Chapter 1

The Relation of Grammar to Cognition

1 INTRODUCTION

A fundamental design feature of language is that it has two subsystems, which can be designated as the *grammatical* and the *lexical* (as these are characterized below). Why is there this universal bifurcation when, in principle, a language could be conceived having only a single system, the lexical? The explanation in this chapter is that the two subsystems have distinct semantic functions, ones that are indispensable and complementary.[1] To develop this account further, we must first note that we take a sentence (or other portion of discourse) to evoke in the listener a particular kind of experiential complex, here termed a **cognitive representation** or CR.[2] The grammatical and lexical subsystems in a sentence seem generally to specify different portions of a CR. Together, the grammatical elements of a sentence determine the majority of the *structure* of the CR, while the lexical elements together contribute the majority of its *content*. The grammatical specifications in a sentence, thus, provide a conceptual framework or, imagistically, a skeletal structure or scaffolding for the conceptual material that is lexically specified.

More generally, across the spectrum of languages, the grammatical elements that are encountered, taken together, specify a crucial set of concepts. This set is highly restricted: only certain concepts appear in it, and not others, as seen later. The present chapter advances the position that this set of grammatically specified notions collectively constitutes the fundamental conceptual structuring system of language. That is, this crosslinguistically select set of grammatically specified concepts provides the basic schematic framework for conceptual organization within the cognitive system of language.

Thus, grammar, broadly conceived, is the determinant of conceptual structure within one cognitive system, language, and as such is the main object of this chapter's study. But such a study directly opens out into a wider investigation across other cognitive systems, such as those of visual perception and reasoning, and some of the broader structural parallels that then become evident are addressed in other chapters of the present volume and its companion. Hence, the greater issue, toward which the present study ultimately aims, is the general character of conceptual structure in human cognition.

As to its type, the present study can be designated as the **semantics of grammar** or as **closed-class semantics**. Its scope follows in a progression from previous types of study. Such studies have largely been an in-depth semantic analysis of a selected grammatical element (or class of elements) of particular interest within a single language, for example, the Turkish evidential suffix *-miş* (Slobin and Aksu 1982); or an exposition of the meanings and functions of all the grammatical elements of a single language, say, as in a grammar of Dyirbal (Dixon 1972); or a crosslinguistic typology of the different kinds of grammatical devices used for a single semantic function, say, to indicate the interrogative (Ultan 1978). And much previous work has also treated broader issues of grammatical meaning (Sapir 1921, Boas 1938, Whorf 1956, Jakobson 1971). But the line of research reported on in this chapter is perhaps the first to address grammatical expression in language at the superordinate level, with the aim of determining the semantic and cognitive properties and functions of this structural component of language as a whole.[3]

The terms **lexical** and **grammatical** as employed here require elaboration. The distinction between the two is made formally—that is, without reference to meaning—in terms of the traditional linguistic distinction between "open-class" and "closed-class." A class of morphemes is considered open if it is quite large and readily augmentable relative to other classes. A class is considered closed if it is relatively small and fixed in membership.

We next look at the particular classes belonging to these two types. The open classes of elements—that is, the lexical classes—that are most commonly encountered in languages are the roots of nouns, of verbs, and of adjectives. The extensive systems of ideophones, or "expressive forms" found, for example, in a number of Asian and African languages, might also be included as a type of open class. Also to be included, at a level above that of basic elements, are **lexical complexes**—that is, collocations

—like English *spill the beans* ('unwittingly reveal a jointly held secret') or *have it in for* ('bear a vengeful grudge against'). Not included are regular adverbs, which seem in all languages to be derived, as from nouns, verbs, or adjectives (as in English from adjectives by the addition of *-ly*), rather than to comprise in their own right an open class of intrinsically adverbial roots. Outside of the class of lexical complexes, the types of open classes identified here are not obligatorily present in every language but rather form a universally available set from which each language draws a subset. That is, while all languages apparently have lexical complexes as an open class, they can lack one or more of the other listed classes—the ones consisting of intrinsically ideophonic, adjectival, verbal, or nominal roots.

Apart from such open-class forms, all other linguistic forms are closed-class—and are considered here to be, quite generally, "grammatical." Such grammatical forms include both an overt type and an abstract, or implicit, type. Forms of the overt type can be bound or free. Overt bound forms are inflections, derivations, and clitics. Overt free forms can include, for example, determiners, prepositions, conjunctions, and particles (among which we would include forms like English *even* and *again*, which otherwise are often loosely termed "adverbs"). Perhaps also to be included in the overt type are such suprasegmental forms as intonation patterns, if intonation in a language is in fact found to resolve into distinct patterns that are relatively few in number and difficult to augment.

The abstract or implicit type of closed-class forms—ones without phonological substance—can include major grammatical categories (e.g., "noun," "verb"), grammatical subcategories (e.g., "count noun," "mass noun"), grammatical relations (e.g., "subject," "direct object"), word order patterns, and perhaps also "zero" forms.[4] The fact that grammatical categories, as well as the other types of abstract forms just listed, constitute closed classes is an observable design feature of language, not something to be taken for granted. In principle, a language could conceivably have, say, an open class of grammatical categories that included hundreds of distinct highly particularized members. Indeed, in one analysis, a language can have more grammatical categories than is typically reckoned, including for example, each distinct position class in a polysynthetic verb. Nevertheless, the set of grammatical categories in any language is relatively small and resistant to new additions.

Finally, perhaps also to be included among closed classes are certain categories of **grammatical complexes**, including for instance grammatical constructions, syntactic structures, and complement structures. Such

complexes consist of specific combinations of simplex closed-class forms, whether these are all abstract, all overt, or a mixture of both (and sometimes in further combination with particular open-class forms). Typically, each grammatical complex resembles a simplex closed-class form in that it represents an abstract schema with a structuring function. However, the inclusion of such complexes here involves certain difficulties. First, it may not always be a determinate matter as to which collection of simplex forms are to be taken as cohering together to constitute a single distinct complex. Second, there is some doubt whether the totality of constructional complexes in a language would in any case constitute a closed-class set—their number might rather be quite large and perhaps even relatively easy to extend (cf. the Construction Grammar approach, e.g., in Fillmore and Kay, forthcoming). To avoid such problems, the present analysis does not depend on the use of grammatical complexes. A complex is cited only if its semantic function is equivalent to that of some simplex closed-class form that otherwise occurs in some language.

2 THE NATURE OF GRAMMATICALLY SPECIFIED CONCEPTS

In this section, we elaborate on two of the foundational property differences between the grammatical and the lexical subsystems mentioned earlier. These are the fact that grammatical forms are semantically constrained while lexical forms basically are not, and the fact that the basic function of grammatical forms is to structure conception while that of lexical forms is to provide conceptual content.

2.1 Constraints on Grammatical Meaning

We begin with a simple demonstration that the concepts specified by grammatical forms are constrained in two ways: as to their categories and as to the member notions within these categories. With respect to the first kind of constraint, many languages have closed-class forms in construction with the noun, such as nominal inflections, that specify the "number" of the object referred to by the noun, for example its 'singularity' or 'plurality', like the English ∅ and *-s*. By contrast, no languages appear to have inflections that specify the "color" of the object referred to by a noun—for instance, its 'redness' or 'blueness'. Of course, the "color" category is readily found specified by open-class forms, as in the case of English *red* and *blue*. (Here, double quotes enclose conceptual categories, while single quotes enclose member notions within those categories.)

With respect to the second kind of constraint, even within a conceptual category acceptable for grammatical expression, there are great restrictions on the particular notions that can be specified. Thus, ''number'' notions expressed by bound closed-class forms include little more than 'singular', 'dual', 'trial', 'plural', 'paucal', and 'singulative'. Free closed-class forms can, as in English, express a few further notions, such as 'no', 'some', 'many', 'most', and 'all'. But the ''number'' category apparently never includes closed-class expression of such notions as 'even', 'odd', 'dozen', or 'numerable'. By contrast, such notions, again, *can* be specified by open-class forms, as is shown by the words just used.

2.1.1 Constraint Permitting Topological But not Euclidean Reference

Given the existence of such constraints on grammatically specifiable notions, we can seek more general principles that determine a number of constraints at once. By one such principle that emerges, grammatical referents generally have a **topological** rather than a Euclidean character. To begin with one of the topological properties exhibited, consider a deictic like the English *this* or *that* as in *This/That chair is broken*. A closed-class element of this type specifies the location of an indicated object as being, in effect, on the speaker side or the non–speaker side of a conceptual partition drawn through space (or time or other qualitative domain). This integral specification can be analyzed as containing the component notions enclosed by single quotes in (1).

(1) (a,b) a 'partition' that divides a space into 'regions'/'sides'
(c–e) the 'locatedness' (a particular relation) of a 'point' (or object idealizable as a point) 'within' a region
(f,g) (a side that is the) 'same as' or 'different from'
(h,i) a 'currently indicated' object and a 'currently communicating' entity

Other notions that might at first be ascribed to such deictics, such as of distance or perhaps size, prove not to apply, on the evidence of sentence pairs like (2).

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

The scenes referred to by (2a) and (2b) differ greatly, involving tiny objects millimeters apart or huge objects parsecs apart. But the sentences differ only lexically, not grammatically. Hence, the scenes' differences

as to the magnitude of size or distance must arise from the open-class elements; they cannot be traced to the deictics (or other closed-class elements) in the sentences. Thus, the notions specified by a *this* or a *that* are abstracted away from any particularities of magnitude and so, to this extent, are genuinely topological. Their schematic representation of a conceptual partition remains constant, but this partition's distance can—by the characterization of topology as "rubber-sheet geometry"—be "stretched" indefinitely without challenge to any semantic constraints of the deictics. These deictics thus appear to have the topological property of being **magnitude neutral**.

Another closed-class form that exhibits this topological property in space is the English preposition *across*. This form can be used to refer to a path of any length, whether one of inches, as in *The ant crawled across my palm*, or one of thousands of miles, as in *The bus drove across the country*. Once again, what this closed-class form is dedicated to representing is a schema—in idealized form, that of a point describing a path that goes perpendicularly from one to the other of two parallel lines—and it is neutral with respect to the magnitude of that schema. Further, the same topological property can be exhibited by a closed-class form with respect to time. Thus, the English past tense inflection *-ed* can be used in the sentence *Alexander died, with dignity* with equal felicity whether the time referred to was last year, in speaking of an acquaintance, or over two millennia ago, in speaking of Alexander the Great. As before, this closed-class form refers to a particular schematic arrangement in time—in idealized form, that of a point event located within the period leading up to the point of the present moment—and is neutral with respect to temporal magnitude. These findings about an English deictic pair, preposition, and tense inflection alert us to noticing whether any grammatical elements make specifications about magnitude. A brief survey through more of English and through various other languages suggests that—while there are grammatical specifications for *relative* magnitude[5]—there are possibly never any for absolute or quantified magnitude, whether of size, distance, interval, or other parameters. We can provisionally conclude that the referents of closed-class forms do generally have the topological property of magnitude neutrality.

Another topological property is exhibited by the type of adposition that specifies, for a moving object, certain characteristics of path and of reference point or reference frame. An example of this type is English *through* as used, for instance, in *I walked through the woods*. In this usage, *through*

specifies, broadly, 'motion along a line that is within a medium'. The component notions contained here include those in (3).

(3) (a) 'motion'
(b–e) which can be thought of as 'one-to-one correspondences' between 'adjacent' points of 'space' and adjacent points of 'time'
(f) motion that describes a 'line' (i.e., a 'linear extent')
(g) the locatedness of a line within a 'medium'
(h,i) a medium—that is, a region of three-dimensional space set apart by the locatedness within it of 'material' in a 'pattern of distribution' with properties and a range of variation still to be determined

It can be observed, from a sentence pair like (4), that the concept specified by *through* is indifferent to particulars of shape or contour in the linear path described by the moving object. This is evident here because, as before, the two sentences differ only lexically, not grammatically—they both use *through* while referring to different path contours. Another cross-linguistic survey of closed-class elements suggests that they largely have this further topological property of being **shape neutral**.[6]

(4) a. I zigzagged through the woods.
b. I circled through the woods.

The same English preposition *across* seen above to be magnitude neutral can now also be seen to be shape neutral. For it can be used in a sentence like *I swam across the lake* when referring to a case in which the lake's perimeter and the swim path I followed are greatly irregular. Here, relative to the idealized schema described above for *across*, the two parallel lines have bent and joined to form an irregular loop, while the perpendicular path between them has itself angled and bent.[7]

In the aim of ascertaining any properties common to grammatically specified notions, the notions examined in detail earlier are gathered together in (5). For heuristic purposes, the notions are provisionally divided into two groups on the basis of their relation to topology. Group (a) includes the notions that properly belong to the specific mathematical system of topology, as well as the intuitively comparable notions that might belong to a language-based system of topology—one that perhaps could serve as the model for the construction of a new topology-like mathematical system. In group (b) are the notions that fall outside any

usual conception of topological properties. The first group has fourteen notions, while the second has six—an indication of a substantial propensity for grammatical elements to specify quasi-topological notions. The ratio in this direction is improved if we consider that even several notions in group (b)—the bottom three—resemble topological notions in the sense of involving relativistic relationships between quantities rather than absolutely fixed quantities.

(5) *Some notions found to be specified by grammatical elements*

a. *Topological or topology-like*		b. *Nontopological*
point	singularity	material
linear extent	plurality	space
locatedness	same	time
within	different	motion
region	"adjacency" of points	medium
side	one-to-one correspondence	entity currently indicated/ communicating
partition	pattern of distribution	

In the complementary aim of ascertaining any properties excluded from grammatical specification, the categories of notions found above *not* to be specified by the elements investigated are listed in (6). Rather than being topological, topology-like, or relativistic, these notions involve Euclidean geometric concepts—for example, fixed distance, size, contour, and angle—as well as quantified measure and various particularities of a quantity: in sum, characteristics that are absolute or fixed.

(6) *Some categories of notions seemingly rarely or never specified by grammatical elements*
absolute/quantified magnitude (of distance, size, etc.)
shape/contour of line
color

The provisional conclusion to be drawn from these findings is that, if grammatical specifications generally correspond to (linguistic-) cognitive structuring, then the nature of that structure is largely relativistic, topological, qualitative, or approximative rather than absolute, Euclidean, quantitative, or precisional.

This preponderant requirement for conceptual neutralities among closed-class elements is in sharp contrast to the referential freedom of lexical items, which can express not only structural abstractions but also

wide-ranging specificities. For example, specificity as to magnitude is seen in nouns like *inch, yard, mile, pint, gallon, hour, month,* and *year*; and as to shape, in nouns like *square*, adjectives like *straight*, and verbs like *ricochet*.

The significance of these findings can be brought into greater relief. Consider again the earlier example in which the ant crawled across my palm and the bus drove across the country. It is clear that we have a number of cognitive systems that would register and process the differences between these two situations. Thus, we would register the fact that the ant event takes place within a single span of attention, while the bus event extends over days and must be reconstructed in memory. We would process the fact that the ant event occurs within a single scope of perception, while the bus event extends well beyond any such scope and, again, can be pieced together only in memory. We have the cognitive capacity to recognize that the ant event involves a single scene, whereas the bus event involves a continuous succession of shifting scenes. We would cognize the difference in the manner of progression between the ant's alternating six-footed steps and the bus's four-wheeled rotary gliding. We would appreciate the sensorimotor differences between standing still while watching the ant's progress, and sitting through bumps and lurches while executing the progression oneself in the bus. Yet, out of all of this rich processing by various cognitive systems, none of it enters the closed-class form *across*. All that such a grammatical form is designed to represent is a spare schema abstracted away from the otherwise available cognitive representations in accordance with certain principles of abstraction, such as the topological principle. It might have been thought simple for a language at least to include two or more grammatical forms that referred to the same geometric schema but that differed in referring as well to different scales of magnitude—for example, one form for a demitasse-sized 'in' and another for an ocean basin–sized 'in'. But the remarkable finding is that, perhaps with only a few arguable exceptions, languages seem to avoid such distinctions in their closed-class subsystem. Thus, as part of its design, the language system includes a component, the closed-class subsystem, dedicated to representing solely a certain kind of abstracted conceptual structure.

As already noted, the specifically linguistic form of topology has somewhat different properties than mathematical topology. To examine such differences, consider the English preposition *in*, which in one main usage refers to a plane so curved as to define a volume of space. First, with respect to properties like those of mathematical topology, the refer-

ent of this morpheme is magnitude neutral: *in the thimble/volcano*. And it is shape neutral: *in the well/trench*.

But forms like *in* can also differ from mathematical topology either by being still more abstract or by being more specific. Thus, *in* is more abstract in that its referent is **closure neutral**—that is, indifferent to whether the curved plane leaves an opening or is wholly closed: *in the bowl/ball*. And it is **discontinuity neutral**—that is, indifferent to whether the curved plane is solid or gapped: *in the bell-jar/birdcage*. These last two properties would form a proper part of language's topological system, whereas they are strictly excluded from mathematical topology.

For the case where language exhibits greater specificity than mathematical topology, consider again the preposition *across*, as in *I swam across the lake*. This preposition is fully felicitous if I execute a straight swim path that more or less bisects the lake. But now, with the same starting point on the shore, consider a succession of swim paths located as if rotated ever further leftward. One of the later paths will not terminate on the diametrically opposite point of the shore, but at some point not too far along the shore from my starting point. Such a later path will divide the lake into two quite unequal portions, the small portion on the left of the path and the large one on the right. For such a later path, one can no longer say *I swam across the lake*. In terms of mathematical topology, there should be no difference. But here language has the following additional requirement for its schemas: The components of a schema must be of *comparable* magnitude. Thus, although a schema overall is magnitude neutral, the schema's components *are* sensitive to magnitude relative to each other and must in fact be comparably sized. Here, with respect to the idealized *across* schema, the areas on either side of the path running perpendicularly between the two parallel lines must be of comparable size.

For another example, imagine that I am standing at one end of a long narrow table that supports a glass of water 20 feet away from me and a glass of white wine 21 feet away. Although I can say *The closer glass is water and the farther glass is wine*, I can no longer use the deictics *this* and *that* to say *This glass is water and that glass is wine*. One explanation for this behavior is that the components of the *this* schema, as well as those of the *that* schema, are too internally disproportionate here. Thus, to consider just the *this* schema, it should locate its conceptual partition between the two glasses, because of the deictic contrast that the sentence sets up. But the distance from this partition to the schema's referent object, the

water glass, is too much smaller than the distance from the partition to the speaker (myself) for the schema to be viable. Distances of more comparable magnitude are required.

In sum, given the general picture developed earlier, the topology-like properties exhibited by closed-class forms must be understood as part of the system of constraints on their meaning. What is important in their topological behavior is not that closed-class forms can vary freely with respect to factors like magnitude and shape—many open-class forms can do the same. It is rather that closed-class forms are constrained from expressing any Euclidean-type particulars of such factors—a constraint that does not apply to open-class forms, which, on the contrary, are free to range over both the topological and the Euclidean. In other words, the important finding is not that the character of closed-class meaning is topological, but rather that it is *only* that and *not* Euclidean as well.

2.1.2 Further Neutralities A constraint against specifying a factor has been represented here as a **neutrality** to that factor. While two such neutralities have resembled aspects of mathematical topology and, hence, been designated by that term, closed-class forms exhibit many further neutralities. In fact, they exhibit indefinitely many more, since closed-class forms cannot express most contentful concepts, such as food preparation, gymnastics, and folk medicine. But out of all such neutralities to particular factors, some have structural significance, either because a certain factor figures prominently in other cognitive systems, or because a closely related factor *can* be represented by closed-class forms. Several further neutralities with this kind of significance are presented next.

First, most closely related to the previous topological properties is the fact that the referents of closed-class forms are also generally **bulk neutral**. That is, the delineations of a closed-class schema represent geometric idealizations abstracted away from the bulk of bodies in space (as well as from the extensions of entities in other domains). Alternatively conceived, such bulk becomes cognitively reduced, or "boiled down," to points, lines, planes, and the like. Thus, the schema of the English preposition *along* pertains only to a path moving parallel to and next to a line and is indifferent to the bulk character of that line. This property is evident in the fact that *along* can be used with equal felicity in reference to linear objects with quite different radial extensions, as in: *The caterpillar crawled up along the filament|the flagpole|the redwood tree*. As discussed in chapter I-2, the significance of bulk neutrality as a property in the closed-

class system of language is that it seems akin to an apparent structural property of visual perception, namely, the sensing of interior structure within bulk.

Another constraint on closed-class reference is that it is **token neutral**. That is, while closed-class forms regularly refer to types or categories of phenomena, they cannot refer to any particular tokens thereof. A token can be characterized as a specific spatiotemporally bounded phenomenon. By contrast, nouns are free to be either token neutral or token sensitive. In traditional terminology, these are, respectively, common nouns like *cat* and proper nouns like *Shakespeare* or *Manhattan*. Thus, while a language can have proper nouns, it cannot have, say, "proper prepositions." What such a proper preposition would be like can be readily envisaged, though. It could, for example, refer to a particular path understood as being executed only once, hence, as being a unique spatiotemporally bounded phenomenon. For an idea of what such forms might look like, each sentence in (7) is given an invented preposition—capitalized to show its status as proper—that purports to refer to a historically unique path-taking. However, constrained by token neutrality, such forms are apparently never found.[8]

(7) a. Jesus walked Astation the hill named Calvary.
    b. Moses walked Amatzah the Red Sea.

A final constraint we can observe here is that closed-class meanings are **substance neutral**—that is, they generally cannot be specific as to particular kinds of materials. Thus, the English preposition *through* applies equally well to the different substances named in the sentence: *A bubble passed through the water/milk/mercury*. This constraint would not seem worth singling out except that closed-class forms *can* be sensitive to a closely related factor, namely, phase of matter. Thus, the closed class of directional morphemes in Atsugewi (see chapter I-3) has a set of forms that together more finely subdivide the conceptual domain covered by English *into*, and these forms mark such phase-of-matter distinctions as 'into solid substance', 'into liquid', 'into fire', and 'into empty space (the air)'.

2.2 Two Venues in Which the Grammatical and Lexical Subsystems Show Their Structure/Content Contrast

We have proposed that language, as a design feature of its construction, has two subsystems with complementary functions. The open-class, or lexical, subsystem represents conceptual content, while the closed-class, or

grammatical, subsystem represents conceptual structure. We now further treat the fact that these two complementary functions appear in two venues: in any specific portion of discourse, such as a sentence, and within the language system generally or within any particular language.

2.2.1 Within a Portion of Discourse We start with the first venue, a portion of discourse. To examine the functional contrast between the closed-class and the open-class type of specification in this venue, consider the full complement of both element-types in a single whole sentence, namely, that selected in (8).

(8) A rustler lassoed the steers.

We first list the closed-class elements present in the sentence and the notions that they specify in (9).

(9) a.	-ed	'occurring at a time before that of the present communication'
b.	the	'the speaker infers that the addressee can readily identify the referent'
c.	a	'the speaker infers that the addressee cannot readily identify the referent'
d.	-s	'multiple instantiation of object'
e.	a . . . ∅	'unitary instantiation of object'
f.	-er	'performer of the specified action'
g.	grammatical category "verb" for *lasso*	'eventhood'
h.	grammatical category "noun" for *rustler*/*steer*	'objecthood' (for one possibility)
i.	grammatical relations "subject"/"object" for *rustler*/*steer*	'agent'/'patient' (among the possibilities)
j.	active voice	'point of view at the agent'
k.	intonation, word order, character of auxiliaries	'the speaker "knows" the situation to be true and asserts it to the addressee'

The open-class forms in the sentence have specifications that can be characterized as in (10).

(10) a.	rustle	property ownership, illegality, theft, livestock particular mode of activity

b. lasso
a rope configured into a loop and a tail gripped by the hand
the loop twirled, cast over the neck of an animal, tautened, and drawn
accompanying cognitive intending, directing, monitoring

c. steer
object of particular appearance, physical makeup, and so on
relation to animal kingdom
castration
institution of breeding for human consumption

In surveying the two lists, we can see these differences emerge: the grammatical elements are more numerous, and their specifications seem more spare and simpler, and more structural in function. Together, their specifications seem to establish the main delineations of the scene organization and of the communicative setting of the CR evoked by the sentence. The lexical elements are fewer in number, but their specifications are greater in quantity and complexity, and they function more to contribute content than structure. The lexical specifications are greater in three ways: compared to a grammatical specification, each has (1) more total information, (2) greater intricacy of information, and (3) more different types of information together. Taken together, their specifications comprise most of the conceptual content of the CR scene evoked by the sentence.

These grammatical-lexical differences can be set into further relief by in turn varying each element type while keeping the other constant. Thus, varying only the closed-class forms of (8), as is done in (11), seems to alter the scene organization and discourse properties of the referent event but to leave its basic contents intact: we are still on a Western cowboy landscape with the same kinds of participants and activities.

(11) Will the lassoers rustle a steer?

By contrast, varying only (8)'s open-class forms, as in (12), shifts us to a new scene altogether, perhaps to a modern office building, and yet the basic breakup of the scene and of its communicative setting seem to remain the same.

(12) A machine stamped the envelopes.

Continuing with the functional differences between the lexical and grammatical subsystems within a portion of discourse, we observe that

open-class forms and closed-class forms *can* incorporate each other's type of references, but that in doing so they tend to assimilate such references to their native type. First, to highlight the contrast between the two types of representation, consider a case where essentially the same concept can be represented by both a closed-class form and an open-class form. Thus, English tense is typically represented for a verb in a finite clause by a closed-class form, either an inflection or a modal, as in (13a) with an *-ed* for the past and an *-s* or *will* for the future. But a nominal in a prepositional phrase cannot indicate tense in that way. If relative time is to be indicated here, one must resort to open-class forms, as in (13b) with the adjectives *previous* to mark the past and *upcoming* to mark the future.

(13) a. i. When he arriv*ed*, . . .
ii. When he arrive*s*/*will* arrive, . . .
b. i. On his *previous* arrival, . . .
ii. On his *upcoming* arrival, . . .

The cognitive tendency here, it seems, is to treat the concepts of 'past' and 'future' as performing a concept-structuring function when they are expressed by the closed-class forms in (13a), but as constituting additional contributions to conceptual content when they are expressed by the open-class forms in (13b).

Next, consider the case where an open-class form incorporates a semantic component of a seemingly structural type that is otherwise characteristically represented by a closed-class form. Thus, the open-class adjective *pregnant*, in addition to having semantic components pertaining to a gestating condition, incorporates an 'all-or-none' component indicating that this condition is to be understood as being in effect either wholly or not at all—in traditional terms, constituting an ''ungradable'' adjective. But, as in the sentence *She is somewhat pregnant*, this adjective can be put in construction with a closed-class form, *somewhat*, which refers to a 'moderate degree along a gradient'. A semantic conflict thus exists here between the 'all-or-none' component of *pregnant* and the 'gradient' component of *somewhat*. One cognitive process that a hearer can apply to such a semantic conflict is to actively maintain the incompatible concepts in an equipollent status—a process termed ''juxtaposition'' in chapter 5 of volume II. This process generates an ''incongruity effect'' such as humor. Relevant here, though, is another cognitive process that can be applied, one that shifts the conflicting semantic component in one of the items so that it comes into accord with that in the other item. In

such a resolution—termed a process of "shift" in the discussion of conflict resolutions—it is preponderantly the open-class form that gives way to the closed-class form. And indeed here, the 'all-or-none' component of the open-class adjective *pregnant* can shift to a 'gradient' sense to yield a new meaning for *pregnant*: 'a certain degree along in the gestation process'. But it is certain that the closed-class form *somewhat* will not give way to the adjective to wind up meaning something like 'wholly'. Thus, here, as in most semantic conflicts, it is the closed-class form that determines the final conceptual structure. But this is presumably so because setting conceptual structure is precisely the linguistic function of the closed-class subsystem. Correlatively, the otherwise seemingly structure-like component within the open-class form perhaps in actuality behaves cognitively more like an aspect of its contentful reference.

Finally, consider the complementary case where a closed-class form includes a semantic component of a seemingly contentful type that is otherwise characteristically represented by an open-class form. In this regard, compare the sentences in (14a) and (14b), which formally differ only in their prepositions. Semantically, though, (14b) differs from (14a) not only in the path schema that it represents, but also by including a rather more contentful type of concept, that of 'attack', so that the *them* in this sentence is understood as referring to some sort of enemy.

(14) a. We marched/rode/sailed/advanced/ ... toward/past them.
b. We marched/rode/sailed/advanced/ ... upon them.
c. We attacked them.

Since it is the only different form, it must be the preposition *upon* that is responsible for the 'attack' notion. Yet this notion behaves differently there than it typically would if expressed by an open-class form. First, although English speakers readily identify the presence of an 'attack' notion in (14b), they typically do not attribute this notion to *upon*, often thinking instead that it is due to one of the verb choices, say, *march*, even though no 'attack' notion appears with those verbs when used with a different preposition. Second, the 'attack' notion is relatively more attentionally backgrounded than when it is expressed by an open-class form, such as by the verb *attack* itself, as in (14c). Third, perhaps one might deem that the 'attack' notion when expressed by *upon* loses some of what would otherwise be a fully contentful character and instead becomes assimilated to the path notion that *upon* more foregroundedly expresses, as if the 'attack' notion here somehow becomes "spatialized." Thus, when

expressed by a closed-class form, a concept that might otherwise be thought to be more one of the contentful type tends to become obscured, backgrounded, and structuralized. In sum, then, the formal fact of a concept's expression in an open- as against a closed-class form tends to set the function it serves as being either contentful or structural.

2.2.2 Within Language or within a Language We turn now to the venue of language as a cognitive system with general properties and constraints. Observations of the kind discussed at the outset have led to the hypothesis that the closed-class forms found in all languages—or that could occur in all possible languages—are semantically a special set, limited to representing only certain conceptual categories and, within those categories, only certain member concepts. To put this another way, language may have a universally available, limited **inventory** of concepts and conceptual categories that can ever be represented grammatically. Such an inventory is of course understood here not to be absolutely fixed in its boundaries and membership. As with every structural and substantive aspect of language—or, for that matter, of cognition—it appears that virtually nothing is rigidly absolute but rather that virtually everything is fuzzy or plastic to at least some degree. Nevertheless, we do posit a privileged inventory, albeit perhaps a partially approximate one, of grammatically expressible concepts. No comparable inventory for lexically expressible concepts exists because open-class forms can for the most part refer to anything within the whole range of the potential contents of consciousness.

At present, no single overarching principle can be adduced to account for the particular membership of the grammatically specifiable inventory. All that can as yet be discerned are several factors, each of which captures only one observable pattern of constraints—constraints that account for only a portion of the inclusions in and exclusions from the inventory. One such factor was already discussed: the constraint against Euclidean-type particulars and the allowance of topology-like neutralities for closed-class reference. Another factor is discussed in chapters I-5 and I-6: with a basis in Gestalt principles, a closed-class form may relate a Figure event to a Ground event, but it is constrained against relating a Ground event to a Figure event. More such factors of limited application can be adduced, but so far, they cannot be seen to fall out from one master principle.

The origin of the posited inventory remains to be understood. One strong possibility is that at least parts of it are innate. In terms of major

cognitive systems, the language system and the culture system (see chapter II-7) were the last to evolve. In forming, they may have copied, or developed connections to, mechanisms of cognitive structuring already present for other major cognitive systems, ones long in place, such as those of visual perception, motor control, and reasoning/inferencing. In that case, the language system would have incorporated some of those extant structuring mechanisms. But it would not have incorporated them all, and the pattern of selection may have been neither wholly systematic nor wholly functional (i.e., on a basis describable by a functionalist view). This possibility could account for any lack of an overall principle governing the inclusions within the inventory.

The posited universally available inventory has the further property of being **graduated**. Its member concepts and categories range along a cline with respect to the extent of their representation across languages. Thus, it may well be that some of the top-of-the-cline entries in the inventory in fact *are* universally realized. Likely candidates for this status include the category of "polarity" with the member notions 'positive' and 'negative', and the category of "speaker-to-hearer stance" with the member notions 'assertion' and 'question'. Other entries in the inventory may be widespread but not universal. The category of "number" may be an example. Still other entries might be rare but not wholly absent. Thus, some, but only a few, languages have closed-class representation for the category "rate" with member notions 'fast' and 'slow'. Finally, some conceptual categories or individual concepts are altogether off the inventory. As discussed at the outset, the category "color" may well be one of these, but, if not, then certainly the category of "gymnastics" is missing from closed-class representation in the inventory.

Among its other ramifications, the hierarchical inventory posited here has implications for theories of grammaticization. Such theories have typically devoted much attention to the starting points of a grammaticization process—that is, to the particular instances and types of lexical forms whose original meanings become progressively bleached. But these theories typically lack any account of the ending points of such a process —in other words, of the instances and types of grammatical meanings that result from the bleaching. The gap in such theories can be filled by the present idea of a universally available inventory of grammatically specifiable concepts. Put succinctly, the process of bleaching can lead only to a member of the inventory.

To illustrate, consider the two regular English verbs *keep* and *hate*, as in *I keep skiing* and *I hate skiing*. It will perhaps be generally agreed that if one or the other of these two verbs were to become grammaticized, say, to auxiliary status, while retaining its central sense, it would be *keep* and not *hate*. The explanation that can now be given is that the central meaning of *keep*, which pertains to temporal structure, specifically, to an iteration, fits the category of "aspect," as well as its member notion 'habitual', which are high in the graduated inventory. By contrast, the category that *hate* would fit, that of "affect," as it happens, is relatively low in the graduated inventory. Thus, perhaps no language includes a closed set of grammatical forms that subdivide the category of "affect" in a systematic manner, in the way that, say, English prepositions systematically subdivide the category of "paths executed with respect to reference objects," or that English modals subdivide the category of "force dynamics." Rather, languages exhibit only sporadic grammatical marking of instances of the "affect" category. Perhaps the most widespread of these are diminutive inflections that mark a feeling of 'affection' and pejorative inflections marking a feeling of 'dislike'. Other cases are desideratives marking 'wish' and optatives marking 'hope', undergoer constructions (as in the English *My plants all died on me*) marking 'unpleasantness', and individual forms like the English conjunction *lest* marking 'concern'. Moreover, within this already poorly represented "affect" category, the specific notion of 'hate' is perhaps still more rarely or never represented grammatically. Accordingly, the English verb *hate* is unlikely to grammaticize into an auxiliary that means 'hate'. Thus, it is the universally available inventory of grammatically expressible concepts with its particular content and hierarchy that seems to govern the possible courses of a process of bleaching toward grammaticization.

From the role of the structure and content subsystems within language in general, we turn briefly to their role within individual languages. The posited inventory of grammatically specifiable categories and concepts has been characterized as universally available, not as universally realized, because, within each language, the extant set of closed-class forms constitutes only a selection from the inventory. We have held that, within the overall language system, the inventory of concepts potentially expressed by closed-class forms functions as the conceptual structuring subsystem of language, relative to the content-providing function of its open-class subsystem. Within each language, comparably, the closed-class portion

of its lexicon functions as the conceptual structuring subsystem of that language, while the open-class portion of the lexicon functions as its contentful subsystem. It remains to determine whatever principles may govern the nature of the selection from the overall inventory for occurrence within a given language. Such principles would presumably include ones concerning the size and representativeness of the selection.

In sum, then, it is proposed that language as a cognitive system has two subsystems that perform complementary functions: providing conceptual content and determining conceptual structure. The structuring subsystem is an approximately closed graduated inventory of conceptual categories and member concepts. In each language, a portion of the lexicon consists of closed-class forms expressing concepts selected from the universal inventory, while the remainder of the lexicon consists of conceptually unrestricted open-class forms. And within any portion of discourse expressed in a particular language, the closed-class forms largely determine the structure of the conceptual complex evoked by the discourse, while the open-class forms contribute the majority of its content. Given this role in discourse, particular languages, and language in general, the closed-class subsystem has accordingly been held to be the fundamental concept-structuring system of language.

3 CATEGORIES OF GRAMMATICALLY SPECIFIED NOTIONS

The preceding sampling of grammatical elements has yielded a set of notions helpful toward discovering common semantic properties. But the set has been small and unstructured. With a broader and more systematic investigation, patterns of organization among the notions become evident. Grammatically specified notions can be seen to pattern in certain conceptual categories. These will be termed **schematic categories**. In turn, such categories group together within extensive integrated concept structuring systems. These will be termed **schematic systems** (formerly called "imaging systems").

These schematic systems are relatively independent of each other in content, with each adding a distinct conceptual dimension to those of the others, but their contributions can be coordinated and linked, at times by individual grammatical forms. Three schematic systems are presented in this chapter: configurational structure, perspective, and distribution of attention. Several additional schematic systems can be recognized, includ-

ing those of force dynamics (which includes causation) and cognitive state. The next three parts of this volume are, in fact, set up with respect to such schematic systems. These parts include chapters that pertain, respectively, to configurational structure, to attention, and to force.

The notional patterns that appear within these schematic categories and systems exhibit certain organizing principles. Among the principles of this sort that will be detailed below are the following. One principle is an extensive homology between the representation of space and that of time. The first schematic category presented, that of **domain**, includes the space-time distinction, and largely crosscuts the subsequently presented categories. These categories will, in the majority, apply to both space and time, and parallel examples from each domain will be presented side by side.

Another organizing principle is the following: Of the member notions of any schematic category represented in a language, often each notion will be incorporated in at least some lexical items. Correlatively, the language will often contain grammatical forms that interact with each lexicalization type in a way that yields the expression of another notion of the category. Each such type of interaction can be regarded as a type of cognitive operation that converts the indication of one notion to that of another within the same category. This principle can be termed that of **intracategorial conversion**.

A corollary principle is that a language with grammatical forms for converting from notion A to notion B frequently has forms as well for conversion in the reverse direction—that is, it can also trigger the reverse cognitive operation. This principle is termed **reverse convertibility**. In many cases, a language favors only one such direction, having much lexicalization with notion A and simple grammatical means for reaching notion B, but in the reverse direction having only little lexicalization and complex grammatical forms. Languages differ typologically in the directions they favor. This issue will not be taken up here but is treated at length in chapter II-1.

Some of the grammatical forms in a language function specifically to perform a particular conversion operation. Others simply make structural specifications that can come into conflict with the specification of a neighboring lexical item. In the latter case, as discussed in the preceding section, the basic pattern is that the grammatical form's specification takes precedence and triggers a kind of operation, a "shift," in the lexical item's

referent that brings it into accord. Such shifts are actually one member of a set of "reconciliation processes"—including blends, juxtapositions, schema juggling, and blockage—that can be triggered by the association of a grammatical and a lexical form with incompatible structural specifications. In the nonshift processes, the grammatical specification does not take precedence over the lexical one but plays an equal role with it. Of all these processes, this chapter treats mostly shifts, but others are discussed in chapter II-5.

4 DOMAIN

The schematic category of **domain** has two principal member notions, 'space' and 'time'. As the terms will be used below, the kind of quantity that exists in space is, generically, 'matter', and, in respectively continuous or discrete form, is 'mass' or 'objects'. The kind of quantity existing in time is, generically, 'action' and, in continuous or discrete form, is 'activity' and 'acts'—terms here used neutrally as to whether the action is static or changing, autonomous or agentive. These notions thus relate as in (15).

(15)

Domain	*Continuous*	*Discrete*
space:	mass	objects
time:	activity	acts

The domain category can be thought to correlate with a putatively further distinct category, **state of progression**, or simply to incorporate its characteristics. State of progression has the two main member notions, **progression** and **staticity**. The concept of progression involves a continuum of successiveness where not all the elements of a referent either exist or are cognized at once. The concept of staticity involves an unchanging fixity where all the elements of a referent are co-present in their pattern of interrelationships and are cognized concurrently. The domain of time, uniquely among the domains, has a fundamental association with progression. All other domains are basically associated with staticity. But operations that shift a referent from one of the member notions of the progression category to the other readily occur, and many will be described in this volume (for example, the fictive motion and the fictive stationariness of chapter I-2). Next, though, we describe shifts within the domain category per se.

4.1 Conceptual Conversions between the 'Space' and 'Time' Members of the "Domain" Category

Homologies between the linguistic structuring of space and of time will be addressed in the categories that follow. But here we address operations of conversion between these two main members of the domain category. That is, we demonstrate the intracategorial convertibility of "domain." Thus, a verb root that lexicalizes expression of an act or activity as a temporal quantity can be associated with grammatical forms, including nominalizations, that signal a cognitive operation of **reification**. By the semantic effect of this operation, the referent becomes conceptualized as an object or a mass, one that can participate in many of the same actions—such as being given or gotten—as a physical quantity, as exemplified in (16).

(16)

An act	*Reified as an object*
John called me.	John gave me a call.
I was called by John.	I got a call from John.
Activity	*Reified as mass*
John helped me.	John gave me some help.
I was helped by John.	I got some help from John.

The semantic effect observable in these sentences can be given the following elaboration—here phrased for the discrete type of the upper examples, but applying as well to the continuous type of the lower examples. The original construction represents an 'act' in terms of an Agent affecting a Patient, where the verb represents this act and carries the core notion of affecting. In the new construction, this sense becomes reconceptualized in terms of the transfer through space of a focal condensation of the action from the Agent as Source to the Patient as Goal, where the deverbal noun now represents this condensate as a kind of 'object'.[9]

It can be observed, moreover, that the paradigm of this act-to-object reconceptualization has a further member. Within the original action conceptualization, not only can the Agent affect the Patient and the Patient be affected by the Agent in the execution of an act, but the Patient can also execute the act independently. Correlatively, in the reconceptualization under reification, not only can the Agent give the reified act to the Patient and the Patient get it from the Agent, but the Patient can also "have" the reified act independently. To represent this "middle" form, British English in fact uses the verb *have* with the deverbal noun, while

American English, perhaps anomalously, prefers the use of *take*. The paradigmatic parallelism is shown in (17).

(17) *An act*	*Reified as an object*
She bathed the child.	She gave the child a bath.
The child was bathed by her.	The child got a bath from her.
The child bathed (himself).	The child had/took a bath.

Once reified, the notion of an action is amenable to many more of the conceptions of spatial pathways and manipulations typically associated with a physical object or mass than just the simple transfer from a giver to a receiver. This is seen in such English formulations as *She transferred/redirected/rerouted/forwarded John's call to me*, or *I returned his call*, or *We exchanged calls*. Further, the concept of a reified action is amenable to many of the same cognitive operations as the concept of a physical quantity, as these are represented by such grammatical processes as pluralization, modification, and quantification—for example, in *He gave me three business calls*.

A still greater range of conceptual manipulations is available for some notions. Thus, when the concept of 'attending' is conceptualized as an action through representation by a verb, English grammar affords little more expressive leeway than that found in sentences like *I attended to the music* and *She had me attend to the music*. But when conceptually reified as an entity through expression by the noun *attention*, much more is possible. Thus, the reified entity can behave like a stationary or moving Figure that surfaces as sentence subject, as in: *My attention was fixed on the music*; *My attention gradually wandered away from the music and on to the events of the day*. Or it can function as a Figure that surfaces as a direct object of a sentence, as in: *The story caught/riveted my attention; The noise attracted/drew my attention away from the book I was reading; I directed/redirected my attention toward/away from the statue; She directed/drew/called my attention to the painting on the far wall*. And the reified entity can function as a Ground appearing as an oblique object, as in: *The sound was now (squarely/firmly) in (the center of) my attention; The matter was (well) out of my attention; The report eventually came to my attention*.

Even with such increased expressive range, the conceptual reification of action still has limitations, as well as action-based challenges. As an example of limitation, our reified concept of phone calling has not extended all the way to that of a fully physical object, so that English includes no expressions like **John threw/pushed/thrust/slid a call to me*. Moreover, a

language with a system of path satellites and prepositions like English is able to express a number of spatial paths even with a verb representing the original action concept. Some of these have reified counterparts. Thus, *We called back and forth to each other* has such a counterpart in *We exchanged calls*. But some constructions of this kind do not. Thus, *I called around to set up the meeting* has no counterpart like **I circulated calls to set up the meeting*, and *I called ahead to let them know we were coming* has no counterpart like **I sent a call to let them know we were coming*. Nevertheless, the reified representation of an action would seem overall to permit a greater range of conceptual manipulations. The reason is that it employs the open class of verbs to represent such manipulations. By contrast, the representation of an action *as* an action with a verb tends to depend on such closed classes as satellites and prepositions to represent further conceptual manipulations, and such closed classes contain fewer options of expression.[10]

A reconceptualization that is the reverse of reification also occurs. A noun referring to an object or mass can be associated with grammatical forms, including verb-forming derivations, that signal a cognitive operation of **actionalizing**. By this operation, the physical referent is melded together with some of the activity in which it participates, with the semantic effect that much of the referent's tangible concrete character is backgrounded, subordinated to a conceptualization in terms of a process of occurrence, as illustrated in (18).

(18)	*Object(s)/mass*	*Actionalized as*
a.	Hail(stones) came in through the window.	It hailed in through the window.
b.	Ice is forming over the windshield.	It is icing up over the windshield.
c.	I removed the pit from the cherry.	I pitted the cherry.
d.	He has blood coming from his nose.	He is bleeding from his nose.
e.	She ejected spit into the cuspidor.	She spat into the cuspidor.
f.	Crowds of people went to the fair.	People thronged to the fair.

This analysis of the space and time members of the domain category and of conversions between them points to a possible typology. Lan-

guages appear to fall into two main typological categories on the basis of the most characteristic form of lexicalization they use to refer to physical objects and substances. Those that favor nouns—presumably the majority type—are **object-dominant** languages, while those that favor verbs are **action-dominant** languages. English is clearly an object-dominant language, preferring to refer to physical entities in terms of their tangible materiality through the use of nouns. But, as seen in the preceding example set, it also has the capacity to actionalize such reference through the use of verbs, conceptually incorporating the materiality into the dynamics of an occurrence. It does this mainly with denominal verb derivation but, in some measure, it also has simplex verbs already lexicalized to incorporate reference to physical entities. An example is *(to) flow*, which refers to a fluid substance moving along a path.

By contrast, Atsugewi, a Hokan language of northern California, is an action-dominant language. Its most characteristic way to refer to physical objects and substances is with verb roots (as well as with certain affixes to the verb root), which include such examples as: *-swal-* 'for a flexible linear object to move/be located' and *-qput* 'for loose dry dirt to move/be located' (see chapters II-1 and II-2). For example, in a situation where English might say *There's a rope lying on the ground*, Atsugewi might use the single polysynthetic verb form *ẃoswalak·a*. This form contains the verb root *-swal-* followed by the Path + Ground suffix *-ak·* 'on the ground', and preceded by the Cause prefix *uh-* 'as a result of gravity/an object's own weight acting on it'. The verb form begins and ends with a set of inflections that together indicate a third-person subject and the factual mode. As a whole, the verb form can thus be glossed as 'a-flexible-linear-object-is-located on-the-ground because-of-gravity-acting-on-it'. But to suggest its nounless flavor, the Atsugewi form can perhaps be fancifully rendered in English as: ''it gravitically-linearizes-aground''. In this example, then, Atsugewi refers to two physical entities, a ropelike object and the ground underfoot, without any nouns. In a pattern complementary to that of English, Atsugewi in some measure does have simplex nouns referring directly to a physical object or substance—for instance, *naha* 'head'. But most nominal forms in Atsugewi, even ones that we might think refer to some of the most basic physical entities, are nominalizations derived from verbs. For example, the noun for 'sun/moon', *ćnehẃu·*, is a nominalization of the verb root *-hẃ^{u}-*, which means 'to describe an arc across the background of the sky' and which could be used by someone looking up to observe a child leaping from one tree across to another.[11]

4.2 Further Members of the "Domain" Category

We can note that the category of domain includes other member notions than just space and time. For an example, recall from section 2 that *this* and *that* specify a partition drawn through space—and can do so through time as well—and indicate that a referent entity is on the same or the other side of the partition as the speaker. Now consider the English pronouns *you* and *they* in their indefinite usage (akin to German *man* or French *on*). These also specify a partition, but one drawn through **identificational space**, understood as a new conceptual domain. They indicate, respectively, that 'the average person' is or is not identified with the speaker in some relevant respect—that is, is on the same or the other side of the identificational partition as the speaker.

Thus, a consumer of organic food that is visiting a new neighborhood can ask a passerby about the purchase of organic food with *you*, but about the sale of organic food with *they*.

(19) a. Where can you buy organic food around here?
b. Where do they sell organic food around here?

But a person looking for a location to open an organic grocery would ask a business consultant in the neighborhood about purchases and sales with the reverse assignment of *you* and *they*.

(20) a. Where can you sell organic food around here?
b. Where do they buy organic food around here?

5 CONFIGURATIONAL STRUCTURE

The first schematic system we treat is that of **configurational structure**. This system comprises the schematic structuring or geometric delineations in space or time or other qualitative domain that closed-class forms can specify. Closed-class forms can ascribe such structure to the whole of a referent scene, thus partitioning that scene into entities in particular relationships, or to any of those entities themselves, or to the paths described by such entities when their interrelationships change through time. With respect to closed-class forms, the configurational system thus encompasses most aspects of the schemas specified by spatial or temporal adpositions, subordinating conjunctions, deictics, aspect/tense markers, number markers, and the like.

Seven schematic categories within the configurational system are presented in this section, together with an analysis of the way the first three

of these categories interact. In addition, further properties of the configurational system are treated by the chapters in part 2 of this volume. In particular, chapter I-3 examines the type of spatial relations characteristically represented by a system of adpositions, such as the closed class of English prepositions, which the present section does not directly address.

5.1 Plexity

The category here to be termed **plexity** is a quantity's state of articulation into equivalent elements. Where the quantity consists of only one such element, it is **uniplex**, and where it consists of more than one, it is **multiplex**. When the quantity involved is matter, plexity is, of course, equivalent to the traditional linguistic category of "number" with its component notions 'singular' and 'plural'. But the present notions are intended to capture the generalization from matter over to action, which the traditional terms do not do. It is true that there are the traditional terms "semelfactive" and "iterative" referring, respectively, to one and more than one instantiation of an event. But there is no real temporal equivalent to "number." "Aspect" includes too much else about the temporal structure of action. And in any case, none of the traditional terms refers generically to both the spatial and temporal domains.

Specifications as to plexity are made by both lexical items and grammatical elements, and there is interplay between the two when they are both in association. Example English lexical items that basically specify a uniplex referent are—for matter and action, respectively—*bird* and *(to) sigh*. They can occur with grammatical elements that themselves specify a uniplexity, like those italicized in (21a) (many languages have here a more regular, overt system of markers than English). But they can also occur with grammatical elements that specify a multiplexity, as in (21b). In this association, such elements can be thought to trigger a particular cognitive operation, one of **multiplexing**. By this operation, an original solo referent is, in effect, copied onto various points of space or time.

(21)		*Matter*	*Action*
a.	*Uniplex*	*A* bird flew in.	He sighed (*once*).
b.	*Multiplex*	Bird*s* flew in.	He *kept* sigh*ing*.

The operation of multiplexing triggered by the grammatical forms shown here yields a multiplex referent that is unbounded (see section 5.2). But apart from elements signaling dual formation or the like, it is not clear

whether there are any grammatical forms (in any language) that directly yield a bounded multiplexity. Such forms might, for example, act on nominal referents to convert 'a bird' into 'a flock', 'a tree' into 'a grove', and 'a kinsperson' into 'a family', or act on verbal referents to convert 'to sigh' into 'to produce a spate of sighs'.

The reverse of the preceding pattern is also found in language. First, there are lexical items that intrinsically specify a multiplexity. English examples are *furniture* or *timber* (i.e., 'standing trees') for matter and *breathe* for action, as used in (22a). And, too, there are grammatical forms that can appear in association with these, as in (22b), signaling an operation the reverse of multiplexing—one that can be called **unit excerpting**. By this operation, a single instance of the specified equivalent units is taken and set in the foreground of attention.

(22)

	Matter	*Action*
a. *Multiplex*	Furniture overturned in the earthquake.	She breathed with full concentration.
b. *Uniplex*	A *piece of* furniture overturned in the earthquake.	She *took a* breath/ breathed *in* with full concentration.

The English grammatical forms seen above that signaled multiplexing— *-s* and *keep -ing*—consisted solely of explicit morphemes. On the other hand, the forms that signaled unit excerpting also included abstract elements: particular grammatical categories that require the insertion of one out of a certain set of lexical items, as represented in (23c,d). The forms can, moreover, contain two or more independent elements. These forms are considered here to be **grammatical complexes**, comparable to other grammatical constructions or indeed to lexical complexes (collocations): they combine distinct elements within a structural whole serving a single overall semantic function.

Actually, though, by one analysis, all grammatical forms are complexes, merely ranked along a cline of elaborateness. Under this analysis, a grammatical form includes not only any explicit and generic elements, but also the semantic and syntactic category memberships of its input and output forms, as represented throughout (23). Thus, the English multiplexing forms, in (23a,b), are merely at the simpler end of a continuum.

(23) a. $[[\_\_\_\_]_{N_{upx}} + \text{-}s]_{N_{mpx}}$
e.g., *bird: birds*

b. $[keep + [\_\_\_\_]_{V_{upx}} + \text{-}ing]_{V_{mpx}}$
e.g., *sigh: keep sighing*

c. $[N_{unit}\ \text{of} + [\_\_\_\_]_{N_{mpx}}]_{N_{upx}}$
e.g., *furniture: a piece of furniture*

d. $[V_{dummy} + [[\_\_\_\_]_{V_{mpx}} + \text{DERIV}]_{N_{upx}}]_{V_{upx}}$
e.g., *breathe: take a breath*

d′. $[[\_\_\_\_]_{V_{mpx}} + \text{PTC}]_{V_{upx}}$
e.g., *breathe: breathe in*

Support is lent to the thesis that a more elaborate grammatical complex can have a semantic unity by the existence, within the same or another language, of a simpler form with the same semantic function. As an example of just this circumstance, the English unit-excerpting complex for nouns, which is rather elaborate, is paralleled in function by a simple suffix in Yiddish, either -¨*l* or -¨*ele* (otherwise indicating diminutives), as illustrated in (24).

(24) zamd 'sand': zemdl 'grain of sand'
groz 'grass': grezl 'blade of grass'
shney 'snow': shneyele 'snowflake'

And the English unit-excerpting complex for verbs, also elaborate, has a simplex counterpart in the Russian verb suffix *-n(u)-*, which, for example, can be added to the infinitive *čix-at'*, the unmarked imperfective form that means 'to sneeze a multiplex number of times', to yield *čix-nu-t'* 'to sneeze once'.

5.2 State of Boundedness

Another category within the system of configurational structure is **state of boundedness**, which has two principal member notions, that of **unboundedness** and that of **boundedness**. When a quantity is understood as **unbounded**, it is conceived as continuing on indefinitely with no necessary characteristic of finiteness intrinsic to it. When a quantity is understood as **bounded**, it is conceived to be demarcated as an individuated unit entity. Entailed by the boundedness category, but conceptually isolable from it, is the notion of a **boundary**. In the prototypical conceptualization, a boundary touches or constitutes the outermost portion of a bounded quantity, so that the boundary "encloses" the bounded quantity, and the bounded quantity lies "within" the boundary. Where applicable, as with objects in space or actions in time, a boundary is

prototypically of a dimensionality one lower than that of the bounded quantity, so that a plane bounds a volume, a line bounds a plane, and a pair of points bounds a line. The concept of a partially bounded quantity—for example, a line with only one end point as a boundary—also figures prominently in linguistic structuring but is not treated here (see the "Motion-aspect formulas" in chapter I-3, section 2.8). An unbounded quantity, correlatively, is conceptualized as having no outer boundary.

In application to nouns, state of boundedness largely corresponds to the traditional linguistic distinction between "mass" and "count," and in application to verbs it can correspond to the distinction between "imperfective" and "perfective," among other terms (the closeness of these correspondences varies with different usages of the traditional terms). However, as with plexity, the concepts designated by the new terms are intended to capture the commonality across the space and time domains and to generalize over their usually separate analyses.

Among English examples of lexical items, *water* and (*to*) *sleep* basically specify unbounded quantities, whereas *sea* and (*to*) *dress* basically specify bounded ones. These specifications are demonstrated by the fact that these words are, respectively, unacceptable and acceptable in construction with the grammatical complex "*in* $NP_{extent\text{-}of\text{-}time}$", which itself specifies boundedness, as seen in (25).

(25)	*Matter*	*Action*
a. *Unbounded*	*We flew over water in one hour.	*She slept in eight hours.
b. *Bounded*	We flew over a sea in one hour.	She dressed in eight minutes.

As with plexity, grammatical elements exist that can, in construction with a lexical item, shift its basic specification for state of boundedness to the opposite value. Those acting in this way on an unbounded-type lexical item, in effect, trigger a cognitive operation of **bounding**, or **portion excerpting**. By this operation, a portion of the specified unbounded quantity is demarcated and placed in the foreground of attention. Examples of such grammatical elements in English are shown in (26). Note that while simplex grammatical forms for unit excerpting were lacking in English and had to be cited in other languages, English does have a simplex grammatical form, *some*, which can signal portion excerpting for both spatial and temporal entities.

(26) a. *matter*
$[N_{\text{bounded quantity}}\ \textit{of} + [\_\_\_]_{N_{\text{unbd}}}]$
e.g., *water*: *body of water*
another form: *some water*
b. *action*
$[[\_\_\_]_{V_{\text{unbd}}} + \text{for } N_{\text{extent of time}}]_{V_{bd}}$
e.g., *sleep: sleep for an hour*
other forms: *sleep from 3:00 a.m. to 4:00 a.m. sleep for a while| sleep some*

When semantically unbounded nouns are grammatically operated on in this way, the resulting forms with their newly bounded referents now *can* appear acceptably with the "*in* $NP_{\text{extent-of-time}}$" constituent, as seen in *We flew over a body of|some water in 1 hour*.

The reverse of the preceding pattern also exists. The English nouns *shrub* and *panel* each refer intrinsically to a bounded entity. But the grammatical elements *-ery* and *-ing* can be added to them, yielding *shrubbery* and *paneling*, forms that now refer to unbounded quantities. In effect, the grammatical elements have triggered a cognitive operation of **debounding** whereby the quantity formerly within bounds is now conceptualized in a form with indefinite extension.

In English, however, such elements are not productive. They cannot, for example, be used with *sea* to yield the meaning 'pelagic water', nor with *(a) tear* to yield 'lachrymal fluid'. One mechanism resorted to in many such cases, including that of *tear*, is the use of the plural, as in (27).

(27) Tear*s* flowed through that channel in Hades.

There seems to be a sequence of cognitive operations here in getting from a bounded to an unbounded quantity. Speculatively, the bounded quantity is first treated as a uniplex entity, it is then multiplexed, the resultant entities are conceived as spatially juxtaposed, and their boundaries are finally effaced, creating an unbounded continuum.

Another debounding mechanism available for a noun is to shift the grammatical category of the noun from count to mass. One construction with this mechanism—seen in the well-known example *There is cat all over the driveway*—includes the deformation of the original referent. But in another type of construction, the physical integrity of the original bounded object is maintained. Further, this construction, which may include a measure term of a particular dimensionality, can trigger

debounding solely along one or two dimensions of the original object. Thus, in the sentence *There are probably (10) miles of pencil in that stationery store*, which includes the one-dimensional measure term *mile*, the concept of a pencil is maintained physically intact, is debounded solely along its long axis, and might typically evoke an image of a series of pencils aligned end to end (although the same sentence with *(10) miles' worth of pencil* might simply evoke an image of successive or summary measurement). Comparably, in accord with the two-dimensional term *acre* in the sentence *There are probably (10) acres of movie screen in that old film studio*, the concept of the screen is debounded over its plane.

The preceding series of constructions shows that the concept of debounding covers several conceptual subtypes. Under debounding, the original bounded entity is extended through deformation in the "cat"-type construction. In the "shrubbery" type of construction, it has its outer boundary effaced, and it is extended outward by the addition of like material. In the "tears"-type of construction, it is extended by contiguous multiplexing, with perhaps only a partial conceptual effacement of the boundaries. And in the "pencil" type of construction, it is extended by multiplexing and the instantiations are maintained intact, but they are aligned and considered over the extent of the alignment.

Though it is not clear why, languages seem to have scant grammatical means for use with a verb to debound a reference to a bounded action. But such debounding can be readily imagined. Thus, if the verb (*to*) *dress* basically refers to the bounded action 'put on a full complement of clothing', then the debounded counterpart should mean 'put on more and more/ever more clothing'. This last locution can in fact represent the debounded sense, as in *As punishment through eternity, the demon had to put on more and more/ever more clothing*. But to represent this debounded sense, the verb *dress* itself can enter into constructions that range from being only moderately to just barely acceptable, as in ?*As punishment through eternity, the demon had to keep dressing/dress on and on/dress and dress*. Perhaps the best forms for representing the debounded sense are *dress without end/without a stop*, but these rely on lexical rather than grammatical means.

To examine the state-of-boundedness category further, with respect to an action in time, as has been seen, our concept of boundedness involves both a boundary at the initial point of the action and a boundary at its terminal point. Thus, the action is understood as occupying a finite

quantity of time and hence as consonant with the aspectual *in* phrase, which also indicates a finite temporal quantity bounded at both ends. Note that for this reason, we here use the term "bounded" instead of "telic," since the latter term has largely been used in other linguistic work to invoke only a terminating boundary on an event. In general, boundedness of action involves the concept of a finite entity of which progressively more becomes affected by the action until all of it has become affected. Such cumulatively total affectedness can, among other possibilities, consist of exhaustion, as in the nonagentive sentence *The log burned up in 10 minutes* and in the agentive *I ate the popcorn up in 10 minutes*, or of a notion of completion, as in the nonagentive *Water filled the tub in 10 minutes* and the agentive *I dressed in 10 minutes*. (The last example relies on the notion of a canonic complement of clothing over one's body that can be progressively built up to until reached.) Correlatively, unboundedness requires no notion of any finite entity, and if there is some entity getting progressively affected by an action, it is conceived of as nonfinite.

It is noteworthy that the bounded/unbounded distinction pertains only to the entity affected by the action. The action itself and the time during which the action occurs are both bounded quantities, equally so in the unbounded and in the bounded situation. Thus, in the aspectually unbounded sentence *I ate popcorn for 10 minutes*, it is the popcorn—the entity affected by the action—that is conceptualized as having no specific bounds. The action of eating itself, however, is a finite bounded quantity and the amount of time this action occupies is the finite bounded amount of 10 minutes.

These concepts have a particular realization when applying to a spatial path undertaken with respect to a reference object. Here, the bounded/unbounded distinction pertains only to the reference object, (relative to the way the path engages it); the path itself and the time taken to execute it are both finite bounded quantities. In particular, a motion sentence with either an *in* or a *for* type of temporal phrase indicates that a finite extent of time with a beginning point and an ending point has been expended on motion, that this motion occurs over a finite extent of space with a beginning point and an ending point (the path), and that the time period and the path correspond at their beginning points, at their ending points, and progressively along their lengths. This is seen, for example, both in the aspectually bounded sentence *I walked through the tunnel in 10 minutes*

and in the aspectually unbounded sentence *I walked along the shore for 10 minutes*. In both sentences, the time period is the same, 10 minutes, the traversed path is bounded and finite, (perhaps even the same length), and the progression of the cited time period is coextensively linked with the traversal of the path. The main difference between the two boundedness types is that a sentence with the *in* type of temporal phrase indicates that the reference object with respect to which the path of motion occurs has a physical or conceptual boundary coincident with the beginning and ending points of the path, while a sentence with the *for* type of phrase indicates that there is no such coincidence and, in fact, that the reference object extends beyond the path's end points. This can be termed the principle of **boundary coincidence** for determining state of boundedness. As is usual in language, these two types of indications are conceptualizations that can be imputed to a referent, so that the same referent can be depicted in either way. Thus, both *I walked through the tunnel for 10 minutes* and *I walked through a portion of the tunnel in 10 minutes* can refer to the same event of a finite path located wholly inside a tunnel. But the former foregrounds the tunnel's extension outside the path, while the latter specifies a conceptual entity, a "portion" of the tunnel, which now does have (fictive) boundaries that coincide with the path's boundaries.

5.3 State of Dividedness

The category of **state of dividedness** refers to a quantity's internal segmentation. A quantity is **composite** or (internally) **discrete** if it is conceptualized as having breaks, or interruptions, through its composition. Otherwise, the quantity is conceptualized as (internally) **continuous**.

The present category may be prone to confusion with the preceding one. Contributing to this confusion is the normal meaning range of *continuous*, which as easily covers 'boundlessness' as it does 'internal seamlessness'. However, the two categories can vary independently. Thus, in the preceding section, the lexical examples given for unboundedness, *water* and *sleep*, happened also to be internally continuous. But the same demonstration of unboundedness could have been made with internally discrete examples like *timber* and *breathe*.

Both lexical and grammatical elements are sensitive, in their specifications, to the distinctions of this category. But there appear to be no grammatical elements that solely specify discreteness or continuity for

a quantity, nor any that signal an operation for reversing a quantity's lexically specified state of dividedness. If forms of the latter type existed, we can describe how they would behave. A grammatical form for a continuous-type lexical item would signal an operation of **discretizing**, whereby the originally continuous referent would become conceptualized as a particulate aggregation. Conversely, a grammatical form for a discrete-type lexical item would trigger an operation of **melding**, whereby the separate elements of the original referent would be conceptualized as having fused together into a continuum.

Although such grammatical forms seem lacking, certain indirect or inexplicit mechanisms for these same operations do exist. Thus, the internal continuity specified by the noun *water* can be reconceptualized as internally discrete with the complex form *particles of*, as in: *Water/ Particles of water filled the vessel*. However, this complex form does not directly specify the shift but again governs a several-stage sequence of other cognitive operations. In particular, a lexical form (*particle*) that invokes the concept of a discretized unit of the continuum is pluralized, thus multiplexing that unit concept, and the resulting multiplexity is understood as internally juxtaposed and coextensive with the original continuum. But this construction capitalizes on the independently existing capacity of a plural count noun to designate a composite. Here, no simplex grammatical form directly designates a reconceptualization in terms of interior compositeness, and such forms might be universally absent.

In the reverse direction, there may also be no simplex grammatical forms that directly evoke the reconceptualization of an originally composite referent as internally continuous. In English, it is even difficult to identify complex forms that might yield this effect. Perhaps among the closer candidates for such forms are *a mass of* or *masses of*, as in *a mass/ masses of leaves*. The problems here, though, are that the former expression has a bounded referent, the latter expression is plural, and both expressions indicate great quantity.

On the other hand, there appears to be a general conceptual tendency for a basically composite-type referent of a lexical root to undergo at least some degree of spontaneous melding, without the addition of any explicit grammatical forms. Thus, lexical items with an internally discrete referent —for example, singular multiplex nouns like *foliage*, *timber*, and *furniture* —tend to evoke a conceptualization of their referents with a degree of

blurring and fusion across their component elements. This contrasts with the counterpart plural uniplex nominals *leaves*, *trees*, and *pieces of furniture*, which maintain the conceptualization in terms of an individuated composite. Spontaneous melding can also be seen in the referents of verbal forms. Thus, if we can take the verb *walk* to refer to an iterated multiplexity of component steps and the verb *step* to refer to just one of these components, *walk* then seems to evoke a greater melding across those components than does the form *keep stepping*, which overtly marks the iteration of the individual component. Comparably, the verb *breathe* suggests greater fusion across its inhalation-exhalation cycles than does the locution *take breaths*.

The two different degrees of melding just seen to be available in referring to a multiplexity might actually be best regarded as just two points along a gradient of conceptual melding from the most individuated to the most fused. Thus, evoking a point toward the most individuated end are constructions in which the elements of a multiplexity are separately indicated, as in *This tree and that tree and that tree are mature*. Indicating a multiplexity with somewhat greater melding, then, is the ordinary plural, as in *Those trees are mature*. Perhaps a still greater degree of melding is evoked by a noun with plural agreement but singular form, like that in *Those cattle are mature*. Finally, the greatest degree of melding across a multiplexity may be shown by nouns with singular agreement and singular form, like that in *That timber is mature*. Of course, beyond the melding of a multiplexity is a referent taken to be fully continuous in the first instance, like that of the noun in *This wine is mature*. Again, a similar gradient might apply to verbally specified actions. Thus, the components of action are more individuated in *The shaman stepped once, stepped again, and stepped once more across the coals*, more melded in *The shaman continued stepping across the coals*, and still more melded in *The shaman walked across the coals*, while the action in *I slid across the patch of ice* is taken to be internally continuous in the first instance. If the gradient notion proposed here holds, the term for this section's category might best be changed to "*degree* of dividedness."

In general, more grammatical phenomena in language are sensitive to the distinctions of the boundedness category than to those of the dividedness category. For one case, forms with unbounded referents share many grammatical properties, whether these referents are continuous or composite. Thus, in the domain of matter, two types of forms with unbounded

referents—mass nouns, whose referents are either continuous or composite, and plural count nouns, whose resultant referents are generally composite—share many syntactic characteristics distinct from those possessed by singular count nouns, whose referents are bounded. For example, most determiners occur either with singular count nouns alone or only with mass or plural count nouns.

(28) a. ____ book/*ink/*books:
a/each/every/either/neither
b. ____ ink/books/*book:
all/a lot of/more/most/*unstressed* some/*unstressed* any
∅ 'generic' (*In my work, I use ink/books/*book.*)
∅ 'progressively more' (*For an hour, the machine consumed ink/books/*book*.)

Correspondingly, in the domain of action, forms with unbounded referents, whether continuous (durative) or discrete (iterative), share syntactic properties not possessed by forms with bounded referents, as seen, for example, in: *He slept/kept sneezing/*sneezed once/*arrived . . . for hours/until midnight*.

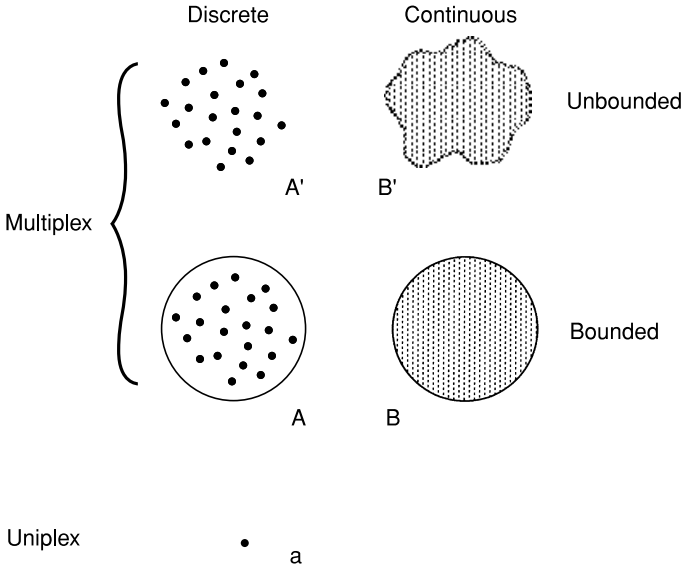
In either space or time, the general explanation for this pattern seems to be that, whether internally continuous or discrete, referents without an outer boundary accommodate syntactic forms that involve a conceptualization of quantity in partitive terms, whereas referents with an outer boundary accommodate syntactic forms that involve a conceptualization of quantity in terms of unit blocks.

Because the category of dividedness has limited realization by itself, further treatment of it will be deferred until the next section, where it can be seen in interaction with the other categories.

5.4 The Disposition of a Quantity: An Intersection of Categories

The preceding four categories of attributes—domain, plexity, state of boundedness, and state of dividedness—all pertain to a quantity simultaneously. Taken together, they can be considered to constitute a complex of attributes that may be termed a quantity's **disposition**. The intersections of these categories form an array that can be schematized as in (29).

(29)



+ the distinction between *matter* and *action*, which crosscuts all of the above

To specifically schematize action along the one-dimensional time axis, the two-dimensional format of (29) can be adapted to a one-dimensional format, with modified conventions for indicating the directional progression of the domain of time.

Each intersection of attributes indicated in (29) is specified by various lexical items (although one, a bounded multiplexity for action, is quite minimally represented in English). An example or two (most were seen earlier) is given for each intersection in (30).[12]

(30) A′: timber/furniture
(to) breathe
B′: water
(to) sleep
A: (a) grove/family
(to) molt
(The bird molted.)
B: (a) sea/panel
(to) empty
(The tank emptied.)
a: (a) tree/bird
(to) sigh

Now if the particular contentful referent for which one chooses a lexical item happens to be wedded, by that lexical item, to an unwanted set of structural specifications, there generally are grammatical means available

for converting this to a desired set. Such means range in directness from specifying the single relevant operation to involving a circuitous sequence of operations (see section 8 on **nesting**). A number of starting and ending points for such conversions, and the means for accomplishing them, are indicated in (31).

(31)

$A' \rightarrow A$	a stand of/some timber breathe for a while/some	$B' \rightarrow B$	a body of/some water sleep for a while/some
$A' \rightarrow a$	a piece of furniture take a breath/breathe in	—	
$A' \rightarrow B'$	?masses of leaves	$B' \rightarrow A'$	particles of water
$A \rightarrow a$	a member of a family ?molt a single feather	—	
$A \rightarrow A'$	members of a family $(A \rightarrow a \rightarrow A')$ molt and molt	$B \rightarrow B'$	paneling empty and empty
$a \rightarrow A'$	trees keep sighing	—	
$a \rightarrow A$	a stand of trees $(a \rightarrow A' \rightarrow A)$ sigh for a while	—	

As noted, the table in (31) shows that in some cases, a conversion from one structural disposition to another cannot be accomplished directly by a single simplex closed-class form in English, but rather requires a series of nested operations. Thus, for uniplex *tree* to be converted into a bounded multiplexity, it must first be multiplexed into the unbounded multiplexity *trees*, and that in turn must undergo portion excerption to yield *a stand of trees*. The dispositional structure that this resulting form has acquired is the same as that already lexicalized in the open-class noun *grove* or *copse*.

Returning to the diagram in (29) for further consideration, we note that the two columns in the diagram reflect the dichotomy into which the state-of-dividedness category was analyzed in section 5.3. But that section also suggested relabeling this category as ''degree of dividedness'' since the internally discrete referents of nouns like *foliage* and verbs like *breathe* exhibit some partial degree of spontaneous melding. In a diagram based on this idea, the top row might place fully on the left such entries as *trees*,

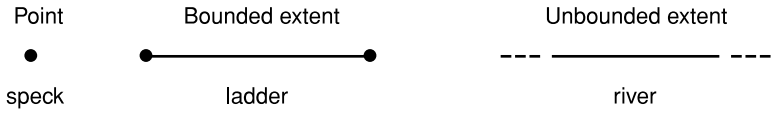
leaves, *pieces of furniture*, and *take breaths*, while placing part way toward the right such counterpart entries as *timber*, *foliage*, *furniture*, and *breathe*.

The asymmetry in the diagram in (29)—the third row having an entry only in the left column—reflects the fact that a composite quantity can yield one of its components for separate consideration, whereas an internally continuous quantity cannot do so. One might think to make the diagram symmetric by having a "b" entry in the right column of the bottom row represent a portion excerpted from the "B′" unbounded continuity. This would parallel the unit in "a" excerpted from the unbounded multiplexity in "A′." Such an excerpted portion might be represented by a circle filled in with gray. But just such a circle is already represented as the "B" entry for a bounded continuity. Since no principled distinction holds between two such entries, the diagram has been left asymmetric.

5.5 Degree of Extension

Implicit in the vertical dimension of the schematic arrangement in (29) is a further schematic category that can be called **degree of extension**. This category has three principal member notions, terms for which are given in (32) together with schematic representations of the notions for the linear case. Lexical items referring to either matter or action may be taken to incorporate specifications as to their referent's basic degree of extension, and three examples of these for the linear spatial case are also shown in (32).[13]

(32)



Now a lexical referent that is perhaps most basically conceived as of one particular degree of extension can, by various grammatical specifications that induce a shift, be reconceptualized as of some other degree of extension. For a first example, consider the event referent of *climb a ladder*, which seems basically of bounded linear extent in the temporal dimension, as is in fact manifested in (33) in conjunction with the grammatical element "*in* + $\mathrm{NP}_{\text{extent-of-time}}$".

(33) She climbed up the fire ladder in five minutes.

With a different accompanying grammatical form, like the "*at* + $\mathrm{NP}_{\text{point-of-time}}$" in (34) (as well as different contextual specifications), the event referent of the preceding can be shifted toward a conceptual schematization as a point of time—that is, as being point durational.

(34) Moving along on the training course, she climbed the fire ladder at exactly midday.

This shift in the cognized extension of the event can be thought to involve a cognitive operation of **reduction** or, alternatively, **adoption of a distal perspective**. This shift can also go in the other direction. The event referent can be conceptually schematized as an unbounded extent by the effect of grammatical forms like "*keep -ing*", "*-er and -er*", and "*as* + S", as in (35).

(35) She kept climbing higher and higher up the fire ladder as we watched.

Here a cognitive operation of **magnification**, or **adoption of a proximal perspective**, would seem to have taken place. By this operation, a perspective point is established from which the existence of any exterior bounds falls outside of view and attention—or, at most, are asymptotically approachable.

The preceding event referent was continuous, but a discrete case can exhibit the same shifts in extension. One such case, perhaps to be considered as most basically of bounded extent, is shown with that degree of extension in (36a). But the referent can also be idealized as a point, as in (36b). Here, clearly, the cows would not all have died at the same moment, yet the spread of their death times is conceptually collapsed into such a single moment. Or the referent can be schematized as an unbounded extent, as in (36c).

(36) a. The cows all died in a month.
b. When the cows all died, we sold our farm.
c. The cows kept dying (and dying) until they were all gone.

The alternative schematizations of extension just seen as specifiable for an event referent are generally also available for an object referent. Thus, for instance, the referent of *(a) box* can be specified for idealization as a point or as a bounded extent (of area or volume). Some grammatical elements making such specifications are illustrated in (37). Also set forth here are the homologies between these and the event-specific elements.

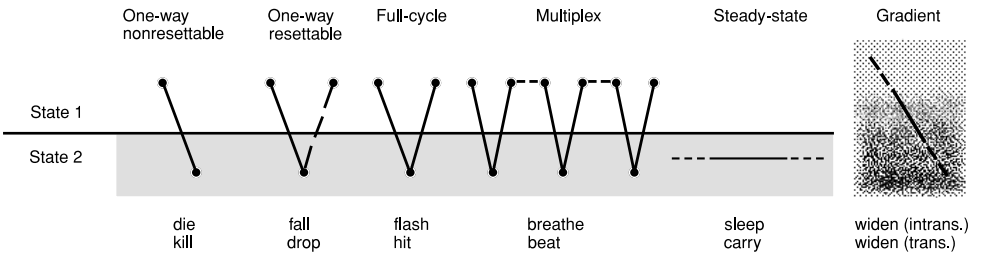
(37) a.	*Point*	The box is 20 feet away from the wall.
		I read the book 20 years ago.
b.	*Bounded extent*	The box is 2 feet across.
		I read the book in 2 hours.

5.6 Pattern of Distribution

The pattern of distribution of matter through space or of action through time is a further category of notions that can be both grammatically and lexically specified.[14] For action through time—the only dimension we will be looking at here—this category together with the preceding one largely constitute the traditional category of "aspect."

Several of the main patterns of distribution for action through time are shown schematically in (38) (the dots here, which represent situatedness in complementary states, should really be adjacent, but they are sketched apart with a connecting line to show the crossing of state interfaces). Also shown are illustrative English verbs, both nonagentive and agentive, that incorporate these patterns.

(38)

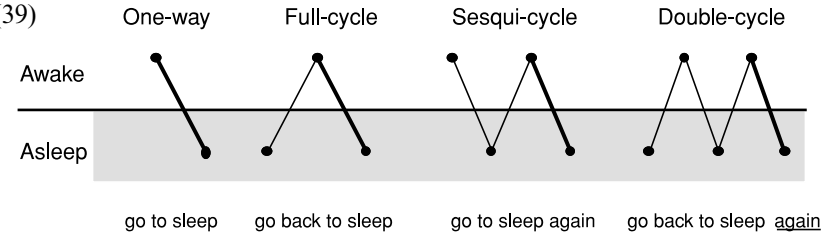


One can determine that these verbs incorporate the specifications indicated by noting the grammatical forms with which they can and cannot occur (or, to put the latter case in our terms: grammatical forms toward whose specifications they will not [readily] shift). A full demonstration is not in order here, but a few examples will show the principle.

The resettable type of a one-way event is distinguished from the nonresettable type by its compatibility with iterative expressions, as in: *He fell three times*; the nonresettable type cannot occur here: **He died three times*. This same one-way form is distinguished from a full-cycle form by its ability to appear in sentences like: *He fell and then got up*, which the latter cannot do: **The beacon flashed and then went off*. A gradient type can appear with adverbs of augmentation, as in *The river progressively widened,* unlike a steady-state type: **She progressively slept*. And so on.

Grammatical elements can, of course, also specify different patterns of temporal distribution, and the present form of diagramming can readily reveal some of their distinctions. Thus, the closed-class elements *back* and *again*, singly and in combination, can indicate versions of full-cycle, sesqui-cycle, and double-cycle patterns, as shown in (39).

(39)



Now consider the circumstance where a verb of one distribution type appears with grammatical forms of another type. The outcome seems invariably to be that the verb shifts its specifications into conformity with those of the grammatical forms. For an example we again take *die*, whose basic specifications can be adjudged as point-durational one-way non-resettable. This verb is used with its basic specifications in a sentence like (40a). But in a sentence like (40b), the grammatical form "*be* + *-ing*" induces a shift. In effect, the infinitesimal interval between the two states involved for *die*—that is, 'aliveness' and 'deadness'—is spread out, with the resulting creation of an extent-durational gradient. This is the shift in the distribution pattern's structural type. But concomitantly, a shift in the basic contentful referent is engendered. Instead of 'dying', the new gradient refers to 'moribundity'. The distinction becomes clear in noting that, as the conception is structured linguistically, one can have been dying without having died, and, correlatively, one can have died without having been dying.[15]

(40) a. He died as she looked on.
b. He was (slowly) dying as she looked on.

5.7 Axiality

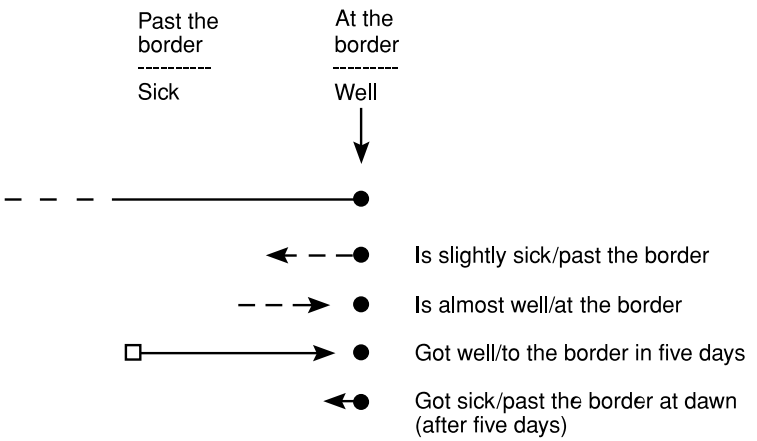
The adjectives in a pair like *well*/*sick* behave contrarily when in association with grammatical forms specifying degree like *slightly* and *almost*, as seen in (41a), and they select for different readings of temporal forms like "*in* + $NP_{extent\text{-}of\text{-}time}$", as seen in (41b). In these respects, perhaps surprisingly, they parallel the behavior of certain kinds of expressions that specify spatial relations—for example, *at the border*/*past the border*.

(41) a. i. He's slightly { sick/past the border. / *well/*at the border. }
ii. He's almost { well/at the border. / ?sick/?past the border. }

b. i. He got well/to the border in five days. (i.e., in the course of five days)
ii. He got sick/past the border in five days. (i.e., after five days had elapsed)

This behavior can be accounted for by positing that such adjectives, in referring to a more generic notional parameter, such as that of 'health', are not simply "opposites" but rather presuppose a schematic axis that is structured and directed in a particular way. Each adjective, then, labels a different portion of that axis. The adjectives here seem in particular to presuppose a directed line bounded at one end; *well* refers to the end point while *sick* refers to the remainder of the line, correlating greater degree with greater distance along the line. These are the **axial properties**, or **axiality**, of the lexical items—that is, the specific relations each has to a particular conceptual axis and to other lexical items with referents along the same axis. It is the lexicalization of such axiality that can align adjectives with expressions of spatial relation. Grammatical forms like the ones just given also have axial properties, and these can function in consonance with those of a lexical item, as in the acceptable cases of (41), now schematized as to axiality in (42).

(42)



In other cases, though, the axiality of a grammatical form can conflict with that of a lexical item and, accordingly, can cause the latter to shift in a process of resolution to the conflict (see chapter II-5). Thus, *sick* in (43)—now associated with grammatical forms that refer to an end point—shifts from its basic "directed shaft" type of axiality, and indeed from its reference to an axis of 'health'. It now specifies the end point of

an axis pertaining to 'feeling poorly'. The addition of the grammatical forms here can be thought to trigger two concurrent cognitive operations. The first is an operation of **punctifying**, whereby a linear extent is conceptually collapsed into a point, as here where the original referent of *sick* reduces from an extended range covering degrees of poor health to a point notion of definitive illness. The second operation is one of **terminalizing**, in which a gradient directed away from an initiating point, as the original referent of *sick* leads away from that of *well*, is converted into the terminating boundary of a gradient that leads toward it, as the new referent of *sick* terminates the gradient of *feeling poorly*.

(43) (After exposure to the virus, he felt worse and worse and) he was almost sick at one point. / he finally got sick in three days.

5.8 Scene Partitioning

The system of configurational structure includes the schematic delineations not only of an individual quantity such as an object, an action, or a quality, as dealt with so far, but also of a whole referent scene. Here, the system involves the conceptualization of a particular **scene partitioning**—that is, a principal division of a referent scene into parts and participants.

A lexical item can specify—in other words, can incorporate or lexicalize within itself—a particular scene partitioning of the event to which it refers. For example, the referent of the English verb *serve* partitions the full situation to which it refers into four main parts: an action, an item served, and a social dyad comprising the two roles of 'host' and 'guest'. The portion of a scene partitioning that constitutes its participant structure—generally, the sentient actor or actors that take part in the scene—can be separately termed the **personation** type for which the verb is lexicalized (as treated in chapter II-1). This schematic category, personation type, has two main member notions, the **monadic** type that involves one participant and the **dyadic** type that involves two interacting participants. Thus, while *serve* may have a four-part scene partitioning and a three-part argument structure, it is of the dyadic personation type.

But closed-class forms can also have scene partitioning or personation properties. Thus, the grammatical complex consisting of a singular subject–plus–reflexive object has the semantic specification of a single participant. When such a grammatical form occurs with a dyadic verb like *serve*, it triggers a cognitive operation of **monad formation**. The verb's

referent is thereby shifted from its original dyadic personation, illustrated in (44a), to one with monadic personation, as in (44b). In this shifted state, its referent is equivalent to that of an intrinsically monadic expression, like that in (44c).

(44) a. The host served me some dessert from the kitchen.
b. I served myself some dessert from the kitchen.
c. I went and got some dessert from the kitchen.

It must be observed that though the grammatical complex in (44b) is determinative in setting the role number as monadic, a trace of the verb's original dyadic personation type does remain. In the cognitive representation evoked by sentence (44b), the connotation of a dyad is blended in with the denotation of a monad, as if both 'host' and 'guest' are together present in the single person of the "I." The construction suggests that the self contains two complementarily functioning subparts, where one subpart acts with hostlike characteristics, such as responsibility and indulgence toward the other subpart, while the other subpart acts with guestlike characteristics, such as receiverhood and a feeling of being looked after by the first subpart.

At work here is a metaphoric process that maps a binary source domain onto a unary target domain in a cognitive operation that can be termed **introjection** (see chapter II-5). Because of this metaphoric introjection of a dyad onto the monad of sentence (44b), that sentence is (aside from other differences of reference due to the different lexical items chosen) not the full semantic equivalent of sentence (44c). The reason is that while this latter sentence also refers to a monad, it does so without any metaphoric impress of a dyad.

While introjection as an operation accompanying monad formation is well represented across languages, its reverse, a putative cognitive operation of **extrajection** that would accompany a process of **dyad formation**, appears to be represented minimally at best. Extrajection would entail that a verb basically lexicalized in the monadic personation type is used in a grammatical context with dyadic meaning, and that a metaphoric impress of the verb's unary character is mapped onto the binary referent. Perhaps the sentence in (45b) does indeed manifest something of this operation. But to be the full complement of the (44b) example, this sentence would have to suggest a metaphoric impress of unarism that encompassed the actions of the two participants in a way felt to be lacking in the simply dyadic sentence of (44c), and this is not at all clear.

(45) a. One twin sang.
b. Both twins sang together (/?jointly).
c. The twins duetted/harmonized.

6 PERSPECTIVE

The first schematic system consisted of the configurational structure that closed-class forms can specify for a referent entity. The present schematic system consists of the **perspective** that one can have on such an entity, as this is specified by closed-class forms. This system thus establishes a conceptual perspective point from which the entity is cognitively regarded. While this schematic system is presumably neutral to particular sensory modalities, it is most readily characterized in visual terms as, in effect, pertaining to where one places one's "mental eyes" to "look out" upon a referent structure.

The perspective system covers several schematic categories. Included among these categories are ones pertaining to: a perspective point's spatial or temporal positioning within a larger frame, its distance away from the referent entity, its change or lack of change of location in the course of time and the path it follows with change, and the viewing direction from the perspective point to the regarded entity. These categories are treated below.

6.1 Perspectival Location

Grammatical forms—as well as lexical forms—can specify the location that a perspective point is to occupy within a referent scene or its speech-event setting. The linguistic literature includes much work on this issue, especially with respect to deixis. In its basic form, deixis sets the position of the perspective point at the speaker's current location. For example, a Figure object's path with respect to some Ground object can be additionally characterized as moving toward or not toward the speaker's viewpoint by such closed-class forms as German *her* and *hin*, as well as by such open-class forms as English *come* and *go*.

The notion of a "deictic center" extends this basic concept to cover any location within a referent scene to which an addressee is directed to project his imaginal perspective point by linguistic forms (see Zubin and Hewitt 1995). Consider, for example, the following bit of narrative: "She sat in the rocker near her bed and looked out the window. How lovely the sky was!" In the first sentence, the use of a third-person pronoun together

with the objective scene description invites the listener to place his perspective point somewhere in the depicted room looking at the sitting woman. But in the second sentence, the exclamatory *how*-construction, together with the expression of subjective experience, induces the listener to relocate his perspective point to the location of the sitting woman, in effect, looking out through her eyes.

To treat a further example with more explanatory detail, consider the sentences in (46) (adapted from a Fillmore example used for another purpose). The first sentence induces the listener to locate her perspective point inside the room, whereas the second sentence inclines toward an external perspectival location (or perhaps to a nonspecific one). How is this accomplished? The cognitive calculations at work appear to combine a rule of English with geometric knowledge. Though often breached, an apparent general rule in English is that if the initiator of an event is visible, it must be included in the clause expressing the event, but if not visible, it must be omitted. Thus, if a glass I am holding slips from my hand, I can felicitously say to a bystander *I dropped the glass*, but not *The glass fell*. Accordingly, in (46a), no initiator of the door's opening is mentioned, hence none must have been visible. But the second clause indicates that the apparent initiator, the two men, moved from outside to inside the lunchroom. Assuming opaque walls and door, the only way that an entering initiator could not be visible to an observer during the door's opening is if that observer were located inside the lunchroom. In (46b), by contrast, the initiator is mentioned, hence must be visible. The only way a door-opening initiator who moves from the outside to the inside can be visible to an observational perspective point is if that perspective point is outside. An index of the capability of our cognitive processing is the rapidity with which a hearer of, say, sentence (46) can combine an English visibility principle, geometric understanding, and real-world knowledge to yield a clear sense of interior perspectived location.

(46) *Position of perspective point*
   a. Interior: The lunchroom door slowly opened and two men walked in.
   b. Exterior: Two men slowly opened the lunchroom door and walked in.

6.2 Perspectival Distance

A second schematic category that closed-class forms can specify for a perspective point is that of **perspectival distance**. The main member

notions of this category are a perspective point's being **distal**, **medial**, or **proximal** in its relative distance away from a regarded entity. Perspectival distance was shown in section 5.5 to correlate with the schematic category of degree of extension. There it was seen that typically a distal perspective correlates with a reduced degree of extension, a medial perspective with a median degree of extension, and a proximal perspective with a magnified degree of extension. It is not clear whether perspectival distance *necessarily* correlates with degree of extension, or with certain other categories. But it seems to be a frequent concomitant and, in any case, it can, on the basis of the visual analogy, function as an organizing aegis to coordinate conceptual phenomena pertaining to the scope, size, and granularity of a referent. Thus, *as with* a distal perspective, there occurs a conceptual correlation of larger scope of attention, apparent reduced size of entities, coarser structuring, and less detail, while *as with* a proximal perspective, there occurs a conceptual correlation of smaller scope of attention, apparent magnified size, finer structuring, and greater detail.

6.3 Perspectival Mode

A third schematic category pertaining to perspective point is **perspectival motility**—that is, whether a perspective point is **stationary** or **moving**. Rather than treating this category in isolation, we observe that its members generally function together with members of the category of perspectival distance. The member notions of these two categories tend to align thus: the stationary with the distal and the moving with the proximal. In addition, these conceptual alignments are generally further linked to two different scopes of attention—that is, with a factor from the next schematic system—respectively, with a global scope of attention and with a local scope of attention. Finally, these two associational complexes can be deemed to make up a larger schematic category, that of **perspectival mode**, whose two main members can be termed the **synoptic** mode and the **sequential** mode, as summarized in (47).

(47) *Perspectival mode*
   a. Synoptic mode: the adoption of a stationary distal perspective point with global scope of attention
   b. Sequential mode: the adoption of a moving proximal perspective point with local scope of attention

Different types of referent situations may tend to correlate with one or the other perspectival mode. In particular, a basic association may tend to

exist on the one hand between a static situation and the synoptic mode of cognizing it, and on the other hand between a progressional situation and the sequential mode of cognizing it, and realizations of such correlations with appropriate closed-class forms are readily evident. In addition, though, often an alternative set of closed-class forms can direct the cognizing of a referent situation with the opposite perspectival mode.

6.3.1 Sequentializing For illustration, consider first an example with a static referent, one of objects in location—in particular, a scene with a few houses dispersed over a valley. This single scene can be alternatively represented by the two perspectival modes. The synoptic (47a) type of perspectival mode—the one more congruent with such a referent—is invoked in (48a). It is multiply specified there by the set of grammatical forms shown underlined, namely, plural number and agreement, the determiner *some* indicating a moderate total quantity, and the locative preposition *in*. But these forms can be replaced by other grammatical forms coding for the sequential (47b) perspectival mode—as in (48b) with singular number and agreement, an adverbial expression of moderate temporal dispersion, and the motion preposition *through*. As a result of these changes, the evoked cognitive representation is converted to one where one's perspective point and attention—or one's own projected location—shift in turn from object to object. In effect, a static multiplexity of objects has been converted into a sequential multiplexity of events consisting of conceptualized encounters with each of the objects in turn. Here, a cognitive operation of **sequentializing** has been carried out.

(48) a. There are some houses in the valley.
b. There is a house every now and then through the valley.

The sentences in (49) exemplify the same contrast between the synoptic and the sequential perspectival modes, but now with the use of partially different grammatical forms.

(49) a. All the soldiers in the circle differed greatly from each other.
b. Each soldier around the circle differed greatly from the last/next.

For representing certain static spatial configurations, the sequential perspectival mode, though noncongruent in character, is nevertheless preponderantly favored over the synoptic mode. Thus, the ready colloquial formulation of (50b) with a moving perspective point is matched in the static global mode of (50a) only by a stilted scientific style.

(50) a. The wells' depths form a gradient that correlates with their locations on the road.
b. The wells get deeper the further down the road they are.

6.3.2 Synopticizing The reverse of the preceding circumstances also exists. A referent that most basically is in fact sequential—for example, a multiplex sequence of occurrences—can be represented in association with the more congruent mode for cognizing it, the sequential perspectival mode, as in (51a). The sequential mode is triggered by the presence of certain closed-class forms: singular number, an adverbial of iteration, and a preposition (or prepositional complex) expressing temporal progression. But essentially the same referent can also be presented as the object of a fixed global perspective point, that is, of the synoptic perspectival mode, as in (51b). The conceptual effect is that the entirety of the sequence is regarded together simultaneously for an integrated or summational assessment, as if the sense of progression that is associated with the temporal dimension were converted into a static presence. Here, a cognitive operation of **synopticizing** has been carried out. The closed-class forms in the present example that trigger this operation are: the perfect auxiliary, a quantifier complex indicating aggregation, plural number, and a preposition of static containment.[16]

(51) a. I took an aspirin time after time during/in the course of the last hour.
b. I have taken a number of aspirins in the last hour.

6.4 Direction of Viewing

The sequential perspectival mode has an additional application within the temporal domain to a succession of events or to the continuation of a single event. In this application, location of perspective point joins with another factor from the system of attentional distribution—that is, with **focus of attention**—to characterize a new schematic category, **direction of viewing**. This category is based on the conceptual possibility of "sighting" in a particular direction from an established perspective point, thereby attending to one or another particular portion of the temporal configuration in reference, and of shifting the direction of this sighting to another portion of the temporal configuration.

To illustrate, consider as a referent the temporal complex consisting of two events occurring in succession. Closed-class forms can direct that

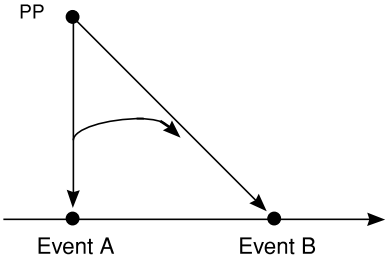
any of a set of different perspectival modes and directions of viewing be applied to essentially this same complex. Thus, as in (52a), closed-class forms can establish a perspective point that is temporally positioned at event A and from which a line of viewing can be directed first at event A itself, a **direct** viewing, and then, in a **prospective** direction, ahead to event B. Alternatively, as in (52b), a perspective point can be positioned at event B and a line of viewing aimed first in a **retrospective** direction back to event A, and then directly at event B itself. In these two cases, what moves is not, as before, the location of one's perspective point, but the direction of one's viewing.

Further, the location of the perspective point can itself also move, with a direct viewing at each location, in the manner of the original sequential perspectival mode seen in (51). Thus, in (52c), a perspective point is first established at event A, which is viewed directly, and then the perspective point moves to a location at event B, now in turn viewed directly.

(52) *Cosequential perspectival mode*

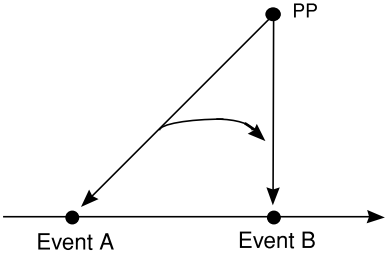
a. direct → prospective

I shopped at the store before I went home.



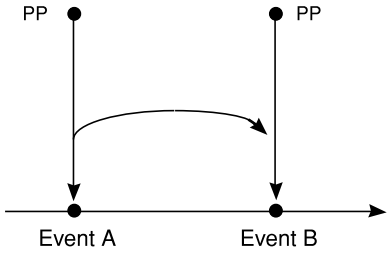
b. retrospective → direct

After I shopped at the store, I went home.



c. $\text{direct}_A \rightarrow \text{direct}_B$

I shopped at the store, and then I went home.



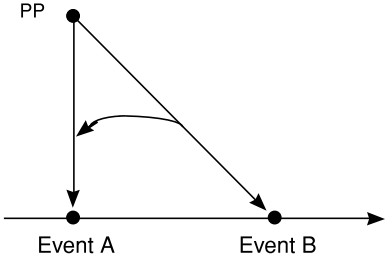
The diagrams in (52) schematize the perspective of these examples. Here, the arrowhead on the timeline represents the progression of time for the referent events, but the upper arrow indicates the progression of time pertaining to the sequence in which the viewings are conceived to be carried out.

In the earlier examples for the sequential mode and so far here, the temporal direction of the viewings has corresponded to the temporal direction of the referent events, and with respect to this relationship can be termed **cosequential**. In addition, however, the perspectival system in language often permits the opposite correlation—that is, where successive viewings are of progressively earlier events, in what can be termed an **antisequential** correlation. The antisequential counterparts to the examples in (52) appear in (53), and the accompanying diagrams now show the viewing arrow pointing backward relative to the referent-time arrow.[17]

(53) *Antisequential perspectival mode*

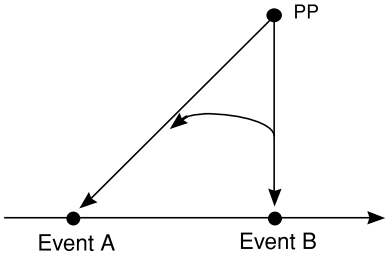
a. prospective → direct

Before I went home, I shopped at the store.

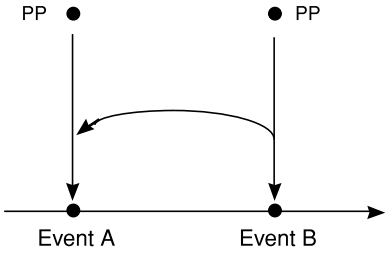


b. direct → retrospective

I went home after I shopped at the store.

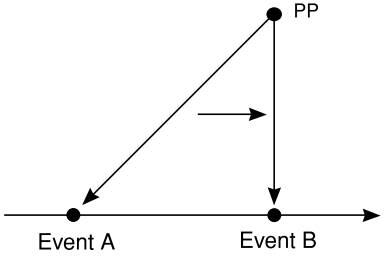


c. $\text{direct}_{B} \rightarrow \text{direct}_{A}$
I went home, but first I shopped at the store.

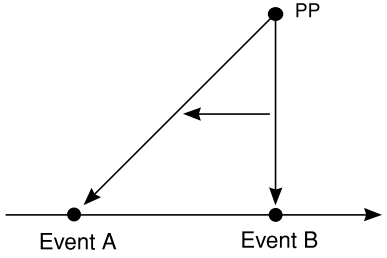


These same perspectival parameters can apply not only to a temporal complex of separate events but also to a single extent-durational event. The event represented in (54) illustrates this. This event is given a retrospective direction of viewing to its onset in the past and a direct viewing at its present. Here, the line of viewing does not make a discrete jump from one event to another (as indicated in the earlier diagrams by a curved arrow), but executes a continuous sweep along the body of the event between the retrospective orientation and the direct one (as indicated in the present diagrams by a straight arrow). As before, the line of viewing can move either cosequentially or antisequentially—seen, respectively, in (54a) and (54b)—relative to the referent event's progression.

(54) a. This festival dates from 1630 A.D.



b. This festival dates back to 1630 A.D.



7 DISTRIBUTION OF ATTENTION

The third of the schematic systems to be treated in this chapter is the **distribution of attention**. This system consists of the various patterns of different strengths with which one's attention is directed over a referent object or scene in accordance with the specifications of closed-class forms. Thus, while the first two schematic systems together ascribe a configurational structure to a referent and establish a perspective point from which to regard it, the present schematic system directs the distribution of one's attention over the given structure from the given perspective point.

Three factors in the attentional system govern the distribution of attention over a referent scene. The first factor is the **strength of attention**, which can range from **faint** to **intense**. Closed-class forms can set attentional strength with respect to either of two scales. They can set it at some value from low to high on an absolute, or zero-based, scale—a cognitive operation for which, of the terms in current linguistic use, **salience** or **prominence** seems the most apt. Or they can set it comparatively lower or higher than some reference value on a relative, or norm-based, scale—a cognitive process for which the terms **backgrounding** and **foregrounding** are apt.

The second factor is **pattern of attention**, by which attentions of different strengths are combined and arranged in particular patterns. We can identify a number of patterns that closed-class forms designate. One such pattern is **focus of attention**—a center-periphery pattern in which greater attentional strength is placed in a central region and lesser attentional strength is placed in a surrounding region. This focusing pattern is treated with respect to figure-ground organization in chapter I-5, as well as elsewhere in this volume. Another pattern is **window of attention**, in which one or more (discontinuous) regions within a referent scene are

allocated greater attention, while the remainder of the scene receives lesser attention. This windowing pattern is the subject of chapter I-4. In a third pattern, **level of attention**, either greater attention is assigned to a higher level of organization within a referent scene, while lesser attention goes to a lower organizational level, or the reverse allocation occurs. The subsections that follow all treat this pattern for setting the level of attention.

The third factor is **mapping of attention**, by which the particular parts of an attentional pattern are mapped onto particular regions of the referent scene. By the operation of this factor, a single attentional pattern can be overlaid in different ways onto the same referent scene. To illustrate with the center-periphery pattern applied variously to a single commercial scene, focal attention can either be mapped onto the seller, with lesser attention on the remainder, as in *The clerk sold the vase to the customer*, or focal attention can be mapped onto the buyer, with lesser attention on the remainder, as in *The customer bought the vase from the clerk*. Note in this regard that, in this volume, all the examples demonstrating the attentional system keep a particular referent scene constant while showing solely how a certain attentional pattern can be mapped onto it in different ways. That is, we demonstrate that closed-class forms can govern the distribution of attention without changing the contents. As with the schematic system of perspective above, that of attention readily shows how the overall concept structuring system of language is relatively distinct from the conceptual content system and can function apart from it to set or shift the latter's schematization—in the present instance, its attentional schematization.

As noted, all the following subsections pertain to the pattern for level of attention—demonstrating four different types of this pattern—which directs greater attention either to the more integral or general characteristics of a referent, or to its more compositional or particular characteristics.

7.1 Level of Synthesis

The schematic category to be considered now pertains to bounded quantities, like those schematized in the A/B row in (29). One form of locution already seen to specify such quantities is the particular type of "NP *of* NP" construction illustrated in (55a). Here the second NP specifies the *identity* of the quantity involved, itself conceptualized as without intrinsic bounds, while the first NP specifies (to use the terms introduced earlier) the **bounding**, or **portion excerpting**, per se of the quantity. Moreover,

in addition to such a pure operation of bounding, the first NP can further specify the particular **form**—the shape, size, and possibly other properties—that the excerpted portion exhibits, as in (55b).[18]

(55) a. a set of trees a quantity of water
b. a cluster of trees a puddle/drop of water

The two NPs here can be seen as coding for two different **levels of synthesis**. Describing this for the internally composite case, such as *a cluster of trees*, we can say that the second NP by itself specifies an unsynthesized multiplexity of independent elements, while the first NP specifies a particular Gestalt synthesized out of that multiplexity. These two levels can thus appropriately be termed the **componential** level of synthesis and the **Gestalt** level of synthesis.

Furthermore, language can mark an additional cognitive distinction here. Either level of synthesis can be placed in the foreground of attention while the other level is placed in the background. One grammatical device for marking such distribution of attention is the placement of the foregrounded NP at the head of the larger nominal construction (in the present English construction, placing it first). Thus, either of the two NPs we have just been looking at can appear as the head, as shown in (56a). With the use of this device, moreover, predications can be made that pertain solely to one level of synthesis or to the other, as seen in (56b).

(56) a. the cluster of trees/the trees in the cluster
b. That cluster of trees is small. / The trees in that cluster are small.

There are certain open- or closed-class forms, furthermore, whose referents are keyed to applying to only one or the other level of synthesis. Thus, *together* (in the sense of 'toward each other') tends to correlate with multiple objects at large, while *in upon -self* tends to correlate with a Gestalt formed from such a multiplexity, as seen in (57).

(57) a. The bricks in the pyramid came crashing together/*in upon themselves.
b. The pyramid of bricks came crashing in upon itself/*together.

In addition, there are closed-class forms that specifically represent a particular level of synthesis. Thus, in English, a cardinal numeral, "Num [NP]-s", as in (58ai) tends to evoke a conceptualization of its referent at the composite level of synthesis. But the closed-class suffix *-some*, or more specifically the grammatical construction "[Num]-some of [NP]-s", as in

(58aii), tends to evoke the Gestalt level of synthesis, calling for the conceptualization of a numbered multiplexity as constituting an abstract higher-order unitary entity.

A comparable distinction can be made by verb forms for events involving objects. Thus, the closed-class Russian verb prefix *s-*, taking the accusative of a plural direct object—"s-[V] [NP-pl]-ACC"—translates well as English *together*, directing attention to the composite level of synthesis, as in (58bi). But the prefix *na-* taking the genitive—"na-[V] [NP-pl]-GEN"—calls for the conceptualization that a process of gathering has created a higher-level entity, an *accumulation*, out of the objects gathered, as in (58bii).

(58) a. *In space: . . . with English CC, numeral suffix* -some
   i. four cooks
   ii. a foursome of cooks
  b. *Over time: . . . with Russian CC, verb prefix* na- [GEN]
   i. Ona s-grebla orexy v fartuk.
   "She scraped nuts together into her apron."
   ii. Ona na-grebla orexov v fartuk.
   "She scraped up an accumulation of nuts into her apron."
   (By scraping them together in her apron, she accumulated (a heap/pile of) nuts.)

The preceding phenomena have involved the shift of attention from a multiplexity to a Gestalt that it can constitute, a cognitive operation that can be called **Gestalt formation**. But also encountered in language are means for specifying the reverse: shifting attention from a Gestalt to components seen as constituting it, in an operation of **componentializing**. This operation can occur when the starting lexical item specifies an entity taken to be already at the more synthetic level, as is the case with *iceberg* in (59a). By grammatical devices like those in (59b), such an entity can be analytically converted from conceptualization as a coherent whole to that of component parts and their interrelations. Again we encounter a surface form—*in two*—that correlates with only one level of synthesis, the Gestalt level, and not with the other.

(59) a. *Gestalt level of synthesis*
   The iceberg broke in two.
  b. *Componential level of synthesis*
   The two halves of the iceberg broke apart (*in two).

The two levels of synthesis with the two directions of conceptual shift applicable to them define four notional types, as indicated in (60). The "Figure" terms here are used as described in Chapter I-5.

(60)

Example	*Type*	*Operation*
cluster of trees	"composite Figure"	Gestalt formation
trees	"multiple Figures"	↑
iceberg	"meta-Figure"	↓
two halves of iceberg	"component Figures"	componentialization

7.2 Level of Exemplarity

A second schematic category pertaining to level of attention can be observed for a multiplexity of objects. This category does not pertain to the basic reference to all the members of the multiplexity, but addresses how attention is directed and distributed within that multiplexity. By the first alternative, the **full complement** of the multiplexity is placed in the foreground of attention, all the elements of the multiplexity manifesting the indicated behavior en masse, with perhaps individual items here and there singled out in the background of attention and instantiating the indicated behavior individually. By the second alternative, a single **exemplar** out of the multiplexity is placed in the foreground of attention, representative of any of the elements that could be comparably focused in upon and seen to manifest the same behavior, with the remaining items as a group perhaps more dimly conceived in the background of attention. These alternative patterns of attentional distribution comprise the schematic category **level of exemplarity**. Perhaps most languages possess grammatical devices for evoking either level of this category. But English stands out in the extensiveness of its specifications: it has separate pairs of grammatical forms that mark the distinction for a number of different types of multiplexity. A rather full list of these pairs is indicated in (61), with examples showing first the full-complement form and then the counterpart exemplar form.

(61) a. Oysters have siphons/a siphon.
An oyster has siphons/a siphon.[19]

b. All oysters have siphons/a siphon.
Every oyster has siphons/a siphon.

c. All the members raised their hand(s).
Each member raised his hand(s).[20]

d. Many members raised their hand(s).
   Many a member raised his hand(s).
e. Some members here and there raised their hand(s).
   A member here and there raised his hand(s).
f. Members one after another raised their hand(s).
   One member after another raised his hand(s).
g. Hardly any members raised their hand(s).
   Hardly a member raised his hand(s).
h. No members raised their hand(s).
   No member (Not/Nary a member) raised his hand(s).
i. On both sides of the room stood tables/a table.
   On either side of the room stood tables/a table.

English has several further unpaired forms. The exemplar form *neither*, as in *Neither member raised his hand(s)*, has no full-complement counterpart. In a complementary way, the full-complement form *some*, as in *Some members raised their hand(s)*, has no exemplar counterpart. This last quantifier might be added to the list of paired forms, though, since Italian, for one language, does have both full-complement and exemplar forms for it.

(62) a. Alcuni membri hanno alzato la mano/le mani.
   some members have raised the hand/the hands.
b. Qualche membro ha alzato la mano/le mani.
   ''some-a'' member has raised the hand/the hands

7.3 Level of Baseline within a Hierarchy

In the linguistic representation of a complex of referents that are related to each other across hierarchical levels, attention can be directed to one or another of these levels for treatment as a **baseline**—that is, as the principal reference level with respect to which the other levels will be related. This schematic category will be termed **level of baseline within a hierarchy**. As with the categories of synthesis and exemplarity, the distinctions of the present category leave the basic substantive referent intact and only specify the pattern in which attention is distributed over that referent.

One type of hierarchy amenable to the present category is a hierarchy of partitive inclusion—for example, one with three levels, in which a Whole has particular Parts that, in turn, have particular Features. This type of hierarchy is illustrated by the sentences in (63), which refer to a

conceptual complex containing one entity from each of the three levels—respectively, a boy, a face, and freckles. While all three sentences in (63) equally identify the particular entities at the three hierarchical levels and their partitive relations, they differ as to which level they establish as the baseline. The baseline is placed at the level of minimal scope, that of Featural details, by (63a); at the mid-scope level, that of Parts, by (63b); and at the level of greatest scope, the Whole, by (63c). The grammatical means for setting the baseline here is the assignment of subject status in conjunction with the *have* + PP construction available in English.

(63) a. There are freckles on the boy's face.
b. The boy's face has freckles on it.
c. The boy has freckles on his face.

Since the present hierarchy is of the inclusional type, the cognitive effect of establishing one of the larger-scoped levels as baseline is to set it up as the **framing level**. Thus, (63c) sets up the large-scope Whole (the boy) as the framing level—in effect, as the "aperture" through which the other two levels (the face and the freckles) are viewed. By contrast, (63b) sets up the mid-scope Part (the face) as the framing level—that is, as the most salient aperture onto the scene through which one views the Featural level (the freckles) as well as the level of the whole (the boy), now somewhat more backgrounded in attention.

7.4 Level of Particularity

Alternative linguistic expressions can refer to essentially the same entity—that is, can evoke in a hearer's cognitive representation an entity of essentially the same identity—with greater or lesser exact particularity. This **level of particularity** ranges over a cline from greater **specificity** to greater **genericity**. With respect to their allocation of attention, alternative expressions accordingly can, by degrees along the cline, foreground more particulars of a referent while backgrounding its more abstract generalities, or they can background the particulars while foregrounding the generalities. In a given context, linguistic specifications made at either end of the particularity cline are often effectively equivalent in the information they convey, since more abstract structure is generally implicit in a detailed reference, while details can be inferred in context from a more generic reference. The difference is that the linguistic setting of the level of particularity draws primary attention to that level, and this cognitive process in turn generally engenders still further cognitive effects. The

brunt of the present category's realization seems generally borne by the *selection* of a particular open- or closed-class form that already directly expresses its referent at the desired level of particularity. There appear to be no grammatical forms whose function is solely to indicate that a referent is to be conceptualized at one or another level of particularity, nor any grammatical forms that trigger a cognitive operation of converting a lexical element's reference from one to another level of particularity. (In this respect, level of particularity is like state of dividedness, treated in section 5.3.)

To illustrate such a selection among alternative closed-class forms, consider that I can say to a person who alone has been balancing a ledger, either *You have made a mistake here* or *Someone has made a mistake here*. *You* identifies the particular agent involved, while *someone*, pitched at a more generic level, solely marks the participation of some agent. Given the context, the use of *someone* does not cause the loss of any inferable information, but it does background, or draw attention away from, the level of specific particularity.

There appears to be a general cognitive linguistic principle that the lack of any explicit naming of some factor makes available cognitive space for the contemplation of alternatives to that factor and, hence, for the deniability of that factor. (This principle is presumably the linguistic counterpart of general defensive psychological processes that provide relief from an unpleasant factor by one or another form of avoidance direct conscious apprehension of that factor.) With the use of *someone*, this "wiggle room" permits the cognitive illusion that the speaker is not squarely directing culpability at the addressee. On this basis, a succession of cognitive effects can build, one upon the other. The distraction of attention away from particularity is the initial cognitive effect. As its concomitant, deniability can be reckoned as a secondary cognitive effect. A tertiary effect of considerateness on the part of the speaker can then enter that allows the addressee a graceful exit off the hook. And, on top of this, a quaternary effect of sarcasm or irony can be intended by the speaker.

For a related example, consider the Yiddish sentences in (64). Taken from a song, (64a) is uttered by a young woman begging off from a young man's invitation to the woods. This sentence is understood in context to refer to a situation that is more specifically spelled out in (64b), though, in another context, it could also refer to the more particularized situation spelled out in (64c). These latter two sentences identify the particular participants in their respective roles. By contrast, (64a) abstracts away

from the situation enough to report only the interparticipant relationship, that one unidentified participant will act on another. Again, given the context, (64a) loses few particulars of information, but it draws attention away from them. Their explicit indication could engender an effect of too starkly calling a spade a spade; their absence has the effect of suggesting delicacy.

(64) a. Me vet zick veln kushn.
one will-3S REFL want-INF kiss-INF
"One will want to kiss another."
b. Du vest mir veln kushn.
you-S will-2S me want-INF kiss-INF
"You will want to kiss me."
c. Mir veln zikh veln kushn.
we will-1P REFL want-INF kiss-INF
"We will want to kiss each other."

8 NESTING

We have seen that grammatically specified concepts largely follow certain organizing principles, namely, spatiotemporal homology, intracategorial conversion, and reverse convertibility. Another such organizing principle is focused on here, that of **nesting**. To a large extent, one grammatically specified concept can occur embedded within another, and that within a third. Alternatively, by an interpretation of nesting that can be called **chaining**, the output of one grammatically specified cognitive operation can serve as the input to another, and the output of that as the input to a third. Discussion of such nesting or chaining is presented separately below for each of the three schematic systems treated earlier.

8.1 Nesting of Configurational Structure

Examples of the nesting of configurational structures have already been presented in connection with (27) and (30). To add to this set, consider now, first for the temporal dimension, the particularly elaborate embedding shown built up layer by layer in (65).

(65) a. The beacon flashed (as I glanced over).
b. The beacon kept flashing.
c. The beacon flashed five times in a row.
d. The beacon kept flashing five times at a stretch.
e. The beacon flashed five times at a stretch for three hours.

To describe these forms in terms of sequenced operations, in (65a), the lexical verb *flash* appears with its basic structural specification as a point-durational full-cycle uniplex event. This undergoes the cognitive operation of multiplexing, to yield the unbounded multiplexity in (65b). This structure then undergoes bounding in (65c). This bounded multiplexity then first goes through the operation of reduction to become schematized as a new pointlike uniplex quantity, and this in turn is multiplexed afresh, yielding (65d). This new unbounded multiplexity is then finally bounded in (65e). The progressive nesting of structural specifications in these five stages can be represented schematically as in (66).

(66) a. !
b. . . . ! ! ! ! ! ! ! ! ! . . .
c. [! ! ! ! !]
d. . . . [! ! ! ! !]–[! ! ! ! !] . . .
e. [[! ! ! ! !]–[! ! ! ! !] . . . [! ! ! ! !]–[! ! ! ! !]]

Analogous to this temporal nesting is the spatial example in (67).

(67) a.	I saw a duck	[. . . in the valley.]
b.	I saw ducks	"
c.	I saw a group of five ducks	"
d.	I saw groups of five ducks each	"
e.	I saw three ponds full of groups of five ducks each	"

With respect to the introductory discussion, note that configurational nesting can be thought of in these two ways: as a dynamic sequential process in which the output of one cognitive operation becomes the input to another, or as a static hierarchical structural complex in which all the conceptual components are concurrently present in their specific interrelations as in a schema. Among the cognitive possibilities, it might be that a conceptual complex like that of (65e) is understood solely in terms of a sequence of operations, as first presented above; or that it involves both this type of dynamic process and the static schematic structure that cumulatively results, like that shown in (66); or that it is understood solely in terms of such a static structure, holistically determined by the co-occurrence of the relevant closed-class forms in the sentence.

Certain correspondences hold between the dynamic and the static interpretations of configurational nesting. The basic element in the dynamic process model—that is, the initial element that acts as input to the

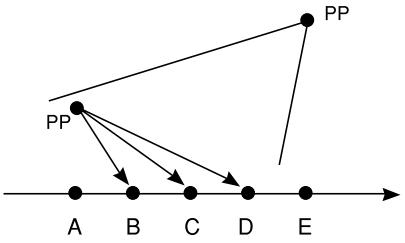
first operation, such as the uniplex point-duration event 'flash' in (65e)—corresponds in the static structure model to the hierarchically lowest (smallest) element, here, any vertical stroke in the schema in (66).

8.2 Nesting of Perspectives

The schematic system of perspective can also exhibit forms of nesting. Consider the case of temporal perspectives, as exemplified in (68) and as diagrammed in (69).

(68) At the punchbowl, John was about to meet his first wife-to-be.

(69)



In this sentence, we can identify a number of distinct perspective points and directions of viewing, both for the speaker and perhaps also for the referent actor, John. Established by the expression *be about to*, the earliest perspective point is that of the speaker—whether personally present or as a fictive projection. This perspective point is located at a point of time ("A" in the diagram) shortly before the point at which John will encounter a particular woman ("B" in the diagram). And the speaker's direction of viewing from that earlier perspective point is prospectively aimed toward that time of encounter. Next, the expression (wife-) *to-be* establishes a second prospective viewing that looks ahead to the time when the woman whom John encounters will be his wife ("C" in the diagram). The originating point of this viewing can be taken either as again that of the speaker, hence coinciding with the earliest perspective point, or as that of John at the time of encounter. Then, triggered by the word *first*, a further prospective viewing, or family of viewings, again most likely originating with the speaker at the earliest perspective point, though possibly otherwise, points ahead to a subsequent wife or wives following John's marriage with the woman at the punchbowl ("D" in the diagram). Finally, a perspective point of the speaker at the present moment of speech ("E" in the diagram) is established by the past tense of the main verb *was*. It is this perspective point at which the speaker's cumulative knowledge of the reported sequence of events is stored as memory and, in turn, which

functions as the origin of a retrospective direction of viewing over the earlier sequence. Thus, nesting in this case involves the inclusion of the earlier perspective points within the scope of the viewing from the current perspective point.

Further, this current perspective point serves as the source of knowledge that is projected back to the earlier perspective points for their seemingly prospective reports. Thus, this case of nesting additionally involves a new cognitive factor, **projection of knowledge**. By this factor, the conceptual content that accrues to one perspective point is projected into the locus of another perspective point to be redirected as if originating from that second perspective point. The main evidence that such a projection from a later to an earlier perspective is conceptually valid is that, in its basic meaning, the sentence in (68) is not understood as making *predictions* but rather as asserting *facts*, ones presented from beforehand but necessarily taken from post facto knowledge.

8.3 Nesting of Attention

Within the schematic system of attention, the category of attentional focus can be used to illustrate nesting. Consider the sentences in (70), which can both refer to the same event of commercial transfer but do so with different forms of attentional focus.

(70) a. The clerk sold the customer a vase.
b. The customer bought a vase from the clerk.

With respect to what holds in common across these sentences, their referents both include two volitional agents, a seller and a buyer, each performing certain actions intentionally. The seller performs such intentional actions as describing, packaging, presenting, and taking payment for a transferred object, while the buyer performs such intentional actions as choosing, requesting, taking possession of, and giving payment for the transferred object. Though these two sets of actions dovetail with each other and, indeed, could scarcely occur alone as sets without their counterpart, still the focus of one's greatest attention may be directed to extend over only one or the other of the two actional complexes.

Lexical forms can signal this distinction. Thus, the English verb pairs *sell* and *buy* are differentially lexicalized for invoking one or the other of these two locations of focal attention. In addition, the grammatical voice forms "active" and "passive" are devices in language for directing focal attention to one or the other pole of a transfer.

Now consider the sentences in (71). Both place primary attention on the buyer, which is expressed as the subject. Yet in certain respects these two sentences differ from each other semantically.

(71) a. The customer bought a vase.
b. The customer was sold a vase.

With its lexical selection of *buy*, (71a) locates focal attention on the buyer in a direct fashion. Accordingly, the buyer's complex of intentional actions seems strongly active, while the seller's role is quite backgrounded. By contrast, with its use of the verb *sell* together with the passive voice, the semantic effect of (71b) seems more complex and indirect, with a primary focus on the buyer but also with secondary attention directed toward the seller. More specifically, though we are in effect "looking at" the buyer and the seller is, as it were, "off stage," it is the seller's complex of intentional actions that seems more strongly active, while the buyer seems more of an inactive recipient. Paralleling the syntactic structure, this semantic effect can be seen as a conceptually nested formation in which focal attention is first directed to the seller by the lexical choice of *sell* but is then redirected to the buyer by the passive voice. If this redirection of attention were total, (71b) would be semantically indistinguishable from (71a), but in fact it is not. Rather, the redirection of attention is only partial: it leaves intact the foregrounding of the seller's active intentional role, but it shifts the main circle of viewing onto the buyer as target. Altogether, then, it can be said that attention on the seller is hierarchically embedded within a more dominant attention on the buyer.

9 FURTHER COGNITIVE CONNECTIONS

Grammatically specified structuring in language appears to correspond, in certain of its functions and characteristics, to the structuring in other major cognitive systems, such as those of visual perception and reasoning. In particular, perhaps the principal overarching function of the structuring common across cognitive systems is that of providing conceptual **coherence**—that is, acting as a means for integrating and unifying a body of otherwise disparate conceptual material. In language and, as suggested later, in vision, this fundamental function has two main global forms of realization: coherence over a scene and coherence through time.

Providing coherence over a cognized scene was the function of grammatical structuring that was originally indicated in the introduction. There it was put forward that the grammatical elements of any particular sentence together specify the structure of the cognitive representation evoked by that sentence. Their specifications act as a scaffolding or framework across which contentful material can, in effect, be splayed or draped. It can be posited that such structuring is necessary for a disparate quantity of contentful material to be able to cohere in any sensible way and hence to be amenable to simultaneous cognizing as a Gestalt. That is, without such structuring, any selection of lexically specified concepts concurrently juxtaposed by a sentence would tend to be only a collection of elements, rather than elements assembled so as to convey an integrated idea or thought complex.

In addition, in the course of discourse, a great welter of notions are expressed in rapid succession, posing the potential problem of an unconnected sequence of ideational elements. But grammatically specified structuring is a principal contributor to the conceptual coherence through time that is requisite here. Through such structuring, a cognitive continuity is maintained through this flux and a coherent Gestalt is summated over time. A language can have a great stock of closed-class elements participating in this function—for example, such English forms as *"yes, but," moreover, nevertheless, besides, instead, also.* Such forms direct the illocutionary flow, specify the "logical tissue" of the discourse, and limn out its rhetorical framework. That is, these grammatical forms establish a structure that extends over a span of time and thus provides a conceptual level with temporal constancy amidst more fleeting aspects of content.

The preceding two global forms of grammatically specified structuring apply over the scope of any single language but—to amplify here on certain observations of section 2—a further form must also be recognized that holds for language in general. While each language has to some extent a different set of grammatical specifications, there is great commonality across languages, so one can posit that each set is drawn from an inventory of concepts available for serving a structuring function in language.

Further, a qualifying property of this inventory can be adduced. It can be observed that grammatically specified concepts range crosslinguistically from ones extremely widespread—perhaps universal—and of broad application within a language, down to ones appearing in only a few languages with minimal application. Thus, the inventory of available

structuring notions that is posited here appears to be graduated with respect to their significance for the language faculty (see the tabular listing of grammatical notions in chapter II-2). For example, the notions 'entity' and 'occurrence' as expressed by the grammatical categories "noun" and "verb" are probably universal and, within any language, of broad application. On the other hand, the conceptual categories of "tense" and "number" (apart from "person") seem to be of mid to high ranking, but not universal. And notions like 'in the morning' and 'in the evening' are expressed inflectionally on the verb in just a few languages.

Perhaps surprisingly, compared to spatiotemporal structuring, the conceptual category of "affect" is rather low in the graduated inventory of concepts that language draws on for structuring purposes. This fact is unexpected, considering the importance of the cognitive system for affect within human psychological functioning. The affect category does have scattered representation, for example 'affection' expressed by diminutive affixes, 'scorn' by pejoratives, 'concern' by a conjunction like *lest*, and 'hurt' by the "adversive" construction (as in the English: *My plants all died on me*.). But seemingly no language has a system of closed-class forms marking major affect distinctions in the way that, say, the modal system in English specifies distinctions of force opposition (chapter I-7).

Such an affect system can easily be imagined, however. Consider a parent addressing a child in danger near an open window. Grammatical systems readily allow the parent to refer to the spatial structure in this situational complex—*Get away from the window!*—leaving the affective component to be inferred. But there is no closed-class form—comparable, say, to a Path satellite like *away* (see chapter II-1)—that expresses 'fear', one that could, for example, be represented by the form *afear* in *Act afear the window!* that would allow the parent to refer to the affective component of the complex and leave the spatial component to be inferred. Comparably, to a child near a freshly painted wall and about to harm it, a parent would likely again express the spatial structure—*Get away from the wall!*—leaving the affect to be inferred. There is no closed-class affect form for 'like/be nice to', which could be represented as *afavor*, that the parent could use instead—*Act aFAVOR the wall!*—thereby leaving the spatial component for inference.

Parallels can now be drawn between the structuring system operating in language and that in visual perception (see Jackendoff 1987a and chapter I-2).[21] The principal function of structure to provide coherence appears

common across the two cognitive systems, and the two global forms of such coherence outlined above for language correspond to comparable forms in the operation of vision.

First, there is a parallel between the linguistic coherence over a *referent* scene and the visual coherence over a *perceptual* scene. The welter of optical sensations registered at any one moment from some whole visual scene is rendered coherent by the perception of structural delineations running through it. For example, one looking at, say, the interior of a restaurant from one corner of the room does not see simply a pastiche of color daubs and curves but, rather, perceives a structured whole that includes the framework of the room, the spatial pattern of tables and people, and the individual tables and people themselves. And seeing a person in some posture involves perceiving a structural framework in the human figure, along the lines of the abstracted "axes of elongation" described by Marr (1982). Children's line drawings of scenes and stick-figure sketches of people, animals, and objects (Kellogg 1970) demonstrate our early capacity to abstract structure from visual scenes and scene parts.

Second, one can observe a parallel between the coherence through time in linguistic discourse and that in visual perception. If the viewer in the illustrative restaurant now walks through the room, the patterns in which visual stimuli and the perception of structure change give rise in turn to the perception of a coherent continuity of path and view occurring within an overall "scene-structure constancy."

It is reasonable to assume that, in addition to these language-vision parallels in global structuring, a number of particular structuring devices match across the two cognitive systems. Perhaps most of the grammatically specified schematic categories treated in this chapter—including, for example, state of boundedness and level of exemplarity—correspond to structuring factors in visual perception. Further, the three schematic systems seen to apply broadly to cognitive organization in language—configurational structure, perspective, and distribution of attention—seem to correspond, as whole systems, to counterparts in visual perception.

Still further parallels can be seen between language and vision in the properties of their structuring. Thus, the topology-like character of grammatical specifications may have some parallel in the character of the perceived delineations of a scene, or the internal structure of a figure, or the plan of a path to be followed through obstacles. Such perceptions of

structure seem in certain respects to abstract away from Euclidean particularities of exact magnitude, shape, or angle, and more to involve qualitative or approximate spatial relationships (see chapter I-2).

As a further parallel, the capacity of grammatical specifications to nest, one within another, and form embedded structuring seems to correspond to embedded structuring within a visual scene. Thus, the structure of the restaurant scene above involved a multiple embedding. This consisted of an overall framework, the pattern comprised by all the tables and people, the individual tables and people, and perhaps further the skeletal structure sensed within each table and person.

All of the preceding has outlined a set of structural parallels between language and vision. But, significantly, each of these two cognitive systems has prominent structuring devices that play little or no role in the other system. Thus, in visual perception, three major parameters that structure (parts of) a scene are bilateral symmetry, rotation, and dilation (expansion or contraction) (Gibson 1966, Palmer 1983) and, if color can be treated as structural, it is a fourth. In language, by contrast, grammatical specification of symmetry is minimal, perhaps limited entirely to the notion 'reciprocal'. Closed-class indication of rotation is limited in English to the prepositions or verb satellites *around* and *over* (*The pole spun around/toppled over*), and it is barely augmented in other languages. Dilation is grammatically expressed in English by the verb satellites *in* and *out* when referring to radial motion (*spread out/shrink in*) and, again, such notions are not particularly elaborated in other languages. And color, of course, was this chapter's original example of a conceptual category *not* grammatically specified.

In the other direction, there are several prominent linguistic categories of seemingly little structural function in visual perception. Examples are "status of reality," as expressed, for example, by inflections for mood, "status of knowledge," as expressed by evidentials, and "comparison of alternatives," as expressed by a category of particles that includes *instead, only*, and *also*. Further possible examples are "relative temporal location," as expressed by tense markings, "degree," as expressed by adjective inflections and modifiers (for example, English *-er, -est, almost, too*), and "force dynamics," as expressed by modals (see chapter I-7).

While language may not share these conceptual structuring categories with visual perception, it may well share some of them with other cognitive systems. Consider again any language's closed-class category of evidentials representing a schematic category of "status of knowledge" with

such member notions as: 'known from personal experience as factual', 'accepted as factual through generally shared knowledge', 'inferred from accompanying evidence', 'inferred from temporal regularity', 'entertained as possible because of having been reported', and 'judged as probable'. This linguistic category is very likely related to a category of comparable structural factors in our cognitive system for reasoning and inferencing.

Generalizing from these and related findings, the possibility is that each major cognitive system has some conceptual structuring properties that are uniquely its own, some properties that it shares with some cognitive systems but not with others, and some properties that run in common through all the systems. This is the overlapping systems model of cognitive organization described in the introduction to this volume. Determining the overall and particular character of conceptual structure is the aim of the research advanced in the present chapter, one requiring a cooperative venture among the cognitive disciplines.

Notes

1. This chapter is a substantially revised and expanded version of Talmy 1988b. That paper, in turn, was a greatly revised and expanded version of Talmy 1978c. Talmy 1977 was a precursor to the 1978 paper.

2. The word "evoke" is used because the relationship is not direct. The CR is an emergent, compounded by various cognitive processes out of the referential meanings of the sentence elements, understanding of the present situation, general knowledge, and so on.

3. More recently, research on different aspects of this broader scope has included work by Jackendoff (1983), Bybee (1985), Morrow (1986), Langacker (1987), and Slobin (1997).

4. A few notes on our terminology are in order. Below, the terms "lexical" and "open-class" are used interchangeably, as are the terms "grammatical" and "closed-class." For consistency, accordingly, the term "grammatical category" has been used here instead of the more usual "lexical category." The grammatical category of, say, "noun," of course refers not to any collection of particular nouns, but to the abstracted status of "nounhood" per se.

5. For example, augmentative and diminutive elements, insofar as they refer to size, rather than, say, affective qualities, seem to specify size relatively greater or lesser than the norm for the particular object in reference. And closed-class elements specifying distance—like English *just* or *way*, as in *just/way up there*—specify notions of 'near' and 'far' relativized to the referent situation.

6. The property at issue here is that of "manifested Euclidean shape," distinguished from that of "intrinsic topological form" because, although closed-class forms are largely neutral to the former, they can be sensitive to the latter. For

example, the Korean numeral classifier *chang* refers to an object whose intrinsic form is planar, regardless of its currently manifested shape. Thus, the classifier can be used in referring not only to a flat sheet of paper, but also to one that has been crumpled into a wad, if the speaker wishes to attend to the object's intrinsic planar form rather than to its current spheroidal shape. (See Oh 1994.)

7. If the so-called idealized form of the schema is understood simply as one alternative within a family of shapes for that schema, the term "shape-neutral" remains appropriate as the name for the schema's property. But if that idealized form is taken as being somehow basic, or unmarked, it might be preferable to say that the schema is *deformable* and exhibits the property of *plasticity* in accommodating to a referent's shape.

8. It is apparently also the case that no "proper verbs" or "proper adjectives" exist. Thus, it seems there could never be a verb like "to Deluge" referring uniquely to the so-conceived spatiotemporally bounded event of the biblical flood, as in some sentence like: *After it Deluged, Noah landed the ark*. And it seems there could never be an adjective like "Awareawake" conceived to refer uniquely to the quality of Buddha's enlightenment at its specific time and place, as in some sentence like: *Buddha became Awareawake under the Bodhi tree*. Note that although a verb like *Manhattanize* and an adjective like *Shakespearean* do include reference to a specific spatiotemporal entity, their reference as a whole is not unique, since an act of Manhattanizing can be performed many times, and many actors and/or plays of a certain style can be called Shakespearean. Thus, while such observations show that token sensitivity is not available for all open-class types, it is at least available to nouns, and it is certainly excluded from closed-class forms.

9. Perhaps this reconceptualization—together with the syntactic reformulations that correspond to it—has functioned as the model for such features as the English passive marked with *get*, as well as for the marking in Italian of the Agent in a passive with *da* 'from'.

10. In some cases, a reified deverbal noun is frozen in construction with only one verb or permits extension to just a few further verbs. Such a form can exhibit the usual grammatically marked cognitive operations but not the wide range of spatial manipulations. An example is the action-specifying verb *(to) bow*, whose deverbal noun *(a) bow* constructs mainly with *take*. Thus, one can observe such grammatical parallels as *I bowed (once)/I took a bow*; *I quickly bowed several times/ I took several quick bows*; *I bowed time after time/I took one bow after another*. A slight degree of spatial manipulation can be seen in sentences like *I directed a bow at the chair of the funding committee*. But wider spatial manipulation is not seen. Thus, there is no **I spread/swept bows across the front row of the audience*, or **I distributed bows to select members of the audience*.

11. As a possible counterpart to the preceding typology for reference to physical entities, there may be a two-category typology for the most characteristic form of lexicalization that a language uses to refer to actions. The predominant language type characteristically uses verbs to refer to actions. But some languages—including many of those in New Guinea and Australia—refer to most actions with

a nonverb class of forms, forms that merely enter into construction with the true verbs of a small closed set.

12. The lexical types for several of these intersections, it should be noted, do have traditional terms. Thus, nominal forms of the a, A or A′, and B′ types, respectively, have been called count nouns, collective nouns, and mass nouns. Verbal forms of the a, A or A′, and B′ types, respectively, have been called punctual, iterative, and durative verbs. The matrix presented here augments, systematizes, and generalizes the traditional notions.

13. This category can be considered a generalization over the earlier category of **state of boundedness** by the inclusion of the **uniplexity** notion. It can in turn itself be generalized—becoming the category *pattern* **of extension**—by the further inclusion of such notions as a quantity bounded at one end but unbounded at the other (see chapter I-3).

14. This category clearly patterns with the preceding five within a single system of notions, one that would be an expansion or generalization over **disposition of a quantity**.

15. Our main purpose here is to note the shift in structural distribution type. The shift in content will doubtless prove part of a larger pattern as well, but this is not yet worked out.

16. The use of the perfect in the synopticized (46b) form is noteworthy, pointing to a principal function of perfect forms in general. This is to indicate temporal containment—that is, the collective inclusion of action or events within a bounded extent of time (indeed, the perfect in general seems to involve a temporal span bounded at both ends). In this respect, the perfect semantically parallels the concept of spatial containment: the collective inclusion of matter or objects within a bounded extent of space. The frequent crosslinguistic occurrence of a 'have'-type verb marking the perfect may evidence a metaphorization of containment from space to time. Thus, spatial containment forms like those in (i) seem paralleled by a perfect construction like that in (ii), for which certain paraphrases, like those in (iii), suggest the parallelism more directly.

(i) a. There were five aspirins in the box.
    b. The box had five aspirins in it.

(ii) I have taken five aspirins in the last hour.

(iii) a. There were five aspirin-takings in the last hour.
      b. The last hour had five aspirin-takings in it.

17. Langacker (1987) distinguishes a pair of temporal factors comparable to the "referent time" and "viewing time" described here, but he identifies this second type as that of processing sequence. It seems preferable, however, to identify viewing time as one further schematic category, first because it can be directly specified by closed-class forms, and second because little is known of how the neural processing relevant to this linguistic category might actually proceed.

18. The two semantic functions conflated within the first NP can also appear separately in two different NPs. That is to say, all three of the semantic functions

indicated here—(a) the identity of a quantity, (b) a portion-excerpting of that quantity, (c) the form of that portion—can be separately represented by three distinct NPs together in a construction, as in:

(i) a clustering (c) of a set (b) of trees (a).

Many lexical items conflate the specification of two or all of these functions at once. Thus, conflating (c) and (b) is a *cluster*, 'a clustering form of a set', and a *drop*, 'a small globular form of an amount [of a liquid]'. A lexical item conflating all three types of notions is a *grove*: 'clustering form of a set [= cluster] of trees', and another such lexical item is a *tear*: 'small globular form of an amount [= drop] of lachrymal fluid'.

Container-contained expressions like *a can of nuts* or *a cup of coffee* that resemble the original construction can be incorporated into the present analysis by adding to the preceding series a fourth (d) term for the container. Then the third term for the form of the portion of material must be understood to correspond to the shape of the container. For example, the expression *a cup of coffee* with two nominals and one apparent relation can more analytically be understood to designate the expression in (ii) with four nominals and three relations.

(ii) a cup (d) containing a cup-interior-shaped form (c) of an amount (b) of coffee (a)

19. A pattern involving the presence or absence of ambiguity as to quantification holds throughout the list and can be illustrated with the (a) forms. For the plural form *oysters*, the plural form *siphons* is ambiguous as to whether there are one or more siphons per oyster. All the other combinations unambiguously indicate the number of siphons per oyster. Thus, with plural *oysters*, singular *siphon* indicates one siphon per oyster (though there is no comparable way to unambiguously indicate plural siphons per oyster). And, with singular *oyster*, the grammatical number of *siphon* unambiguously indicates the number of siphons per oyster. Thus, the exemplar form is always unambiguous in this regard—one of its advantages over the full-complement form.

20. The difference between *each* and *every* arising in this analysis can now be added to those observed elsewhere (for example, Vendler 1968). *Each* is the exemplar counterpart of the full-complement expression *all the*, but not of *all* without *the*. Accordingly, **Each oyster has a siphon* cannot function as a generic assertion. *Every* is not as unilaterally aligned in this way but does serve more naturally as the exemplar counterpart of *all* without *the*.

21. Clearly, the language-related faculty of the brain evolved to its present character in the presence of other already existing cognitive domains, including that of vision, and no doubt developed in interaction with their mechanisms of functioning, perhaps incorporating some of these.