Chapter 3

How Language Structures Space

1 INTRODUCTION

This chapter is concerned with the structure ascribed to space and the objects within it by linguistic "fine structure," the subdivision of language that provides a fundamental conceptual framework.[1] The primary aim of the chapter is to characterize the general properties of this structuring and the linguistic-cognitive system in which it participates.

Previous linguistic space studies, by authors like Gruber (1965), Fillmore (1968), Leech (1969), Clark (1973), Bennett (1975), Herskovits (1982), Jackendoff (1983), and indeed, myself (Talmy, 1972, 1975a, 1975b), have laid a groundwork by isolating many of the basic geometric and dimensional distinctions that languages mark, and by recognizing the patterns that these form.[2] The present study, however, aims beyond pure description of spatial categories to an account of their common fundamental character and place within larger linguistic-cognitive systems.

This aim is addressed in several ways. First, the chapter considers the foundational role played in linguistic space descriptions by **schematization**—a process that involves the systematic selection of certain aspects of a referent scene to represent the whole, while disregarding the remaining aspects. A range of schematization types is documented in section 2, including some by which a scene receives its primary division into subparts and some that attribute to these parts certain structural conformations. Section 3 then provides an overview of the little-recognized generic properties of schematization; these properties include idealization, abstraction, and a topological type of plasticity, as well as a disjunct character, which permits alternative schematizations of a single scene.

Second, the study addresses the cognitive processes attending schematization in communication, treating both the speaker's decision-making

process concerning the alternative of schematization and degree of specificity she wishes to convey for a scene and also the listener's image-constructing process as it interacts with this selection (section 3.2).

Finally, the findings on how languages represent space are taken as a particular case of the system by which language represents meaning in general, with the conclusion that this system is not so much "classificatory" in a strict sense as it is *representative*, supplying the requisite schemas for a sufficiently dense and distributed "dotting" of semantic space (section 4.1.1).

A few comments may be in order on the manner of presentation. I have concentrated on English as my primary source of examples. But the general applicability of the examples—and such generality is the aim since this study's concern is with universal properties of languages—is underwritten by my work with a range of languages. Finally, since first-order observations must precede higher-level generalizations, section 2 is primarily devoted to cataloging certain major types of scene and object schematizations, while section 3 abstracts their common properties and determines the larger system in which these take part. Thus, the reader more concerned with theoretical demonstration and systematic principles can skip directly to section 3 and infer many of the particulars described earlier.

1.1 The Fine-Structural Level of Language

The fact that this analysis will focus on only one subdivision of language, its "fine-structural level," calls for some justification. In a study of how conceptual material is represented in language, one must distinguish two main levels, each with possibly distinct properties and organization. One of these is the macroscopic expository level. Here, within the scope of a sentence, a paragraph, or a whole discourse if need be, one can convey conceptual content of any sort, including feelings, local gossip, and practical medicine—or indeed, the organization of space, time, and causality. The main resource for this level is a language's stock of open-class lexical elements—that is, commonly, the stems of nouns, verbs, and adjectives.

The second level, which can be characterized as the fine structural, is that of closed-class "grammatical" (as distinguished from "lexical") forms—including grammatical elements and categories, closed-class particles and words, and the syntactic structures of phrases and clauses, as detailed in chapter I-1.[3] These forms also represent conceptual material, but from a much more limited array. They do not refer to items of gossip

or medicine. They represent only certain categories, such as space, time (hence, also form, location, and motion), perspective point, distribution of attention, force, causation, knowledge state, reality status, and the current speech event, to name some main ones. And, importantly, they are not free to express just anything within these conceptual domains but are limited to quite particular aspects and combinations of aspects, ones that can be thought to constitute the "structure" of those domains. Thus, the closed-class forms of a language taken together represent a skeletal conceptual microcosm. Moreover, this microcosm may have the fundamental role of acting as an organizing structure for further conceptual material (including that expressed by the open-class elements)—as if it were a framework that the further material is shaped around or draped over. More speculatively, this language-based microcosmic selection and organization of notions may further interrelate with—and even to some degree constitute—the structure of thought and conception in general. Hence, the importance of determining the fine-structural level's representation of various conceptual domains—and in particular that of space, under study here, which itself may play a central role by functioning as a (metaphoric) model for the structuring of other domains.

An illustration can be given of the exclusive nature of the fine-structural system—the fact that only certain notions and not others are permitted representation—with this example of spatial descriptions that one person might give to another while standing at the edge of a field.

(1) a. This field is plowed in concentric circles. Look at the middlemost furrow. There is a pit dug at one point of it. The plow you are looking for is in that pit.

Here, a complex set of spatial configurations and relationships are conveyed in an expository paragraph. That may well be the only way to do so. But now consider another expository description, one that seems comparable to (1a) except that it is still more complex.

(1) b. This field has two borders that are relevant to us. These two borders are roughly parallel and don't coincide. Any perpendicular line between them would run crosswise to the pull of gravity—in other words, would be horizontal. We're standing at one point on one border. There's a point on the other border that's roughly on a perpendicular line drawn from our point. The plow you're looking for is at that point.

What is special in this case is that all the spatial information can be equivalently conveyed in English by a single closed-class word, the preposition *across*, as in

(1) b′. The plow is across the field.

By contrast, there is no simplex word that represents the spatial information in (1a), a word that would function like the hypothetical preposition *apit* in

(1) a′. *The plow is apit the field.

Moreover, a search through the world's languages would probably turn up no cases of a closed-class element representing the (1a) configuration, whereas the (1b) configuration is clearly well represented. What is it about some spatial configurations, but not others, that makes them crosslinguistically suitable for fine-structural representation, and hence foundational status? This study will research the properties common to such special forms.

The fact that this study, for the sake of accessibility, draws mainly on English to demonstrate points about spatial fine structure will necessarily involve us in a treatment predominantly of prepositions. However, the points made apply generally to the comparable closed-class elements of other languages as well—hence, also to space-indicating noun affixes, postpositions, adpositional phrases based on a noun, affixes on the verb, and so on.

2 BASIC SPATIAL DISTINCTIONS MADE BY LANGUAGE

Our conceptualization of spatial structure can be understood to exhibit two main subsystems. One subsystem consists of all the schematic delineations that can be conceptualized as existing in any volume of space. This subsystem can be thought of as a matrix or framework that contains and localizes. Static concepts relevant to it include **region** and **location**, and dynamic concepts include **path** and **placement**.

The second subsystem consists of the configurations and interrelationships of material occupying a volume of the first subsystem. The second subsystem is thought of more as the contents of space. Such contents can constitute an **object**—a portion of material conceptualized as having a boundary around it as an intrinsic aspect of its identity and makeup—or a **mass**, conceptualized as having no boundaries intrinsic to its identity and makeup.

The material subsystem of space can bear certain static relations to the matrix subsystem of space. With respect to relations that it can exhibit directly, material can, for example, **occupy** a region and be **situated** at a location.

Spatial properties that material entities exhibit in themselves or with respect to each other can also be related to schematic delineations of the containing framework. We can see three forms of this. First are the spatial properties that a single object or mass of material exhibits in itself. Examples are the contour of the entity's external boundary that determines its shape—for instance, the shape of a doughnut or a skyline—and its internal structure, such as the interior disposition of a solid or a latticework. Second are the spatial properties that one material entity can have with respect to another. These include geometric relations, like those specified by such English prepositions as the ones in *X is near/in/on Y*, as well as ones specified more elaborately. Third are the spatial properties that a set of material entities can exhibit as an ensemble. These include their "arrangement," potentially to be conceptualized as a Gestalt of geometric patterning, as in a cluster or a sheaf. (An ensemble whose multiplex composition has been backgrounded can be conceptualized spatially in the same way as a single object or mass.)

The material subsystem of space can also bear certain dynamic relations to the matrix subsystem of space. With respect to relations that it can exhibit directly, material can, for example, **move** through a region or along a path, or exhibit a **transposition** from one location to another. Spatial properties that material entities exhibit in themselves or with respect to each other can also be related to schematic delineations of the containing framework in the same three ways as before. Thus, first, a single material entity can exhibit dynamic spatial properties in itself. Examples include change of shape—for example, twisting or swelling. Second, one entity can execute various paths relative to another entity. Examples are the paths represented by the English prepositions in *X moved toward/past/through Y*. Third, a set or ensemble of entities can alter their arrangement. Examples of this are scattering and converging.

2.1 The Primary Breakup of a Spatial Scene

One main characteristic of language's spatial system is that it imposes a fixed form of structure on virtually every spatial scene. A scene cannot be represented directly at the fine-structural level in just any way one might wish—say, as a complex of many components bearing a particular

network of relations to each other. Rather, with its closed-class elements and the very structure of sentences, the system of language is to mark out one portion within a scene for primary focus and to characterize its spatial disposition in terms of a second portion (as treated in this section), and sometimes also a third portion (treated in section 2.7), selected from the remainder of the scene. The primary object's **spatial disposition** here refers to its site when stationary, its path when moving, and often also its orientation during either state.

2.1.1 Characterizing One Object's Spatial Disposition in Terms of Another's The spatial disposition of a focal object in a scene is largely characterized in terms of a single further object, also selected within the scene, whose location and sometimes also "geometric" properties are already known (or assumed known to an addressee) and so can function as a reference object (see the more detailed discussion in chapter I-5). The first object's site, path, or orientation is thus indicated in terms of distance from or relation to the geometry of the second object. For example, in the sentences

(2) a. The bike stood near the house.
    b. The bike stood in the house.
    c. The bike stood across the driveway.
    d. The bike rolled along the walkway.

the bike's site is characterized in (2a) by *near*, in terms of distance from the house's location ("proximal"). The bike's site is characterized in (2b) by *in*, in terms of the house's location *and* geometry ("colocational" + "part of interior"). The bike's site *and* orientation are characterized in (2c) by *across* in terms of the driveway's location and geometry ("colocational" + "the former's axis perpendicular to the latter's long axis"). And the bike's *path* is expressed in (2d) by *along* in terms of the walkway's location and geometry ("colocational" + "colinear with the long axis"). Throughout characterizations of this sort, it remains implicit that the second object can be used as a reference only by virtue, in a recursive manner, of its own known spatial disposition with respect to the remainder of the scene. That is, spatial characterizations expressed overtly (as with prepositions) ultimately rest on certain unexpressed spatial understandings.

The distinct referencing functions that have here been isolated for a scene's two main objects are seen generally, though not absolutely, to

correlate with other property differences between the two objects. The alignment is as follows:

(3) *Primary object*	*Secondary object*
• Has unknown spatial (or temporal) properties to be determined	Acts as a reference entity, having known properties that can characterize the primary object's unknowns
• More movable	More permanently located
• Smaller	Larger
• Geometrically simpler (often pointlike) in its treatment	Geometrically more complex in its treatment
• More recently on the scene/in awareness	Earlier on the scene/in memory
• Of greater concern/relevance	Of lesser concern/relevance
• Less immediately perceivable	More immediately perceivable
• More salient, once perceived	More backgrounded, once primary object is perceived
• More dependent	More independent

It might be argued for cases like (2) that language simply relates two objects in space without any inequality of status—in other words, without one serving as reference for the other. But the semantic reality of their functional difference can be demonstrated simply by interchanging their nouns in a sentence pair like that in (4).

(4) a. The bike is near the house.
b. The house is near the bike.

One could have expected these sentences to be synonymous on the grounds that they simply represent the two inverse forms of a symmetric spatial relation. But the obvious fact is that they do not have the same meaning. They *would* be synonymous if they specified *only* this symmetric relation—that is, here, the quantity of distance between two objects. But in addition to this, (4a) makes the nonsymmetric specification that the house is to be used as a fixed reference point by which to characterize the bike's location, itself to be treated as a variable. These nonsymmetric role assignments conform to the exigencies of the familiar world, where in fact houses have locations more permanent than bikes and are larger landmarks, so that (4a) reads like a fully acceptable sentence. The sentence

in (4b), on the other hand, sounds quite odd, and is thereby well flagged as semantically distinct from (4a). Since the assertion of nearness is unchanged, the reason for the difference can only be that (4b) makes all the reverse reference assignments, ones that in this case do not happen to match the familiar world.

It might at first be thought that certain grammatical constructions, like the reciprocal, are means available in a language specifically to avoid assigning different referencing roles, which otherwise are inescapably imposed upon a basic proposition in formulations like (4). But in fact, the reciprocal does not abstract the symmetric relation common to the inverse asymmetric forms, but rather *adds* the two together. This is shown by the fact that the reciprocal for the preceding example

(5) The bike and the house are near each other.

sounds odd in just the same way as (4b) itself—that is, because of the implication that the house is somehow a floating entity to be fixed with respect to a stable bike.

2.1.2 Figure and Ground The distinct roles played by the "primary" and "secondary" objects just described for linguistic schematization appear to be closely related to the notions of "Figure" and "Ground" described in Gestalt psychology, and the same terms can be applied to them. Thus, in examples (2a) and (2b), *bike* functioned as the **Figure** and *house* as the **Ground**. But for their specifically linguistic application, the Figure and Ground concepts must be given the following particular characterization.

(6) *The general conceptualization of Figure and Ground in language*
The Figure is a moving or conceptually movable entity whose site, path, or orientation is conceived as a variable the particular value of which is the relevant issue.
The Ground is a reference entity, one that has a stationary setting relative to a reference frame, with respect to which the Figure's site, path, or orientation is characterized.

In a linguistic context, the term **Reference Object** may at times be more suggestive than Ground and will be used interchangeably with it from now on.[4]

In a linguistic context, the Figure and Ground notions amount to semantic roles or "cases," in the sense of Fillmore's (1968) "Case

Grammar.'' The present notions, in fact, compete with those of Fillmore, and certain advantages can be claimed for them. Full comparison aside (see chapter I-5), one main difference is that four Fillmorian cases—''Locative,'' ''Source,'' ''Path,'' and ''Goal''—because they incorporate particulars of direction, fail to capture the crucial spatial factor they have in common, their function as reference object for a figural element, a function specifically delegated to our Ground notion. Further, because it names separate cases for several different incorporated directionals, Fillmore's system is open to question over how it can handle novel directional distinctions that some language might mark or directions that do not clearly fit any established case. For example, should the directionals represented by the prepositions in *The ball rolled across the crack./past the TV./around the lamp*. all be classed as ''Path''? By identifying a core Ground notion, our system can set up a separate Directional component for the various attendant path types—one that can, within universal constraints, expand or contract and exhibit somewhat different structurings as appropriate for each particular language. This separation, moreover, corresponds to the usually encountered division of morpheme classes, where the Ground notion is expressed by a noun root (plus any modifiers) and the Directional notions by closed-class elements such as noun affixes or adpositions.

2.2 Figure and Ground Geometries and Their Relations

The particular spatial schemas ascribed to Figure and Ground objects by closed-class elements of languages can be specifically termed **geometries**, and their basic types and distinguishing features can be regarded as a map of the kinds of spatial discriminations language is concerned with.

One major feature of this ''map'' is that closed-class spatial elements generally characterize the Figure's geometry much more simply than the Ground's geometry. The explanation for this can perhaps be found in our very mode—in large part presumably innate—of conceiving, perceiving, and interacting with the contents of space. In this mode, our predominant concern is with a smaller portion of focal interest within a broader field and, often also, with a determination of that portion's spatial relation to the field, so that we can achieve direct sensory (or imaginal) contact with it. The very concept of the ''location'' of an object within space—with its implication of an immediate containing region, itself cross-indexed within the space—owes its existence and character to this cognitive mode. And ''localizing'' an object (determining its location), in turn, involves

processes of dividing a space into subregions or segmenting it along its contours, so as to "narrow in" on an object's immediate environment. Accordingly, elements like prepositions largely delineate a field and the reference objects in it with some particularity, while typically treating the focal object as reducible simply to a geometric point. Nevertheless, some spatial elements do indicate greater Figural complexity, and their types are analyzed in sections 2.2.1 and 2.2.2.

As just noted, closed-class specifications for Figure geometries more complex than a point do exist and are addressed at length in this chapter. But Levinson (1992) cites the Mayan language Tzeltal as a challenge to the idea that point geometries always predominate. He notes that in referring to a locative situation (though not to a motion event), Tzeltal typically uses a verb that refers to the Figure's shape and orientation, doing so, in fact, more specifically than the abstractions of our usual geometric schemas. Further, the Ground nominal is often accompanied solely by a generic locative preposition that can cover the range of English *at*, *in*, *on*, and *near*. His point is that Tzeltal uses a strategy for the listener to locate a Figure object in a surrounding scene that depends on scanning for and spotting the object from linguistically specified shape characteristics, rather than on partitioning the scene with elaborate Ground geometries and finding the Figure with respect to that.

While it may be true that Tzeltal locative sentences are often constructed as just described, several points in Levinson's argument about them can be faulted. Most important, the Tzeltal verbs that refer to the Figure's shape and orientation—the "position" verbs—are not a small closed class, but rather number in the hundreds, and thus either are or come near to being an open class. The claim in this chapter for a preponderance of Figural point geometry pertains only to closed-class forms, and so this claim remains unchallenged by the Tzeltal data. If open-class forms were to be included in consideration, then we would need to note that English also has no small number of verbs that refer to the Figure's shape and orientation. Examples include *lie*, *sit*, *stand*, *lean*, *dangle*, *squat*, *kneel*, *crouch*, *sprawl*, *bow*, *bend*, *curve*, *arch*, *sag*, *droop*, *cluster*. Further, position verbs are not obligatory in Tzeltal locative sentences. The language also has a generic 'be located' verb comparable to English *be*. And the language can in addition use verbs with no reference to the Figure's shape or orientation—for example, ones with meanings like 'roast' or 'dry', as in *The beetle is roasting/drying at the fire*. Finally, with

its closed-class set of prepositional complexes, Tzeltal can as readily refer to elaborate Ground geometries as English. (Levinson makes a point of the fact that much of this set derives by analogic processes from body-part terms, but whatever its diachronic origins, this set is today a schematically abstract closed-class system.)

A further general feature of the "map" of geometric distinctions that languages typically mark is that objects are not characterized as to just any properties of physical configuration or makeup. Missing from the catalog of geometric types that follows, for example, are virtually all properties specific to metric spaces (including the Euclidean) such as particular size, length, distance, angle, or contour, as well as more substantive properties like texture, material, or identity. Instead, the objects are characterized almost solely by more qualitative or "topological" properties such as their type of structural conformation, degree of subdivision ("partiteness"), number of relevant dimensions, boundary conditions, and symmetry versus distinguishability of parts.

2.2.1 Geometric Relations of a Nonpoint Figure to a Ground Though the seeming majority of spatial elements schematize the Figure solely as a point or related simple form, in contrast with the treatment given the Ground, one type accords the Figure a full geometry and relates it to that of the Ground. Elements of this type can in fact represent a quite elaborate spatial complex, simultaneously indicating a particular geometry for the Figure, another one for the Ground, the Figure's position or path with respect to the Ground, and the concurrent relation of the Figure's geometry to that of the Ground—that is, its orientation thereto. An example of this type is the English preposition *across*, as in

(7) The board lay across the railway bed.

The preposition here indicates that the Figure (the board) is linear, that the Ground (the railway bed) is "ribbonal"—in other words, a plane bounded along two parallel edges (what Herskovits (1986) terms a "strip")—and that these two forms bear certain positional and orientational relations to each other, summarized as follows.

(8) (F = the Figure object; G = the Ground object)
   a. F is linear (and generally bounded at both ends).
   b. G is ribbonal: a plane with two roughly parallel edges as long as or longer than the distance between them.

c. The axis of F is horizontal.
(The plane of G is typically, but not necessarily, horizontal.)
d. The axes of F and G are roughly perpendicular.
e. F is parallel to the plane of G.
f. F is adjacent to—not in—the plane of G.
g. F's length is at least as great as G's width.
h. F touches both of G's edges.
i. Any extension of F beyond G's edges is not enormously greater on one side than on the other, nor than the width of G itself.

If one or the other of these factors fails to hold in a referent situation, then some expression other than *across* must be used. For example, the plane of the Ground may be vertical, but if the axis of the Figure is still horizontal, as in the parenthesized sentence of (9c′), then *across* can still be used. But if the Figure is not horizontal (factor c), then instead of *across* one must use some expression like *up and down on/against*, as in the unparenthesized sentence of (9c′). If the Figure's axis is not perpendicular to that of the Ground (factor d) but rather parallel to it, then *along* is more suitable, as in (9d′). If the Figure is not parallel to the plane of the Ground (factor e) but is rotated away from it, then a locution like *stick into/out of* may apply, as in (9e′). If the Figure is not adjacent to the plane of the Ground (factor f) but is part of it, then the preposition *in* is more appropriate, as in (9f′). If the Figure's length is not great enough to span the Ground's width (factor g), then the preposition *on* is more fitting, as in (9g′). Next consider the case where the Figure is long enough to be able to span the Ground's width and indeed is perpendicular to the Ground's length, but, say, is so positioned as to lie half on and half off the ribbon of the Ground. Here, the Figure does not touch both edges of the Ground (factor h), but it does satisfy all the factors (a) through (g). But then the form *across* would again no longer apply, and some locution like *half on* or *extend halfway onto* would be needed, as in (9h′). Finally, if the Figure satisfies all of the earlier factors but extends beyond both edges of the Ground by an amount disproportionately large relative to the width of the Ground (factor i), then one might use the preposition *over* instead of *across*, as in (9i′ (i)). And if the Figure extends disproportionately beyond just one edge of the Ground, then a locution referring to one end of the Figure might be used, as in (9i′ (ii)).

(9) c′. (The spear hung across the wall.) The spear hung up and down on the wall.

d′. The board lay along the railway bed.
e′. The board stuck (obliquely) into the railway bed. / The (horizontally level) spear stuck (obliquely) into the wall.
f′. The board lay (buried) in the railway bed.
g′. The board lay on the railway bed.
h′. The board lay half across the railway bed/extended halfway across the railway bed/extended onto the railway bed.
i′. (i) The 50-foot board lay over the railway bed.
(ii) The end of the 50-foot-long board lay across the railway bed.

2.2.2 The Orientation of the Figure Relative to the Ground Prepositions of the *across* or *along* type can generally be used even in situations where a Figure's site relative to a Ground is already known. In this case, they shed their localizing function and serve solely to indicate the Figure's orientation with respect to the Ground. They are then equivalent to expressions like *crosswise to* and *parallel to*, which always indicate orientation alone:

(10) a. The gate was set across/crosswise to the pier.
b. The gate was set along/parallel to the pier.

2.3 The Range of Geometries of the Figure

Looking over those linguistic elements that relate a full Figure geometry to one for a Ground, we find represented a certain array of Figural geometries more complex than just a point. One type here seems universal. Languages allow a term referring to a point Figure that is in motion, and therefore describing a linear path, to apply as well to a linear Figure moving coaxially along the same path, and sometimes also to a stationary linear Figure positioned in coincidence with such a path, as in the following English examples.

(11) (i) *Motion of a point Figure*
(ii) *Coaxial motion of a linear Figure*
(iii) *Coaxial location of a linear Figure*
a. (i) The ball rolled . . . (ii) The trickle flowed . . . (iii) The snake lay . . .
across the railway bed.
b. (i) The ball rolled . . . (ii) The trickle flowed . . . (iii) The snake lay . . .
along the ledge.

c. (i) The ball rolled ... (ii) The trickle flowed ... (iii) The snake lay ...
around the tree trunk.

d. (i) The ball rolled ... (ii) The trickle flowed ... (iii) *The snake lay ...
past the rock.

e. (i) The ball rolled ... (ii) The trickle flowed ... (iii) *The snake lay ...
through the tube.

f. (i) The car drove ... (ii) The stream flowed ... (iii) *The road lay ...
from Burney *to* Redding.

While a stationary linear Figure as such is excluded from the reference of some spatial terms, as in (11d) to (11f), it can be rendered suitable there if it is conceptualized as having a leading edge in virtual motion, or as being scanned along its length by one's focus of attention—as is generally indicated by verbs that unlike *lie*, suggest movement, as in (12).[5]

(12) This road runs past the factory/extends through the tunnel/goes from Burney to Redding.

Reference to a moving point (and, hence, also to a moving coaxial line) may be considered more basic than reference to a stationary line. As one form of evidence for this proposition, those forms in (11) that refer to only one of these two types, rather than covering both types—namely, (11d) to (11f)—all apply to the motion type, not to the locative type. Accordingly, we can reinterpret the linear-locative *across* case in (8), even with its elaborate features, as derived in some way from the moving case, as suggested in (13).

(13) A point moved across a bounded plane.
→ A line was located across a bounded plane.

Thus, although the example of locative linear *across* was introduced as representing an instance of Figural geometry more complex than a point, even it may reduce to a form of Figural point geometry.

Although there is thus some question here whether linear Figure geometry has any original (nonderivative) reference, at least by English prepositions, we can look further to observe that at least some such prepositions do genuinely indicate other nonpoint Figural geometries. One preposition, *over*, in one usage represents the Figure as planar, fur-

ther specifying that it is largely coextensive with and everywhere touching a planar Ground (or a salient planar part of a Ground), as in (14).

(14) The tablecloth lay over the table. / The tapestry hung over the east wall of the living room.

An additional group of prepositional expressions characterizes the Figure as a distributed quantity—indifferently, either as a continuous mass or a composite aggregate. These expressions further distinguish the Figure as having a one-, two-, or three-dimensional distribution in agreement with the dimensionality of the Ground object, as shown in (15).

(15)

		The Ground is:
{There was oil / There were droplets of oil}	*all along* the ledge.	linear
	all over the table.	planar
	throughout the aquarium.	volumar

(Note that *over* and *all over* behave in the distinct ways outlined here and are not interchangeable.)

2.4 The Range of Geometries of the Ground

In accordance with our mode of cognizing space, linguistic closed-class elements—while they usually treat the Figure as a point or simple extension thereof—mark an elaborate range of geometric distinctions for the Ground. Certain main types in this range are surveyed here and in the next section.

2.4.1 Degree of Partiteness In one such type, the Ground's "partiteness" is marked in degrees increasing from unity to comminution. One such series of English prepositions is presented in (16).

(16) *Prepositions indicating progressively greater partiteness for the Ground*

The Ground is treated schematically

as a single point by *near*:

a. The bike stood *near* the boulder.

a point pair by *between*:

b. The bike stood *between* the boulders (i.e., two of them).

a set of points—more than two, but typically not very many—by *among*:

c. The bike stood *among* the boulders.

as an aggregate mass—that is, a set of points that are numerous enough, and closely enough spaced relative to their size, to approximate or be conceptualized as a continuous mass—by *amidst*:

d. The bike stood *amidst* the cornstalks.

As a kind of limiting case for this series, *through* in one of its motion usages characterizes the Ground as anything from an aggregate on up to a continuous mass, a range that can be generalized as forms of a *medium*:

e. The tuna swam *through* the minnows/the seaweed/the polluted water.

2.4.2 Qualitative Geometric Configuration Another group of prepositions—usually referring basically to motion—represents the Ground as of one or another qualitative kind of integrated geometric configuration, as shown in (17).

(17) *Prepositions indicating different geometric configurations for the Ground*

The Ground is treated schematically

as a bounded plane by *across*:

a. The bike sped *across* the field.

as a linear enclosure—that is, as a kind of cylindrical form—by *through* (in another of its usages):

b. The bike sped *through* the tunnel.

as a surface so curved as to define a single volume by *into*:

c. The bike sped *into* the sports hall.

Languages other than English often mark different, sometimes additional, geometric distinctions for the Ground, ones that can seem quite exotic from our perspective. The class of space-characterizing elements in these languages is not always one of prepositions, or even postpositions, adjacent to the noun that indicates the Ground. Thus, Atsugewi, a California Indian language that I have worked on, has a set of suffixes appearing on the verb that mark some 50 distinctions of Ground geometries and the paths that relate to them. Some dozen of these suffixes mark distinctions covered by the English preposition *into*, which does not itself reflect such finer subdivisions.[6] (The "+" below indicates that the form must be fur-

ther followed by a suffix indicating 'hither' or 'hence'; the superscript vowel represents a special phonological element of this language.)

(18)	-ic̓t	'into a liquid'
	-cis	'into a fire'
	-isp -u· +	'into an aggregate' (e.g., bushes, a crowd, a ribcage)
	-wam	'down into a gravitic container' (e.g., a basket, a cupped hand, a pocket, a lake basin)
	-wamm	'into an areal enclosure' (e.g., a corral, a field, the area occupied by a pool of water)
	-ipsn^{u} +	'(horizontally) into a volume enclosure' (e.g., a house, an oven, a crevice, a deer's stomach)
	-tip -u· +	'down into a (large) volume enclosure in the ground' (e.g., a cellar, a deer-trapping pit)
	-ikn +	'over-the-rim into a volume enclosure' (e.g., a gopher hole, a mouth)
	-ik̓s^{u} +	'into a corner' (e.g., a room corner, the wall-floor edge)
	-mik·	'into the face/eye (or onto the head) of someone'
	-mic̓	'down into (or onto) the ground'
	-cis^{u} +	'down into (or onto) an object above the ground' (e.g., the top of a tree stump)
	-ik̓s	'horizontally into (or onto) an object above the ground' (e.g., the side of a tree trunk)

Although the Atsugewi forms subdivide the semantic domain of *in* beyond what English speakers might have thought that 'in-ness' merited, these forms still by no means get down to any level of semantic primitives. On the contrary, it can be observed that the references of the Atsugewi forms in turn represent easily discernible complexes of still finer components. Thus, the form -*wam* referring to a container and the form -*ipsn*^{u} + referring to an enclosure (specifically, a volumetric type of enclosure) each comprise a constellation of factors and differ from each other with respect to all these factors. The container form indicates that the Figure moves prototypically downward to enter the Ground object, fills much of the empty volume defined by the Ground, is pressed against the sides of the Ground by gravity (hence involving force dynamics in addition to spatial configuration), and would spill radially outward if those sides were not in place. Examples of its usage include the motion of

acorns into a basket, articles into a pocket, and water into a lake basin. By contrast, the enclosure form indicates that the Figure prototypically moves horizontally to enter the Ground, sits alone on the Ground's bottom otherwise surrounded by the empty volume that the Ground defines, does not press against the sides of the Ground, and would remain in place if those sides were not present. Examples of its usage include the motion of a dog into a room, a cake into an oven, a broom into the space between a refrigerator and a wall, and a rock into a deer's stomach. For cases with properties between those of the two constellations, it is probable that Atsugewi speakers would choose one of the two full schematic complexes and impose it on the intermediary spatial referent.

While perhaps reeling from the semantic pyrotechnics of a language like Atsugewi, we should not overlook the additional distinctions that English does mark, not with distinct forms, but with distinct combinations of and constraints on its forms. For example, in referring to entry of an enclosure, either *in* or *into* will serve, as seen in (19a). (In the definitions here and below, braces enclose the type of entity that the prepositional object must refer to.)

(19) a. *in(to):* 'into {an enclosure}'
I ran in the house/into the house.

But there is a separate usage, referring to passage through an opening in the wall of an enclosure, that can be expressed only by *in* and not also by *into*, as seen in (19b). (This same pattern holds for *out* as against *out of*: *I ran out the back door.* / *out of the back door.)

b. *in:* 'through {an opening} into an enclosure'
I crawled in the window/*into the window.

And there is a third usage, for which only *into* will serve, indicating impact with a solid object:

c. *into:* 'into collision with {an object}'
I ran into the wall/*in the wall.

Moreover, while English has such geometrically encompassive forms as *in*/*into*—spanning geometric situations as different as immersion amidst liquid and encirclement by a curved plane—it does also possess forms with finer specifications, ones that thus more closely approximate the Atsugewi-type forms. For example, *inside*, unlike *in*/*into*, can refer to enclosures, but not also to liquids, as seen in (20). Thus, in effect, the

closed-class system of English, like that of Atsugewi, does recognize 'liquid immersion' as a distinct concept, but only, as it were, by **semantic subtraction**, since this concept is merely implicit in the difference between the smaller semantic range of *inside* and the larger one of *in*/*into*.

(20) a. The ball { is in / fell into } the water.
*The ball { is inside / fell inside } the water.
b. The ball { is in / fell into } the box.
The ball { is inside / fell inside } the box.

Finally, English extends its familiar prepositions in their standard constructions to include further reference to various complex geometries. One particular pattern of such extension was already seen in (19b). This pattern accounts for a small set of complex geometric references. In this pattern, a preposition relevant to a certain object A within the geometric complex in reference is used instead with an object B that bears a particular relation to object A.

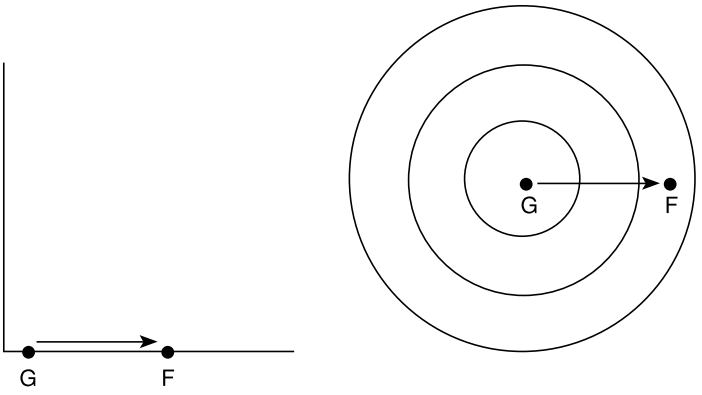
(21) a. *in*/*out:* 'through {an opening} into/out of an enclosure'
I crawled in/out the window.
[as if, e.g., from: I crawled through the window into/out of the house]
b. *across:* 'along/over {a bounded linear extent} across a bounded plane/space'
I walked across the bridge.
[as if, e.g., from: I walked along/over the bridge across the canyon]
c. *around:* 'along {a linear extent} around a bounded plane'
I ran around the track.
[as if, e.g., from: I ran along the track around the field][7]

2.4.3 Association with a Framework A spatial form such as a preposition can appeal not only to geometric characteristics actually present in a Ground object—as just seen for the partiteness or configuration of a Ground object—but also to the geometric characteristics of a virtual framework that is only fictively associated with the Ground. In particular,

a Ground object that is geometrically idealized as a point can be conceptualized as being situated within a rectilinear framework—in effect, at the intersection of the *x*-axis and *y*-axis of a Cartesian coordinate system. Alternatively, it can be conceptualized as situated at the center of a radial or concentric framework—in effect, at the origin of a polar coordinate system. Thus, in English, both *away from* and *out from*, as in (22), refer to the motion of a schematically pointlike Figure along a path that progressively increases its distance from a schematically pointlike Ground. But *away from* suggests the conceptualization that the Ground is, in effect, on a line and that the Figure's path begins at the Ground point and extends perpendicularly to that line, as represented in diagram (23a). On the other hand, *out from* suggests the conceptualization that the Ground is, in effect, at the center of a set of concentric circles and that the Figure's path begins at the Ground point and extends radially through those circles, as represented in diagram (23b).

(22) The boat drifted further and further away/out from the island.
The sloth crawled 10 feet away/out from the tree trunk along a branch.

(23)



a. b.

2.5 Asymmetric Ground Geometries

While the preceding Ground geometries have all been in a certain sense "regular," with homologous parts or aspects not distinguished from each other, a major group of space-characterizing linguistic forms makes appeal to a Ground object's having some form of **asymmetry**, or **biasing**,

in its structure. Either it has structurally distinct parts—parts that in themselves are distinguishable from one another and can form a basis for spatial discriminations—or it has some kind of unidirectionality. This unidirectionality can consist either of a static one-way directedness or, dynamically, of an actual path of motion. Here, "asymmetry" is used as a technical term intended to refer not to all, but only to certain, forms of nonsymmetry, as these are characterized below.

2.5.1 Asymmetry of Parts The prepositions in section 2.4 did not appeal to a Ground object's having any parts with distinguishable identities. In the use of *across* with reference to a field, for example, there is no a priori singling out of one edge of the field as the starting point over the other edge as terminus, and in the use of *through* with a tunnel, one end of the tunnel is as good as the other. But in other cases, the important factor is distinguishable parts. This can be termed **asymmetry of parts**. Typically, objects have such parts in opposed pairs. Objects with only one such pair are a headlight with a front and a back or a tree with a top and a bottom. Objects with two pairs of distinguishable parts and a third derivative pair are a TV or a person or a building—all having a front and a back, and a top and a bottom, and, derived from these, a right and a left, where the parts of this last pair are generally not different from each other in shape or features. A partially different three-way pattern is usually ascribed to an object like a lizard, with a head (front) end and a tail (rear) end, an upper (dorsal) side and an under (ventral) side, and again a derivative right and left. The objects that exhibit such differentiation of parts cover a distribution of types. They range from the integral forms just mentioned, to composite objects like a line of people, to objects of geographic extent like a fairground or the plane of the earth.

A general way to characterize the present asymmetric kind of geometry is that here (at least) one part of an object is uniquely identifiable without any external indicators—either because that part has its own distinguishing characteristics or because it has a distinct relation to the structure of the whole object.

2.5.1.1 Contact with an Asymmetric Part Expressions that refer to a Reference Object's parts in order to localize a Figure divide into three kinds according to the amount of separational distance that they indicate. In one kind the Figure is in contact with—either within the substance of or simply touching—the physical part singled out from the Reference

Object. In English, the part thus named is treated as a regular noun and, because of its function within the noun phrase, therefore usually occurs after *the*.

(24) a. The mosaic is { on the front of / on the back of / on the (right/left) side of } the church.

b. The boy is in the front of the line.

c. The carousel is in the front of the fairground.

2.5.1.2 Adjacency to an Asymmetric Part The second type of expression uses a Reference Object's part to indicate the volume of space, or portion of terrain, *immediately adjacent* to it, and localizes the Figure within that region. In such expressions in English, the words *front* and *back* have no *the* before them.

(25) The bike is { in front of / in back of/behind / on one side of/beside / on the right/left of } the church.

The police officer is in front of the line.

The parking lot is in front of the fairground.[8]

The fact that these expressions cannot be used to localize Figures at a greater distance shows that they indicate relative adjacency to the Reference Object. For example, a bike directly lined up with the front of a church but three blocks away cannot be said to be "in front of" the church.

Notice that the human body, although presumably the prototype for the ascription of asymmetric geometries to many other objects, is not structurally treated as any kind of special case in many languages, including English. Thus, in the examples above, the word *church* can be replaced by *me* without any disturbance to the spatial indications or grammaticality of the expressions (except that perhaps a preferable alternative to *on the right/left of me* is *on my right/left*).

2.5.1.3 At Some Distance from an Asymmetric Part The third type of expression is like the second except that the adjacency condition is removed. The Figure is localized in a particular quadrant by reference to some Reference Object part, but it is at any remove. However, this type is poorly represented in English. Perhaps only *to the right/left of* really serve in this sense. Note that the English construction with this property is the

one that contains *to* (not, say, the one containing *on*), as in *The bike is to the right of the church* (anywhere from three feet to three blocks). *Rearward of* might work for the back direction, as in *The bike is rearward of the church*, but *forward of* will certainly not do for the front direction. In general, conveying these concepts requires lengthy expressions, and then ones that are not neutral to distance but in fact indicate nonadjacency, as in *The bike is a ways off from the front of the church*.

2.5.2 Asymmetry in Directedness A sense of unidirectionality, itself a form of asymmetry, can attach to some axis in an object or other spatial array that functions as a Ground. This can be termed **asymmetry in directedness**. In the type we first consider here, this unidirectionality can be static, consisting of a sense of one-way directedness implicit within the object or array. With this static directedness, it is thereby possible, within the object or array alone, to characterize a Figure's path of motion along the contained axis as occurring in one direction or its opposite. In some cases, such a directed axis can be conceptualized as having an end point that is associated with a particular asymmetric part of the object or array. Or it can be conceptualized as having two end points associated with two different asymmetric parts and as extending from one of those parts to the other. In such cases, the direction of a Figure's path can be characterized by either of the two asymmetric systems, the one based on parts or the one based on directionality. Several types of configurations exhibit these properties.

One type is a queue—for example, a line of people all facing in the same direction. Such a queue has an asymmetric directedness, one that points in the direction the people are facing in. A Figure can be characterized as moving in this direction by such English forms as *ahead* or *forward*, and as moving in the opposite direction by forms like *backward* or *back down*, as shown in (26a). Alternatively, expressions like *toward the front* and *toward the rear* appeal to a queue's asymmetry of parts, as seen in (26b).

(26) (The people who were queued up at the box office assisted the man in the wheelchair.)
   a. They passed his $20 bill ahead in the line, and passed his ticket back down the line.
   b. They passed his $20 bill to the front of the line, and passed his ticket back to the rear of the line.

Another venue for asymmetric directedness is the interior anatomy of an organism's body. Here, English terms like *ventrally* appeal to a concept of a directed axis from the back toward the stomach side of a body, and refer to the motion of a Figure in that direction, as seen in (27a). This type, again, also permits a construal in terms of asymmetry of parts with such expressions as *toward the ventral side*, as seen in (27b).

(27) In an affected fish, the parasites hatch along the spine
  a. and move ventrally/dorsally through the tissue.
  b. and move through the tissue toward the ventral/dorsal edge of the fish.

A further type of asymmetric directedness is present in a gradient. In a gradient, the quantity of some factor differs progressively in some direction. A Figure can then be characterized as moving in the direction of increasing or decreasing quantity. An expression like English *along* can indicate such motion with respect to a gradient. It does not intrinsically indicate increase or decrease, but once this feature is established in a given context, a term like *against* can refer to motion in the opposite direction, as seen in (28). The gradient form of directedness does not readily allow a counterpart construal in terms of asymmetry of parts.

(28) The growing axon moves along/against the interstitial chemical gradient to encounter its target.

A number of languages, such as Samoan, express a fourth type of asymmetric directedness with a pair of forms that can be roughly glossed as 'seaward' and 'inland'. The 'seaward' term can refer to motion from the center of an island toward the sea, or from the island into the sea, or from one sea location to another that is further from the island. Complementarily, the 'inland' term refers to motion from one sea location to another that is closer to the island, or from the sea onto the island, or on the island toward its center. These referents of the terms could in principle be characterized very simply as 'away from/toward the center of the island'. Here, the direction is based on a form of asymmetry of parts, since it is determined with respect to a particular part of the spatial array. But apparently the usual construal evoked by these terms is of an asymmetric directedness that permeates the array, and any notion of the island's center is greatly backgrounded. In a parallel way, the center of the earth could in principle be used to characterize the meanings of English *up* and *down*, but here, too, the 'upward' and 'downward' senses

seem to suffuse the vertical axis, and any concept of an end point at earth's center lies outside of main attention. Apropos of this observation, the earth is in fact a fifth venue of asymmetrically directed axes, and it will be treated as such separately in section 2.6.

2.5.3 Asymmetry of Motion In the preceding section, the unidirectionality associated with a Ground object or array was of the static type, termed "directedness." But such unidirectionality can also be dynamic, consisting of an actual path of motion, whether of the whole Ground object or of some part of it. Such Ground motion constitutes a form of asymmetry—one that can be termed **asymmetry of motion**—and the path of a Figure object can be characterized with respect to it. For the case in which the moving Ground is an extended linear entity and the Figure is situated within it, the English term *with* generally represents the Figure's path as parallel to and heading in the same direction as the motion of the Ground object, while the form *against* represents the Figure's path as heading in the opposite direction, as seen in (29). The situations that these terms refer to probably also include a sense of force dynamics in the interaction of the Figure with the Ground.[9]

(29) a. Jane swam with/against the current.
b. Jane sailed with/against the wind.
c. Jane biked with/against the (flow of) traffic.

In addition, English has some special forms for particular moving Grounds, as seen in (30). Note here that *upstream*/*downstream* permit the Figure to move alongside the moving Ground, not just within it. Note also that any construal in terms of asymmetry of parts—say, of the Figure's motion with respect to a stream's end points, its source or mouth—seems semantically unrealistic.

(30) a. Jane swam/drove her car upstream/downstream.
b. Jane ran upwind/downwind.

2.6 The Earth as a Ground with Asymmetric Geometry

The earth is regularly used as a Ground object in languages' systems for structuring space, and as such is—along with the human body—the most important case of an asymmetric geometry. It generally encompasses a three-way opposition like that of English up and down, north and south, east and west.

In principle, one could consider the asymmetry in these oppositions to be based either on distinguishable parts or on instances of directedness. Under the former interpretation, one would single out such reference portions of the earth as the north and south poles or an "east" and a "west"—that is, an eastern/western horizon, coast, land mass, and so on. Then, in saying, for example, *The balloon floated north(ward)|east(ward)*, one would be referring to motion toward the north pole or toward the east. Similarly, indication of an object's vertical motion might appeal to a concept of movement toward or away from a singled-out reference portion of the earth. Thus, indication of an object's motion up or down in the air, as in *The balloon floated up|down*, might appeal to a concept of movement toward or away from the surface of the earth, while indication of an object that moves within the ground, as in *The oil drill tip moved up|down*, might evoke the earth's center as a reference point.

However, our everyday usage of earth-based geometry generally seems more to appeal to a sense of certain forms of directedness implicit throughout earth-associated space, or to a use of the familiar visual backdrop as a reference for such forms of directedness. Some evidence can be adduced for the primacy of this asymmetry-in-directedness interpretation. If asked, an average English speaker would probably answer that there is no qualitative difference between the two sentences *The plane flew north* and *The plane flew east*, only a difference in the heading. One might then need to point out that the plane could continue flying north only until it reached the North Pole, and then it would be flying south, whereas the plane could continue flying east indefinitely. That is, the fact that there is an end point to northern directedness is greatly backgrounded in attention. A northerly heading is thus generally experienced as consisting of a pervasive directedness, rather than as a Goal-targeted course. The same finding might result on asking for a qualitative difference between *The balloon floated up* and *The balloon floated down*. The fact that the upward path would be unlimited, whereas the opposite path would by definition cease to be downward either at the surface or at the center of the earth, would seem to be backgrounded in the average speaker's attention.

Possibly even when the form of a spatial expression suggests singled-out reference points, a predilection for directionality could prevail, so that both *Sue drove north* and *Sue drove toward the north* would be felt equally as involving pure directedness.

The earth can also be used as a Ground object to characterize not location or path, but the orientation of a Figure with a more complex (especially linear) geometry. Section 2.2.2 considered such orientations generally with respect to any Ground object, with English here using expressions like *along/parallel to* or *across/crosswise to*, which require indication of the particular Ground object involved. When the earth provides the reference geometry, however, a language usually furnishes special locutions to indicate orientation, ones that do not call for explicit mention of the earth or its geometric delineations. Thus, instead of locutions like those in (31a), we find the special forms in (31b).

(31) The beam is
  a. ?parallel to/crosswise to the earth's up-down direction.
  b. vertical/horizontal.

2.7 Characterizing Location by More Than One Reference Object

The spatial expressions treated so far have involved the partitioning of a referent scene at only a first order of complexity. They have characterized a Figure's spatial disposition on the basis of just a single Ground object, whose internal structural characteristics alone—whether asymmetric or irrelevant to symmetry—sufficed for the task, as in (32).

(32) The bike is near/in/behind the church.

But language also permits easy reference to a more complex partitioning of a spatial scene. Most frequently, this involves the distinction between a **primary Reference Object**, one that has the same syntactic position and largely the same semantic role as the single Ground objects studied up until now, and a **secondary Reference Object**, which in many cases is not explicitly named but merely implied by a particular spatial term.[10] Such further Reference Objects are considered here under two categories: those that "encompass" the primary Reference Object and those wholly outside it. We treat such further Reference Objects here only for their capacity to characterize the location of a Figure; their capacity to characterize the path or orientation of a Figure arises by extension from their locative capacity.

2.7.1 Encompassive Secondary Reference Object One type of secondary Reference Object, generally with an asymmetric geometry based on directedness, encompasses the primary Reference Object. That is, its forms

of directionality permeate—can be referred to throughout—the environment of the primary Reference Object. It can be termed an **encompassive secondary Reference Object**. In section 2.5.2, it was seen that different types of Ground objects and arrays that contained some asymmetric directedness could, in their own right, serve to characterize the path of a Figure. Here, we see how such types can also serve as secondary Reference Objects, working in conjunction with an enclosed primary Reference Object, to characterize the location of a Figure.

Thus, the queue discussed earlier simply as a Ground array directed from back to front can also function as a secondary Reference Object that encloses a primary Reference Object within it, as seen in (33).

(33) John is ahead of Mary (in the line).

To localize the Figure, John, we need to know not only the location of a primary Reference Object, Mary, but also the directionality of a second object that is distinct from it and, in the present case, encompassive of it, a queue. The Prepositional phrase *ahead of* implies just such an exterior lineup. Moreover, it is appropriate regardless of the direction in which "Mary" is facing. By contrast, if there were no queue and Mary were the sole Reference Object, a more suitable spatial expression would be *in front of*, though now Mary must actually face John.

Similarly, the directed interior of an organism's body, discussed earlier simply as a Ground, can also function as a secondary Reference Object, as seen in the following example.

(34) In this fish species, the swim bladder is ventral to the spine.

Here, *swim bladder* refers to the Figure, *spine* refers to the primary Reference Object, and *ventral to* includes reference to the secondary Reference Object.

The commonest secondary Reference Object of the encompassive type is the directed space set up by the earth. This can be used to localize a Figure object at any of the three removes from the Reference Object discussed earlier, as in (35).

(35) a.	The mosaic is on the east wall of the church.	[*physical contact with a part of the primary Reference Object*]
b.	The bike is on the east side of the church.	[*location in a region adjacent to the primary Reference Object*]
c.	The bike is east(ward) of the church.	[*location at an unspecified remove from the primary Reference Object*]

As with the contrast between *ahead of* and *in front of*, an expression like *on the east side of* implies the presence, relevance, and identity of a secondary Reference Object, whereas an expression like *on the left side of* —despite the identity of syntactic form between the two—has no such implication in its relevant reading. In this reading, the "left" expression (as in *The bike is on the left side of the church*) makes appeal to nothing outside the primary Reference Object itself, referring only to one of its distinct parts in order to narrow down the locale of the Figure. However, the "east" expression (as in *The bike is on the east side of the church*) requires looking outside the main Reference Object, to the arrangement of the earth's orientations, in order to effect a comparable narrowing down of locale. In this process, it still, however, does not name the earth overtly, as *ahead of* mentioned no queue, and the earth's axes are indicated much less saliently than the primary Reference Object, without their own independent noun phrase.

The earth-based vertical axis plays a comparable backgrounded role as a secondary Reference Object in a whole paradigm of English expressions, those in (36). Together, these constitute another series, like those in section 2.4, where the primary Reference Object varies along some parameter. As arrayed from left to right here, these expressions imply a decreasing relevance of the primary Reference Object's other—non-verticality-related—characteristics to the localization of the Figure.

(36)

	(a)	(b)	(c)	(d)	(e)
Upward-directed	on the top of	on top of	over	above	higher than
Downward-directed	on the bottom of	underneath	under	below	lower than

The columns of forms in (36) contrast semantically with each other in the following ways. First, the forms in (36a) do not strictly belong to the present paradigm because they make no direct appeal to earth-based verticality as a secondary reference. They refer to intrinsic parts of the primary Reference Object regardless of the object's current orientation (though these parts *are* named for their *canonic* orientation with respect to the earth). Thus, a fly that is "on the top of" a TV that happens to be lying on its side now flanks the TV rather than being uppermost on it. A fly that is "on top of" this TV—using (36b's) *the*-less expression—*would* be uppermost on it, resting on its side panel.

The forms in (36b) indicate a Figure's physical contact with the primary Reference Object, in particular with that portion of it that is most extreme, in either direction, with respect to the earth-based vertical dimension—for example, *The seagull is on top of the round boulder*, which indicates that the bird is touching the uppermost part of the rock. The forms in (36b) share with those in (36c) and (36d) the indication that the Figure and the Reference Object are vertically aligned—that is, that a single up-down line could be drawn through the two objects—but it differs from them in indicating physical contact, which they both deny.

The (36c) forms differ from those of (36d) in seeming to suggest a location closer to the Reference Object, a location somehow more related to or "in the sphere of" the Reference Object, and one in a direct line of sight with the Reference Object without other objects in the way. Thus, *The seagull is over the boulder* seems to suggest that the bird is about to relate to the boulder in some way (e.g., alight on it or pick off some food from it) or is closer to the boulder than the same sentence with *above* would do. Thus, the use of *above* in *The seagull is above the fog bank* would be preferable to the use of *over* when the idea to be conveyed is that the bird is *clear of* the fog and thereby out of relation to it. The use of *above* is mandatory in *The sixth floor is above the first floor*, because there is intervening matter.

The (36e) forms differ from the preceding three groups in that they do not necessarily indicate vertical alignment. Thus, *The seagull is higher than the top of the tree* does not require that the bird be directly over the tree. All these four groups of forms tend to exhibit "slippage" toward the right. For example, while *underneath* predominantly suggests physical contact, it can also be found functioning like *under*. And *above* is often found used like *higher than* with the indication of vertical alignment relaxed.

Here, as in all semantic analysis, care must be taken not to confuse separate senses of a word. Thus, the 'surface-covering' meaning that *over* has in *Hang the calendar over the hole in the wall*, which would be lacking if *above* were the preposition used, is a distinct sense described for *over* in section 2.3 and should not be confounded with its verticality sense. This latter reappears when the context is changed to render the surface-covering meaning impossible, as in *Hang the microphone over (= above) the large hole in the wall.*

Again, spatial expressions that at the surface appear entirely similar—like the English single-word prepositions *in* and *over*—can be of quite different semantic types. One type characterizes location in terms of the geometry of a single object. Thus, for example, *in the box* appeals only to the box's establishment of an interior space. The other type uses two objects. For instance, *over the box* appeals not only to our knowledge about the box—in this case, only its location rather than its geometry—but also, though less saliently, to our knowledge about earth-based upward directedness.

A number of spatial terms are extremely covert in their incorporation of a secondary Reference Object role for earth-based orientations, in particular for the vertical dimension or its complement, the horizontal plane, as seen in (37). For some terms, such as (37d), the implication of a secondary reference is so subliminal that one is surprised to learn of its having any role at all. Because of these additional covert references, terms like *in* and *across* that were earlier treated, in a simplified way, as not looking outside the primary Reference Object must now be seen as actually somewhat more complex.

(37) a. *across*: The plane of the primary Ground can have any orientation, but the Figure's path must be horizontal:
The fly walked across the tabletop./across the blackboard from right to left. /*across the blackboard from bottom to top.

b. *past*: The Figure's path must be horizontally to one side of, not over, the primary Ground (contrast Italian *passare*, which is indifferent to this horizontal/vertical distinction):
The bullet flew past my head, grazing my temple. /*grazing my pate.

c. *around*: The Figure's path involves a horizontal deviation from straightforward horizontal motion—complementing *over*/*under*'s indication of a vertical deviation from such a motion:
I went around the fence. vs. I went over/under the fence.

d. *in*: The primary Ground object cannot merely surround the Figure, but must also be in its canonical vertical orientation so as to contain or enclose the Figure in its customary way.
with the opening of the bowl up/of the tent down:
The pear is in the bowl. / He's standing in the tent.
with the bowl/the tent inverted:
The pear is under/*in the bowl. / He's standing on/*in the tent. (tent example is from Shingo Imai)

2.7.2 External Secondary Reference Object The other type of secondary Reference Object is one that is wholly outside the primary object, that exhibits a range of often nonasymmetric geometries, and that is generally expressed by an independent nominal, thereby exhibiting a degree of salience comparable to that of the primary object. One type of such an **external secondary Reference Object** functions like a geometric point that singles out the particular portion of the primary Reference Object nearest to it—or, alternatively, furthest from it. This portion in turn serves to characterize the location of an adjacent Figure, as seen in (38). This strategy for localizing a Figure thus works through an "externally characterized Ground part."

(38) a. The bike is on the side of the church toward the cemetery.
= The bike is on the cemetery side of the church.
b. The bike is on the side of the church away from the cemetery.

The speaker's own body in its current location is also able to serve as this kind of external secondary Reference Object. This is a situation for which English (among many languages) provides specialized locutions.

(39) a. The bike is on this side of the church.
(i.e., on the side of the church toward me)
b. The bike is on the other side of the church.
(i.e., on the side of the church away from me)

The speaker—or some comparable entity, such as the last perspective point adopted in a discourse—also serves as an external secondary Reference Object when incorporated as a component in the meaning of certain prepositions. An example is *beyond*, as in (40).

(40) The travelers are now beyond the continental divide.

Here, the location of the travelers (the Figure) is understood as being on the side of the continental divide (the primary Reference Object) that is away from the location of the speaker or perspective point (the external secondary Reference Object).

Another strategy for localizing a Figure by means of an external secondary Reference Object works through a fictive **Figure-encountering path** (equivalent to an "access path," as characterized in chapter I-2). In this strategy, an external point object can be used as a guide by which to establish a Figure-encountering path, as seen in (41). Locutions of this type indicate that the Figure is located somewhere along the line from the primary Reference Object to the secondary Reference Object.

(41) a. The bike is toward the cemetery from the church.
b. The bike is this way (i.e., toward me) from the church.

Note that this same strategy is also used for an encompassive secondary Reference Object. Thus, in all expressions of the type *John is ahead of/east of/over Mary*, the location of the Figure (''John'') is ascertained by—conceptually, perceptually, or with physical motion—beginning at the primary Reference Object (''Mary'') as a starting point and then proceeding along a path determined by a form of directedness in the secondary encompassive Reference Object (''ahead in a queue''/''toward the east''/''upward'') until encountering the Figure.

Although two Reference Objects are named in the external secondary Reference Object type, we can still distinguish which object is ''primary'' and which is ''secondary'' on the basis of syntactic analogy with the encompassive secondary Reference Object type, where this is clear.

(42) a. *Encompassive type* X is east of Y [*Y = primary Reference Object*]
b. *External type* X is toward Z from Y [*Y = primary Reference Object*]

But the distinction begins to blur in the external type, since both Reference Objects receive comparable prominence from their equal expression by overt nominals. Further, the external object and the Figure-encountering path that it determines can be geometrically more complex than just a point and a straight line toward it. In English, virtually the whole range of Ground and path geometries with terms to specify them can also be used as external secondary references.

(43) The bike is across the street/down the alley/around the corner from the church.

Moreover, such geometric indications can be strung together in a sequence to make up a quite complex Figure-encountering path.

(44) The bike is across the street, down the alley, and around the corner from the church.

The implication in locutions of the (43) and (44) type is that the Figure is at the end point of the specified path. To counter this implication, one must add Some special phrase, like *somewhere* (*along the way*). In reaching locutions such as these, we can perhaps no longer speak of a ''primary'' or a ''secondary'' Reference Object, but now must speak in

terms of a starting point and a multiply-determined path, all together functioning as a Reference Complex by which to localize the Figure.

2.7.3 Reference Frame Projected Out by a Secondary Reference Object Considering again the case of a pointlike object acting as an external secondary Reference Object, a special further circumstance can hold where the object has an asymmetric geometry. This asymmetric geometry can be conceptualized as radiating out beyond the object, thereby defining a reference frame. Where the object is movable—the usual case—the reference frame is relative to the object's current position and orientation. The commonest object of this sort is a person, especially one of the participants in a speech event. The clearest illustrations emerge where there is no geometric interference from the primary Reference Object—that is, where this object itself has no asymmetry in the relevant dimensions, like a silo or a tree with no intrinsic front, back, right, or left. Thus, in a sentence like

(45) The bike is to the left of the silo.

it is the speaker or hearer whose intrinsic front/back/right/left extends out and defines a framework by which the Figure is localized with respect to the primary Reference Object (the silo).

Notice that once this reference frame is projected out by the external secondary Reference Object, it behaves much like an encompassive secondary Reference Object. In particular, it permits the Figure-encountering strategy. Thus, just as the encompassive *The bike is west of the silo* uses the earth-based east-to-west directionality to outline a fictive path from the silo to the bike, so too the sentence *The bike is left of the silo* relies on the left-to-right directionality of the reference frame projected out from the speaker as external point object, and also outlines a fictive path from the silo to the bike.

Note that, in the preceding section, when the speaker functioned as an external secondary Reference Object, he was treated geometrically as a punctual object assessed solely for his location to serve as a kind of guidepost. But here, the speaker is assessed for her asymmetric geometry projecting out as a reference field.

2.7.4 Asymmetry Imputed by a Secondary Reference Object onto a Primary One We just saw that the reference frame generated by an external object—the speaker or hearer—can have its left-right (lateral)

orientation applied to a primary Reference Object, like a silo, in sentences like *The bike is to the right/left of the silo*. Now what about the front/back orientation? A perfectly consistent extension of the pattern for right/left would be to place the bike on the opposite side of the silo from the speaker/hearer with the prepositional complex *in front of*, as in (46a), and between the speaker/hearer and the silo with the preposition *behind*, as in (46b). The reason that this arrangement should be considered consistent is that the silo's asymmetric assignments would then correspond to those of a standing human: in clockwise succession, front, right, back, left.

(46) a. The bike is in front of the silo.
b. The bike is behind the silo.

This consistent use of the generated reference frame is in fact exactly what some languages, such as Hausa, employ. In English, however, a spatial phenomenon wholly distinct from any seen so far is involved. Rather than simply sitting amidst an externally projected orientational frame, the primary Reference Object has an asymmetric geometry *imputed* to it, one derived by mirror-image reversal from the secondary Reference Object (the speaker/hearer). It, in effect, has acquired its own front and back, and its front now faces that of the donor object. With this additional factor, *The bike is in front of the silo* now means that the bike is *between* the silo and the speaker/hearer, while *The bike is behind the silo* means that the bike is on the *opposite* side of the silo from the speaker/hearer. Notice that this phenomenon takes place only for the front/back axis, not also for the lateral axis, which remains as described earlier. Thus, the clockwise sequence around the silo for English is front, left, back, right.

Hill (1975) has made a cross-cultural study of the difference in the way that these "in front of"/"in back of" references are conceptualized—with the primary Reference Object as "facing" or "aligned" with the speaker or hearer. He has used test situations like placing a glove, a ball, and a bat in a row extending away from the subject and then asking "What is in front of the ball?" His findings are that two-thirds of schoolchildren and 90 percent of graduate students in America respond as if considering the primary Reference Object to face toward them, while 90 percent of Hausa subjects treat the object as facing away from them—that is, aligned with them.

2.7.5 The Range of Ways in Which Reference Objects Localize Figures

In all, the bases on which the location of a Figure can be characterized

with respect to Reference Objects fall into just a few main types. The simplest type involves only a single Reference Object, making appeal to the geometric properties of the Ground object alone, as discussed in sections 2.4 to 2.6. Localization by this type can be said to be **Ground based**, as in *The bike is near/behind the church*.

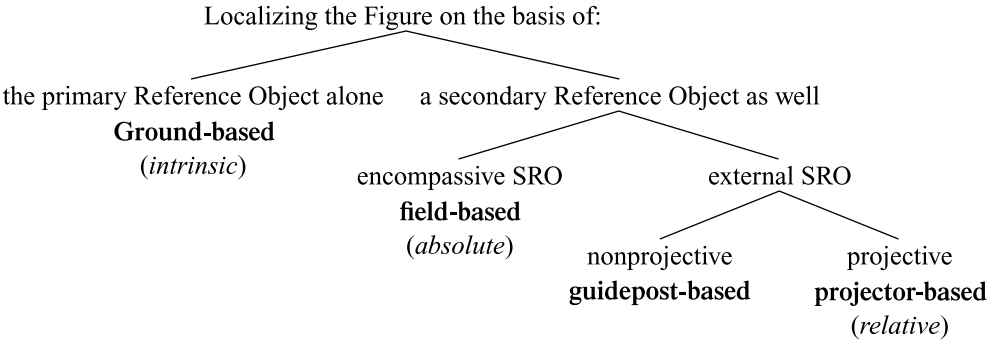
The remaining types involve a secondary Reference Object. Where this secondary Reference Object encompasses the primary Reference Object, as discussed in section 2.7.1, the localization can in general be said to be **field based**. As discussed further below, this field-based type can involve different particular Reference Objects, such as a queue, as in *John is ahead of Mary in line*, or the earth, as in *The bike is east of the church*.

As discussed in section 2.7.2, an external secondary Reference Object can also be used to localize a Figure. We first discuss the case where such an external object is **nonprojective**—that is, it either lacks an asymmetric geometry or, if it has one, its projection is not being used for a localizing function. Such an external object is frequently a geometrically punctual entity whose location is used as a guide by which to characterize the location of the Figure, as in *The bike is on the side of the church toward the cemetery*, or to "plot" a course for encountering the Figure, as in *The bike is toward the cemetery from the church*. In some cases, the external secondary Reference Object is a geometric complex that offers sequential guidance for plotting the Figure-encountering course, as in *The bike is across the street, down the alley, and around the corner from the church*. The speaker can also function as an external punctual object, often with special locutions for the situation, as in *The bike is on this side of the church*. The use of such a nonprojective external object to localize a Figure will be said to be **guidepost based**.

Finally, as discussed in section 2.7.3, an external secondary Reference Object can have an asymmetric geometry that projects out from it to form a reference frame. The use of such a reference frame for localizing the Figure can be said to be **projector based**. The speaker or some previously established viewpoint frequently serves as the source of the projection, as in *The bike is left of the silo* (from where I'm standing/from the last spot I mentioned).

The terminology of Levinson (1996) can be correlated with the present terminology. Generally, his "intrinsic" corresponds to the present "Ground based," his "absolute" to the present "field based," and his "relative" to the present "projector based." The accompanying figure shows these relationships. His system of terminology, though, appears to

have several limitations. It does not recognize or include a term for our "guidepost-based" system for localizing a Figure. And our "field-based" system for localizing would seem to capture a generalization missed by his "absolute" notion. First, our field system covers not only earth-based localizing, but also, for one additional type, queue-based localizing—itself not otherwise recognized by his taxonomy. Second, the term "field" avoids the problem that his term "absolute" has, to refer to the same type of localizing system, namely, that this system is often relative. An example is when an astronomer considers earth-based compass points with respect to celestial orientation, or, when a floating aircraft carrier is used to set local orientations even as it shifts relative to the earth's compass points.



NB: The projection of a projector-based system becomes the field of a field-based system.

A set of terms referring to specific Reference Objects can be adopted that crosscuts the preceding terms for type of referencing function. Thus, an **earth-based** system can use the earth and its associated reference frame as a Ground-based type of system for localizing a Figure, as in *I drove east*. Or it can use it as a field-based type of referencing system, as in *I drove eastward from Chicago*. Likewise, a **queue-based** system can function either as a Ground-based system for localizing a Figure, as in *John moved ahead in line*, or as a field-based referencing system, as in *John is ahead of Mary in line*. In a comparable way, a **speaker-based** system can use the speaker as a nonprojective landmark in a guidepost-based system for localizing a Figure, as in *The bike is this side of the silo*. Or it can use the speaker as an object with asymmetric geometry in a projector-based referencing system, as in *The bike is left of the silo* (i.e., as reckoned from where I am standing while facing the silo).

Of course, any particular spatial locution in a language is often capable of use in more than one localizing system. Thus, in this chapter, it is true, we have used the spatial form *behind* to illustrate solely a Ground-based ("intrinsic") system (as in *The bike is behind the church*). And the spatial form *left of* has been used only to illustrate a projective speaker-based ("relative") system (as in *The bike is left of the church* (*from where I'm standing*)). But in fact, both forms can be used for either localizing system. Thus, *behind*, even when used in the same sentence as just above, can instead be employed in a projective-speaker-based system to refer to a bike located on the opposite side of the church from where I am standing. And *left of*, again in the same sentence as before, can instead be used in a Ground-based system to refer to a bike located at the left flank of the church. Accordingly, in an analysis of any particular spatial example, the usual care needed in semantic work must be taken to ascertain the underlying conceptual schemas that are present, without unduly identifying any specific expression with a unique reading.

2.8 Further Distinctions

The descriptions presented so far in section 2 represent just one part of a much broader complex in language for structuring the domain of space-time. A brief outline here can help to indicate further parts of the complex. I have so far identified and analyzed in some detail four of the ramified systems in language, encoded at the fine-structural level, that characterize different kinds of relationships among entities within space or time. There are a number of such systems, but these four are the main ones that involve the conceptual structuring of space and time. I term them **schematic systems**. These systems are largely independent, with each adding a distinct conceptual dimension to those of the others. Each system offers a range of alternative structural characterizations, among which a speaker chooses so as to convey a particular conceptualization of a scene. The first schematic system—the one that I have termed **configurational structure** and that the present chapter predominately addresses—specifies geometries: abstract geometric characterizations of entities and their relationships to each other within different reference frames.

While this chapter has so far discussed only those characterizations that apply to physical objects within space, by looking at the distinct dimension of time, we can see that language applies much of the same "geometric" structuring to that dimension as well, as evidenced by these spatial-temporal homologies in English.

(47)

Space	*Time*
a. A bird sat along the ledge.	I sneezed (once) during the performance.
a point located on a bounded linear extent	
b. Birds sat all along the ledge.	I sneezed all during the performance.
points distributed over a bounded linear extent	
c. This road goes as far as Chicago.	He slept until she arrived.
a linear extent bounded by a point at its further end	
d. This road extends for three miles.	The performance lasted for three hours.
a bounded linear extent measured for length	

The temporal dimension viewed in its integral functioning with the spatial domain yields the special conceptual complexes of "stationariness" and "motion," only partially dealt with earlier. In analysis of this conjunction, a certain small set of primitive **Motion-aspect formulas**—ones that seem to underlie all more complex characterizations of stasis and movement in association with aspectual structure in language—appears to emerge universally. These formulas can be represented schematically as in (48). In each formula, the initial term is the **fundamental Figure schema** (always a point). A deep preposition written in capitals represents a **Vector**. And following the Vector is a **fundamental Ground schema**. The appendix to this chapter presents a more rigorous and detailed treatment of this system of formulas.[11]

(48) a. A point BE_{LOC} AT a point, for a bounded extent of time.
(The napkin lay on the bed/in the box for three hours.)

b. A point MOVE TO a point, at a point of time.
(The napkin blew onto the bed/into the box at exactly 3:05.)

c. A point MOVE FROM a point, at a point of time.
(The napkin blew off the bed/out of the box at exactly 3:05.)

d. A point MOVE VIA a point, at a point of time.
(The ball rolled across the crack/past the lamp at exactly 3:05.)

e. A point MOVE ALONG an unbounded extent, for a bounded extent of time.
(The ball rolled down the slope/along the ledge/around the tree for 10 seconds.)

e′. A point MOVE TOWARD a point, for a bounded extent of time.
(The ball rolled toward the lamp for 10 seconds.)

e″. A point MOVE AWAY-FROM a point, for a bounded extent of time.
(The ball rolled away from the lamp for 10 seconds.)

f. A point MOVE ALENGTH a bounded extent, in a bounded extent of time.
(The ball rolled across the rug/through the tube in 10 seconds.)
(The ball rolled 20 feet in 10 seconds.)

f′. A point MOVE FROM-TO a point pair, in a bounded extent of time.
(The ball rolled from the lamp to the door/from one side of the rug to the other in 10 seconds.)

g. A point MOVE ALONG-TO an extent bounded at a terminating point, at a point of time/in a bounded extent of time.
(The car reached the house at 3:05/in three hours.)

h. A point MOVE FROM-ALONG an extent bounded at a beginning point, since a point of time/for a bounded extent of time.
(The car has been driving from Chicago since 12:05/for three hours.)

In these Motion-aspect formulas, the geometries of the Figure and the Ground are represented by the simplest schemas that they can have. But they are not limited to these schemas. The Figure and Ground geometries are free to extend in any dimension or direction that the formula does not pertain to. This freedom can be termed the principle of **extendability in ungoverned directions**. To illustrate, consider formula (48e′), which represents the Figure as an object idealizable as a point, moving toward a Ground object that is also idealizable as a point. These idealizations are in fact appropriate for the referent of a sentence like *The car sped toward the village*. But the formula applies as readily for a Figure that is best idealized as a line, say, one aligned with the path, as in the referent of the sentence *The train sped toward the village*. Further, the Figure can be best idealizable as a line oriented transversely to the path, as in *The front line of troops advanced toward the village*. Or, indeed, such a Figural transverse line can extend into the third dimension to constitute a plane transverse to the path, as in *The cold weather front advanced toward the village*. Or the Figure can be idealizable as a planar object still lying in the original plane, as in *The carpet of floodwater advanced toward the village*. Or,

of course, the Figure can be conceptualized as an entire three-dimensional volume, as in *The storm region advanced toward the village*. To be sure, the Ground is equally capable of such extensions, as seen in *The car sped toward the border|the cliff wall*.

The principle of extendability in ungoverned directions applies as well even to more specific spatial schemas built upon the Motion-aspect formulas. Thus, consider the schema represented by the English satellite *out* in its sense of 'radial motion', which is ultimately based on formula (48e″). The simplest Figure schema for this Path satellite would seem to be indeed a point, as in *The boat sailed further and further out from the island*, where the Figure's path is conceptualized as radially traversing concentric circles. Such a point can, to be sure, extend into a line aligned with its path, as in *The caravan of boats sailed further and further out from the island*. But such a Figural point can also extend into a line oriented transversely to its path—moreover, one that also forms a circle, as in *The circular wave spread out from the point at which the leaf fell onto the water*. Further, such a line can extend into a planar schema that still lies on the original plane, as in *The oil spread out over the water from where it spilled*. Or the circular line can extend into the third dimension to form a schematic cylinder, as in *The ring of fire spread out as an advancing wall of flames*.

The second schematic system specifies **perspective point**—the point within a scene at which one conceptually places one's "mental eyes" to look out over the rest of the scene—and characterizes its location, distance away, and mode of deployment. A scene's geometric structuring, set by the previous schematic system, is largely independent of these perspectival indications. One ready illustration here involves the difference between a stationary distal perspective point with synoptic scope of attention, and a moving proximal perspective point with local scope of attention (as detailed in chapter I-1). The former of these is indicated in a sentence like *There are some houses in the valley* by the use of such closed-class elements as the plural *-s* with its agreeing *are*, the locative preposition *in*, and the presence of a quantifying constituent (*some*). The latter perspectival mode, on the other hand, is expressed in *There is a house every now and then through the valley* by its elements, the singular *a* with its agreeing *is*, the motion preposition *through*, and a temporally distributive constituent (*every now and then*), with the indication that one is to cognize this identical scene as if with a temporal sequence of close-up

inspections. This latter type, with movement of a perspective point rather than of an object within a scene, is another example of fictive motion, which has already been noted twice, once in (12) for the virtual-motion effect of expressions like *This road extends through the tunnel*, and once in section 2.7.2's discussion of localizing a Figure by means of a Figure-encountering "path," as in expressions like *The bike is down the alley from the church*.

It is possible that a treatment of perspective point should also include the obverse of this fictively moving scan over a stationary scene, namely the **freeze-frame** phenomenon, where one fixes on a "snapshot" taken from the path of an actually moving object. This is seen, for example, in expressions reporting on a courier's progress: *He's through the tunnel!*, *past the guardhouse!*, *into the bunker!*, where the path point fixed on is the one that follows immediately after completion of the path indicated by the preposition.

The third schematic system specifies the particular **distribution of attention** to be given to a referent scene from an indicated perspective point. It affords alternative patterns of primary and secondary, and so on, as well as minimal, attention on different elements within essentially the same scene. This system is the one responsible for establishing among selected objects within a scene the roles of Figure, primary Reference Object, and secondary Reference Object, treated at length earlier.

It is also this system, accordingly, that can function to indicate that minimal attention should be directed to some portion of a scene. The system can do so by omitting explicit reference to that portion under conditions where its presence is nevertheless fully implied, as in (49a) where the middle portion of a path is deemphasized, and in (50a) where an obviously necessary agent is excluded from the framing of a scene (as detailed in chapter I-4).

(49) a. The crate fell out of the plane into the ocean. [*beginning and end of path*]
b. The crate fell out of the plane, through the air, into the ocean. [*full path*]

(50) a. My cufflink finally turned up at the bottom of the clotheshamper. [*event alone*]
b. I finally turned up/found my cufflink at the bottom of the clotheshamper. [*event plus agency*]

The attentional system also involves setting the particular level, out of several hierarchically nested levels that can be present, on which to place main focus in attending to a Gestalt—for example, that of a freckled boy, as in (51).

(51)

	Main focus is on:
a. There are freckles on the boy's face.	the level of finest detail
b. The boy's face has freckles on it.	the mid-scope level
c. The boy has freckles on his face.	the framing level

A fourth schematic system pertains to **force dynamics**—that is, the ways that objects are conceived to interrelate with respect to the exertion of force, resistance to force, the overcoming of such resistance, barriers to the exertion of force and the removal of such barriers, and so on. Such indications, which seem mostly to reflect our kinesthetic/somesthetic sensory modality, are additional to and largely independent of the other three systems' indications, which together mostly reflect our visual modality. This system's operation is seen, for example, in the difference between a force-dynamically neutral expression like *The ball rolled along the green*, which depicts an instance of motion simply as an autonomous occurrence, and a force-implicational expression like *The ball kept rolling along the green*, for which one reading suggests that the ball had a natural tendency toward rest that was being overcome by an external force toward movement (such as a breeze). (See chapter I-7 for an extensive treatment.) As this brief outline indicates, the material in section 2 should be taken as only part of a much broader description of language's structuring of space and analogical dimensions.[12]

3 SCHEMATIZATION IN THE REPRESENTATION OF SPACE

We have just seen some of the basic geometric concepts distinguished by the closed-class spatial expressions of language, and we are therefore now in a position to investigate the more abstract properties that govern this representation. As indicated in the introduction, a fundamental character of the way that space is represented at language's fine-structural level is that it is *schematic*. That is, only particular selections of all the aspects present in spatial scenes are actually referred to by linguistic elements, while all the other aspects are disregarded. These remaining aspects can vary indefinitely without any effect on the choice of linguistic elements to

represent the scenes. Thus, every fine-structural spatial expression actually represents a family of spatial configurations that all share certain abstractable characteristics.

3.1 The Basic Properties of Individual Schemas

The particular schematic abstractions represented by individual spatial expressions, such as English prepositions, can be called *schemas*, and their properties can be investigated at three levels. The first is that of the components that go to make them up. The present chapter is too limited to treat this level adequately, so I simply note here that schemas are largely built up from such rudimentary spatial elements as points, bounded and unbounded lines, bounded and unbounded planes, and the like, and that these elements are governed by properties pertaining to their combination, coordination, cancelability, and so on. The second level, treated in this section (3.1), is that of the properties pertaining to the behavior of whole individual schemas. The third level, treated in section 3.2, involves the relationships that individual schemas have to each other within the larger system of schema usage. (See Herskovits 1986, 1997 for more on such spatial schematization.)

3.1.1 Idealization The actual, "literal" referent of any spatial expression, such as an English preposition, is a particular assemblage of primitive geometric components in the form of an abstract schema. This schema, however, must be conceptually applied to a full, repletely detailed referent. The term **idealization** will refer to this process of "application," where a referent spatial entity is conceptually idealized in terms of a schema applied to it. Idealization thus includes the process by which familiar objects, in all their bulk and physicality, are differentially "boiled down" to match ascribed schemas. The cognitive nature of these processes must yet be worked out for the operation of language in particular, but they will no doubt resemble certain processes of perception and Gestalt formation or those operative in the drawing of stick figures by children (see chapter I-2).

Some typical cases of the linguistic idealization process are the following. Idealization occurs where a physical object with one dimension much greater than the other two, say a pencil or a person or a skyscraper, is conceptualized as a line—as when used with the preposition *along* (*An ant crawled along the pencil.* | *The snake slithered down along the performer.* | *The outside elevator rose along the skyscraper.*). Or it occurs where a bulk

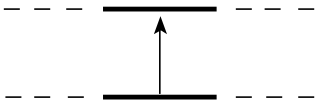
form with some concavity in it, such as a birdbath or a volcano, is conceptualized as a planar enclosure of volume—as when used with the preposition *in* (*the water in the birdbath*/*the lava in the volcano*). Or it occurs where a roughly equidimensional bulk, like a boulder or a planet, is conceived as a single point—as when used with the preposition *near* or *from* (*a pelican near*/*20 feet from the boulder* or *an asteroid near*/*10,000 miles from the planet*).

Idealization can be illustrated more fully with the schema specified by *across* in its usage referring to a path of motion. As an approximate verbal characterization (consult the diagrams in (53)), this is:

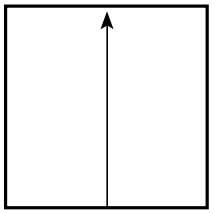
(52) *Across schema*
(motion of the Figure along the whole length of) a horizontal path line that runs perpendicularly from one edge to the other of a planar Ground object bounded by two opposite parallel edges, where this plane is "not laterally collapsible."

The last phrase in this characterization pertains to the relative lengths of the plane's two axes: the axis that is parallel to the plane's defining edges, and the perpendicular axis that is parallel to the Figure's path line. The meaning of the phrase is that the axis running parallel with the two edges cannot be so short, compared to the path-line axis, that it can be conceptually collapsed into that line itself, leaving the plane able to be regarded as one dimensional. Thus, the edge-aligned axis may be indefinitely long, as in the case of a river being crossed, schematized in figure (53a). Or it can be about the same length as that of the path-aligned axis, as with a square field being crossed, diagrammed in (53b). But it *cannot* be relatively short, like the narrow axis of a pier being traversed in the longer direction (53c). Such an arrangement makes the referent object more idealizable as a line that is co-oriented with the path, a configuration for which the schema associated with *along* is more appropriate. The critical range within which the edge-aligned axis becomes "too" narrow needs consideration. Perhaps in its basic usage, the *across* schema becomes inapplicable where the edge-aligned axis is at all perceptibly shorter than the path-aligned axis, as in the case of an oblong pool being swum in the longer direction, depicted in (53d). But even such a basic usage typically still allows some degree of "stretch" so as to apply to an only moderately oblong pool, though never to a long pier. Such a stretch is one of the types of schema deformation treated in chapter II-5.

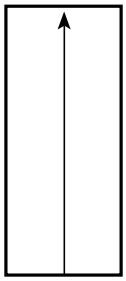
(53)



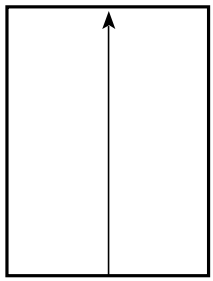
a. Across the river



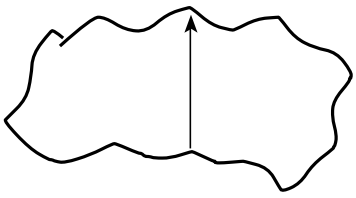
b. Across the square field



c. *Across the pier



d. ?Across the swimming pool



e. Across the lake

Taken as an abstract whole, the *across* schema thus requires that a physical object be idealizable—relative to a path executed with respect to it—as a plane with certain orientational and boundary conditions and with axes whose relative lengths obey certain constraints. This case thus shows that a schema can act like a filter passable to only some physical objects. That is, it can act as an integrated set of factors that test for an object's reducibility to a particular complex of schematic elements.

3.1.2 Abstractedness "Abstractedness" is one way to name the complementary property to idealization. While idealization involves finding within a physical object the delineations that correspond to a particular schema, abstractedness involves ignoring the rest of the object. Thus, in the use of *across*, it is of no consequence whether a referent object lacks side boundaries, as in the case of a river (53a above), or has them, as with

a square field (53b). Equally irrelevant is whether the plane is a liquid layer (the river) or a solid surface (the court). Thus, the characterizability as a two-edged plane that the *across* schema calls for classes together a multifarious set of objects. The difference between these objects is abstracted away from—hence, can be disregarded for this particular categorization.

3.1.3 Topology The degree to which language's spatial schemas abstract away from physical characteristics is even greater than suggested so far. Not merely does a schema attend only to geometricized delineations within a physical object. Not merely are physical bulk forms within an object idealized down to the points, lines, planes, and so on of the schema (with the remainder disregarded). But a schema also abstracts away from any specificity as to shape (curvature) or magnitude for these points, lines, and planes—and hence, also from any specificity as to angles or distances between them as they relate within the schema. This sort of further abstraction is characteristic of the spatial relations defined within the mathematical field of topology. It is metric spaces, such as classical Euclidean geometry, that observe distinctions of shape, size, angle, and distance. Distinctions of this sort are mostly indicated in languages by full lexical elements—for example, *square*, *straight*, *equal*, plus the numerals. But at the fine-structural level of conceptual organization, language shows greater affinity with topology. (One might further postulate that it was this level—and its counterparts in other cognitive systems—that gave rise to intuitions from which the field of topology was developed.) We can illustrate linguistic topology now under two of its characteristics. See chapter I-1 for further discussion of the present approach, and see Petitot and Doursat 1997 for a mathematical treatment of the linguistic topology in this approach.

3.1.3.1 Irrelevance of Shape It is easy to see that spatial elements generally permit wide ranges of shape variation. For example, the use of *in* requires that a Reference Object be idealizable as a surface so curved as to define a volume. But that surface can be squared off as in a box, spheroidal as in a bowl, or irregular as in a piano-shaped swimming pool; it can be open over a whole quadrant as in the preceding examples, or closed to form a complete enclosure as in a shed. It can also be an unbroken solid as in the previous examples, or have gaps, like a cupped hand, an open-work basket, or a house with its doors and windows open. As we

see, none of these variations of physical manifestation affect the use of *in*. Likewise, the two edges called for by the *across* schema need not be neat parallel lines. One can also swim "across" a lake, where the opposed "edges" are highly curved and full of irregularities, as suggested in diagram (53e).

Freedom of shape applies not only to the Reference Object itself but also to paths characterized with respect to it. Consider *through* in its use referring to a linear path within a medium. Not only is the "medium" free to range from a fluid ("through the water") to a dispersed aggregate ("through the timber"), but the path can take almost any contour.

(54) I arced/zigzagged *through* the woods.

That is, regardless of whether the path constitutes a straight line, an arc of a circle, or a set of zigs and zags, no change of preposition is called for. *Through* suffices for them all, simply because the abstraction that it refers to is insensitive to such further properties.

3.1.3.2 Irrelevance of Magnitude To a large extent, languages distinguish the same spatial characteristics for small objects and distances as for great ones. This is not simply a necessary fact, one just to be presumed. It would be very easy to imagine that objects capable of fitting in one's hand and broad geographic terrains, say, might have very different spatial characteristics of relevance to humans and that language forms would reflect such differences. Yet, the evidence is that very much the same spatial structures are distinguished all along the size spectrum, a fact that then testifies to the overall unity of our linguocognitive spatial system. To illustrate, consider these two sets of sentences.

(55) a. i. The lamp stood in the box.
ii. The man stood in the barn.
iii. The building stood in the valley.
b. i. The ant crawled across my palm.
ii. The man walked across the field.
iii. The bus drove across the country.

Here, the range in the size of a Reference Object, from a palm to a country, and the corresponding range in the length of the path traveled, are irrelevant to the choice of schema-specifying preposition.

Comparably, the use of the spatial terms *this* and *that*—indicating objects relatively closer to and farther from the speaker—can be equally used in the two sentences in (56).

(56) a. This speck is smaller than that speck.
b. This planet is smaller than that planet.

Again the difference in size between a speck and a planet, and the difference in the distances involved—from millimeters to parsecs—is irrelevant to the use of the spatial terms.

3.2 Relationships Among Different Schemas

We have been looking at the properties of single spatial schemas considered in isolation. But every language makes available not one, but many schemas, all constituting different configurations within the same conceptual domain, that of (objects in) space. What are the principles that govern the speaker's selection from among these schemas to make a particular reference? What are the semantic relations between the different individual schemas? And what relation does the full set of individual schemas bear to the spatial domain as a whole? We now explore these questions.

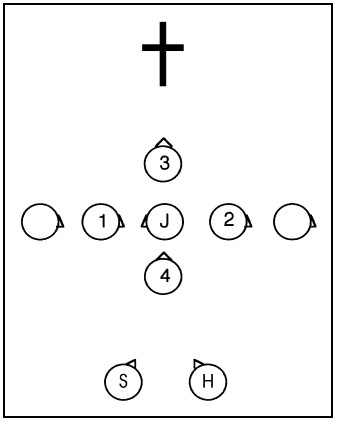
3.2.1 Alternatives in Schematization Because of the nature of idealization as applied to a physical entity—that is, where all those characteristics of the entity not pertinent to a particular schema are disregarded as irrelevant—it is generally the case that those very characteristics will include some that *are* relevant to other schemas. Thus, different schemas can usually be applied with equal appropriateness to the same physical configuration, capitalizing on different sets of characteristics contained in the configuration—and, correspondingly, disregarding different sets. We can observe two forms of such alternative schematization.

3.2.1.1 An Object Participating in Different Spatial Configurations In one form, a single physical entity can participate in several different spatial configurations and so be subject to alternative schematizations. Thus, a single box as a Ground object can have different Figures bearing different spatial relations to it—say, a dish on it, a ball in it, and a doll 20 feet away from it—whether on different occasions or concurrently. The dish's 'on' relation requires of the box that it have a horizontal plane uppermost on its bulk, but disregards any other features of that bulk—in this case, for instance, it cares not at all that the box has an interior space. By contrast, the ball's 'in' relation requires this latter feature of the box but is neutral to whether or not one of the box's sides (as opposed to its open face) is turned topmost so as to provide a surface for something to

be 'on'. The doll's 'away from' relation to the box is indifferent to either of the preceding two spatial conformations and is sensitive only to whether the box's bulk is localized enough, rather than distributed overly much—relative to the separational distance involved—that it can be treated as a single point.

Similarly, a further example here is like the preceding one in that several different Figure objects concurrently bear different spatial relations to a single Ground object by appealing to different aspects of that Ground object's spatial characteristics. What is striking in this new example, though, is that the *same* spatial form—namely, *in front of*—is used to represent all the different spatial relations. It accomplishes this by appealing either to the Ground object alone or to one of several different secondary Reference Objects that are co-present in the same referent complex. This complex—here, a scene within a church—is schematized from an overhead perspective in diagram (57), where circles represent people and the "noses" show the directions in which the people are facing. In this scene, John ("J") is standing backward in a queue that extends from left to right in the church, and the speaker ("S") and hearer ("H") are close to the entryway. With respect to this complex, the answer to the question *Who is in front of John?*—or, equivalently, the value of the variable in *Someone is in front of John*—can refer to any one of four different individuals, those designated by numbers in the diagram.

(57)



Here, person 1 is in front of John with respect to the asymmetric geometry intrinsic to John—specifically, with respect to his front—where John alone is taken into consideration as a Reference Object. Person 2 is in front of John—who now is treated as a primary Reference Object with only a schematically pointlike geometry—with respect to the asymmetric

geometry of the queue as a secondary Reference Object, specifically, with respect to its left-to-right directedness. Person 3 is in front of John—who again is treated as a point-geometric primary Reference Object—with respect to the asymmetric back-to-front geometry of the church's interior. And person 4 is in front of John—once again a pointlike primary Reference Object—with respect to the asymmetric reference frame projected outward by the speaker-hearer. Note that these distinct geometric assessments can often be linguistically disambiguated by the addition of certain short phrases, as in (58).

(58) a. Who is in front of John that he is facing? (= person 1)
b. Who is in front of John in the line? (= person 2)
c. Who is in front of John in the church? (= person 3)
d. Who is in front of John from where we are standing? (= person 4)

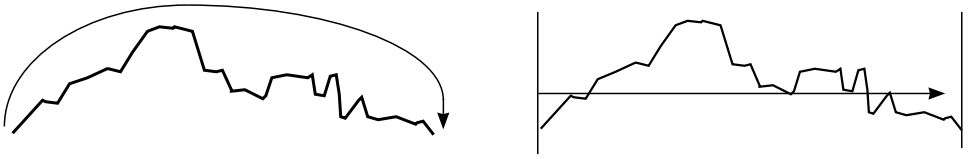
3.2.1.2 A Single Spatial Configuration Open to Different Schematizations

In the second type of case, the same physical configuration without any variation in its contents—say, a particular Figure moving or located with respect to a particular Ground object—is nevertheless open to alternative schematizations. Consider the example of a wheatfield with a man going from one side of it to the other. This configuration is complex enough to allow different schematizations. If we say that the man went *across* the wheatfield, then we are abstracting forth one aspect of the wheatfield complex, the fact that it has a horizontal bounded land parcel, and are disregarding the fact that there is wheat growing atop this land. If, on the other hand, we say that the man went *through* the wheatfield, then the wheatstalks, conceived together as constituting a medium, are abstracted forth from the whole physical complex, and now the presence of a land surface underneath, horizontal and bounded, is irrelevant.

The flexibility afforded by the linguistic processes of idealization and topology allows even further latitude for the imaging of a physical configuration in more than one way. Consider, for example, a cluster of mountains and a path that goes from one edge of the cluster to the opposite edge. If the mountains are thought of in terms of their elevation above the ground, the preposition *over* is best used, coding for a path schema something like that diagrammed in (59a). If, however, the mountain crests are thought of as defining a sort of plateau within which the path resides, then the preposition *across* is wholly appropriate as indicated in diagram (59b). In either case, we should note the immense degree of

abstraction from the actual physical details present for such a situation—an index of our cognitive capacity for idealization.

(59)

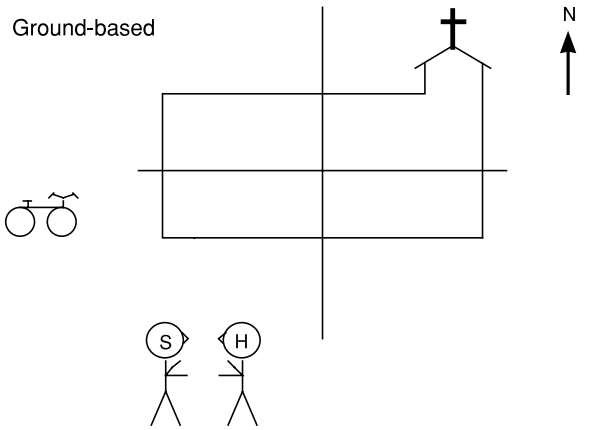


a. over the mountains

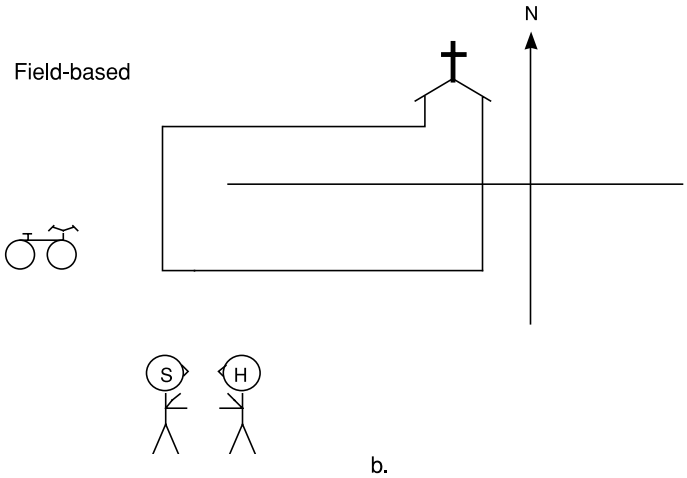
b. across the mountains

Another case of alternativity falls directly out of the analysis of asymmetric geometries in sections 2.5 and 2.6. The arrangement in which an object with an intrinsic asymmetric geometry is situated within the earth-based reference frame and is positioned with respect to a speaker-hearer dyad automatically permits alternative characterizations of location. Thus, the location of a particular bike relative to a church—as depicted in (60)—can be characterized by appeal to the asymmetric geometry of the church as primary Reference Object, with the form *behind* as in (61a). Alternatively, it can be characterized by appeal to the asymmetric geometry of the earth as an encompassive secondary Reference Object, with the form *west of*, as in (61b). Or it can be characterized by appeal to the asymmetric geometry of the speaker as an external secondary Reference Object that projects out a reference frame, with the form *left of*, as in (61c).

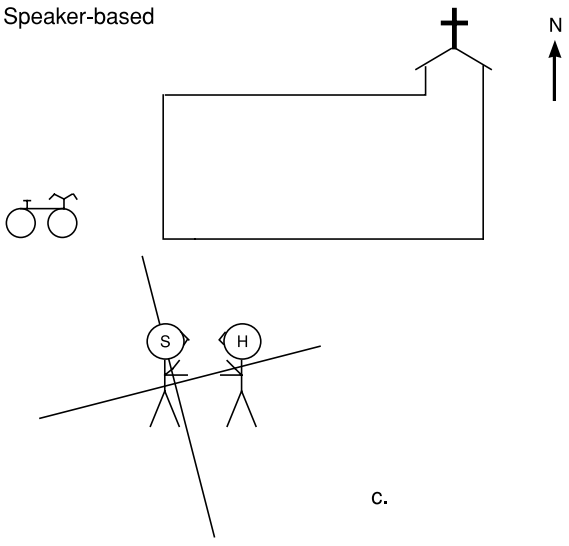
(60)



a.



b.



c.

(61) The bike is { a. behind the church / b. west of the church / c. left of the church }.

Two nonobvious examples of alternativity now can round out our characterization. A person standing some five feet away from and pointing to a bicycle in a driveway has the option of saying either *Get this bicycle out of the driveway!* or *Get that bicycle out of the driveway!* The

forms *this* and *that*, in effect, set up a conceptual partition in space and suggest that an indicated object is on the same side of the partition as the speaker, or on the opposite side, respectively. The point here is that the single spatial configuration of speaker, bicycle, and driveway allows for the imposition of either of these two partitioning schemas, in accordance with the speaker's conceptualization of the scene.

And, referring to the single situation of a bin full of cabbage heads, one could say either *The cabbage in the bin is all turning brown* or *The cabbages in the bin are all turning brown.* That is, this particular physical configuration allows schematization either as a mass quantity, conceived of without internal differentiation (indicated by use of the grammatical singular for the Figure), or as a set of discrete items, conceptualized with a network of divisional spacing running throughout (as indicated by the grammatical plural form).

In the cases of alternativity just reviewed, it is the speaker that selects one schema over another from those available and applicable, and it is thus the speaker that determines the highlighting of one group of factors or of another. In this choice, the speaker is presumably responding to preferences of emphasis or viewpoint, or to some sense of differential importance or salience among the features of a configuration. But the determiners of, and the degree of consciousness involved in, the selection await investigation.

3.2.2 Culture or Language "Preselecting" among Alternative Schematizations While in the preceding cases it was in the speaker's province to select among alternative schemas that could all equally be applied to a given spatial situation, in certain cases the culture or the language requires one particular way of looking at the situation over other possibilities. In effect, the option of selecting a preferred emphasis or viewpoint is removed from the speaker in these cases—a linguocultural "preselection" among the potential alternatives has already been made.

For example, the spatial relations of a passenger to surround-type vehicles like a car or a bus seem enough alike that for either vehicle a speaker should have the option of imaging the passenger as being either *in* the vehicle as a whole, thus invoking an 'enclosure' schema, or *on* some surface within the vehicle (say, its floor or seat), thus invoking a 'platform' schema. But for prototypical reference to vehicular use, English requires that a car be schematized as an enclosure, so that a rider necessarily is *in* this vehicle, or gets *into* or *out of* it, whereas a bus is schema-

tized as a platform, so that a passenger must be *on* it, or get *onto* or *off of* it.

To be sure, this distinction in usage is neither wholly frozen nor unprincipled. Thus, for nonprototypical depictions, a speaker still has the option of saying that a passenger is *in a bus* to emphasize its character as an enclosure, as in *There was an artist in the bus sketching its contours*. And, as Fillmore has pointed out, the use of *on* with a bus depends on its functioning as a vehicle. Thus, speaking of a decomissioned bus in a junkyard, one would say that some children are playing *in* the bus, not *on* it. One might add that a Figure not intending to use the bus as a vehicle readily permits the use of *in*, as in *There was a stray dog/a bomb in our bus*. Furthermore, the English use of *on* or *in* with a vehicle seems generally to mark the distinction between the vehicle's having a walkway (or walking area) or not having one. Thus, a passenger is on an airplane, but in a helicopter; on a ship, but in a boat; on a train, but in a carriage; (usually) on a submarine, but in a diving bell; and, of course, on a bus, but in a car. Thus, the use of *on* with the class of vehicles that has horizontal surfaces that one in fact walks "on" is motivated by the usual geometric schema of that preposition.

Nevertheless, although the use of *on* responds in a principled way to a geometric factor in a vehicle, there is no a priori reason why that particular factor should, in the requirements of English, take precedence over the fact that the vehicle is also an enclosure. Such a factor and its precedence certainly do not appear in most other languages. Thus, German has also preschematized cars and buses but treats them *both* as enclosures. Accordingly, the point demonstrated by the bus-type case in English is its obligatory requirement in prototypical usage for adopting the platform schema over the enclosure schema, and the preselectivity on the part of English that this shows.

While the preceding case showed a contrast of schematization *within* a single language/culture, some preselections of schematization are so pervasive throughout the local context that they can easily go unnoticed until one steps over to another language/culture. Thus, our linguocultural view of a table has us regard the tabletop as comprising the table's essential geometric character, with the legs merely as incidental appendages. Thus, a ball thrown across from one squatting person to another between the legs of a table is said to be thrown *under* the table. In Atsugewi, by contrast, a table can be regarded as tabletop plus legs all taken together as a volumar configuration, so that the same ball would be said to be thrown

through the table. The option for such an idealization is not present for English speakers—and may rarely have even been envisioned.

Similarly, we saw above that, to localize a Figure, English affords the option of referring to the geometric asymmetry of the primary Reference Object, or of the earth, or of the speaker, as in *a bike behind/west of/left of the church*. But the option to refer to earth geometry turns out to be available only where the primary Reference Object is permanently positioned, like a church. Localization done with respect to a mobile object, such as a Person, can generally make appeal only to the object's own asymmetric geometry and not also to earth-based compass points.

(62) a. the bicycle just to my right/*just east of me
b. the itch on my right arm/*on my east arm

By contrast with English, the Native American language Wintu is reported to avoid reference to any intrinsic right/left laterality, even for mobile objects, and instead to refer in fact to earth-based geometry. That is, the speakers of this language would in fact say sentences like "My east arm itches."[13]

It is difficult to resolve whether "preselection"—that is, constraints on options in schematization—is a purely formal aspect of a language's rule system or is always originally due to some psychocultural exigency that has become conventionalized in language usage. Cases of both types may exist. Thus, we would probably want to appeal to the notion of different cultural emphases—specifically, with respect to one's mode of perception—to account for the distinct understandings of the phrase "in front of" generally found among Americans as opposed to Hausas (section 2.7.4). The case for culturally different emphases is supported by Hill's (1975) observation that individuals' understanding of the phrase is not uniform throughout each culture but is a matter of proportion, one that in fact varies according to age. On the other hand, one might want to ascribe to pure linguistic formalism the fact that the option for viewing cabbage as either a mass or a discrete aggregate—*The cabbage(s) in the bin is (are) all turning brown* (section 3.2.1.2)—is not available for celery, which has only the 'mass' option (that is, without resort to expressions like "stalks of"), nor for Brussels sprouts, which have only the 'aggregate' option.

(63) a. The celery in the bin is / *The celeries in the bin are
b. *The Brussels sprout in the bin is / The Brussels sprouts in the bin are

—all turning brown.

That is, it may seem that at issue here is purely the formal assignment of particular lexical items to one or another noun type (to the "mass" or the "count" noun type). Even here, though, the psychocultural question enters. The assignment of lexical items to noun types might not be simply arbitrary, as "purely formal" implies, but rather might reflect cultural norms of imaging physical material—norms that respond to an object's size, its frequency of occurring together with other like objects, its resolvability into some substance-like homogeneity, and so forth.

3.2.3 Disjunctiveness of the Alternative Schematizations A fundamental characteristic of schematization at the fine-structural level is its **disjunct mode of representation**, rather than a continuous mode of representation. Thus, a language can have nothing like a "schema continuum"—that is, an array of directly expressible schemas, with each differing from its neighbors by only one feature or feature value in a fairly continuous way. Rather, each language uses a small set of "quantally" separated schemas with which to represent all possible spatial configurations. Each schema in such a set differs from the others by a *number* of features *simultaneously*. This lack of "in between" forms is not a flaw in the organization of language, but an apparently necessary—perhaps even superior—design feature that is compensated for by other properties, as discussed later.

The lack of ready expressions for the whole range of interstitial spatial configurations means that a speaker does not have the expressive freedom at the fine-structural level to convey just the right schematization with just the right emphases for her current way of conceptualizing a particular spatial form. At this level, therefore, languages exhibit a failure of precision. Particular instances of such failure can be grouped into two types: cases of overspecificity, where the closest available schemas specify more than what the image in the speaker's mind calls for, and cases of underspecificity, where the nearest schemas specify less than the speaker would like to indicate about her image.

3.2.3.1 Overspecificity of the Closest Available Schemas To illustrate overspecificity, one spatial configuration for which all the prepositionally indicated schemas in English are too specific is the following: a linear path located on only a portion of a roughly horizontal plane without boundaries in the region of consideration. The path can, for example, be that of a man taking a walk, and the plane can be a prairie. How is one to express

this configuration using a preposition? One cannot with full appropriateness say *He walked across the prairie* because *across* implies the presence of two opposite borders and a path that spans the full breadth between them—a physical arrangement lacking in the present case. Similarly, one cannot say *He walked along the prairie*, which implies a narrow-strip shape for the plane, nor *He walked over the prairie*, which implies an upbulging curvature to the plane, nor *He walked through the prairie*, which implies the presence of a medium atop the plane (compare the wholly appropriate *He walked through the sage-covered prairie*). Also inappropriate is *He walked around the prairie* (comparable to *He walked around the track*), which implies a narrow-strip plane with a curvature in the horizontal. In fact, the present configuration falls "in the cracks" between the schemas represented by English prepositions, all of them too specific for it. What would be needed is a new English preposition, say, *aflat* as in *He walked aflat the prairie*, that refers to nothing more property laden than a path located on a horizontal plane.

Another example of a configuration "in the cracks" in English is a path extending from one end to the other of a narrow-strip-shaped plane, such as a walk from end to end on a pier. It is not wholly appropriate to say here *She walked along the pier* because *along* implies the *absence* of end points to the path. This sentence would normally be understood to involve walking only a conceptually unbounded partial distance along the pier. This interpretation is supported by the fact that the sentence with *along* accepts a temporal expression with *for*, which is compatible with unbounded actions, but not a temporal expression with *in*, compatible with bounded actions: *She walked along the pier for|*in 20 minutes*. Again, a new preposition would be needed to capture the exact configuration involved, perhaps something like *alength*, as in *She walked alength the pier in 20 minutes*.

3.2.3.2 Underspecificity of the Closest Available Schemas An immediate example of the underspecificity circumstance can be seen in the earlier case of the "wheatfield" (section 3.2.1.2). One spatial configuration into which this object can be idealized is a horizontal bounded plane with an associated medium atop it. But there is no single English preposition that captures the relationship of a horizontal path to this relatively complex configuration. A speaker using either of the two closest prepositions, as in *He walked across the wheatfield* or *He walked through the wheatfield*, must choose between omitting reference to the bounded-plane character of the

object or to its medium-constituting character. To specify the more complex schematic referent, we would again need a new preposition, perhaps one like that in *He walked throughcross the wheatfield.*

For a more elaborate example, consider the diverse possible configurations of points on a plane. English has two ready expressions to schematize these. One, consisting of a quantifying term plus the preposition *on*, indicates the number of points present but not their spatial distribution:

(64) There is a dot/There are several/some/many/50 dots on the board.

The other expression, involving a simple plural plus the prepositional phrase *all over*, as in *There are dots all over the board*, cannot be used with a quantifier to indicate number. Thus, one cannot say **There are several/some/many/50 dots all over the board.* But this prepositional phrase does indicate a certain range of spatial distributions—roughly, those for which every subregion of the plane has at least one point in it, with the size of the subregion used for this assessment depending on the total number of points present. Notice that the *all over* schema does not require a great density of points—at the lower limit, just a few will suffice as long as they have the requisite distribution. Contrariwise, numerosity alone does not ensure that the *all over* schema *will* apply—a multitude of points could be present, but all concentrated in one region of the plane, thus lacking the necessary distribution.

Now, between these two expressions, all possible configurations of points on a plane are encompassed: there are no "cracks" in the coverage. But this broad applicability is won by giving up greater specificity. There is no direct way to indicate both number *and* all-over distribution at once. And there are no direct expressions to indicate any distribution *other* than the all-over type, such as when points on a plane occur in clusters, or in concentric circles, or in some density gradient. Thus, the schema for each of these two expressions is underspecific—and no other simple expressions exist in English—for the purpose of referring directly to many other particular configurations.

3.2.4 Means for Getting "In Between" Disjunctive Alternatives We have seen that any language has only a small set of closed-class elements that code for a similarly small set of schemas. These cannot possibly refer directly with precision to the myriad of conceptualizations of spatial configuration that a speaker can have in mind to convey. We must therefore ask what processes there might be by which a listener can come to

form some of the same conceptualizations that the speaker has. I point to four such processes here.

3.2.4.1 Canceling Features of Overspecific Schemas An overspecific schema includes one or more features that are inappropriate to a speaker's understanding of a particular spatial configuration. In a case where *all* the available schemas are overspecific, one procedure available to the speaker is simply to proceed with the use of one of the schemas regardless, without making any additional correctives. The listener's understanding of the spatial configuration, derived in part from the context to that point (see the discussion of "Image-Constructing Processes" in section 3.2.4.3), can engender a cancelation or suspension of the schema's nonfitting features. Thus, on hearing *She ran across the boulevard for five seconds and then stopped in the middle*, a listener can gather from the context that the runner's path did not reach the opposite side of the street. That is, the listener understands that everything about the *across* schema applies to the referent configuration except the feature 'path terminates on opposite border'. Similarly with the earlier "prairie" example, a speaker could simply settle on using *across* to say *He walked across the prairie* and count on the hearer to suspend all three inappropriate features: 'the plane has two opposite boundaries', 'the path originates on one boundary', and 'the path terminates on the opposite boundary'.

Note that where a schema is too specific for what a speaker *desires* to convey about some spatial configuration but nevertheless is wholly appropriate to it—that is, has no nonfitting features—it cannot be used with the expectation that the hearer will suspend the undesired features. No feature cancelation will occur. To avoid conveying the undesired features, the speaker must use other means. Thus, a speaker wanting to remain unspecific about which of a trip's two end points was the start and which the finish cannot use *from . . . to*, as in *She drove from San Diego to San Francisco last night*, and expect the hearer to feel ignorant about the direction of the trip. He may instead take advantage of the availability of another spatial expression, namely, *between . . . and*, which is neutral with respect to origin and terminus, as in *She drove between San Diego and San Francisco last night*.

Significant to the understanding of language organization is the fact that the use of a word that expresses an overspecific schema, and hence that calls for feature cancelation, can sound forced or awkward. This contrasts with the full acceptability of a word whose schema has been

involved in processes of idealization or topological shifts, as described in sections 3.1.1 to 3.1.3. That is, language is apparently so organized that the processes involved in feature cancelation are not as free to operate as are "flexibility"-type processes, though it must nevertheless be recognized that there is *some* structural provision for them to occur.

3.2.4.2 The Use of Open-Class Elements A major linguistic means for the expression of spatial configurations, outside of the possibilities of the closed-class elements, is in fact afforded by a language's open-class elements. While these may not play a fundamental structuring role at the fine-structural level, they do provide hundreds of particular, sometimes idiosyncratic, characterizations of space. English examples of such forms are nouns like *zigzag* and *spiral*, adjectives like *concentric* and *oblique*, or verbs like *ricochet* and *streak* (*Paint streaked her cheeks*). Their use can be integrated into the regular constructions involving closed-class elements, as in a sentence like *There's a spiral of dots on the board*, or can figure in distinct constructional types of their own, as in *The board is streaked with dots*.[14]

3.2.4.3 Image-Constructing Processes in the Hearer At the comprehension end of communication, surely the most important means for arriving "between" morphemes' disjunct specifications is the hearer's **image-constructing processes** (no purely visual connotation is intended here)—occurring at what was called the "macroscopic level" in the introduction. Uncovering the nature of these processes is one of the most significant tasks awaiting cognitive-linguistic research. What can be said so far, however, is that the hearer somehow combines the reference ranges of a sequence of grammatical and lexical elements with each other and with her understanding of the world and of the current speech situation in a way that there emerges a fairly detailed image, one taken to be close to what the speaker wanted to convey. The image may go through revisions as more is heard or more is called up from general knowledge. Of note here, though, is that this image will in general be of considerably greater specificity than the explicit linguistic references themselves. For example, person B hearing from person A that *There are dots all over the board* may combine his sense of the configurational range allowed by the *all over* schema with general expectations of how dense such a dotting might be (no one is likely to have applied hundreds of such marks) and with a knowledge of person A's tendency to become upset over minor matters

and so to exaggerate, so as to come up with an image of a few chalk marks located here and there over parts of the board.

3.2.4.4 Elaboration of Descriptions by the Speaker Within the domain of the speaker, surely the main property of language that enables finer characterization of a spatial configuration is that language permits an elaboration of references made to the same configuration. Such an elaboration can consist simply of a concatenation of descriptive specifications, such as *There are dots all over the board, and they increase in density toward the bottom edge*. Or it can consist of bits of separate indications scattered through a discourse. Two theoretical points stand out about this elaborative property of language.

The first is that while this property may be so taken for granted that it rarely draws explicit recognition, it is not in principle a necessary aspect of linguistic organization. One can imagine a communication system in which every designation of a spatial configuration would be limited to a single characterization by one of a small set of prepositions, and that would be all that could be expressed about that referent. The fact that a speaker can refer repeatedly and from different perspectives to the same referent is a positive, not a neutral, feature of language organization.

Second, these elaborative processes for the speaker are not in principle correlatively linked to the listener's image-constructing processes. The latter are indeed necessary if the former occur—they must gather and integrate into a single image the relevant references scattered through an utterance. But image construction could play a role even with a fixed-format form of expression, for it would be needed to combine even such minimal indications with contextual and general information in a way that yielded a fuller picture. Accordingly, the speaker's elaborative processes are a feature of language organization that is additional to the feature of the hearer's image-constructing processes.

We can take special note of one form of elaboration, **nesting**, in which the output of one descriptive construction is cycled back as the input to another. We have a clear example of nesting in *There are clusters of dots all over the board*. Here the phrase *clusters of dots*, which is roughly equivalent to the full assertion "The dots are in clusters," constitutes a description of a first-level, more local spatial pattern in which certain dots configure. The elements of this pattern, the "clusters," can in turn be treated as new units to which a further spatial characterization is applied: that they are "all over" the board. Thus, the more local configuration is nested within the more global configuration.

A subtler case of nesting also serves as a solution to the earlier "prairie" example's difficulty of expression. That example's special configuration can now be exactly captured by the locution *He walked along on the prairie*. In this sentence, there is an inner characterization "He walked along." As it happens, the element *along* here is structurally not a preposition relating a Figure to a Ground (as it would be in *He walked along the pier*) but is a verb satellite that simply indicates a point Figure's line-defining forward progression. This self-subsistent motion event is then characterized as taking place "on" a prairie, the configuration that nests it. Since *on* makes no requirements as to boundaries for a planar Ground (as *across* does), the new nested locution is perfectly suited for the unbounded prairie case.

Note that because of nesting and the various concatenative forms of elaboration—employing both closed-class and lexical elements—it is possible to characterize extremely intricate spatial configurations, as (65) shows.

(65) There are some clusters of dots near the lower left of the board and streaks of dots all over the rest of the board, with an occasional spiral of dots located here and there.

4 THE WAY LANGUAGE REPRESENTS MEANING, AS GENERALIZED FROM THE WAY IT STRUCTURES SPACE

The presentation thus far—a survey of the basic spatial distinctions marked by closed-class elements and the properties that characterize them generally—has achieved, albeit with varying degrees of resolution, a form of descriptive comprehensiveness over one whole semantic domain, that of the structure of space and its contents. Through this purchase on one domain, we can now consider the system of semantic representation that is generally characteristic of language. It is by this system that language breaches an ever-present disparity—that between its finite and relatively small set of fine-structural elements representing an equally small set of disjunct schemas, on the one hand, and the indefinitely large perceptual and conceptual continuum potentially to be referred to, on the other hand. While section 3.2.4 just treated several means built into language for getting "in between" such disjunct specifications, we further need to begin a description of the *general* character of this representational system.

4.1 Linguistic Categories as Largely Noncontiguous

The traditional view is that any closed-class system in a language—for example, the set of space-characterizing prepositions in English or the set of object-indicating "numeral classifiers" of Chinese—constitutes for some semantic domain a classificatory system with the following properties. Its categories to a large extent are contiguous (start up near the boundaries at which others leave off), are exhaustive (leave few gaps), are mutually exclusive (exhibit little overlap), and, generally perhaps, are of roughly equal size. An image readily associable with such a conception is a two-dimensional array of adjacent "pigeonholes"—contiguous and exhaustive of their frame, well-partitioned, same-sized—where any particular item clearly fits into one pigeonhole or another. But this concept's actual applicability requires examination.

4.1.1 Forms with Relatively Specific Reference This examination is best carried out with respect to a particular semantic gradient. The meanings of the elements of a closed set tend to range along a gradient of specificity from very general to very specific. Examples among English prepositions might be *near* toward the general end of the specificity gradient, and *across* toward the specific end. The more specific a term is, the narrower a band it indicates on a greater number of semantic parameters simultaneously. It is the specific elements of a set that most challenge the traditional classificatory concept and require attention.

To be sure, in some morpheme sets, even the specific terms can exhibit the pigeonhole form of classification, sometimes even over extensive portions of the semantic domain. This behavior is often seen, for example, within a language's sets of personal pronouns, kinship terms, and color terms. Thus, to consider the color domain in English, a term like *pink*—which denotes a rather specific range of colors that are red in hue, moderately high in lightness, and pale in saturation—neighbors the equally specific term *lavender*, from which it differs primarily in the parameter of hue and, along another dimension, neighbors a further specific term, *rose*, from which it differs mainly in lightness. But what characterizes morpheme sets like these is that their semantic domains—like the array of pigeonholes—are determined by only a small number of dimensions or parameters. Thus, the domain of color terms is structured only with respect to hue, lightness, and saturation (plus, in most languages perhaps, a few parameters pertaining to the surface or object bearing the color). For such restricted domains, it is feasible for the number of even fairly

specific terms to be quite low and still provide comprehensive coverage of the domain.[15]

By contrast, the majority of semantic domains in language are *n* dimensional, with *n* a very large number. Spatial semantics appears to constitute a domain of this sort. Thus, no fewer than the following 20 parameters are relevant to the domain of spatial configuration as expressed by closed-class elements such as English prepositions and deictics.

(66) a. Partitioning of a spatial configuration to yield a Figure and a Ground
b. Schematic geometry of the Figure object
c. Schematic geometry of the Ground object
d. Symmetry or asymmetry in the geometry of the Figure and of the Ground
e. An object's asymmetric geometry based on its parts or on a directedness within it
f. Number of relevant dimensions in an object's schematic geometry
g. Boundary conditions of an object's schematic geometry
h. An object's geometry as continuous or composite
i. Orientation of the Figure with respect to the Ground
j. Relative distance/magnitude of the Figure compared to the Ground
k. Presence/absence of contact of the Figure with the Ground
l. Figure's distribution of substance relative to that of the Ground
m. Presence/absence of self-referentiality for a Figure-Ground configuration
n. Presence/absence of further Reference Objects
o. External projection of a secondary Reference Object's geometry
p. Imputation of asymmetry onto a primary Reference Object
q. Orientation of the Figure or Ground to the earth/speaker/other secondary Reference Object
r. Further embeddings of one Figure-Ground configuration within another or concatenations of one upon another
s. Adoption of a perspective point from which to regard the configuration
t. Change in the location of a Figure or perspective point through time (hence, paths of motion and perspectival scans)

With so many parameters, full domain coverage by fairly specific references would require thousands of distinct vocabulary items, and coverage by *very* specific references would require millions. Such an arrangement is not in principle impossible for a symbol system, but natural languages appear to be under a constraint that limits the number of distinct symbolic elements they can utilize, and in fact never exhibit systems of same-category elements in such numbers. Rather than showing a contiguous array of specific references, languages instead exhibit a smaller number of such references in a scattered distribution over a semantic domain. That is, a fairly specific reference generally does not have any immediate neighbors of equal specificity.

This arrangement can be illustrated with the example in section 2.2.1 of a board lying across a railway bed. The English preposition *across* here designates a rather specific spatial configuration with the nine properties listed in (8), including the requirements that the board be horizontal, be perpendicular to the railway bed's main axis, reach from one side of the railway bed to the other, and be adjacent to, but not in, the plane of the railway bed. Now what if a board bears all but one of these same spatial relations to the railway bed? It could, for example, extend horizontally and perpendicularly from one track to the other but a little distance beneath them (hence be buried in the bed) or above them, but not directly atop them. In such cases, *across* would no longer serve. But there are no equally specific prepositions—such as forms like *acrinss* and *acrupss*—to handle the new spatial configurations. All that English provides to refer to these configurations are such severely underspecific general terms as *in* and *over*, which can be used even if the board is not horizontal, not perpendicular to the tracks, and too short to span them.

There is a large referential distance between *across* and the other specific prepositions of English, such as *around*, *through*, *alongside*, *underneath*, *past*, *beside*. Thus, with English prepositions as the exemplar of semantic representation in general, we can say that, for the organization of relatively specific references in language, there appears to be at work a principle different from that of classification in the traditional sense of a contiguous "pigeonhole"-like partitioning of semantic domains. The principle seems, rather, to be one of *representativeness*. The references are not exhaustive of these domains, but representative of them. In particular, (67) applies.

(67) With its stock of relatively specific morphemic references, a language must provide a sufficiently distributed and dense (but not too dense) dotting over a semantic "*n*-dimensional conceptual space"—both over individual semantic domains and over the whole of semantic reference.

4.1.2 Forms with Relatively General Reference The more general terms of a closed set—for example, the spatial terms *in* and *over*, as used in the preceding railway example—appear to have a special form of functioning, one not much shared by more specific terms, in the way they represent elements of a scene. A key to understanding their functioning is found in the nature of the schematization process. A morpheme never specifies a referent as to the full detail in which it exists in fact, in perception, or in conception, but rather specifies a particular complex of aspects abstracted from the total referent. Nevertheless, a communicator generally wants to convey a complete picture of a referent situation—that is, to engender the emergence of a full image in the mind of an addressee. Such transmission is accomplished in language by a complementary pair of processes: the sender represents the whole of a conceptual complex with only a portion thereof, and the receiver "fleshes out" or **reconstitutes** the whole from this portion by the operation of her image-constructing processes (section 3.2.4.3). The sender's process, which can be termed **part-for-whole representation**, is a natural concomitant of schematization, and could have been treated in section 3.1 along with the other concomitants, idealization, abstractedness, and topology. As a particular feature of its operation, a speaker, in order to convey some referent *at all*, must at times resort to fastening upon any aspect of that referent for which there is *some* ready-to-hand term available in the language, whether or not that aspect is especially relevant to his larger discourse. Thus, in the railway example, if a board is horizontal, is perpendicular to and spans the railway bed, *and* happens to be buried in it, a speaker has no recourse but to utilize this last aspect, as in the expression *the board in the railway bed*, even if this aspect is wholly irrelevant, in order to designate the presence of the board's complex of spatial relations at all. This, then, would seem to be a major function of the more general terms in a language. Because their specifications are minimal, they refer to aspects present in a broad range of full conceptual complexes and so can be seized on so as to convey those complexes as a whole, in conjunction with the reconstitution process on the receiving side.

4.2 The Effect of Systemic Constraints on Language

The properties observed so far in this section—a specificity gradient among closed-class terms; a representative "dotting," not a comprehensive classification, exhibited by specific terms; part-for-whole representation as a major function of general terms—can be understood as resulting from several constraints that language is under at once. The character of human communication imposes several requirements: language must be able to represent all of an enormous referential field, express conceptual material of certain kinds with great enough specificity, and convey this information at a fast enough rate. Language might in theory be able to accomplish all this with an inventory of millions of specific terms, except that it appears to be under an additional constraint limiting the total number of distinct symbolic elements it can employ, presumably due to the difficulties of processing the great degree of phonetic discrimination and memory accessing that would be entailed. Moreover, if such terms were uniformly *very* specific, any utterance would require stringing together too many of them to accord with the timing requirement of communication. So language must at least reduce its inventory of specific terms.

But it may not do so without also including a number of general terms, because otherwise the requirement of whole-field coverage would not be satisfied. General terms are necessary for referring to interstitial conceptual material, that between the references of specific terms. Such terms accomplish this largely by indicating one aspect of a more complex concept, in accordance with a process of part-for-whole representation and its complement, reconstitution. On the other hand, language could not abandon specific terms entirely in favor of all general ones because it would then fail the specificity requirement of communication. After all, full-field coverage could be achieved by just a few very general terms. Thus, the five English words *someone*, *something*, *do*, *happen*, and *be*, plus a few grammatical morphemes for tense, modality, and the like, can in construction encompass virtually all conceptual phenomena with sentences like *Someone did something*, *Something happened*, and *Something is*. But these would lack all necessary specificity. Hence, language needs both specific and general terms.

Further, the same reasoning that has led to this conclusion also requires that the specific terms be well distributed over the whole of semantic reference. For if they were not, there would be large regions covered only by general terms, again insufficient to the requirement of specificity.

One further feature can be pointed out about this distribution of specific references. While there are undoubtedly factors that encourage the positioning of these at certain locations within semantic space—such as a high frequency of occurrence or cultural significance attaching to some specific notions—their locations must nevertheless be to a great extent arbitrary, constrained primarily by the requirement of being representative of the lay of the semantic landscape, as evidenced by the enormous extent of noncorrespondence between specific morphemes of different languages, even where these are spoken by the peoples of similar cultures.

In conclusion, our examination of how language structures space has not only uncovered basic characteristics of a significant cognitive domain as reflected in a major cognitive system, language, but has also shed light on the general nature of conceptual representation in that same system.

5 APPENDIX: MOTION-ASPECT FORMULAS + CONFORMATIONS

This appendix excerpts and updates the treatment in Talmy 1975b of Motion-aspect formulas. However, the derivational approach that characterizes some portions has been left intact.

The core subset of the Motion-aspect formulas of (48) is shown here in a more symbolic format. These formulas use the following symbols to represent the fundamental Figure and Ground schemas.

$\text{POINT}_{S/T}$: Specifies an unextended point of space or time.

${}_{E}\text{POINT}_{S/T}$: Specifies an extended point of space or time.

$\text{EXTENT}_{S/T}$: Specifies an unbounded extent of space or time.

${}_{B}\text{EXTENT}_{S/T}$: Specifies a bounded extent of space or time.

(68) a. a POINT_S BE_{LOC} AT a POINT_S, FOR an ${}_{B}\text{EXTENT}_T$
b. a POINT_S MOVE TO a POINT_S, at a POINT_T
c. a POINT_S MOVE FROM a POINT_S, at a POINT_T
d. a POINT_S MOVE VIA a ${}_{E}\text{POINT}_S$, at a POINT_T
e. a POINT_S MOVE ALONG an EXENT_S, FOR an ${}_{B}\text{EXTENT}_T$
f. a POINT_S MOVE ALENGTH an ${}_{B}\text{EXENT}_S$, IN an ${}_{B}\text{EXTENT}_T$

In the use of one of these formulas to refer to a particular situation, the fundamental Ground schema is typically elaborated further. Built on it is an additional geometric complex—the **Conformation**—that relates the fundamental Ground schema to the schema for a full Ground object.

Each language lexicalizes its own set of such geometric complexes. An example of such a Conformation in English—one that represents interior location—is shown in (69). In the formulations that follow, such Conformations will be represented as relative clauses on the fundamental Ground schema to indicate its role in elaborating that schema.

(69) a POINT_S IS OF the INSIDE OF an ENCLOSURE

In a complex structure consisting of a Motion-aspect formula and a Conformation, the expressions for particular full figure and ground objects can be associated with the initial and final geometric schemas, respectively, as in

(70) a POINT_S BE_{LOC} AT a POINT_S that IS OF THE INSIDE OF an ENCLOSURE
the ball *the box*

(which ultimately yields *The ball is in the box*). The particular figure and ground objects specified in such a complex structure can be appropriate only if they are capable of being idealized as the geometric schemas in the structure. Thus, (29) can specify a semantically well-formed situation only if 'the ball' is topologically idealizable as 'a point of space' and 'the box' as 'an enclosure'.[16]

Thus, even a simple Path-specifying form like English *in* or *across* actually corresponds to a complex structure. In particular, in derivational terms, it arises from the last portion of a Motion-aspect formula together with the first portion of a Conformation. We will now consider six such structures—built from the last portions of (68a) to (68c) together with the first portions of two different Conformations—and sketch the derivations leading from these to the corresponding surface path expressions of English. The last portion of a Conformation (the geometric schema for the full Ground object) is shown only in brackets and is assumed not to participate directly in the derivation.[17]

(71)

(A)	For (68a)	For (68b)	For (68c)
a.	AT a POINT_S that IS OF the INSIDE OF [AN ENCLOSURE]	TO a POINT_S that IS OF the INSIDE OF [AN ENCLOSURE]	FROM a POINT_S that IS OF the INSIDE OF [AN ENCLOSURE]
b.	AT a POINT_S OF the INSIDE OF	TO a POINT_S OF the INSIDE OF	FROM a POINT_S OF the INSIDE OF
c.	AT the INSIDE OF	TO the INSIDE OF	FROM the INSIDE OF
d.	AT IN	TO IN	FROM IN
e.	—	—	FROM OUT
f.	IN AT	IN TO	OUT FROM
g.	*in*	*in (to)*	*out (of)*

(71) (B)				
	a.	AT A POINT$_S$ that IS OF the SURFACE OF [a VOLUME]	TO a POINT$_S$ that IS OF the SURFACE OF [a VOLUME]	FROM a POINT$_S$ that IS OF the SURFACE OF [a VOLUME]
	b.	AT a POINT$_S$ OF the SURFACE OF	TO a POINT$_S$ OF the SURFACE OF	FROM a POINT$_S$ OF the SURFACE OF
	c.	AT the SURFACE OF	OF the SURFACE OF	OF the SURFACE OF
	d.	AT ON	TO ON	FROM ON
	e.	—	—	FROM OFF
	f.	ON AT	ON TO	OFF FROM
	g.	*on*	*on (to)*	*off(-of)*

Note that the derivations in (71) apply equally well to Russian through the (f) forms. In deriving further to the surface (g) forms, the deep morphemes IN, OUT, ON, and OFF key in the appropriate Russian prepositions, while the deep Vector morphemes AT, TO, and FROM key in case markers for the governed noun.

(72)				
	f.	IN AT	IN TO	OUT FROM
	g.	*v*+-PREPOSITIONAL	*v*+-ACCUSATIVE	*iz* + -GENITIVE
	f.	ON AT	ON TO	OFF FROM
	g.	*na*+-PREPOSITIONAL	*na*+-ACCUSATIVE	*s* + -GENITIVE

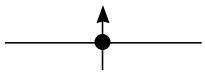
In addition, the (c) forms are represented at the surface in (for one language out of many) Japanese—for example, in *no ue ni* 'at top surface of' (= 'on'), in *no ue ni/e* 'to top surface of' (= 'onto'), and in *no ue kara* 'from top surface of' (= 'off of'). The right-hand (d) forms are represented at the surface in Hebrew in *mē 'al* 'from on' (= 'off of'). The right-hand (e) forms are represented at the surface in older English in expressions like *She ran from out the house*. And the right-hand (f) forms are represented at the surface in modern English—using the word *from* instead of *of*—when they precede a nonnominal expression, as in *Get out from in front of the television*.

We now consider elaborations of the Motion-aspect formulas of (68d) to (68f) in (73), (74), and (75), respectively. In each case, the Motion-aspect formula's Vector and fundamental Ground schema are shown in construction with several different Conformations. For each such construction, a derivational sketch, a pictorial diagram, and an illustrative sentence are given. Although not shown above, the aspect indications that are an intrinsic part of Motion-aspect formulas are included below.

(73) a. VIA a $_{E}$POINT$_{S}$ that IS$_{LOC}$ TO-ONE-SIDE-OF [a POINT] AT a POINT$_{T}$
VIA TO-ONE-SIDE-OF [a POINT] AT a POINT$_{T}$
past [a POINT] AT a POINT$_{T}$

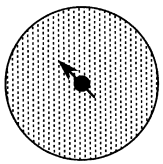
The ball sailed past his head (at exactly 3:00).

b. VIA a $_{E}$POINT$_{S}$ that IS$_{LOC}$ ON and PERPENDICULAR TO [a LINE] AT a POINT$_{T}$
VIA ON [a LINE] AT a POINT$_{T}$
across [a LINE] AT a POINT$_{T}$



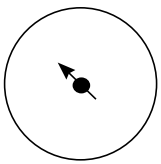
The ball rolled across the border (at exactly 3:00).

c. VIA a $_{E}$POINT$_{S}$ that IS$_{LOC}$ IN and PERPENDICULAR TO [a PLANE] AT a POINT$_{T}$
VIA IN [a PLANE] AT a POINT$_{T}$
through [a PLANE] AT a POINT$_{T}$



The ball sailed through the pane of glass (at exactly 3:00).

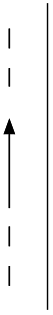
d. VIA a $_{E}$POINT$_{S}$ that IS$_{LOC}$ INSIDE and PERPENDICULAR TO [a CIRCLE] AT a POINT$_{T}$
VIA INSIDE [a CIRCLE] AT a POINT$_{T}$
through [a CIRCLE] AT a POINT$_{T}$



The ball sailed through the hoop (at exactly 3:00).

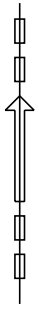
(74) Here and in (75), wherever UP and *up* appear, DOWN and *down* are equally appropriate.

a. ALONG an EXTENT_S that IS_{LOC} TO-ONE-SIDE-OF and PARALLEL-TO [a LINE] FOR an ${}_B\text{EXTENT}_T$
ALONG TO-ONE-SIDE-OF [a LINE] FOR an ${}_B\text{EXTENT}_T$
along[side] (a LINE) FOR an ${}_B\text{EXTENT}_T$



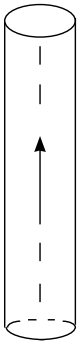
She walked along (side) the fence (for 5 minutes).

b. ALONG an EXTENT_S that IS_{LOC} ON and PARALLEL-TO [a LINE] FOR an ${}_B\text{EXTENT}_T$
ALONG ON [a LINE] FOR an ${}_B\text{EXTENT}_T$
along [a LINE] FOR an ${}_B\text{EXTENT}_T$



I walked along the path (for 20 minutes).

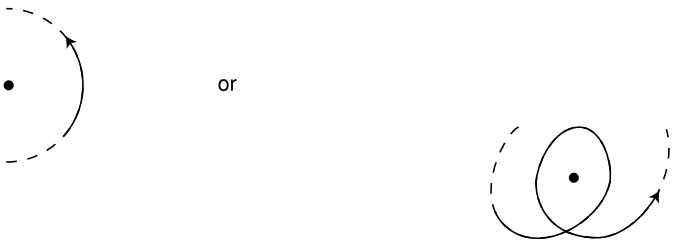
c. ALONG an EXTENT_S that IS_{LOC} INSIDE and PARALLEL-TO [a CYLINDER] FOR an ${}_B\text{EXTENT}_T$
ALONG INSIDE [a CYLINDER] FOR an ${}_B\text{EXTENT}_T$
through [a CYLINDER] FOR an ${}_B\text{EXTENT}_T$



I walked through the tunnel (for 20 minutes).

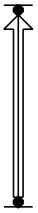
c′. UP ALONG an EXTENT_S that IS VERTICAL and IS_{LOC} INSIDE and PARALLEL-TO [a VERTICAL CYLINDER] FOR an ${}_B\text{EXTENT}_T$
UP ALONG INSIDE [a VERTICAL CYLINDER] FOR an ${}_B\text{EXTENT}_T$
up [a VERTICAL CYLINDER] FOR an ${}_B\text{EXTENT}_T$
I crawled up the chimney (for 1 minute).

d. ALONG an EXTENT_S that IS_{LOC} RADIALLY TO-ONE-SIDE-OF [a POINT] FOR an ${}_B\text{EXTENT}_T$
ALONG RADIALLY TO-ONE-SIDE-OF [a POINT] FOR an ${}_B\text{EXTENT}_T$
around [a POINT] FOR an ${}_B\text{EXTENT}_T$



I ran around the house (for 20 seconds).
I ran around the house (for 2 hours).

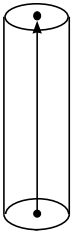
(75) a. ALENGTH an $_{B}$EXTENT$_{S}$ that IS$_{LOC}$ ON, PARALLEL-TO, and COTERMINOUS-WITH [a BOUNDED LINE] IN an $_{B}$EXTENT$_{T}$
ALENGTH ON [a BOUNDED LINE] IN an $_{B}$EXTENT$_{T}$
the length of [a BOUNDED LINE] IN an $_{B}$EXTENT$_{T}$ (no English preposition corresponds to this structure)



I walked the length of the pier (in 10 minutes).

a′. UP ALENGTH an $_{B}$EXTENT$_{S}$ that IS VERTICAL and IS$_{LOC}$ ON, PARALLEL-TO, and COTERMINOUS-WITH [a VERTICAL BOUNDED LINE] IN an $_{B}$EXTENT$_{T}$
UP ALENGTH ON [a VERTICAL BOUNDED LINE] IN an $_{B}$EXTENT$_{T}$
up [a VERTICAL BOUNDED LINE] IN an $_{B}$EXTENT$_{T}$
I walked up the ladder (in 20 seconds).

b. ALENGTH an $_{B}$EXTENT$_{S}$ that IS$_{LOC}$ INSIDE, PARALLEL-TO, and COTERMINOUS-WITH [a BOUNDED CYLINDER] IN an $_{B}$EXTENT$_{T}$
ALENGTH INSIDE [a BOUNDED CYLINDER] IN an $_{B}$EXTENT$_{T}$
through [a BOUNDED CYLINDER] IN an $_{B}$EXTENT$_{T}$

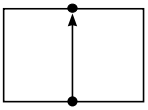


I walked through the tunnel (in 30 minutes).

b′. UP ALENGTH an $_{B}$EXTENT$_{S}$ that IS VERTICAL and IS$_{LOC}$ INSIDE, PARALLEL-TO, and

COTERMINOUS-WITH [a VERTICAL BOUNDED CYLINDER] IN an $_{B}$EXTENT$_{T}$
UP ALENGTH INSIDE [a VERTICAL BOUNDED CYLINDER] IN an $_{B}$EXTENT$_{T}$
up [a VERTICAL BOUNDED CYLINDER] IN an $_{B}$EXTENT$_{T}$
I crawled up the chimney (in 3 minutes).

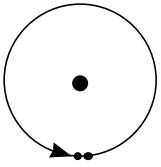
c. ALENGTH an $_{B}$EXTENT$_{S}$ that IS$_{LOC}$ ON and COTERMINOUS-WITH [a BOUNDED PLANE] IN an $_{B}$EXTENT$_{T}$
ALENGTH ON [a BOUNDED PLANE] IN an $_{B}$EXTENT$_{T}$
across [a BOUNDED PLANE] IN an $_{B}$EXTENT$_{T}$



I walked across the field (in 5 minutes).

c′. UP ALENGTH an $_{B}$EXTENT$_{S}$ that IS VERTICAL and IS$_{LOC}$ ON and COTERMINOUS-WITH [a VERTICAL BOUNDED PLANE] IN an $_{B}$EXTENT$_{T}$
UP ALENGTH ON [a VERTICAL BOUNDED PLANE] IN an $_{B}$EXTENT$_{T}$
up [a VERTICAL BOUNDED PLANE] IN an $_{B}$EXTENT$_{T}$
The fly walked up the wall (in 30 seconds).

d. ALENGTH an $_{B}$EXTENT$_{S}$ that IS$_{LOC}$ RADIALLY TO-ONE-SIDE-OF [a POINT] and COTERMINOUS-WITH ITSELF IN an $_{B}$EXTENT$_{T}$
ALENGTH RADIALLY TO-ONE-SIDE-OF [a POINT] IN an $_{B}$EXTENT$_{T}$
around [a POINT] IN an $_{B}$EXTENT$_{T}$



I ran around the house (in 40 seconds).

Notes

1. This chapter is a substantially revised and expanded version of Talmy 1983. The appendix included in this version is a revised excerpt from Talmy 1975b.

I am indebted to Herb Pick, Charles Fillmore, Jennifer Lowood, and Eileen Eastman for their editorial comments on content and style in earlier drafts of this manuscript. And for our discussions over the years on language and space, I want to thank Melissa Bowerman, Charles Fillmore, Annette Herskovits, Ray Jackendoff, Paul Kay, George Lakoff, David Mark, Dan Slobin, and David Zubin.

2. Continued analysis since the publication of Talmy 1983 has appeared in many works, including Levelt 1984, 1996; Zubin and Svorou 1984; Herskovits 1986, 1997; Langacker 1987; Brugman 1988; Vandeloise 1991; and Regier 1992.

3. The linguistic term "open-class" refers to any set of elements, like noun stems, that is quite large in number and can rather readily add new members. "Closed-class" is applied to a set of elements—for example, verbal inflections for tense, pronouns, prepositions—that are relatively small in number and fixed in membership.

4. Other linguists working on space have described notions similar—though generally not identical—to these, and have employed different terms for them. Thus, Gruber's (1965) "theme" and Langacker's (1979) "trajector" are quite comparable to my Figure, while Langacker's "landmark" compares with my Ground. Fillmore's (1968) "Patient" includes, but is more general than, the present Figure notion, but he has no analog to my Ground, as discussed next.

5. The "virtual motion" referred to here is one type within the elaborate system of "fictive motion" described in chapter I-2, namely, the type termed "coextension paths."

6. Because of this semantic range of English *in*, Lakoff and Johnson's (1980) selection of the term "container" to label the literal and metaphoric meaning of *in* does not well represent this morpheme's coverage and can be misleading. Thus, for example, 'containment' pertains to only a small subset of Atsugewi's distinctions. A better label for the general meaning of *in* might be "a surround," so that one could speak of a "surround metaphor."

7. Perhaps a version of this pattern underlies prepositional *up* and *down* in English.

(i) up/down: 'up/down along {a linear extent}/through {a cylinder}
I climbed up the ladder. / I crawled down the chimney.
[as if, e.g., from: I climbed up along the ladder/crawled down through the chimney]

8. On the basis of a broader range of expression in English—such as on the *east side of*, *on this side of*—the word *side* in one of its usages can be considered a general term for referring to the region adjacent to a particular Reference Object part. Accordingly, the specialized expressions in (25) can be considered equivalent to fuller expressions containing the word *side* as follows:

in front of = on the front side of
in back of/behind = on the rear side of
on the right/left = on the right/left side of

9. The use of *with* and *against* with something like a traffic signal, as in *I crossed the street with/against the light*, probably rests on a conceptualization of the traffic light as a fictive emanation (see chapter I-2). In this conceptualization, the emanation flows out from a red light, but into a green light, which is in view before a pedestrian, and can interact force dynamically with certain cognitive characteristics of the pedestrian.

10. We note again that our term "Reference Object" is equivalent to and interchangeable with our term "Ground." It is used preferentially in the present section only because it may lend itself more suggestively to the descriptions offered.

11. With regard to examples (48g) and (48h), the Spanish prepositions *hasta* and *desde* appear to capture exactly the (g) and (h) notions—for both space and time—of motion or temporal continuation along an extent bounded at only one end, so that *hasta Chicago* means 'as far as/up to Chicago' and *hasta 3:00* means 'until 3:00,' while *desde Chicago* means 'from Chicago and onward' and *desde 3:00* means 'since 3:00'.

12. By way of cross-referencing, part 1 of this volume treats the first three schematic systems. Part 2 treats the first schematic system (configurational structure). Part 3 treats the third system (attention). And part 4 treats the fourth system (force dynamics).

13. This phenomenon was perhaps first observed for a language, specifically, for Wintu, by Harvey Pitkin (personal communication). But it has since then been explored in great detail by Levinson (1996b), Pederson (1993), and others in the Cognitive Anthropology Research Group at the Max Planck Institute for Psycholinguistics.

14. To this open-class group in English belong a number of **postural** verbs that characterize how certain complex geometric objects, including the human body, enter a variety of configurations and, in some cases, relate spatially to further reference objects: *bow*, *bend*, *crouch*, *squat*, *kneel* (*on*), *lie* (*on*), *sit* (*on*), *stand* (*on*), *lean* (*against*), *hang* (*from*), *huddle* (*together*).

15. Although the spatial domain has too many parameters to behave like the kinship or color domains, microportions of the domain can exhibit the pattern of contiguous specific classification. Thus, English *across* and *along* together form a two-member subset that schematizes most versions of a path extending over a bounded plane, with the venue of one preposition giving way to that of the other as the plane's ratio of axis lengths changes in magnitude.

16. Note that a single physical object can be idealized into several different geometric schemas. Thus, a particular box is idealized as an enclosure in the situation specified by *The ball is in the box*, but it is idealized as a point in the situation specified by *The box is 20 feet away from the wall*.

17. With regard to (71Af), in standard American English, *into*, *onto*, and *off of* can appear without their second element as *in*, *on*, and *off*. But *out of* cannot do so. At least in some dialects, however, this *can* happen: *I fell out the bed*.