the intervening items are, the less the fusion it is. The possibility of occurrence of open-class items (e.g. adjectives) between the gram and its scope element is an indication of the independent status of the gram. Among closed-class items that may occur in that position some are more indicative of the independence than others. For instance, the occurrence of demonstratives, numerals, possessive pronouns and articles (when not obligatory) shows a more independent status of the gram than when (more or less) obligatory items, such as plural markers, morphological case markers or noun-class

markers occur. Table 20 presents the open and closed-class items that may occur between the gram and its scope element in each of the languages for which I have F-/B-REGION data. The table is organized in two sections, for preposed and postposed grams. Also a distinction between nominal and pronominal scope elements is maintained.

Table 20: Intervening classes between gram and its scope elements

A: Preposed grams

	Nominal Scope								Pronominal Scope			
Language	ADJ	DEM	ART	DIR	REFL	NUM	N-CL	GEN ADP	0	DIR	N-CL	GEN ADP
Bari								*				*
Car		*	*						*			
Halia			*						dn			
Isl.Carib.		*		*	*				*			
Mel.Pid.	*								*			
Mwera				*			*			*	*	
Pal.Chin.						*			dn			
Tigre	*	*	*						*			

B: Postposed grams

	Nominal Scope							Pronominal Scope		
Language	ADJ	DEM	ART	NUM	POSS PRO	PL	GEN AFF	0	GEN AFF	PL
Abkhaz	*			*	*	*		*		
Basque							*		*	
Bihari						*	*		*	*
Chacobo	*					*		*		
Dakota	*		*	*				*		
Guaymi						*		*		
Haka	*			*				*		
Karok	(*)				*	*		*		
Kui						*	(*)	dn		
Navajo					*	*		*		
Papago					*			*		
!Kung	*	*				*		*		

(dn: data not available)

F-/B-REGION grams show greater degree of fusion with pronouns than with nouns. Typically, pronouns do not get modified by adjectives, demonstratives, articles and numerals. The morphologically-marked categories that may occur with pronouns are number (Bihari), case (Basque, Bihari) and noun class (Mwera). If a language does not mark such categories on pronouns, as is the case with the rest of the languages in Table 20, then nothing prevents the agglutination of the gram with the pronoun. In that case greater degrees of fusion are possible resulting in the occurrence of phonological processes between them. For example, in Tigre there is vowel assimilation (*e* of the *ehom* is deleted when *a* precedes it), as in example (166). In Karok there is a change in stress where the gram *?á:vkam* and the pronoun constitute a single unit with the stress on the pronoun, as in (167).

Tigre (Raz 1983:110)

(166) *gərra-hom far'on wa-qadam-ehom baḥar ga'a*
behind-them Pharaoh and-in.front.of-them sea became
'Pharaoh was behind them and the sea in front of them'

Karok (Bright 1957:304)

(167) *káru yiθθa ?úkvi:pti mukún-?a:vkam*
and one is.running their-in.front.of
'And one is running in front of them'

In summary, a number of parameters contribute to the greater degree of fusion of grams with pronouns as opposed to nouns. First is the lack of modifiers such as demonstratives and adjectives. Second, the fact that the pronouns are a small, closed class in each language makes the occurrence of each of the pronouns with spatial grams more frequent than their occurrence with any other noun. As a result, fusional phenomena, such as phonological processes, are possible.

F-/B-REGION grams of only two languages are agglutinated to nouns. In Papago, only a possessive pronoun (marking "inalienable possession"), which is a suffix on nouns, may intervene between the object and the postpositional gram. In Karok, a plural suffix may intervene between the object and the postpositional gram. However, plural marking is not obligatory in Karok, number being understood from context. Occasionally, adjectives may occur in that position, but their typical position is before the nouns. In the rest of the languages, grams are more independent and the number of intervening items is greater.

Based on this data, we can generalize that the degree of fusion of F-/B-REGION grams (and for that matter other relative grams) depends on the lexical status of the scope elements: verbal scope elements are the best hosts because they always accommodate the gram in the form of an affix; pronominal scope elements allow for greater fusion than nominal scope elements.

5.1.3 *The order of gram and its scope*

Within a language F-REGION and B-REGION grams were either preposed or postposed to nominal and pronominal scope elements. All preposed grams that were associated with nominals are independent, in the form of prepositions. The only prefixal grams (4 F-REGION and 1 B-REGION grams) occur in Abkhaz and they are affixed to verbs. In contrast, all suffixal grams (6 F-REGION and 3 B-REGION grams) are associated with nominal (and pronominal) stems and characterize only two languages, Papago and Karok, with the exception of the Shuswap *-ep* which is a verbal suffix. The rest of the postposed grams are independent postpositions (see Table 21).

These findings can be summarized in two observations: a) that F-REGION and B-REGION grams tend to be postposed rather than preposed in the languages of the world, and b) that these grams overwhelmingly do not fuse with their scope, but remain independent. The few occurrences of prefixes and suffixes characterize specific languages. A discussion of these findings follows.

Overall, there are more postposed than preposed grams. 64% of all F-REGION grams are postposed and the rest preposed (see Table 21). If we exclude the Abkhaz verbal prefixes the difference is even more pronounced. The B-REGION grams also exhibit similar difference in the postposed (62%) over the preposed ones, but with less difference if the verbal prefixes are excluded. The predominance of postpositions and suffixes is not unique to this domain. In fact, across all the semantic domains that

Table 21: Order with respect to the scope elements[40]

	PREP	PRE	Subtotal	POSTP	SUF	Subtotal
FRONT-REGION	13	4	17	24	6	30
BACK-REGION	13	1	14	19	4	23

were identified in my data base, postposed grams were by far more frequent than preposed ones.

This finding is in accord with previous ones by Greenberg (1957, 1963b), Kahr (1976), Reh (1986), Hawkins and Cutler (1988), Hall (1988), and Bybee, Pagliuca and Perkins (1990), according to which across languages suffixal morphology, generally in both nouns and verbs, is more frequent than prefixal morphology and postpositions more frequent than prepositions.

The wide range of occurrence of this phenomenon suggests that it is a characteristic of language in general, and its explanation cannot be found by simply focusing on specific cognitive domains, such as spatial relations. There have been several attempts so far to provide an explanation. Cutler, Hawkins, and Gilligan (1985) and Hawkins and Cutler (1988), drawing upon psycholinguistic evidence, have focused on the predominance of suffixes over prefixes and have attributed this phenomenon to certain principles of language processing: in speech recognition stems are processed before affixes; by having the affixes afterwards, the overall processing is facilitated, preserving the same iconic relations between linear order of signal perception from left to right and order of processing.

This kind of explanation, although attractive at first, becomes questionable when we consider one of its implications: languages with preposed grammatical material are less efficient, more difficult to process, than languages with postposed grammatical material. Whereas this might well be the case (and language is not at all such a perfect product of human thought!), we would still not have explained why there are prefixes at all. Furthermore, focusing only on the phenomenon of suffixation and separating it from the postposing of grammatical material when the two seem to be related begs the question of why postpositions are more frequent than prepositions.

Reh (1986), discussing several African languages, attributes the small number of prefixes which describe case relations, as opposed to the number of case suffixes, to their individual historical developments. Case suffixes develop from postpositions, but prepositions do not become nominal prefixes; rather, they become verbal suffixes, eventually developing into derivational affixes. My data provided evidence only for one case of a B-REGION gram which is suffixed to a verb, the Shuswap *-ep*. From the meaning of this gram, it seems that it is derivational (see examples 163 a, b). The fact that this is the only instance of a verbal suffix suggests that F-REGION and B-REGION

grams tend not to participate in derivational processes with verbs. If this is true, then Reh's observations are valid for certain semantic domains only within case relations. The kinds of such semantic domains remain to be found.

Hall 1988 recognizes the inadequacies of any single hypothesis, either psycholinguistic or historical, concluding that the explanation must be sought by trying to incorporate historical and psycholinguistic facts.

Bybee, Pagliuca, and Perkins (1990) investigated the universal general preference for postposing of grammatical material, considering the preference for suffixation only a specific case of this general tendency, drawing from data of verbal categories from 71 languages. They have found evidence for the "fossilized syntax" hypothesis (Givón 1971), that is, that the position of an affix is the same as the position of the nonbound lexical and grammatical material from which the affix developed. They have also found evidence against the processing hypothesis as it relates to the preference of suffixation over prefixation, as articulated by Hawkins and his associates. They conclude, however, that the role of language processing cannot be disregarded completely, as it is crucial in considerations of the relation of lexical and grammatical elements: "Lexical and grammatical elements that belong together conceptuallly are processed together and stored together in the lexicon." (Bybee, Pagliuca, Perkins 1990:35) Thus, they provide an account in terms of a division of labor of cognitive and historical factors whereby cognitive factors, such as processing and memory/storage, are responsible for the physical closeness of lexical and grammatical material, and historical typological factors are responsible for the appearance of grammatical material in pre- or post-position to lexical material.

The findings of this study also support the "division of labor" account. From the historical account of spatial grams in Chapter 3 we have seen that their synchronic position with respect to their scope depends, on the one hand, on the typological characteristic of the language, and, on the other, the fact that they evolve primarily from expressions which incorporate genitive constructions and, therefore, follow that pattern. Furthermore, because of the nature of the concepts encoded by F-REGION and B-REGION grams, it is easy to see why they are associated more with nominal than with verbal scope elements.

5.2 *Internal structure of the grams*

In the previous section we saw that F-/B-REGION grams range from embraced to agglutinated in the continuum of the degree of fusion. The form of those grams further varies in their internal structure. While most agglutinated grams are monomorphemic, most embraced grams are polymorphemic exhibiting several compounding patterns and degrees of internal fusion.

5.2.1 *Monomorphemic grams*

The forms that were not further analyzable, either as the author of the grammar has indicated, or following my unsuccessful attempts to further analyze them, were considered monomorphemic. Nineteen out of forty-eigth F-REGION grams in ten languages are monomorphemic, as Table 22 shows. Two of these forms, Tigre *qabəl* and Car *kú:?*, can optionally combine with a very general preposition forming complex expressions such as Tigre *'ət qabəl* and Car *i kú:?*. Eleven out of forty B-REGION grams in seven languages are monomorphemic.

A greater percentage of F-REGION grams (37.5%) are monomorphemic, compared to a 27.5% of monomorphemic B-REGION grams. Let's further discuss the data. In two languages, Bihari and Papago, monomorphemic grams are the only way to express F-/B-REGION notions. The Haka gram *a:* and the Karok *ma:m* are the only F-/B-REGION monomorphemic forms in those languages, all others being polymorphemic. In other languages, Chacobo, Car, Kui, Palantla Chinantec and Shuswap the monomorphemic forms are the only ones found to express F-/B-REGION relations. It is not clear whether this is characteristic of these relations only or of the entire language. In Kui and Car other relations may be expressed by polymorphemic grams, whereas in Palantla Chinantec and Shuswap all relations are expressed by monomorphemic grams. In Guaymi and !Kung the F-REGION gram is the only monomorphemic one, but there are other polymorphemic B-REGION grams. Note also that the Papago and Shuswap grams are of the agglutinated type and represent 7 out of the 10 grams of this type.

The rest of the forms are polymorphemic. Some of them consist of a noun plus a locative gram (affix or adposition), as shown in Tables 23 and 24, while others consist of a monomorphemic or polymorhemic designator plus a marker of possessive or genitive relation (see Table 27).

Table 22: Monomorphemic grams

FRONT-REGION grams		BACK-REGION grams	
Language	*Grams*	*Language*	*Grams*
Bihari	*āge*	Bihari	*pāchū*
	sacchat^{a}		*bada*
	sam^{a}*ne*		
	sōjhā		
	para		
Car	*kú:?*	Car	(no data)
Chacobo	*rikɨ*	Chacobo	*čo*
Guaymi	*kukuore*	Guaymi	*teri*
			biti
Haka	*a:*	Haka	(polymorph.)
Karok	(polymorph.)	Karok	*ma:m*
Kui	*bahta*	Kui	(no data)
!Kung	*ts'i*	!Kung	(polymorph.)
Palant.Chin.	*nyú?*^{1}	Palant.Chin.	(no data)
Papago	*-dagio*^{h}	Papago	*-webi'G*
	-ba'i^{h}*tc*		*-oi'Dk*
	-ba:^{h}*cO*		
	-wui		
Shuswap	(no data)	Shuswap	*-ep*
Tigre	*qabəl*	Tigre	*darb*
	qadam		*ħar*
	šəbab		
Tallies	19 (/48 =37.5%)		11 (/40 =27.5%)

Table 23: Compound FRONT-REGION grams

Language	*Gram*	*Components*
Abkhaz	*a-ç'+àpx'a*	(*a-ç'ə* "at" + *àpx'a* "front")
	a-ç-pnə	(*a-ç'ə* "at" + *a-p+nə* "in front")
	a-p+*nə*	
	-a-pə+n-	(*a-pə* ?+ *nə* "at (adv.suf)"
	-a-pə(+ra)-	
Bari	*i ŋerot*	(*i* "loc" + *ŋerot* "front")
	ko...ŋerot	(*ko* "to, into" + *nerot* "front")
	i kɔmɔŋ	(*i* "loc" + *kɔmɔŋ* "face")
Basque	*aitzin-ean*	(*aitzin* "front" + *ean* "loc")
Dakota	*'a-glágla*	('*a-* "in, at" + *glágla* ?)
	'i-thokap	('*i-* "in, at" + *t*^{h}*okáp* "ahead")
	'aíyopteya	('*a-* "at" + *'i-* "at" + *ópta* "through, across" + *-ya* [manner])

Table 23: Continued

Language	*Gram*	*Components*
Haka	*she na*	(*she* ? + *-a* "loc")
	hmai lé ya:	(*am-hmai* "face" + *lé* "side" + *-a* "loc")
Halia	*i matana*	(*i* "loc" + *mata* "face" + *-na* (adv.suf)
Island Carib	*l-igibu-giẽ*	(*l-* (poss.pref) + *igibu* "face" + *-giẽ* "from")
Karok	*-ʔá:v-kam*	(*ʔá:v* "face" + *kam* "side")
	-iθvá:y-kam	(*iθvá:y* "chest" + *kam* "side")
Mwera	*ku-mujo*	(*ku-* (loc) + *mujo* ?)
Melanesian Pidgin	*fɔrəd lɔŋ*	(*fɔrəd* "forehead" + *lɔn* (loc))
Navajo	*bi-diní-náá*	(*bi-* (poss) + *dini* ? + *-náá* "across")
	bi-naa-shii	(*bi-* (poss) + *náá* "across" + *shii* ?)

Table 24: Compound BACK-REGION grams

Language	*Gram*	*Components*
Abkhaz	*a-šta+x'*	(*a-* (3SG POSS) + *šta* "trace" + *a-x'* "to")
	a-šta+x'-à-la	(*a-* (3SG POSS) + *šta* "trace" + *à-la* "in")
Bari	*ko...bot*	(*ko* "to" ...bot "back, backwards")
	ko...mükok	(*ko* "to" ... *mükok* "hip, region of hips")
	i mükok	(*i* "in" + *mükok* "hip, region of hips")
	i...na-pɛlɛ'	(*i* "in" ... *na-* "this" + *pɛlɛ'* "abdomen")
	i na-pɛlɛ'	*i* "in" + *na-* "this" + *pɛlɛ'* "abdomen")
	i ki'din	(*i* "in" + *ki'din* "back, dorso")
Basque	*gibel-ean*	(*gibel* "back" + *-ean* (loc))
	ondo-an	(*ondo* "proximity" + *-an* (loc))
Dakota	*'i-hákab*	(*'i* "in, on" + *hakap* ?)
	'-héktap	(*'i* "in, on" + *hektap* "back")
	'i-láza-tanhan	(*'i* "in, on" + *láza* ? + *tanhan* "from")
	'i-yó-hakap	(*'i* "in, on" + *'o* "in" + *hakap* "after")
Haka	*hnu lé ya*	(*hnu* "back" + *lé* "side" + *a* "in, on, at")
Halia	*i murina*	(*i* "at" + *muri* "back" + *-na* (adv.suf))
Guaymi	*tro-kiri*	(*trö* "back" + *kiri* "side")
Island Carib	*l-anaga-giẽ*	(*l-* (3SG POSS M) + *anaga* "back" + giẽ "from")
	t-ede-giẽ	(*t-* (3SG POSS F) + *ede* "bottom" + *giẽ* "from")
Karok	*vásih-kam*	(*vásih* "back" + *-kam* "side")
Melanesian Pidgin	*bihajn lɔŋ*	(*bihajn* "go later, afterwards" + *lɔŋ* "in, from, of")
Navajo	*bi-ne'-di*	(*bi-* (3SG POSS) + *ne'* "?" + *di* "in, at")
	bi-kéé'-déé'	(*bi-* (3SG POSS) + *kéé'* "trail" + *déé'* "from")
Tigre	*mən rahar*	(*mən* "from, of" + *rahar* "?")
	'ət gərra	(*'ət* "in, on, at" + *gərra* "?")
!Kung	*!'o-n!eng*	(*!'o* "at" + *n!eng* "in")

5.2.2 *Polymorphemic gram composition patterns*

The most common composition of F-/B-REGION grams is manifested in combinations of nouns and adpositions. Four patterns have been identified: Noun + adposition, adposition + noun, adposition + adposition and noun + noun. The noun + adposition pattern is a summary of a number of patterns including N + Adp, (N+N)+ Adp and N + case marker. Table 25 presents the patterns of gram composition. The number at the left of the slash represents the F-REGION grams and the number at the right the B-REGION grams exhibiting the corresponding pattern.

Although most languages are consistent with respect to the gram composition pattern (Bari, Basque, Halia, Island Carib, Guaymi, Karok, Melanesian Pidgin, Mwera, Tigre, !Kung), it is possible for a language to exhibit more than one pattern (Dakota, Haka). In Haka two nouns, the first of which refers to a body part and the second of which means "side" combine with the postposition *-a* to form a complex postposition. The postposition *she na* has been analyzed as belonging to N + Adp although the nominal status of *she* has not been established.

The Abkhaz and Navajo postpositions require some discussion. The Abkhaz postpositions *a-ç'+àpx'a* "in front of" and *a-šta+x', a-šta+x'-à-la*

Table 25: Patterns of F-/B-REGION gram composition

Language	N+ADP	(N+N)+ ADP	N+CASE	ADP+N	ADP+ADP	N+N
Abkhaz					5/1	
Bari				3/4		
Basque			1/2			
Dakota				1/1	2/2	
Haka	1/0	1/1				
Halia				1/1		
Isl. Car.	1/2					
Guaymi						0/1
Karok						2/1
Mwera					0/1	
Mel.Pid.	1/0					
Navajo					2/1	
Tigre				0/1		
!Kung					0/1	
Totals	3/4	1/1	1/2	6/7	9/6	2/2

"in back of, behind", and the Navajo postposition *bi-kéé'-déé'* "behind" could be analyzed in two ways. First, as a N + Adp combination, since the first component does refer to a nominal notion (e.g. body part) by itself. Second, as an Adp + Adp combination, since the first component is also used as a postposition by itself. I argue for the second analysis. There are secondary derivations of postpositions in both of those languages, and since the components already function as postpositions it would be arbitrary to suggest that the first component is still a noun.

The nouns involved in these constructions are body part nouns, while in two-noun combinations one of them means "side", as in Haka and Karok. The adpositions that these nouns combine with are usually monosyllabic, very reduced morphemes, having a very general locative meaning, appearing as free forms, as the Bari preposition *i*, the Haka postposition *a*, the Halia preposition *i* and the Melanesian Pidgin preposition *lɔŋ* or, as case affixes, as the Basque *-ean*; or, as a monosyllabic locative affix, as the Dakota suffixes *-'a* and *-'i*.

5.2.3 *Internal gram fusion*

The variation in the internal syntax of F-/B-REGION grams is further characterized by variation in internal fusion. Some of the forms are written as two elements, others as one, and still others present highly fused forms. We may distinguish four types of internal gram fusion, as summarized in Table 26, ranging in a continuum from low fusion, "discontinuous" grams to high fusion "dovetailed" grams, with intermediate "juxtaposed" and "abutting" types. The only instance of discontinuous grams are the Bari grams *ko/i...nerot* "in front of" and *ko...bot, ko/i..mukök, i...napɛlɛ'* "behind". Not only are they written as two elements, but the scope intervenes between the two elements, as is illustrated in the following examples.

Bari (Spagnolo 1933:210)

(168) a. *ití kö-yö ŋerot!*
go in-1SGPRO front
'Go in front of me!'

(ibid.:211)

b. *köji kata i mɛrɛ mukök*
village present at mountain foot
'The village is at the foot of the mountain'

If the scope is nominal (168b), it may be further modified by a demonstrative and/or an adjective, thus creating an even greater gap between the two elements of the form.

On the other extreme, in several languages the grams constitute phonological units. The component parts are bound together by morphophonemic processes at their boundaries. I call this type "dovetailed". The Dakota form *aíyopteya* is an example of this: two prefixes and an adverb followed by a manner suffix are all fused together: *'a-* "on" + *'i-* "in" + *ópta* "through, across" + *-a* (manner). In Basque, the gram *ondo-an* "in back of" exhibits fusional phenomena at the boundary of the noun *ondo* and the locative suffix, as compared to *aitzin-ean* "in front of". Other languages with grams which belong to this type are Abkhaz, Guaymi, Haka and Island Carib.

Intermediate cases are exemplified by the Bari, Melanesian Pidgin, Tigre and Halia grams (e.g. Bari *i ŋerot na* "in front of", Melanesian Pid. *fɔrəd lɔŋ* "in front of", Tigre *'ət gərra* "in back of", Halia *i murina* "in back of") in which the components are simply juxtaposed without any open or closed class item intervening between them. I call this type "juxtaposed". Another intermediate type, "abutting", is exemplified by the Karok, Mwera, Navajo and !Kung grams (e.g. Karok *vásih-kam* "in back of",

Table 26: The Continuum of Internal Gram Fusion

	discontinuous	*juxtaposed*	*abutting*	*dovetailed*
Language				
Bari	X	X		
Melan.Pid.		X		
Tigre		X		
Halia		X		
Karok			X	
Mwera			X	
Navajo			X	
!Kung			X	
Dakota				X
Abkhaz				X
Basque				X
Guaymi				X
Haka				X
Isl.Carib				X

Navajo *bi-kéé'-déé'* "behind", !Kung *!'o-n!eng* "behind, in", Mwera *ku-mujo* "behind" in which their component parts are written bound with nothing intervening between them, but also no morphophonemic processes seem to be caused by the compounding.

The last two types could be collapsed if there were further evidence as to whether stress changes occur in "juxtaposed" grams. The English preposition *in front of*, for instance, although it is written as three elements, it constitutes a phonological unit exhibiting not only a single stress but also certain assimilation phenomena such as the assimilation of the alveolar nasal of *in* to the labiodental-fricative of *front* giving [ɪmfrʌntəv].

5.2.4 F-/B-REGION grams and genitive markers

The second kind of polymorphemic forms is a compounding of a possessive/genitive pronominal form and a F-/B-REGION gram, and appears in three languages. Table 27 presents those forms.

In Abkhaz the pronominal prefix *a-* has a number of uses. First, according to Hewitt (1979:102), it belongs to a set of pronominal verbal

Table 27: Grams with incorporated possessive markers

FRONT-REGION grams		BACK-REGION grams	
Language	*Grams*	*Language*	*Grams*
Abkhaz	*a-ç'ə* *a-p+nə* *àpx'a* *a-ç'+àpx'a* *-a-pə+n-* *-a-p ə+ra)-* *-a-çh°a-*	Abkhaz	*à-šta+x'* *-a-šta-* *a-šta+x'-à-la*
Navajo	*bí-tsé* *bi-tsi* *bi-dááh* *bi-dinínáá* *bi-naashii*	Navajo	*bi-kéé'(-déé')* *bi-ne'(-di)*
Island Carib	*l-uba(ra)* *l-ubàdu* *l-igibu-giẽ*	Island Carib	*l-ábu* *l-anaga-giẽ* *l-árigi* *l-ede-giẽ*

prefixes which mark indirect objects, among which *a-* is used to indicate a third person singular non-human referent. Within the verbal complex this set is also used in combination with particles (preverbs and determiners) to indicate various oblique nominal functions. For example, in (169) and (171) the prefix *s-* marks first person singular and belongs to the set of indirect object markers:

Abkhaz (Hewitt 1979:130)
(169) *də-s+ pə+ra-gə̀lo- w+p'*
he-me+in.front.of-stand-(STAT)
'He's standing in front of me'

(ibid.:120)
(170) *à-c'la à-k°c°a*
the-tree its-top
'the top of the tree'

(ibid.:132)
(171) *yə-sə̀+št-ga*
it-me+from.behind-take
'Take it away from behind me!'

a- is also used outside the verbal complex, prefixed to the possessed noun in possessive constructions to indicate part-whole relations, as in (170). It is also used as a definite-generic article and must accompany nominal bases, as for instance, *à-jγab* (the-girl). It is the same prefix *a-* that accompanies, not only F-/B-REGION grams, but all postpositions in Abkhaz, and most of the spatial verbal affixes. The following examples illustrate its use with F-REGION and B-REGION grams.[41]

Abkhaz (Hewitt 1979:130)
(172) *a-y°n-[a]-àpx'a də-t°'ò-w+p'*
ART-house-[it]in.front.of he-sit- (STAT)
'He is sitting in front of the house'

(173) *àaljga a-(ç-)pnə̀ də-n-xò-yt'*
A. it-in.front.of he-PREV-live-FIN
'He lives in front of(ie.on the bank of) the river Aaljga'

(ibid.:131)
(174) *a-y°n-à-šta+x'* *də̀-q'o-w+p'*
ART-house-it-behind he-be-(STAT)
'He is behind the house'

The second language in which possessive markers are obligatorily prefixed to spatial grams is Island Carib. Taylor (1956a:36) describes the Island Carib forms as combinations of adverbial nouns and person-marker prefixes. Two person-marker prefixes are found with the adverbial nouns *-ubara, igibu, ubadu, abu, anaga* and *ede* (among others specifying other relations): the prefix *l-*, which marks third person singular masculine, and the prefix *t-*, which marks third person singular feminine. They are members of a set of person-marker prefixes which attach to verbal themes to indicate pronominal subject, and to noun themes to indicate pronominal possessor. When they attach to adverbial nouns in prepositional phrases, they agree in gender with the head, as example (176) illustrates.[42] In case of a pronominal head, as in example (175), these prefixes are used to indicate the referent, also agreeing in gender with it.

Island Carib (Taylor 1956a:36)

(175) *l-ubára-ū*
3SGPOSSMASC-front-to
'to the front of him'

(176) *b-úmari* *t-ábu*
2SGFEMPOSS-wife 3SGPOSSFEM-behind
b-ímenodi
2SGFEMPOSS-mother-in-law
'Thy wife behind(backing up) thy mother-in-law'

Furthermore, Taylor notes that such phrases as in (176) "are grammatically equivalent to 'ordinary' noun phrases such as *tebéneri lúba*, her-door his-house (the door of his house)..." (ibid.)

Finally, in Navajo, according to Young and Morgan (1980), all independent postpositions consist of a monosyllabic stem and a personal pronominal prefix, or a stem and a prefix in addition to the personal pronoun. The pronominal prefix is similar in shape to those denoting possession with nouns. With postpositions, under the analysis provided by Young and Morgan, the pronominal prefix either indicates the head of the construction, as in example (177), or, if the head is a noun, it represents the "indirect object of the verb", as in example (178). In both cases the possessive pronominal prefix indicates the person and number of the referent, as in *bi-lii* (his-house) and *bi-tl'ool* (his-rope).

Navajo (Young & Morgan 1980:86)

(177) *shi-lééchąą'í si-tsi-jį' yilwoł*
1SGPRO-dog me-in.front.of-LOC run
'My dog is running along in front of (ahead of) me'

(ibid.:89)

(178) *shi-lééchąą'í chidí yi-dáah-gi sidá*
1SGPRO-dog car it-in.front.of-LOC sit
'My dog is sitting in front of the car'

(ibid.:85)

(179) *tsin bi-ne'dęę' sé-zį́*
house 3SGPOSS-behind 1SGPRO-stand
'I'm standing behind the house'

Table 28: Genitive markers in association with FRONT-REGION grams

Language	*Gram + Genitive*	*Examples*
Basque	N-GEN *aitzinean*	*eliz-e aitzinean* (church-GEN front-LOC)
	PRO(GEN)	*bere aitzinean* (3SGPOSSFEMPRO front-LOC)
Bihari	PRO-ABL *age*	
	PRO(OBL) *samane*	*ghara-k^a samane* (house-GEN opposite)
	N-GEN *sōjhā*	*ham^{a}ra sōjhā au* (me(OBL) in.front come)
	sacchat^a	*ham^{a}ra sacchat^a* (me(OBL) before)
Bari	*i ŋerot na* (of) N/PRO	*i ŋerot nio'* (in front of-1SGFEMPRO)
	i kɔmɔŋ na (of) N/PRO	*i kɔmɔŋ na kadi* (in front of house)
Car	*(i) kú:?* {PRO(GEN) / N (0)}	*i kú:? hi:?* (in front 1PLPOSSPRO)
Guaymi	PRO(GEN) *kukuore*	*ti kukuore* (1SGPOSSPRO in.front)
	N (0)	
Karok	PRO(GEN) *-?á:vkam*	*mú-?a:v-kam* (1SGPOSSPRO-face-side)
	N (0) *-iθvá:ykam*	*?iv-iθvá:y-kam* (house-breast-side)
Kui	PRO-GEN *bahta*	(no examples available)
	N-GEN	
Melanes. Pidgin	*fɔrəd lɔŋ* {N / PRO}	(no examples available)
Mwera	*ku-mujo* {POSS LOC-POSS PRO / POSS LOC-N}	*ku-mujo kwa-ŋgu* (in-face LOC-1SGPOSSPRO)
Papago	PRO(GEN) N (0) {*-dagio^h* / *-ba'i^{h}tc* / *-wui* / *-ba:^{h}cO*}	*mo'o'be'dame-dagio* (hunters-in.front) *pualt ba'ij* (door in.front) *tai vui* (fire facing) *ki: ba:ṣo* (house in.front)
Tigre	*qadam* -PRO(GEN)	*qadam-ehon* (in.front-3PLPOSSPRO)
	('ət) qabəl N (0)	*qəblat-na* (in.front-1PLPOSSPRO)
!Kung	N (0) *ts'i*	*tš'u ts'i* (house in.front)
	PRO(GEN)	

(ibid.:85)
(180) *'ahił-ne'* *na'azhch'id*
REFL-behind 3PLPRO-search
'They searched behind each other'

Genitive markers in association with F-/B-REGION grams indicate the existence of dependency between the gram and its scope, which as we saw earlier is also manifested on a semantic level. Such genitive markers are not limited to the three languages described above. Those are only the cases of affixed genitive markers. In a number of other languages possessive-genitive markers appear in association with these grams, as Tables 28 and 29 show.

Table 29: Genitive markers in association with BACK-REGION grams

Language	*Gram* + Genitive		Examples
Basque	N-GEN	*gibel-ean*	*bate-n gibel-ean* (door-gen back-LOC)
	PRO(GEN)	*ondo-an*	*gur-e gibel-etik* (all-GEN back-to)
Bari	*i ki'diŋ na* N/PRO		
	i mükok na N/PRO		*i mükok na mɛrɛ* (at hip of mountain)
	i napɛlɛ' na N/PRO		
Bihari	N-GEN	*pāchū*	*ham[a]ra-sa pāchū* (me-ABL after)
	PRO(OBL)-GEN		
Papago	N (0)	*-webi'G*	*cai-webi'G* (bush-behind)
	PRO(GEN)	*-oi'Dk*	*ha-webi'G* (3PLPOSSPRO-behind)
Guaymi	N (0)	*teri*	(no examples available)
	PRO(GEN)	*trokiri*	(no examples available)
		biti	*tokoni biti* (relative after)
Karok	N PRO(GEN)	*-ma:m*	*tasáxxa: kúm-ma:m* (*tasaxxa:its*-behind)
	PRO(GEN)	*-ma:m*	
		vásihkam	(no examples available)
Tigre	*darb*	N (0)	*darb-u* (after-3SGPOSSPRO)
	mən rahar	PRO(GEN)	*mən rahar lag nazat* (at behind body)
	har		*har Barka* (behind Barka)
	('ət) gərra		*gərra-hom* (behind-3PLPOSSPRO)
Melanes. Pidgin	*bihajn lɔŋ*	N	(no examples available)
		PRO	
!Kung	N (0)	*!'on!eng*	*ts'uwa !'on!eng* (house behind)
	PRO(GEN)		

The existence of a genitive marker in F-/B-REGION constructions seems to be determined, at least in some languages, by the lexical status of the scope. First, with the exception of Bari, in none of the languages is there a genitive marker if the scope of the gram is a clause. In Car, Guaymi, Karok, Papago, Tigre and !Kung genitive relations are marked only in case of pronouns which appear in the possessive form, while no markers exist with nouns.[43] In contrast, in other languages, like Bari, Basque, Bihari, Kui, Melanesian Pidgin and Mwera, genitive markers appear irrespective of the status of the scope. In these languages, genitive markers associated with nouns can either be distinguishable affixes (Basque, Mwera, Bihari) or possessive adpositions (Bari, Melanesian Pidgin); with pronouns, genitive markers are fully fused resulting in possessive pronouns.

Table 30: Juxtaposed FRONT-REGION grams

Language	*Gram* + *Object*	*Examples*
Dakota	N *'aglágla* PRO *'it^{h}okap* *aíyopteya*	no examples available
Haka	N *she na* PRO *hmai lé ya* *a:*	*kema she na* (me before) *kema hmai lé ya* (me in.front) *mí a:* (fire before)
Palantla Chinantec	*nyó?^{1}* N PRO	*nyó?^{1} zyu^{1}new^{12}* (before midnight

(Chacobo & Halia might also belong in this table, but not enough info is available)

Table 31: Juxtaposed BACK-REGION grams

Language	*Gram* + *Object*	*Examples*
Chacobo	N *čo*	*?ina čo* (dog behind)
	PRO	*?i-čo* (1SGPRO-behind)
Dakota	N *'ihákab* PRO *'ihéktap* *'ilázatanhan* *'iyóhakap*	*m-ilazata (1SGPRO-behind)*
Haka	N *hnu lé ya*	*k'-hnu lé ya* (1SGPRO-back side at)
	PRO	
Halia	*i murina* N	*i murina luwma* (in back house)
	PRO	

Lack of genitive markers in these constructions is also possible, as is exemplified by the languages in Tables 30 and 31. In these languages nouns in the scope of the grams do not receive genitive markers, and the pronouns are the same as in the agent-encoding form (In general there is no distinction between personal and possessive pronouns).

Irrespective of the way languages pattern according to their treatment of nominal and pronominal scope of F-/B-REGION constructions or the use of genitive markers in them, they all seem to be in an iconic relation to the possessive constructions existing in the language. That is, if in a genitive construction the possessed follows the possessor, in F-/B-REGION constructions the gram follows its object (=postposition/ suffix). If the possessed precedes the possessor, the F-/B-REGION gram also precedes its object (=preposition). Table 32 shows the syntactic relations and morphological marking of genitive constructions and F-REGION and B-REGION constructions in each of the 20 languages.

Not only is the syntax of F-/B-REGION constructions similar to the syntax of genitive constructions, but also the marking of the genitive relation is the same with regard to marking of pronominal possessors and pronominal F-/B-REGION grams (possessive pronouns or genitive affixes), and marking of nominal possessors or wholes (in part-whole constructions) and nominal scopes of F-/B-REGION grams. Note also that not only do the languages which mark genitive relations morphologically in F-/B-REGION constructions present iconic relations with possessive constructions, but also the ones that do not, like Chacobo, Dakota, Haka, Halia, !Kung and Palantla Chinantec also present such a picture.

Another observation that should be made is that morphological genitive markers, in the form of affixes of adpositions appear between the gram and its scope in most cases (Bari, Basque, Bihari, Kui, Melanesian Pidgin, Mwera). Even in languages in which the genitive marker is affixed to the gram, the genitive marker happens to be in between. One exception is Island Carib which has prepositions marked for genitive with a prefix.

The iconicity between genitive constructions and adpositional constructions has been suggested by several universals researchers and typologists (Greenberg 1978; Ultan 1978; Nichols 1986; Heine, Claudi & Hünnemeyer 1987) in the context of different claims about language. In this study it serves as evidence for the claimed semantic dependence of F-/B-REGION grams on the LMs. Furthermore, as Heine, Claudi & Hünnemeyer (1987) suggest, it is an indicator of the degree of grammaticization of adpositional constructions.

Table 32: FRONT-REGION/BACK-REGION constructions and genitive constructions

Genitive construction: N/PRO(possessor) N(possessed)		Genitive construction: N(possessed) N/PRO(possessor)	
Language	Loc.Construction	Language	Loc.Construction
!Kung	N POSTP	Bari	PREP POSSP N
	PRO(GEN) POSTP		PREP POSSP -PRO
Abkhaz	N PRO-POSTP	Car	PREP N
	PRO(GEN) -POSTP		PREP (GEN)PRO
Basque	N-GEN POSTP	Halia	PREP N
	PRO-GEN POSTP		(PREP PRO)
Bihari	N-GEN POSTP	Island	PRO(GEN)-PREP N
	PRO(OBL) POSTP	Carib	PRO(GEN)-PREP
	-GEN		
Chacobo	N POSTP	Melanesian	PREP POSSPREP N
	PRO -POSTP	Pidgin	(PREP POSSPREP PRO)
Dakota	N POSTP	Mwera	PREP LOCPOSS-N
	PRO -POSTP		PREP LOCPOSS-PRO
Guaymi	N POSTP	Palantla	PREP N
	PRO(GEN) POSTP	Chinantec	PREP PRO
Haka	N POSTP	Tigre	PREP N
	PRO (-)POSTP		PREP-PRO(GEN)
Karok	N (PRO-)POSTP		
	PRO(GEN) POSTP		
Kui	N-GEN POSTP		
	PRO-GEN POSTP		
Navajo	N PRO(GEN)-POSTP		
	PRO(GEN) -POSTP		
Papago	N -POSTP		
	PRO(GEN) -POSTP		

Not only do languages structure possessive and adpositional constructions alike, but also, if there is an ALIENABLE/INALIENABLE distinction in the expression of possession, this is reflected in the expression of spatial relations. Five of the languages of my sample (for which I have F-/B-REGION data), Island Carib, Papago, Navajo, Palantla Chinantec and Dakota, have such distinctions.

In Island Carib, alienable possession is expressed by a set of nominal suffixes that appear on nouns in addition to a set of seven person-number prefixes, which mark possession when they appear on nouns (On verbs,

they mark pronominal person and number) (Taylor 1956a:12). The latter prefixes, when they appear by themselves on body part nouns and kinship terms, mark inalienable possession. Compare the following examples. In (181) the nouns are alienably possessed and they are marked by suffixes *-te* and *-li* (in addition to the person prefixes), but the inalienably possessed body part and kin terms in (182) only carry the pronominal prefixes.

Island Carib

(181) *n-esúbara-te* (1SGPRO-matchet-my) (:11)
b-umaraga-li (2SGPRO-maraka-your) (:11)

(182) *ha-gíbu* (3PLPRO-face) "their faces" (:16)
n-amúlē (1SGPRO-younger.brother) "my younger brother" (:18)

In Palantla Chinantec alienable possession is marked by a prefix on the pronominal possessor (183) or preceding the nominal possessor (185a). Inalienably possessed nouns, on the other hand, do not carry such markers, whether their possessor is expressed by a pronoun (184) or a noun (185b-c) (Merrifield 1968:56).[44]

Palantla Chinantec

(183) *kwiy*^{2} *kyew*^{1}*-hni* (maize 1SG INANIM PRO-1SG PRO) "my maize"
kwiy^{2} *kya?*^{2}*-?niw* (maize 2PRO-2SGPRO) "your maize"

(184) *ze*^{1}*-hni* (head-1SGPRO) "my head"
zey?^{12}*-?niw* (head-2SGPRO) "your head"

(185) a. *kwiy*^{2} *kya?*^{12} *no*^{13}*-za*
maize 3 INANIM PRO son.in.law-3SG PRO
"his son-in-law's maize"

b. *zi*^{3} *ŋo*^{13}*-za* (head son.in.law-3SG PRO)
"his son-in-law's head"

c. *hów*^{3} *?yo*^{13} (dress woman) "the woman's dress" (ibid.:90)

Similarly, in Papago alienable possession is marked by a nominal suffix *-ga*^{h}, which, in case of a pronominal possessor, appears in addition to a pronominal prefix (186 a-c). This suffix does not appear on nouns denoting body parts (187b), terms of relationship (187a) and manufactured objects (187c), in which "possession is more or less inherent or natural" (Mason 1950:31-33).

Papago

(186) a. *n-'o'be''ga^{h}* (1SGPRO-enemy-ALIEN) "my enemy"
b. *neholi-ga^{h}* (slave-ALIEN) "someone's slave"
c. *ha-^{h}tcu^{h}k:u'de-'ga^{h}* (3PLPRO-men-ALIEN) "their men"

(187) a. *ha-'o'G* (3PLPRO-father) "their father"
b. *ñ-'e'e^{h}ṭ* (1SGPRO-blood) "my blood"
c. *ñi-^{h}i^{h}* (1SGPRO-house) "my house"

In Dakota the alienable/inalienable distinction appears in the pronominal expression of possessors. Alienably possessed entities are marked by the prefix *t^{h}a-*, while inalienable entities (e.g. body part terms) receive a set of pronominal prefixes, also used as objective pronominal prefixes. In this case possession is indicated on the verb. Terms of relationship receive an additional set of suffixes (Boas & Deloria 1941:128-133).

Dakota

(188) *t^{h}a-súke ki skéhaha'* (his-horse is restless) (ibid.:131)
t^{h}a-c^{h}ánupa ki háske' (his-pipe is long) (ibid.:131)

(189) *mi-síha* (1SGPRO-foot) "my foot" (ibid.:128)
mi-ísta (1SGPRO-eye) "my eye" (ibid.:128)

(Buechel 1939:92)

(190) *maȟpíya zitkálapi kiŋ* (cloud air the) "the birds of the air"
ceȟ íkaŋ waŋ (bucket rope a) "rope of a bucket"

Finally, in Navajo a certain class of nouns always appears with a possessive pronominal prefix. These nouns include body part terms, kin terms, nests, burrows and lairds, entities, that is, which are normally not found independently of their possessors (Young & Morgan 1980:7).

Navajo

(191) a. *'a-náá'* (3SG UNSPEC PRO-eye) "someone's eye"
b. *bi-má* (3SGPRO-mother) "his mother"
c. *'asdzání bi-tł'aajį'éé'* (woman her-trousers) "woman's trousers (ibid.:16)

These findings suggest that if in a given language there are alternative ways of marking possession which distinguish between alienable and inalienable possession, there will be analogical/iconic relations between the inalienable possessive construction and the adpositional construction. Furthermore, the fact that FRONT-REGION designators historically come

from body part terms (see Chapter 3), which are typically inalienably possessed, suggests that the structure of FRONT-REGION constructions at any synchronic point is a product of a genitive construction in which the possessed is a body part, and eventually object part, and the possessor is an object which can be construed as possessing that body part.

In an extensive study of alienability Nichols (1986) points out that the current use of the alienable/ inalienable distinction is not consistent. As a result, this distinction is not very useful. After studying a large number of languages which are claimed to have such a distinction, she concludes that alienability as a morphological category does not exist. Rather, morphological distinctions of that sort reflect a frequency of use effect. Entities that are usually considered inalienably possessed are the ones that are most frequently possessed in general. Entities that are considered alienable, are the ones that are less frequently possessed. The difference in morphological marking is that the entities that are most frequently possessed carry old morphology (the erosion of which they caused), while alienable markers are newer morphology.

If we adopt Nichols' analysis of alienability as a distinction of old and new genitive morphology, then we can predict that locative constructions would have the old possessive morphology, since, as we saw, genitive markers are always present in F-/B-REGION constructions (if a language has any) making them almost obligatory. This prediction finds support in an interesting case in Ewe that Claudi and Heine (1987) present. In this language kinship terms and relational-locative concepts are considered inalienable when they are possessed and receive no morphological marking, but body parts are possessed via alienable morphology as in *Kofi pé ta* (Kofi of head) "Kofi's head". The marker *pé* is a new development from the noun *pé* "place". Body parts, when used as region-designators, do not receive *pé*, but rather abide to the juxtaposition pattern (Cf. *é-pé tá* [he-of head] "his head", *é-tá* [he-head] "on (top of) him" (Heine & Reh 1984:257).

Chapter 5

Conclusion

This study dealt primarily with the similarities and differences among languages in the encoding and expression of spatial relations. The discussion centered around the emergence and evolution of spatial grams, and the semantic and morphosyntactic characteristics of two types of spatial grams. Data from 26 genetically unrelated and randomly selected languages served as the basis upon which specific hypotheses were tested. It was shown that languages are similar in the way they encode spatial relations, on the one hand in the way spatial grams emerge and evolve, and on the other in the way specific types of spatial grams are used to express not only spatial but also temporal and other non-spatial relations. It was suggested that the motivation for the similarities lies in the way we, as human beings, experience the world, which is constrained by our physical configuration and our neurophysiological apparatus, as well as our individual cultures. Several hypotheses were investigated pertaining to the two main issues. The hypotheses, the findings and the conclusions are summarized in the following section.

1. On the emergence and evolution of spatial grams

The hypothesis put forth concerning the evolution of spatial grams holds that languages are similar in the way they encode and express spatial relations. Such similarities are due to the history of spatial grams encoding such relations. Specific lexical sources give rise to spatial grams, which retain some of the image-schematic properties of their sources. The emergence of

such grams is gradual, evidenced through the slow disappearance of lexical characteristics original to their sources, which at later stages give way to more and more grammatical characteristics. Similarities in the lexical sources and paths of evolution of spatial grams across languages suggest the postulation of universal principles governing the linguistic encoding of spatial relations, relating both to the form and meaning of spatial grams.

This hypothesis makes claims about the lexical sources of spatial grams on the one hand, and the process of grammaticization on the other. In this study, I have concentrated on the investigation of the lexical sources, and the grammaticization process as it pertains to the earlier stages, but also some later stages with respect to one set of spatial grams.

Based on the data from languages in my sample, as well as several other languages, two kinds of lexical sources of spatial grams where identified: nouns and verbs. Among nominal sources, several classes were identified according to the referent they encode: body part terms, environmental landmark terms, relational object-part terms, and finally, a few abstract spatial nouns. The correspondence of specific nominal sources to specific types of grams gives evidence for three models: the anthropomorphic, the zoomorphic, and the environmental landmark models. These models make universal claims about possible sources of types of spatial grams. The anthropomorphic model is the most common, while the zoomorphic and landmark models complement it, and sometimes compete with it. All three models make predictions about the sources of FRONT-REGION, BACK-REGION, TOP-REGION, and BOTTOM-REGION grams. The anthropomorphic model is more common than the landmark model for SIDE-REGION, MEDIAL-REGION, and INSIDE-REGION grams, while only the landmark model makes predictions for directional and path grams, such as ACROSS, ALONG, VIA and THROUGH.

The motivation for the development of certain body part terms to specific types of spatial grams depends, for the most part, on the location of the body parts that the terms refer to relative to the rest of the human or animal body. In some cases, functional characteristics of body parts seem to be responsible for specific gram developments. Relative location of landmarks with respect to the geographical environment of a community motivates the development of such terms into spatial grams. Also, the experience a specific community has with such landmarks, which emerges from the interaction with them, plays a significant role in determining the kinds of grams such terms may give rise to.

The generalization we can make from the data analyzed, results in a small and coherent set of predictions about the nominal sources of spatial grams, described by the three models. Each model may make predictions about the development of grams within a single language. Not only do they predict cross-linguistic variation, but also variation within a single language. This fact strengthens the validity of the three models as universally available models to be exploited by the languages in the world. On the level of cognition, these models show that most commonly and typically we understand spatial relations in terms of familiar entities which are characterized by asymmetries. Our bodies and the environment within which we move and interact with other entities, give us the tools to understand and talk about other entities and their spatial relations.

To account for the evolution of meaning from the concrete and referential content of nominal sources, to the abstract and relational content of grams, a path of evolution was proposed (see Fig.9). This path identifies several stages of evolution. The transition from one stage to the other is gradual and continuous. Each stage constitutes an evolution from a previous one, simultaneously carrying properties of the original source, and the implications of the immediately previous one. The underlying dimension which propels grams along such a path is the cognitive manipulation of image schemata, which arise from the relational spatial properties of body-part terms and environmental landmark terms, as well as some of their functional characteristics. Such manipulations are metaphorical in nature and are motivated by perceived similarities between bodies or landmarks, and objects, at an initial level, which gives rise to the uses of body-part terms and landmark terms as relational object part terms. These terms correspond to subregions of objects which are partitioned with reference to body parts. The subregions provide asymmetries according to which Trajectors may be located. At an initial stage, the Trajectors are conceived as being in contact with the asymmetrical entity which functions as a Landmark, but gradually specific subregions may be expanded, and are, thus, used to locate Trajectors which are not in contact with it. Thus, the transition from one stage to the next involves specific cognitive manipulation having to do not only with a particular image schema, but also an expansion of the region which the schema applies to. Such extensions were considered to be examples of metonymic shifts.

Similarities in the semantic content of the lexical sources of spatial grams and their paths of evolution are paralleled by morphosyntactic

characteristics of the source, and the morphosyntactic changes that take place during the evolution. The dependence of body-part terms on other elements, specifically their "possessors", in discourse is seen as a consequence of their relational character. Furthermore, the fact that body-part nouns are frequently deprived of modifiers, and carry markers of inalienability, suggest a low degree of categoriality. The low degree of "nouniness" of such nouns makes them good candidates for grammaticization.

To account for the morphosyntactic consequences of the evolution of spatial grams, I proposed a grammaticization path, which is viewed as a consequence of the path for semantic evolution, and makes predictions about the gradualness of change and continuity of identifiable stages. Two different routes to gram status were identified: a route which leads from a noun through a genitive construction stage to an adpositional construction, and a second one, which leads from nouns through an adverbial stage to an adpositional construction stage. These alternative routes represent ways in which different languages evolve. The existence and position of genitive markers within spatial gram constructions was found to be relevant in determining whether a language would follow the genitive construction route or the adverbial route. Thus, languages in which a genitive marker was found between the gram and its scope element, either free or attached to the gram, follow the genitive construction path. Furthermore, these languages tend to have very few adverbs of any sort, suggesting perhaps a tendency to describe spatial relations with reference to a specified entity, rather than deictically. On the other hand, languages in which either there is no overt marker, or it is suffixed to the scoped noun, were found to follow the adverbial route. The explanation for this correlation has not been determined. Whether it constitutes a typological consequence, or it is due to some other principles, still has to be investigated.

The verb was identified as another lexical source of spatial grams. Although only a few languages give evidence for verbal sources, it constitutes an important source of information. In the relatively few cases I have encountered, similar grams emerge out of similar verbal sources. The majority of the spatial notions expressed by grams which emerge out of verbs, specify directions, path of movement, or end-point of movement. The only locative notion expressed by grams with such evolution are regional and proximal grams. Dynamic verbs encoding movements (actual or imagined) in specific directions evolve into directional grams. Similarly, stative verbs evolve into stative grams of regional and proximal notions. Two

alternative routes leading from verbs to spatial grams were identified: via verb-serialization and co-verb stages to gram, and via a participial stage. The alternative routes represent different paths languages follow in the process of grammaticization. The data are not sufficient to lead to conclusive findings, but perhaps these differences also delineate typological dimensions.

The three nominal and the verbal models are not dimensions along which languages vary. In fact several languages were found in which nominal and verbal models were both present, giving rise to the development of different types of grams. This suggests that the three models make predictions about universally available paths of evolution of spatial grams. Furthermore, the fact that languages may develop spatial grams either from nouns or from verbs suggests that spatial relations may be perceived by human beings either with reference to the physical and functional properties of entities, or with reference to the properties of movements. Grams which encode directional and path notions are predominantly verbal in origin, although there were some exceptions like the Papago "eye" used for DIRECTION TOWARDS, suggesting that the source verbs were 'selected' precisely because they referred to movement and that the directional and path notions are retentions of the original meaning of the verbal ancestors.

2. Semantic and morphosyntactic characteristics of a semantic subdomain

Another hypothesis that was approached in this study claims that a small number of uses are associated with a specific type of spatial gram across languages. These uses are similar to each other in such a way as to present a specific structure to the semantic subdomain that the type of spatial gram delineates. The motivations for the particular structure can be found in core properties of the meaning of the gram.

A small number of uses were found to be associated with FRONT-REGION grams. The most frequent use of such grams was the ANTERIOR; other uses ranged from spatial ones, such as OPPOSITE TO, direction TOWARDS, ULTERIOR, at the EDGE, to temporal ones such as ANTERIOR ORDER, ANTERIOR TEMPORAL, BEFORE and DURING THE LIFETIME, to other non-spatial uses such as VIS-A-VIS, COMPARATIVE, OBSTRUCTION and COMITATIVE.

Similarly, BACK-REGION grams were associated with a small number of uses. The most frequent use was the POSTERIOR; other uses include several

spatial uses such as UNDER, BASE, CIRCUMFERENTIAL, THROUGH, BACK-TO, LATERAL, temporal uses such as POSTERIOR ORDER, POSTERIOR TEMPORAL, STATE COMMENCES, AFTER and EVERY; and finally, other non-spatial uses such as COMITATIVE, INSTRUMENTAL and BENEFACTIVE.

The high frequency of occurrence of ANTERIOR and POSTERIOR as uses of FRONT-REGION and BACK-REGION grams indicates that these uses constitute the core of the uses of these grams cross-linguistically. Other uses are associated with ANTERIOR and POSTERIOR in a particular fashion, so that they may be seen as arising from the sense of such core uses. To represent the relation of peripheral uses to the core ANTERIOR use and show the structure of these semantic subdomains, two semantic maps were provided representing the perceived similarities among uses.

Spatial uses of such grams are seen as implications arising from our experience with FRONT-REGION and BACK-REGION spatial relations. Our experience with motion, the consequences of the configuration of entities in our perception of motion, as well as our perception of directionality, are associated with our experience of FRONT-REGION and BACK-REGION spatial relations, so that some motion situations may be considered as implications of such spatial arrangements. For instance, the association of ANTERIOR and direction TOWARDS may be seen as a consequence of the way mobile entities move, with their front facing the ultimate destination. Similarly, the association of POSTERIOR with THROUGH, may be seen as a consequence of typical access to backs of penetratable entities, such as mountains with tunnels.

Non-spatial uses of FRONT-REGION and BACK-REGION grams are seen as arising from the significance and implications that specific spatial arrangements have for communicative contexts and social situations. For instance, the face-to-face spatial arrangement, which is typical for several social interactions such as conversations, confrontations, comparisons, and associations, leads to the conceptualization of such social situations in terms of the spatial arrangements of the participants. Thus, uses such as VIS-A-VIS, COMPARATIVE, COMITATIVE and OBSTRUCTION arise.

We may infer from a POSTERIOR (or UNDER) spatial arrangement the functional notion of support. In the case of humans, physical support may also imply mental support and association. Thus, uses such as COMITATIVE and BENEFACTIVE may arise from BACK-REGION grams.

Temporal uses of FRONT-REGION and BACK-REGION grams are seen as arising from spatial order. Order relations are understood in terms of the order of moving entities with respect to their destination. A notion closely

associated with movement is time. Motion is understood in terms of changes, and changes imply the passage of time. Time and movement, therefore, are almost inseparable experientially. Spatial order of moving entities imply, therefore, temporal order as well. Thus, we may talk about the temporal order of moving entities in terms of their spatial order, and the temporal order of events in terms of the spatial order that would have existed, from a particular perspective, if such events were to happen at the same time.

We may conclude, therefore, that the way speakers of a language use spatial terms to encode not only spatial, but also temporal and social relations, reflects the way people selectively perceive, retain and associate experience. Furthermore, it indicates that the way language reflects experience is not by partitioning it in discrete conceptual domains such as space, time, causality, etc., reflected by the forms of languages and their uses, but rather by encoding the most frequently occurring spatio-temporal situations together with their functional and social implications.

The fact that FRONT-REGION and BACK-REGION grams each have a variety of uses which do not correspond to opposite values along a dimension, but rather each has a separate set of uses associated with it, is an indication that such grams should not be treated as opposites in all respects. Although they emerge from body-part terms which are located at opposite parts of the body, the different ways in which we interact with fronts and backs, and the implications of our interactions determine the evolution of those body-part terms to FRONT-REGION and BACK-REGION grams. These grams have a collection of uses which reflect not only the original relational properties of body-part terms, but also other properties acquired during their evolution. As a result, the opposite values associated with fronts and backs are retained only to a certain extent (e.g. the BEFORE and AFTER uses, or ANTERIOR and POSTERIOR), while the rest of the uses constitute implications of "frontness" and "backness", as we experience them. Thus, in a lexicosemantic analysis of such grams, they cannot be treated as opposites.

Another hypothesis I investigated concerns the morphosyntactic properties of these two types of grams. I hypothesized that cross-linguistic variation in the internal structure of the grams and their interaction with other elements (e.g. scope elements) is constrained by specific semantic domains. Within such domains, the formal characteristics of grams are more similar than they are across semantic domains.

The morphological characteristics of the FRONT-REGION and BACK-REGION grams were investigated, as a test of this hypothesis. The data support the hypothesis in the following way:

a) The majority of the grams for both FRONT-REGION and BACK-REGION are of the embraced expression type, very few of the agglutinated, and none of the fused type. In that respect, it is in accord with the predictions made by the continuum of the degree of fusion of spatial grams, according to which the expression type of grams within a specific semantic subdomain is not of types that represent discontinuous points on the continuum of the degree of fusion. The implication of this finding is that such grams tend not to have hosts, but rather are independent forms. The reason for that was found to be the number of elements allowed by the language to intervene between the gram and its scope or a potential host. Specifically, the lexical status of the scope elements was the determining factor: when noun phrases are the scope elements of grams, there is a greater number of intervening elements allowed than when pronouns or other lexical categories are the scope elements. Finally, whenever a gram is attached to a verb, almost no other element may intervene, at least not obligatorily. Thus, verbs are the best hosts of grams, followed by pronouns. Only in two languages grams were found to be agglutinated to their noun scope elements.

b) More postposed than preposed grams were found for both FRONT-REGION and BACK-REGION grams. All grams preposed to nouns were prepositions, and only 5 prefixes were found, which, however, attach to verbs. The majority of the postposed grams are postpositions, and only a few suffixes were found. The predominance of postposed to the preposed grams is in accord with previous findings by Greenberg (1957, 1963), Kahr (1976) and Reh (1986), Bybee, Pagliuca, and Perkins (1990) concerning other kinds of grammatical forms. This suggests that the preference for postposing grams is not a characteristic of these specific grams, but rather a characteristic of all grammatical categories. After considering several explanations for the tendency, the "division of labor" hypothesis was adopted according to which historical typological factors together with memory/storage constraints are regarded the most likely explanation for the postposing preference.

c) FRONT-REGION and BACK-REGION grams vary according to the degree of internal fusion. There are more polymorphemic than monomorphemic grams. Most agglutinated grams are monomorphemic, while most embraced grams are polymorphemic. Polymorphemic grams exhibit a vari-

ety of patterns, consisting of combinations of nouns with nouns, nouns with adpositions, and adposition with adpositions. These grams range along a continuum of internal fusion. Languages are consistent within a type on the continuum. Most of them have grams of the "dovetailed" type, characterized by a high degree of internal fusion. In three languages the grams were polymorphemic, but consisted of a gram plus an incorporated genitive marker. The predominance of a complex mode of expression is an indication of the relatively high degree of specificity, and the cognitive complexity associated with such grams. Moreover, it may be an indication of the low degree of grammaticization as compared to other grams which have a low degree of specificity. Since no such grams have been considered in this study, this point still remains to be investigated.

d) The existence of genitive markers in association with FRONT-REGION and BACK-REGION grams is predictable from the way specific languages mark genitive relations. Thus, not only the existence of genitive markers, but also the host of the marker, the syntax and the fusion, all are predictable from the way genitive constructions pattern in a language. This finding is in accord with the predicted stage in the evolution of spatial grams, as we saw earlier. Furthermore, the genitive markers present in spatial gram constructions are the same as the markers of inalienability, if such distinction exists in a language.

These four findings generally support the hypothesis, but also raise further issues:

- Since the observed tendency of postposing FRONT-/BACK-REGION grams also occurs across grammatical categories, we expect that other types of spatial grams pattern similarly.
- The degrees of internal fusion, characterizing FRONT-/BACK-REGION grams may characterize other types of grams, too.
- If the existence and syntax of genitive markers in FRONT-/BACK-REGION construction is predictable from the genitive constructions in a language, we should expect that other types of grams would show such iconicity.

The validity of such claims may be tested after other types of grams have been analyzed. Comparison of the properties of several kinds of grams along these lines will help us decide whether these constitute characteristics of a larger domain within the domain of spatial relations, and will help us determine the limits of such domains.

3. Some implications of the notion of "region"

The notion of "region" of an entity constitutes a central component of the theory upon which this work is based. The region is a conceptual structure which is determined by our structured knowledge about physical, perceptual, interactional and functional attributes associated with specific entities. Entities have regions which may be partitioned into subregions by situational reference to other entities. Several parameters determine the boundaries of specific subregions, as well as the values associated with them. These parameters include the inherent physical configuration and size of an entity, its distance to and/or size of other relevant entities, the larger area within which the objects are arranged, and finally a functionally determined "use-space" around the object.

The notion of region constitutes the basis upon which some of the meaning components, which describe situations in the world as they are encoded by different languages, were defined. Furthermore, this notion served as a conceptual bridge for the understanding and articulation of the fine conceptual adjustments which take place during the evolution of body-part terms and landmark terms into relational markers of spatial relations and location. The incorporation of several kinds of knowledge into this notion motivates the structure of the semantic space of FRONT- and BACK-REGION grams, which as we have seen, could not be explained if we were to postulate the relevance only of physical configurations and geometrical relations among objects.

Notes

1. Such a view of language is shared among others by scholars like Charles Fillmore with his work on frames and scenarios; George Lakoff and Mark Johnson with their work on metaphor; Ronald Langacker and his students, Eugene Casad, Bruce Hawkins, Susan Lindner, Claude Vandeloise; Gilles Fauconnier with his work on mental spaces; Len Talmy with his work on space; John Haiman with his work on iconicity; T. Givón with his work on grammaticization; George Miller and Philip Johnson-Laird with their work on procedural semantics; Bernd Heine and his associates Mechtild Reh, Ulrike Claudi, and Friederike Hünnemeyer with their work on grammaticization; Eve Sweetser with her work on modality; and last, but not least, by my own teachers Joan Bybee, David Zubin and Bill Pagliuca.

2. I am referring to what have been called "frames", "scenarios" or "scripts" in the discourse literature (Fillmore 1982b; Schank and Abelson 1977).

3. See also Langacker's notion of "level of specificity" (Langacker 1986, 1987, 1991)

4. The term "basic level" in this context refers to an optimal amount of information that is specified in linguistic interactions, without being redundant nor not specific enough. In a certain sense, it differs from Rosch's basic level categories, which refer to experimentally significant entities (Rosch 1978), but in another it is similar to the basic level of categorization of names in folk taxonomies; it has similar types of implications with respect to use, frequency, and salience.

5. Space has not always been viewed as relativistic, based on spatial relations among things. Cartesian and Newtonian views define space absolutely, based on a coordinate system independent of any thing the space might contain. Such theories, of course, did not consider perceptual factors, which, if included, allow only for a relativistic view of space.

6. Since everything in this world may be located with respect to something larger, or may be contained in something larger, I should point out that if we conclude that there is no asymmetry between objects, it is only *apparently* so. The existing asymmetry between two entities may not be relevant, "salient" or even useful during

the act of locating. Take, for instance, a situation in which we are trying to talk about the location of a rock in the desert when there is nothing else in its vicinity to compare it to. That is only apparently so to an observer who is close to the rock, but it is not so objectively. The rock may be "in" the desert, 500 miles away from a village. But such information is only marginally useful and only remotely relevant if we do not know of the existence of the village or if we have lost orientation and thus we are unaware of an existing asymmetry. So, it is not the objective existence of asymmetry, but rather the subjective or perceived asymmetry which is relevant.

7. Narratives present an interesting case. While narrating (orally or in writing), a sequence of events, dynamic in character, and the location where they took place is presented. Since events may be viewed either as activities or as events that come to have an end, locative expressions associated with such events may encode either the locus of an activity or the goal of an accomplishment, or even the source of the latter. The understanding of a sequence of events sometimes requires description of scenes that are not in the main narrative line, but which help set the stage for narrative line events. Such scenes would be preferably described statically, thus treating landmarks statically also. Thus, narratives permit a fluctuation between dynamic and static character of landmarks.

8. Langacker (1986, 1987, 1991) makes use of the term "region" in his theory of Cognitive Grammar, which is basically a "localistic" theory. "Region" in his theory is used as an abstract structure, having its source in spatial regions, which defines the category "noun" ("A 'noun' designates a 'region' in some domain", 1991:63)

9. The fascinating studies that Alexander Luria conducted with nonliterate peasants of Uzbekistan and Khirgizia in the Soviet Union in the early 1930's present excellent evidence that manipulation of two-dimensional shapes is not a natural process but rather it requires learning it. His subjects, requested to name figures such as triangles, circles and squares, gave the names of familiar objects, such as kettle stand for a triangle, plate for a circle, mirror for a square. Furthermore, they refused to see the similarity between a circle and an open circle. Luria concluded that the ability to classify objects in terms of abstract categories is learned rather than innate. Educated people may classify objects with respect to their abstracted shape characteristics, which is in no way a natural and inevitable characteristic of human mind (Luria 1979). We can further conclude that shape characteristics are in no way divorced from the functional attributes of the object itself.

10. The mechanisms of visual perception at a low-level, and the nature of representations at a higher level constitute current issues in neuroscience and cognitive psychology. In the latter, the question of the nature of representations, whether analogical and imagistic (Kosslyn 1980), or propositional (Pylyshyn 1981) has not been resolved. I do not take issue with such problems here. My consideration of objects and our experience with their shape has to do with knowledge gathered not only through visual perception, but all kinds of interaction with objects.

11. In English, French, Greek and other languages the use of a definite article accompanying the region designator preempts the speaker/listener to assume an inherent RF.

12. Note the following examples from some of the languages in my sample.

Language	*Form*	*Meaning*
Abkhaz	*ra-*	across water or bridge
Dakota	*k'oákatan*	beyond, on the other side, across river, ocean, lake, creek
Haka	*var ra*	across a river
Karok	*kara*	across, towards the middle of body of water
	kaθ	from there across a body of water
	kúrih	into water
	rina	from here across a body of water
	ríPa:	away from the center of water, inland, towards the hills, out of water or fire

13. Some examples are:

Language	*Form*	*Meaning*
Abkhaz	*la-*	in an object with mass
	k'+ç'a-	into a corner
	çħ°a-	in front of the fireplace
	cra-	on fire
	-nə	at the field, village, end
	y°na-	through the house
	q'a-	to town, house, village, country
	d°ə+l-	out of the house
	çə̀+ƶ°ə	on the horse
Karok	*-kirih*	into, on a fire
	-ríPa:	out of water or fire
	-rúprih	in through a solid
	-rúprav	out through a solid
	-rô:vu	around a basket, hence upriverward
	-Ovraθ	into a sweatshop

If the landmark is a space, then distinctions with respect to the shape of the boundary of the space are made, and include delimited, enclosed area, narrow opening, tubular space, container.

Language	*Form*	*Meaning*
Abkhaz	*ta*	into a delimited area (e.g.yard, box)
	k'ə+la	into a narrow opening
Karok	*-kiv*	out through a tubular space (e.g.mouth)
	-vara	in through a tubular space (e.g. gloves)
	rúPuk	out of an enclosure (e.g. house)
	-várayva	here and there within an enclosure
	-rámnih	into a container
	rišuk	out of a container (not for water, fire and enclosure)

-Orientation of ground: vertical or horizontal

Language	*Form*	*Meaning*
Abkhaz	*də-*	support on vertical plane, lateral
	k'ə+d(ə)-	support on a vertical plane (wall), "when the hook or string by which they are suspended is hidden from view (may be glued on)"
	k'+na	support on a vertical plane "when the means of suspension show"
	(k'ə)+d-k'na	support on a vertical plane "regardless of whether or not the means of suspension are apparent"
	qə'+nə̀	support on a vertical plane; the TR should be an object that is canonically suspended (e.g. vine, sword) and extending along a vertical plane/object
	n-	on or across a flat horizontal surface
Karok	*-ku*	onto a vertical surface
	-taku	onto a horizontal surface
Navajo	*baah*	alongside a vertical plane

14. Some examples are:

Language	*Form*	*Meaning*
Dakota	*ihútab*	downstream from
	ihéyata	in the hills from
Karok	*shuk*	above with respect to hillside
	klang(a)	below with respect to hillside
	faku	hither form uphill
	ra:	hither from downhill
	ura:	uphill from here
	unih	downhill from here, down from a height
	várak	hither from upriver
	ra:	hither from downriver
	rô:vu	upriver from here
	rupu	downriver form here

15. The term *gram* was first used in Bybee 1986 to refer to grammatical morphemes of languages. The abbreviated form of the term iconically reflects the typically small phonological size of grammatical morphemes as well as the fact that they are a product of evolution from larger units.

16. The other kind of linguistic universals are *formal universals*, which refer to the formal conditions that every grammar of a language has to meet in order to be adequate. Formal universals are an extreme case of theory-bound universals and are useful to investigators using formalization of the same kind. This kind of universals will not involve us here. (See Chomsky (1965) and Comrie (1981) for discussion of formal universals)

17. See Bell (1978), and Perkins (1987) for more on language samples.

18. Gramcats: Grammatical Categories. The group consisted of Joan Bybee, William Pagliuca and Revere Perkins.

19. A stratified sample is a sample selected from a frame which has been partitioned into non-overlapping categories or strata. From each category a random selection is chosen; the number of cases chosen is proportional to the size of the category, or may be determined by other criteria. In the case of this sample, the Voegelin and Voegelin (1978) classification of languages into major groups was used; then, if a major group had more than one subgroup, depending on the number of subgroups and the number of languages in each subgroup, a certain number of languages was selected randomly using a random number table. For more details see Bybee, Perkins and Pagliuca 1994.

20. Lexicalization is used here in the sense of Talmy (1985),where a particular meaning component is found to be in regular association with a particular morpheme, or where a set of meaning components, bearing particular relations to each other, is in association with a morpheme, making up the whole of the morpheme's meaning.

21. Satellites, also suggested as a term by Talmy (1985), refer to immediate constituents of a verb root other than inflections, auxiliaries, or nominal arguments. They form a constituent with the verb root. In English, all the verb particles function as satellites.

22. Data from Radmilo Bozinovic.

23. A relational database management system (R:BASE SYSTEM V) was used for storing the data. R:BASE SYSTEM V is a 1986 release by Microrim, Inc. for personal computers.

24. Robins (1967) cites the following works: E.B. de Condillac's "Essai sur l'origine des connoissances humaines" published in 1798, and J. Horne Tooke's "Epea Pteroenta or the diversions of Purley" first published in London in 1786.

25. A recent book by Heine, Claudi, and Hünnemeyer (1991) provides the most comprehensive account of grammaticization so far, making reference to all the influential trends in this field of research, providing a critical account of all major assumptions and guiding principles, and taking supported positions on important issues and questions.

26. The use of the term "evolution" to describe the developmental and other changes in the history of spatial grams is a conscious choice. According to the OED, "evolution" is "the development or growth, according to its inherent tendencies, of anything that may be compared to a living organism (e.g. of a political constitution, science, language, etc.), sometimes contrasted with revolution. Also, the rise or origination of anything by natural development, as distinguished from its production by a specific act; "growing" as opposed to "being made"". Thus, this term

reflects the assumption that language is a living organism and every observed change in it reflects a natural development. The principles of evolution of spatial grams, then, are natural, pertaining to human interaction and cognition rather than "unnatural" governed by systemic principles.

27. I owe the observation that not all languages which develop spatial grams out of animal body parts are spoken in pastoralist cultures to David Mark. The term "zoomorphic" was proposed by Martin Haspelmath.

28. E. Andersen (1978) points to the fact that there is no exact correspondence of referents of a given term across languages. The English term "nose", for instance, does not correspond to the Tarascan "nose", which also includes the forehead. Thus, distinctions should be made between cultures that do distinguish body parts but have one term for them, and those that do not distinguish the relevant body parts, and therefore, have no need to have distinct lexical items.

29. Such images resemble the "conventional rich images" proposed by Lakoff (1987).

30. The existence of the prefix *a-*, which is a prefix occurring with all nouns in Abkhaz, and functions as a definite article, but also as a 3rd Singular Possessive pronoun, may cause a problem here. It is not clear whether in the adverbial constructions it functions as a possessive marker, or is simply the result of the evolution of such forms, which come from the nouns *a-y°nə* "house", àpx'a "front" and à-šta "footprint".

31. Ansre (1966:31) notes that the term "verbid" was used both by Jespersen (1937, "Analytic Syntax") and Mittin (1962, "The grammar of Spoken English"), to cover certain occurrences of the infinitive and the Verb+ing form. Ansre uses it for the unconjugated morpheme which combines with the nominal group to form a class of the adverbial group. The term reminds us of the close resemblance between itself and the verb while it still maintains the distinction between the two.

32. Data from Twi, Yoruba, Krio, Ijo are from Givón 1975, for Ewe are from Givón (1975) and Heine, Claudi, and Hünnemeyer (1991). Data from Chinese, Korean, Turkish are from Kahr 1975.

33. Other Bihari postpositions which have developed from participles are the following:

boli "considering to be..."	< ABS of bōl "to speak"
bhae / bha "in, going in...", "in the capacity of"	< ABS of bha "to be"
bhàkà "having gone in"	< ABS of OIA bhū and kṛ "to do"
bhari "throughout, for"	< ABS of bhṛ "to fill"
ràhⁱkà "after (time)"	< ABS of rah "to remain"
là / lakà "including"	< ABS of OIA la "take", SKT la "receiving, talking"
lagā "including, with, by"	< ABS of lāg "to come in touch with"
satī, sattī "in lieu of"	< PRES PARTCP of *santa + LOC -i or -e

cāhi "than, on account of"	< MIA * cāhia "having seen"
chāṛi "except, without, besides"	< Late MIA chaḍḍia "having left"
calait[a] "on account of"	< PRES PARTCP of cal "to go" (going > while going > on account of)

34. Mason (1950:38) notes that the Papago postposition *dagio '* is found most frequently with pronouns and cardinal directions.

35. Not only FRONT-REGION grams give rise to anterior temporal uses, but also BOTTOM-REGION grams, as in the following example from Palantla Chinantec (Merrifield 1968:77)

ka^{l}gwi?^{l}-za-kala? nyú?^{l} zyo^{l}new^{l2}
arrive.home-3-again before midnight
'She arrived home again before midnight'

See also 2.3.1 for the relation of UNDER to POSTERIOR and discussion of the relation of the two domains.

36. Mathiot 1973 offers the form *veegaj* as alternate to *veebij* (= Mason's *webi'G)*

37. Taylor (1956a:37) discusses the semantic content and history of *l-ábu* as follows: "The line separating adverbial or positional nouns from those others that have pronominal reference and gender is blurred and unstable....Such semantic fluctuation (polysemy) and change may well account for homophonous *ábu* "bone(s)" and *-ábu* "supporting, carrying, underlying, etc.", both of Arawak ancestry; while resemblant ébu "support", which is Cariban, must be regarded as unrelated to either were it not for historical evidence to the contrary. However, Breton's seventeenth century record shows that the Dominican dialect contained, in addition to these same three forms with the same meanings, a fourth, *épu* "bone(s)", belonging to the men's speech of that period; and this too is Cariban. Certainly mutual attraction may have resulted to some convergence;...Yet the one-time presence in Kalina (Carib) of homophonous (or near homophonous stems), *épu* "bone(s)" and *épu* (or ébu) "support", analogous to an Arawak pair *ábu* "bone(s)", *-ábu* "supporting, etc.", could be attributed to anything but borrowing or, more likely, to genetic relationship."

38. Nilsen (1973) provides the following forms in support of his observation: English *with*, German *mit*, Danish *med*, Flemish *met*, Norwegian *med*, French *avec*, Spanish *con*, Persian *ba|amra*, Estonian *ga*, Eskimo *mik*, Aymara *-mp*, Quechua *-wæng*, Turkish *(i)le*. I add to this list the Md.Greek *me*.

39. The Guaymi gram *biti* is used in an AFTER sense, as in the example that follows, but it is also used with the sense of "above, over", although no posterior uses have been reported by Alphonse 1956.

Guaymi (Alphonse 1956:24)
moroko mikiani juke tokoni biti
he-? leave-PAST door relative after
'He shut the door after his relative left'

40. I have excluded the Bari discontinuous forms. Also, one Abkhaz and one Navajo gram function as both postpositions and prefixes to verbs.

41. A use of *a-* in the verbal complex can be illustrated by other preverbs since no data of FRONT-REGION grams are available:

Abkhaz (Hewitt 1979:210)
a-xaħ°c°'àħ° *à-šaq'a* *y-à+k°ə-y-c'e-yt'*
ART-beam ART-pillar it-it+on-he-put-FIN
'He put the beam on the pillar'

where *y-* refers to the beam and *à-* to the pillar.

42. Since no FRONT-REGION examples are available, the agreement can be illustrated by the following example of the use of another spatial gram. *t-* is the feminine agreement marker reflecting the grammatical gender of the house.

Island carib (Taylor 1956a:36)
t-urúgabu *l-úba*
her-close.by his-house
"close by his house"

43. In Guaymi, it is not clear from the materials whether there is any morphological marking in genitive relations between nouns. Although possessive relations such as *Juan toro-e* (John book-POSS) "John's book" receive morphological marking with a suffix on the possessed noun (Alphonse 1956:50), there is no indication of similar behavior with other genitive relations, such as part-whole. Furthermore, examples from the use of other spatial grams suggest that there is no genitive suffix used on either the gram or the head, as in the following examples:

Guaymi (Alphonse 1956:54)
tau *meren* *bore*
be.3PL seashore along
'They are along the seashore'

(ibid.:55)
ne *a'n'* *nio* *kringu* *toni?*
how and now book under
'How is it under the box?'

The Karok suffix *?à:vkam* appears with the possessive form of pronouns as in the following example:

Karok (Bright 1957:304)
káru yiθθa *?úkvi:pti* *mukún-?av:kam*
and one is.running their-in.front.of
'And one is running in front of them'

Unfortunately, I do not have any examples for the use of this suffix with nouns.

Possession in Karok is expressed by a pronominal prefix on the possessed indicating the possessor, or, if the possessor is expressed nominally, the relation is indicated by a prefix on the possessed, as in the following example:

Karok (Bright 1957:128)
pa?ávansa *mú-tta:t*
the-man his-mother
'the man's mother'

Such constructions are also used to express other relations such as modification or location:

pi?e:p	*va-?iripra:m*	*Panámni:*	*kuma-yu:m*
long-ago	its-mine	Orleans	its-downriver
'an old mine'		'downriver from Orleans'	

It is possible that FRONT-REGION grams also require such prefixes as *va-* or *kuma-*, but it is not clear.

In Tigre and Car possessive constructions with nominal possessors can be illustrated by the following examples. In both languages possessors and possessed are juxtaposed.

Tigre (Raz 1983:35)

fatay	*waldat*	*la-walat*	*(la)wəlad*	*ladəgge*
friend	parents	the-girl	boys	village
'a friend of the parents of the girl'			'the boys of the village'	

Car (Braine 1970:251)

patí:?	*harvé:*	*nɛ:*	*mahú:ve*	*ŋíh*	*təcó:c*	*panám*
house	Harvey	these	waves	this	troubled	land
'Harvey's house'		'These waves of this troubled land'				

44. In Palantla Chinantec the following are considered inalienably possessed: body parts, kin, products, and a few items of personal nature such as clothing, house, homeland, nest, guilt, years of age. Money and language are treated as both alienable and inalienable (Merrifield 1968:56).

Appendix A

The SpaceCats Sample

	Languages	*Affiliation*
1.	Basque	(unaffiliated)
2.	Tigre	(Afroasiatic, Semitic)
3.	Cheyenne	(Macro-Algonquin)
4.	Island Carib	(Andean-Equatorial , Equatorial, Arawakan)
5.	Gugu-Yalanji	(Australian, Pama-Nyungan, Pama-Maric)
6.	Car	(Austroasiatic)
7.	Halia	(Austronesian, Oceanic, NW& Central Solomons)
8.	Pima/Papago	(Atzec-Tanoan)
9.	Abkhaz	(Caucasian)
10.	Guaymi	(Macro-Chibchan, Chibchan)
11.	Kui	(Dravidian)
12.	Chacobo	(Ge-Pano-Carib, Macro-Panoan)
13.	Karok	(Hokan)
14.	Bihari(Maithili)	(Indo-European, Indic)
15.	Nimboran	(Indo-Pacific, North New Guinea, North Papuan)
16.	!Kung	(Khoisan)
17.	Navajo	(Na-Dene)
18.	Mwera	(Niger-Kordofanian, Niger-Congo, Benue-Congo)
19.	Bari	(Nilo-Saharan, Chari-Nile, Eastern Sudanic)
20.	Palantla Chinantec	(Oto-Manguen)
21.	Zuni	(Penutian, Penutian isolate)
22.	Shuswap	(Salish)
23.	Haka	(Sino-Tibetan, Tibeto-Burman, Naga-Kuki-Chin)
24.	Dakota	(Macro-Siouan)
25.	Buriat	(Altaic)
26.	Melanesian Pidgin	(Pidgin)

The pilot study languages

	Language	*Affiliation*
1.	Djirbal	(Pama-Nyungan, Pama-Maric)
2.	English	(Indo-European, Germanic)
3.	Finnish	(Uralic, Finnic)
4.	Fula	(Niger-Congo, West-Atlantic)
5.	Greek	(Indo-European, Hellenic)
6.	Kannada	(Dravidian)
7.	Serbo-Croatian	(Indo-European, Slavic)
8.	South-Eastern Pomo	(Pomo)
9.	Turkish	(Altaic, Turkic)
10.	Vai	(Niger-Congo, North Western, Mande)
11.	Vietnamese	(Mon-Kmer, Viet-Mu'o'ng)
12.	Yagaria	(Indo-Pacific, Central N.Guinea, E.N.Guinea Highlands)
13.	Yokuts	(Penutian)

Appendix B

Coding Manual

Section 1: Coding Morpheme Data (Page 1)

1. LANGUAGE: Write the number and the name of the language that the form coded belongs to.

2. SOURCE: State the surname of the author(s) of the reference work(s) and the year of publication.

3. GENERAL INFORMATION ABOUT THE FORMS:
   a) FORM: Which forms need to be coded? In order for a form to be coded, it must have all of the following properties:
      i) Since the domain in this study is defined primarily on semantic grounds, the form must be used primarily to express a spatial relation which holds between a Trajector and a Landmark.
      ii) The form must be able to occur in a transitive construction, where the landmark is explicitly stated. In English, for instance, *under* can be used transitively, as a preposition, and intransitively, as an adverb. But *upstairs* can only be used intransitively. In this case *upstairs* would not be coded. Hence, if the author provides forms which s/he classifies as adverbs, but s/he mentions that they have prepositional uses as well, then code them, with primary expression mode ADV, and give examples of the prepositional and adverbial uses separately, if available. If the author provides forms which s/he classifies as adverbs only, do not code them, but make a note of those adverbs citing examples, if possible. If the author provides forms which s/he classifies as prepositions, postpositions, locationals etc. then definitely code them.
      iii) The form must belong to a closed class. In some cases the same form may function as an open class item (e.g. noun, verb) but also as a closed class item (e.g. preposition). In such a case the form is eligible for coding, but the open class item should be included under "related string". The case of spatial adverbs is of interest here, since in some languages (e.g. Greek, English) they seem to form a closed class, new members to which can be

added only through diachronic processes. Despite that, however, not all spatial adverbs will be coded; rather, only the ones that have the property stated in (ii). Some locative morphemes belong to a closed class which changes the category of the head noun/verb that they attach to, and they mean "the place where..." or "the place of...". Such morphemes reflect a different part of grammar and they will not be coded.

b) SHAPE: This is the phonological form of the morpheme. Sometimes spatial grams have allomorphs. In such case, write the shape of the "prime allomorph". Some criteria for deciding which is the prime allomorph are:

i) The prime allomorph is the longest allomorph.
ii) If the longest allomorph is clearly marginal or infrequent, or if the allomorphs are of the same length, code the one the author indicates is underlying, or most frequent or the most important in some way.
iii) Sometimes allomorphy appears with pronominal forms. In such case, code the shape that occurs with nouns.
iv) If none of these criteria help you decide, code the allomorph that the author mentions first.

c) # OF ELEMENTS (# els): Very frequently a spatial gram consists of more than one element. In those cases a number greater than 1 will be entered here. The elements are, most of the time, identifiable as belonging to a certain morphosyntactic class. The usual combinations are *adposition + noun* (e.g. on top of), *adposition + adverb* (e.g. Greek *apo piso apo* 'from behind of', "behind") and *adposition + adposition* (e.g. from under the desk). If there is a noun, it might be marked for genitive, accusative or dative case. In some languages those cases are expressed by a free morpheme and in others by an affix. Code the case morpheme as a separate element. In the case of *adposition + adverb*, if the adverb itself has prepositional uses, as well as in the case of *adposition + adposition*, code the two as separate forms, under the condition that their combination produces a transparent meaning. Code in each one of the forms the other forms that they combine with in number (11). If a form consists of two elements one of which has already been coded as a separate form, code each element separately. If the element which has already been coded before happens to appear in the form of an allomorph of the coded form, code the element according to its present (allomorphic) form and behavior, and note under 'Related String' the connection with the other form. For each element enter data in numbers 5-10.

d) AUTHOR'S MEANING LABEL (Author Label): The translation that the author provides to describe the meaning of the morpheme. In some cases it is a long list of words. List as many of them as possible.

e) AUTHOR'S CLASS (A Class): Write the class that the morpheme is classified or discussed in connection with (preposition, locational, directional, adverb, verbal suffix, etc).

f) PAGES (Pg): Write the pages in which the morpheme is discussed, or appears in examples.

4. DISTINCTION MADE ONLY WITHIN: Spatial grams in languages may sometimes have nouns, sometimes verbs or other elements (pronouns, clauses) in their scope. Indicate here the categories it occurs with.

5. If the spatial gram consists of more than one element answer questions 5-10 separately for each element.

   a) ELEMENT #: assign the element a number (1-3)

   b) PRIME MODE OF EXPRESSION (Prim exp mode): The possible answers to this question are:

prefix (PRE)	if the element is bound to a host and precedes it
suffix (SUF)	if the element is bound to a host and follows it
preposition (PREP)	if the element is not bound, but in fixed position with respect to a noun and precedes it.
postposition (POST)	if the element is not bound, but in fixed position with respect to a noun and follows it.

   The above labels reflect whether the morpheme is bound or free, and whether it precedes or follows its scope. It is not necessarily the label provided by the author. Even if the form consists of two elements, one of which is a general adposition and the other an adverb or a noun, both elements will be coded according to their boundedness and position with respect to the scope rather than their function.

   c) PHONOLOGICAL SHAPE (Ph.shape): Give as nearly as possible the IPA transcription of the prime allomorph of the element.

   d) SYLLABLE STRUCTURE (Syl.Str.): Specify the structure of the element with a series of C's and V's. Long vowels are indicated as V:, and dipthongs as VV.

   e) STRESSED (Stres'd): Is the element stressed or does it follow the stress pattern of its scope? Possible answers are Y, N, D for "don't know", and A for "alternating", if the morpheme is sometimes stressed and others unstressed.

   f) STRESS POSITION (Stress pos): If the element is stressed, indicate the syllable that the stress falls onto. Possible answers are: UL for "ultimate", PU for "penultimate", and AP for "antepenultimate".

6. If the morpheme occurs with more than one category of scope, for instance verbs and nouns, then for each category code the following information (a-l), as well as the information in numbers 7 and 8 below:

   a) SCOPE CATEGORY (Scope Cat): Indicate the category of the scope that the morpheme occurs with. Possible answers are N (noun), V (verb), PRO (pronoun), DA (deictic adverb), CL (clause).

   b) POSITION WITH RESPECT TO THE SCOPE (Pwrt scope): The answer contains a '+' or '−' followed by a number. The '+' indicates that it follows the scope; the '−' indicates that it precedes the scope. The number indicates the position with respect to the scope. '1' indicates the affix closest to the scope; '2' the next position outward, etc. The position of spatial grams is sometimes very difficult to find, especially in languages in which they are verbal affixes, and many other

categories are expressed in similar fashion. The combinatorial possibilities are so great that it is almost impossible to account for all the individual positions of the morphemes. In such a case, indicate variability using 'V'.

c) PHONOLOGICAL PROCESS CONDITIONED BY THE SCOPE (PP/ scope): Does the element undergo any phonological process conditioned by its scope? e.g. vowel harmony. Possible answers are Y, N and D.

d) CONDITIONS STEM CHANGE (Cond stch): If the element conditions a change in the stem of the scope, answer this question by indicating what changes in the stem: V (vowel), C (consonant), T (tone change), S (stress change) or VCST if more than one variables are possible following the order given above (e.g. VC, CS, VT). Answer this question as N if there is no stem change.

e) OPEN CLASS INTERVENES (Open CI): Can any open class or lexical item(s) come between the element and it scope? If the answer is yes, then indicate the category of the item. Possible answers are ADJ (adjective), ADV (adverb), Nn (noun), etc. If it is not possible, answer N, and D, if it is not clear.

f) CLOSED CLASS INTERVENES (Closed CI): Can any closed class item come between the element and it scope? If the answer is yes, then indicate the category of the item. Possible answers are PRO (pronoun), ART (article), POSS (possessive pronoun), REFL (reflexive pronoun), DM (demonstratives), PL (plural marker), GEN (genitive case marker), DIR (directional affix), NCL (noun-class marker), etc.

g) OTHER ALLOMORPHS (Other allos): Possible answers are:

'00' for no allomorphs
'01' for one allomorph
'02' for two allomorphs
'03' for three allomorphs
'>3' for more than three allomorphs

Here we are dealing with allomorphy associated with the particular morpheme, not general, phonetically-conditioned allomorphy.

h) REDUCED (Redu): Are any of the allomorphs reduced versions of other allomorphs? That is, do any allomorphs have some of the same consonants and vowels, or consonants and vowels relate to those in other allomorphs by natural reduction processes? Possible answers are Y, N, or D.

i) IRREGULAR (irreg): If one of the allomorphs is not at all phonologically related to the prime allomorph, write Y in this space. Otherwise, write N.

CONDITIONING (Cond'g): The next three questions concern the conditioning of the allomorphs. Possible answers for all of them are Y, N, D.)

j) PHONOLOGICAL(Phon): Is the allomophy conditioned by some phonological rule?

k) MORPHOLOGICAL (Morph): Does some other morpheme condition allomorphy in this form? If so, the semantic label of the morpheme will be listed in number 7 below, e.g. if a spatial gram has a different allomorph when it occurs with a plural noun, then 'plural' will be entered in number 7.

l) LEXICAL (Lex): Allomorphs are lexically conditioned if the choice of the scope determines the allomorph used. Thus, conjugation classes or noun classes and declinations represent lexical conditioning.

7. ALLOMORPHY CONDITIONED BY: Write the semantic label of the morphemes/categories that condition allomophy.

8. a) MODE OF EXPRESSION OF ALTERNATE ALLOMORPH (MEaltall): If the mode of expression of any of the other allomorphs differs from the prime allomorph, indicate the alternative mode(s) of expression here, choosing from the list given under "Prime mode of expression" above.

   b) POSITION WITH RESPECT TO HOST (Pwrt host): This is the place to indicate if the morpheme or an allomorph of the morpheme has a position different from the prime allomorph. Use the same code as in 6b above. If the morpheme itself has an alternate position, enter 'same' in 8a and the alternate position in this slot.

9. PORTMANTEAU WITH: If the morpheme occurs in an unsegmental unit with a morpheme that has separate expression elsewhere, code the semantic label of the form it is fused with.

10. a) RELATED STRING: If the form bears an etymological relation (either mentioned explicitly by the author, or surmised by the coder) to another string, provide that string here. This is the place to code all the lexical items related to spatial grams.

    b) CATEGORY OF THE RELATED STRING (Rel.Cat): Provide the category that the string is classified in by the author. Possible answers are N (noun), ADV (adverb), ADP (adposition), V (verb), etc.

    c) CONFIDENCE: Enter '1' if either the author says there is an etymological relation or the forms are exactly the same and their semantics compatible. Enter '2' if the author says there is probably an etymological relation or the author does not say anything but the forms are similar. Enter '3' and '4' if the confidence both on the part of the author and the coder is less.

    d) MEANING: Give the English translation of the related string in quotes, or its semantic label without quotes.

    e) MORPHEME'S RELATION TO RELATED STRING (Morph rel to string): Is the form being coded shorter, longer or the same as the related string? Possible answers are SHORTER, LONGER, SAME, SIMILAR. If the two forms are the same in length in terms of the number of segments, but the form being coded has reduced vowels or consonants, write REDUCED.

11. COMBINES WITH FORM #: If the morpheme being coded can combine with other forms producing a transparent meaning, provide the form numbers of these morphemes.

12. EVIDENCE OF FUSION: Sometimes, in complex grams (forms with more than one element), the individual elements have a different shape from when they occur as single units. The difference might be evidenced in the position of the stress, if stressed, in the loss of a vowel or a consonant, or in some phonological process. Such facts constitute evidence of fusion among the elements of an expression. Answer Y, N in the following:)

    a) STRESS: Has the stress pattern of the individual elements changed?

    b) CONSONANT LOSS (C.Loss): Are there any consonants lost in any of the elements of the expression?

    c) VOWEL LOSS (V.Loss): Are there any vowels lost in the expression?

    d) PHONOLOGICAL PROCESS (PP): Does any other phonological process occur between the elements?

Section B: Coding uses (page 2)

13. USES. In this section, each use of the morpheme is coded. Uses are described by a combination of meaning components and co-occurrence restrictions. Examples are coded to illustrate the uses.

    Procedure: Compare the author's translations, comments, and examples with the current list of meaning components. Code as separate uses if:

    i) the author indicates that the morpheme can be used sometimes with one meaning and sometimes with another. For example, in Greek, the preposition *apo* indicates spatial source (ablative), but also it can indicate the agent of an action (agentive) when it is used in a passive construction. These would be coded as separate uses.

    ii) the examples and translations indicate that the morpheme's use sometimes fits one meaning component and sometimes the same meaning component in combination with another one. For instance, if the morpheme in one case expresses the spatial relation of anteriority ("in front of") locating an object in space ("The bicycle is in front of the church"), and in another it expresses movement of an object to an anterior location ("He put the bicycle in front of the church and locked it"), then these would be coded as separate uses. In the last case it is arguable whether the motion is part of the meaning of the spatial morpheme or it is provided by the context (the verb "put"). In order to make sure that no assumptions are made that would prevent us from uncovering the meaning of such morphemes, I decided to overanalyze in coding them.

    iii) the author, the examples, or the translation indicate that sometimes the morpheme is used in spatial contexts and sometimes in metaphorical contexts, including time or mental states. It is very common for spatial grams to be used to express relations between abstract notions. In English, the preposition *in* locates physical objects, "in the house", but also mental objects, "in her argument". In order to make sure all the available metaphorical extensions are coded such cases are coded as separate uses.

a) USE #: Give a number to each use of the morpheme starting with #1.

b) AUTHOR USE NAME: Write down the label that the author used to describe the particular use.

c) OBLIGATORY? (Oblig): Certain classes of grammatical morphemes are obligatorily required to appear with the stem. A classical example is the morphological case system. In languages that possess such a system every nominal in the language has to be accompanied by a case marker. In such a case the answer is yes (Y), otherwise it is no (N).

14. CO-OCCURRENCE RESTRICTIONS (Co-oc rest): Co-occurrence restrictions are basically semantic restrictions applying when a morpheme is used to express a certain meaning. Sometimes these semantic restrictions take morphological class form and can be collectively referred to by the class. For example, if a morpheme is used to express location at a region defined by several landmarks simultaneously ("among the trees"), a plural marker will appear on the landmark noun (if the language marks number distinctions). If the language makes a singular-dual-plural distinction in number, we would expect 'dual' as a co-occurrence restriction of the MEDIAL use, but 'plural' as a co-occurrence restriction of the MEDIAL-PLURAL use. In other cases, a morpheme might be used to express a meaning that refers to a certain class of objects. For instance, it can be used to express location within a container with a particular shape, let's say cylindrical. Another possibility is that a use occurs with a certain semantic class of verbs. In the example of the two uses of anteriority mentioned above, motion verbs are a co-occurrence restriction of the second use.

    CONFIDENCE: Assign a confidence number from 1 to 4 reflecting the author's and/or the coder's confidence about the restriction.

15. MEANING COMPONENTS: Assign one or more meaning component from the list of meaning components (see Appendix C). Meaning components in conjunction with each other and with the co-occurrence restrictions characterize a use.

    CONFIDENCE: Assign a confidence number as above (14).

16. EXAMPLES: Examples which the author cites, or which the coder has gathered from texts, that illustrate the particular use will be entered here.

    a) EXAMPLE # : Assign a number starting with #1.

    b) PAGE # : Enter the page number that the example appears in. If there are multiple sources, also enter the initial letter of the author's name.

    c) EXAMPLE: Write the example retaining as much as possible the author's orthography.

    d) GLOSS: Provide a morpheme-by-morpheme gloss as much as this is possible.

    e) FREE: Provide the free translation the author has used.

MORPHEME INPUT Page 1

1 Language #:>—< Language name:>————————————————————<

2 Source:>————————————————————<

3 a) Form #:>—< b) Shape:>————————————< c) # els: >—<
d) Author label:>————————< e) A class:>————————< f) Pg:>——<

4 Distinction made only within: >————< >————< >————< >————<

5 a) Element #:>—< b) Prim exp mode:>————< c) Ph.shape:>————<
d) Syl.Str.:>————————< e) Stres'd: >—< f) Stress pos.: >—<

6 a) Scope cat.: >——< b) Pwrt scope: >——< c) PP/scope: >—< d) Cond st ch: >——<
e) Open CI: >————————< f) Close CI: >————————< g) Other allos: >—<
h) Redu: >—< i) Irreg: >—< Conditioning? j) Phon: >—< k) Morph: >—< l) Lex: >—<

7 Allomorphy conditioned by: >————< >————< >————< >————<

8 a) MEaltall: >————< b) Pwrt host: >——<

6 a) Scope cat.: >——< b) Pwrt scope: >——< c) PP/scope: >—< d) Cond st ch: >——<
e) Open CI: >————————< f) Close CI: >————————< g) Other allos: >—<
h) Redu: >—< i) Irreg: >—< Conditioning? j) Phon: >—< k) Morph: >—< l) Lex: >—<

7 Allomorphy conditioned by: >————< >————< >————< >————<

8 a) MEaltall: >————< b) Pwrt host: >——<

9 Portmanteau with: >————< >————< >————<

10 a) Related string: >————————< b) Rel.Cat.: >————< c) Confidence: >—<
d) Meaning: >————————< e) Morph rel to string: >————————<

10 a) Related string: >————————< b) Rel.Cat.: >————< c) Confidence: >—<
d) Meaning: >————————< e) Morph rel to string: >————————<

11 Combines w/form#: >—< >—< >—< >—< >—< >—< >—< >—< >—< >—< >—< >—<

12 Evidence of fusion: a) Stress: >—< b) C.Loss: >—< c) V.loss: >—< d) PP: >—<

MORPHEME INPUT Page 2

Language #: >—< Language name: >————————————————< Form #: >—<

13 a) Use #:>—< b) Author Use name: >————————————————< Oblig.: >—<

14 Co-oc rest.: >————————————————————————————< Confidence: >—<
14 Co-oc rest.: >————————————————————————————< Confidence: >—<
14 Co-oc rest.: >————————————————————————————< Confidence: >—<

15 Meaning Components: >————————————————————< Confidence: >—<
15 Meaning Components: >————————————————————< Confidence :>—<
15 Meaning Components: >————————————————————< Confidence: >—<
15 Meaning Components: >————————————————————< Confidence: >—<

16 a) Example #: >—< b) Page: >—<
c) Example: >————————————————————————————————<
d) Gloss: >————————————————————————————————<
e) Free: >————————————————————————————————<

16 a) Example #: >—< b) Page: >—<
c) Example: >————————————————————————————————<
d) Gloss: >————————————————————————————————<
e) Free: >————————————————————————————————<

16 a) Example #: >—< b) Page: >—<
c) Example: >————————————————————————————————<
d) Gloss: >————————————————————————————————<
e) Free: >————————————————————————————————<

Appendix C

Meaning component working definitions

The following is a list of all the meaning components that were identified and used in the description of the uses of the spatial grams in the data base. Although only few of them have actually been discussed in the text, this list has been provided as an indication, first, of all the different categories that are involved in the uses of spatial grams, and, second, the richness of information that can been obtained following the methodology used in this study. The definitions provided are working definitions and by no means constitute the final word. The frequency with which each occurred in the data base is provided separately in Appendix D.

LOCATIONS: static spatial relations between a trajector and a landmark.

regional: the trajector is at the region of the landmark; the landmark is treated as a place whose dimensionality, orientation, shape are not being specified and are not relevant.[at]

interior: the landmark is treated as a container having an INSIDE-REGION; the trajector is located at the INSIDE-REGION of the landmark.

exterior: the landmark is treated as a container having an INSIDE-REGION and an OUTSIDE-REGION; the trajector is located at the OUTSIDE-REGION of the landmark.

superior: the landmark is treated as an asymmetrical object with a TOP-REGION and a BOTTOM-REGION, which are assigned by an inherent or a deictic reference frame; the trajector is located in the TOP-REGION of the landmark.

inferior: the landmark is treated as an asymmetrical object with a TOP-REGION and a BOTTOM-REGION, which are assigned by an inherent or a deictic reference frame; the trajector is located at the BOTTOM-REGION of the landmark.

under: the landmark is treated as an asymmetrical object with a TOP-REGION and a BOTTOM-REGION, which are assigned by an inherent or a deictic reference frame; the trajector is located at the BOTTOM-REGION of the landmark, and its region is included within the BOTTOM-REGION of the landmark.

top: the landmark is treated as an asymmetrical object with a TOP-REGION and a BOTTOM-REGION, which are assigned by an inherent or a deictic reference frame; the trajector is located at the TOP-REGION of the landmark, and is contiguous with it.

base: the landmark is treated as an asymmetrical object with a TOP-REGION and a BOTTOM-REGION, which are assigned by an inherent or a deictic reference frame; the trajector is located at the BOTTOM-REGION of the landmark, and is contiguous with it.

anterior: the landmark is treated as an asymmetrical object with a FRONT-REGION and a BACK-REGION, which are assigned by an inherent or deictic reference frame; the trajector is located at the FRONT-REGION of the landmark.

posterior: the landmark is treated as an asymmetrical object with a FRONT-REGION and a BACK-REGION, which are assigned by an inherent or a deictic reference frame; the trajector is located at the BACK-REGION of the landmark.

opposite: the landmark is treated as an unpartitioned object; the trajector, which is an asymmetrical object with respect to front-back, is located so that its FRONT-REGION faces the landmark. Encounter, contact, exchange is usually implied by the facing of TR and LM, which are usually (but not necessarily) animate.

against: the landmark is treated as a solid entity which exerts resistance; the trajector is in contact with the landmark and receives the resistance.

lateral: the landmark is treated as a 3-D entity with front and back, top, bottom and side; the trajector is located at the region defined by the side(s) of the landmark.

uni-lateral: the landmark is treated as a 3-D entity with front-back, top-bottom and sides; the trajector is located at the region defined by one side of the landmark only, regardless of which one.

hetero-lateral: the trajector is located at the distal side of the landmark. The location of the speaker is taken as the reference frame.

medial: the landmark is treated as a discontinuous entity consisting of two parts; the trajector is located at the space defined by the two parts.[between]

medial-plural: the landmark is treated as a discontinuous entity with more than two parts; the trajector is located at the space defined by the parts.[among]

middle: the landmark is treated as an entity with defined boundaries; the trajector is located at the region of the center of landmark (at a position that is in equal distance from everywhere).[in the middle of]

ulterior: the landmark is treated as a 1-D entity; the trajector is located at the region which extends away from that point.[beyond]

contiguous: the landmark is treated as a 2-D entity (surface); the trajector is in contact with the region of the landmark.

support: the landmark is treated as a 2-D entity (surface); the trajector is in contact with the landmark but it is also supported by it.

chezative: the landmark is the location where a participant considers his/her base (usually home, home-town, but also the place where they are currently occupying); the trajector is located at the landmark.

edge: the landmark is treated as a 3-D entity with clearly defined boundaries. The trajector is located at one of the edges of the landmark.

next: the trajector is located close to the landmark in such a position such as nothing else (or, nothing of a similar kind) occurs in between.

disseminative: the landmark is a large space. The trajector, which is a plural entity, is distributed randomly on the landmark.

end-point of extension: the trajector is located at the end of the extension of the landmark.

DIRECTIONS: dynamic spatial relations between a trajector and a landmark.

allative: the landmark is treated as a destination; the trajector is treated as moving towards the landmark.The implication is that the destination will be reached, other things being equal.

towards: the trajector is treated as moving in the direction towards the landmark.

ablative: the landmark is treated as a point of departure; the trajector is treated as moving away from the landmark.[from]

away: the trajector is treated as having moved in the direction away from the landmark.The landmark is understood as the source of the motion. The emphasis is on the resulting state of the motion of the trajector.[away from]

origin: the landmark is treated as a point of origin (departure, birth); the trajector is moving away from the landmark.[to come from]

vertitive: the landmark is implied to be the point of an earlier departure; the trajector is treated as returning to the landmark.

down: the landmark is treated as an entity occupying a normative position; the trajector is treated as moving away from the landmark in the direction of gravity.

up: the landmark is treated as an entity occupying a normative position; the trajector is treated as moving away from the landmark in the direction opposite to gravity.[up]

along: the landmark is treated as an elongated entity; the trajector is treated as moving parallel to the extended side of the landmark.

circumferential: the landmark is treated as a circular entity, perhaps because of the circular travel required to pass by its entire periphery; the trajector is treated as moving parallel to the periphery of the landmark.

through: the landmark is treated as a penetratable entity (allowing passage either because of its loose consistency or because of its shape, e.g.doorway); the trajector is treated as passing through the landmark.

over: the landmark is treated as a stative entity; the trajector is treated as moving above and across the landmark (restricted to non-contact).

across: the landmark is treated as an entity with two boundaries; the trajector is treated as traversing the landmark from one boundary to the other.

via: the trajector is treated as moving towards the direction of the landmark via (by way of) some secondary reference point.

contraplex: the trajector is treated as moving in a direction opposite to the one that it was moving before the reference time, or it is facing in a direction opposite to the one that it was facing before.

apomacrynsis: the trajector is physically separated/removed from the landmark by a variety of means (breaking, tearing,etc.)

end-point location: the trajector is treated as moving so as to arrive up to the location of the landmark.

DISTANCE: position of the trajector defined by the relative distance (measured psychologically or metrically) from the landmark.

proximal: the trajector is relatively close to the landmark.

distal: the trajector is relatively far from the landmark.

FIXED LANDMARKS: In some languages certain landmarks are incorporated in the spatial grams. They usually refer to geographic entities (river, mountain,etc.), body parts or artifacts. These cases are distinct from the case where a spatial gram expresses a relation between a trajector and a certain kind of landmarks. For instance, in KAROK, the verbal suffix *-taku* is used to describe contiguity relations of a trajector with a horizontal surface, as opposed to the suffix *-ku* which is used to express contiguity with a vertical surface. The latter case is perceived as a co-occurrence restriction to the use of the gram.

landmark=...

geographic entities	body parts	artifacts	other
ground	body & clothes	basket	fire
hills	face	house	lifetime
land	limps	sweatshops	
river	mouth		
sky			
valley			
(body of)water			

RIVERAIN: ("pertaining to a river or its vicinity" OED). In these meaning components the river, an environmental landmark, plays an important role. It is the landmark which is used as a reference frame with respect to which orientation is obtained.

upriver: the trajector is treated as moving in the direction opposite to the flow of the water, toward the source of the river.

downriver: the trajector is treated as moving in the direction of the flow of the water, towards the outfall of the river.

HILLIAL: In these meaning components a hill or a mountain is the environmental landmark that participates in the orientation system.

uphill: the trajector is treated as moving in the direction towards the top of the hill.

downhill: the trajector is treated as moving in the direction towards the foot of the hill from somewhere on the hill.

SPATIO-TEMPORAL RELATIONS

anterior-order: the trajector and the landmark are moving along the same path as in a procession, or are engaged in similar activities; the trajector precedes the landmark in order.

posterior-order: the trajector and the landmark are moving along on the same path, or are engaged in similar activities; the trajector follows the landmark in order.

TEMPORAL LOCATIONS

temporal region: the trajector is a situation; the landmark is a conventional time interval; the trajector situation takes place at some point of the time interval.

interior-temporal: the trajector is a situation or a time interval; the landmark is a conventional time interval; The trajector situation occurs throughout or at some particular point in the duration of the landmark time interval. (e.g. during the night, within five days) (the progressive or punctual view of the situation is specified by the aspectual character / marking of the verb)

anterior-temporal: the trajector is a situation; the landmark is a conventional time interval; the trajector situation takes place during a time interval which starts at an unspecified time and ends before the beginning of the landmark time interval.

posterior-temporal: the trajector is a situation; the landmark is a time interval. The trajector situation starts (or, takes place) after the passage/completion of the landmark time interval.

starting-point of situation: the trajector is a situation; the landmark is a point in time. The trajector starts (has departure point) at the landmark and continues forward. (e.g. from now on)

end-point of situation: the trajector is a situation, or a conventional time interval; the landmark is a point in time. The situation (or its relevance) ends at the landmark.(e.g. up till now)

durative: the trajector is a situation; the landmark is a specified interval of time. The situation lasts for the entire interval of time.

ASPECTUALS

continuous: the landmark is a situation; the trajector is an agent engaged in the landmark situation which is viewed as in progress, as maintained over a period of time.

inceptive: the landmark is an action or event (dynamic situation); the trajector is an agent; the trajector starts his engagement with the action described by the landmark.

state exists: the landmark is a state (stative situation); the trajector is an experiencer; the trajector has entered the state described by the landmark over specified intervals of time.

state commences: the landmark is a state; the trajector is an experiencer; the trajector enters the state specified by the landmark.(such a morpheme, as a grammatical element, changes the valence of the verb)

every: the trajector is a situation; the landmark is a specified time interval; the trajector recurs over and over at the intervals specified by the landmark.

repetitive: the trajector is a situation; the landmark indicates a number; the trajector is repeated the number of times specified by the landmark.

TEMPORAL LOCATION OF SITUATIONS

before: the trajector is a situation (expressed by a main clause); the landmark is also a situation (expressed by a subordinate clause). The trajector situation is temporally ordered before the beginning of the landmark situation (in present, past or future).

after: the trajector is a situation (expressed by a main clause); the landmark is also a situation. The trajector situation is temporally ordered after the end of the landmark situation (in present, past or future).

while: the trajector is a situation expressed by a main clause; the landmark is another situation which has begun before the trajector situation and continues after it; the trajector situation occurs within the temporal boundaries of the landmark situation.

when: the trajector is a situation expressed by a main clause; the landmark is another situation. The trajector situation occurs when the landmark situation occurs.

DEICTICS

LOS: the landmark is deictically defined by the location of the speech event; the trajector, which may be a situation or an agent/experiencer, is located at the landmark.

LOS-*proximal*: the landmark is deictically defined by the location of the speech event; the trajector is located relatively close to the landmark.

LOS-*distal*: the landmark is deictically defined by the location of the speech event; the trajector is located relatively far from the landmark.

**past*: establishes the temporal setting of the situation (event, activity, state) as occurring before the moment of speech.

**future*: taking place after the moment of speech; the speaker predicts that the situation in the proposition will hold.

deictic: the landmark is understood from context, either as an entity located in the immediate physical environment of the speech event or in the immediate context of the discourse; the trajector is located with respect to the landmark in a relation specified by another linguistic element. (this MC always occurs in conjunction with another MC to describe a spatial or temporal relation)

RELATIONS AMONG SITUATIONS (SITUATIONS → SITUATIONS)

reality condition: the trajector is a situation; the landmark is also a situation. The trajector situation occurs under the condition that the landmark situation occurs or will occur.

purpose: the trajector is a situation; the landmark is also a situation; the trajector situation takes place for the purpose of enabling the landmark situation to take place.

concessive: the trajector is a situation; the landmark is also a situation; the trajector situation occurs despite the occurrence of the landmark situation (implies that the trajector situation should not have occurred, other things being equal).

reason: the trajector is a situation; the landmark presents the reason that the trajector situation occurs.

complement to verbs of desiring: the trajector is a situation which expresses the desire of an agent; the landmark is an entity/situation which is the object of desire of the agent in the trajector situation.

ENTITIES → SITUATIONS

enablement: the trajector is a hypothetical/generic agent; the landmark is an action; the trajector is enabled by certain conditions to carry out the action specified by the landmark.

ability: the trajector is an agent; the landmark is an action; the trajector has the mental or physical ability to complete the action specified by the landmark.

VALENCE (SITUATIONS → ENTITIES)

benefactive: the trajector is a situation; the landmark is an entity; the trajector situation is carried out for the benefit or on behalf of the landmark.

malefactive: the trajector is a situation; the landmark is an entity; the trajector situation is carried out to the detriment/disadvantage of the landmark.

instrumental: the trajector is a situation; the landmark is an entity; the trajector situation is carried out with the landmark as an instrument.

comitative: the trajector is a situation; the landmark is an entity; the landmark participates in the trajector situation along with other participants.

agentive: the trajector is a situation; the landmark is an entity; the trajector situation is performed by the landmark.

direct object: the trajector is a situation; the landmark is an entity; the trajector situation is addressed towards the landmark.

recipient: the trajector is a situation; the landmark is an entity; the landmark is the recipient of the action designated by the trajector situation.

source: the trajector is a situation; the landmark is an entity; the landmark is the source of information or action that the trajector situation specifies.

reciprocal: the trajector is a situation; the landmark is a plural entity; the members of the landmark participate in the trajector situation in a way which involves interaction with each other.

reference: the trajector is a state or characteristic. The landmark is an entity; the trajector state exists with respect to the landmark.

dessive: the trajector is a situation; the landmark is an entity; the trajector situation concerns the landmark.

vis-a-vis: the trajector is a situation; the landmark is an entity; the trajector situation is performed in the presence of the landmark.

circumstantial: the trajector is a situation; the landmark is an entity which is involved in the trajector situation; the trajector situation is carried out while the landmark is in a specified state (described by an adjective) only temporarily and by chance. In other words, the state is not a permanent characteristic of the entity (e.g. he ate with dirty hands).

ADVERBIAL-MANNER

comparative: the trajector and the landmark are both situations or both entities; the trajector is better in comparison to the landmark.

comparative-equational: the trajector and the landmark are both situations or both entities; the trajector is of equal quality or quantity in comparison to the landmark.

manner: the trajector is a situation; the landmark is a manner expression. The trajector situation is being carried out according to the landmark manner.

superlative: the trajector is a situation which is performed in the best manner.

suddenly: the trajector is a situation which occurs in a sudden manner.

punctual: the trajector is a situation which occurs in an exact manner.

extremely: the trajector is a situation which is carried out to an extreme degree.

more: the trajector exceeds in some ways the landmark.

bifurcative: the trajector is being separated in two.

motion: the trajector is treated as moving physically.

incremental: the trajector increases in size or number.

existential: the trajector exists in some place specified by a spatial expression.

MEASUREMENT

anthropometric: the trajector is an entity which is located at distances approximating human proportions/measurements.

upper limit of measurement: the trajector is located at the end-point of a measurement scale.

PREDICATIVE RELATIONS (ENTITIES → ENTITIES)

dependence: the trajector (which is always animate) is mentally dependent upon the landmark.

sociative: the trajector is engaged in some activity / interacts socially with the landmark.

purposive: the trajector is intended for interaction with the landmark.

enandion: the trajector is actively opposed to the landmark in a social interaction.

characteristic: the trajector is an entity; the landmark is a state (expressed by a nominalized verb or adjective); the trajector is characterized by the landmark state.

exchange: the trajector was acquired or achieved by exchange with the landmark; the landmark is usually a specified (by numeral) amount of money or other form of exchange.

expectancy: the trajector (which is animate) is waiting for a landmark.

obstruction: the trajector is in some way obstructed by the landmark.

sufficient: the trajector, which is a measurable entity, is sufficient for the purpose specified by the landmark.

uncontrolled: the trajector or situation is not under the control of the landmark.

possessive: the trajector is possessed by the landmark.

possession: the trajector is in close association with a landmark, so that the landmark is considered to be a characteristic of the landmark, and thus, to be possessed by the trajector. (e.g. fish have scales)

partitive: the trajector is one of the entities comprising the landmark (which is treated as a plural entity).

part/whole: the trajector is one of the parts comprising the landmark.

material: the landmark is treated as an entity which can be used as a material; the trajector is made out of the material specified by the landmark.

CONJUNCTIVE RELATIONS (ENTITIES →ENTITIES)

coordinative: a number of discrete trajector entities are involved in the same situation.

unexpected inclusion: the trajector is unexpectedly included in the activities of a group of other entities, which are understood as the landmarks. (e.g. even John [=TR] went to the party!)

inclusion: the trajector is included in the group of landmarks involved in a situation.

DERIVATIONAL

nominalizing: a morpheme which derives a noun from another noun or a verb.

verbalizing: a morpheme which derives a verb from a noun.

transitivizing: a morpheme which adds an argument to an intransitive verb.

(*: from the GRAMCATS coding manual/components)

Appendix D

Frequency of meaning components in the data base

Below an alphabetical list of all the meaning components used for the description of uses of spatial grams is given. The number of occurrences of each one of them does not distinguish between the cases in which the meaning component is describing a use by itself and the cases in which it participates in the description of a use together with other meaning components. Thus, the large number of occurrences of "allative" is partly due to the fact that it co-occurs with "anterior", "posterior", "interior", to mention just some of them. Furthermore, the 47 occurrences of "deictic" all constitute combinations with other meaning components, describing adverbial uses of spatial grams, as for instance, when it combines with "anterior", "posterior", "top", "under", etc.

Meaning Component	Number of Occurrences
ability	1
ablative	68
across	19
after	4
against	7
agentive	7
allative	153
along	15
anterior	55
anterior-order	4
anterior-temporal	3
anthropometric	2
apomacrynsis	10
away	16
back-to	5
base	4
before	3
benefactive	8
bifurcative	1

Meaning Component	Number of occurrences
characteristic	1
chezative	14
circumferential	20
circumstantial	1
comitative	13
comp to verbs of desiring	1
comparative	4
comparative-equational	2
concessive	3
contiguous	36
continuous	1
contraplex	1
coordinative	1
deictic	47
dependence	1
dessive	7
direct object	10
disseminative	4
distal	6
down	12
downhill	2
downriver	3
durative	3
edge	7
enablement	1
enandion	3
end-point location	11
end-point of extension	3
end-point of situation	10
every	1
exchange	3
existential	1
expectancy	1
exterior	31
extremely	1
future	1
landmark=basket	1
landmark=body & clothes	1
landmark=face	1
landmark=fire	2
landmark=ground	1
landmark=hills	1
landmark=house	1

Meaning Component	Number of occurrences
landmark=land	2
landmark=lifetime	1
landmark=limps	1
landmark=mouth	2
landmark=river	1
landmark=sky	1
landmark=sweatshop	1
landmark=valley	1
landmark=water	1
landmark=water/fire	1
hetero-lateral	3
inceptive	1
inclusion	1
incremental	3
inferior	13
instrumental	19
interior	104
interior-temporal	11
lateral	43
LOS	10
LOS-distal	13
LOS-proximal	8
malefactive	2
manner	3
material	7
medial	21
medial-plural	16
middle	17
more	2
motion	1
next	5
nominalizing	2
obstruction	1
opposite-to	13
origin	4
over	19
part/whole	2
partitive	5
past	2
possession	2
possessive	4
posterior	46

Meaning Component	Number of occurrences
posterior-order	8
posterior-temporal	1
proximal	29
punctual	3
purpose	9
purposive	2
reality condition	1
reason	8
recipient	14
reciprocal	2
reference	5
regional	45
repetitive	1
sociative	4
source	8
starting-point of situation	3
state commences	2
state exists	1
suddenly	1
sufficient	1
superior	30
superlative	2
support	14
temporal region	15
through	24
top	28
towards	23
transitivizing	1
ulterior	9
uncontrolled	1
under	45
unexpected inclusion	1
uni-lateral	4
up	10
uphill	3
upper limit of measurement	1
upriver	2
verbalizing	2
via	21
vis-a-vis	5
when	3
while	4

Appendix E

Nominal sources of spatial grams

1. FRONT-REGION

Body parts		
Face		
Bari	*i kɔmɔŋ na* "in front of, facing"	*i* "in" + *kɔmɔŋ* "face" + *na* "POSS"
Car	*i kú:?* "in front of"	*i* "in" + *kú:?* "face, surface"
Halia	*i matana* "in front of"	*i* "in" + *mata* "eye, face, front" + *na* (ADV.SUF)
Haka	*hmai lé ya* "in front of"	*am-hmai* "face" + *lé* "side, direction, position" + *-a* "in,to"
Isl. Carib	*l-igíbugiẽ* "facing him"	*l-igíbu* "his face" + *giẽ* "from, at"
Karok	*?á:vkam* "in front of,ahead"	*?á:v* "face" + *kam* "side"
Chal.Mix.	*nūū*"in front of"	*nūū* "face"
Ewe	*nkúmè* "before"	*nkúmè* "face"
Igbo	*nihu* "in front of"	*na* "in" + "face"
Margi	*áŋwà(r)* "before"	*a* "in, at" + *ŋwà* "face, front" + *-r* (GEN)
Bib.Hebr	*lip̄nê* "in the presence of" *mippənê* "from before, from" *millipnê* "the presence of"	{ *li-* "in, at" *mi-* "from" } + *panîm* "face"
Breast		
Karok	*iθvá:ykam* "in front of"	*iθvá:y* "person's breast, chest, heart" + *kam* "side"
Papago	*-ba:'cO* "in front of"	*-ba:'cO* "breast"
Finnish	*rinnalla* "in front of" *rinnalle* "to the front of" *rinnalta* "from the front of"	*rinta* "breast" + { (ESS) (ALL) (ABL) }
Hausa	*gàbán* "in front of"	*gàbā́* "chest" + *-n* (GEN MASC)
Forehead		
Melan.Pdg.	*fɔrɛd lɔŋ* "in front of"	*fɔrɛd* "forehead, forwards" + *lɔŋ* "in, to"

Nimboran	*méuo* "in front of"	*méue* "forehead"
English	*in front of*	<LAT. *frons* "forehead", OE *front* "face, front"
Hausa	*gòshĩn "before"*	*gòshĩn* "forehead" + *-n* (GEN)
Mouth		
Abkhaz	*a-ç'ə "in, in front of,etc"*	*a-ç'ə "mouth"*
Bihari	*mūhē* "facing towards from"	*~SKT.múkha* "mouth, face"
Tigre	*'ət 'af "before (temp)*	*'af* "mouth"
!Kung	*ts'i* "in front of"	*ts'i* "mouth"
Ewe	*nu* "before"	*nu* "mouth, edge"
Eye		
Abkhaz	*-a-la-* "in, at, in front of"	*a-là* "eye" (??)
Vai	*ja'à* "in front of"	*àjá* "his eyes"
Head		
Navajo	*bi-tsi* "at the head of"	*'atsii'* "head, hair"
Maasai	*dukuja* "in front"	*en-dukuja* (GEND MARK)-"head"

Environmental landmarks

Bank		
Bihari	*para* "opposite to, on, after"	*SKT. pará* "the further bank, bound"
Door		
Mid.Welsh	*ar drws* "in front of"	*ar* "on" + *drws* "door, entrance"

Object parts

Front		
Abkhaz	*àpx'a* "in front of"	*àpx'a* "front"
	-çh°*a*- "in front of fireplace"	*a-çh°a* "the front of the fireplace"
Basque	*aitzinean* "in front of"	*aitzin* "front" + *-ean* (LOC) "in,on,at"
Bihari	*āge* "in front of, before"	*agra* "front, tip, end, beginning" *-e* (LOC); *~SKT agra* "front,tip"
Indones.	*dimuka* "in front of"	*di* "in" + *muka* "front"
	kemuka "to the front of"	*ke* "to" + *muka* "front"
Vietnam.	*trứớc* "in front of"	*trứớc* "front"
Turkish	*ön-ün-de* "in front of"	*ön* "front" + (GEN) + (LOC)

Abstract nouns

Presence		
Bihari	*sacchat*[a] "in front of, before"	*~SKT sakaça* "presence"; OIA *sakṣat*

	sam^{a}ne "in front of, before"	*OIA samanya* "equality" (Hindi *samna karna* "to face for fighting" or "to show oneself on equal terms" > *samna* "to face", "in front of". The Bihari postposition may be an import from Hindi)
Korean	*aphe* "in front of"	< *alphai* < **alph* ~ Turk. *alp* "foreman,hero" ~ Mongul *albagut* "the nobles"

2. BACK-REGION

Body parts		
Back		
Bari	*i ki'diŋ na* "in back of"	*i* "in, at" + *ki'diŋ* "back, dorso" na (POSS)
Basque	*gibelean* "in back of"	*gibel* "back" + *-ean* (LOC)
Guaymi	*trokiri* "in back of"	*trö* "back" + *kiri* "side"
Haka	*hnu lé ya* "behind"	*hnu* "back" + *lé* "side, direction" + *ya* (POSS)
Halia	*i murina* "behind"	*i* "in,at" + *muri* "back,backside" + *-na* (ADV SUF)
Isl. Carib	*l-anágagiẽ* "at the back of"	*l-anága* "his back" + *-giẽ* "from, at"
Karok	*vásihkam* "behind"	*vásih* "back" + *kam* "side"
Chal.Mix.	*yata* "behind"	*yata* "human back"
English	*behind*	< *be* "at on" + *hind* "back" + *-anna* (ADV SUF)
Finnish	*takana* "behind" *takaa* "from the back of" *takakse* "to the back of"	*taka-* "back" + {(ESS) (ALL) (ABL)}
Indones.	*dibelakang* "behind" *kebelakang* "to the back of"	*di* "in, at" + *belakang* "back" *ke* "to" + *belakang* "back"
Maasai	*orioŋ* "behind"	*enk-orioŋ* (GEND MARK) + "back, spine"
Margi	*áyìr* "behind, beyond"	*a* "in" + *yì* "back" + *-r* (GEN)
Mid.Welsh	*ar gefyn* "on the back of"	*ar* "on" + *kefyn* "back"
Persian	*dar pošt-e* "behind"	*dar* "in" + *pošt* "back" + *-e* (GEN)
Anus		
Papago	*-'a'ai* "in back of"	*'a'at* "anus"
Maasai	*saidi* "behind" *kurum* "behind"	*o-siadi o-*(GEND MARK) + "anus" *ol-kurum ol-*(GEND MARK) + "anus"
Loins		
Tigre	*haqo* "after"	*haqw* "loins"

Buttocks/Bottom

Isl. Carib	*t-édegiẽ* "behind"	*t-éde* "her bottom" + *-giẽ* "from, at"
Shuswap	*-ep* "behind",(under)	*ep* "buttocks, bottom"
Vai	*kpáà'ɔ* "behind"	*à kpáà* "his buttocks"

Bones

Isl. Carib	*l-ábu* "behind, supporting"	*ábu* "bones"

Environmental landmarks

Trace/Footprint

Abkhaz	*a-šta+x'* "behind"	*à-šta* "track,footprint" +
	-a-šta- "behind"	*x'* "in, on"
Guaymi	*to biti* "after"	*to* "footprint" + *biti* "after, upon"
Isl. Carib	*-árigi* "after, back to, backwards"	~ Dominican: *árisi* "trace"
Navajo	*bikéé'* "behind, following"	*bi-* (3SGPOSSPRO) + *'akéé'* "trail"
Tigre	*'asär* "after, following"	*'atr/'asr* "trace"
Mid.Welsh	*ar ol* "after"	*ar* "on" + *ol* "track"

Object parts

Tip/End

Estonian	*pärä-st* "after"	*pärä* "tip, end" + *-st* (ELAT)

The Behind

Burmese	*-nau? phe-hma* "behind"	*nau?* "the behind" + *phe* "side" + *hma*

3. TOP-REGION

Body parts

Head

Abkhaz	*a-xə*+x' "above"	*a-xə* "head" + *-x'* "at"
Car	*kúy* "on top of"	*kúy* "head, top"
Tigre	*ra'as* "on, above, on top of"	*ra'as/r's* "head"
Carapana	*ropoto* "upstream"	*rupo* "head"
Chal.Mix	*šini* "on top of, over"	*šini* "head"
Estonian	*pea-l* "on"	
	pea-le "after (part.), on"	*pea* "head" + { *-l* (ALL) / *-le* (ADES) / *-lt* (ABL) }
	pea-lt "from of"	
Ewe	*tà* "above"	*tà* "head, top"
Finnish	*pää* "on top of"	*pää* "head, top"
Hausa	*(à) kân* "on top of"	*à* "at" + *kâi* "head" + *-n* (GEN)
	à kain "at the head of"	
Margi	*ár kára* "on top of"	*ár* "on" + *kər* "head"

Mid.Welsh	*ar ben* "on top of"	*ar* "on" + *penn* "head"
Persian	*bar sar-e* "on"	*bar* "on" + *sar* "head" + *-e (ezāfe)*
Back (animal)		
Chacobo	*kača* "on top of"	*ka-* "back"
Shuswap	*-ikn* "on top of"	*ik'n* "upper back, top surface"
Chal.Mix.	*sikɨ* "on top of, on, over"	*sikɨ* "back of animal"
Face		
Bib.Hebr.	*'al-pənê* "on the surface of, up against"	*pānîm* "face"
Persian	*(bar) rū-ye* "on"	(*bar* "on") + *rū* "face" + *-ye (ezāfe)*

Environmental landmarks

Heaven, Sky		
Guaymi	*koin* "up, of" *kointa* "above, overhead"	*koin* "heaven"
Ewe	*dzi* "on"	*dzi* "sky"
Cape		
Halia	*i yeluwna* "on top of, on"	*i* "in,at" + *oluna* "cape, point"
Summit		
Basque	*gainean* "on top of"	*gain* "summit, roof" + *-ean* (LOC)
Ewe	*tà* "above"	*tà* "peak"

Object parts

Top		
Abkhaz	*a-k°+c°a* "on top of"	k°*c°a* "top"
Tigre	*(mən) la'al* "above, over"	*la'al* "top"
Chinese	*-shang* "on, above"	*shang* "topside"
Igbo	*nɛlu* "above"	*na* "in, at" + "top"
Kannada	*mēle* "on top of"	*mēl* "top" + *-e* (DAT?)
Maori	{ *ki* / *no* / *ko* } *runga* { *ki* / *no* / *ko* } "on" / "from top of" / "to"	
	{ ki / *hei* / *i* / *no* } *runga* *i* "above, to above"	*runga* "top"
Mid.Welsh	*ar uchaf* "upon, over"	*ar* "on" + *uchaf* "top"
Vai	*mà* "on"	*mà* "top surface"
Vietnam.	*trên* "above, on top of"	*trên* "top"
Yagaria	*agovetulo* "on top of"	*agovetu* "top"

4. BOTTOM-REGION

Body parts

Buttocks

Halia	*i kopiyna* "under"	*i* "in, at" + *kopi* "buttocks, bottom +*-na* (ADV SUF)
Navajo	*biłʼááh* "underneath, on the bottom"	*bi-* (3SGPOSSPRO) + *ʼałʼáá'* "rump, buttocks"
Swuswap	*-ep* "under (behind)"	*ep* "buttocks"

Hips

Bari	*ko..mukök* "beneath, after" *i...mukök* "at the end, foot of"	*ko* "to" + *mukök* "hips" *i* "in, at" + *mukök* "hips"

Back

Vai	*kɔ́'ɔ̀* "under"	*à kɔ́'ɔ̀* "his back, area under/ behind him"

Foot/Leg

Chal.Mix.	*ha?a* "at the base, foot of"	*ha?a* "leg/foot"

Belly

Chal.Mix.	*čii* "under"	*čii* "belly"

Environmental landmarks

Ground

Hausa	*ƙàrƙashín "under"*	*ƙàsā́* "ground" *ƙàrƙashī́* "lower part" < (redupl)

Object parts

Underside

Chinese	*-shiah* "below, under"	*shiah* "underside"
Turkish	*alt-~~in~~-dan* "under"	*alt* "underside" + (GEN) + (ALL)

Surface under object

Bihari	*tara* "under"	*~SKT.tala* "surface under an object"
Basque	*azpi-en* "under"	*azpi* "area under" + *-en* (LOC)
Yagaria	*hitagipi'* "underneath"	*hita* "bed" + *gina* "opening" + *pi* "in"

Bottom

Swuswap	*-ep* "under, (behind)"	*ep* "bottom"

5. SIDE-REGION

Body parts		
Flank		
Abkhaz	*a-vara* "beside"	*àvara* "flank, side"
Tigre	*səməṭ* "beside,near,at the side of"	*~AMH. šənṭ* "flank" *~GEEZ səmṭ* "flank"
Heart		
Papago	*hu:ta (huda)* "on the side of"	*huḍ* "heart"
Ribs		
Bari	*ko..merete* "at the side of"	*mere-te* "rib" + *-te* (PL)
Basque	*aldean* "at the side of"	*alde* "ribs" + *-an* (LOC)
Korean	*jephe* "at the side of, with"	*jep* "rib"
Ear		
Bari	*i swöt lɔ* "at the side of"	*i* "in, at" + *swöt* "ear" + *lɔ* (POSS MASC)
Estonian	*kõrva-l* "next to" *kõrva-le* "to next to" *kõrva-lt* "from next to"	*kõrv(a)* "ear" + { *-l* (ALL) / *-le* (ADES) / *-lt* (ABL) }
Abdomen		
Bari	*i...nupɛlɛ'* "on that side of, beyond" *i...napɛlɛ'* "on this side of, behind"	*i* "in, at" + *nu* "that" + *pɛlɛ'* "abdomen" *i* "in, at" + *na* "this" + *pɛlɛ'*
Mouth		
Margi	*ár mnyá* "beside, at the edge of"	*ár* "at" + *mnyá* "mouth, opening, edge"
Object parts		
Side		
Buriat	*xažuuda* "at the side of"	*xažuu* "side" + *da* (LOC)
Halia	*i rehina* "beside, near"	*i* "in, at" + *rehi* "side" + *-na* (ADV SUF)
Isl. Carib	*t-áubagiē* "beside her/it"	*t-áuba* "her side" + *-giē* "from"
Karok	*-kam* "on the side, part, direction of"	*kam* "side"
!Kung	*!'om* "beside" *!ā* "beside"	*!'om* "side" *!ā* "side"
English	*beside* < ME *biside*	< *OE be* "by" + *sidan* "side (DAT)"
Finnish	*sivulla* "beside" *sivulle* "to the side of" *sivulta* "from the side of"	*sivu-* "side" + { (ESS) / (ALL) / (ABL) }
Indones.	*disamping* "beside"	*di* "in, at" + *samping* "side"

Margi	*ár ŋgwàmá* "beside"	*ár* "in, at" + *ŋgwàm* "side, half" + *á* (GEN)
Persian	*(dar)pahlū-ye* "beside"	(*dar* "in") *pahlū-* "side" + *-ye (eẓāfe)*
Edge/Border		
Bihari	*disa* "on the side of, towards"	~*SKT diç* "point"
Navajo	*baah* "alongside, beside"	*baah* "edge, border"
Melan.Pid.	*arade lɔŋ* "beside, along"	*arade* "side, edge" + *lɔŋ* "in"

6. EDGE

Body parts		
Forehead		
Papago	*-koA* "at the edge of"	*koa* "forehead"
Mouth		
Margi	*ár mnyá* "at the edge of"	*ár* "in, at" + *mnyá* "edge, mouth, opening"
Tarascan	*mi* "edge, at the edge of"	*mi* "mouth"
Environmental landmarks		
Riverside		
Basque	*bazterrean* "at the edge"	*bazter* "riverside, edge" + *-ean* (LOC)
Object parts		
Edge		
Isl.Carib	*l-áru* "at the edge of"	*áru* "edge, border"

7. MEDIAL-REGION

Body parts		
Waist		
Ossetic	*astæy* "among, between"	*astæy* "waist"
Chest		
Margi	*ár kátlá* "in the middle of"	*ár* "in" + *kátlú* "chest, middle"
Environmental landmarks		
Canyon		
Papago	*ca:gi'D* "between"	*ca:gi'D* "canyon"

Object parts
Middle

Bihari	*mājhē* "among, between, within"	~*SKT mádhya* "middle"
Halia	*i gusuwna* "in the middle of"	*i* "in" + *gusuwna* "middle"
Isl. Carib	*l-amídā* "in the middle of"	*l-* (POSS PRO) + *amídā* "middle"
Karok	*ʔá:čip* "in the middle of"	*ʔá:čip* "middle, center"
Melan.Pid.	*nəmɛl lɔŋ* "in the middle of"	*nəmɛl* "middle" + *lɔŋ* "in, at"
Bib.Hebr.	*bəqéreḇ* "in the midst of"	*qéreḇ* "inward part, midst"
Persian	*(dar)miyān-e* "between, among"	(*dar* "in") + *miyān-* "middle" + *-e (eẓāfe)*
English	*amid/amidst* <LME *amiddes* <13c.*amidde* < OE *on middrum*; *on midre*	

Abstract nouns
Space

Basque	*artean* "between"	*arte* "interval" + *-an* (LOC)
	biztartean "between"	*biztarte* "interval" + *-an*
Bihari	*bica* "between, in"	~*OIA vyacaḥ* "wide space"
Hungarian	*között* "between"	
	közül "from among"	*köz* "space in between"
	köze "to between"	*közep* "the middle of" < *köz*
	közepén "in the middle of"	"space in between" + *ep* (GEN)

8. INTERIOR-REGION

Body parts
Heart

Abkhaz	*-a-g°ə+la* "inside"	*a-g°ə* "heart" + *-la* (PREV)
!Kung	*!x'a* "inside"	*!x'a* "heart" [+ *!a* "side"]
Tubatul.	*cu.naba'n* "inside"	*cu.na* "heart"

Stomach

Abkhaz	*-a-γra-* "inside"	*a-γra* "stomach"
Hausa	*cíkín* "in"	*cíkî* "stomach" + *-n* (gen)

Blood

Papago	*-ʔeḍa'* "inside"	*ʔeʔeḍa'* "blood"

Mouth

Abkhaz	*-ç'ə* "inside"	*a-ç'ə* "mouth"

Neck

Abkhaz	*-a-x°+la* "inside"	*à-x°da* "neck" + *-la-* (PREV)

Eye

Abkhaz	*-a-la* "inside"	*à-la* "eye"

Environmental landmarks
House

Abkhaz	*a-y°nə́*+c'q'a "inside" *-a-y°na-* "inside"	*a-y°nə* "house"

Object parts
Interior/Inside

Chacobo	*šara* "inside"	*ha-šara* "interior, inside"
Guaymi	*koteri* "inside, within"	*ko* "place" + *teri* "inside"
	terikiri "inside"	*teri* "inside" + *kiri* "side"
Halia	*i yahana* "inside"	*i* "in, at" + *hana* "the inside"
Papago	*-'eḍa'* "inside"	*'eḍa'* "interior, inside"
Finnish	*sisään* "inside" *sisälla* "to the inside" *sisaltä* "from the inside"	*sisä-* "the inside" + {(ESS) (ALL) (ABL)}
Kannada	*(V)oLag(e)* "inside"	*(V)oLa* "interior"
Vai	*'ɔ́* "in"	*'ɔ́* "the inside"
Vietnam.	*trong* "inside"	*trong* "the inside"

9. EXTERIOR-REGION

Environmental landmarks
Field

Abkhaz	*-a-d°ə́+l* "out of"	*a-d°ə́* "field" + *-la-*(PREV)
Armenian	*artakhs* "outside"	*art* "field" +*?*
Breton	*erméaz* "outside"	*méaz* "field"
Gallic	*i maes* "outside"	*maes* "field"
Irish	*immag* "to the outside" *immaig "outside"*	*mag* "field"
Lithuan.	*lankan* "outside" *lanke*	*lankas* "field"

Doorway/Door

Armenian	*durs* "outside"	*durs* (??) "door"
Anc.Greek	*θüraze* "outside"	*θüra* "door" + *-ze* "at"
Latin	*foris* "outside"	*fora* "door" + *?*
Persian	*dar* "outside"	*dar* (??) "door"

Object parts
Exterior/Outside

Hausa	*wajaŋ* "outside"	*waje* "outside"

Finnish	*ulkona* "outside" *ulkos* "to outside" *ulkoa* "from outside"	*ulko-* "outside" + { (ESS) / (ALL) / (ABL) }
Kannada	*horag(e)* "outside"	*hora* "exterior" + *-g(e)* (dat.)

10. ACROSS

Environmental landmarks
Dam

Karok	*iθya-* "across"	*iθya:h* "fish dam, weir"

Object parts
Back

Margi	*ár yá* "across, on the other side"	*ár* "in, at" + *yí* "back" + *-á* (GEN)

11. AROUND

Object parts
Circumference

Persian	*dar dour-e* "around"	*dar* "in" + *dour-* "circumference" + *-e (ezāfe)*
Igbo	*na buruburu* "around"	*na* "in, on" + *buruburu* "circumference"

Edge

Igbo	*nagega* "round about"	*na* "in, on" + *gega* "edge"

12. ALONG

Object parts
Side

Buriat	*xažuugaar* "along"	*xažuu* "side" + *?*

Environmental landmarks
Shore

Guaymi	*jateta* "along the coast, by the interior"	*jate* "shore, land, interior, south" *jateri* "one who comes from interior"

Abstract nouns
Length

Mid.Welsh	*ar hyt* "along"	*ar* "on" + *hyt* "length"
Md. Greek	*kata mikos* "along"	*kata* "in, concerning" + *mikos* "length"

13. PROXIMAL

Body parts
Heart

Abkhaz	*a-z-àayg°a-ra* "near to"	< *àayg°a* "near" < *a-g°ə* "heart"

Body

Margi	*údzə̀(r)* "near, beside"	*ú* "in" *údzú* "body"
	áabdzá "on, at, against"	*údzú* "body"

Abstract nouns
Proximity

Basque	*ondo* "near"	*ondo* "proximity" + *-an* (LOC)

14. SUPPORT/CONTIGUOUS

Body parts
Eye

Papago	*vuhio* "located on the face"	*vuhi* "eye"

Environmental landmarks
Summit

Navajo	*bighááh* "joined, attached to"	*bi-* (3SGPOSS) + *ghá́á* "summit" *dziłghá́á"* "peak, mountain top, summit"

Abstract nouns
Burden

Bihari	*bhare* "on, dependent on"	~*SKT bharáa* "burden"

15. AT THE END

Body parts		
Head		
Basque	*buru* "at the end of"	*buru* "head, extremity" *iturburu* "source of river"

16. CHEZATIVE

Body parts		
Ear		
Bihari	*kane* "at the house of"	~*SKT kárna* "ear"

17. THROUGH, VIA

Environmental Landmarks		
Road		
Abkhaz	*my°a* "motion past"	*à-my°a* "road"
Pal.Chin.	*hwu*^{12} "through, with"	*hwu*^{12} "road"

18. ALLATIVE

Body parts		
Eye		
Papago	*wui* "to, towards"	*wui* "eye"
Environmental landmarks		
Road		
Chal.Mix.	*ičí* "towards"	*ičí* "road"
Abstract nouns		
Direction		
Melan.Pid	*lɔŋ hæf* "towards"	*hæf* "direction, half, piece, place, room, clan"
Tigre	*šankat/šanak* "in the direction of, towards"	*šänäk* "direction"

19. ABLATIVE

Body parts		
Hand		
Igbo	*naka* "from"	*na* "in, on" + *ka* "hand"
Abstract noun		
Place		
Kui	*bahta* "from"	*baha* "place"

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