

Charles Fillmore and Paul Kay

Construction Grammar

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CHAPTER 1

Preliminaries

1.1 Introduction

A grammar is a part of the system of knowledge that language users put to use when they produce or interpret TEXTS. By the term TEXT (or LINGUISTIC TEXT) in this context we refer to any actual or potential product of the activity of speaking or writing, including novels and speeches, memos and whispered sweet nothings, and the letters we could have written and the clever things we might have said. In the general case, any speaker of the language in which linguistic texts are produced is able to provide INTERPRETATIONS of them in ways that are at least partly based on the FORM of the texts – i.e., the words that are used, the manner in which the words are grouped, as well as features of pacing, emphasis, tune, and the like. The phrase ‘at least partly’ is to recognize that many aspects of text interpretation depend on features that fall into the general category of ‘context’ and depend only indirectly, or not at all, on the language’s grammar as such.

Linguists try to understand all aspects of the relationship between the production of texts – including contextual factors – and the interpretations that can be given to the texts by members of the language community within which the texts are produced. Such relationships can be mediated by conventions of usage that are independent of conventions of grammar, by the employment (on the part of the producer) and the recognition (on the part of the interpreter) of conversational strategies of various sorts, by shared beliefs or perceptions on the part of the communicators that provide implicit contexts for what is being said, and even at times by an interpreter’s

recognition of unintended revelations on the part of the producer – the ‘symptomatic’ rather than the ‘symbolic’ aspect of communication using linguistic signs. We tell you to break a leg just before you go on stage because doing so will bring you luck; we ask you a question to which we know that you know the answer in the hope that you will consider the consequences of that information (“Was I born yesterday?”); we infer from your tone of voice that your words contradict your true feelings.

GRAMMARIANS in particular are interested in those narrower aspects of the relationship between the form of a text and the interpretation people derive from it which are regulated by the kinds of conventional knowledge that came with learning to speak that language. We speak of such knowledge as comprising the GRAMMAR of the language, and we see the grammar as incorporating the relationships (i) between words (or morphemes) and their conventionally assigned meanings, and (ii) between the patterns of organization of words (or word-parts) and the manner in which such patterns figure in the structuring of interpreting of texts. The parts of a text include at the smallest level the elements that simply belong to the lexicon of the language – things that language learners simply have to know, like individual morphemes and morphologically simple words – and well-formed combinations of these (complex words, phrases, full sentences, etc.) which we will say are LICENSED by the grammar. In this course we will devote a lot of attention to the kinds of knowledge language users have about the primary elements, and the ways in which this knowledge is used in licensing the complex parts of well-formed texts.

In speaking of texts and grammars and their relationships, we are making a large number of simplifying assumptions: that the grammar a person learns is stable and consistent, that the grammars of individuals who communicate regularly in their language are identical, that the texts which communicators produce and interpret are the products of such a stable and

homogeneous grammar, and so on. Any serious theory of language must in the end take into account the realities that speakers may acquire more than one dialect, that in a number of subtle ways languages are continually changing, that speakers (for whatever reason) often have honest disagreements regarding either the interpretation or the acceptability of presented utterances, and that people speaking what seems to each of them as the same language often do not understand each other. For most of the judgments that will concern us in this book, such differences – we would like to believe – will not play an important role. Behind the vaguenesses and indeterminacies in certain areas of linguistic judgment, there remains an impressive amount of certainty and stability in the grammar of any language, and most of what we will busy ourselves with here will be of that kind.

The study of human languages offers problems not found in a great many communication systems, the first of which is that while all normal speakers know how to use their language, very few could even begin to describe how it works. Writing a grammar of our own language, in other words, is a great deal more than simply writing down things that we already clearly 'know'.

In some communication systems, the relation between text and interpretation is simple and straightforward. In the extremely artificial and inefficient code that we can refer to as the Papal Conclave Smoke Signal system (which was last put to use – twice – in 1978), there is, let us say, a precise and explicitly known 'codebook' which allows interpreters on the piazza outside the Sistine Chapel to know that when black smoke is emitted from the chimney after a balloting, the attempt to choose a new pope has not yet succeeded, and that when white smoke is emitted, that is a signal that a new pope has been chosen. Users of the codebook see a puff of white smoke, look up *fumata bianca* in their codebooks, and read off the interpretation *habemus papam*. There are vaguenesses and

indeterminacies in the operation of this code, but not in the code itself. The priests tending the fire inside the chapel may not always do what needs to be done to create the right kind of smoke, the weather outside may cause the smoke to be too quickly dissipated, with the result that the interpreter may not know whether a sighted flow of smoke is supposed to be seen as white or black. But the code itself is precise and explicitly knowable, being a conscious product of human invention.

In the case of the Papal Conclave system, it was possible to imagine the existence of a precise codebook, and to imagine what information such a codebook could contain. We can KNOW what the code is. But in the case of human language, we find it necessary to make a distinction between two sorts of 'knowing' - implicit and explicit. The users of a language 'know' the code (implicitly), in the sense that for the most part they can successfully communicate with each other by means of it. But, notoriously, the people who use a language every day of their lives are hardly ever able to say anything reliable about what it is that enables them to do this; and most of them will never in fact find any reason to be troubled by, or even to become aware of, such lack of knowledge.

This means that before we begin thinking about the workings of the grammar of our language, we may have to convince ourselves that there are things to know that we don't already know, and we have to become willing to learn or devise precise ways of discovering and describing such things.

What kinds of things do we need to talk about, and what terms and notations can we use to express what needs to be? We need, first of all, to recognize different kinds of WORDS,¹ since some of the generalizations we will need will be generalizations over WORD CLASSES. For English we will certainly need to distinguish ADJECTIVES, NOUNS, and

¹ Let us agree to postpone until later questions about the theoretical status of the concept 'word'. For most purposes, in most languages, it is fairly straightforward and non-controversial.

VERBS, for example. We will soon come to realize that the kind of information we need to recognize about individual words can be subtle and complex and richly structured.

Secondly, we need to recognize certain ways of forming PHRASES in the language, and we need to devise some means of describing or classifying the many varieties of phrases. We know that when the adjective *wet* and the noun *clothes* are put together into a single phrase in such a way that the adjective PRECEDES the noun, the result is a particular kind of modified noun, an expression in fact which designates something which joins the property of being clothes with the property of being wet. We know, furthermore, that while the order we find in *wet clothes* gives us an acceptable modified noun, the order in **clothes wet* does not: a description of the combinatorial principle which yields an adjectivally modified noun phrase in English requires mention of the order Adjective + Noun. Wherever we find that order reversed, as in *House Beautiful* or *notary public*, we feel that somebody owes us a special explanation for those phrases.

It is important to realize that the principle just suggested is a fact about ENGLISH, rather than a fact about LANGUAGE, since the ordering requirements can differ from language to language. Compare Spanish (*ropa mojada* 'wet clothes'), where the adjective *mojada* 'wet' follows the noun *ropa* 'clothes'.

The word *wet* applied to *clothes* can occur in another grammatical pattern, as in the sentence *My clothes are wet*. This time we have, not an expression designating some object, but a description of a state of affairs which takes the form of a grammatical CLAUSE containing a SUBJECT and a PREDICATE. In addition to names of CLASS or CATEGORY concepts as word types and phrase types, we find that we will also need names of the relations that words or phrases have to the larger structures which contain them; we refer to such relations as FUNCTIONS or ROLES. Thus in the MODIFIED NOUN structure we will need to be able to identify the roles MODIFIER and HEAD. In the clause just presented,

we need to identify the phrase *my clothes* as having the function SUBJECT, and the phrase *are wet* as having the function PREDICATE.

In addition to using the names of CATEGORIES and ROLES (or functions - we intend no distinction between these two terms), we will often need to speak of particular DEPENDENCIES between elements related to each other within given types of phrases. While the Spanish word *ropa* is singular, the English word *clothes* is plural. As grammatical consequence of these facts we see that the predicate phrase in the English clause is *are wet* rather than *is wet*, and that the modifier in the Spanish *ropa mojada* is *mojada* (SINGULAR) rather than *mojadas* (PLURAL). In describing such dependencies we frequently need to speak of GRAMMATICAL FEATURES (such as singular vs. plural) which characterize particular words (notice that *clothing* is singular and has no plural form, and *clothes* is plural but has no singular form), but are often not limited to particular word classes (such as noun, verb, or adjective).

In doing syntax, we find that we need to create and justify a technical vocabulary and a formal notation for describing and displaying the principles we discover. As we have just seen, even for describing some elementary properties of extremely simple English and Spanish phrases we have needed (1) NAMES OF CLASSES OF LINGUISTIC OBJECTS (VERB, MODIFIED-NOUN, etc.), (2) NAMES OF PROPERTIES OF LINGUISTIC OBJECTS (SINGULAR, etc.), and (3) NAMES FOR THE FUNCTIONS WHICH SOME LINGUISTIC OBJECTS SERVE INSIDE LARGER LINGUISTIC OBJECTS (MODIFIER, PREDICATE, etc.). We will shortly present the mechanisms for expressing the needed COMBINATORY (PHRASE-FORMING) PRINCIPLES and the means of showing ELEMENT-TO-ELEMENT DEPENDENCIES.

The terminology we introduce will grow very fast, we will need to keep track of this growth, and we will wish to be able to define and justify each of the terms we find ourselves using

at each point. In the cases we have seen so far, and in many others, we of course won't have to invent the terminology we need – since after all we're not the first ones to look at these phenomena – but there will be times when we have to go beyond the tradition.²

The description of a grammar of a language can be called successful when it becomes possible, with such a description, to represent, in a precise way, any interpretable sentence in the language as the product of the grammatical resources of that language and to show, with reference to this same grammar, the impossibility of constructing or interpreting sentences which do not belong in the language. That is, in claiming that a grammar recognizes *Kim loves chocolate* but not **into danced whether* as sentences of English, we mean that the grammar contains the means of producing the first but not the second. A grammar that meets these conditions can be classified as GENERATIVE.

We will be satisfied with the technical resources at our disposal, and with our use of them, if they allow us to represent, in a perspicuous way, everything that we consider to be part of the conventions of the grammar of the first language we work with. We will be happy if we find that a framework that served us well for the first language we examined also performs well in representing grammatical knowledge in other languages. And we will be downright rapturous if we can convince ourselves that the formal frameworks that we rely on for doing linguistic descriptions have a reality of their own, i.e., that they can themselves be interpreted as reflecting universals of human experience, or as

² Hardly any of the terminology introduced in this book will be actually unique to this approach. In addition to the school-grammar traditions, we borrow heavily from several modern theoretical orientations, mostly within one or another branch of the broad 'generative grammar' tradition that originated in Noam Chomsky's work of the 1950's.

providing insights into the nature of innate human cognitive capacities.

In this course we will not seek such ultimate rapture, since we will need to work fairly hard to convince the reader, and to assure ourselves, that we at least know how to deal with certain ground-level observations, for a small number of domains, in those few languages that we think we know something about. But we will always have, in the back of our minds, a concern for the ultimate question of the extent to which the tools, concepts, and principles that we need for our work can be read off as claims about some properties of the human mind.

1.2 The Data for Syntax

Our goal is that of seeing certain regularities observable in linguistic texts as evidence of grammatical knowledge. One of our problems, already mentioned, is that of knowing which of the regularities we find in texts can be accounted for as explained by the grammar and which are explained by other things. But first a different problem: how can we be sure that we have on our hands the kind of data that we can trust as being products of the linguistic abilities we are seeking to characterize?

There is a respected view in the history of linguistics that the material we use in grammatical analysis should be limited to **ATTESTED UTTERANCES** – things that speakers of the language have produced in the natural course of using language. Such data can be referred to as **CORPUS DATA**. There is in some quarters an attitude that only corpus data can be regarded as truly authentic, since otherwise we are limited to the guesses and intuitions of the grammarian.

Concern for this sort of 'authenticity' takes at least two quite different forms. One group would have it that we should concentrate on **EDITED WRITTEN LANGUAGE**: it's too easy for people to make mistakes when they're just speaking in a natural setting, or whenever they're writing for the purpose of

communicating something urgent and hence can't really take the time to be careful. The idea underlying such a commitment is that if we need corpus evidence for LINGUISTIC COMPETENCE as such, we have to make sure that we have eliminated all of the things that can go wrong in LINGUISTIC PERFORMANCE – stuttering, running out of breath, forgetting what you started to say, changing what you intended to say mid-sentence, and so on. The producers of texts usable for linguistic analysis should have made the effort to guarantee that what they have said or written really represents a careful use of their linguistic skills. Traditional grammars of English limit their examples to passages from accredited great literature.

Another and opposing group would have it that when we are composing what we write carefully and self-consciously, we subdue our natural linguistic intuitions to the numerous extraneous rhetorical inventions and stylistic conventions that characterize written language, and what results is not reflective of the language we have in our bones. Researchers who take this view would recommend limiting the data over which we make generalizations about grammar to the things that people say to each other when they are least linguistically self-conscious, when their language is merely a tool for communicating, and when they are personally engaged in what they are talking about. Monstrosities like "Whom shall I say is calling?" occur only in the lips of someone who is trying to accomplish something unnatural.

It is interesting that these two views give opposite importance to discourse about things that matter to the conversants. (1) When engaged in urgent conversation, you can't take time to be careful in how you say what you say, so such talk can't provide reliable evidence of how the grammar is supposed to work. Or, (2) when engaged in urgent conversation, you can't bother with the artificial trappings of the written language, and so you have to depend on using the language in the most natural way. Since it seems that *both*

sides have a point, what we really need is a grand theory that will allow us to understand the nature of performance errors, the artificialities of self-conscious speech and writing, and the prescriptive principles invented for creating language socially considered 'good' and 'correct'. We have to filter out all of this to find out what is the 'real' language.

Sometimes linguists use ELICITED data, especially in cases where we are looking for evidence on a particular point of grammar and are impatient to wait for the critical piece of data to emerge in natural talk. Elicitation can sometimes be quite informal: the linguist describes a scenario and asks the informant what the most natural thing to say in such-and-such a situation would be. There are always problems with such probes, of course, since it's not possible to be sure that the situation the linguist had in mind in setting up the question is the situation that the informant understood in giving the response. But for working with a language or dialect which is not one's own, elicitation in one form or another is indispensable.

A traditional data-collecting method, for most practicing linguists dealing with areas of language in which uncertainties remain, is to ask speakers to make judgments about the interpretation or acceptability of presented utterances. Can you say this? Would you say this? Do you have this expression in your dialect? Negative answers to these questions are of particular importance, since they make it possible to recognize the limits of linguistic generalizations. From a corpus it is not possible to derive negative evidence, since no conclusion can be drawn from the absence of a given expression in a corpus.

Suppose that in a huge corpus of spoken and written English I have never found the verb *resemble* used in the passive voice. Do I have the right to ask speakers of English if they would accept *My uncle Harry is resembled by John* as an acceptable paraphrase of *John resembles my uncle Harry*? If they say no, can I trust them? Obviously, we have to be able

to ask questions like this, but unfortunately, people are simply notoriously poor judges about what they would say in imaginary contexts. Every linguist has anecdotes about informants who denied the possibility of a particular utterance in a particular context but who were heard to use it in exactly that context only a few minutes after the denial.

The most common source of data for the average practicing grammatical theorist is simply, in the case of doing linguistics for one's native language, INVENTED EXAMPLES which are accepted or rejected without question. The reasoning is something like this: 'I am a speaker of English, so I know as well as anybody what the sentences of my language are like. I know the kind of data I need, so I'll just make up something and decide for myself if I like it. If people disagree with me, all that means is that they don't speak my dialect.'

The biggest disadvantage of dreaming up our own examples is that it is too easy to lose track of what it could mean for the sentence we've just produced to be an actual utterance in our language. We are concentrating so much on seeing a sentence as an example of some rule or principle that we ignore what the sentence actually means. Most linguists brought up on Sapir's *Language* read with appreciation his subtle analysis of the English sentence *The farmer kills the duckling*, but few of us noticed how much work it would take to construct a setting in which this would be a natural and appropriate thing to say, and to realize that the knowledge that enables us to construct such a setting, far-fetched or otherwise, has to be taken as a part of the interpretation of the sentence. (The reader is invited to try to find a natural context for Sapir's duckling sentence, keeping in mind the fact that it is a *present tense* sentence and the object of kills has the definite article, *the*.) This case is not particularly harmful, because Sapir's intentions were to display the elementary syntactic structure of that sentence and the semantic and morphological properties of its words and its grammatical features,

comparing these with the closest translational equivalents in other languages.

Dramatic evidence of the fact that self-conscious discourse about language destroys the ability to understand the language is the common practice in beginning textbooks in formal logic to use a sentence like *A man walks* for demonstrating a predicate-logic translation of ordinary grammatical notions in English. The treatment of this sentence as an artificial logical statement using English words ends up giving an absurdly incorrect analysis of the sentence as a possible utterance in natural English.

For such a grammar-to-logic exercise it is important to have an intransitive verb, because in the first lesson you don't want to have to introduce the complexities of many-place predicates, so *walk* ought to be a good verb to use. It is convenient to have a simple present-tense form, interpreted as a general truth because the problems introduced by tense and aspect are way beyond what one would want to talk about in the first logic lesson. You want a singular count noun as the subject of such a sentence because predicate logic is based on a universe of individuated entities. And you want that subject to be indefinite, because the discourse properties of the English definite article don't belong in a beginning logic lesson. The sentence is taken, by specific interpretations of each of its words, as the English language version, said to be quite regular, of a logical expression that would translate as 'there is something which is a man and which walks.'

Now if we were to ask the question of whether the sentence *A man walks* could conceivably be used as an ordinary sentence of English, we would have to work pretty hard.

We would have to explain why *walks* is used, without any modification, in the simple present tense. It would be natural to include a manner adverb (*walks with a limp*), or to include a destination plus some indication of iterativity (*walks to work every day*); but to have the verb all by itself, in the simple

present tense, more or less requires us to think of reference to walking as specifically presenting a contrast with other means of locomotion: flying crawling, riding, etc.

Why is *man* used in subject position with the indefinite article? Under what conditions does English allow indefinite subjects? Indefinite subjects occur in definitions (*A man is a human male adult*), or in sentences expressing appearance on a scene or in someone's perceptual experiences (*A man appeared in the doorway*), or as identifying a generic man, in contrast with something which is not a man – for example, a woman, a child, a beast, or a god (*A man wouldn't have done that*).

Since the context seems only to allow the contrastive generic interpretation of *a man* and a contrastive generic interpretation of *walks*, it would appear that the only possible interpretation of our sentence is one which requires a context in which someone has pointed out (say) that fish swim and that birds fly, and the speaker wishes to add to this list of generalizations, that *a man walks*. But such an utterance cannot have the meaning that the logic lesson was supposed to associate with it. When put in the only imaginable context which will welcome it, the sentence simply cannot mean that there is a man who walks; it means that all men walk.

An inescapable result of this exploration of the use of linguistic examples in making generalizations about grammar and meaning is twofold: that we have to pay attention to how language is actually used in real communication contexts, AND that at bottom we have to rely on native-speaker intuitions, in spite of the undeniable fact that such intuitions cannot always be relied on in the artificial context of a university classroom. We cannot set up simple rules about data appropriateness.³

³ Appeal to native-speaker intuition is the bottom line. If we complain to committed corpus linguists that a corpus that we have been offered doesn't contain evidence on some particular question, they will usually tell us that that's because the corpus simply isn't large enough: we need a bigger one. But our only reason for knowing

1.3 Grammatical Constructions

It is usually said, in descriptions of generative grammars, that a primary satisfaction criterion for such a grammar is that it can distinguish well-formed sentences in the language from objects which are not well-formed sentences in the language. Shifting the emphasis a bit, we would rather say that a grammar is a repertory of the formal resources which enable speakers to produce or to understand any linguistic expression in their language. Any linguistic expression which is not 'in' the language, is not licensed by the grammar, and any linguistic expression which is ambiguous can be analyzed in more than one way by the grammar. (Our use of 'linguistic expression' rather than 'sentence' represents a generalization of the usual formulation of the grammarian's goal.)

One aspect of the description of a linguistic expression which a grammar provides is that of its CONSTITUENT STRUCTURE. The rest of this chapter is devoted to the nature of constituent structure and to the means of assigning constituent structure interpretations to linguistic expressions.

Theories of grammar fall into two large classes, according to the manner in which they recognize the syntactically relevant elements of texts and the ways in which such elements are related to each other. DEPENDENCY GRAMMARS see the individual words (for some purposes, the individual morphemes) as the primary relation-bearing elements in sentences, whereas CONSTITUENT-STRUCTURE GRAMMARS begin by seeing sentences as segmentable into their major parts, these as segmentable in turn into their own major parts, and so on. Within theories of grammar which recognize the constituent structure organization of linguistic

that we need a larger corpus is that we know, intuitively, that some facts about the language are not evident in the corpus. That is, we necessarily rely on our intuition about what we know to be true about the language in order to form the judgment that a given corpus is inadequate!

expressions, words are simply the smallest relevant constituents. Believing that the insights of the dependency grammarians concerning the 'governing' properties of individual words can be incorporated into constituent structure representations, but that facts about constituent structure are not naturally representable within dependency grammars, we align ourselves with grammars that use constituent structure representations.⁴

In the approach to grammar taken in this course, the information or knowledge that constitutes a grammar can be broken down into separate pieces which we call CONSTRUCTIONS. We can start out by thinking of grammatical constructions as plans or patterns for combining words into phrases, smaller phrases into larger phrases, and so on. Phrases which stand on their own, that is, which are not parts of still larger phrases, are SENTENCES.⁵ Hence, as

⁴ There are, to be sure, languages in which constituent structure as such – that is, the regulated fixed linear structure of phrases – plays a very limited role in the organization of sentences. For such languages, the phrase-forming mechanisms of the kind we will soon be describing will be few in number.

⁵ As a preview of the kind of terminological care that we will have to show in this area is the knot of problems connected with the words PHRASE, CLAUSE and SENTENCE. In ordinary usage, the word PHRASE indicates something that (i) contains more than one word and (ii) is a part of something else. Following modern usage in the generative tradition, we will use the word PHRASE to refer to any whole syntactic element, including single words at the small end and whole sentences at the large end. In ordinary usage, the word SENTENCE indicates a phrase (as just defined) which is not a part of another sentence. Following modern usage in the generative tradition, we will use the word 'sentence' to refer to any phrase capable of being a sentence (in the ordinary usage), even if it is a part of another sentence. (The expression *she loves me* inside the sentence *I doubt that she loves me* is a sentence by the modern definition, but not by the traditional definition.) The word CLAUSE will be used here to refer to any complete phrase containing a subject and a predicate, independently of whether it

presently conceived, the patterns that may exist for combining sentences into larger structures ('paragraphs' or whatever) are not to be included in the set of grammatical constructions.

Descriptions of the plans or patterns that organize words into phrases and sentences - constructions - will always include information about linguistic form (SYNTACTIC INFORMATION) and will typically include information about meaning (SEMANTIC INFORMATION). They sometimes mention particular words (i.e., they contain LEXICAL INFORMATION) and in addition contain information about the uses to which the pieces of language that they license can be put in actual conversation (i.e., they may contain PRAGMATIC INFORMATION). The representation of constructions given below in this chapter will be mere approximations to the view we intend to communicate about full-fledged construction descriptions. Here we concentrate on constituent-structure organization, characterization of constituent types, and some matters of constituent-to-constituent compatibility.

1.3.1 Representing Constituent Structure

A sentence is not merely a sequence or a set of words. This amounts to saying that the constructions of a grammar do not provide recipes for combining individual words directly into sentences. Rather we have constructions that provide recipes for combining words into phrases, constructions that provide recipes for combining phrases into still larger phrases, and constructions that provide recipes for combining phrases (including, sometimes, single-word phrases) into sentences.

could occur freely as a free 'sentence' or not. In this usage, the bracketed expression in *I resent [everybody making fun of our president]* constitutes a clause, though, since it lacks a tense, it could not stand alone as a sentence.

The hierarchy of phrases that makes up a sentence is that sentence's constituent structure and each word and phrase in a sentence is a constituent of the sentence. Similarly, a word or phrase may be a constituent of a non-sentential phrase. A word or phrase A is a constituent of a phrase B if A is a constituent of the sentence in which B occurs and A is, in the obvious sense, a 'part' of B. Consider the very simple sentence given as (1).

(1) The shoe fits

There are three logical possibilities regarding a constituent-structure grouping of the elements of (1) and, at the same time, there are three visually distinct, but mathematically equivalent, notations in which these three structurings may be represented. The three main types of notations for displaying constituent structure of sentences and their parts are: BRACKETING, BRANCHING TREES, and NESTED BOXES. All three are presented in Figure 1.

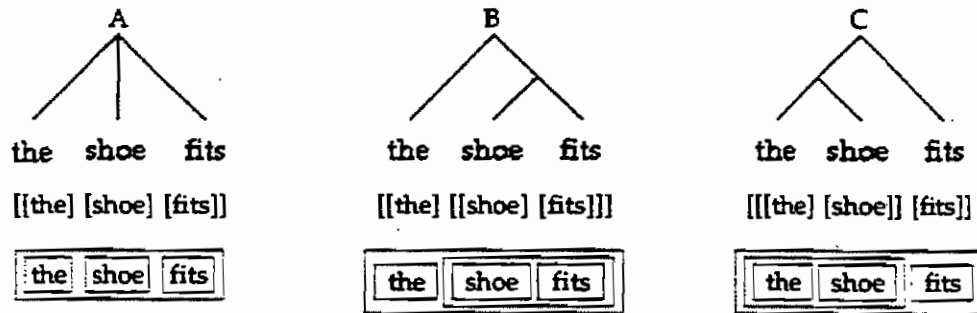


Figure 1

The columns of Figure 1, labeled A, B, C, represent three different hypotheses regarding the constituent structure of example (1). Each of the representations in column A corresponds to what is called a FLAT STRUCTURE: each word stands alone as a constituent of the whole sentence: no word is grouped together with any other below the level of the

sentence. In column B, *shoe* and *fits* are grouped together into a constituent, with *the* outside that group, and in column C, *the* and *shoe* are grouped together into a constituent, with *fits* outside that group. We will return in a moment to the question of which hypothesis - A, B, or C - is correct.

The rows of Figure 1 display three equivalent notations. The first two rows present TREE DIAGRAMS and BRACKETING DIAGRAMS, respectively, each of which should be familiar from other linguistics courses. The third row represents the same structures in the form of NESTED BOXES. To satisfy yourself that the same kind of structure can be represented by nested boxes as by brackets, imagine a box to be formed by simply connecting the tops and bottom of each set of brackets (extending the vertical bars of the brackets as necessary before connecting them).

[[[the] [shoe]] [fits]]

In this course we will exploit the nested box notation extensively; the reason for this is that the interior of the box gives us a convenient place to represent information about the constituent which the box itself represents, information about the content of the constituent.

A nest of boxes with information written inside each box is equivalent to a tree structure with a complex symbol recording the comparable information at each node or to a bracketing representation with a complex label, attached to each set of brackets, containing information regarding the enclosed constituent. (In approaches to syntax that make extensive use of the bracketing notation, some abbreviated form of this information is normally written at the bottom of the opening bracket of each matched pair.) Toward the end of this chapter we will begin to discuss how to represent inside a box the information regarding the constituent represented by that box.

If the box for a constituent A contains the box for a constituent B we say that A DOMINATES B or that B is a CONSTITUENT of A. If B is a constituent of A and there is no

other constituent C such that B is a constituent of C and C is a constituent of A, we say that B is an IMMEDIATE CONSTITUENT of A or equivalently that A DIRECTLY DOMINATES B. For example, in column A, all three lexical constituents are treated as immediate constituents of the sentence; in column B this is true only for the word *the* and in column C this is true only for the word *fits*. In an equivalent terminology, we will say that A is the MOTHER of B and that B is a DAUGHTER of A just when B is an immediate constituent of A.

1.3.2 Discovering or Justifying Constituent Structure

So far we have only considered the question of how to represent the constituent structure for an expression once we have a hypothesis about what it is. But how do we know the correct constituent structure for a sentence like (1)? In comparing the columns in Figure 1, you are likely to have preferred analysis C (as do we) and to have regarded those suggested in A and B as obviously wrong. But what underlies those intuitions?

If you were to give expression to your preference for analysis C, your reasoning may be something like the following. I was taught in school that English has a class of words called ARTICLES and that *the* is an article; that similarly *shoe* is a NOUN and *fits* is a VERB, that an article followed by a noun can be the SUBJECT of a sentence, that every sentence has to have a subject and a verb, and so on.

But if this is your explanation, you have merely passed the answer to our question on to your former teachers, without actually answering it. What still needs to be explained is how whoever made those decisions made them. What justifies the grammarian in saying, for example, that *the* is an ARTICLE (along with *a* or *an*), that *shoe* is a NOUN (along with *mud*, *syntax*, and *democracy*), that one can put an article before a noun to make a particular kind of phrase, and so on? The answer to such a question is not simple. It is, in essence, that

by assigning a large number of decisions of this type to a grammar of English (say), one can give a precise account of the fact that some sequences of English words constitute sentences in the language and others do not. But this brief answer will require a fair amount of amplification.

We simply know, as speakers of English, that **shoe the fits* isn't a grammatical sentence of English, and the reason we can give for this is, in part, that the pattern, i.e., the construction, which licenses a phrase like *the shoe* does not license a phrase like **shoe the*. We say 'in part' because there is more to the answer in the case of **shoe the fits* than the mere fact that **shoe the* isn't a phrase of English. It could be a fact of English that *shoe+the+fits* forms a flat sentential structure; it could be that *the fits* is a possible predicate phrase and that the word *shoe*, all by itself, is a possible subject of an English sentence, and so on. We have to know that each of these hypotheses is false in order to show that **shoe the fits* is not an acceptable sentence of English. Or rather, that there is no combination of structural principles for English which would allow us to put these words together in this order to create an acceptable English sentence. In short, in order to know that a given string of words is a sentence of the language, we have to know all of the constructions that are involved in the analysis of that sentence, and in order to justify the decision that a given string of words is not a sentence of the language, we have to know the entire grammar, the entire repertory of constructions; only in this way can we know that no collection of constructions will license this string of words as a sentence of English. In a sense, then, we have to know the entire grammar of a language before we can be sure about assigning the correct structure to a single sentence.

As a practical matter, the situation is not as hopeless as the preceding paragraph suggests. We can make hypotheses, that is guesses, about what may turn out to be useful constructions. We can then see if these hypothesized constructions fit a lot of observations of acceptable and non-

acceptable strings of words and whether they 'fit together' to provide full analyses of these strings of words in a way to be made more precise in Chapter 2. Of course, we must be prepared at any point to run into a previously unconsidered string of words that, contrary to the predictions of the array of constructions we have postulated to that point, either is or isn't a sentence. When this happens, we will have to revise one or more of the constructions we have postulated. We always hope that this revision will be relatively minor. This is the way grammatical research proceeds.

Let's suppose that we have often encountered sequences of words in which an article precedes a noun and that in various ways the sequence *Article + Noun* appears to be treated as if it were a single unit. Some such observations might include pairs of sentences such as the following.

- (2) a. The shoe fits
 b. It fits
 c. *The fits
 d. *Shoe fits

(Where we learn that a minimal (one-word) subject like *it* can be replaced by the sequence *the + shoe* but not by either member of the sequence.)

- (3) a. He refused to polish the shoe
 b. The shoe, he refused to polish
 c. *Shoe, he refused to polish the

(Where we learn that the whole phrase *the + shoe* can be displaced, but not just a part of it.)

- (4) a. She threw the shoe away
 b. She threw the shoe and the sock away

(Where we learn that the phrase *the + shoe* can be conjoined, using *and*, with another phrase of the same kind.)

From such observations we can never be absolutely sure that *the shoe* is a constituent in these sentences, that is, that the grammar contains a construction which allows joining *the* and

shoe in this order to form a phrase, but observations like this can furnish us with some good initial guesses and rough rules of thumb. So we hypothesize that there is such a construction. Our initial effort to formulate and represent this construction, which we will later find to be inadequate, might be something like what is shown in Figure 2.

**Determination Construction
(first effort)**

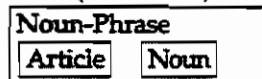


Figure 2

The diagram can be read as telling us that whenever we need a constituent of the type "Noun Phrase" we can achieve that by joining a constituent (in this case a word) of the type "Article" with a following constituent (again, a word) of the type "Noun". (Our reason for calling this the Determination Construction will be made clear later.)

The phrasal character of *the shoe* in sentence (1) is now accounted for, but we need to account for the rest of the constituent structure analysis given in column C of Figure 1. As suggested above in our speculations about things you may have learned before this class, we will posit a construction for a certain type of sentence of English which may consist of a nominal constituent followed by a verbal constituent. Our first attempt at characterizing this construction, which will later be replaced by something greatly revised and expanded, is given as Figure 3.

**Subject-Predicate Construction
(first effort)**

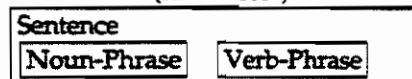


Figure 3

Although the second constituent of the Subject-Predicate construction is described with the term 'Phrase', we mean merely any constituent that can complete a sentence, by means of this construction, following a Noun-Phrase. Since *fits* is an intransitive verb, it requires no further material to serve as a sentence's predicate, and can occur alone as a Verb-Phrase.

We can now provide an analysis of the string of words in (1) as a sentence of English by hypothesizing that *the shoe* is a noun phrase, licensed by the Determination construction, that *fits* is a verb that can serve alone as a verb phrase, and that the former followed by the latter constitutes a sentence of English because we have the Subject-Predicate construction to license this sequence of constituents. The preceding analysis can be represented in a single diagram as follows.

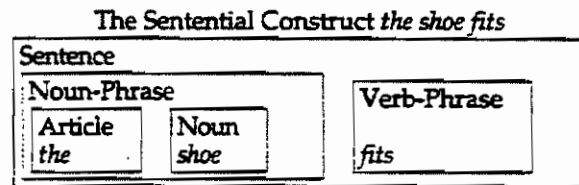


Figure 4

We say that the box diagram in Figure 4 represents an analysis of the CONSTRUCT *the shoe fits* by means of both the Subject-Predicate construction (Figure 3) and the Determination Construction (Figure 2). Similarly, the nominal construct *the shoe*, a constituent of Sentence (1), is given its analysis as the left daughter of Figure 4, by way of the Determination Construction (Figure 2). In sum, the reason we know, or suppose that we know, that the correct constituent structure for (1) is given in column C of Figure 1, is that we are willing to hypothesize that the grammar of English contains Determination and Subject-Predicate constructions along the lines of Figures 2 and 3, and no other combination of

constructions capable of supporting either of the competing analyses.⁶

More details of the analysis of sentence (1) have been omitted than included in this discussion, and before long we will not only have to add a lot to what we have said about the Determination and Subject-Predicate constructions, but we will have to confess to a few white lies that we have told in order to make things seem simpler. The point to be taken at present is that we believe column C of Figure 1 to give the correct constituent structure because we believe that English contains Determination and Subject-Predicate constructions like what is shown in Figures 2 and 3, that *the*, *shoe* and *fits* are ARTICLE, NOUN and VERB respectively, and that there is no other way the grammar of English allows for putting these words together in this order to form a sentence.⁷

We assume, moreover, that the constructions we have proposed for the analysis of our initial trial sentence will be useful in the analysis of many other sentences, in fact indefinitely many other sentences. Let us consider what we will need to add to the grammar to deal with the following sentence:

(5) A blue porpoise swallowed a minnow

In Figure 5 we see a proposed analysis of sentence (5), devised by using the same sorts of considerations we have been using until now. From now on we will abbreviate Sentence as S, Noun-Phrase as NP, Verb-Phrase as VP, Article as Art, and Adjective as A.

⁶We haven't explained how the verb *fits* can constitute a Verb Phrase by itself, but that story will be told presently.

⁷The reader with minimal exposure to the literature of generative grammar will realize that the arguments given here for two constructions are exactly the same arguments as would be given for justifying and explaining the phrase structure rules $S \rightarrow NP VP$ and $NP \rightarrow Det N$

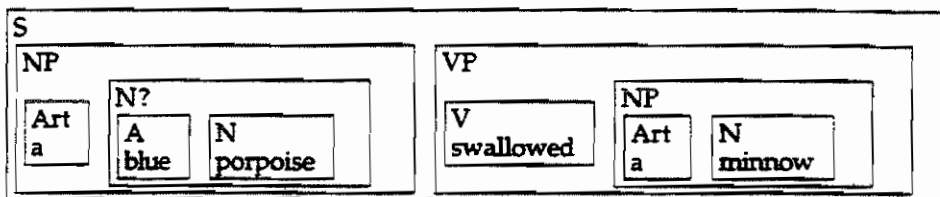


Figure 5

The analysis tacitly assumed in Figure 5 incorporates a number of new assumptions. If you look at the subject constituent, *a blue porpoise*, you will see that it has two daughters, *a* and *blue porpoise*. The former is an article, but the latter is a variety of noun-like constituent provisionally assigned the label "N?" here (meaning we don't yet know what to call it). In Chapter 3 we will postulate a Noun Modification construction which puts an adjective before a noun (or, in fact, an already modified noun) to build a kind of constituent not readily classifiable as either N or NP; we will discover that the traditional categories N and NP do not exhaustively classify the types of nominal constituents we will need to postulate. At that point we will take up the revision in the Determination construction which will allow an article to precede either a bare N or a constituent of the new type.⁸

Turning now to the VP constituent in Figure 6, we are not surprised to discover that *swallowed* is classed as a V. *A minnow* also fits the Determination construction we postulated in Figure 2 without a problem. But we have also tacitly assumed a VP construction which admits a V and a following NP as its two daughters. This constituency of VP is unlike that assumed for sentence (1), in which the VP consists of the single V *fits*. Later on we will posit a Verb Phrase construction

⁸ Readers familiar with developments of the Standard Theory in the transformational tradition may be interested to be told that the solution to be developed below is not quite 'a variety of X-bar theory'.

which admits of both of these sub-types, as well as many others. For now, we ask you to take on faith that such a thing is both possible and desirable.

The practical point to be noted about the analysis suggested in Figure 5 is that as soon as we started looking for further empirical data to justify the constructions we postulated to account for the constituent structure of (1), we were forced to postulate further constructions to take care of unforeseen aspects of the first new example we came up with, sentence (5). But of course we could only fully justify these new constructions by finding further examples in which they show up, and these additional examples might well introduce new kinds of data which would require us to postulate still more constructions. This process might go on for a very long time. Every new example introduced to exemplify an already postulated construction may introduce some data that itself invites the postulation of a new construction. We are brought back to the observation we made earlier, that in principle one doesn't finish justifying one's grammatical analysis of the first sentence considered until one has done the grammatical analysis of the whole language.

1.4 More on the Determination Construction

The Determination construction is actually more general in one respect than what we have given in Figure 2. In particular, the determining expression (the left daughter) can be lots of things other than an article (*the* or *a(n)*). Consider the following examples.

- (6) a. this shoe
 b. every shoe
 c. my cousin's shoe

In example (6a), the determining expression is a word belonging to the syntactic category Demonstrative; in (6b) the determining word belongs to the syntactic category Quantifier. In (6c) the determining expression is not a word at all but the

phrase *my cousin's*. Possessive noun phrases may in general serve as determiners, as evidenced by the standard example

(7) [[[the king of England] ['s]] [hat]]

Notice that the possessive marker 's is added to the full phrase *the king of England*, not to the word *England*, a fact we can appreciate if we recognize that the hat belongs to a particular king, not, for example, to the country England, and that the king is the king of a country and not the king of a hat.

It's clear that we can't get away with describing the Determination construction as merely requiring "Art" as its left daughter. We will return in Chapter 3 to a more detailed discussion of just what kind of constituents can occupy the position of left daughter and right daughter in the Determination construction. But before that, there are some more elementary matters regarding this construction which we need to consider.

For the purposes of the Determination construction we have to specify the dependencies that exist between the kinds of constituents that can occur as the left daughter and the right daughter *in the same construct*, because not every possible left daughter can co-occur with every possible right daughter. Notice the co-occurrence restrictions suggested in (8)

(8)	a.	the mud	the shoe	the shoes
	b.	*a mud	a shoe	*a shoes
	c.	*these mud	*these shoe	these shoes

While in (8)a the article *the* can co-occur in a Determination construct with either a singular or a plural noun, in (8)b the article *a* contains the information 'singular' and so can't co-occur with the plural noun *shoes*. Similarly, in (8)c the demonstrative *these* contains the information 'plural' and so can't co-occur with either of the singular nouns *mud* or *shoe*. (We'll consider later why in (8)b *a* can't go with *mud*.) But what kind of information regarding number ('singular'

versus 'plural') does *the* contain, since it doesn't seem to conflict with either the singularity of *mud* and *shoe* or with the plurality of *shoes*? The answer we will give is that *the* is UNSPECIFIED for number.

In general the 'number' information in the determining expression doesn't have to match that of the nominal expression, but it *must not conflict* with that information. Since *the* is unspecified with respect to singular versus plural, it conflicts neither with the singularity of *shoe* nor with the plurality of *shoes*. We will say that in the Determination construction the information about number in the left daughter has to UNIFY with the information about number in the right daughter, and we will take as our initial understanding of the concept of unification that two pieces of information may unify if and only if they don't conflict, i.e., that they are not mutually contradictory. The case in which two pieces of information are identical is thus a special case of non-conflict, that is of possible unification.

We need now to represent the information regarding number explicitly, in order to get a clearer idea of what we mean by non-conflict of information. We represent the idea that a constituent is singular by placing the expression

"[num sg]"

inside the box representing that constituent, and we say that for this constituent the ATTRIBUTE 'number' (num) has the VALUE 'singular' (sg). Similarly

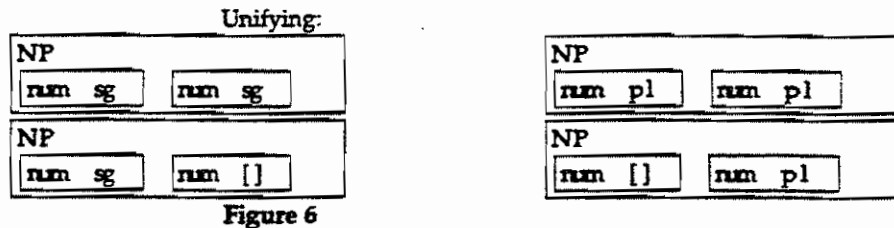
"[num pl]"

indicates that the number attribute of the constituent has the value plural (pl). If the constituent does not specify any particular number information we write

"[num []]"

In this last case we say that the value of the number attribute is unspecified. The attribute/value pair [num sg] unifies with [num sg], but not with [num pl]. [num []] (read 'number unspecified') unifies with either [num sg] or [num pl]. Thus the partial structures displayed in Figure 6 as candidates

for realizations of the determination construction are well formed, while those displayed in Figure 7 are not.



We have seen that the Determination construction requires that the values of the number attributes in the two daughters unify. Is this true for the values of all attributes in the two daughters? No it is not. In fact, we have already seen that it is not. We noted earlier that the right daughter in the Determination construction must be some kind of nominal constituent and that the left daughter may, for example, be a constituent of the category article or demonstrative. Thus the two daughter constituents differ with respect to this kind of information. Suppose we represent this kind of information as the attribute 'syntactic category' (cat) with values such as 'noun' (n), 'verb' (v), 'article' (Art), and so on. Thus a partial representation of a singular article like *a* would be:

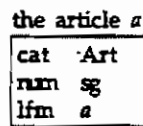


Figure 8

The expression in Figure 8 is a representation of a constituent whose 'syntactic category' value is 'article' and whose 'number' value is 'singular'. We have also added the attribute 'lfn', standing for 'lexeme', roughly the dictionary form of a word. While the Determination construction requires the num values of the two daughters to unify, it does not impose this requirement on the cat values. (In fact, it requires that the cat values differ.) In Figures 9 and 10 we see partial representations of acceptable constructs realizing the Determination construction, *the shoe*, and an unacceptable candidate, **a shoes*.

the shoe

NP			
cat	Art	cat	N
num	[]	num	sg
lfn	<i>the</i>	lfn	<i>shoe</i>

Figure 9

**a shoes*

NP			
cat	Art	cat	N
num	sg	num	pl
lfn	<i>a</i>	lfn	<i>shoes</i>

Figure 10

The general point is that a construction may require the values of some attribute which occurs in two constituents to unify without specifying that the values of all attributes in these two constituents unify. Such a state of affairs is in fact normal. What is needed – and what we will soon provide – is some formal device for indicating which features of different constituents of a construction require unification and which do not.

In Chapter 2 we continue our investigation of the way information is represented in constructions and in the linguistic

objects which realize constructions, which we call constructs. This will develop an idea of the general architecture of a construction grammar. In Chapter 3 we return to the details of certain nominal constructions of English, in order to further exemplify this conception of a grammar.

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CHAPTER 2

Feature Structures, Structures and Unification

2.1 Attributes and Values

A great deal of grammatical information, including semantic information, can be represented in terms of the *values* of particular *attributes*. It will be easier to introduce these concepts by example than by abstract definition.

A noun or noun phrase in English is necessarily either SINGULAR (sg) or PLURAL (pl). We call the array of choices the attribute of NUMBER (num) and we call sg and pl the possible values of this attribute. Another attribute that nouns have is what we will call CONFIGURATION (cnfg); the values of cnfg are COUNT (count) and MASS (mass).

We need to define the attribute of number for noun-phrases because noun-phrase subjects must show agreement with the predicate phrase under certain conditions (*The computer is plugged in, The computers are plugged in.*). We need to associate the number attribute with nouns, as we have seen, because some determiners are compatible with singular, others with plural, nouns (*these computers, a computer*), and we need the attribute of configuration for nouns because some determiners are compatible with count nouns, others with mass nouns (*three shoes* but not **three mud; (not) much mud*, but not **(not) much shoe(s)*, etc.). We will treat number and configuration as semantic attributes, although the question whether these kinds of properties are semantic, syntactic or both is one too complex to be dealt with in this text.

We will also be concerned with syntactic attributes. Every word or phrase must belong to one of what we learned in school to call the parts of speech: noun, verb, adjective,

preposition, etc. This array of choices is denoted by the attribute SYNTACTIC CATEGORY (*cat*) and we call the items NOUN (*n*), VERB (*v*), ADJECTIVE (*a*), PREPOSITION (*p*), etc., the values of this attribute. Another example: some constructions distinguish constituents that are LEXICAL (*lex*) from those which are not; for example, pluralization applies only to lexical nouns. For this we posit an attribute *lex* with possible values + and -, and we require that the object which participates in the pluralization construction have the *n* value of the *cat* attribute, and the + value of the *lex* attribute. Additional elementary attributes and values will be introduced as we go along, but these will do for now.

2.2 Feature Structures

- (1) A list of attributes with exactly one value assigned to each is called a *complex feature structure*.¹

A complex feature structure is thus a kind of function, in the mathematical sense. More specifically, it is, for our purposes, a function whose *domain* is a subset of the finite set of attributes used for the grammar as a whole – like *cat*, *lex*, *num*, etc.

Feature structures illustrating partial representations of the syntactic and semantic properties of the word *shoes* are depicted in Figure 1.

Syntactic properties of <i>shoes</i> $\left[\begin{array}{l} \text{cat } n \\ \text{lex } + \end{array} \right]$	Semantic properties of <i>shoes</i> $\left[\begin{array}{l} \text{num } pl \\ \text{cufg } \text{count} \end{array} \right]$
--	--

Figure 1

¹For the moment we are concerned exclusively with *complex* feature structures. The distinction between complex and simple feature structures and the more general notion of feature structure will be introduced later in this chapter.

For some purposes (e.g., identifying a feature structure in the middle of a paragraph) we will present the attribute-value pairs of a feature structure in a horizontal list, separated by commas, rather than in a vertical list, as shown in Figure 1. Thus, the information given in Figure 2 is identical to that represented in Figure 1. (In both cases, we enclose feature structures in square brackets.)

Syntactic properties of <i>shoes</i>	Semantic properties of <i>shoes</i>
[cat n, lex +]	[num pl, cnfg count]

Figure 2

An object like that given in Figure 3 is not a feature structure. Why? Because it is not a function: each attribute in a feature structure receives a unique value and in this object the attribute *cnfg* receives two distinct values.

An attribute value matrix that does not represent a feature structure

	structure	
[	cnfg count	
]	cnfg mass	

Figure 3

2.3 Complex Values and More Elaborate Feature Structures

So far we have considered only attributes that have atomic values, that is, values consisting of a single, unanalyzable symbol, like 'n', '+', or 'count'. But there are also more complex values. In particular, the value of an attribute may itself be a complex feature structure. Since we will wish to represent the syntactic and semantic properties of the word *shoes* as a single feature structure, we can posit the attributes SYNTAX (*syn*) and SEMANTICS (*sem*), and assign them values which correspond, respectively, to the two feature structures we have already seen. We then represent all the information shown in Figures 1 and 2 as follows.

$$\left[\begin{array}{l} \text{syn} \left[\begin{array}{l} \text{cat } n \\ \text{lex } + \end{array} \right] \\ \text{sem} \left[\begin{array}{l} \text{num } pl \\ \text{cnfg } \text{count} \end{array} \right] \end{array} \right]$$

Figure 4

This representation incorporates into our (still partial) representation of *shoes* the idea that *cat* and *lex* are *syn(tactic)* attributes, while *num* and *cnfg* are *sem(antic)* attributes.

The embedding of feature structures as values within larger feature structures can be continued indefinitely. Figure 4 displays a well-formed feature structure whose *syn* attribute has the value which is a feature structure whose *infl* attribute has the value which is a feature structure whose *form* attribute has the (atomic) value *prp* and whose *fin* attribute has the (atomic) value *-*.

$$\left[\begin{array}{l} \text{syn} \left[\begin{array}{l} \text{cat } v \\ \text{lex } + \\ \text{infl} \left[\begin{array}{l} \text{fin } - \\ \text{form } \text{prp} \end{array} \right] \end{array} \right] \\ \text{lxm } \text{seeing} \end{array} \right]$$

Figure 5

(We do not, at this time, wish to discuss in detail the substantive information introduced in Figure 5 but merely to exemplify with this information the recursive property of feature structures. Briefly, the feature structure in Figure 5 might be a partial representation of the lexical item *seeing*, which is syntactically verbal (*cat v*) and lexical (*lex +*) and which is, furthermore, inflectionally non-finite (*fin -*) and of the present participle (*-ing*) form.) This kind of recursive extension of feature structures, which consists in letting values be themselves complex feature structures, can continue as long as we like, so long as the structure ultimately bottoms out with

simple values. For example, if a complex feature structure were substituted for *prp* in Figure 5, the values of each of its most deeply embedded feature structures would themselves have to be simple.

A feature structure may also be viewed as a mathematical object called a Rooted Directed Acyclic Graph (DAG, pronounced [dæg]). This may sound abstruse, but the idea is simple. The DAG corresponding to Figure 5 is diagrammed in Figure 6.

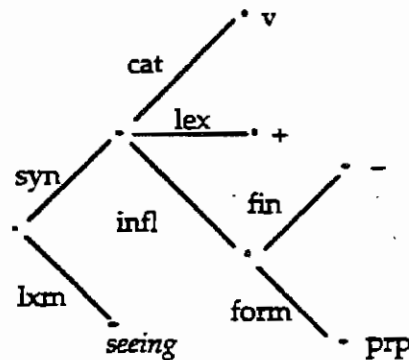


Figure 6

Attributes are represented by branches (often called 'edges') and values are represented by nodes. Nodes that give rise to two or more branches represent complex feature structures. Non-branching (i.e., terminal) nodes represent atomic values. 'Directed' means that the branches connecting the nodes of the graph are interpreted as one-way arrows; we can suppress the heads because by convention we interpret the edges as leading from left to right across the page. 'Acyclic' means that there's no way to get back to a node once you've left it. 'Rooted' refers to the fact that there is a unique node,

called the root, from which every other node may be reached by a succession of branches.²

2.4 Constituent Structure and Simple Feature Structures

We have seen that feature structures can be notated either by DAGs or in the form we have mostly had recourse to, which involves nested square brackets with attributes on the left and values on the right. We have already tacitly introduced a name for this notational object (in Figure 3): Attribute Value Matrix (AVM).

At the end of the last chapter you were given an example of an AVM with an unspecified value, represented by '[]'. This kind of AVM also represents a feature structure. A *simple feature structure* is either an atomic value or an unspecified value '[]', sometimes called a variable. Thus, atomic and unspecified values are themselves (simple) feature structures. The notion *feature structure* is thus defined disjunctively as either a complex feature structure or a simple feature structure. Viewing atomic values and unspecified values as feature structures allows us the generalization that the value of every

²We will have little more to say in this text about the graph-theoretic treatment of feature structures. The graph-theoretic view of feature structures is particularly valuable in more mathematical approaches to unification-based grammars because graphs are a well-understood kind of mathematical object, on which, for example, various kinds of combinatory operations have been defined. For the reader interested in pursuing a more mathematical approach to unification-style grammars, a good place to start is Shieber, Stuart M. *An Introduction to Unification-Based Approaches to Grammar*, 1986, Center for the Study of Language and Information: Stanford University, Stanford, California. A more recent and complete treatment of the subject is to be found in Carpenter, Bob, 1992, *The Logic of Typed Feature Structures: with applications to unification grammars, logic programs, and constraint resolution*, Cambridge, New York: Cambridge University Press.

attribute in a feature structure is itself a feature structure. As the little old lady might have said to William James, it's attributes and feature structures all the way down.

You are already familiar with the box diagram notation for displaying the constituent structure of constructs and constructions. Up to now we have often written information in the boxes in an unofficial way to indicate properties of the constituent that the box represents. Now we will start writing this information as AVMs. Thus, each box will have an AVM in it to represent the feature structure embodying the grammatical properties of the corresponding constituent. A box always includes an AVM and may also include smaller boxes, each with its own AVM, as suggested in Figure 7.

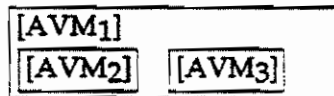


Figure 7

Taking Figure 7 as indicating a standard format for displaying a structure with two immediate constituents, we can see that what we showed you about the determination construction in Chapter 1 will now have to be revised. Specifically, we will need to begin by replacing the words 'Noun Phrase', 'Article' and 'Noun' in Figure 2 of Chapter 1 with the feature structures that contain the information which defines those concepts.

We say that the AVM in the mother box of a diagram (e.g., AVM₁ of Figure 7) expresses the *external* properties of the construct or construction. The daughter boxes (e.g., AVM₂ and AVM₃ of Figure 7) – and possibly their own daughters, each with its own AVM, and so on – express the *internal* properties of the construct or construction. So, in a construct or construction whose representation has the form of the diagram given in Figure 7, AVM₁ represents the external properties, and everything else (except the box around the

whole thing) represents the internal properties. (Let us remind ourselves that the outermost box in a nested box representation corresponds to the root in a DAG representation.)

For convenience, when using box diagrams, we will omit the outermost brackets of the AVM that expresses the external properties of the depicted constituent. According to this convention, a (very partial) representation of the construct *the shoe* might look like what we see in Figure 8.

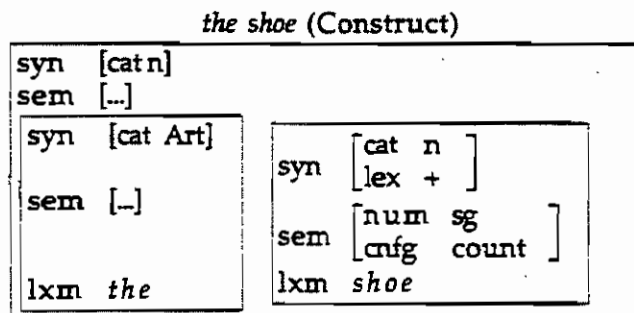


Figure 8

In Figure 8 the external properties of the construct *the shoe* are expressed by the AVM [syn [cat n], sem [...]]³ and the properties of the left daughter by the AVM [syn [cat Art], sem [...], lxm *the*]. For practice, you may wish to write out the feature structure corresponding to the right daughter of Figure 8 in this way.

You will have noted that in Figure 8 we have added the attribute lxm (lexeme). This indicates that the constituent in question is a word and its value is the citation form of that word. Exactly what kinds of linguistic objects constitute lexemes is a subject we'll take up later, when we consider the

³The notation '[...]' is an informal abbreviation, indicating the presence of an attribute, here 'sem', without mentioning its value.

distinction between lexemes and wordforms and other matters where construction syntax touches on morphology. For the moment, we're not going to worry about the difference between, say, *be* and *am*.

2.5 Unification

In Chapter 1 we discussed unification as the idea of combining two pieces of non-conflicting information. You will recall that in the Determination construction the number of the determining word cannot conflict with the number of the noun that is determined. We will now need to sharpen our discussion of the technical means for achieving such compatibilities. Unification is an operation on two feature structures which maps them onto a third, which combines the two original structures. Unification is defined possibly only if the original two structures do not conflict. We will thus need to specify (a) what we mean by conflict between feature structures and (b) in the case of non-conflict, what we mean by the combination (unification) of the two original feature structures. The unification of two feature structures is the feature structure which contains all the information of the original two and no more.

It is useful to introduce the idea of a *path* through a feature structure. Intuitively a path is the record of a journey through a DAG (see Figure 6) from the root node 'rightward', listing each attribute one encounters in turn. A complete path is one which keeps going as far as it can, that is, until there is no attribute remaining because the last (rightmost) attribute in the path has a value which is not a complex feature structure. Somewhat more precisely, a feature structure f determines a unique set of *complete paths*. A complete path p in a feature structure f is a sequence of attributes a_1, a_2, \dots, a_n in which (i) a_1 is a member of the domain of f , (ii) for any two consecutive members a_j, a_{j+1} of p , a_{j+1} is in the domain of the value of a_j , and (iii) the value of a_n is a simple feature structure. For example the feature structure illustrated in Figures 5 and 6 contains the

complete paths <syn, cat>, <syn, lex>, <syn, infl, fin>, <syn, infl, form>, and <lxm>.

We refer to a complete path followed by the value of its final attribute (also called the value of the path) as a *completed path*. Any feature structure determines a unique set of completed paths. For example, the feature structure of Figures 5 and 6 is equivalent to the set of completed paths (<syn, cat> v, <syn, lex> +, <syn, infl, fin> -, <syn, infl, form> prp, lxm seeing). The symbols within the angled brackets express a sequence of attributes and the final symbol is the value of rightmost attribute in the sequence.

Although every feature structure defines a set of completed paths, not every set of completed paths corresponds to a feature structure. In particular, a feature structure cannot contain two completed paths which have the same attribute sequence but distinct specified values. Such a pair of completed paths is said to *conflict*. Similarly, a pair of feature structures whose corresponding sets of completed paths contain conflicting paths are also said to conflict. A pair of completed paths like <syn, infl, form> prp and <syn, infl, form> psp conflict. ('Prp' stands for present participle and 'psp' stands for past participle.) Informally, nothing can be both a present participle and a past participle. More formally no complex feature structure could determine a set of completed paths including these two, since this object would then assign two distinct values to the attribute syn and would thus not satisfy definition (1).

A completed path whose value is unspecified, i.e., '[]', does not conflict with any path. For example, the completed paths <syn, infl, form> [] and <syn, infl, form> prp do not conflict. To say that an object has an inflectional form does not conflict with saying that this object has the inflectional form of a present participle. If as a result of some computation we find ourselves with an object that looks like a feature structure except for determining two completed paths which are alike except that one has an unspecified value, that

object is not prevented from being a well-formed feature structure by this fact. We may take the more specific statement as superseding the more general one. For example, we may take the path stating that inflection is present participle to supersede the path stating that there is some inflection or other.

Representing a feature structure by the set of completed paths it determines enables us to give a definition of unification which is easy to understand.

- (2) (a) The *unification* of two complex feature structures A, B is the feature structure that contains all the completed paths of A and all the completed paths of B and no others (ignoring completed paths with unspecified values when a completed path with the same attribute sequence and a specified value is present);
 (b) An atomic feature structure (atomic value) does not unify with any feature structure except an unspecified value '['];
 (c) The unification of an unspecified value '[' with any feature structure *f* is *f*.

The rows in Figure 9 present three examples of triples of AVMs A, B, and C in which C is the unification of A and B.⁴

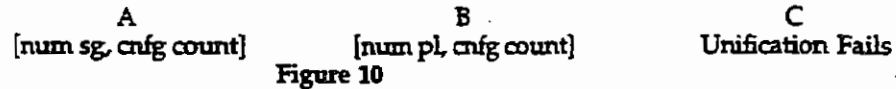
A	B	C
[num sg]	[num sg]	[num sg]
[num sg]	[num sg, cnfg mass]	[num sg, cnfg mass]
[num sg]	[cnfg mass]	[num sg, cnfg mass]

Figure 9

The set of completed paths in the first row is {<num> sg}, in the second row {<num> sg, <cnfg> mass}, and in the third row {<num> sg, <cnfg> mass} as well. Now, what happens if

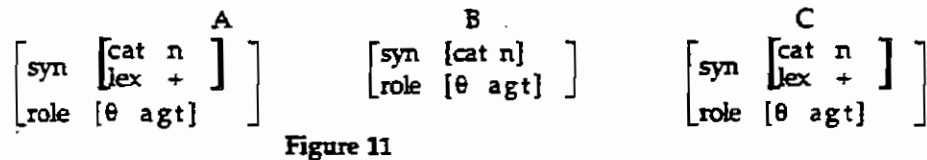
⁴When we represent particular feature structures with AVMs, we will sometimes speak loosely of the AVMs as if they were the actual feature structures.

we attempt to unify two feature structures such as A and B in Figure 10?

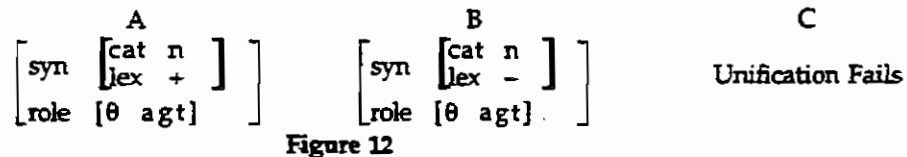


The set of completed paths in Figure 10 is {<num> sg, <cnfg> count, <num> pl}. The first and third of these are completed paths with the same attribute sequence but conflicting values. Unification is not possible, reinforcing the informal observation that nothing can be both singular and plural.

In the preceding examples we have looked only at values which are atomic, but the same principle of non-conflict applies to values which are themselves complex. Unification is possible in Figure 11 but impossible in Figure 12.



In Figure 11, the union of the sets of completed paths of A and B jointly is {<syn cat> n, <syn lex> +, <role θ> agt}.



In Figure 12, the union of the sets of completed paths of A and B is {<syn cat> n, <syn lex> +, <role θ> agt, <syn lex> -}.

The second and fourth of these completed paths conflict. So unification fails.

2.6 Unspecified Values and Unification in Box Diagrams

We have already introduced the idea of unspecified values and here expand on the use of that concept. Sometimes, in fact frequently, a construction will indicate the presence of a certain attribute but not stipulate a specific value for that attribute. The principal reason for this is a phenomenon we have already encountered: the construction stipulates that a particular attribute occurs in two (or more) different constituents with the *same* value, but does not specify what that value is. The Determination construction, for example, stipulates that in each construct which it licenses the determining word and the determined noun have the same value for the configuration attribute, and it makes an identical stipulation about the number attribute as well. That is, in the Determination construction, the *num* and *cnfg* values in each of the daughters are unspecified and the unspecified value in each daughter is unified with the corresponding value in the other daughter. In *three shoes* both daughters are plural and count. In *[not] much mud* both daughters are singular and mass. In both cases the two daughters agree on each of the two attributes, but in the construction in general – which covers these two and many other cases – all we want to say is that the corresponding values are the same in both daughters without specifying what these values are.

We represent visually the idea that two distinct elements in a construction are unified by placing a 'pound sign' (#) followed by a specific numerical index directly in front of each of the two elements. For example, in a highly abbreviated version of the Determination construction, the idea that the values for the *num* attribute of the determining word unifies with the *num* value in the determined noun is represented in Figure 13 by the two occurrences of the unification index #1.

The index #2 similarly indicates the unification of the *cnfg* values in the two daughters of the construction.⁵

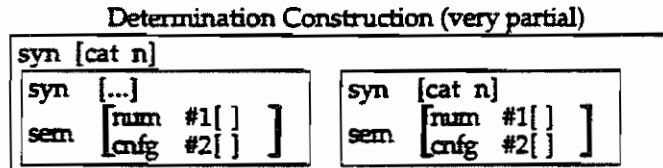


Figure 13

In each construct licensed by the Determination construction there will be specific values for *num* and *cnfg* and these will be shared between the two daughters; in the construction itself the values themselves are not specified but the fact that they are to be shared in each corresponding construct is. We noted in Chapter 1 that the article *the* is unspecified with respect to both number (*the shoe, the shoes*) and configuration (*the shoe, the mud*). As these examples illustrate, an unspecified value may unify with any value. As a (lexical) construction, i.e., as a part of the grammar of English, the word *the* is unspecified with respect to number and configuration. In a specific construct, however, we may think of the occurrence of the word *the* in that construct as acquiring, through unification, the number and configuration value of the head noun it modifies. Thus, while *the* as a

⁵It might be noticed, from this simplified example, that we could get the same effect by simply requiring the value of the *sem* attribute to be the same for both constituents of the Determination Construction, allowing us to have just one unification index instead of two. (I.e., in each case, [sem #1[num [], cnfg []]] The reason we cannot do this, of course, is that the determining constituent and the head noun are different semantically in ways that our diagrams do not yet show. For example, the right box alone will give us the information that we are talking about, say, a shoe, and the left box might provide the information that the shoe is close to the speaker (*this shoe*) or far from the speaker (*that shoe*).

construction (dictionary entry) is unspecified for number, the occurrence of *the* in *the shoe* is singular and the occurrence of *the* in *the shoes* is plural.

2.7 Constructions versus Constructs Again

Recall that constructs are pieces of a language while constructions are pieces of its grammar. So, for example, we have a Determination construction that is realized in the constructs *the shoe* and *much mud*, and which stipulates that the putative construct **much shoe* is not a construct of English (because the value mass of the configuration attribute of *much* can't unify with the corresponding configuration value count of *shoe*). We have talked about constructions as patterns which constructs have to fit, or alternatively 'which we can use in building constructs.' Since we use the same diagramming procedure for constructs and constructions – nested boxes with feature structures in the boxes – it is important to keep in mind the construct/construction distinction at all times. Constructions are analogous to rules and words of a grammar while constructs are items of the language, which are licensed, or 'generated', by the rules.

2.8 The Unification of Constructions

A sentence of a language is licensed and given an analysis by virtue of the grammatical constructions in the grammar of that language. As you read in Chapter 1, the way we can tell that a string of words of a language *L* is *not* a sentence of *L* is that we discover that no collection of constructions in the grammar of *L* can be jointly unified to license that string of words and give it the structure of a sentence.⁶ We illustrate

⁶Readers with certain computational interests may worry about whether, for certain complex sentences and a very large grammar, it is always possible to 'discover' that no combination of constructions is capable of licensing a given sentence. Such issues will not concern us here; at the very least we can agree that rejecting the

this idea once more intuitively in this section and then, in subsequent sections, turn our attention to explaining more precisely what we intend by such terms as 'license', 'sentence', 'construction' and 'unify'.

Consider the following strings of English words, which represent all the possible sequences of the words *saw*, *Sidney* and *Marion*.

- (3) a. Sidney saw Marion
 b. *Sidney Marion saw
 c. *Marion Sidney saw⁷
 d. *Saw Sidney Marion
 e. *Saw Marion Sidney
 f. Marion saw Sidney

The first and last examples of (3) are sentences of English – distinct sentences of English, with distinct meanings arising from their different structures – and the middle four examples are not sentences of English. These are the kinds of facts that a grammar must account for. How do we account for such facts?

The following story is oversimplified; it is intended to get across a general idea which will be polished as we proceed. Consider first examples (3)a and (3)f, the good sentences. With regard to these sentences we will say that there are five specific constructions of English which can be jointly unified in

grammaticality of a sentence amounts to not being able to assemble it by the means provided by your grammar.

⁷The unacceptability indicated by the stars on examples b and c is based on the assumption that special prosodies are necessary for the various 'topicalization', 'Yiddish-movement' and 'focus fronting' interpretations for these strings of words, and that these prosodies are not present in our examples. That is, we are ruling out here, to keep the set of examples simple, sentences spoken with the kind of intonation that arises in a discourse like the following.

- (i) A: Did Sidney see Marion and Tracy?
 B: Marion, Sidney saw... [but not Tracy]

two distinct ways, one producing sentence (3)a and the other producing sentence (3)f.

Among these five constructions there are three lexical constructions, corresponding to the words *saw*, *Sidney* and *Marion*. These lexical constructions tell us, among other things, that the word *saw* is a verb and that the words *Sidney* and *Marion* are not only lexical nouns but also noun phrases (as is the case with all proper nouns, and also pronouns).⁸ Partial versions of these lexical constructions are displayed in Figure 14.

syn	[	cat	n]
		lex	+	
		max	+	
bcm		<i>Sidney</i>		

syn	[	cat	n]
		lex	+	
		max	+	
bcm		<i>Marion</i>		

syn	[	cat	v]
		lex	+	
		max	[]	
bcm		<i>saw</i> ⁹		

Figure 14

In Figure 14, the words *Sidney* and *Marion* are, as mentioned, syntactically nominal (cat n), lexical (lex +) and maximal (max +). The basic idea of maximality is that a maximal constituent can play a 'major role' in a sentence, such as subject or direct object. We can say *I like Sidney* or *Sidney likes me* because *Sidney* and *me* are maximal but not **I like neighbor* or **Neighbor likes me*, because *neighbor* is not maximal.

⁸The reason we use lexical proper nouns for noun phrases in (3) rather than common nouns in phrases such as *the girl* or *a boy* (and relying on the determination construction) is that we would in that case have had to consider in an example like (3), not six strings (representing the possible permutations of three words), but 120 strings (representing the possible permutations of five words).

⁹Strictly speaking, the "lexeme", as we are using the term, is *SEE*, not *saw*. We repeat the promise that the distinctions we need in the area of words and word-forms will be dealt with in a future chapter.

A common, singular, count noun like *neighbor*, if undetermined, is not maximal. (We'll have something more precise to say about maximality and 'major role' later on.) In Figure 14, the word *saw* is shown to be syntactically verbal (cat v) and lexical (lex +). It is shown to be unspecified for maximality (max []). A verb like *saw* may or may not constitute an entire verb phrase. In *I know what Marion saw*, the word *saw* constitutes an entire verb phrase. We use empty brackets [] to indicate unspecified values.

The two other constructions in our set of five are the Subject-Predicate construction, which was introduced in Chapter 1, and the Verb Phrase construction.

The Subject-Predicate construction is presented in somewhat revised (but still oversimplified) form in Figure 15, displaying this time the fact that each constituent of a construction has associated with it an AVM.

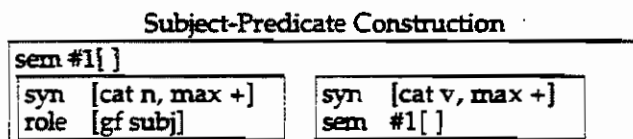


Figure 15

The external structure of the diagram in Figure 15 says that the external semantics of any Subject-Predicate construct is the same as the semantics of its right daughter. This is notated by the two instances of the unification index #1.

The notation 'syn [cat v, max +]' in the right daughter tells us that this constituent is a verb phrase.¹⁰

The information in the left daughter says that this constituent is a noun phrase and also that the grammatical

¹⁰This statement will be slightly amplified later.

function (gf) aspect of its role in the sentence is that of subject.¹¹

With respect to the data in examples (3), the important thing to note about the Subject-Predicate construction is that it licenses a sentence of the form NP + VP, but not of, say, the form NP + NP + VP or the form VP + NP.

Since *Sidney* and *Marion* are lexically determined to be noun phrases and the S-P construction permits a sentence to consist of a noun phrase followed by a verb phrase, to make things work out right for examples like (3), our VP construction is going to have to license as verb phrases expressions like *saw Sidney* and *saw Marion* but not expressions like *Sidney saw*. A primitive version of the Verb Phrase construction appears in Figure 16.

Verb Phrase (VP) Construction

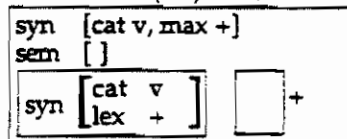


Figure 16

A slightly tricky aspect of the VP construction has to do with the right daughter box, which is followed by a 'plus' sign. In the context in which a '+' follows a constituent box, it notates what is called a 'Kleene plus'. Here the meaning is that the VP construction provides, occurring to the right of the lexical verb, one or more constituents, as illustrated in (4)b-e but not in (4)a.¹²

¹¹Later we will see that in fact not all subject constituents need be noun phrases, but for now this fiction is convenient and harmless.

¹²In some of our descriptions, an asterisk will appear instead of a plus sign. This, referred to as a Kleene star, indicates the possibility of any number of instances (including zero as one possibility) of the symbol to which it is affixed.

- (4) a. The shoe [*fits*]¹³
 b. The shoe [[*fits*] [*Sidney*]]
 c. *Sidney* [[*gave*] [*Marion*] [*dancing shoes*]]
 d. *Sidney* [[*gave*] [*Marion*] [*dancing shoes*] [*for Christmas*]]
 e. *Sidney* [[*gave*] [*Marion*] [*dancing shoes*] [*for Christmas*] [*last year*] [*in Idaho*] [*as a joke*]]

(Just how the VP construction assures that each VP ends up with an *appropriate* array of constituents accompanying its lexical verb is another matter that will be dealt with later in the course. For the present we ask you to believe that this will be accomplished when we present the VP construction in full in a later chapter.)

We are now ready to look at examples (3) from the point of view of our five constructions. Let's start with the acceptable sentences: a and f. The S-P construction requires that a sentence have the form NP + VP. Since *Sidney* in example a and *Marion* in example f are possible NPs, we are okay so far in each case. Consider the remaining parts of these examples: *saw Marion* and *saw Sidney* can both be VPs since (a) a VP can take the form V + NP, (b) *saw* is a verb and (c) *Marion* and *Sidney* are each NPs. We have shown that examples (3)a and (3)f are licensed by our five constructions. These two sentences will be accorded different semantic values by virtue of the fact that in the former 'seeing Marion' will be predicated of Sidney while in the latter 'seeing Sidney' will be predicated of Marion.

Considering examples d and e we can easily decide that these strings of words are ruled out as sentences by our little five-construction grammar. Each begins with a lexical verb and our repertory of constructions provides us with no way of analyzing a lexical verb as either a noun phrase or as the initial

¹³The VP construction does not account for examples like (4)a, containing just a single verb. We will show, in the discussion of the maximality attribute for verbs, how it is that in some cases a verb can occur alone as the predicate of a sentence.

constituent of a noun phrase. But our only sentence construction, S-P, requires that a sentence begin with a noun phrase.

Finally, we consider examples b and c. Since they are of the same form, we can let the analysis of b serve for both (with the obvious substitutions in the case of c). Since the S-P construction requires the NP + VP constituent structure shown in Figure 17A, for our example to fit this construction it must have one of the constituent structures shown in Figures 17B or 17C.¹⁴

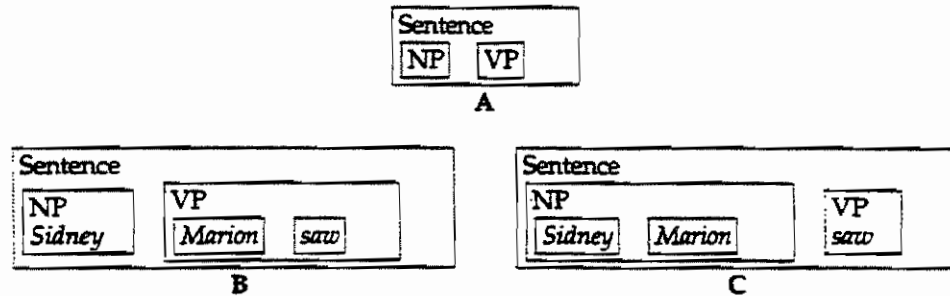


Figure 17

In case B *Sidney* is fine as a NP but *Marion saw* is not a possible VP, since it doesn't begin with a lexical verb as required by the VP construction. In case C, the VP part, *saw*, is ok, but *Sidney Marion* is not a possible NP, since our grammar does not contain any construction that allows us to put two NPs together to make an NP.¹⁵

¹⁴We regress momentarily to our pre-AVM notation for constructions.

¹⁵Note that our mini-grammar doesn't mention any helpful little words like *and*, *furthermore*, etc., and that none of the sentences we are analyzing contain such words. We should probably point out, to cover objections from those who might not understand the purpose of the word-permuting exercise, that when we allow ourselves to say that '*Sidney Marion* is not a possible NP', we are thinking of each

Implicit throughout the preceding discussion is the idea that we can find a way to 'fit together' a subset of constructions from our set of five to license the good sentences (3)a,f but not the bad sentences (3)b-e. Our precise notion of 'fitting together' of constructions will involve a generalization of the concept of unification, which we have introduced above as an operation on feature structures only. We need an extended notion of unification that will allow us to say, not only that one feature structure can unify with another feature structure, but that one construction can unify with another construction. In particular, we will want to say that our lexical NP constructions *Sidney* and *Marion* unify with the NP constituent of the S-P construction in examples (3)a and (3)f respectively, and also with the syntactically unspecified, right-daughter constituent of the VP construction in examples (3)f and (3)a respectively. Analogously we want to think of the lexical construction *saw* as unifying with the lexical verb which is the left daughter of the VP construct in both (3)a and (3)f.

2.8.1 Structures

We think of the grammar as consisting of a repertory of constructions (including lexical constructions, words). We say that a sentence or phrase of a language is licensed by the grammar of that language when there is a subset of the constructions in the grammar which can be unified in such a way that the resulting structure is the sentence or phrase in question. The unification of several constructions to license a sentence (or a lesser construct) can be figuratively described as follows. All the constructions are written on overhead transparencies. For certain pairs of constructions there is the possibility of overlaying ('unifying') the transparencies, so that everything on either sheet either exactly 'fits' some stuff on the

of these names as having separate proper-name functions. It is of course possible that *Sidney Marion* could be somebody's two-part name.

other transparency or simply 'shows through'.¹⁶ A construct is the picture projected by any set of non-conflicting, i.e. unifiable, constructions laid on top of each other.¹⁷ Finally, we suppose that we have some way to recognize a specifically sentential construct when we see one.

In order to get more precise about this idea, the first thing we will have to define is what we mean by a 'structure', that is, what kind of a formal object we take both constructions and constructs to be. Since we have said that constructions and constructs are both to be represented by box diagrams, another way to look at this initial problem is to ask ourselves what kind of an abstract object a box diagram is a diagram of.

Several of the elements that are needed to define a structure, in the special sense we will give this term, have already been introduced. First, we know what a feature structure is. A 'structure' will involve a number of feature structures arranged into some constituency hierarchy. Now we need only to decide what we mean exactly by our notion of constituency hierarchy. In Chapter 1, section 1.3.1, the notion of immediate constituency (the mother-daughter relation) was introduced. We talked there of mothers and daughters as 'nodes'. We now want to think of these 'nodes' as corresponding one-to-one with feature structures.

A (constituent structure) tree of the sort you are familiar with from earlier linguistics courses, can be defined in terms of two notions: immediate constituency (motherhood) and linear

¹⁶The recursive property of language guarantees that this figurative image of overlaid constructions could never be made a physical reality: *The cheese* is a noun phrase; *the mouse that ate the cheese* is a noun phrase; *the cat that chased the mouse that ate the cheese* is a noun phrase; and so on. Where would we find a blank transparency large enough for us to draw on it the construction that builds this kind of noun phrase?

¹⁷Actually we would want to elaborate this a little more to be sure that all constructs were fully specified lexically, but we needn't agonize over that detail in this quick sketch.

precedence.¹⁸ A structure, as we now define it, is rather like a tree except that (1) it has a feature structure associated with each node, (2) not all relations of linear precedence need be specified, and (3) the number of nodes involved need not be fixed (that is, there may be an arbitrary number of nodes).

(5) A set N of nodes is a structure iff

- (i) There is a set F of feature structures whose members correspond one-one with the nodes in N ;
- (ii) There is exactly one node r in N which has no mother (r is called the *root* of N);
- (iii) There is no node in N which has more than one mother;
- (iv) For any two sister nodes a, b in N , the relation of linear precedence, symbolized ' \rightarrow ', may be defined between them in either direction: $a \rightarrow b$ or $b \rightarrow a$.
- (v) For distinct nodes a, b, α, β , if a is the mother of α , b is the mother of β and $a \rightarrow b$, then $\alpha \rightarrow \beta$.

The set N of nodes may, by this definition, contain only one member. When the sole member of N is r we have the structure corresponding to a simple lexical construction. In this case the root node is also terminal (see next paragraph). A single constituent is a (hierarchically trivial) structure.

It follows from (ii) and (iii) that every node in N other than r will have exactly one mother. Since the relation of motherhood is intransitive, there will be nodes with no daughters; such nodes are called *terminal* nodes. In (5) we

¹⁸For the 'vertical' relations, the primitive is immediate constituency; the more general notions of 'dominance', 'ancestry' can be derived from a set of immediate constituency relations; for the 'horizontal' relations, the primitive is precedence, not 'immediate precedence' (precedence plus adjacency), requiring immediate precedence to become a derived notion. This is because we can frequently state something about relative precedence (without any assumptions about adjacency) in describing the ordering requirements of a construction, but we cannot imagine many constructions in which the relations of immediate dominance are unclear.

have a structure exactly like the linguist's familiar (constituent structure) tree except that (i) there is a feature structure associated with each node, (ii) the specification of linear precedence relations is optional, and (iii) the number of nodes in a structure is not necessarily finite.¹⁹

Recall that in the special case in which the structure is an actual *construct* of a language a complete set of linear precedence relations is specified. The words of an actual phrase or sentence are necessarily pronounced in a particular order.

Also a construct necessarily contains a finite number of nodes. For example, while the VP construction sets no theoretical limit on the number of sisters to the lexical verb, any particular VP construct will have a finite number of such sisters. Although we require a construct to have all its linear precedence relations specified, there are good reasons to permit some constructions not to specify all the possible linear precedence relations – or to specify exactly how many daughters there are – as in the case of the Verb Phrase construction. If we wish to have a single Verb Phrase construction licensing all the various verb phrase constructs in examples (4)b-e, this construction won't be able to say anything about linear order beyond that fact that the lexical verb precedes each of its sisters. And we do wish to have a single verb phrase construction at work in all the examples of (4) in order to capture the generalization that each of these sentences contains a verb phrase, that is, a phrase containing a lexical verb and its non-subject complements (and frequently some other stuff, too). In the case of actual VP constructs which contain more than one sister to the lexical verb, like those in (4)c,d, and e, some additional construction(s), in addition to the VP construction, will be required to impose a linear order on these complement sisters.

¹⁹This informal definition of structure will be sharpened in section 2.8.4.4.

2.8.2 Three Cases of Unification of Constructions

Intuitively speaking, there are three distinct kinds of cases we want to deal with in connection with the idea of unification of constructions.

The first case involves unifying a one-box lexical construction with a terminal node of another structure. In example (4)a above we have a structure like that of Figure 18A given by the S-P construction and a structure like 18B given by the lexical construction for the word *Sidney*.

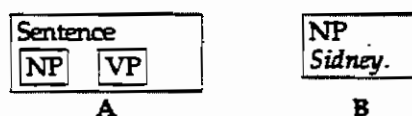


Figure 18

These two structures can be unified by matching the structure in B with the left daughter (NP daughter) of A, as in Figure 19.

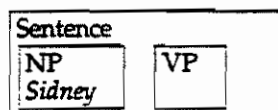


Figure 19

The second case may be illustrated by the development of the subject node in a sentence like (6). In this case the terminal NP node 'branches' into two nodes (*that* and *person*).

(6) That person saw Marion

Again, the S-P construction gives us the structure in Figure 18A. Now using the Determination Construction and the lexical constructions for *that* and *person* and the kind of unification in which lexical constructions unify with terminal

nodes (which we illustrated in (Figure 19) by the unification of *Sidney* with the subject NP node), we get the structure shown in Figure 20.

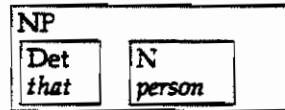


Figure 20

Now we can unify the structure shown in Figure 20 with the left daughter of Figure 18A to produce the structure shown in Figure 21.

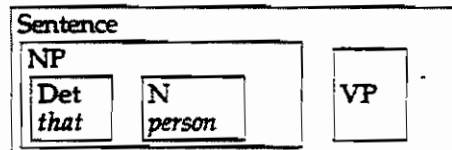


Figure 21

In the first case, Figure 19, we unified a one-box structure with one constituent (i.e., box) of another structure. In the second case, Figure 21, we unified the root node of a branching structure, represented visually as a box containing daughter boxes, with a terminal node (undivided box) of another structure.²⁰

The third case involves the fitting together of two structures both of which involve branching (i.e., boxes within boxes). Another way to express this is to note that – unlike the two cases just discussed – in this case, where we match up

²⁰The reader may have noted that in the case of a single-node structure A and a constituent B of a multi-node structure C, we speak ambiguously of unifying A with B and of unifying A with C (by 'matching' A and B) to designate the same operation of unification. This deliberately ambiguous usage is convenient, and we think no confusion need arise from it.

nodes from the distinct structures both of which have daughters, the daughters themselves have to match up one-to-one. Examples (7)a and (7)b are both licensed in part by the VP construction (Figure 16). In addition, example (7)a requires a construction like that diagrammed in Figure 22A and example (7)b one like that diagrammed in Figure 22B.

- (7) a. ate the pizza up
b. ate up the pizza

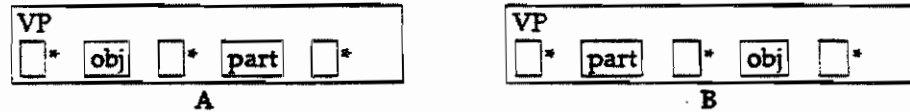
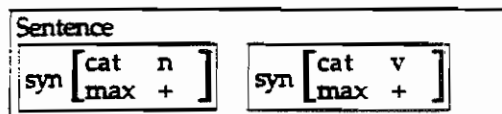


Figure 22

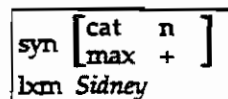
The construction in 22A shows a schematic VP in which the object (*the pizza* in our example) precedes the particle. In 22B on the other hand, the particle (*up*) precedes the object. The constructions of Figures 22A and 22B unify with the VP construction in the licensing ('building up') of examples (7)a and (7)b, respectively. In example (7)a there is a one-one matching of the daughter nodes of construction A onto the daughter nodes of the VP construction (Figure 16); in example (7)b there is a one-one matching of the nodes of construction B onto the daughter nodes of the VP construction.

2.8.3 The Same Examples in Greater Detail

Let's look at the first case from the preceding section in a little more detail. The problem was to unify the lexical construction for the NP *Sidney* with the subject NP constituent of the S-P construction. Below, Figures 23A and 23B correspond to Figures 18A and 18B and Figure 24 corresponds to Figure 19. This time we show the unification of the AVMS in the matched nodes explicitly.



A



B

Figure 23

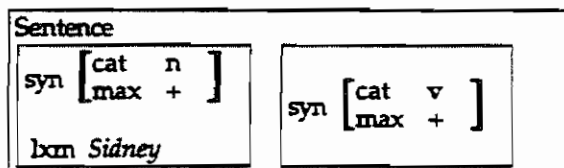


Figure 24

Consider now the second case considered above, in which the root node of a branching structure unifies with a terminal node of another structure, as illustrated in example (6) by the branching NP structure *that person* unifying with the subject node of the S-P construction. Figure 20 can be redrawn as Figure 25.

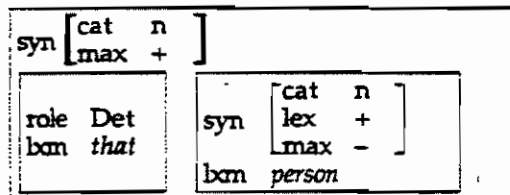


Figure 25

Figure 23A is now our representation of the S-P construction, replacing Figure 18A. We can unify the noun phrase construct represented in Figure 25 (which we assume to have been licensed by the Determination construction) with the left (subject) daughter of the S-P construction as represented in Figure 23A to produce the structure shown in Figure 26. This figure amplifies Figure 21 above, showing in greater detail

the result of unifying the NP construct *that person* with the (subject constituent of) the S-P construction.

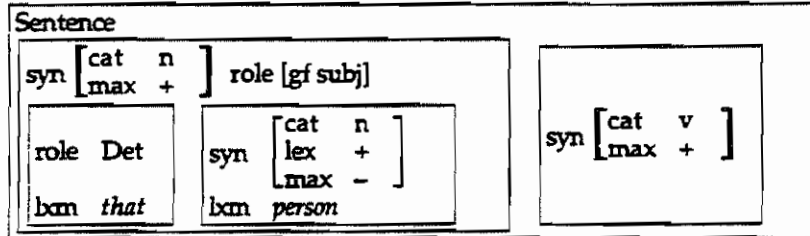


Figure 26

In order to diagram the third case from the preceding section at this level of detail we would have to know more about certain other constructions than we do at present. The aspect of this case which is important to bear in mind now is that when we unify two structures in a way that associates two nodes each of which has daughters, these daughters must themselves match up one to one. That is, the resulting structure must contain a node corresponding to each member of a one-one mapping between the daughter sets the original structures. The feature structure associated with each node in this mapping is the unification of the feature structure associated with the two corresponding nodes of the original structures.

We can exemplify the content of the preceding paragraph with regard to example (7)A, the VP construction (Figure 16) and the construction in Figure 22 A as follows. The constituent *ate* corresponds in Figure 16 to the left-most box, containing 'syn [cat v, lex +]', and in Figure 22A to its leftmost box, which is interpreted as expanding the Kleene star into a single unspecified constituent. With regard to Figure 22A, the phrase *the pizza* is interpreted as unifying with the 'obj' constituent and the *up* phrase is interpreted as unifying with the 'part' constituent. The two non-initial Kleene star

expansions of Figure 22A are interpreted as null, that is, as indicating no constituents. With regard to the VP construction in Figure 16, the Kleene plus expansion is interpreted in this construct as representing two constituents, the first of which unifies with *the pizza* and the second with *up*.

2.8.4 Structures and Combination

The purpose of the present section is to develop somewhat more formal definitions of the objects that figure in a construction grammar, constructs and constructions, and a formal definition of their mode of combination. In order to do this, we use some of the vocabulary of elementary set theory. For those readers unfamiliar with this vocabulary, an informal introduction to the necessary mathematical concepts is given in section 2.8.5.

2.8.4.1 Constructs

A construct is a grammatically organized piece of language, e.g., a specific sentence or prepositional phrase, including its complete analysis (total parse). According to this usage a sentence or phrase cannot properly be said to be ambiguous, rather the kind of object that can be ambiguous is a sequence of words. A sequence of words is ambiguous if it corresponds to two or more sentences or phrases, that is, to two or more constructs. To disambiguate a sequence of words is to select one among the several sentences or phrases (i.e., one of the sentential or phrasal constructs) to which the sequence corresponds. The terminology just introduced is at variance with an important tradition in the field of formal grammar, which defines a sentence in terms of a string of symbols in a terminal alphabet and therefore allows one to talk about a sentence being ambiguous. In construction grammar we say that a string of words like *Visiting relatives may be annoying* corresponds to two sentences (two sentential constructs); in more traditional terminology, *Visiting relatives may be annoying* is an ambiguous sentence.

2.8.4.2 Constructs as Closed Structures

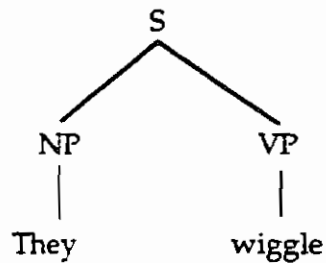
We represent constructs (linguistic objects) with a certain kind of formal object, a *closed structure*. Presently, we will discuss a more inclusive class of formal object, which we will call a *structure*. Structures were introduced in section 2.8.1, and in the present section the notion is elaborated in a somewhat more formal manner. Constructs are modeled by closed structures; constructions will be modeled by structures that are not closed. For expository reasons we first introduce the narrow concept of closed structure and then generalize to the idea of structure.

Constructs are modeled by formal objects (closed structures) which are more restricted in two ways than the formal objects (structures) that model constructions. First, in a closed structure (construct) every completed path of every feature structure ends in a specified atomic value. That is, no path in a closed structure ends in an unspecified value or variable, '[]'. For example, the Determination construction states that the number of the determiner and of the nominal constituent are the same, but does not state what the shared num value is, while in each particular construct licensed by this construction either *sg* or *pl* is specified. Secondly, the terminal nodes of a closed structure (construct) are necessarily ordered linearly with respect to one another, corresponding to the observation that the words and phrases of a particular sentence always come in one order or another: we have no way to articulate, and we never write, two distinct constituents simultaneously. But constructions need not always specify linear order. For example, we want *ate the pizza up* and *ate up the pizza* to share the basic VP construction of English, while differing in more detailed constructions which impose relative order on the elements of a VP.

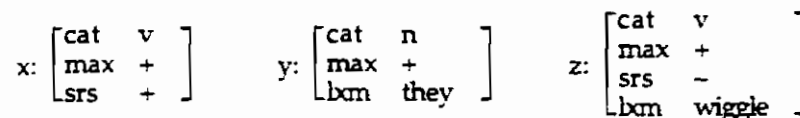
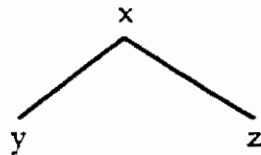
Informally speaking, a closed structure is like the familiar sort of tree shown in (8)a, except that while a tree such as (8)a assigns a category label or lexical item to each node, a closed

structure, like (8)b, assigns a particular kind of feature structure to each node, one in which no completed path ends in '['. Thus, example (8)b represents the closed structure that corresponds to the tree shown in (8)a. (Don't worry for the moment about what "srs" means beyond noting that sentences and verb phrases differ with regard to the value of this attribute.)

(8)a



b



2.8.4.3 Preliminaries

We will call the special kind of feature structures that are involved in modeling constructs *fully specified feature structures*.

- (9) A feature structure f is *fully specified* iff every completed path of f ends in a specific atomic value (i.e., not '[]').

- Let
- (i) s be a set of nodes,
 - (ii) ID_s be the irreflexive, asymmetric, intransitive relation of *immediate dominance*, restricted to the members of s ,
 - (iii) LP_s be the irreflexive, asymmetric, transitive relation of linear precedence restricted to the members of s ,
 - (iv) f be a set of fully specified feature structures,
 - (v) M be a one-many mapping of f onto s

Familiar definitions:

For nodes in s :

- s_i is *mother* to s_j (equivalently s_j is *daughter* to s_i) iff $s_i ID_s s_j$ (equivalently, iff $\langle s_i, s_j \rangle \in ID_s$).
- distinct nodes s_i and s_j are *sisters* iff they share a mother,

- (9) An ordered 5-tuple $S = \langle s, ID_s, LP_s, f, M \rangle$ is a *closed structure* iff
- (a) there is a unique node r (for root) in s which has no mother,
 - (b) every node in s other than r has exactly one mother,
 - (c) For distinct nodes a, b, α, β in s , if a is the mother of α , b is the mother of β , and $a LP_s b$, then $\alpha LP_s \beta$.
 - (d) For distinct sisters s_i, s_j of S , either $s_i LP_s s_j$ or $s_j LP_s s_i$.

An immediate consequence of these axioms is that every pair of nodes in which neither dominates the other is ordered by linear precedence. In particular, this holds for every pair of terminal nodes (those having no daughters).

We have been careful to distinguish a node from the feature structure which is associated with that node. The reason for this is that we will sometimes want to say that a

single feature structure is associated with two distinct nodes or that the feature structure at a certain node represents the unification of two distinct feature structures. To make observations of this kind, we obviously have to be able to distinguish nodes from the feature structures associated with them. Nevertheless, when no confusion is likely to result, we will commonly refer to a specific node by indicating the feature structure associated with it. Thus, we will often write things like "The VP node dominates the object node," rather than the more careful "The node with which the VP feature structure is associated dominates the node with which the object feature structure is associated."

2.8.4.4 Structures and Constructions

A *structure* is a formal object which may be interpreted either as a partial (or total) representation of a construct or as a representation of a set of constructs. Constructions, which can also be thought of as sets of constructs, are represented by structures which are not closed. As the names suggest, closed structures present a special case of structures.

Somewhat more formally,

- Let
- (i) s, ID_s, LP_s be as before,
 - (ii) f^* be a set of feature structures,
 - (iii) M^* be a one-many mapping from f^* onto s .

The three axioms for structures are just the first three axioms for closed structures. The fourth axiom for closed structures, dealing with LP relations, is dropped in the definition of structure.

- (10) An ordered 5-tuple $S = \langle s, ID_s, LP_s, f^*, M^* \rangle$ is a *structure* iff
- (a) there is a unique node r in s which has no mother,
 - (b) every node in s other than r has exactly one mother,
 - (c) For distinct nodes a, b, α, β in s , if a is the mother of α , b is the mother of β , and $aLP_s b$, then $\alpha LP_s \beta$.

By dropping axiom (d) of the definition of closed structures, we allow a structure to have LP relations specified to any arbitrary degree. Closed structures are structures with LP relations fixed for every pair of sisters (and hence for every pair of mutually non-dominating nodes). At the other extreme, it is possible that a structure specify no LP relations at all. Anything in between these two extremes is also possible in a structure. An example of an 'in between' circumstance, which we will revisit in greater detail in a later chapter, is the VP construction given in Figure 16. This construction portrays a lexical verb followed by an indeterminate number of additional constituents whose relative linear order is left unspecified. (Other considerations decide the number and order of these constituents in any particular VP construct.)

To summarize, a closed structure presents the special case of a structure in which all feature structures are fully specified and all pairs of sisters are ordered by linear precedence (hence all pairs of mutually non-dominating nodes, crucially all terminal nodes, are so ordered).

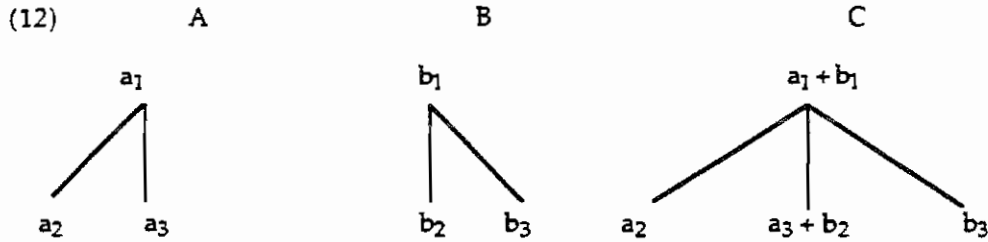
The constructions of a grammar constitute the irreducible set of structures that have to be known by a speaker. Structures provide CG the means for expressing both lexical items and rules of grammar. Intuitively, we 'fit together' structures in order to license constructs. If a closed structure can be 'built up' by 'fitting together' constructions of the grammar, then that structure represents a construct – for example, a sentence of the language.

2.8.4.5 Combination of constructions to license constructs

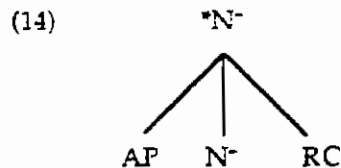
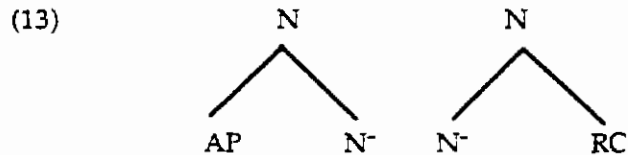
We define the notion of *combination of structures*. The definition depends in part on the notion of unification of feature structures.

- (11) A structure $C = \langle a \vee b, ID_a \vee ID_b, LP_a \vee LP_b, f^*_c, M^*_c \rangle$ is a *combination* of two structures $A = \langle a, ID_a, LP_a, f^*_a, M^*_a \rangle$ and $B = \langle b, ID_b, LP_b, f^*_b, M^*_b \rangle$ iff
- (a) For a node c in $a \vee b$,
- i. if c is in a and not in b , then M^*_c assigns to c the feature structure assigned to c by M^*_a ,
 - ii. if c is in b and not in a , then M^*_c assigns to c the feature structure assigned to c by M^*_b ,
 - iii. if c is both in a and in b , then M^*_c assigns to c the unification of the feature structure assigned to c by M^*_a and the feature structure assigned to c by M^*_b ;
- (b) if two nodes c_i, c_j in $a \vee b$ are sisters in C , then c_i and c_j are sisters in A or sisters in B (or sisters in both).

Axiom (a) says that when you combine two structures A and B into a third structure C , first (i, ii), a node in C that corresponds to a node in only one of the structures A or B has as its feature structure in C the feature structure it has in A or B , secondly (iii) a node of C that corresponds both to a node of A and to a node in B has associated with it in C the unification of the feature structures associated with it in A and B . Axiom (b) is designed to rule out cases like (12), in which structure C is supposed to be the combination of structures A and B . (Assume that the symbols a_1, b_2 , etc. refer to feature structures, and that ' $a_i + b_j$ ' denotes the unification of a_i and b_j).

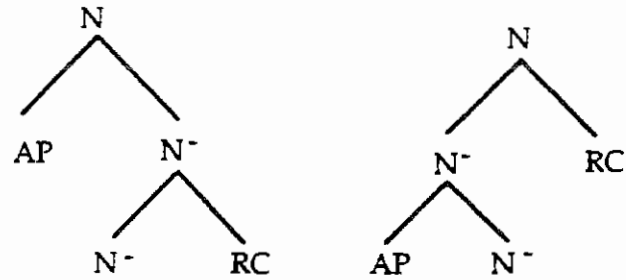


The nodes a_2 and b_3 are not sisters in either A or B and so the combination violates axiom (b). Speaking informally, this provision prevents combination of constructions which "overlap" without "matching". For example, we would not want the facts, shown in (13), that English contains (i) a construction which allows a modifying adjective phrase (AP) to precede a nominal of unspecified maximality (N) and (ii) a construction which allows a modifying relative clause (RC) to follow a nominal of unspecified maximality to permit creation of a flat structure in which a nominal of unspecified maximality is preceded by AP and followed by RC, as in (14).



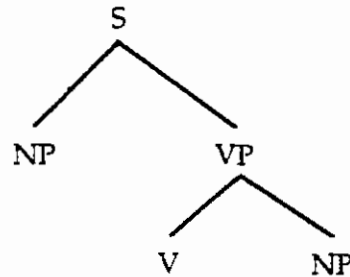
Rather, either of the combinations in (15) might be allowed by our definition of combination (depending on further details of the AP and RC constructions).

(15)

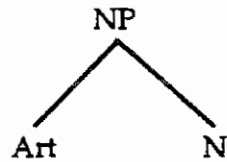


In this section we have been careful to distinguish terminologically between the *unification* of feature structures and the *combination* of structures. These are distinct mathematically. For example unification of two feature structures yields a unique feature structure as a result and so unification of feature structures is an operation. On the other hand, two structures may be combined in more than one way. For example, the structures in (16)a and (16)b can be combined by unifying the root node of (16)b either with the subject or with the object NP of (16)a.

(16) a



b



In later sections, we will write loosely of "unifying" structures and of "unifying" constructions, by which we will literally mean *combining*, them, as *combination of structures* has been defined in this section. This terminological move is convenient because when we combine constructions which contain a single node, the combination amounts in practical terms to the unification of the feature structures corresponding to the respective nodes. Since there is no formal definition of unification as applied to structures, stipulation that the word "unification" may refer to what is formally defined as the "combination" of structures can lead to no confusion.

Some Simple Nominal Constructions

3.1 The Attributes of Number, Configuration and Boundedness

Toward the end of Chapter 1, we talked about the fact that in the Determination construction the values of the number attribute in the left and right daughters must unify. The attribute of number is in fact only one of three dimensions of semantic variation which apply to lexical nouns and which play a role in most nominal constructions. The other two dimensions are called here configuration and boundedness. Linguists are not unanimous that these three attributes should all be treated as specifically semantic, rather than syntactic, properties of English nominal constituents. In fact there is not universal agreement that the semantic field in question should be formulated in terms of these exact attributes and values. But there is universal agreement that the distributional facts which we account for in terms of these attributes (in the constructions developed below) must be accounted for by a comparable, if not identical, set of properties.¹

Figure 1 introduces the notional content of the attributes number, configuration and boundedness pictorially.

¹ A careful study of these questions, which we follow here for the most part, is 'The Relation of grammar to cognition – a synopsis' by Leonard Talmy, appearing in *Proceedings of TINLAP - 2* (Theoretical Issues in Natural Language Processing), ed. David Waltz, New York: ACM, 1978.






		NUMBER		
		singular	plural	
CONFIGURATION	mass	 mud	IMPOSSIBLE	bounded -
		 the mud	IMPOSSIBLE	bounded +
	count	IMPOSSIBLE	 shoes	bounded -
		 (the)shoe	 the shoes	bounded +

Figure 1

The *configuration* attribute has to do with the distinction between things which are thought of as inherently individuated and not necessarily of uniform composition, like shoes, and things which are thought of as not inherently individuated and of being of uniform composition, like mud. Things of the former sort can be counted, *three shoes*; things of the latter sort cannot be counted, **three muds*. The traditional terms for the poles of this distinction derive from the latter observation: 'count' nouns (e.g., *shoe*) versus 'mass' nouns (e.g., *mud*). Since this terminology is traditional, we will adopt the terms *count*

and *mass* as the names of the values of the configuration attribute.

Although the *count/mass* terminology is traditional, we should note that it is not perspicuous. Proper nouns, for example personal names like *Jane*, denote things of the former sort: individuated entities of non-uniform composition. We will say that proper nouns have the configuration (cnfg) value count. But we do not enumerate the unique referents of proper nouns: **three Janes*. (You can probably think of *special* circumstances under which we can indeed say *three Janes*, and, for that matter, somewhat different circumstances under which we can say *three muds*. But note that when we say *three Janes* we are not talking about three manifestations of a unique person named Jane; rather we are talking about three different people, each of whom is named Jane. The word *Jane*, when it is used this way, does not denote a unique person, as it does in normal usage, but rather means something like 'person named Jane'. That is, in the special usage *Jane* is not used as a proper noun but as a (derived) common noun. Later in this chapter we will postulate special constructions to cover these special usages, including also the case of mass nouns used as derived count nouns and that of count nouns used as derived mass nouns.) Since we don't count proper nouns and since proper nouns are also of the configuration type opposed to mass, 'individuated', rather than 'count', would be a more appropriate term to use for this value of the cnfg attribute. Nevertheless, we retain the traditional term 'count' to acquaint you with it and to avoid proliferation of terminology.

Abstract nouns, such as *love*, *sincerity*, and *distaste*, behave like mass nouns. It is unclear whether the notional characterization 'uniform composition' is simply inapplicable to abstract nouns or whether it can sensibly be applied to them in a metaphorical way. In any case, we again stick with traditional usage.

The notional content of the attribute *number* and its values *singular* (sg) and *plural* (pl) is pretty obvious and need not be

belabored. We should note, however, that the binary distinction between one and more-than-one individuated object, familiar from many European and Asian languages, is not universal. Many languages distinguish three values for this attribute: singular, dual, and plural. Thus, many languages have separate pronouns, for example, meaning I, we-two, we-more-than-two; you-sg, you-two, you-more-than-two, he/she/it, they-two, they-more-than-two.

The boundedness attribute, with its values + and -, is probably less familiar. While only count nouns can be modified by a numeral (**three mud(s)*), either count or mass nouns can refer to both bounded and unbounded things. In particular undetermined mass nouns and underdetermined plural count nouns refer to unbounded entities.

- (1) a. He was playing in mud.
b. She was shining shoes.

The nouns *mud* and *shoes* in examples (1) don't refer to a particular bounded quantity of mud or a particular - hence bounded - collection of shoes. Instead, they denote unbounded, indefinitely extended bodies of mud or collections of shoes.

In the top left box of Figure 1 *mud* is unbounded (indicated by the lack of enclosure of the field of dots) and the lack of an enclosing circle in the box labeled *shoes* also indicates unboundedness. On the other hand, if we say

- (2) a. Clean up *the* mud on the carpet
b. Pick up *the* shoes

We are talking about a bounded amount or collection, and it makes sense to respond in a way which presupposes this boundedness:

- (3) a. *All the mud?*
 b. There are *too many shoes*.

So the appropriate boxes in Figure 1 show *the mud* and *the shoes* both to be bounded. We will see in the Determination construction that all determined nominal constituents are bounded whether or not their right daughters are bounded.

A mass stretches out indefinitely and so one can't have a plurality of something like mud: **muds*. Since we can't say **muds*, we can't say **the muds*. This is what is meant by the word IMPOSSIBLE in the boxes corresponding to [confg mass, num pl, bounded +] and [confg mass, num pl, bounded -].

Things like shoes, which are inherently individuated, are inherently bounded. That is why the box corresponding to [confg count, num sg, bounded -] is marked IMPOSSIBLE. On the other hand, the word *shoes* does not necessarily denote something with a definite boundary, although one may be imposed. So we have both of the possibilities *shoes* [bounded -] and *the shoes* [bounded +].

So far, we have described the notional content of the attributes configuration, number and boundedness and have given semantic arguments for postulating these attributes, but we have not yet justified the postulation of these attributes with distributional evidence. We turn now to the latter task. Recall our earlier claim that in the Determination construction, the values for the number attribute in the two daughters must unify. We will see presently that the same holds for the values of the configuration and boundedness attributes of these daughters as well. Thus, when we come to formulate the Determination construction precisely, we will introduce distributional data (e.g., *this shoe* versus **these shoe*) which motivate the attributes number, configuration and boundedness by showing that their values in the two daughters must unify in the Determination construction.

3.1.1 A Methodological Aside

In syntactic research, in fact in grammatical research generally, whenever a theoretical entity is introduced to do a certain job (e.g., ensure that the Determination construction predicts just the correct combinations of determining (left) and determined (right) daughters), that entity should be independently motivated. That is, postulation of the theoretical object in question should solve at least one distributional problem distinct from the first. Otherwise we have no firm reason to believe in its reality.

Imagine, for example, a fictitious language containing four determiners a, b, c, d and four nouns X, Y, Z, W. Suppose that determiners a and b go only with nouns X and Y and that determiners c and d go only with nouns Z and W. That is, suppose the distributional data are as follows.

- | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|
| (4) | aX | bX | aY | bY | *aZ | *bZ |
| | *aW | *bW | | | | |
| | | | | | | |
| (5) | *cX | *dX | *cY | *dY | cZ | dZ |
| | cW | dW | | | | |

Consider the following 'explanation' of this distribution. First, we postulate an attribute X-Y-osity with the values + and -. Then we assign to a, b, X, and Y the feature [X-Y-osity +], while assigning to c, d, Z, and W the feature [X-Y-osity -]. Finally, we require that the Determination construction unify the X-Y-osity values of the two daughters. Clearly, this procedure will predict exactly the distribution we see in (5) and just as clearly it provides no explanation of this distribution. The attribute X-Y-osity is just a renaming of the problem we started out with, not a solution to it.

But suppose now that just those nouns with positive 'X-Y-osity' have another distributional property in common; say, only [X-Y-osity +] nouns can pluralize, or only [X-Y-osity +] nouns accept a certain suffix that derives an adjective from

the noun (like English *-wise* in *lengthwise*), or only [X-Y-osity +] nouns co-occur with a certain class of adjectives, or what have you. In such a case the attribute X-Y-osity is really doing some work for us and not just renaming the problem it was invented to solve. Now we say that the feature is independently motivated. We always want our features (attributes) to have more than a single motivation, and whenever we are forced to admit an attribute without independent motivation we will be ashamed of ourselves. Unfortunately, this kind of shame can not always be avoided, which amounts to a confession that grammatical research is not yet concluded.

3.2 Independent Motivation of Number, Configuration and Boundedness

This said, let us see if we can motivate the attributes number, configuration and boundedness independently of their roles in the Determination construction.

With regard to the configuration attribute we have already seen motivation independent of its role in the Determination construction in the fact that only count nouns can pluralize. When we specify the Pluralization construction, we will take formal account of this fact.

The number attribute shows up in the phenomenon of subject-verb agreement in English, and many other languages: *the boy knows it, the boys know it*. In the Romance languages, adjectives have to agree in number (as well as gender) with the nouns they modify or predicate something of: French *la main sale* 'the dirty (sg) hand', *les mains sales* 'the dirty (pl) hands'.

The boundedness attribute plays an important role in the system of verbal aspect in English and many other languages. Verbal aspect is a daunting subject and we cannot give a satisfying treatment of it here, but we can look at a few examples in which the boundedness value of a nominal phrase clearly plays a role.

A class of intransitive verbs can be subclassified semantically into those which encode a type of event which

has a natural point of termination (like getting well or dying), sometimes called *telic* events, and those which don't (like running or sweating), sometimes called *atelic* events. A temporal adverbial phrase introduced by the preposition *in* can cooccur only with intransitive verbs of this class that are also telic.

- (6) a. He recovered in three hours.
 b. It will dissolve in thirty seconds.
 c. *He ran in thirty seconds. [meaning 'accomplished his running in thirty seconds']
 d. *He sweated in thirty seconds. [meaning 'accomplished his sweating in thirty seconds']

In the case of many transitive verbs, the telicity of the event encoded by the full verb phrase depends on the boundedness of the object expression. Thus, in the following cases we see that the *in*-phrase is acceptable when the direct object is a determined singular count noun phrase (*a house, the cement*), which, like *the shoe* in Figure 1 are bounded, while when the direct object is a mass noun (*cement*) or a pluralized count noun (*houses*), and therefore unbounded, the *in*-phrase is not acceptable.

- (7) a. Pat built a house in six months.
 b. Pat mixed the cement in half an hour.
 c. *Pat built houses in six months.
 d. *Pat mixed cement in half an hour.²

We have now observed that each of the proposed attributes, configuration, number and boundedness, is motivated independently of its role in the Determination construction.

3.2 Some Lexical Constructions

We will treat lexical entries as themselves constituting constructions, single-constituent constructions of course. We look first at some examples of simple lexical constructions. Later we will consider the ways these unify with multi-constituent constructions to constitute phrases. Figure 2 shows the lexical entries for the words *shoe*, *mud* and *Lynn*.

syn	[cat n proper - max - lex +]	syn	[cat n proper - max [] lex +]	syn	[cat n proper + max + lex +]
sem	[bounded + cnfg count num sg]	sem	[bounded - cnfg mass num sg]	sem	[bounded + cnfg count num sg]
lxm	<i>shoe</i>	lxm	<i>mud</i>	lxm	<i>Lynn</i>

Figure 2

In each case the outer AVM contains syn, sem and lxm attributes. Each of the three nouns represented in Figure 2

² Special construals can be given to the starred sentences (7)c,d to make them acceptable. These construals derive from special constructions, partially analogous to those we mentioned earlier in connection with the use of inherently proper nouns as common nouns: *I know three Janes*. For example, *When he was younger and had more energy, Pat built houses in six months*. *Now each house takes him a year*. We will not pursue the matter here other than to note that these special constructions introduce particular features of semantic interpretation.

may be thought of as standing for a large class of lexical entries. For example, there is a set of singular, count nouns (*tree, pencil, river, heart, ...*) whose members share all the syntactic and semantic features of *shoe* shown in Figure 2. (Of course, *tree, pencil, etc.* will differ from *shoe* in semantic respects that are not displayed in Figure 2, and which do not figure in the syntactic behavior to be studied in this chapter.)

Each of the three lexical constructions in Figure 2 shows that every member of the class of nouns in question is assigned a value on each of the semantic attributes *bounded*, *cnfg* and *num*. As we saw above in our discussion of Figure 1, singular common count nouns, like *shoe*, are inherently bounded; mass nouns like *mud* are inherently common, singular and unbounded; proper nouns like *Lynn* are singular, bounded and count, differing from the [proper -] variety, like *shoe*, only in the value of the feature [proper +].

With regard to their syntactic features, all are [cat n], indicating that they are nouns. The [proper +] versus [proper -] distinction needs no further discussion here. Skipping the *max* attribute for the moment, the indication [lex +] in the *syn* value records the information that each of these three constructions is lexical. Certain morphological and syntactic constructions refer to the lexicality, plus or minus, of some constituent. We will see examples of motivation of the feature of lexicality as the course progresses.

We turn now to the *max* values of *shoe, mud, and Lynn*. *Shoe* is represented as [max -]. This means that *shoe* can unify with a constituent in a structure which is specified [max -] (or listed as [max []]), assuming that the values on no other attribute conflict. We will see shortly that the Pluralization construction and the Determination construction both require that one of their daughters is nominal ([cat n]), and that daughter must be [max -]. We are thus not surprised that the expressions in (8) are well formed.

- (8) a. shoes
b. the shoe

On the other hand, any constituent that occurs as an 'argument', for example as the subject or direct object of a verb or as the object of a preposition, has to be [max +]. (The concept of *argument* will be treated in Chapter 4.) The ill-formedness of the sentences in (9) exemplifies this fact.

- (9) a. *Shoe hurts
b. *Emelda likes shoe
c. *Emelda is fond of shoe

We thus notice that a singular count noun, like *shoe*, can be determined or pluralized (see 8) but cannot occur alone as, for example, the subject of a sentence (see 9).

Turning now to a mass noun, such as *mud*, we observe a different distribution. Mass nouns can also be determined, as in (10), which shows that their max value is compatible with -.

- (10) the mud

But mass nouns can also appear in argument positions, as in

- (11) a. Mud is slippery.
b. Emelda detests mud.
c. Emelda isn't fond of mud.

Hence, the max value of mass nouns must also be compatible with +. Since the max value of a mass noun like *mud* is compatible with both + and - it is unspecified, [].

We have mentioned the resistance of mass nouns to pluralization: observe the unacceptability of (12).

- (12) *muds

When we look at the Pluralization construction, we will see that this resistance is due, not to the max value of *mud*, but to the fact that its value on the configuration attribute is mass: only nouns describing individuated entities can be pluralized.

For the moment, the only thing that concerns us with regard to mass nouns is the fact that they are [max []]; the resistance of mass nouns to pluralization for a reason unrelated to their maximality should occasion no confusion.

We have seen that singular count nouns have [max -] and that mass nouns (which we have incidentally noticed occur only in the singular) are [max []]. Proper nouns, like *Lynn*, display the third possibility for maximality: [max +]. They may occur in argument positions, as in (13);

- (13) a. Lynn likes movies.
 b. Movies interest Lynn.
 c. Emelda gave some shoes to Lynn.

and they cannot be determined.

- (14) a. *The Lynn likes movies.
 b. *I gave some shoes to the Lynn.

Examples (13) show that proper nouns can occur as arguments, hence have a maximality value compatible with +. Examples (14) show that proper nouns cannot be determined, hence have a maximality value incompatible with -. Consequently, such nouns are assigned [max +].

3.3 Pluralization

The Pluralization construction is shown in Figure 3.

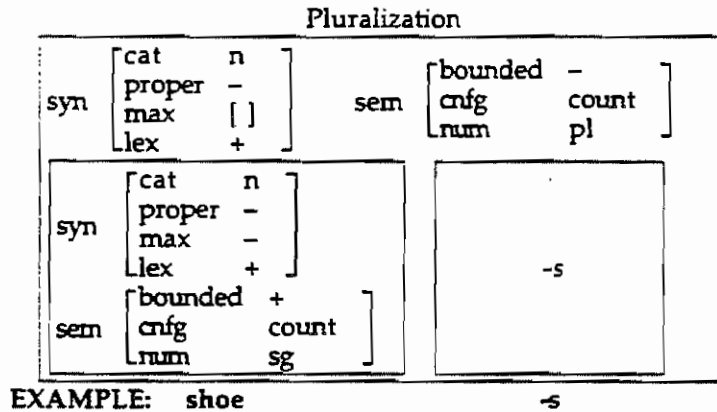


Figure 3

We have already discussed unofficially several properties of the Pluralization construction in talking about the lexical entries for *shoe*, *mud*, and *Lynn*. We now take a more systematic inventory of the various aspects of this construction.

We note first that there are two daughters. The right daughter is simply the plural morpheme. We notate this with '-s', but it should be recognized that this is not a phonetic representation. The piece of typography '-s' symbolizes the abstract phonological entity that is realized as /z/ in *boys* and *pencils*, as /s/ in *books* and as /ɹ z/ in *churches*.³

The left daughter is the singular noun that, informally speaking, 'gets pluralized'. Syntactically this noun of course has [cat n]. It must be a common noun, [proper -], as evidenced by **Lynns*. Semantically it must be of the *shoe* type: bounded, count and singular. Note the ill-formedness of **muds*. We have already observed that nouns of this type are always syntactically [max -].

The left daughter must also be a lexical noun, syn [lex +]. Thus, we can pluralize *book* and obtain *books*. We noted in Chapter 2 that the possessive 's occurs after the last word of

³ Irregular plurals will be considered in the next section.

the noun phrase, as in *the King of England's hat*. The plural *s*, on the other hand, occurs directly after the lexical noun: *the Kings of England* is a plural, not a possessive, noun phrase. This observation is reflected in the composition of the Pluralization construction in Figure 3 by the fact that syntax value of the left daughter is marked *lex +*.

In the external semantics of the Pluralization construction we find that the *cnfg* value is the same as that of the head (left daughter): [*cnfg count*]. No surprise here. The number and boundedness values, however, differ between the left daughter and external semantics. As to number, once a singular noun is pluralized it becomes plural. Thus, appealing to subject verb agreement,

- (15) a. The shoe is/*are tight.
b. The shoes *is/are tight.

The boundedness values also differ, + in the head daughter and - in the external semantics.

- (16) a. He built a house [bounded +] in six months
b. *He built houses [bounded -] in six months

Turning now to the external syntax of the construction, we note without further comment the obvious specifications [*cat n*] and [*proper -*]. We have no reason to say that *shoes* is any less a lexical item than *shoe*; hence we find [*lex +*] in the external syntax.

We come now to the maximality value of the external syntax of Pluralization. Interestingly, we find that although singular count nouns are [*max -*], plural nouns are unspecified with respect to maximality, [*max []*]. That is, in contexts specifying a particular value for maximality, plural nouns (which are, of course, always count) act just like mass nouns: they can appear either in contexts requiring maximality or in those requiring non-maximality. Examples (17) and (18) are just like examples (10) and (11) except that count plurals have

been substituted for mass nouns (with adjustments to number in the verb when necessary).

(17) the shoes

- (18) a. Shoes are slippery [when the soles are polished].
 b. Emelda detests shoes.
 c. Emelda isn't fond of shoes.

In concluding our discussion of pluralization, plural nouns end up having the same boundedness and maximality properties as mass nouns. We have just demonstrated this with respect to maximality in noting the parallels between examples (17, 18) and examples (10,11): both mass and plural nouns are [max []]. Both mass and plural nouns are also unbounded. As we noted in our discussion of the notions encoded in Figure 1 and of the lexical entry for *mud* in Figure 2, mass nouns are [bounded -]. In example (16) we saw that plural nouns are also [bounded -]. We emphasize here this parallelism in behavior of mass and plural nouns because it comes up again in the discussion of the Modified Nominal construction.

3.3.1 Irregular Plurals and Pre-emption

A number of English nouns do not form their plurals with the Pluralization construction given in Figure 3. These include cases of internal changes in vowels (*goose-geese*, *foot-feet*, *mouse-mice*), cases where there is no phonetic alternation (*sheep-sheep*, *fish-fish*) and quite a few cases of phonetic alternations that are difficult to describe in summary terms (*ox-oxen*, *child-children*). Most of the foregoing examples represent the remnants of patterns that were more productive in older forms of English. We can also find vestiges among English plurals of patterns from other languages. These occur in words whose plural forms were borrowed into English along with the singular forms (*memorandum-memoranda*,

datum-data, medium-media, focus-foci, alumnus-alumni, alumna-alumnae < Latin; *phenomenon-phenomena, criterion-criteria* < Greek; *chateau-chateaux, chapeau-chapeaux* < French). In some of the latter cases, a change within recent modern English can be observed in which the singular form begins to drop out and the plural form is (apparently) reanalyzed in the minds of speakers, no longer as a plural of a count noun but as a (necessarily singular) mass noun. Many contemporary speakers find *The media was quick to report that the data was missing* at least as natural as *The media were quick to report that the data were missing*.⁴

When a regular plural form is innovated to compete with an existing irregular plural form the older form may hang on for quite a while.⁵ We find this with both the borrowed plurals (*mediums-media, memorandums-memoranda*) and the native plurals (*fishes-fish, deers-deer*). This historical circumstance raises an interesting problem for the synchronic grammar of English. How do we account for the fact that in most of the cases of irregular plurals (e.g., *children, moose, criteria*) no regular plural form (**childs, *mooses, *criteria*) exists alongside the irregular one, although in a few cases (*fish-fishes, memoranda-memorandums*) both irregular and regular plural forms occur? We think we can understand how this situation arises historically – as we have just said, occasionally an old, irregular form and a newer, regular form

⁴In some more innovative dialects, the word *media* has undergone a further change to become the plural of a new count noun, denoting television personnel, which has no singular form, as in

- (i) There were so many media present they were tripping over their own wires.

This word *media* appears to have lost all connection with its origins as the plural of *medium*.

⁵ This kind of competition between traditional and innovative forms is of course restricted to neither plurals nor nouns.

coexist for a time. The problem is how to represent this state of affairs in the synchronic grammar of the contemporary language.

Interestingly, it is the case in which the irregular form appears to 'pre-empt' the regular pluralization process – i.e., the majority case among the irregular plurals – which causes the theoretical problem. If all the irregular plurals were of the relatively rare *memorandums-memoranda* type, in which the irregular plural (*memoranda*) is doubled by a regular one (*memorandums*), we could just list two simple lexical items: *memorandum* (sg.) and *memoranda* (pl.). Then the Pluralization construction would apply to singular *memorandum* to produce plural *memorandums*, in just the way Pluralization applies to singular *kingdom* to produce plural *kingdoms*. The predicted result would agree with the observed facts: there is in English a singular form *memorandum* which has two plural alternants *memoranda* (irregular) and *memorandums* (apparently regular).

Our problem is, however, with the more frequent, non-doubling cases. We have to somehow explain how the absence of forms like **childs*, **mooses*, and **criteria* results from the existence of the irregular plural forms *children*, *moose* and *criteria*. How does the existence of the irregular form pre-empt the expected regular form? Our approach to this problem has four parts. (1) For the unproblematical regular plurals, we list the singulars and let the Pluralization construction create the plurals. (2) For irregular plurals without competing regular forms (e.g., *children*) – i.e., for the majority of irregular plurals – we list both the singular and the plural form as simple lexical items. (3) We posit a principle of 'pre-emption', according to which the existence of a *simple* plural form prevents application of the Pluralization construction to the corresponding singular form, thus blocking **childs*. But now we have ruled out – by our pre-emption principle – the regular plural members of the regular-irregular doublets, i.e., alternations of the *memorandum-memoranda-memorandums* type. One way to get around this is to say (4) that

memorandums, for example, is not produced by unifying the singular *memorandum* with the Pluralization construction, but is merely memorized as if it were phonologically irregular.⁶ We do this for each case of a seemingly regular plural which is doubled by an irregular plural form.

But what is the nature of the pre-emption principle? Specifically is this principle restricted to irregular forms of words and the constructions that would licence the parallel regular forms, or could the pre-emption of non-occurring regular plural forms like *gooses* by the corresponding irregular plurals (*geese*) reflect a more general principle? Finding this last hypothesis correct would be a source of encouragement because it is difficult, if not impossible, to implement a pre-emption principle in a unification-based grammar. In the kind of grammar described in Chapter 2, a construct is licensed simply by putting together (unifying) patterns (constructions). It is far from evident that in such a grammar the existence of one pattern can prevent an independently existing pattern from operating. Although many linguists have assumed that some kind of pre-emption principle must be incorporated into grammatical theory in order to handle 'blocking' data, as exemplified by the majority of English irregular-regular plural doublets, our position will be that the pre-emption of the regular by the irregular forms is part of something more general than grammar.

Some evidence for the view that the pre-emption phenomenon is more general than a grammatical process which 'blocks' regular forms when irregular forms with the same meaning exists comes from cases in which the existence of a word corresponding to a particular denotatum seems to block the otherwise expected use of another word or phrase for that denotatum. For example, *beef*, *pork* and *veal* mean

⁶There is in fact some experimental psycholinguistic evidence suggesting that the regular-appearing forms which have an irregular doublet are processed like irregular forms.

approximately 'meat of a mature bovine', 'meat of a pig', and 'meat of an immature bovine', respectively. Ordinarily, we can use the name of an animal whose flesh is commonly eaten as the name of the meat of that animal: *I like chicken, We had trout for lunch, Do you like lamb?* But we can't do this in the case of *beef, pork* and *veal*; we do not say *I like cow/steer, We had pig for lunch, Do you like calf?* It has been maintained that English contains a rule (construction) of 'grinding', according to which we use the name of a commonly eaten animal to denote the meat of that animal. 'Blocking' of the three odd sentences just cited is then seen to consist in a constraint on grinding, caused by the existence of the forms *beef, pork* and *veal*. This is the view against which we will argue: that the grammar contains a device causing the existence of a word to block the application of a pattern which would license the creation or use of another word for the intended denotatum.

First, we observe that the 'grinding' pattern itself pre-empts another way of talking. It has been observed that the grinding pattern is reserved for the flesh of animals that are considered to form a part of the normal human diet of our culture. Thus, since 'grinding' yields *chicken*, but not *toucan*, as names of kinds of meat, it is possible to say *Have you ever eaten toucan meat?* but hardly *Have you ever eaten chicken meat?* Presumably, whatever causes the pre-emption of *pig* by *pork* is also what causes the pre-emption of *pig meat* by *pork* and of *chicken meat* by *chicken*. It would be convenient indeed if the same principle could account for the pre-emption of *childs* by *children*. There seems to be at work here something more general than any pair of constructions.

The same phenomenon appears with longer phrases as well. There was once a debate in theoretical linguistics over whether a verb such as *kill* should be 'decomposed' at a 'deep syntactic level' into a logical formula with a number of simpler predicates: something along the lines of 'cause to die' (where *die* itself decomposes to 'become not alive'). The lexical decomposition controversy *per se* is not germane here, but an

interesting observation (by James D. McCawley) to which it gave rise is. McCawley, a proponent of the lexical decomposition view, was confronted with the fact that one says *Smith killed Jones* and *Smith caused Jones to die* under different conditions and presumably with the idea of communicating something different. McCawley pointed out that this observation does not prove that *kill* and *cause to die* are distinct in meaning. Assume they do mean the same thing, he argued. Since *kill* is a ready-made way of communicating this meaning, when the speaker chooses to put together the syntactically analyzable expression *cause to die* instead, the addressee assumes the speaker has gone to this extra trouble for a reason and so infers that something slightly different from *kill* was the speaker's intended meaning.⁷ That is, we assume that a speaker will use a simple, ready-made expression when one exists, rather than employing the combinatorial resources of the language to construct a more complex expression carrying the same meaning. In the case where the constructed expression can be attributed meaning beyond its conventional signification, it may be used to convey

⁷The philosopher Paul Grice has elaborated a theory of conversational meaning, according to which hearers, by assuming that speakers assume themselves to be considered truthful, economical, concise, etc., are able to infer richer interpretations than the conventional content of the speakers' words. Speakers, aware of these assumptions by hearers, are able to exploit systematically in constructing their utterances this kind of mutual speaker-hearer knowledge regarding conversational cooperation. (See, Grice, H.P. (1957) "Logic and conversation" In P. Cole and J. Morgan (eds) *Syntax and Semantics, vol. 3: Speech Acts* (pp. 41-48). New York: Academic; (1975) "Further notes on logic and conversation" In P. Cole (ed) *Syntax and Semantics, vol. 9: Pragmatics* (pp. 113-127). New York: Academic. More recent developments of this theory are to be found in S. Levinson (1983) *Pragmatics*. Cambridge: Cambridge U. Press and G. Green (1989) *Pragmatics and Natural Language Understanding*. Hillsdale, NJ: Earlbaum.)

that extra meaning. In the case of *cause to die* (in place of *kill*) the indirection of the means of expression may suggest indirect causation; so if A left the gun out and B pulled the trigger, we feel that *cause to die* is more appropriate to convey A's indirect causation of someone's death and *kill* to convey B's more direct causative action.⁸

We propose that there is just one kind of pre-emption principle at work in all these cases: A speaker chooses a simplex, ready-made expression rather than constructing a complex expression with the same meaning. With regard to the psychological motivation of this principle, computer science provides a suggestive analogy: table look-up is cheaper than computation. Translated into constructional terms, it is easier to locate a single construction in memory than to locate two or more constructions and then unify them. If, as in the case of *kill* and *cause to die*, the *choice* of the complex expression may itself be interpreted by the addressee, the speaker may wish to go to the extra trouble to utter the complex expression for the purpose of conveying the additional meaning. In cases like *children/childs* or *swam/swimmed*, the expression resulting from unification of two constructions (*childs*, *swimmed*) is virtually never employed because there is no alternative interpretation available. On this view, *childs* and *swimmed* are actually grammatical but are ruled out by a pragmatic principle governing language use.⁹

3.4 The Modified Nominal (MN) Construction

In Chapter 1, we noted that nominal expressions can be modified by placing adjectives before them; an example was

⁸This is not exactly the way McCawley put the matter. We have adapted his observation and argument to our own purposes.

⁹And conceivably governing other sorts of behavior as well. For example... LET'S ELIMINATE THIS NOTE IF A PERSUASIVE EXAMPLE CAN'T BE FOUND.

blue porpoise. We notated the resulting construct with the symbol 'N?', promising a fuller account at a later time. That time has now come. Actually, it's not easy to make up a descriptively accurate name for this construction that isn't absurdly long. If length of name were no object, we might call this construction something like the 'Adjectivally and Restrictively Pre-Modified Nominal' construction, to indicate that it consists of a restrictive adjectival modifier preceding a nominal constituent in a construct that is itself nominal. Since this name is too long to be useful, we will content ourselves with 'Modified Nominal (MN)' construction.

A not quite complete version of this construction is given in Figure 4. In that Figure, you will note that consideration of the max values for the right daughter and the external syntax of the MN construction has been postponed (as indicated by the question marks) until after we discuss the rest of the construction. The determination of these values constitutes an interesting problem, which we will put off until we have discussed the other properties of the construction, those on which Figure 4 takes a stand.

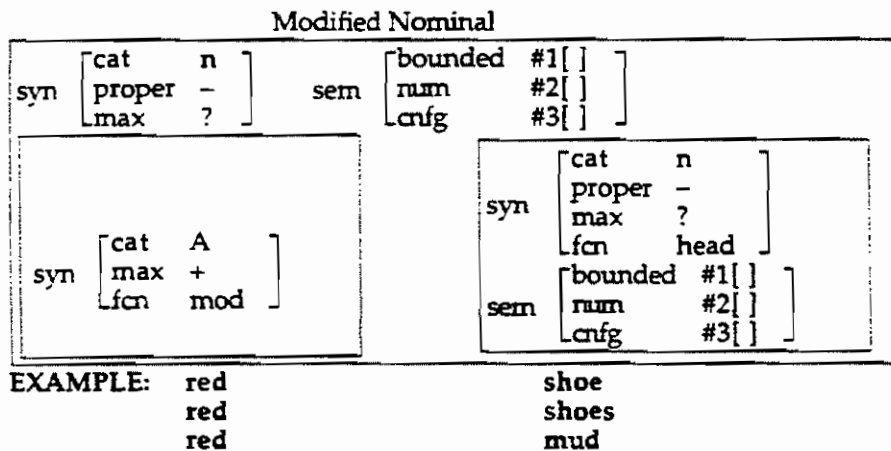


Figure 4

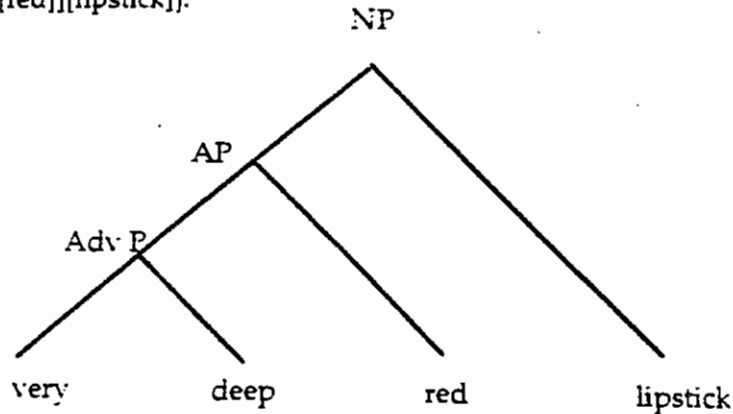
Let's begin with the right, or head, daughter.¹⁰ In the sem value the bounded, num and cnfg attributes have unspecified values: '[]'. This indicates that a nominal with any possible combination of such values can be modified by an adjective phrase. We have seen, for example, that *shoe*, *shoes* and *mud*, each of which exhibits a distinct combination of values on these three attributes can be modified by *red*. Preceding the indications of unspecified values are the indications '#1', '#2' and '#3'; these unification indices (or unification variables) also appear before the (unspecified) values of the corresponding attributes in the external semantics. This means that the values of the boundedness, number and configuration attributes within the sem value of the right daughter unify with the values of the boundedness, number and configuration attributes, respectively, of the external semantics. For example, *shoes* is [bounded -], [num pl], and [cnfg count] and the modified nominal *red shoes* has these same values.

Staying with the right daughter, [cat n] indicates that it is nominal. The notation [proper -] records the fact that proper nouns cannot be restrictively modified by a preceding adjective phrase: *honest Congressman Lightfinger* can't be interpreted as a restrictive modification; this expression

¹⁰We have been slipping in the term 'head' now and then, undefined. Note that the syn value of the right daughter contains the feature 'fcn head'. Often, in fact usually, one daughter in a construction will share the cat value and the values on a number of other attributes with the external syntax and semantics. This is called the head daughter. There are generalizations about heads *per se* that can be extracted both within a given language and, arguably, across languages. For example, languages show a strong tendency, though not a perfectly reliable one, either to put the complements of all heads (e.g., direct object of verbs, object of prepositions, prepositional complement of nouns [*teacher of Spanish*], prepositional complement of adjectives [*aware of the problem*]) on the same side of the head regardless of the syntactic category of the head; in English the complements tend strongly to come after the head.

always means 'Congressman Lightfinger, who is honest'. Since a proper noun denotes a unique object, and since restrictive modification narrows the sense or reference of the expression modified, there is no coherent notion of restrictive modification of a proper noun. As mentioned above, we return to the max value later.

The left, modifying, daughter is simply an adjective phrase. Modifiers are, very roughly, elements that combine with heads to produce a constituent which is of the same syntactic category and semantic type as the head. Thus, an adjective phrase when modifying a noun produces a result that is syntactically nominal and has the type of semantics associated with the original noun, including such features as boundedness, configuration, and number. The adjective phrase in the MN construction may be either a one-word phrase, like *red* in *red mud*, or an adjectival phrase consisting of several words such as *very deep red* in [[[very] [deep]] [red]][lipstick]].



We have already covered the external semantics in connection with the unification of the bounded, num and crfg values.¹¹ Turning now to the external syntax, we note that the

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category is nominal, [cat n]. The external syntactic behavior is that of a common noun, [proper -]. The question of the maximality value of the MN construction and its head nominal is the topic of the next section.

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that distinguishes, say, the meaning of *fat dogs* from the meaning of *thin cats*. This is in keeping with our general practice in this course of concerning ourselves only with those semantic properties which are conventionally linked to grammatical form. There is a semantic distinction between *fat dog* and *fine sand* which makes a difference for linguistic form as illustrated by

- (i) a *[not] much fat dog
b [not] much fine sand

There is no comparable, syntax-relevant semantic difference between *fat dog* and *thin cat*.

¹²We have said nothing about that part of the semantics of modified nominals that most people would think of first, the part that distinguishes, say, the meaning of *fat dogs* from the meaning of *thin cats*. This is in keeping with our general practice in this course of concerning ourselves only with those semantic properties which are conventionally linked to grammatical form. There is a semantic distinction between *fat dog* and *fine sand* which makes a difference for linguistic form as illustrated by

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There is no comparable, syntax-relevant semantic difference between *fat dog* and *thin cat*.

3.5 The Maximality Values in the MN Construction

Now for the question of the max values in the head daughter and external syntax of the MN construction, which were signaled simply with question marks in Figure 4. Given the machinery we have postulated so far, and given the formulation of the Determination construction (which is shown later in this chapter), there is no way to account for the data regarding maximality in the MN construction within the framework being employed. The argument leading to the foregoing conclusion is somewhat complex and we trace it in detail to give you a chance to see the kind of reasoning that comes up in the conduct of syntactic research. At the end we will propose several solutions to the problem, none of which is flawless. We number the steps in the following argument, so that earlier steps can be easily referred to in later steps.

[1] A determined nominal phrase cannot be modified within the MN construction: **red the shoe*, **red some mud*, etc. We noted in Chapter 2 that the external syntax of a determined nominal construct is max +. (This reflects the fact that, for example, *Shoe hurts* is not a sentence, while *The shoe hurts* is. See, for example, Figure 25 of Chapter 2.) By assuming, as shown in Figure 5 below, that the right daughter of the MN construction is syn [max -], we can explain why a determined nominal phrase such as *the shoe* can not occupy this position, thus ruling out **red the shoe*.

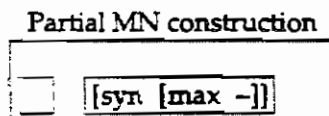


Figure 5

[2] MN constructs can appear in argument positions: *Red shoes are pretty*. Thus, what is shown in Figure 6 is a possible MN structure (with most detail omitted).

Possible MN structure

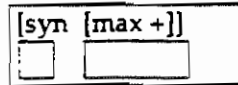


Figure 6

[3] MN constructs can be determined: *the red shoes*. Thus, what is shown in Figure 7 is also a possible MN construct (with most detail omitted).

Possible MN structure

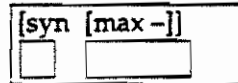


Figure 7

[4] Jointly [2] and [3] imply that the external max value in the MN construction must be unspecified. Hence, the MN construction must contain the information in Figure 8.

(Partial) MN construction

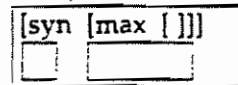


Figure 8

[5] Jointly [1] and [4] imply that the MN construction must contain the information given in Figure 9.

(Partial) MN construction

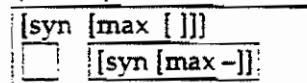


Figure 9

Unfortunately, the construction shown in Figure 9, yields the prediction that any MN construct can appear in argument position. Bu: this is false when the head daughter is singular and count (and consequently [max -]).

(19) *Red shoe hurts

Intuitively what is going on is that for mass and plural heads, which are unspecified for maximality, the MN

construct is itself unspecified for maximality, whereas for count singular heads which are negatively specified for maximality, the MN construct is also specified negatively for maximality. Thus, the specification (or lack thereof) of the maximality value of the head daughter determines the specification (or lack thereof) of the maximality value of the external syntax. We would like to capture this intuition by simply unifying these two values, as in the version of the MN construction posited in Figure 10.

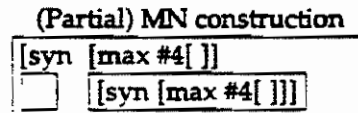


Figure 10

But distressingly, the construction in Figure 10 won't do either. The construction displayed in Figure 10 does effectively block (19) because it will copy the [max -] value of the head daughter *shoe* to the external syntax of the construct *red shoe*, which will then block this constituent from appearing as a subject. But this construction falls afoul of our original observation in [1] that a determined nominal phrase, such as *the shoe*, cannot be the head daughter of MN: **red the shoe*. Recall our conclusion in [1] that the max value of the head daughter of MN must be minus.

A possible solution to the problem is to retain the construction in Figure 10 for MN while finding another way to block **red the shoe*. We might, for example, add a feature to the Determination construction: say, [determined +]. We could then put the notation [determined +] in the external syntax of the Determination construction and add [determined -] to the syntax of the head daughter of MN as in Figure 11.

(Partial) MN construction

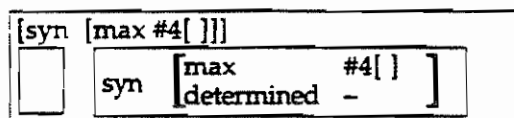


Figure 11

This approach would block **red the shoe* while still blocking **Red shoe hurts* and admitting *Red shoes hurt*. However, while this move succeeds in predicting the data accurately, it involves the postulation of the attribute 'determined' to solve this single problem; this attribute is not independently motivated.

A second approach to the problem can be founded on the following observation. With mass and plural heads, we always need [max []] in the external syntax, while with count singular nouns we always need [max -] in the external syntax.

Since we want the notation [cat n, max +] to indicate a nominal constituent that cannot be made larger, and since in the case of a count singular noun we independently need the head daughter to be of the type [max -], we find it convenient to assign the feature [max -] to the daughter constituent in both cases. Fortunately, there is an attribute other than maximality that neatly partitions nouns into these two classes, namely the boundedness attribute: mass and plurals are [bounded -], while singular count nouns are [bounded +]. Consequently, we could posit two distinct MN constructions along the lines of Figures 12a and 12b. The former would accept only mass and plural heads and the latter would accept only count singular heads.

Two (Partial) MN Constructions

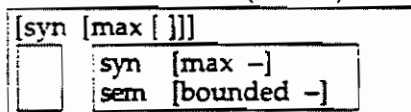


Figure 12a

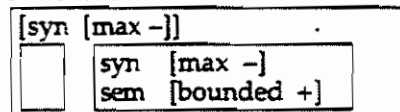


Figure 12b

The construction in Figure 12a accepts only mass and plural heads and licenses both *the red shoes/the red mud* and the

subject phrase in the sentence *Red mud is gooey*. In combination with the determination construction, which will set the external boundedness values of *the shoes/the mud* at +, it will block **red the shoes/mud*.

The construction in Figure 12b accepts only heads that are singular and count. In combination with the Determination construction, which sets the external maximality value of *the shoe* at +, it will block **red the shoe*. Since 12b sets the maximality value of the MN construct *red shoe* at -, it blocks **Red shoe hurts*. So the two-construction approach of Figures 12 also correctly encodes the data, but this time the cost is the obvious one of positing two constructions to account for data that seem pretheoretically to constitute a unitary phenomenon.

The decision to describe the head daughter in the 12a version as *max -* was motivated by a desire to give *max +* a particular consistent interpretation, but that decision was not dictated by the theory. We might instead have found some value in claiming that what the two constructions have in common is a unificational relation between the mother and the daughter of each construction. We examine that possibility next, in the constructions shown in Figures 13a and 13b.

Two (Partial) MN Constructions

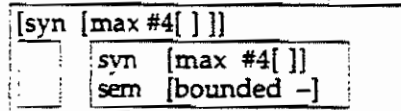


Figure 13a

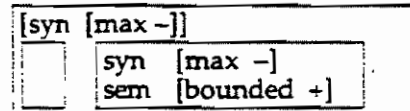


Figure 13b

The construction in Figure 13b is identical to the one in Figure 12b. In Figure 13a, however, we give up the intuition that head daughters must always be non-maximal in favor of the intuition that MN unifies the maximality values of the head daughter and external syntax in all cases. Figures 13a and 12a yield exactly the same empirical predictions; hence the Figure 13a,b solution has the same empirical consequences

as the Figure 12a,b solution. You should satisfy yourself that the last two sentences are true before proceeding.

If we consider what we have done in Figures 13a and 13b, the conceptual content of this move can be put into words as follows. (1) All the data are accounted for by the two constructions. (2) In both of these constructions the head and external values of maximality are the same; so we can say in general that the maximality values of the head and external syntax unify in any MN construct. (3) Heads that are both [max +] and [bounded +] are ruled out! (Figure 13a allows either value of maximality with [bounded -]. But Figure 13b allows only [max -] with [bounded +].) This means that we can save the intuition that the external and head values of maximality unify, given in Figure 10, if we can somehow eliminate the possibility of MN heads which are both [max +] and [bounded +]. In order to do this we must expand our notational possibilities to express a constraint on a combination of values for distinct attributes within a construction. This is exemplified in Figure 14

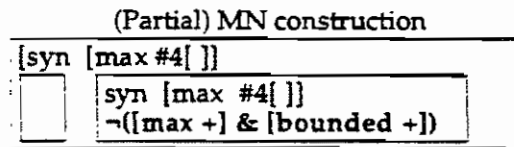


Figure 13c

At the cost of (1) adding the constraint, expressed in bold type, ruling out heads with both [max +] and [bounded +] and (2) abandoning the intuition that a head daughter can never be maximal, the construction in Figure 13c accounts for all the distributional facts in a single construction, without requiring us to add a specific additional feature (e.g., 'determined') which is not independently motivated. We should not be *too* proud of this accomplishment, however, because, from a mathematical point of view a constraint like this is the equivalent of the addition of one more feature in a strictly unificational system. The (somewhat arguable) theoretical

advantage of the solution in Figure 13c over that of Figure 11, is that Figure 13c does not commit us empirically to any *particular* unmotivated feature. In a sense, one can interpret a constraint like that in Figure 13c as acknowledging a problem to exist and correctly predicting the data without proposing a specific phony solution. Later in this course we may have recourse now and then to constraints like the one in Figure 13c. We will view an occasional move of this kind as a necessary, but relatively venial, transgression against a method which (a) is strictly unificational and (b) obeys an unwavering canon of independent motivation of each theoretical entity.

The solution proposed in Figure 13c to the maximality problem in the MN construction can now be combined with our original partial representation of the MN construction (in which we ignored the maximality problem), Figure 4, to give us a final formulation of the MN construction.

Modified Nominal Construction (final version)

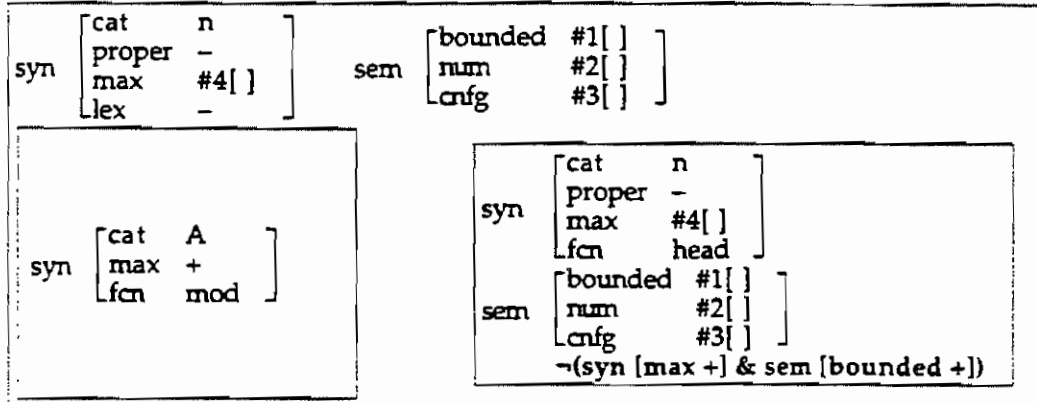
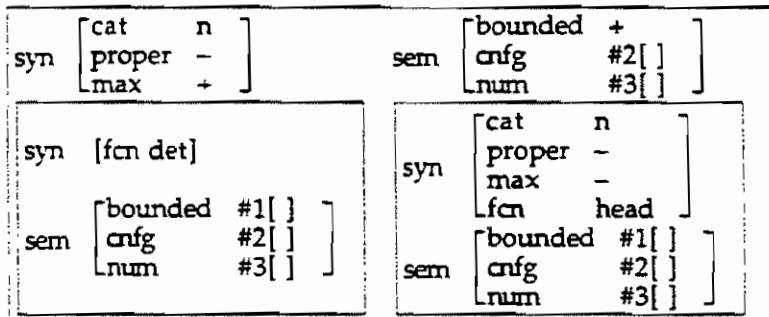


Figure 14

3.6 The Determination Construction

We have already talked about the Determination construction in an unofficial way. We now officially present and discuss this construction.

Determination Construction



Examples: the (red) shoe(s)
 some (red) mud

Figure 15

Consider first the head daughter. Syntactically, its category is *n* (nominal). The attribute proper is assigned the value - to take account of the impossibility of determining a proper noun: **some Lynn*/*the Lynn*. The *max* attribute is also assigned the value -; since the external syntax is [max +], this means that an already determined noun (that is, a construct of the Determination construction) cannot itself be determined: **the some shoes*. The value of the function (*fcn*) attribute is head.

Turning to the *sem* value of the head daughter, we note that the three attributes of boundedness, configuration and number can each take on any value possible for that attribute.

In the external semantics, the *cnfg* value and the *num* value unify with the corresponding values of the head daughter. There is a conservative dialect of English for which the following judgments are valid.

- (20) a. Lynn cleaned up less mud than Pat did
 b. *Lynn cleaned up fewer mud than Pat did
- (21) a. *Lynn picked up less shoes than Pat did
 b. Lynn picked up fewer shoes than Pat did

You probably have no trouble agreeing with the judgment of unacceptability for example (20)b. You may have trouble believing that anyone would object to a sentence like (21)a; if so, we ask you to take on faith the claim that there are such speakers.

The point of examples (20-21) is that in the dialect represented there *less* cooccurs only with mass nominals, while, of course, *fewer* occurs only with count nominals. Since in differing contexts, the nominal constituents in question may either be determined or not, this observation gives us a test for the claim that determination preserves the *cnfg* value of the head daughter.

(22) The mud he tracked on the carpet was less/*fewer than what we had feared.

(23) The items she ended up donating to the raffle were fewer/*less than what she had promised.

In (22) and (23), the determined phrases *the mud* and *the items* show the same co-occurrence links with *less* and *fewer* as the undetermined mass and count nominals in (20) and (21), arguing that the configuration value of the head daughter is maintained in the external semantics of Determination.

With regard to justifying the unification of the external number value and that of the head daughter, note that subject-verb agreement, which unifies the number value of the subject constituent to that of the finite verb, reflects this identity.

- (24) a. The shoes are in the closet.
 b. Shoes are fun to buy.
 c. This shoe isn't where it ought to be.

In (24)a and (24)b, respectively, the determined plural subject and the non-determined plural subject take plural verbal agreement (*are*). (Of course the paradigm in (24) has to remain incomplete because an undetermined singular count noun, *shoe*, being non-maximal, can't occur in an argument position.)

In Figure 15, the external semantics shows [bounded +] (while the bounded value of the head daughter is unspecified). The examples in (7) justify this decision.

The external syntax value of the Determination construction contains [cat n]. This may seem self-evident given the approach to syntax you have been exposed to in this course, but we should point out that some current syntactic approaches treat what we call determined noun phrases as Determiner phrases; that is, the determiner is taken as the head of the phrase. Such an analysis requires (1) that a syntactic category of Determiner be postulated and (2) that in the cases of undetermined count and plural phrases occurring

in argument positions, as in examples (11) and (18), an empty constituent of the category Determiner be postulated as the head daughter of the phrase. Since Construction Grammar does not countenance the notion of empty constituent, such an analysis is not possible for us.

The indication [proper -] in the external syntax is unsurprising, simply reflecting the fact that the result of determining a common nominal is itself common. As regards distributional evidence, consider the phenomenon of indefinite pronominalization. As we would suppose on notional grounds alone, indefinite pronouns do not accept proper nouns as antecedents, since a proper noun functions to pick out a contextually unique referent.

- (25) a. *Lynn saw Pat and I saw one, too
 b. Lynn saw a sophomore and I saw one, too

Sentence (25)a shows that [proper +] nominals may not occur as the antecedent of the indefinite pronoun *one*; in example (25)b, a common nominal may be seen to function unproblematically as the antecedent for the indefinite pronoun.

We have discussed at some length, in connection with the Modified Nominal construction, the fact that the external syntax of the Determination construction specifies positive maximality, blocking the determination of already determined nominals.

Turning our attention now to the left, determining, daughter in Figure 15, consider first the syntax value. No syntactic category is specified. In fact determiners can be selected from a large number of syntactic categories, including Demonstrative, Article, Noun [max +, poss +], Quantifier, and perhaps others. The syntactic function determiner seems to be closely associated with a particular kind of semantic function, having to do with locating the entity denoted by the NP in the ongoing process of constructing a representation of the discourse. Thus, indefinite articles like *a* or *some* indicate that

a new participant is about to be introduced into the discourse, definite articles like *the* indicate that a uniquely identifiable participant already 'on stage' is to be denoted, possessive determiners like *John's* indicate definiteness, like *the*, and in addition say in effect that the addressee can pick out the intended denotatum by supplying some contextually available relation that the intended denotatum bears to John.

(Later on we will consider the possibility that there is still another construction that belongs to the family of noun-headed constructions. We might call this the Quantified Nominal Construction; the significant properties of this construction would be that the left daughter is a quantifier and the right daughter is a [max -] nominal, and the construction as a whole is of unspecified maximality. In these respects the "QN" Construction is analogous to the MN construction, in appending a limiting expression to a non-maximal nominal and producing a nominal of unspecified maximality. We need to account for the facts that quantifiers precede adjectives and follow determiners, allowing for such sequences as *twelve monkeys*, *my twelve monkeys*, *twelve noisy monkeys*, *my twelve noisy monkeys*, and the like. A construction of the sort just described would allow for quantifiers to take modified nominals as their right sisters, but unfortunately it will also allow quantified nominals to appear as the right sisters of adjectives: but **noisy twelve monkeys* is not acceptable. The full story will have to wait.)

It remains for us to consider the sem value of the left daughter and to note again that the value for each of the sem attributes: boundedness, configuration and number in the left daughter must, in this construction, unify with the corresponding values of the right daughter. Figure 16 shows a number of examples of determiner + noun combinations illustrating the phenomenon of unification of the values of these three attributes in the two daughters.

syn	[	cat	n]
		proper	-	
		max	[]	
		lex	+	
sem	[	bounded	-	
		cnfg	mass	
		num	sg]
lexn	mud			

syn	[	cat	n]
		proper	-	
		max	-	
		lex	+	
sem	[	bounded	+ count	
		cnfg	sg	
		num]
lexn	shoe			

syn	[	cat	n]
		proper	-	
		max	[]	
		lex	+	
sem	[	bounded	-	
		cnfg	count	
		num	pl]
lexn	shoe	[-s]		

syn	[	cat	Art]
		lex	+	
sem	[	bn'd	+ count	
		num	sg]
lexn	a			

**a mud*

a shoe

**a shoes*

syn	[	cat	Q]
		lex	+	
sem	[	bn'd	- count	
		num	pl]
lexn	many			

**many mud*

**many shoe*

many shoes

syn	[	cat	Q]
		lex	+	
sem	[	bn'd	- mass	
		num	sg]
lexn	much			

much mud

**much shoe*

**much shoes*

syn	[	cat	Dem]
		lex	+	
sem	[	bn'd	[]	
		cnfg	[]	
		num	sg]
lexn	this			

this mud

this shoe

**this shoes*

syn	[	cat	Q]
		lex	+	
sem	[	bn'd	- []	
		num	[]]
lexn	some			

some mud

**some shoe*

some shoes

syn	[	cat	n]
		max	+	
		Poss	+	
sem	[	bn'd	[]	
		cnfg	[]	
		num	[]]
lexn	Lynn	's		

Lynn's mud

Lynn's shoe

Lynn's shoes

Figure 16

In Figure 16 each column is headed by the lexical entry for a noun, *mud*, *shoe*, and *shoes*, respectively. Each row is headed (on the left) by a determiner word or phrase: from top to bottom, *a*, *many*, *much*, *this*, *some*, *Lynn's*. The entry in the table at the intersection of the *i*th row and the *j*th column is the expression formed by writing the determining expression of the *i*th row in front of the nominal expression corresponding to the *j*th column. You should inspect each entry in Figure 16 along with the diagrams which head its row and column in order to satisfy yourself that in the case of each starred entry there is a conflict of values on at least one of the three attributes in question in the representations of the corresponding determining and nominal expressions. For example, in the entry for the first row and third column, **a shoes*, there is conflict between [bounded +] for *a* and [bounded -] for *shoes*, whereas in the entry for the first row and second column, *a shoe*, the representations of both *a* and *shoe* have a sem value of the form [bounded +, cnfg count, num sg].

3.7 Notional Interpretation of Cooccurrence Relations among Grammatical Elements

A word should be said about the notional interpretation of the sem features of determiners. It seems rather less natural to interpret these 'semantic' values as inherent notional properties of the determining expression than as constraints on that expression's combinatorial potential. That is, we are inclined to interpret the boundedness, configuration and number notations in the determining daughter of the Determination construction less as part of the meaning of the determining expressions themselves than as inherent properties of the nominals with which a determining expression can combine. For example, it seems a bit strange to say that the word *every* 'has' the notional properties of boundedness, mass and singularity; it might be more appropriate to interpret these

feature assignments as recording the fact that *every* has a certain combinatorial potential, namely, the ability to determine nominals which themselves have the inherent semantic properties of boundedness, mass and singularity.

In the case of English determiners, this seems to be an intuition that is shared fairly widely. In other cases it is less clear how comparable phenomena should be viewed. For example, in French past participles often agree in gender and number with some nominal in the sentence.

- (26) a. Le coffre était ouvert The trunk
 [masc,sg] was open [masc,sg]
 b. Les valises étaient ouvertes The suitcases
 [fem,pl] were open [fem,pl]

We may ask ourselves a question about French past participles like the one we asked about English determiners: do the gender-restricted and number-restricted forms of the French past participle meaning 'open' inherently possess such properties as feminine and plural or, as in the case of English determiners, are these forms better thought of merely as being combinatorily restricted to occur only with nominals having these properties. In the case of French past participles it does not seem as easy to decide as it did with English determiners.

The same question can also be raised with respect to the contrasting forms of French 'was/were', *était* (sg) versus *étaient* (pl) in (26). Do French *étaient* or English *were* possess the idea of plurality as part of their meaning or do these words merely have a grammatical limitation which permits them to occur only with subject expressions that themselves have this meaning? We have no ready answer to this question. But if we did have an answer, what use, it is fair to ask, could it be put to? If there is no adequate answer to the second question, then the first question becomes otiose. Depending on one's point of view, a unificational approach has either the disadvantage of not furnishing a convenient notation to distinguish inherent notional properties from combinatorial

potentials or the advantage of not requiring us to sort out a distinction that corresponds to no real difference.

Some Things about Determiners We can Only Briefly Mention

There are many cases in English where we find an expression that seems to fit the Determination construction, but in which we also find that the particular choice of determiner is conventionally fixed. Most names of diseases in English are treated grammatically as mass nouns.

- (27) She is suffering from (*a/*the/*that)
diphtheria/pneumonia/scarlet
fever/mononucleosis/diabetes, ...

But some analogous medical conditions are treated as count nouns. Examples are *cold* and *virus*. Thus,

- (28) a. She is suffering from a virus.
b. I've had three viruses this winter.

The words for yet other such conditions look deceptively as if they fall in the category exemplified in (28), normal count nouns.

- (29) She is suffering from the flu/the measles/the mumps

But in fact the words *flu*, *measles*, and *mumps* accept only the determiner *the*.

- (30) She is suffering from (the/*a/*that/*this/*these)
flu/measles/mumps

Flu, *measles* and *mumps* are neither normal count nouns nor normal mass nouns with regard to their determination possibilities. These words simply require *the* in all occurrences. The phrases *the flu*, *the measles*, *the mumps* look like normal constructs of the Determination construction but in fact they are fixed phrases ('collocations') which happen to fit the external pattern of this construction but do not contain the

full array of information called for by it. Facts of this kind have to be learned individually, one by one, by speakers acquiring the language.¹³

Determiners, either definite or indefinite articles, can occur with count singular nouns in generic interpretations.

- (33) a. The lion is feared by all other beasts.
b. A lion can sometimes become a loving pet.

There are shades of meaning difference between these different generic constructions which are hard to specify but which can be detected by noting the slight oddness of

- (34) a. ?A lion is fearsome.
b. ?The lion can sometimes become a loving pet.

(Very roughly, we can say that *the lion* denotes the species *Felis leo*, while *a lion* denotes an arbitrary or representative member of that species.) The rather special generic construction which employs the definite article is further narrowed in cases like the following.

- (35) a. She plays the violin/trumpet/harp/...
b. I appreciate the violin.
c. Lynn is learning the violin.

- (36) a. *I make the violin.
b. *Lynn buys the violin.¹⁴

Again we have an instance of a minor pattern that must be learned separately from the more general constructions of the

¹³Actually there is some disagreement about *flu*. Some speakers accept (i) and (ii) though most appear not to.

- (i) ?I had a bad flu
(ii) ?This flu is worse than that flu

¹⁴ This sentence is unacceptable in the generic interpretation in which Lynn buys violins habitually, professionally, or the like.

language, like the Determination construction or the *the*-Generic construction.

3.9 Feature-Changing Lexical Constructions

We have noted in passing that inherently count nouns can sometimes appear in contexts calling for mass nouns, that inherently mass nouns can sometimes appear in contexts calling for count nouns and that proper nouns can sometimes appear in contexts calling for common nouns. We take up each of these cases in detail below, noting that in each such case special interpretive conditions are imposed on the derived usage. The special semantic conditions arising in the derived cases are theoretically significant, because they force us to postulate special constructions to effect these semantic changes and thereby justify our populating the grammar with these additional constructions.

The words *blanket* and *cat* are inherently count nouns.

- (37) a. a blanket
b. a cat

We find these words used as mass nouns, however.

- (38) a. I don't need much blanket.
b. There was cat everywhere.

In the case of *blanket* in (38)a the special interpretive condition imposed by this usage is not so obvious because blankets are normally thought of as consisting of uniform stuff. But notice, with regard to (38)b, that while we do not normally think of cats as consisting of uniform stuff, rather of disparate kinds of stuff: fur, claws, whiskers, hearts, etc., in (38)b an interpretation is imposed in which a concept of 'cat-stuff', a mass of homogeneous constitution, arises. Consequently, we postulate the lexical construction pictured in Figure 17, in which a mass noun *cat* is derived which is like the normal count noun *cat* except (a) for the count (versus mass) value of the *cnfg* attribute, (b) the unspecified (versus negative) value

The same kind of thing happens to mass nouns when they are used as count nouns, that is, when a morphological construction 'derives' a count noun from a mass noun: (1) the syntactic and semantic features characteristic of the derived configuration type replace those of the original type (here [cfg mass] 'becomes' [cfg count], [max []] becomes [max -], [bounded -] becomes [bounded +]) and (2) a special condition is added to the semantic frame value. Examples of constructs realizing the Mass » Count construction are

- (39) a. I'll have one sugar, please
 b. Does the hostess know wines?

In (39)a we find the numerical determiner *one* which can determine only a count nominal. In (39)b we find that *wine* has undergone pluralization and we recall that the head daughter of the Pluralization construction must have the features [cfg count] and [bounded +]. Thus, the construct *wines* in (39)b corresponds to a box diagram in which the normal mass noun *wine* figures as the daughter of a Mass » Count construct, which in turn serves as the head daughter of a Pluralization construct. Figure 18 displays this plural construct in highly schematic form.

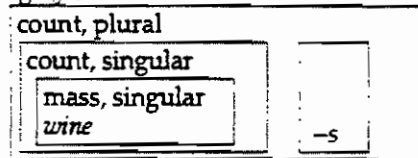


Figure 18

The special formal interpretation imposed by the Mass » Count construction is that the derived noun is necessarily interpreted as denoting either a type of the stuff denoted by the count noun, as in (39)b, or as a conventional portion of the stuff denoted by the count noun, as in (39)a. Moreover, this

value formalism, the relation between the intuitive concepts 'cat' and 'homogeneous stuff of cat', although there is no problem of principle in creating such representations.

construction seems especially restricted to foodstuffs. Note that if we are working together in the garden you can't say to me

(40) *I'll have a dirt here

to convey

(41) I'll have a shovelful of dirt here

The Mass » Count construction is displayed in Figure 19

Mass » Count Construction

syn	cat	n]
	proper	-	
	max	-	
	lex	+	
sem	frame	portion or type of #1[]]
	bounded	+	
syn	cat	n]
	proper	-	
	max	[]	
	lex	+	
	cnfg	mass	
sem	num	sg]
	frame	#1[]	
	bounded	-	
cnfg	count]
	num	sg	
bcrn	[]]

Figure 19

Proper nouns, as we have discussed above, can also be used as common nouns in sentences such as

- (42) a. The blond Lynn is the taller.
 b. I know more Andersons than Johnsons.

In such usages the special semantic condition is that instead of denoting a person with the name in question who is, according to contextual presupposition, unique, the noun denotes the class of persons who bear the name (in the sense

that, say, the word *dog* denotes the class of dogs; semanticists are far from unanimous that this is the most felicitous thing to say about what the word *dog* means, but semantic niceties of this degree of refinement are not our concern here). The construction deriving common nouns from proper nouns is displayed in Figure 20.

Proper » Common Construction	
syn	[cat n proper - max - lex +]
sem	[frame person or thing named #1[] bounded + cnfg count num sg]
syn	[cat n proper + max + lex +]
sem	[frame the person or thing named #1[] bounded - cnfg count num sg]
bcn	#1[]

Figure 20

Again, in Figure 20 the frame values are not intended either to present careful conceptual analyses of the semantic differences or to express these differences explicitly in the attribute-value notation.

We have noted that pre-nominal adjectives may sometimes modify non-restrictively. Thus, the expression *my poor brother* is ambiguous. In one construct the words *poor brother* realize the MN construction and would be useful in a sentence like

(43) My poor brother is kinder than my rich brother

In the other construal, *my brother* itself is taken as capable of picking out a unique referent (say the speaker has only one brother) and *my poor brother* is interpreted non-restrictively, along the lines: 'my brother, who - incidentally - is an unfortunate creature'. (These distinct readings of *my poor brother* are frequently, perhaps always, distinguished by intonation.)

Proper nouns can receive non-restrictive modification, as in

(44) Poor Pat just failed another exam

Cases like (44), in which a proper noun is non-restrictively modified, are not to be confused with cases in which a derived common noun heads an MN construct, as in

(45) The poor Johnsons settled this county long before the rich Johnsons came

To complicate matters further, there are special constructions which confound a number of these variables, while borrowing the external patterns of the more productive constructions. Compare (46) and (47).

(46) The young Beethoven wore a beard.

(47) The young musician wore a beard.

Example (47) presents an ordinary MN construct (*young musician*) serving as the head daughter of a Determination construct. But *the young Beethoven* is something else again. This phrase is interpreted on the lines of 'Beethoven, when he was young'. There is a difference, moreover, between contexts in which we can say (46) and those in which we can say (48)

(48) Young Beethoven wore a beard.

In the latter case, the reference time of our narrative has to be already situated in the past. Thus, (49) is natural, but (50) is distinctly strange because the construction that licenses *the young Schwartz* has as part of its meaning that Schwartz is not young at the time of speaking.

(49) Young Schwartz wears a beard.

(50) ?The young Schwartz wears a beard.

The construction that licenses expressions of the form *the + Adjective+Proper Noun* seems restricted to the description of historical figures or to figures in formal narratives and it is also probably restricted to certain literary genres.

The point of these last remarks is one that has also been made earlier. The regular and highly productive constructions of the language sometimes furnish the syntactic skeleton for special constructions which embody particular semantic and pragmatic features, sometimes quite narrowly specified ones. Another way to say this is to note that all languages contain many idiomatic or collocational turns of phrase that embody the structural skeleton set up by some highly productive construction or constructions but which also evidence particular semantic and/or pragmatic properties that are not predictable from the properties of the productive constructions to which they may be related. These special constructions have to be individually learned by the speaker and individually specified by the grammarian.

CHAPTER 4

Valence and Instantiation

4.1 The Plan of the Present Chapter

In this chapter we deal with a new sort of problem, one that can be approached by considering the grammaticality judgments associated with the following items.

- (1) a. The children devoured the spaghetti.
b. *The children devoured.
c. *The children devoured the spaghetti the cheese.
- (2) a. She put the cheese on the shelf.
b. *She put the cheese.
c. *She put the cheese on the shelf the poison.

The a sentences of (1) and (2) are perfectly ordinary sentences, but there's something wrong with the b and c sentences. Briefly, the b sentences don't have enough of what they need, and the c sentences have too much. To understand what is going on when someone speaks of a devouring act, we need to know about two entities: the one that does the devouring, and whatever it is that gets devoured. Sentence (1)b mentions one thing instead of the needed two, and sentence (1)c mentions three things instead of two. The need for a specific number of phrasal companions is determined by each individual verb, as can be seen by comparing the sentences of (1) with those of (2). The verb *put* requires three things, a need which is satisfied by sentence (2)a. But sentence (2)b gives us only two, and sentence (2)c gives us four.

The lexico-grammatical arrangement by which verbs (and other kinds of words as well) determine the number and kind of things that co-occur with them is called *valence*.¹ One aspect of the concept of valence has to do with the number of accompanying elements (two with *devour*, three with *put*, but only one with a verb like *vanish*). Another part has to do with the kinds of constituents these accompanying elements can be. A phrase like *on the shelf* can serve as satisfying a valence requirement for *put*, but it cannot serve for one of the elements that can go with *devour*. A sentence like (3)

(3) *The children devoured on the shelf.

is just as bad as (1)b. Valence specifies not only the number of required accompanying elements, but something about the grammatical type of these elements. The direct object of *devour* has to be a *noun-phrase*.

A third part of the concept of valence has to do with the nature of the semantic relation that each of the accompanying elements has to the verb, in the sense that one of the companions of *devour* has to designate the diner and the other has to designate the food. And this brings us to a fourth aspect of valence, namely the grammatical relation that each constituent has, in a given sentence, to the verb. When *devour* is used as a simple transitive active verb, the subject is the diner, and the object is the food. This is how we know which is which in the sentences of (4):

¹ When we are more careful about this, we will speak not only of words, but of words in given senses, and not just in terms of the elements which co-occur with given words in given senses, but of the elements which may, must, or cannot co-occur with them.

- (4) a The lizard devoured the snake.
b The snake devoured the lizard.

In section 4.2 we review the notion of agreement that came up in chapter 2 and in 4.3 we compare agreement with the kind of relationship known as government, involving valence. Briefly, A agrees with B if there are some properties of A that are determined by parallel properties of B: agreement, as we define it, is symmetrical: if A agrees with B, B agrees with A. The relation we define in this chapter is government or dependency. We say that A governs B, or that B is dependent on A, if B is a valence element of A. What that means will become clear soon.

In section 4.4 we consider the various components of the valence requirements of words, and the extent to which they are interdependent. In 4.5 we consider the various means by which the grammar of a language provides for the satisfaction of valence requirements. These mechanisms are previewed in this chapter, but developed in detail in the next two chapters. The present chapter ends, in section 4.6, by introducing a notation for the description of verbal valence.

4.2 Agreement

First we review the phenomenon of agreement. Many of the descriptive problems we faced with the English Determination Construction in Chapter 3 had to do with situations in which the type of word or phrase that occupies one part of a construction must share certain properties with whatever occupies some other part of that construction. In the most obvious cases, the two (or more) affected constituents in question must *agree* in respect to the values of certain attributes, and we describe such a situation by providing paired *unification indices* in the appropriate places in the representation of the construction.

Determiner-Noun Agreement. In the Determination construction, the relevant attributes were those we named

boundedness, configuration, and number. Since not all expressions capable of occurring in the two parts of that construction have specific values assigned to those three features, it is important to recall that when we say that two constituents must *agree*, or *unify*, we mean that they must not *disagree*, that is, that they must not *clash* in respect to the agreeing features. The expressions in (5) exhibit clashes among these features; but the examples in (6) are all acceptable because the determiner *the*, is unspecified for all three of these features, and is therefore compatible with any kind of common noun.

- (5) a. *a mud
 b. *this children
 c. *much house
- (6) a. the mud
 b. the children
 c. the house

Adjective-Noun Agreement. The other nominal construction we examined in the last chapter was the MN (or "Modified Nominal") construction. We noticed that for the English MN construction, there was no need to deal with problems of agreement. While there are certain very specific co-occurrence preferences in English between nouns and the adjectives that can modify them – consider phrases like those in (7) – such relationships are too idiosyncratic to lend themselves to treatment in terms of feature unification.

- (7) a. excessive force
 b. blithering idiot
 c. consenting adults
 d. mitigating circumstances

But in other languages – Spanish and German, for example – the constructions corresponding to the English MN construction do have agreement requirements calling for the kind of feature unification we have become familiar with. In

Spanish, for example, a noun and an adjective which modifies it have to agree in *gender* and *number*. The number attribute offers a choice between the values *singular* and *plural*; and the *gender* attribute has the values *feminine* and *masculine*. The Spanish word for 'Sunday' is *domingo*, and it is masculine, a fact reflected in the *-o* ending. In the Spanish phrase that means 'last Sunday', given in (8)a, we find the definite singular masculine article *el*, the noun *domingo* (which, of course, is singular), and the adjective *pasado*, 'past', which, as signaled by the *-o* ending, is also masculine and singular. The word which means 'week' is *semana*, a feminine noun. The phrase meaning 'last week' is given in (8)b, where the noun is preceded by the definite singular feminine article *la*, and followed by the feminine singular form of the adjective meaning 'past', *pasada*.

- (8) a. el domingo pasado
b. la semana pasada

As we see, a description of this much of the Spanish nominal constructions must specify (i) that the adjective follows the head noun² (in contrast to English, where adjectives precede the nouns they modify), and (ii) that in both the MN and the Determination constructions in Spanish, the sister constituents must agree in the values of both their gender and their number attributes.

The German situation is more complicated still. In this language, the equivalents of the Determination and the MN construction require agreement in *gender*, *number* and *case*. This time there are three genders, not just two: *masculine*,

² There is a second construction for adjectival modification in Spanish in which the adjective precedes the noun. These two constructions appear to differ semantically in apparently quite complex ways.

feminine and neuter; and there are four cases³: *nominative, genitive, accusative, and dative*. So far this looks only slightly more complex than the Spanish situation: there is one additional attribute to deal with (case), and for the attribute *gender*, there are three possible values instead of just two. But German offers a further complexity. Whereas in English, the feature of *definiteness* in a determiner has an effect only on the external syntax of the containing noun phrase, in German it also has an effect on the form of a modifying adjective. Looking at just the nominative case and neuter gender, we find that adjectives in singular indefinite noun phrases end in *-es* (as in (9)a below), whereas adjectives in plural indefinite noun phrases (headed by a noun of any gender) end in *-e* (as in (9)b). But adjectives in definite noun phrases (and this is independent of gender) end in *-e* if the head noun is singular (see (9)c), in *-en* if it is plural (see (9)d). Thus, for the neuter singular noun *Kind* ('child') and its plural *Kinder*, we find the following variations in the nominative case:

³ "Cases" are formal differences in (some of the constituents of) NPs that reflect the syntactic function served by the NP, e.g., as subject or object. In English, case distinctions are found only in personal pronouns: *he vs. him vs. his, they vs. them vs. their*, etc.

- | | | |
|--------|-------------------|---|
| (9) a. | ein gutes Kind | 'a good child'
indefinite singular |
| b. | das gute Kind | 'the good child'
definite singular |
| c. | viele gute Kinder | 'many good children'
indefinite plural |
| d. | die guten Kinder | 'the good children'
definite plural |
| e. | gute Kinder | 'good children'
indefinite plural |

The unification problem for these German phrases is quite intricate, involving, as we have seen, four cases, three genders, two numbers, and an influence on adjectives based on a contrast between definite and indefinite. Part of the problem is this: adjectives in MN constructs which are maximal NPs (i.e., which lack determiners) have endings referred to in traditional grammars as 'strong': in the nominative singular, *-er* for masculine, *-es* for neuter, *-e* for feminine, and in the plural (for all genders), *-e*. Adjectives in noun phrases with determiners can be either 'strong' or 'weak', depending on the definiteness of the determiner. The so-called 'weak' endings, for all genders, are *-e* for the nominative singular and *-en* for the nominative plural.⁴ (A fact about these forms that contributes to the difficulty of seeing what is going on is that the singular weak form looks like the plural strong form.)

The dependencies that we see with these German forms depart from the simple notions of agreement that we started out with: here we need to note that the definiteness of a determiner affects the shape of a following adjective, but it would seem strange to insist that the adjectives themselves bear definiteness values.

Subject-Verb Agreement. All of the agreement phenomena examined so far have been in noun-headed

⁴ The full declension can be found in any German grammar.

constructions, but there is another common pattern found in many languages, generally called *Subject-Verb Agreement*, in which the form of a finite verb reflects the person and number of the sentence's subject. English has this in a reduced form: for most verbs it only makes a difference in respect to one of the variants (third person singular present tense, as in *sings, walks, etc.*), and, more broadly, in one irregular verb (*am, are, is* and *was, were*). Anyone who has stared at a conjugation table for the Latin verb meaning 'love' (of which the present indicative paradigm is *amo, amas, amat, amamus, amatis, amant*) knows that a full reflection of the 'person' and 'number' characteristics of subjects can show up throughout a large and complex system of verb forms.⁵

An interesting characteristic of Slavic languages, e.g., Russian, is that while we find present-tense verbs agreeing with their subject in *number and person*, we find past-tense verbs agreeing with their subjects in *number and gender*.⁶ Compare the present-tense verbs in (10) with the past-tense verbs in (11).

- | | | |
|---------|----------------|-----------------|
| (10) a. | ja vas l'ubl'u | 'I love you' |
| b. | my vas l'ubim | 'we love you' |
| c. | on vas l'ubit | 'he loves you' |
| d. | ona vas l'ubit | 'she loves you' |

⁵ The Latin situation is complicated by the fact that this is not necessarily a dependency between the superficial form of a subject and the verb it is a subject of: subjects are not obligatory constituents of Latin sentences. We will see later that this "complication" is not a problem for the unification concepts we are working with.

⁶ Actually, *gender* agreement only holds for the singular forms.

- (11) a. on vas l'ubil 'he loved you'
 b. ona vas l'ubila 'she loved you'
 c. ja vas l'ubil 'I loved you' (male
 speaker)
 d. ja vas l'ubila 'I loved you' (female
 speaker)

We will treat subject/verb agreement in a way that differs from our account of agreement within a noun phrase. Individual verb forms (like English *is*, Russian *l'ubim*, Latin *amat*) will be tagged with information – person, gender, number, among others – about the constituents that satisfy their subject valence requirement. The nature of this account can be predicted from a way of describing the phenomenon: we will not say that the English verb *loves*, or the Latin verb *amat*, has the features third person singular (i.e., [person 3, number sg]), but that it requires a subject with those properties. (Bantu languages are among those well-known for having verb form differences that determine the kinds of objects they can have in addition to whatever determines the kinds of subjects they can have.)

4.3 Government and Valence

We speak of agreement when two things are free to combine only if they do not disagree in respect to some attribute which they both share.⁷ There is another kind of constituent-to-constituent dependency, which we introduce in this chapter, called *government*, by which one word licenses the presence and determines the nature, and possibly the morphological shape, of other linguistic elements that can occur with it. Feature unification figures in the description, to be sure, but it is unification between a requirement (or a list of requirements) associated with a single word and the

⁷ But recall the qualifications we had on this kind of treatment in the discussion of definiteness and German modifying adjectives.

constructs which co-occur in constructions that are built around that word. A verb can require that a constituent it occurs with bear, say, accusative case, but the verb itself does not bear that feature.

The difference between the two situations, agreement and government, can be understood with a simple analogy. Imagine, first, that according to the constitution of a particular club there must be two main executive officers – let's say president and treasurer – and these two officers must be of the same sex. There may be quite different sets of qualifications for the two positions, and the people who hold them might have totally different responsibilities in the organization. But necessarily, according to the club's constitution, if one of the two offices is occupied by a female, the other must also be occupied by a female; and if one of these officers is a male, the other must also be a male. The values of the sex attribute in the two offices of this invented "executive officers construction" must unify.

That was an instance of agreement. As with the linguistic analogue, there is no need to decide which of the two determines the other: the relationship is symmetrical. We might feel intuitively that for a language like Spanish, it's the noun that determines the gender of an adjective that can modify it. Since most nouns don't need accompanying adjectives, and since nouns generally come with their own gender and are not capable of accommodating to their surroundings in respect to this attribute, it is perhaps natural to feel that the noun 'leads' in this particular dependency relationship. But within the Spanish MN construction itself, the relationship can be seen as symmetrical: a feminine singular adjective in such a construction requires as its companion a feminine singular noun just as much as the other way around.

Now consider a different situation. In another organization, the key office is that of the president, and the organization's constitution provides that whoever is chosen as

president has the right to determine his or her own staffing requirements. One incoming president might require a secretary, a treasurer, and a chief of staff. Another would require a larger staff structured according to a complex hierarchy; and a third might plan to do everything that needs to be done without any assistance. The bureaucratic hierarchy such an organization has depends, in each "administration", on the requirements of the individual selected as president.

The parallel in language can be seen in the difference in the structure of English clauses when the position of main verb is occupied by a word like *show* or a word like *sleep*. In a sentence in which the verb *show* is accompanied by everything it needs, it will be surrounded in its sentence by three things: (1) something representing the demonstrator, the person who does the "showing"; (2) something representing the display, that which is "shown"; and (3) something representing the audience, the person or persons to whom something is shown. In sentence (12)a, the architect is the demonstrator, the plan is the display, and the city council is the audience. By contrast, a verb like *sleep* does its work with only one accompanying noun phrase, as in (12)b: in an event of sleeping, only one participant is needed.

- (12) a. [The architect] showed [the plan] [to the
city council].
b. [The baby] slept.

The grammatical analogue to the president's staffing requirements in the second organizational scheme is called *valence* (or *valency*). The concept of valence is similar to the notion of *complementation*, in many traditional grammatical models, which like valence also relates to the type and variety of the entities that can or must accompany a verb (or other predicating word), but it differs in that the description of a verb's *valence* includes mention of the subject. The term is more common in European linguistic writings than in American writings and is a central component of versions of what is

called *dependency grammar*, starting with the writings of the French Slavacist Lucien Tesnière.⁸

The relationship of government, quite roughly, is the relationship a verb has to the members of its valence, and the valence of a verb is a set of feature structures characterizing the kinds of constituents that must or can be put in a dependency relationship to the verb.

4.3 Valence Illustrated

There is no way of avoiding a certain terminological confusion in the area of valence. A term from logic that matches part of our notion of valence is *argument*: the word *know* has two (semantic) arguments because the concept necessarily involves two entities, that which knows and that which is known. A term from grammar that matches another part of the notion of valence is *complement*: the word *know* has two (grammatical) complements because it needs (in the simplest contexts) two grammatical constituents to 'complete its meaning': in a simple active sentence, these are the subject and the object.⁹

Usually, the arguments that a verb has by virtue of its meaning are in a one-to-one relationship to the complements that it needs by virtue of its grammatical functioning in a sentence. But there are times when the two are discrepant. Consider the sentences in (13).

⁸See especially Lucien Tesnière (1959), *Syntaxe Structurale*, Klincksieck.

⁹ Another source of confusion is that the word 'complement' has a more limited scope in some grammatical traditions, e.g., not including the subject in many traditional grammars.

- (13) a. He knows that I'm not going to get the job.
b. He knows.
c. That I'm not going to get the job is already known.

In (13)a the two semantic arguments are matched by the two grammatical complements *he* and *that I'm not going to get the job*: *he* stands for the one who knows, and *that I'm not going to get the job* stands for what is known. In (13)b, however, which represents an utterance in which the content of what "he knows" is taken for granted by the conversation partners, the second argument is unexpressed; and in the passive sentence (13)c, the first argument is unexpressed.

In the sentences of (13)b-c we had more arguments than complements. The opposite situation is also possible, as can be seen in the examples of (14) and (15).

- (14) a. Some cockroaches are under your dinner plate.
b. There are some cockroaches under your dinner plate.
- (15) a. That I'm not going to get the job stinks.
b. It stinks that I'm not going to get the job.

The semantic arguments of the existential sentences of (14) are that which is located somewhere ("some cockroaches") and the location ("under your dinner plate"). The constituent *there* in (14)b is a complement for which there is no accompanying argument. The single semantic argument of *stinks* in (15) is the fact that the speaker is not going to get the job. The constituent *it* in (15)b is another example of a complement for which there is no accompanying argument.¹⁰

¹⁰ The example with *stinks* is not very refined. We would prefer to use phrasal predications like *is obvious*, but we are not yet ready to explain the relationship between the two parts of that phrase and

Places where we find argument vs. complement discrepancies of the kinds just examined make up important parts of the grammar of English and will be discussed in considerable detail in later chapters. For the time being, we will allow ourselves to speak of valence elements as if they were simple and well-behaved in that every semantic argument corresponds to a syntactic complement and vice versa.

Much of the discussion of valence is restricted to verbs, but the concept is valid for nouns, adjectives and prepositions as well. For example, the noun *preface* welcomes a prepositional phrase with "to": *the preface to his first book*; the adjective *aware* requires either a prepositional phrase with "of" or a "that" clause: *aware of your presence*, *aware that her help is needed*; and prepositions generally require object NPs: *into the sink*.

We can begin by thinking of the valence of verbs in terms of the *number of participants* that figure in any scene which exhibits the state of affairs represented by the verb's meaning.

For some verbs – the *intransitive* verbs – we need only one participant. Examples of intransitive verbs are *sleep*, *die*, *jump*, *vanish*, *grow*, and *drown*. If we were to stage a scene showing such things going on, we would need only one actor or one prop.¹¹

For some verbs – the simple *transitive* verbs – we need two participants. Examples are *see*, *push*, *lift*, *love*, *understand*, and *scold*. We need to have two things in mind (or on stage) for using or interpreting any of these verbs.

there are very few verbs which can stand alone in this same function.

¹¹ There are features of "setting" that are in a sense available for all events that make this simplistic explanation unsatisfying: if we ask an actor to jump, we need to provide a surface to spring from; if we ask an actor to drown, we need to provide a sufficiently abundant quantity of a liquid.

And for some verbs – the so-called *ditransitive* verbs – we need three participants. Examples are *give*, *show*, *send*, and *explain*.

There are various terminological conventions for talking about the patterns just illustrated. We can speak of a verb's 'adicity', sorting the three kinds of verbs as *monadic*, *dyadic*, and *triadic*. We can also speak of the three types as *one-place*, *two-place*, and *three-place* verbs; or, from Tesnière, *monovalent*, *divalent*, and *trivalent* verbs. Later in this chapter we will formulate the idea of the valence of a verb as *set* of needs or requirements, each requirement described by a feature structure. We will call each individual requirement a *valence element* and their ensemble the *valence set* of the verb. Thus, we will want to say that the valence set of an intransitive verb like *sleep* or *die* contains one valence element, that a transitive verb such as *see* or *push* has two valence elements in its valence set and that the valence set of a ditransitive verb such as *give* or *show* contains three valence elements. Each valence element of a verb thus represents – in ways to be made clearer as we proceed – both a *semantic* requirement of the verb (e.g., the single valence requirement of the verb *sleep* is to be understood as designating the individual that sleeps) and information about the syntactic realization of the constituents that satisfy those requirements: the 'sleeper' is expressed as the grammatical subject of the verb *sleep*.

Because of a certain freedom in the grammar of verbs in English, we cannot use such a simple classification in order to fix for each verb the number of constituents that must accompany it in a sentence. There are various reasons for this.

Variable valence. First, a number of verbs have what can be called *variable valence*, of which an extremely common case is the ability to be used both transitively and intransitively.¹²

¹² This is the tip of the iceberg. For a detailed examination of valence variation in English, see Beth Levin (1993), *English Verb*

The *grow* in of (16)a designates a spontaneous version of the same process as the *grow* of the causative sentence (16)b.

- (16) a. Cabbages grow.
b. Aunt Matilda grows cabbages.

Implicit arguments. Second, as we saw a moment ago, some contexts allow fewer complements than arguments; that is, we understand a sentence as implying the existence of a certain number of arguments, but not all arguments are given explicit expression in the sentence. Notice *show* (described above as a three-place verb) in (17)a and (17)b. In (17)a it is taken for granted that there was an audience for this display ('he showed his skill to somebody-or-other'); in (17)b the identity of the display is known to the participants in the ongoing conversation ('he showed me whatever it is that we have just now been talking about').

- (17) a. He showed his skill.
b. They showed me.

The examples in (17) are explainable in terms of properties of the verb *show*. Not every verb allows its arguments to be omitted under such specific conditions; for example, it is possible to construct a sentence with *demonstrate* that is analogous to (17)a but there is no structure with *demonstrate* that matches (17)b.

There are other instances of missing constituents that can only be explained with reference to particular constructions; this is so with imperative sentences such as those in (18), where the subject is missing, or with particular mini-genres – such as what one finds in recipes and the labels of medicine products, where direct objects are also missing – as in (19).

- (18) a. Show this to your children.
 b. Leave the room quietly.
- (19) a. Season to taste and serve immediately.
 b. Shake well before using.

Plural arguments. It was misleading to propose equating the number of arguments of a verb with the number of *participants*. It is more appropriate to speak of *participant roles*. In (20)a and (20)b, both of which have plural subjects,

- (20) a. We slept.
 b. The jewels vanished.

we have more than one actual 'participant' in each associated scene (more than one person sleeping, more than one thing vanishing); but the number of *participant roles* – that of the sleeper in one case and that of the things that vanished in the other – is still only one. It just happens that in general any *participant role* can be filled by more than one *incumbent*.

Reflexives. The number of participating entities can exceed the number of participant roles, as we have just seen. The opposite situation is also possible, where the number of participant roles exceeds the number of participants. In sentences of the type called *reflexive*, we can have multiple-place verbs, but with each of two roles occupied by expressions referring to the same individual. In (21)a, Pat is both the admirer and the admired; in (21)b Pat is both the giver and the receiver.

- (21) a. Pat admires herself
 b. Pat gave himself a raise

Zero arguments. One aspect of the valence of a verb, then, can be expressed in terms of the number of *participant roles* necessary for modeling its meaning. We should also consider the case of verbs which have no semantic arguments at all, as seen, for example, in certain kinds of sentences representing atmospheric conditions. In (22), we don't have to think of the word "it" as identifying any entity: we can think of

it as simply filling an obligatory slot in the grammar of an English clause.

- (22) a. It rained all day yesterday.
 b. It's snowing again.

Languages which, unlike English, do not require an expressed subject in every finite clause, commonly express weather conditions with verbs that take no subject. Italian is such a language: the verbs *piovere* 'to rain' and *tuonare* 'to thunder' occur without a subject.

4.4.1 Semantic Roles

If we really want to know what is going on in a state of affairs designated by a verb, merely knowing the adicity, the number of participant roles, is not enough. If we have to hire actors to carry out activities named by the verbs in our language, we have to tell them what to do. The elements of the semantic structure represented by a multi-place verb will need to be distinguished from each other, if only to make it clear who is doing what to whom; and the elements of the semantic structures represented by different verbs may need to be distinguished from each other, in case different sorts of participant-roles have different grammatical reflexes in the sentences which realize them. For naming such distinctions we will find ourselves using two kinds of participant-role names. One we will refer to as *frame-specific roles*, meaning the participant roles as they fit the meaning of the 'semantic frame' associated with any given verb. The second kind we will refer to, following common terminology, *thematic roles* or θ -roles (*theta*-roles).¹³

¹³ The θ -roles correspond more or less to what Fillmore referred to a quarter of a century ago as 'semantic cases', or 'deep cases', using terminology that saw them as the semantic analogues of morphological cases like dative, ablative, etc. (Charles J.

4.4.1.1 Frame-Specific Roles

As a first approximation, we can think of the frame-specific roles as determined by the meanings of the individual verbs. Recall that we earlier gave the informal names *demonstrator*, *display*, and *audience*, for the verb *show*. In that discussion, the names we used were intended as informal tags introduced just to show the different argument relations specific to the meaning of the verb *show*: we were not claiming for these terms any particular place in a general theory of semantic roles for language. That is, in assigning those names to the semantic roles associated with *show*, we did not specifically have in mind their reusability for talking, for example, about such other verbs as *demonstrate* or *display*. Sometimes linguists in inventing participant role names wish to emphasize the lexical specificity of the role names they introduce by limiting themselves to derivatives of the verb itself: this practice is especially obvious when we see the two elements of the *love* frame referred to as the *lover* and the *lovee*, those of the *hit* frame as the *hitter* and the *hittee*, and most especially when we see those of the *see* frame as the *seer* and the *seee!*

We believe that in careful semantic analyses of words in the same semantic 'field', it will eventually make sense to use shared names for describing systems of participant roles where the verbs being described overlap in their semantic structure. Thus we would be inclined to use the same terms for describing the semantic roles for separating the arguments in sentences like those in (23), perhaps something like *speaker*, *addressee* and *topic*. The commonality of the semantic structure of the verbs in such groups can be accounted for by showing the (partial) identity of their associated semantic roles; their semantic differences, then, are to be sought in other aspects of

Fillmore 1968, "The case for case", in E. Bach and R. Harms, *Universals in Linguistic Theory*, Holt-Rinehart-Winston, pp. 1-90)

their meaning. Their grammatical differences consist in differences in the mapping from semantic roles to grammatical functions and grammatical form.

- (23) a. They spoke to us about the war.
 b. They discussed the war with us.
 c. They told us about the war.
 d. They said something to us about the war.
 e. They consulted us about the war.

The kind of semantic representation that will be assumed in this course (but not developed in detail) is the so-called *frame semantics*.¹⁴

4.4.1.2 θ -roles

Quite separate from the frame-specific roles is a broader and more abstract set of semantic-role notions, notions which participate in the linguistic schematizing of acts, events and states-of-affairs into very general patterns. These patterns are independent of, and normally coexist with, the more particular participant role patterns associated with individual frames. These are called θ -roles, originally *thematic roles*; the Greek letter θ ('theta') is used as an abbreviation of the word *thematic*.

The list of θ -roles includes but is not limited to such notions as the following:

¹⁴ On frame semantics see Charles J. Fillmore 1982, "Frame semantics," in *Linguistics in the Morning Calm*, Seoul: Hanshin, pp. 113-137; 1985, "Frames and the semantics of understanding," in *Quaderni di Semantica* 6.2.222-254; also Charles J. Fillmore and Beryl T. Atkins, "Towards a frame-based lexicon: the case of RISK and its neighbors," in *Frames, Fields and Contrasts*, edited by Adrienne Lehrer and Eva Kittay, Erlbaum Publishers, pp. 75-102.

agent

(roughly, an active instigator of any action; the *Joe* of *Joe screamed*, or *Joe lifted the box*),

patient

(roughly, something undergoing a process or affected by an action; *the ice* of *the ice melted* or *the egg* of *we smashed the egg*),

theme

(roughly, something that is located in a place or that is seen as moving from one place to another; *the cup* of *the cup is on the shelf* or *let's put the cup on the shelf*),

instrument

(roughly, a physical force or object seen as bringing about a change in something by virtue of coming into direct contact with it; *the wind* of *the wind toppled the windmill*, or *the hammer* of *we smashed the egg with the hammer*),

experiencer

(roughly, the being which is the locus of a mental state or event; the *I* of *I feel hungry*, or *the me* of *you frightened me*),

content

(roughly, the 'content' of a psychological state or of a representation: *bankruptcy* of *she fears bankruptcy*, or *the story* of *we believed the story*),

stimulus

(roughly, the event or object that brings about a psychological response in an experiencer; *the thunder* of *the thunder scared the kids*),

source

(roughly, the starting point of a motion; *home* of *he left home*; *from Ohio* in *he came from Ohio*),

goal

(roughly, the end-point of a motion; *home* in *we finally reached home*, or *Ohio* in *we went to Ohio*),

location

(roughly, the place in which an object or event is located; in *Paris* in *she lived in Paris*, *on the shelf* in *the cup is on the shelf*).¹⁵

The word "roughly" was boringly repeated in each of the parenthesized explanations above in order to acknowledge the fact that it is extremely difficult to define these notions precisely. For a three-entity situation of the kind expressed with a sentence like (24), we feel comfortable with the terms *agent*, *patient*, and *goal*. But for a very large number of situations, the familiar terms turn out not to be very satisfying.

(24) Joe shoved the table against the wall.

To see what we mean, consider the examples in (25) and try to apply terms from the standard set to the subjects and objects of these sentences.

- (25) a. He risked death.
 b. We resisted the enemy.
 c. She resembles her mother.

The general experience linguists have had with θ -roles is that the idea is intuitively appealing, and there are numerous cases where generalizations based on them seem to work; but it happens to be extremely difficult to develop a coherent theory of θ -roles for which it is easy to answer such questions as "Just how many of them are there?" and "How can we assign them to verb-frame participants in each particular case?". Many of the standard roles have features in common: for some reasons it is common to link experiencer and location (the loci of psychological or physical events); agent and instrument (the causer of an event); source and goal (the

¹⁵ A distinction is often made between *patient* and *theme*, where the latter is defined as a figural object in a static scene, or as an object in motion, and the former as an inanimate entity which undergoes a change. For most purposes will use *patient* to cover this range of meanings.

termini of a motion); patient and theme (something that undergoes a change); and so on.

After all of that hedging, it is nevertheless possible to recognize that there are in fact many classes of verbs for which a good deal of useful analysis can be accomplished with a theory of θ -roles.

Simple intransitive verbs can be divided into two sorts, depending on whether the subject is seen as effecting the action or affected by it. The two roles in this case can be spoken of as agent and patient. In (26), we recognize agent subjects (somebody is doing something), but in (27), we find patient subjects (something is happening to something).

- (26) a. He jumped.
b. I screamed.
c. We danced.

- (27) a. The tree grew.
b. The tower collapsed.
c. The ice melted.

The most typical kind of (active-voice) transitive verb has an agent (as subject) and a patient (as direct object), as in (28):

- (28) a. The child broke the vase.
b. The plumber repaired the faucet.
c. The lion ate the gazelle.

These can be put in contrast with another class of transitive verbs with experiencers (as subjects) and content (as direct object). Examples are given in (29).

- (29) a. I understood the example.
b. Pat enjoyed the performance.
c. We believed the story.

Still more possibilities exist in the case of simple transitive clauses. The cause of an event affecting a patient might not be

specifically attributed to an agent but rather to some physical object or force. We can refer to this as the *instrument*.¹⁶ Examples of sentences with instruments (as subjects) and patients (as direct objects) are given in (30)

- (30) a. The rock crushed the snail.
 b. The falling tree destroyed my bicycle.
 c. The fire damaged the crops.

It is possible that some event or object is instrumental in bringing about a psychological change-of-state in a sentient being. If we want to minimize the system of contrasts we use, we might refer to this as another, context-dependent, use of the θ -role Instrument, or, as in the present work, we might use a separate term for this, *stimulus*. For such verbs in English it is typically the case that in the active sentence the stimulus appears as the subject and the experiencer as the direct object. Examples in (31).

- (31) a. Lightning frightened the puppy.
 b. The noise awakened us.
 c. Her stories amused the children.

Once we have developed a set of θ -role categories, at least for the simple cases, we can then start to look for generalizations, both within a single language and across languages. The observations we made earlier about the transitive and intransitive uses of the verb *grow* (example (16)) happen to be matched by a large number of English verbs,

¹⁶ Many people believe that the English noun 'instrument' can refer only to something manipulated by an agent and that therefore it is improper to use this name for this role. But they are wrong. Actually, Fillmore (1968 and elsewhere) began using *Instrumental*, derived from the adjective, rather than *Instrument*, the noun, having in mind that a fire or a rock or a noise could be 'instrumental' in bringing about some sort of event. Nobody could deny the appropriateness of the adjective in such a context.

where the intransitive use has a patient (or theme) subject and the transitive use has an agent (or instrument) subject and a patient (or theme) object, in which the change attributed to the subject in the intransitive verb is the same as that assigned to the object in the transitive verb.

- (32) a. The cylinder rotated.
b. The experimenter rotated the cylinder.
- (33) a. The door opened.
b. The wind opened the door.
- (34) a. The glass broke.
b. The boy broke the glass.
- (35) a. The ice cream melted.
b. The sun melted the ice cream.

Thus the θ -roles figure in characterizing certain differences in function available to individual verbs.

There are many situations in which an event can be seen as involving an agent who brings it about that an instrument causes a change of state in a patient, especially by bringing the instrument into contact with the patient. In such cases we find that there are fairly rigid constraints on how the participants can be expressed. In an active sentence corresponding to such a θ -role schema, the general pattern has to be that the agent is the subject, the patient is the direct object, and the instrument is expressed with the help of a preposition. Thus:

- (36) a. The vase broke.
(Patient only)
- b. The boy broke the vase.
(Agent and Patient)
- c. The hammer broke the vase.
(Instrument and Patient)
- d. The boy broke the vase with the hammer.
(Agt, Inst, Pat)
- e. *The hammer broke the vase by the boy

It would appear, from these and a very large number of other examples, that there are generalizations that predict which of several θ -roles in the same valence structure will be assigned the grammatical function of subject. The generalizations linking θ -roles to grammatical functions, called *linking constructions*, are discussed in detail in Chapter 8.

4.4.2 Grammatical Functions

Those generalizations about θ -roles that have most impressed linguists, then, link particular patterns of θ -roles with particular syntactic modes of structuring clauses. Sometimes there is an impressive predictability in these relationships, but sometimes there isn't. In many cases there are alternative mappings between θ -roles and grammatical functions for the same verb. This brings us to a further dimension of valence, having to do with the syntactic fates of the linguistic expression of participant roles, both in terms of the grammatical functions which they serve in the clause (subject, etc.), and in terms of formal requirements on their expression, with respect to the grammatical category in general (noun phrase, adjective phrase, etc.) and with respect to what we might call the 'trappings' (case, complementizers, etc.).

Returning briefly to the terminological chaos involving the word complement, we shall use the fully spelled-out version "complement" to refer to the role that a constituent has in a complementation construction, as for the object of a transitive verb within a verb-phrase construction. But we shall use the

abbreviation "comp" as the name of a particular class of grammatical functions.

There are some grammatical functions that we need without question: *subject (subj)* and *object (obj)*. These are sometimes spoken of as the nuclear *gfs*. For sentence (37) we recognize *Harry* as the subject and *the cheese* as the object.

(37) Harry sliced the cheese.

We will experimentally use the name *complement (comp)* for all of the non-nuclear *gfs* – though we will soon introduce a special use for the name *oblique (obl)* as designating a special kind of comp, and we will in a later chapter introduce the considerations that motivate a distinction between complements and *adjuncts*.

Some linguists employ an additional nuclear *gf* for discussing the structure of sentences of the kind seen in (38)a, contrasted here with (38)b-d with which it is (essentially) synonymous.

- (38) a. He gave Mrs. Wilson the flowers.
b. He gave the flowers to Mrs. Wilson.
c. Mrs. Wilson was given the flowers.
d. The flowers were given to Mrs. Wilson.

The VP in (38)a contains two NPs, which we can refer to as NP-I and NP-II. Both of them look like objects – a sentence like (38)a is frequently spoken of as exemplifying a "Double Object Construction" – but they have clearly different functions, semantically and syntactically. In one naming tradition, NP-I is the direct object and NP-II is a secondary object; in another naming tradition, NP-I is the indirect object, and NP-II is the direct object. Both of these traditions are well motivated. A reason for regarding the NP *Mrs. Wilson* as the direct object in (38)a is that there is (see (38)c) a corresponding passive sentence with *Mrs. Wilson* as the subject; it can be seen that a generalization relating

uncontroversial direct objects with the subjects of passives holds for sentences (38)b and (38)d as well. A reason for regarding NP-I and NP-II as indirect object and direct object, respectively, is that those same names have been traditionally given to the constituents of the VP in (38)b.

In the early generative tradition, an English sentence such as (38)a was held to have been derived from a structure similar or identical to that displayed in (38)b via a transformation which removed the preposition and permuted the order of the two non-subject NPs. This transformation was christened "Dative Shift" for the reason - which appears perverse in retrospect - that in languages which rely heavily on the morphological cases of NPs (rather than word order, preposition-marking, or hierarchical structure) to express grammatical functions, the case-marking that is assigned to goals is named dative. The perversity is that such languages do not have phenomena comparable to the alternation seen in the sentences of (38).

In our usage, the first NPs in the VPs of both the a and the b versions of (38) will be given the *gf obj*; both *the flowers* in (38)a and *to Mrs. Wilson* in (38)b will be given the *gf comp* (or, as we will soon suggest, *obl*).

In general we will use *comp* for anything that isn't a *subj* or *obj*, since the differences among the various types of *comp*'s can be represented as differences in their grammatical form and their semantic roles. In form, some *comp*'s are PPs (*They gave it [to the teacher]*); some are adjectives (*They found him [dead]*); some are NPs (*I consider him [a friend]*, *do you ever ski [Tahoe]?*, *we gave her [the flower]*); some are VPs (*They made me [wash the dishes]*); and some are complete sentences (*They told me [that it was time to leave]*). Instead of inventing different grammatical-function names for these various types, we can be satisfied to use the name *comp* for them all. However, there is one *comp* type for which it is convenient (and traditional) to have a separate name, namely those *comp*'s which are not

predicates: we speak of nominal obliques, prepositional obliques, and adverbial obliques.

How are we to talk about all this? Looking back at the sentences in (38), we can say, for (38)b, that Joe, the agent, has the subject function; that the apple, the theme, has the object function; and that the teacher, the goal of the act of giving, has the oblique function. You should be aware of some technical problems with these locutions. If we were more careful, we would not allow ourselves to say that Joe is the agent and *has* the subject function, or that the apple is the theme and *has* the object function. In talking this way we are confusing domains. It is Joe, the person in the scene associated with the sentence, that plays the agent role; but it is *Joe*, the linguistic expression, which has the subject function. We will often allow ourselves the freedom of expression exhibited in the first sentence of this paragraph, however, since everyone should know what we mean, and since locutions that are more technically pure can become quite cumbersome to produce and difficult to follow.

In case of the oblique goal (*to the teacher*), we have two ways of expressing what is going on. We could say that the goal is realized as *the teacher* and that its oblique role is signalled by the presence of the preposition *to*; or we could say that the goal is realized as the prepositional phrase *to the teacher* and its oblique role is signalled by the prepositional head of that phrase. The syntactic signals of these oblique roles will be indicated in the representation of the syntactic form of the instantiating frame, in this case with the abbreviation PP[*to*]. Turning back to our distinction between arguments and complements, we will say that the teacher is the *argument* and that *to the teacher* is the *complement*.

4.4.3 Four-Row Valence Descriptions

The full account of the valence of a verb in a given context is expressible by associating four pieces of information with the verb for each valence element: its grammatical function

(subject, object, ...), its frame-specific role (the eater, the eaten,...), its θ role (agent, theme, ...), and its grammatical form (noun phrase, prepositional phrase,...).

Here are some examples of clause patterns showing the linking of (1) frame-specific roles, (2) θ -roles, (3) grammatical functions, and (4) syntactic form. Each column represents four different kinds of information assigned to the same entity. Consider first how the three kind of roles line up in sentence (37) *Joe gave an apple to the teacher*. The row names stand for "frame-specific roles", " θ roles", "grammatical functions", and "syntactic form".

give	(Joe)	(apple)	(teacher)
fr	giver	gift	receiver
θ	agent	theme	goal
gf	subject	object	oblique
sf	NP	NP	PP[to]

In the following sentences, we explore the possibility of using the same descriptive terms, on all four levels, for describing the ways in which different verbs indexing a single semantic frame differ from each other. Many more examples could be added to these by including various sorts of variable valence which some of these verbs allow, and by including passive as well as active voice; but there is enough to be said about the examples we have here.

Here we find four elements, with subject, object, and either two obliques or an extra object and one oblique. In each case we have the same set of frame-specific roles, as discussed below, but the different verbs assign them to distinct θ -roles, which in turn determine their possible grammatical functions. In all cases the frame-specific roles are assigned to a constant set of entities: Minnie, Max, the car, and the payment for the car. That is to say, all of these sentences refer to a single situation involving these four entities.

- (39) a. Minnie sold the car to Max for a hundred dollars.
 b. Max bought the car from Minnie for a hundred dollars.
 c. Max paid a hundred dollars to Minnie for the car.
 d. Minnie charged Max a hundred dollars for the car.

The examples in (39) allow us to notice that semantic roles may be frame-specific and yet not lexically specific. Within what we might call the *commercial transaction frame*, which covers all four of these verbs and several others, we can distinguish the *buyer*, the *seller*, the *goods*, and the *money*. In this collection of verbs, which separately index this same cluster of frame-specific roles, the theme θ -role can be assigned to either of the frame-specific roles: goods or money. Similarly, the agent role can be assigned to either the buyer or the seller, with either of these also identified as the source or the goal of the 'motion' undergone by the theme. The remaining non-active participant has, here, the unsatisfying ad hoc θ -role name "exchange" (a thing which replaces another thing); and the non-agentive active participant receives the θ -role of goal or source according as the agent participant is seen as source or goal, respectively.

In the case of *sell*, (39)a, the seller is treated as the agent and the goods as the theme, requiring the money to be seen as the "exchange" element. The assignment of grammatical functions follows, then, certain general principles: other things being equal, agent is linked with subject, theme – in a structure with an agent – is linked with the object, and the exchange element is marked with the preposition *for* and the goal is marked with the preposition *to*.

Sentence (39)a (*sell*)

	(Minnie)	(car)	(\$100)	(Max)
<i>fr</i>	seller	goods	money	buyer
θ	agent/source	theme	exchange	goal
<i>gf</i>	subject	object	oblique	oblique

sf NP NP PP[for] PP[to]

Buy differs from *sell* in associating agent with goal and hence requiring the source to be represented with the preposition *from*. *Pay* differs from each of these in assigning the theme role to the money and the agent role to the buyer, thus expressing the seller with the preposition *to* and the goods with the preposition *for*. *Charge* differs from *pay* in making the seller the agent and in linking the buyer and the money with direct object and the x-object respectively.¹⁷ The following tables show these correspondences for sentences (39)b-d.

Sentence (39)b (*buy*)

	<i>(Max)</i>	<i>(car)</i>	<i>(\$100)</i>	<i>(Minnie)</i>
<i>fr</i>	buyer	goods	money	seller
θ	agent/goal	theme	exchange	source
<i>gf</i>	subject	object	oblique	oblique]
<i>sf</i>	NP	NP	PP[for]	PP[from]

¹⁷Actually, although we did not show it in examples (39), *pay* also permits the grammatical pattern with two objects. An example is

- (i) Max paid Minnie a hundred dollars for the car.

Sentence (39)c (*pay*)

<i>fr</i>	(<i>Max</i>) buyer	(\$100) money	(<i>Minnie</i>) seller	(<i>car</i>) goods
θ	agent/source	theme	goal	exchange
<i>gf</i>	subject	object	oblique	oblique
<i>sf</i>	NP	NP	PP[to]	PP[for]

Sentence (39)d (*charge*)

<i>fr</i>	(<i>Minnie</i>) seller	(<i>Max</i>) buyer	(\$100) money	(<i>car</i>) goods
θ	agent/source	goal	theme	exchange
<i>gf</i>	subject	object	x-object	oblique
<i>sf</i>	NP	NP	NP	PP[for]

There are two important general points to be taken from the preceding examples. The first is that the matching of frame-specific roles to θ -roles is a feature of individual lexical verbs. The valence sets of the individual verbs differentially allow the buyer to be agent of the action, the goal of the goods, the source of the money; allow the seller to be the agent of the action, the source of the goods, the goal of the money; and allow either the goods or the money to be assigned either the theme or the exchange roles.

The second general point is that there are two distinct ways in which a given frame-specific participant can come to have more than one possibility of grammatical expression. First, the *frame-specific role* can be alternately mapped to distinct θ roles in ways noted in the preceding paragraph. Secondly, a given θ role can be differentially mapped to distinct *grammatical functions* by different linking constructions, such as active versus passive or such as those exemplified (but not explained) by the alternation represented in the sentences (39)c and (i) of note 17. Linking constructions are the focus of Chapter 8.

A point that is not made obvious in the preceding discussion is that much of the information in these four-row n-column displays is predictable from other information in those

displays. We will be proposing a distinction between the *minimal valence* of a verb, that selection of valence information which is constant across all uses of the verb in one of its adicities, and its *fully specified valence*, which is the full range of information we can associate with a verb in a given context. All of the examples we have been considering have been in the active voice, which means that the gf's subj and obj were assigned to particular arguments; but these assignments are not part of the minimal valence, since they are predictable from the "active voice" status of these sentences and would be different with "passive voice" versions of the same verb. Additional details on this distinction are treated in section 4.6 below and in Chapter 8.

4.5 Structural Instantiation of Participant Roles

In the preceding examples, we have observed that association of frame-specific roles with θ -roles is achieved in the lexicon, providing two 'tiers' of semantic structure to individual words. The association of θ -roles with grammatical functions, like subject and object, is dealt with in the grammar by means of linking constructions. The grammatical realization of valence elements in sentences, which depends heavily on the functions assigned by linking constructions, is dealt with by means of principles of *instantiation* operating in a number of phrasal constructions. Thus, the manner of situating verbs in the phrasal constructions that realize their valence requirements requires two steps. Verbs are initially provided with what we call *minimal valences*: those parts of a valence structure which are idiosyncratically linked to any given lexical item. For present purposes these minimal valences will usually be taken as a set of specifications of

thematic roles.¹⁸ The first step in associating these with their grammatical realizations is a system of linking constructions, which have the function of associating grammatical functions with thematic roles. The second step is achieved by the constructions which provide realizations, or interpretations, of the various valence elements depending on their grammatical functions, that is which instantiate (or otherwise satisfy) the valence elements.

We begin the study of instantiation in the remaining sections of this chapter, postponing the study of linking until Chapter 8. The reason we take up the subjects of instantiation and linking in this order is that it is easier to understand instantiation while taking linking for granted than it is to understand linking without some knowledge of the various process of instantiation.

The first two types of instantiation we will refer to as direct instantiation. In the simplest clauses of English, a verb has certain complements occurring within the phrase that it heads; we refer to the presence of complements within such a phrase as verb-phrase instantiation, more specifically, as instantiation within the Phrasal Verb-Phrase Construction. Again, in these simple clauses, the instantiation of the subject occurs in the Subject position in the Subject/Predicate Construction.

The later types of instantiation (including non-instantiation) involve departures from what we find in the

¹⁸ We have seen, in the case of the commercial transaction verbs, that the mapping between participant roles and thematic roles can vary from verb to verb within a single semantic domain; hence, we do not expect to find facts about the narrow semantics of verbs figuring in the processes to be discussed in this section. Sometimes, as will be demonstrated later on, a grammatical function needs to be assigned to a particular argument lexically rather than by general principles linking functions to θ -roles.

simplest English clauses. These include Null Instantiation, where there is no explicit complement corresponding to a semantic argument; Left-Isolate Instantiation, where some constituent is found to the left of its clauses, in a position typically distinct from that of the Subject; Double Instantiation, where we find two constituents corresponding to a single argument, one filling its expected syntactic position, the other expressing its meaning; and Co-instantiation, corresponding to the situations in which a single complement is seen as satisfying a valence requirement for more than one verb (or other predicating word).

4.5.1 Verb-Phrase Instantiation

Elements of verb valences which are not subjects can be realized as right-sisters of the verb, in constructs of what we will call the PVP (Phrasal Verb Phrase) Construction. The external syntax of any construct exhibiting the PVP construction is [cat v, max +, srs -]: it is a maximal verbal phrase but it does not contain among its daughters a constituent with the grammatical function subject. In a sentence like (40), the elements "the situation" and "to Pat" are sisters to the verb "explained"; the element "Kim" is not.

(40) Kim [{explained} {the situation} {to Pat}]

For this particular sentence, the instantiation of the subject is provided by what we call the Subject/Predicate construction.

The verb phrase construction itself does not specify the relative order of the sisters of the verb; such facts are accounted for by a number of ordering generalizations, which we will present later on as *ordering constructions*. One such principle is that, other things being equal, in an English verb phrase, the direct object immediately follows the verb. That is, the sentences in (41) are not grammatical.

- (41) a. *She spelled [correctly] [my name]
 b. *He treated [kindly] [the old man]

Another is that "heavy" constituents (made up of long and complex phrases) are by preference located at the end of a verb phrase. This second principle can be in conflict with the first one, which was our reason for the "other things being equal" clause in the generalization about the position of the direct object. A sentence like (42), with a VP-final direct object,

- (42) She spelled [correctly] [every word that we dictated to her]

is not ungrammatical, even though the direct object follows an adverb and it is the latter that immediately follows the verb.

Other ordering principles involve such generalizations as the fact that in English, but not necessarily in other (even closely related) languages, a locational adverb precedes a temporal adverb. A sentence like (43)a

- (43) a. I worked [in the garden] [yesterday]
 b. *I worked [yesterday] [in the garden]

matches the English idiom, but (43)b does not. This, too, is an "other things being equal" generalization, since the following sentence is grammatical, in which a "heavy" locative follows a "light" temporal phrase:

- (44) I worked [all day yesterday] [in the garden that I described to you last week]

4.5.2 Direct Subject Instantiation

Any of a verb's valence elements can be realized inside the PVP construction except the one that is designated to serve the subject function. One provision for the subject is as left sister to the verb phrase in the Subject-Predicate Construction. Thus we notice the position of "Kim" in (45) (the same sentence as in (49)):

(45) [Kim] [explained the situation to Pat]

Chapter Five treats the topic of direct instantiation in detail, and presents a full treatment of the Phrasal-Verb-Phrase construction and the Subject/Predicate construction.

4.5.3 Null Instantiation

In our discussion of implicit arguments in section 4.3 we noted that some valence elements can be missing from the construct built around the verb. It is our claim that there must always be some grammatical account of such an omission. In some cases, this account takes the form of a construction which provides an interpretation of the missing element (the second-person subject is missing but 'understood' in imperative sentences, as in (46)); a direct object is missing but contextually understood in certain kinds of instruction formulas (as in (47)); or an argument can be missing under various interpretation conditions to be discussed in chapter 7: it can be interpreted as something indefinite, as in (48); as something generic, as in (49); or as something pragmatically given, as in (50).

(46) Get out of my garden.

(47) a. Shake before using.
b. Tear here.

(48) When did you eat?

(49) To err is human.

(50) We won.

4.5.4 Left Isolate Constructions

There are certain constructions in which a valence element is realized "to the left" of the rest of its clause. The constructions we have in mind include those that are treated in transformational grammars as involving "WH-Movement". Examples are given in (51-54).

- (51) Who did you speak to? (WH-question)
 (52) Beans I like. (Topicalized sentence)

- (53) I wonder [who they'll elect]. (Subordinate
 interrogative clause)
 (54) the one [to whom we spoke] (Relative Clause)

In (51), *Who* is the object of the preposition *to*, and in (52), *Beans* is the object of *like*; in (53), *who* is the object of the verb *chose*; and in (54), *to whom* is a complement of *spoke*.

4.5.5 Double Instantiation

In some sentences we find what we may think of as two realizations of the same valence element, one satisfying a syntactic requirement (by occurring in a necessary structural position), and the other expressing the meaning. A general name for the constructions in question is "extraposition".¹⁹ Here are some examples in which the semantically empty pronoun *it* fills the syntactic position required by the construction and a *that*-clause expresses the intended meaning. Examples are in (55-57).

¹⁹ The word *extraposition* is a derivative of the verb *extrapose*, and the general image within the transformationalist tradition was that the constituent in question is moved (extraposed) to the end of the clause, leaving an empty place-holder behind. We don't have a movement view of grammatical rules, but we can happily use the same word, suggesting that there are constructions that in addition to providing the normal positions for all of the relevant grammatical functions, provide an 'extra' position for a constituent that specifies the meaning of the 'dummy' constituent in the 'normal' position.

- (55) It is unlikely [that you will succeed].
 (56) I like it a lot [that she can relax when she is with us].
 (57) See to it immediately [that the portholes are closed].

In these cases, the pronoun *it* is the subject (55), the direct object (56), or a prepositional object (57), and a *that*-clause, at the end of the verb phrase, gives the semantic content corresponding to that syntactic position.

4.5.6 Coinstantiation

The last type of valence-element instantiation in this preview is the topic of chapter 7: *coinstantiation*. In the case of coinstantiation we say that the same linguistic expression simultaneously instantiates valence elements for more than one word. Examples are found in sentences (58) and (59).

- (58) Kim tried to finish the job.
 (59) They persuaded Pat to write the letter.

In (58), *Kim* is simultaneously the subject of *tried* and the subject of *finish*; in (59), *Pat* is simultaneously the object of *persuaded* and the subject of *write*.

4.6 Valence Representations

The verbal lexeme *persuade* will in any of its occurrences require the accompaniment of three arguments: an agent (the persuader); an experiencer (the person who gets persuaded); and the *content* of the act of persuasion: either the act that the latter is persuaded to perform (in the case of *persuade X to Y*) or the belief that he or she is persuaded to entertain (in the case of *persuade X that Y*). Different lexical forms of the lexeme *persuade*, however, assign to these three semantic arguments distinct grammatical functions. For example the active forms of *persuade*, which may appear in sentences like (47), assign in their fully specified valences the subject function to the agent/persuader, the direct object function to the experiencer/persuadee, and the grammatical function

which we will henceforth call *complement* (comp) to the content, the ideational entity of which the latter is persuaded.

(60) Lynn often persuades Pat to leave early.

On the other hand, the *passive* lexical form of the lexeme *persuade*, which occurs in sentences such as (48), links a different array of grammatical functions to the same set of semantic arguments. The agent is assigned to an optional *by-oblique* (if the *by*-phrase does not appear in the sentence, the agent is necessarily interpreted as indefinite); the content thematic role is again assigned to the comp grammatical function; this time it is the experiencer that is assigned the subject grammatical function.

(61) Lynn was often persuaded (by Pat) to leave early.

Possession of the agent/persuader, experiencer/persuadee and content/action-or-belief arguments is a property of the lexeme *persuade* itself, and so is a property of each of its lexical forms. However, the particular assignments of these semantic arguments to syntactic functions vary across active and passive lexical forms of the lexeme, as illustrated in (47) and (48). We refer to the valence that automatically comes with the lexeme as the *minimal valence* and to the completely filled out valence of a lexical form as a *fully specified valence*.

In the remainder of the present chapter we concentrate on the way in which fully specified valences are represented in the lexical entries (lexical constructions) of verbs. The valence of a verb determines to a significant degree the full array of constituents of the clause which that verb heads. In the next chapter we take up the interactions of fully specified valences of verbs with the Verb Phrase and Subject-Predicate constructions, which assure (i) that all the valence requirements of the verb are satisfied and (ii) that each of the argument-type constituents found in a sentence is licensed by

a verb (or other valence-taking word).²⁰ We summarize these two desiderata in the following two-part slogan.

- (62) i. We must find everything we need;
 ii. we mustn't find anything we can't use.

Recall the observations we made in connection with the examples with which this chapter began, repeated here for convenience:

- (1) a. The children devoured the spaghetti.
 b. *The children devoured.
 c. *The children devoured the spaghetti the cheese.
- (2) a. She put the cheese on the shelf.
 b. *She put the cheese.
 c. *She put the cheese on the shelf the poison.

In these examples, the b sentences violate requirement (62)i: they don't have everything that *devour* requires, and that the c sentences violate requirement (62)ii: they contain constituents that we don't know what to do with (*the cheese* in (1)c, *the poison* in (2)c).

Let us consider the same points with the verbs *wiggle* and *relish*. Consider the acceptability judgments for the following sentences:

²⁰ Some readers will be wondering at this point about 'adjuncts', such as the preposition phrases which denote the locations or times of events. Our story about adjuncts will come later.

- (63) a. Trout relish worms.
 b. *Trout relish.
 c. *Trout relish worms minnows.
- (64) a. Worms wiggle.
 b. *Worms wiggle minnows.

The lexeme *relish* is a two-argument predicator. Its two arguments are (i) the person or animal which enjoys an experience of relishing something and (ii) the thing that is relished in its role as content of that experience. The lexeme *wiggle* is a single argument predicator, requiring a thing that wiggles and nothing more. Sentences (63)a and (64)a are unproblematical because they contain expressions denoting two arguments and one argument, respectively. Sentence (63)b is defective because it contains no constituent expressing the thing relished. Sentence (63)c is bad because, in addition to the experiencer expression *trout*, it contains two expressions, *worms* and *minnows*, which compete, as it were, for the role of content. The verb *relish* evokes a scene in which there are exactly two participants; sentence (63)c presents a scene with three participants on stage where only two are called for in the script. Example (63)b fails because it is a violation of principle (62)i. Examples (63)c and (64)b fail because they violate principle (62)ii.

A lexical entry for a verb that incorporates the various kinds of information we have been discussing will do the following. It will present the valence of a verb as a *set* of valence requirements, each of these represented by a partial AVM shown in square brackets. The "set" character of the value of the valence attribute is indicated by writing the valence element representations between curly braces ("{" and "}") and by separating the members with a comma. In other words, the left-to-right order of valence elements in valence descriptions is not predictive of the left-to-right sequencing of the instantiations of these elements. The θ roles and the *gf*'s are parts of an AVM that stands as the value of an attribute

called relation (rel). Whereas the "syn" attribute introduces the inherent syntactic properties of whatever constituent appears as one of these elements, and the "sem" attribute introduces the inherent semantic properties of those constituents, the "rel" attribute names the kinds of relationship that the constituent holds to the verb (and indirectly to the clause which is headed by the verb), these separated into the grammatical function (subject, etc.) and the θ -roles (experiencer, etc.).

The frame-semantic roles are identified within a (schematized) representation of the semantics of the verb itself and are associated with the semantics of the valence elements by unification indices. The frame for *relish* has the (unhelpful) name RELISHING, referring to a complex notion involving a certain kind of experience of gustatory pleasure. This frame has two main participants, labeled here as simply first participant (part1) and second participant (part2), identifying, respectively, the consumer and the consumed entity in such an experience. While a reasonable expectation for a semantic analysis of a sentence is that it can be used for deriving its entailments, and while it might be considered an entailment of *A relishes B* that *A likes B*, there is nothing in the notation RELISHING which reveals that it is a kind of LIKING, or anything of that sort. This notation simply indicates that the level of conceptual analysis being represented stops here (for now): no position is taken on the issue of whether or not the conceptual analysis might be pushed further.

The lexical entry for the lexeme *relish*, showing its minimal valence, appears in Figure 1.

syn	[cat v, lex +]		
sem	[	frame RELISHING]
	part1	#1[...]	
	part2	#2[]	
val	{	[	syn []
	sem	#1[]	
	rel	[_{gr} []]
		[_θ exp]
]	
		{	[
		syn []	
		sem #2[]	
		rel [_{gr} []]
		[_θ cont]
]	
		}	
bcm	relish		

Figure 1

The notations 'part1' and 'part2' stand for the idea that the relishing frame has two participants: the person (or animal) that has an experience of relishing something, and the content of that experience. Note that the values of these two attributes are not specified in detail, but that the space which is to contain the part1 value contains three dots. This value will turn out to be the semantic representation of the being that plays the relisher-experiencer role and the three dots indicate that a part of the meaning of this constituent is specified by the verb *relish* itself. In particular, a relisher, in fact any experiencer, has to be an animate being. Thus, a sentence like

(65) ?Rocks relish worms.

is odd in that rocks aren't animate beings and we know that only an animate being can be the referent of the subject of an active clause of which the main verb is *relish*. We can of course imagine fantasies or science fiction stories about situations in which rocks can talk, fall in love, have nightmares, etc. In a text so situated a sentence like (65) becomes unexceptionable.²¹ Nevertheless, it will often be important to

²¹ In other words, if we find a situation in which (54) is acceptable, we will not say that the semantic proposal just made for *relish* is

note that certain thematic roles, in this case the experiencer role, impose constraints on the kind of notional object which may bear that role to the main predicate: for example, experiencers must be animate. It seems inescapable that such facts are linguistic facts. In the generative tradition, semantic relations of this kind between predicating words and their arguments are called *selection restrictions*.

The tricky thing about an example like (65) is that the sentence is odd for two reasons, only one of which is linguistic. On the one hand, it is a fact of English, not of the world outside language, that the verb *relish* (when used in the active voice) requires an experiencer subject denoting an animate being. On the other hand it is a non-linguistic fact that rocks are not animate beings. In an interpretive context in which rocks are animate beings but sticks are not, (65) becomes unexceptionable but (66) remains odd.

(66) ?Sticks relish worms.

In such a case the world against which the sentence is interpreted is different from the familiar world, but English remains unchanged: active *relish* requires a subject which denotes an animate being. By making selection restrictions part of the grammar of English, or whatever language is under study, we can account for these varying judgments of normality (versus semantic oddity) as we use the unchanging language in different contexts of interpretation. Once again, it is a fact of English that active *relish* requires an animate experiencer as its subject; it is not a fact of English that rocks are commonly viewed as inanimate objects. (It appears to have been lack of clarity on this issue which led in the early history of generative grammar to a famous equivocation over

incorrect, but rather that the speaker is assuming something about rocks that makes them fit the semantic expectations of *relish*.

the grammaticality of the sentence *Colorless green ideas sleep furiously.*)

Henceforth we will not bother to indicate with three dots, or in any other way, the fact that a predicating word imposes a semantic restriction of the kind we have been discussing on one of its arguments, but we will often have occasion to refer to such selection restrictions in our text.

Still considering the value of the *part1* attribute in Figure 1, we note (from the "#1[]") that it unifies with something else, specifically, with the *sem* value of the valence element whose θ -role is *exp*. This is how we represent in the notation of construction grammar the idea that the verb *relish* requires an argument which bears the thematic role of experiencer. The way this works out is that the valence element in question (the one that contains the substructure [role [θ exp]]) will have to unify with some constituent (in an active sentence, the subject) in order for all of its unspecified values to become specified. Recall that a sentence requires fully specified feature structures. When this unification is effected, the *sem* value of the valence element is given content and this content will, by the unification index #1, automatically become also the content of the value of *part1* in the external *sem* structure. Thus both the *sem* value of the *exp* valence element and the *part1* value of the external *sem* will obtain their needed content in a sentence which properly employs the verb *relish*. In this way the constituent that shows up as subject in an active sentence or *by*-oblique in a passive sentence furnishes the semantic content for the first participant of the semantics of the verb, via unification with the appropriate substructure of the corresponding valence element.

Turning now to the *part2* value in the external semantics of Figure 1, we see that this value unifies with the *sem* value of the other valence element, the one that contains [role [θ cont]]. In an active sentence, this valence element will unify with the direct object constituent, and hence the semantic value of that constituent will unify with the *sem* value of this valence

element and, via this, with the value of the part2 attribute of the external semantics of *relish*. We have seen a pattern which associates (i) the external part1 value with (ii) the experiencer valence element and also with (iii) the subject. An analogous pattern links (i) the external part2 value with (ii) the content valence element and also with (iii) the object.

Throughout the above discussion, we have had to be careful in talking about the correspondence of subject and object to experiencer and content, respectively, to specify that we were talking about active sentences. In a passive sentence, such as

(67) Worms are relished by trout.

the experiencer corresponds, not to the subject, but to the *by*-oblique, and the content of the experience corresponds to the subject. If we look now at the grammatical function (gf) values in the valence elements of Figure 1, we see that these are unspecified. This lack of specification corresponds precisely to the fact that the lexeme *relish* can swing either way: it can take on an active lexical form, assigning the subject gf to the valence element containing the θ value experiencer or it can take on a passive form²², in which the θ value experiencer is matched with an optional *by*-oblique. The fact that Figure 1 shows no matching of θ values with corresponding gf values in its valence elements is characteristic of minimal valences. As we have said, consideration of the linking constructions which match gf values to θ values in valence elements is postponed for now, to be taken up later in the course. For now, we

²² The curious will wonder whether we have thought of the fact that the passive form of a verb is a different kind of object from the active form in more ways than we have dealt with so far. We have, and there'll be something about it later on. In particular, a verb stem with passive morphology requires some supporting verb - commonly *be*.

simply assume these links have been made and turn our attention to fully specified valences, such as that shown in Figure 2.

syn	[cat v, lex +, voice active]		
sem	[frame RELISHING part1 #1[] part2 #2[]]		
val	{ [syn [cat n, max +] sem #1[] rel [gf subj] [θ exp]] }	{ [syn [cat n, max +] sem #2[] rel [gf obj] [θ cont]] }	}
bkm	relish		
lfm	relish		

Figure 2

A fully specified lexical entry *relish* is shown in Figure 2. Note first that we have added the *lfm* (lexical form) attribute and value. As it happens, since the form we have selected is third person plural²³, present tense, there is no evident difference between it and the citation form of the lexeme given as the *bkm* value, but if we had decided to use the third person singular, present tense form, the value of the *lfm* attribute in Figure 2 would have appeared as *relishes* (*Hugo Trout relishes worms*). In addition to this amplification of the lexeme construction given in Figure 1, we find in Figure 2 that the active lexical form depicted there specifies that each valence element must be a noun phrase ([cat n, max +]). Additionally, we find that the valence element whose *sem* value unifies with the *part1* value of the external semantics and which is assigned the θ value of *exp* is assigned the *gf* value of *subj*. In parallel fashion, the valence element whose *sem* value unifies

²³ Because of the peculiar morphology of English verbs, the form is not specifically third-person plural. It is also the form used in the singular for first and second person.

with the part2 value of the external semantics and which is assigned the θ value of cont is assigned the gf value of obj. The valence of this lexical form is fully specified: a gf value is matched to each θ value. This particular assignment, subj to exp, obj to cont, is characteristic of active (versus passive) voice.

syn	[cat v, lex +, voice active]
sem	[frame WIGGLING part1 #1[]]
val	{ [syn [cat n, max +] sem #1[] role [gf subj θ agt]] }
bkm	wiggle
lfn	wiggle

Figure 3

Intransitive verbs like *wiggle* appear only in the active voice. The intransitivity of *wiggle* is reflected semantically in the fact that its sem value contains a single participant and syntactically in the fact that its valence value contains a single element, carrying the grammatical function of subject. We note that the sem value of this valence element unifies with the part1 value of the external semantics. Here we see a case in which every lexical form corresponding to a given lexeme carries the same valence set, although there will be distinct lexical forms for *wiggle* according to the person and number of the required subject: *wiggle* versus *wiggles*.

Direct Instantiation

5.0 Role, Rel, and Fcn: An Embarrassing Digression

We begin this chapter by proposing a new design for the basic feature structure organization of a number of elementary constructions, which means that some of the notions that were introduced in earlier chapters will be reshaped, and some will be renamed. The confusions we hope to clear up in this section are related to the notions "role", "relation", and "function". The reason this is called "An Embarrassing Digression" is that at the time of the writing of this chapter we saw things better than we had before, and there wasn't time to make any changes in the earlier chapters. The final version of this text, of course, will be characterized by a seamless consistency, in notation and conceptualization, from start to finish.

In the earliest proposed version of the Determination construction, we gave no particular analysis to the notion "determiner": we simply called the word that in the phrase that person a "Det". The most important fact about determiners at that point was that they can combine with something that is itself incapable of being a self-standing nominal argument to form a maximal NP. Our diagram looked like this:

Determination Construction
Figure 20, chapter 2

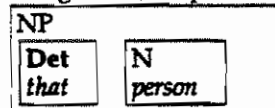


Figure 1

We knew that this wasn't going to be adequate, since the first position of this construction can be filled by articles, demonstratives, possessive NPs, as well as several other sorts of things. The idea of being a determiner, we argued, was more that of a "role" than that of a kind of thing. So in the improved version of the construction in that chapter, we said that the left sister had "role Det", intending to express in that way the insight just mentioned. We assigned no role name to the right sister.

Determination Construction
Figure 25, Chapter 2

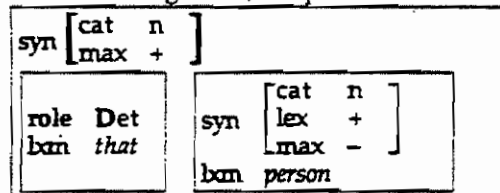


Figure 2

But we also used the word "role" in that chapter to name the attribute whose value consisted of a complex consisting of the *gf* and the θ features. It was awkward, in that discussion, to be using the same word, "role", for each of these notions, and we puzzled about what to do.

Then in Chapter 3 we introduced a slightly different way of talking, where (i) the word "function" (abbreviated *fcn*) replaced "role" in contexts like the one in Figure 2, (ii) it was suggested that a "function" label should be given to *each* member of a phrasal construction, not just one, and (iii) the word "role" was limited to use as the higher attribute for the

the *gf* and *θ* features of valence elements. The first constituent of the Determination construction (Chapter 3, Figure 15) was provided with the feature [*fcn det*], and the second constituent had [*fcn head*] (as shown in boldface in Figure 3). But this time, instead of having these *fcn* features at the highest level in the AVM for the constituent, we (unwisely) subordinated them to the attribute *syn*.

Determination Construction
Figure 15, Chapter 3

syn	[<i>cat</i> <i>n</i> <i>proper</i> - <i>max</i> +]	sem	[<i>bounded</i> + <i>cnfg</i> #2[] <i>num</i> #3[]]
syn	[<i>fcn det</i>]	syn	[<i>cat</i> <i>n</i> <i>proper</i> - <i>max</i> - <i>fcn head</i>]
sem	[<i>bounded</i> #1[] <i>cnfg</i> #2[] <i>num</i> #3[]]	sem	[<i>bounded</i> #1[] <i>cnfg</i> #2[] <i>num</i> #3[]]

Figure 3

We are making several changes in the feature-structure apparatus now, and we would like to think that the new notation, and the re-conceptualization that it represents, will seem more orderly.

First change: we wish to be consistent in giving names to the roles that constituents have within the phrases that contain them, and this "role" feature will be introduced at the highest level in each daughter AVM. For this we will use the term "phrasal role" when we need to be careful, but since it will be the only place in the notation itself that uses the word "role", we will simply write *role*.

Second change: we wish to make a clear distinction between relational features and inherent features. This is a distinction between what is true about a particular word or phrase, on its own, and what properties it has by virtue of its relation to a predicator whose requirements it satisfies. To

present the relational features of arguments, we will now use the word "relation" (*rel*) rather than "role" and will intend the values of this attribute to be feature structures containing *gf* features and θ features, and something else that will come up in Chapter 8. For grouping the inherent features, we will introduce an attribute name that combines the syntactic and semantic properties, called "syntax/semantics" or "synsem" but abbreviated as *ss*.

Figure 4 gives a general schema for a two-part phrasal construction. In the Determination construction, the α and the β will be replaced by *spec* (see below) and *head* respectively. In the MN construction the role names will be *mod* and *head*. If the mother of a construct that satisfies such a construction is itself a constituent of a higher phrase, then it too will have a role feature corresponding to its role in that higher phrase. The point is that it is phrasal constructions that supply phrasal roles.

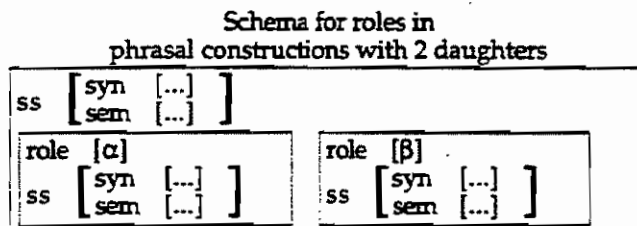


Figure 4

Arguments will have *ss* features and *rel* features. That is, constituents which are arguments will carry syntactic information revealing their grammatical type, semantic information, showing their meaning, and relational information indicating the grammatical (*gf*) and semantic (θ) relations they bear to the predicates whose valence requirements they satisfy. A general schema for arguments is given by Figure 5. If an argument finds itself as a member of a phrasal construction, it will also have a role feature.

Schema for arguments

ss	[	syn	[...]]
		sem	[...]	
rel	[	gf	[...]]
		θ	[...]	

Figure 5

Predicates are valence-bearing constituents. They will bear syntactic information, indicating their category and semantic information giving their meaning, plus a set of valence requirements. A schema for predicates is given by Figure 6. In this schema, the raised 'plus' sign indicates that the entity which precedes it can occur in one or more repetitions: the valence is presented as a set of one or more arguments.¹ A simple intransitive verb will have just one valence member; a simple transitive verb will have two; a ditransitive will have three; and there are various means of augmenting a valence that will be discussed later on.

Schema for predicates

ss	[	syn	[...]]
		sem	[...]	
val	{	[...] ⁺	}	

Figure 6

Predicates have val features; but since predicates can in fact be arguments, they may contain rel features as well; and since either predicates or arguments may be the constituents of phrases, either may contain a role feature too. Consider what there is to say about the phrase *read this* in sentence (1).

¹ This symbol, called the "Kleene plus", will be discussed below, together with the "Kleene star", in connection with our representation of the Phrasal Verb Phrase construction.

- (1) You should read this.
- (i) [read this] has [role pcomp] within the phrase [[should] [read this]] (should being the head, i.e., having [role head]);
- (ii) the modal verb should has a valence set, and [read this] is a constituent bearing the relation [gf comp] within that valence set (notice the contrast between comp and pcomp);
- (iii) and in our analysis, a verb phrase like read this is treated as sharing the valence of its head daughter, the valence within which the constituent this is [gf object].

Since the features of *ss*, *role*, *val* and *rel* are all mutually compatible, they can all – as has just been shown with *read this* in sentence (1) – appear in a single feature structure.

The newly introduced *role* feature, then, will introduce the names of the roles that constituents have within the phrases that they take part in. We can distinguish two main types of phrasal constructions, *headed* and *non-headed*. For a headed construction, there is one constituent that participates more centrally in determining the character of the whole, and that is the *head* of the construction. For non-headed constructions (such as the one that gives us the coordinate conjunction *John and Mary*) no single constituent has such a function.²

The Determination construction, as we have seen, has a *head* and (to its left) what we will now call a *specifier*. This role will appear in other constructions as well, as you will see in a later chapter. Thus, the role features of the two constituents

² The construction licensing *John and Mary* is Coordinate Conjunction. A later chapter will be devoted to it. The phrases that are conjoined will be called *conjuncts*, i.e., will have the role feature [role conjunct]; the word that connects them will be called the *conjoiner*.

of the phrase *this person* are [role specifier] and [role head] respectively.

For the MN construction the role names will be *modifier* and *head*; the role features of the two constituents of the phrase *warm milk* will be [role modifier] and [role head] respectively.

For certain phrases we will find that one of the constituents has a simple "marking" function, without any independent accompanying semantic function. An example is the Marked Infinitive construction, which is simply the word *to* followed by a bare-stem verb phrase. We will say that the two parts of *to sleep* have the features [role marker] and [role head].

Most other uses of [role head] will be to mark the heads of complementation structures, where the head constituent has a valence and the other constituents of the phrase are its complements. Since we have other uses for the word "complement", we need a separate term when speaking of the non-head role of a phrasal member whose head has an unsatisfied valence: for this we will use "phrasal complement", abbreviated *pcomp*.

The head of a preposition phrase is the preposition and its object is its *pcomp*. The two parts of *into the cave*, then, are [role head] and [role phrasal-complement]. The head of a verb phrase is the verb, and all of that verb's sisters have the role *pcomp*. Thus, for a phrase like *demonstrated the proof to the class*, the verb *demonstrated* has the feature [role head] and each of the constituents *the proof* and *to the class* will have the feature [role *pcomp*].

There is a third new development in our AVM representations, and that has to do with syn features. Syn features can be divided into *head* features (the features that are identical between a head daughter and its mother) and what we will call *level* features. The *head* features that we will speak of first are category (*cat*) and lexical head (*lexh*). For various reasons we sometimes need to be able to refer to

headed phrases by their lexical heads, so the *lexh* of the noun *boy* will be *boy* and the *lexh* of the NP *the boy* will also be *boy*. Additional head features will be introduced in later chapters. Since a NP is a phrase headed by a noun, and a PP is a phrase headed by a preposition, etc., the *cat* feature will also belong to the AVM that serves as the value of *head*. The level features are those that indicate degrees of "completion" of a phrase of a particular category. The feature *lex* indicates whether the constituent is a lexical item ([*lex +*]) or a phrase ([*lex -*]); the feature *max* indicates whether the constituent is ([*max +*]) or is not ([*max -*]) capable of standing as an argument.³ In short, ss features will fit the following schema:

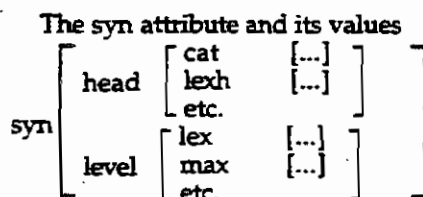


Figure 7

With all of these changes we have now introduced a new possible source of confusion, in our recycling of the word "head". In one use it is the atomic value of an attribute, namely *role*; but as a part of a syn AVM, it is an attribute which takes as its value an AVM characterizing those properties of a head constituent which are shared by the mother constituent. Using the same word for both purposes is deliberate, of course, but only as a mnemonic: the features that are called head features are the ones that are shared by a phrase and its head daughter, the daughter which bears the notation '[role head]'.

³ We will soon be adding another level feature, separating a VP from a sentence: "srs" to indicate whether or not the "subject requirement" (of a predicator's valence) is satisfied.

One last change has to be mentioned. Now that we recognize *lexh* as a "head" feature within *syn*, we will let that stand for what we earlier called "lexeme", and we will use, at the outermost element of a lexical constituent, an attribute *phonology* (abbreviated *phon*) that will stand for the actual occurring form of the word.⁴ Examples will appear later in this chapter.

5.1 Direct Instantiation

With that out of the way, we turn now to our main job in the present chapter, which is to develop an explicit method of showing why sentences (2)a and (3)a are grammatical while the other sentences in (2) and (3) are not.

- (2) a. Jim hated mud.
- b. *Jim hated.
- c. *Jim hated mud the cheese.

- (3) a. Jim squirmed.
- b. *Jim squirmed mud.

These sentences should remind you of discussions in Chapter 4, where we spoke of principles about making sure that we have everything we need and that we know what to do with everything we've got.

⁴ The phonology values, in general, will be determined by reference to the 'underlying phonological form' of each lexical item and other relevant information found, for example, in the specification of the inflection of an inflected word. Here we assume this feature only for lexical items, but it seems clear that the theory of phonology that works best with construction grammar will be one which assigns a phonology value to every phrasal constituent, not just lexical ones. Phonological processes – which may or may not be unificational in nature – will relate the phonology of phrases to the phonology of their constituents. Since we will seldom have anything to say about phonological form in this book, we will represent this part of a lexical entries with representations in standard spelling.

By *direct instantiation* we refer to the licensing of phrases by means of constructions that provide that a valence requirement is satisfied by – that is, unified with – a sister of the valence-bearing constituent. These are phrases whose constituents contain one head and one or more pcomps; the head will either be a lexical item, namely the item which has the valence set as a part of its description, or a particular kind of phrase onto which that valence set has been projected. (For our immediate purposes, the latter will apply only to a verb phrase in constructs in which its immediate left sister is its subject.) In example (2)a, the relation between *hated* and *mud* holds between the lexical head *hated* and its object. The realization of this relation in the verb phrase of example (2)a presents an example of direct instantiation: the Phrasal Verb Phrase construction provides a structure in which this instance of direct instantiation is housed. The relation between *hated mud* and *Jim* is a relation between the predicate phrase of a sentence and the subject of the sentence. The Subject-Predicate construction provides a structure in which this second instance of direct instantiation is housed. On the other hand, the relation between *What* and *hate* in *What did Jim hate?* is not an instance of direct instantiation; and the relation between *Jim* and *hate mud* in a sentence like *Jim has adamantly refused to reconsider his decision to hate mud* is also not an instance of direct instantiation.

Here, again, some terminological clarification may be necessary: we will say that the constituent *Jim* in sentence (2)a has the feature [role pcomp] within the sentence as a whole (since the VP *hated mud* is the head of that sentential construct) and also that it has the feature structure [rel [gf subj, θ exp]] defining its relation to the verb *hate*. Notations that reflect this contrast will be introduced shortly.

5.1.2 *Jim Squirmed* (Licensed)

We begin our exemplification of the details of the licensing (or non-licensing) of the sentences in (2) and (3) by considering

the intransitive sentence (3)a. To license this sentence we will need to unify the NP *Jim* with the left daughter of the S-P construction and the verbal lexeme *squirmed* with the right daughter. Figures 8, 9 and 10 give simplified versions of the nominal construct *Jim*, the verbal construct *squirmed*, and the S-P construction, respectively. The construct for *Jim* depicted in Figure 8 should conform to expectations you already have and therefore require no further explanation.

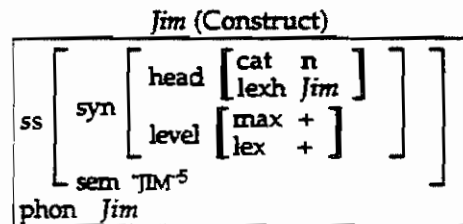


Figure 8

Figure 9 represents a lexical construct for the verb *squirm* in the form *squirmed*.⁶ The valence description tells us that it needs an agentive subject (the squirmer is active in his or her squirming, and since there is only one argument, it is necessarily the subject); and that that element is going to be a NP. The fact that the word form (indicated as [phon *squirmed*]) is in the past tense is reflected as the feature [tense past] under the sem attribute for the verb.

⁵ We will simply use the notation "JIM", to stand for the meaning of the name *Jim* (whatever kind of semantic object that is), not wishing to embark here on a discussion of the meanings of proper names and their formal representation.

⁶ There will of course be a simpler entry in which the tense has not been selected and neither the gf nor the syntactic form of the argument has been assigned. The selection of tense is optional and the gf and its syntactic realization will be automatic, so these will not make up part of the actual initial entry for this verb.

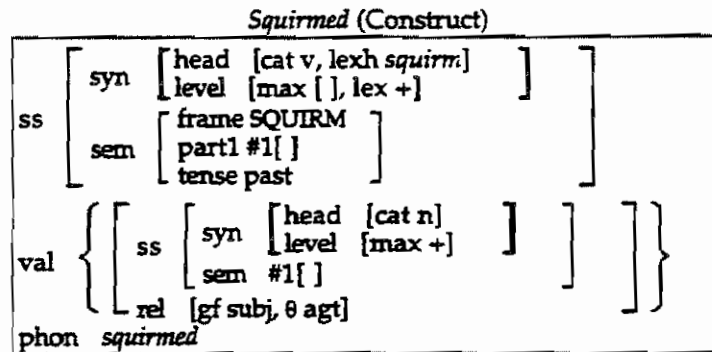


Figure 9

We will need to consider the Subject-Predicate construction in licensing sentences (2)a and (3)a. Figure 10 presents the Subject-Predicate construction, expanded from our earlier version.

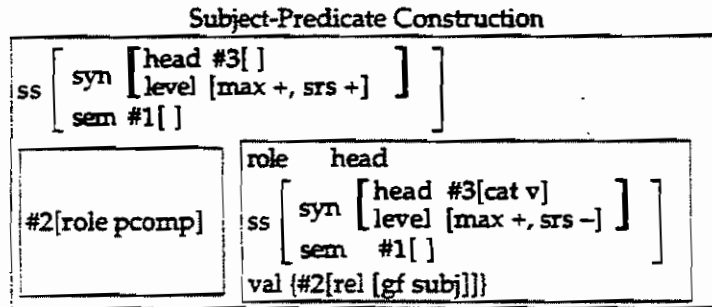


Figure 10

There are several things to say about this diagram. Looking at the external syntax value, note that a sentence is taken to be a type of maximal verbal constituent, 'cat v, max

+'.⁷ That is, we take the verb phrase to be the head of the sentence, as the verb is the head of the verb phrase, thus making the sentence ultimately a 'projection' of the verb. There are a number of reasons for this, both syntactic and semantic.

On the semantic side, we consider the verb to evoke the basic 'frame' (or scene or schema) for the interpretation of its clause.⁸ Recalling the various examples of the last chapter involving the verbs *buy*, *sell*, *pay* and *charge*, it is in each case the verb which evokes the commercial event schema or frame, thus providing the overall structure of the interpretation. One way to think about this is to imagine oneself overhearing exactly one of the indicated constituents of an utterance like [Max] [paid] [Minnie] [a hundred dollars]. If the overheard constituent was anything other than the verb *paid* the overhearer could infer nothing about the event described (beyond the fact that one of its participants was Max, Minnie or a sum of one hundred dollars, depending on what was overheard). But if all we heard was the verb *paid*, we could nevertheless infer quite a lot about the whole event, namely that there was (i) some merchandise or service that got bought by (ii) some buyer from (iii) some seller in return for (iv) a payment. Moreover, we would know that (v) the buyer was being treated by the speaker as an agent, (vi) the money as a theme, and (vii) the seller as a goal. This 'projection' of the semantics of the whole sentence from the semantics of the verb

⁷ An expression such as 'cat v, max +' will continue to be used in the text as a convenient abbreviation for 'maximal verbal constituent' even though under the newly introduced feature scheme 'cat' and 'max' are no longer attributes in the same feature structure.

⁸ There are numerous exceptions to this generalization, in the form of VPs whose head verbs are semantically fairly empty (these are often referred to as *light verbs*): *take a bath*, *run a risk*, *do a favor*, etc. Nevertheless, since the semantic structure of a VP is built around the semantic schema associated with its head verb, it still remains true that the semantic organization of the VP as a whole makes use of structures associated with the verb.

is indicated in the S-P construction of Figure 10 by the fact that the external sem value, that is, the semantics of the sentence construct, is unified (via '#1') with the sem value of the right daughter (the VP). We will see, when we consider the Phrasal Verb Phrase Construction, that the sem value of a phrasal VP is unified with that of the lexical verb, completing a chain of unification which 'projects' the semantics of the lexical verb to that of the sentence.

Syntactic motivation for treating the sentence as a type of verbal construct – that is, as [cat v] – comes from the fact that there are contexts in which either a sentence or a verb phrase may occur, suggesting that sentences and verb phrases make up a natural category. The position following a left-isolated element (such as *what*), as exemplified by the bracketed constituents in (4) and (5), defines a variety of contexts in which both sentences and verb phrases are welcomed. By making 'cat v, max +' an essential part of the notation both for sentences and for verb phrases, we equip ourselves to describe situations such as that exemplified in (4) and (5), which we will consider in detail in a subsequent chapter on Left Isolation.

- (4) I wonder what [_{vp} happened to the pizza].
 (5) I wonder what [_s the dog hated].

The distinction between sentences and verb phrases is encoded in the level attribute 'srs', standing for Subject Requirement Satisfied. A verb phrase is a maximal verbal constituent whose subject requirement is not satisfied, [srs -], while a sentence is a maximal verbal constituent whose subject requirement is satisfied, [srs +]. In saying that they make up a natural category we are saying that there are some syntactic processes in the language which apply to constituents in which the value of the srs attribute is unspecified.

The remaining aspects of the S-P construction bring us back to the central topic of this chapter: the instantiation of the valence requirements of predicators. The left daughter of

the S-P construction contains the notation 'rel [gf subj]'. We know that the verb *squirm* has a valence element whose gf is subj and whose θ role is agent. We know also that ultimately the subject constituent will unify with this requirement, causing the sem value of the subject constituent to unify with the part1 value of the *squirm* frame.

Still looking at the S-P construction depicted in Figure 10, note that the unification variable #2 unifies the entire external AVM of the left daughter constituent with something in the right daughter. Turning now to this 'something' with which the subject constituent unifies we see in the right (VP) daughter an attribute 'val' with its value indicated as '{#2[rel [gf subj]]}'. This notation denotes a set of AVMs one of whose members⁹ is an AVM which includes the feature '[rel [gf subj]]' and which is indexed by the unification variable '#2'. In Figure 10, then, the notation '[rel [gf subj]]' within the val value indicates the subject requirement of the sentence. The unification of this AVM with the (external AVM of the) left daughter constituent of the construction, via #2, is the aspect of the S-P construction which specifies that *in a sentence of the subject-predicate type*¹⁰ *the subject requirement of the sentence is satisfied by direct instantiation as the left daughter constituent.*

We go about unifying constructions to license example (3)a *Jim squirmed* as follows. We first unify the lexical item *squirm*, given in Figure 9 with the right daughter of the S-P construction (Figure 10), as shown in Figure 11.

⁹ The wording "one of whose members" is important. Using wavy braces to indicate sets will mean, not that the items thus enclosed are the members of the set, but that they are included in the set. Thus any two set descriptions can unify.

¹⁰ There are other types of sentences, as you know.

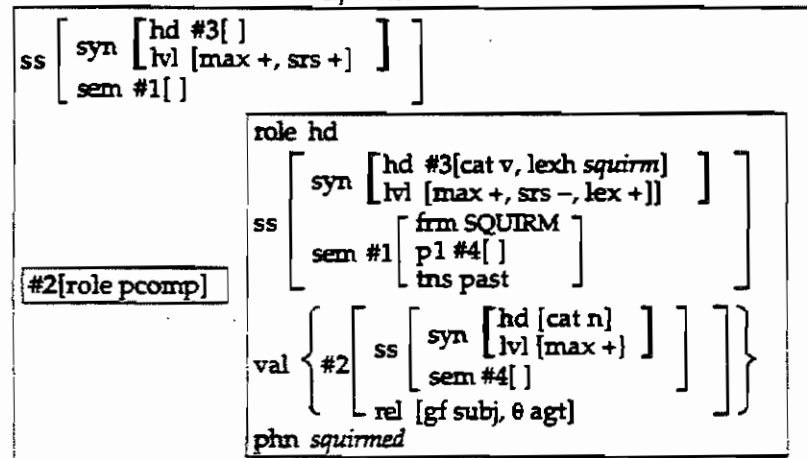
Unification of Figures 9 and 10: Sentential Structure with VP
squirmed


Figure 11

(The word-processing technology for producing these box diagrams has certain limits which required us in this case to commit still further abbreviations. Here, *hd* is head, *lvl* is level, *p1* is part1 ("participant 1"), and *phn* is phon(ology). Further abbreviating will become necessary as we go along.)

With regard to the unification accomplished in Figure 11, note that a lexical verb is able to unify with the [max +] right daughter of the S-P construction because lexical verbs are not specified with respect to maximality. Since a lexical verb is not specified for maximality it can unify either with the [max +] right daughter of the S-P construction or with the [max -] left daughter of the Phrasal Verb Phrase construction, as we will see shortly. This represents an application of the concept of underspecification similar to what we saw in connection with mass and plural nouns, which, because they are unspecified for maximality, can either be noun phrases [max +] and therefore serve as arguments (*Mud stinks*) or can

themselves be determined and hence [max -] (*this mud*). Thus, in the structure depicted in Figure 11, we may say that *squirm* is both a verb and a verb phrase. It is a (lexical) verb because it is 'cat v, lex +' and it is a verb phrase because it is 'cat v, max +, srs -'. This is analogous to saying that a pronoun like *she* or a proper noun like *Sheila* is both a noun and a noun phrase; [lex +] makes it lexical and [max +] makes it phrasal. One does find single-word phrases in the cases of proper or pronominal noun phrases, and, as we have just discovered, also in the case of one-word intransitive verb phrases, such as *squirmed* in example (3)a.

What remains for us now is to unify the nominal construct *Jim* (Figure 8) with the left daughter of the structure given in Figure 11. First, we will check to see that all the indicated unifications can be performed (i.e., that there are no conflicts) so that the result is a well-defined structure. Then, we will check to make sure that this structure is a construct (i.e., that there are no values left unspecified).

The result of unifying *Jim* (Figure 8) with the left daughter of the structure in Figure 11 – which resulted from unifying *squirm* with the right daughter of S-P – is shown in Figure 12.¹¹

¹¹ In the Figure, and henceforth, 'NP' abbreviates "syn

$\left[\begin{array}{l} \text{head} \text{ [cat n]} \\ \text{level} \text{ [max +]} \end{array} \right]$.

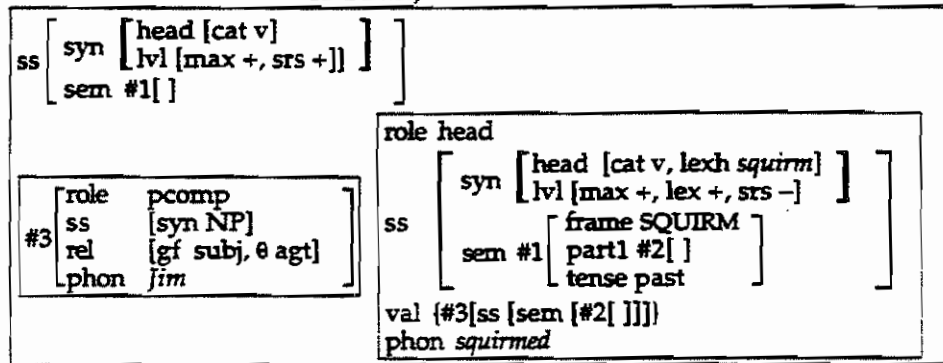
Unification of Figures 11 and 8: *Jim squirmed* (Sentential construct)

Figure 12

We trace out each of the unifications shown in Figure 12. The unification here represented by '#3' is the unification of the subject constituent of the S-P construction with the subject requirement of the VP valence; this is represented in the S-P Construction diagram of Figure 10 by the notation '#2'. (Make sure this is clear to you before proceeding. The functions of the unification indices is to guarantee unification of the two constituents so tagged: when structures are unified with each other, what is important is not that the actual choice of numbers is preserved, but that the identities are preserved. In Figure 12, for example, the index '#3' indicates the unification of elements whose unification is indicated by '#2' in Figure 10.)

We note that the left-daughter AVM #3 in Figure 12 has been provided with the information found in Figure 8 (the construct *Jim*) and that the AVM indexed #3 in the valence value in the right daughter does not conflict with the comparable structure in Figure 9. By this unification (#3 in Figure 12) the representation of the AVM indexed by #3 in the valence value (i.e., the valence requirement) 'acquires' the information associated with the *Jim* construct. The semantics associated with this construct is indexed in Figure 12 by the

unification variable #2, so the 'squirmmer' in this case is identified with Jim. This just says something that we already know about the lexeme *squirm*: that whatever constituent satisfies its valence requirement for an agent/subject also provides the semantic substance of its part1 (i.e., its unique, 'squirmmer', participant). Index #1 in Figure 12 then represents the fact that the squirming, and the identification of the squirmmer, are associated with the meaning of the whole sentence, as well as that of the VP.

5.4 The FVP Construction

In the licensing of the simple intransitive sentence *Jim squirmed*, we did not employ the Phrasal Verb Phrase construction because the lexical verb *squirm* unifies directly with the right daughter of the S-P construction, since the former is not specified for maximality (and thus does not conflict with the [max +] stipulation in the right daughter of the latter). But for a transitive sentence like (2)a we will need to use the Phrasal Verb Phrase construction to license a constituent that has a place in it for the object, *mud*. Figure 13 represents the Phrasal Verb Phrase construction.

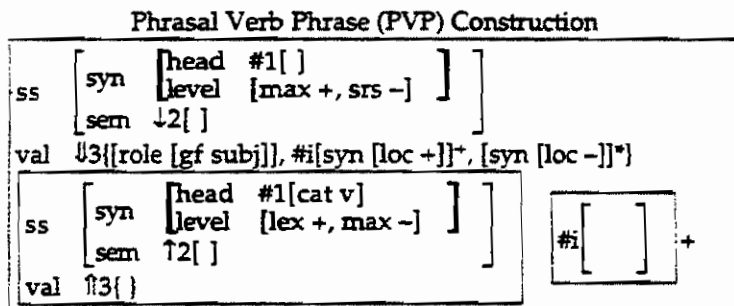


Figure 13

The name *Phrasal Verb Phrase* is perhaps a bit strange, but it will remind us of two uses of the word 'phrase' in current grammar. Abbreviations like VP, NP, PP, etc., stand for

maximal phrases headed by verbs, nouns, or prepositions, independently of whether they are 'phrases' in the more ordinary sense, that is, independently of whether they consist of a single word or a group of words. Since a single verb can occur as a maximal VP simply by not having its maximality value specified (as we have just seen in the case of *squirmed*), we don't need a separate construction for indicating that fact; but what we do need is a construction which will group a lexical verb with those of its arguments or adjuncts which join it in forming a multi-word phrase. In other words, every construct that is an instance of the PVP construction is a VP, but not every VP is licensed by the PVP construction.

The PVP construction provides for a constituent whose external syntax is 'cat v, max +, srs -'. This is exactly what is required by the right daughter constituent of the S-P construction, so a constituent licensed by the PVP construction can be the right daughter of an S-P construct, just as a bare intransitive verb can. We will use the abbreviation VP for any construct whose external syntax contains 'cat v, max +, srs -', and PVP for the name of the construction that licenses a multi-word VP.

There are two daughter boxes in the diagram of Figure 13. The left one represents the lexical verb; its syn value is 'cat v, lex +, max -'.

There are upward and downward pointing arrows in this diagram, some single-shafted and some double-shafted. These represent what for now we can think of as simply the unification of the sem value of the head constituent with the external sem value of the VP, and the unification of its valence value with the valence value of the VP as a whole. Let them remain as mysteries for the time being, more or less equivalent to the use of the pound sign in the case of ordinary unification; their functions will be explained and justified when we discuss *adjuncts* in a later chapter.

The right daughter box in Figure 13 is followed by the symbol '+', read 'Kleene plus' (after the logician S. C. Kleene,

whose name is pronounced [klini]). Its interpretation is the following: for any symbol 'x', 'x +' denotes an arbitrary sequence of (one or more) x's. Thus, the constituency of the VP construction is represented in Figure 13 as containing a head (lexical) verb daughter on the left followed by one or more additional constituents. In other words, a VP licensed by the PVP construction (we bear in mind that there are other kinds of VPs), contains the lexical verb on the left, followed by at least one sister to its right. To exemplify, in (6)a the lexical verb *hated* has one right sister, in (6)b *shipped* has two right sisters and in (6)c *leased* has three right sisters.

- (6) a. [vp [v hated] [the cheeseburger]]
 b. [vp [v shipped] [the diamonds] [to Geneva]]
 c. [vp [v leased] [her ocelot] [to the studio]
 [for peanuts]]

Two questions remain regarding the sisters to the verb (= non-head daughters): (i) what *kinds* of constituents can appear as sisters to the verb in a particular VP¹² and (ii) in what order may they appear? As we will see shortly, the second question is not answered within the PVP construction itself, but rather depends on certain constructions with which the PVP construction unifies. We will come back to question (ii) presently.

To answer question (i), we turn our attention to the content of the valence value which is shared by the lexical verb and the VP. The first member of this set of AVMs expresses the subject requirement of the verb (and equally the VP). This AVM will unify with the subject constituent in an S-P type sentence exactly as we have already seen exemplified in Figure 12; it is consequently not involved in determining what kinds

¹² For the remainder of this section we will be talking only about VPs which are licensed by the PVP construction. For convenience, we will abbreviate 'VP which is licensed by the PVP construction' to 'VP'.

of non-head daughters can occur in the VP. To the right of the subject AVM we find '#i[]+'. The second part of this notation, '[]+', indicates an arbitrary number (greater than zero) of AVMs (of unspecified composition). The first part of the notation, '#i', we see repeated in the right daughter box. The matched instances of '#i' mean that each of the AVMs in the expansion of the symbol '[]+' in the valence set unifies with the external AVM of one of the non-head daughters, and vice versa. That is, the two Kleene +'s specify, respectively, an arbitrary number of AVMs in the valence value and an arbitrary number of non-head daughters and the matched unification variable symbols '#i' appearing with the two Kleene + expansions indicate that each non-subject valence member unifies with (the external AVM of) a non-head daughter.¹³

For illustration consider the examples in (6). In the highly abbreviated box diagrams of these VP constructs given in Figures 14a, 14b and 14c, the thing to note is that there is in each case a one-one correspondence between non-subject valence elements and non-head daughters (sisters to the lexical head).

¹³ Stated somewhat more carefully: the matched unification variables '#i' indicate that there is a unique, one-one mapping $\{ \langle v_i, d_i \rangle : v_i \text{ is a non-subject valence element, } d_i \text{ is a non-head daughter constituent, and } v_i \text{ unifies with the external AVM of } d_i \}$.

syn	[cat v, max +, srs -]
val	{[rel [gf subj]], #1[rel [gf obj]]}
hated	#1[the cheeseburger]

Figure 14a Compare (6)a

syn	[cat v, max +, srs -]
val	{[rel [gf subj]], #1[rel [gf obj]], #2[rel [gf obl-to]]}
shipped	#1[the diamonds] #2[to Geneva]

Figure 14b Compare (6)b

syn	[cat v, max +, srs -]
val	{[rel [gf subj]], #1[rel [gf obj]], #2[rel [gf obl-to]], #3[rel [obl-for]]}
leased	#1[her ocelot] #2[to the studio] #3[for peanuts]

Figure 14c Compare (6)c

In each of the displays in Figure 14, the left-to-right order of the elements in the valence set corresponds with the left-to-right order of the corresponding constituents in the sentence, but this is entirely fortuitous. Since a valence value is simply a set its elements are by definition unordered. (We can't help ordering them from left to right when we write them on a page, but that doesn't count.) In sentential constructs the S-P construction will make sure that the subject occurs before the VP, but within a VP construct the only aspect of linear order of actual constituents that is determined by the PVP construction is that the verb precedes all its complements. We will have to count on *other* constructions to unify with the PVP construction to produce a linear order for the daughter constituents of the VP. As illustrated by examples (7)a,b, other things being equal, direct objects precede everything else in the verb phrase. Examples (8)a,b show that place adverbials 'normally' precede time adverbials.

- (7) a. *Fido ate yesterday my pizza.
 b. Fido ate my pizza yesterday.
- (8) a. *She swims on Sundays in the lake.
 b. She swims in the lake on Sundays.

There are, however, times when other things are not equal, notably when a constituent is 'heavier' than the one that is 'supposed' to come to its right. 'Rightward shifting' (metaphorically speaking) of so-called heavy constituents is illustrated in (9).

- (9) a. Fido ate yesterday an entire anchovy pizza
 from Beppo's.
 b. He visited last year one of the loveliest
 cities in the world.

We assume that there are a number of constructions – some pairs of which can unify with each other and some pairs of which contradict each other – that, when compatible, may unify with the PVP construction and each other to impose a linear order on the sisters of the verb in a PVP construct. A sentence like (10) would employ, in addition to the PVP construction, the ordering construction that puts the direct object directly after the verb and the ordering construction that puts place adverbials before time adverbials.

- (10) The dog was eating pizza on your bed ten
 minutes ago.

There remain some features of the PVP construction which have not been discussed. They will briefly be reviewed in section 5.6 at the end of this chapter.

5.5 *Jim hated mud* (Licensed)

We have already had occasion to illustrate a certain convenience in representations with unification indices, something we will be taking even more advantage of in this section. Since the semantics of a verb is shared by (transmitted to, projected to) the semantics of the VP and

ultimately the semantics of the sentence; and since the valence of a verb is projected to a valence set in a phrasal VP as well; and since head features are shared by the head daughter and their mother, it is not necessary to write all of the information out in each place: one can merely write it out in one place and indicate the presence of the same information by means of a unification index in the appropriate place or places elsewhere. It is even possible to write different information in two different places, each with the same unification index, with the understanding that all of it is actually present in each place. Sometimes such decisions are made because there is more room in one place than another, sometimes because there might be some explository point in having the information in one part of the diagram rather than another. (And sometimes the decision is arbitrary.)

Refer once more to Figure 12 and the two AVM's preceded by '#3': the information that gives us the identify of the syntactic and relational properties of the subject are presented in the left daughter (the box showing the subject), but the information that the semantics of that entity is associated with the 'squirmmer' is given within the valence description of the verb. The diagrams would technically convey exactly the same information if it had all been put in the same place, or if the locations of the two parts had been reversed.

Figure 15 presents a diagram for the past-tense verb *hated*. The diagram shows its lexical head to be *hate*, and it shows that its valence contains two elements, experiencer and patient, and that the semantic description of the experiencer and patient, respectively, unify with the first and second participants of HATE. (Obviously a description of the HATE frame will identify part1 as the hater, part2 as the hated.) It should be realized that the off-the-shelf entry for the lexical head *hate* will not have the gf values specified, but that the form *hated* is a past-tense form, and hence is of active voice, requiring the experiencer to be the subject and the patient to be

the object. The details of the mechanisms by which these assignments are achieved form the topic of Chapter 8.

hated (Lexical Structure)

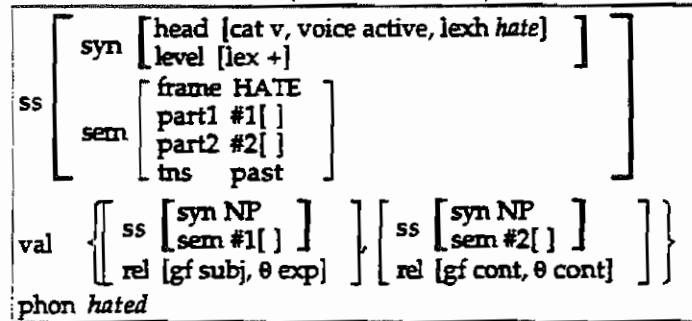


Figure 15

In Figure 16 we assume that the right sister of the PVP construction is occupied by the NP *mud*, and we have unified the information of Figure 15 into the left daughter position of Figure 13.

Unification of Figures 13 and 15: *hated mud* (PVP construct)

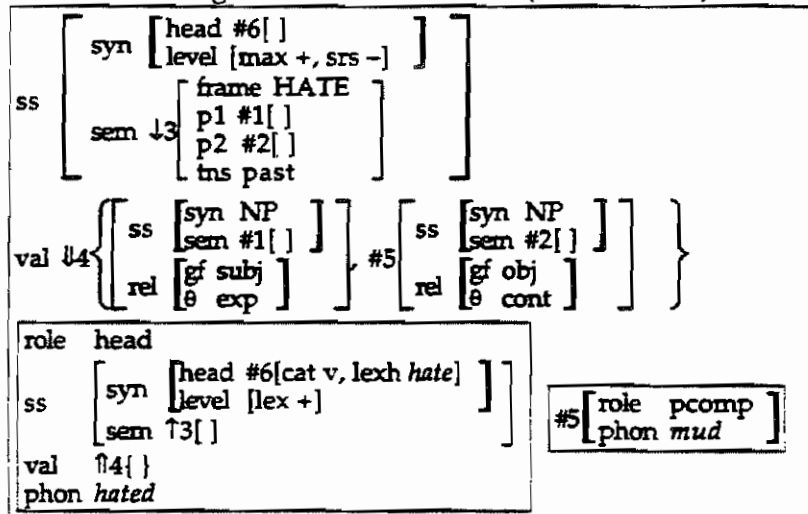


Figure 16

As we see in Figure 16 the semantics and valence values are both shared between the VP and the lexical verb, as licensed by the arrow notations discussed in connection with the PVP construction.

The object/content requirement of the verb and of the VP is satisfied within the PVP by its daughter NP *mud*. The unification of the *mud* constituent with the valence element (requirement) which licences it and is satisfied by it is effected by the unification variable '#i' in the PVP construction of Figure 8, represented in the construct depicted in Figure 16 by '#5'. The linked Kleene + expansions come out in the case of *hate* to license exactly one non-subject complement and thus exactly one sister to the lexical verb. Under the unification #2, the semantics of the direct object becomes the sem value of the part2 element of the HATE frame. Recall that all of the information in the two AVMs prefixed by #5 are to be understood as present in both places.

We will now unify the lexical construction for *Jim* with the subject daughter of the S-P construction and then unify the PVP construct of Figure 16 with the VP daughter of the resulting, incomplete S-P, structure.

Unifying the structure of Figure 8 (the *Jim* construct) with the left daughter of the S-P construction (Figure 10), we get the structure of Figure 17.

Unification of Figures 8 and 10: Sentential Structure with *Jim*
as Subject

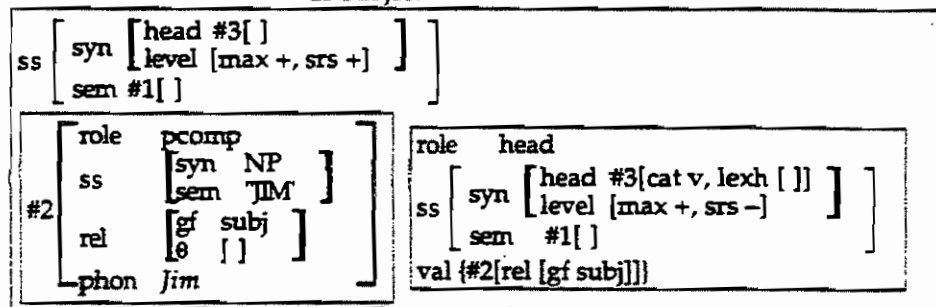


Figure 17

Figure 17 give us the skeleton of an S-P sentence which specifies only that the subject is the word *Jim*. (In the subject constituent, *Jim*, the grammatical function *subj* has been filled in by the S-P construction, but nothing has filled in the theta value of the subject. That won't happen until we find out what the verb of the sentence will require.)

Now by unifying the PVP construct *hated mud* with the right daughter of the structure in Figure 17, we get the desired sentence, *Jim hated mud*. And you see how easy it all is.

Unification of Figures 16 and 17: The Sentence (Sentential Construct) *Jim hated mud*

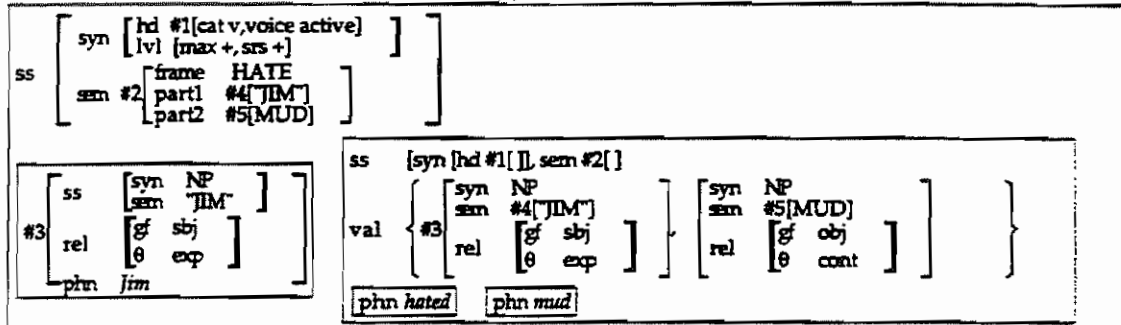


Figure 18

The structures of the daughters (*hated*, *mud*) of the PVP construct are not shown in Figure 18, but the reader can recover this information from Figure 16, as well as the details of how this information is unified with parts of the external structure of the VP. In Figure 18 we see how the information contained in the subject constituent, *Jim*, is unified by the S-P construction (index #2 of Figure 10) with the appropriate element of the VP valence set. It is then integrated into the semantics of the VP exactly as the semantics of the object, *mud*, was. The S-P construction, as we have seen, unifies the semantics of the VP with the external semantics of the sentence.

In Figure 18, all attributes have received fully specified feature structures as values. The PVP construction has (via #i of Figure 13) unified the object constituent (*mud*) with the object valence element, furnishing the latter with values for its sem and syn attributes. The S-P construction has analogously (via #2 of Figure 10) unified the subject constituent with the subject valence element and so provided values for the subject valence element's sem and syn attributes. The sem values of the constituents *Jim* and *mud* have both been passed along in the ways we have described, so that no sem attribute is left

without a fully specified value. In the construct of Figure 18, we 'can find everything we need'. Example (2)b, on the other hand, does not have this property because the need for a specified value of both the *syn* and *sem* attributes of the object/content valence requirement go unrequited, causing the *part2* attribute in the semantics to also suffer absence of a specified value.

Also in Figure 18, every semantic value has become part of the AVM representing the semantic value of the sentence. This is what we meant by 'semantic integration'. We have 'found a use for everything we have been offered' in this sentence. Example (2)c would not have this property, because the *#i* variable in the VP construction requires each non-subject valence requirement to unify with a distinct constituent and the candidate constituents *mud* and *the cheese* compete for the single verb-phrase requirement specified by the verb *hate*. A similar point could be made for example (3)b, where we find the intransitive verb *squirm* apparently provided with a direct object, even though its valence does not welcome one.

5.6 Further properties of the PVP construction

There are several features of the PVP construction given in Figure 13 which are not relevant to the problem of direct instantiation but which are related to the points that we have made in earlier chapters. Notice that the final element in the valence description in the VP we find the notation '[loc -]*'. Since all of the sisters of the lexical verb have the unification index variable '*#i*' and this one does not, these members of the VP's valence are obviously not a part of constructs of the PVP construction. The feature '*loc +*' means that a constituent so marked is necessarily a constituent of a PVP construct, and '*loc -*' means that it is not. There are two ways in which a verb's valence can contain members that are not realized in a phrase headed by the verb, and they are what we referred to earlier as null instantiation (an item is not realized at all, but is rather simply given an interpretation), and distant

instantiation (where an element is realized outside of the scope of either the S-P or the PVP constructions).

Verbal and Clausal Complements

6.0 Introduction

Our aim in this short chapter is to introduce some of the terms and notations that figure in the description of verb-headed ('cat v', 'max +') constituents that serve as complements, that is, as constituents satisfying the comp requirements of predicators (and which are therefore notated 'gf comp'). Such complements are of two types, verb-phrases, that is, verbal projections which lack subjects ('srs -'), and clauses, that is, verbal projections which include subjects ('srs +'). We will be discussing then (i) constituents carrying the notations 'cat v', 'max +', 'srs -' and 'gf comp' and (ii) constituents carrying the notations 'cat v', 'max +', 'srs +' and 'gf comp'.

Verbal and clausal complements are among those phenomena that cause human languages to be *recursive*. Since a verb can have a verbal or clausal complement, and a verb inside that complement can itself have a verbal or clausal complement, and a verb inside that complement can also have a verbal or clausal complement, and so on indefinitely, sentences can be unlimitedly long and complex. Consider a sentence like "I expect you to remember that Pat tried to get Kim to persuade Lou to believe that you intended to ask Chris to marry you." The process of sentence-construction that produced that sentence could have gone on. It is only because we allowed the last verb in the sentence to take a non-modified NP complement that we were able to stop. The verb *expect* in that sentence has a marked infinitive VP as one of its complements; the verb in that infinitive VP is *remember*, which takes a finite *that*-clause as its complement. The finite verb in

that clause is *tried*, which takes an infinitival VP complement headed by a causative use of *get*. A complement of *get* is *to persuade...*; a complement of *persuade* is *to believe...*; the complement of *believe* is *that you intended...*; the complement of *intended* is *to ask...*; and a complement of *ask* is *to marry you*.

6.1 Survey of Complement Types

For most of the valence structures that we have examined so far, we have dealt mainly with nominal and prepositional complements, such as those bracketed in (1-2):

- (1) [_{NP}Joe] gave [_{NP}the letter] [_{PP}to me]
- (2) [_{NP}Sheila] introduced [_{NP}her new friend] [_{PP}to her father]

We will later raise the question of whether or not the minimal valence descriptions of these verbs need to specify specific grammatical categories, such as the NP and PP of these examples. It is likely that the initial or minimal valence descriptions for most valence-bearing lexical items will specify only semantic elements and that the grammatical forms of the expressions realizing these elements will be determined by independent general principles. There are many cases in which a valence element clearly needs to be characterized semantically, since there is no single grammatical form in which it can be realized. For example, we will want to say that the third complement of *put*, needs to be described in semantic terms, as an expression of place or location. Expressions meeting such conditions can be prepositional phrases, as in (3); adverbs or adverb phrases, as in (4), or clauses headed by the locative WH-word *where*, as in (5).

- (3) He put it [in his pocket]
- (4) Put it [right here]
- (5) We put it [where it belonged]

In this chapter we will limit ourselves to the grammatical form of verb-headed complements. In (6) we find three types

of verbal complements, and in (7) we have three types of clausal complements.

- (6) a We tried [to get the door open]
 b I don't really enjoy [talking to Harry]
 c The devil made me [do it]
- (7) a He believes [that the world is flat]
 b We were quite eager [for you to succeed]
 c I hate [people saying things like that]

One of the most important ways in which the verb-headed complements differ from each other has to do with what we will call the Inflected Form of the Verb, for which we introduce the attribute name *vif* (verbal inflected form). The values we associate with this attribute will be *bse*, *ing*, *en*, and *fin*, exemplified as follows:

<i>bse</i>	be, go, walk, have, see, tell	base, bare infinitive, citation form
<i>ing</i>	being, going, walking, having, etc.	ing-form, present participle, gerund
<i>en</i>	been, gone, walked, had, seen, told	perfect participle, passive participle
<i>fin</i>	is, was, were, goes, went, had, etc.	finite form, tensed form

The verb form here called [*vif bse*] is found in imperative sentences (8a), after the "infinitive marker" *to* (8b), in certain kinds of full-clause complements, e.g., after *insist* in some dialects (8c), and in certain verbal complements (8d).

- (8) a *Be* nice to me! *Eat* your spinach!
 b I tried to *understand*. I want to go back some day.
 c She insists that I *be* here on time.
 d Didn't you see him *leave*?

Since *be* is the only verb in English for which the base form is distinct from all other forms, the occurrence of the morphological form "be" in a particular constructional slot is the best test of whether the feature [vif bse] is called for in that slot.

The feature [vif ing] characterizes the most regular element of English verb morphology: the form made by suffixing *-ing* to the verb base. Verbal expressions headed by a [vif ing] verb occur as defining the progressive aspect after *be*, as in (9)a; after certain simple verbs as their complements, as in (9)b; as the third complement of certain transitive verbs, as in (9)c; in some cases as objects of prepositions, as in (9)d; and as subject-controlled subordinate VP's as in (9)e.

- (9) a The kids were *screaming* their heads off
 b Let's start *running* faster
 c The teacher keeps us *jumping*
 d We must prevent them from *leaving* through that door
 e I always did my homework *riding* the bus to school

The form we label [vif en], often called the past participial form, occurs after the perfect auxiliary *have*, as in (10a), and as the head of a passive verb phrase, as in (10b).

- (10) a I have *known* Pat for many years
 b Kim is *known* by everybody in town

Following a generativist tradition, we use *en* as the label for the value, suggested by the (relatively rare) cases in which the category in question is formally distinct from the simple past-tense form: *seen* vs. *saw*, *been* vs. *was/were*, *known* vs. *knew*, and, in some dialects, *shown* vs. *showed*, *proven* vs. *proved*, *gotten* vs. *got*. Since for the majority of English verbs there is

no distinction between the simple past-tense form and the [vif en] form, the occurrence of one of these "en" forms is evidence that such a form is welcomed or required in the constructional slot in question.

The feature [vif fin] covers all finite, or tensed, forms of verbs. As such, of course, it cannot uniquely determine verbal form.

First, every finite verb includes a specification of tense: the values of *tns* (the tense attribute) are, for English, *pres* (present) and *past*. Thus, we would describe *saw* as [vif fin, tns past], *is* as [vif fin, tns pres].

Second, it happens that under some conditions English tensed verbs must agree in person and number with their subject. This is true of *be* in both tenses, and of all verbs (except for modal auxiliaries) in the present tense. The agreement features do not figure in the syntax of the complements as such, but involve only the individual lexical forms. The details will be discussed in a later chapter. Suffice it to say now that English subject-verb agreement is difficult to state in simple unificational terms, unless we add disjunction to feature descriptions. The difficulty comes from the fact that we need an "elsewhere" condition. For the present tense form of *be*, we can describe *am* by saying that it is [vif fin, tns pres] and that the subject specification in its valence structure must include the features [pers 1, num sg]; and we would describe *is* as differing from *am* in requiring the features [pers 3, num sg]. But then *are* covers all of the other possibilities: [pers 2, num sg] or [pers [], num pl]. For past-tense *be* we need to note that *was* is either [pers 1, num sg] or [pers 3, num sg], and that *were* covers everything else. For the present-tense form of an ordinary verb, e.g., *sees*, we need a subject that is [pers 3, num sg], but then *see* covers everything else.

What we have seen so far has had to do with the basic verb type in a verb-headed complement of a predicate. We will now consider the full range of distinctions that we need.

First, we offer the full set in Table 1, including suggested names for the verb-headed complements :

a	We	should	take it home	bare verb VP
b	They	made me	take it home	bare verb VP
c	They	let	me take it home	bare verb clause
d	She	keeps	talking loud	gerundial VP
e	I	heard you	talking loud	gerundial VP
f	I	hate	you talking so loud	gerundial clause
g	He	dislikes	John's talking so loud	poss-gerund clause
h	We	want	to vote for her	to VP
i	They	expected me	to vote for her	to VP
j	She	wants	me to vote for her	to clause
k	I	would hate it	for you to vote for her	for/to clause
l	I	think	he's smart	finite clause
m	I	think	that he's smart	that-finite clause
n	She	persuaded me	that he's smart	that-finite clause
o ¹	He	insists	I be ready on time	bare-verb clause
p	He	insists	that I be ready on time	that-bare-verb clause
q	I	wish	she were here now	subjunctive clause
r	I	wish	that she were here now	that-subjunctive clause
s	You	have	misunderstood me	perfect complement
t	I	was	misunderstood	passive VP
u	I	had	the lock fixed	passive clausal comp
v	I	asked him	what to do	interrogative VP
w	I	told him	what he should do	interrogative clause
x	I	wonder	whether I should leave	interrogative clause

Table 1

Some of the rows in Table 1 showing repetitions in the right-most column display a difference between cases in which the verb has or does not have an intervening NP direct object. (Compare a & b, d & e, h & i, m & n.) In some cases where there are repetitions in the verb column we could say that the

¹ For the purposes of this chapter we will postpone our treatment of rows o, p, q & r.

"tagging" or "marking" of a complement is "optional": for example, the clause that follows *think* may, but doesn't have to, begin with the marker *that*.

6.2. Distinguishing between V+NP+VP and V+Clause.

In some cases a NP is shown in the same column as the verb, as its direct object, and in other cases it is presented as part of the complement, as its subject. The distinction intended in these cases is that where the NP is interpreted as the true direct object of the verb, that verb has a corresponding "passive" form; where this is not so, the NP is taken as the subject of the following clause. Compare e & f. We interpret the post-verbal NP in e as a direct object, since both sentences in (11) are grammatical; but we interpret the post-verbal NP in f as the subject of the complement, since while (12)a is grammatical, (12)b is not.

- (11) a Somebody heard you talking to Millie
 b You were heard talking to Millie

- (12) a I hate you talking so loud
 b *You are hated talking so loud

Similarly unproblematic is the distinction between i & j: while both sentences in (13) are grammatical, the attempted passive version of (14) is not.

- (13) a Everybody expected me to vote for Kim
 b I was expected (by everybody) to vote for Kim

- (14) a Everybody wanted me to vote for Kim
 b *I was wanted (by everybody) to vote for Kim

If we were to make the same argument for the contrast proposed for b & c, however, it wouldn't quite work.

- (15) a They made me take it home
 b *I was made take it home

- (16) a They let me take it home

- b *I was let take it home
- (17) a *They made me to take it home
b I was made to take it home

Neither (15)b nor (16)b is grammatical, suggesting that neither *make* nor *let* is "passivizable". But now look at (17)b, which is grammatical, comparing it to the ungrammatical (17)a, a sentence which looks like something that ought to be the corresponding active sentence. In our treatment we will add to our description of *make* the requirement that it has a bare-verb VP complement when it is active, but a *to*-marked VP when it is passive. Other verbs with similar behavior are given in (18-19).

- (18) a We saw them leave early
b They were seen to leave early
- (19) a Somebody heard you speak negatively about that
b You were heard to speak negatively about that

Let us quickly say that with this descriptive and notational scheme we are trying to provide tools for analysis; we are not so concerned, at the moment, with arguing for the correctness of specific explanations of the phenomena. Individual analyses may be questionable, there may be dialect differences with respect to some of the phenomena in question (e.g., with respect to *want*), and there are certain fixed expressions (like *he was let go*) that do not jibe with what we said about *let*. Such details will not concern us just now.

6.3. Complementizers

Table 1 shows us that in describing the complements of particular verbs, we need to be able to specify various constructions made up of particular "markers" or "complementizers" tagged onto particular kinds of constituents. Specifically, we need to say something about expressions tagged with the function-words *that*, *to*, and *for*.

We interpret all three of the structures to which these words are prefixed as "transparent", in the sense that the only difference – with respect to external syntactic features – between the structure containing the word and the structure to which it is attached is the presence or absence of the tag.

What we need to say about *that* is that it takes as its right sister a structure of the type 'cat v', 'max +', 'srs +', 'vif fin', 'marker null'. In somewhat brute-force manner, we distinguish mother from daughter with the features [marker that] and [marker null]. (In the diagrams we abbreviate the attribute "marker" as "mkr". "Marker", however, will be used as the name of the category. (Both can be seen in Figure 1.)

The construction we need looks like this:

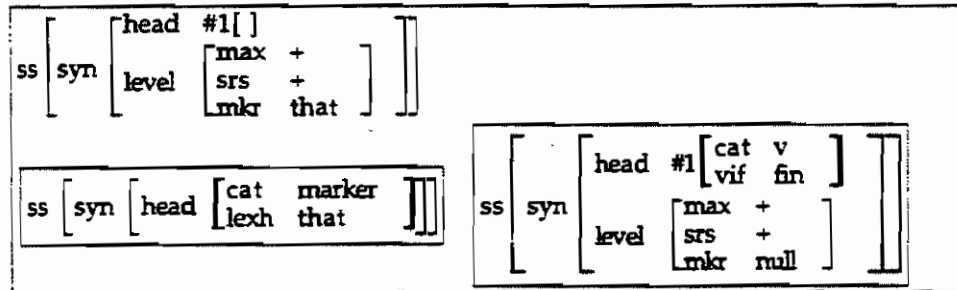


Figure 1

In the case of *to*, we know that it is added to a constituent notated 'cat v', 'max +', 'srs -', 'vif bse'. The structure resulting is as follows:

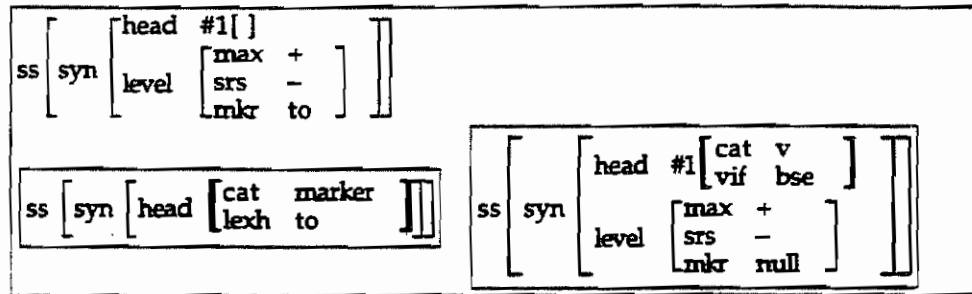


Figure 2

And in the case of *for*, we claim that it is added to a constituent notated 'cat v', 'max +', 'srs +', 'to +'. This gives us the constituent structure [*for* [*John to fix the lock*]] rather than [[*for John*] [*to fix the lock*]]. The argument for this position is mainly the fact that the constituent to which the *for* is attached can itself be a conjunct in a coordination construction (discussed in a later chapter).

(20) The best plan would be [*for* [*me to go*] and [*you to stay*]]

The construction needed is as follows:

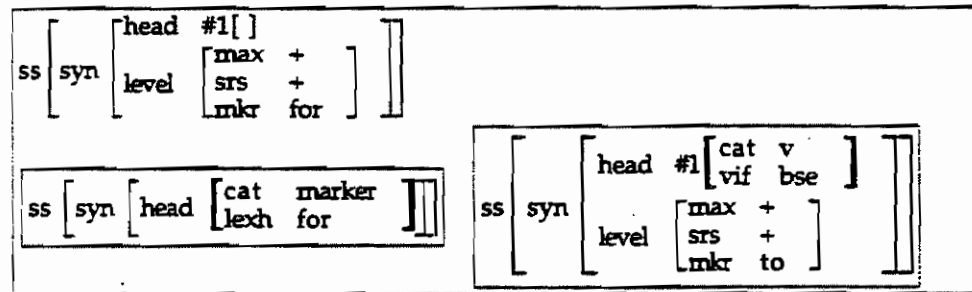


Figure 3

It is clear from what has preceded that the Subject-Predicate Construction can be restated (or simplified) so as to allow as its right sister any constituent notated 'cat v', 'max +',

'srs -', not just a finite VP. That is, we need to have 'srs +' constituents bearing the following notations:

Context	Example	Description
I think	Joe got married	'cat v', 'max +', 'srs +', 'vif fin', 'tns past'
We had	the lock fixed	'cat v', 'max +', 'srs +', 'vif en', 'voice passive'
I wanted	you to go with me	'cat v', 'max +', 'srs +', 'vif bse', 'marker to'
He let	the patient die	'cat v', 'max +', 'srs +', 'vif bse', 'marker null'
I hate	you doing that	'cat v', 'max +', 'srs +', 'vif ing'

Table 2

6.4. Some Valence Descriptions

We pointed out earlier that the minimal valence descriptions of predicators do not necessarily specify the grammatical form of all of their complements, but since the elements of valence sets must unify with their grammatical realizations, fully described lexical verb constructs will in the end contain characterizations of such grammatical realizations. We offer a partial survey of these here. In the descriptions which follow in section 6.4.2, we offer only the rel and syn information.

6.4.1 A Notational Aside: Abbreviating Paths

Suppose that we wanted to say about a particular valence element only that (i) it was nominal ('cat n'), (ii) it was maximal ('max +') and (iii) it was the subject ('gf subj'). In our current notation, this is expressed as shown in Figure 4.



Figure 4

In Figure 4, all the information that is not highlighted in boldface is predictable from the highlighted information. For example, we know that '[cat n]' can only appear in the value of a 'head' attribute, that '[head [cat n]]' can only appear in

the value of a 'syn' attribute, and that '[syn [head [cat n]]]' can only appear in the value of a 'synsem' attribute. It would be nice to have an abbreviatory convention that would permit us to omit the predictable information in CG diagrams, like that in Figure 4. Such a convention is illustrated in Figure 5, which according to the convention we are about to adopt contains exactly the same information as Figure 4.

$$\left[\begin{array}{l} | \text{cat} \quad n \\ | \text{max} \quad + \\ | \text{gf} \quad \text{subj} \end{array} \right]$$

Figure 5

The abbreviatory convention illustrated in Figure 5, and hereby adopted, is the following.

- (21) **Path Abbreviation Convention:** A vertical bar '|' may be used to replace any portion of a path that is completely predictable from the portion shown.

In Figure 5, the abbreviated path includes every attribute but the final one. This need not always be the case, as illustrated in Figure 6.

$$\left[\begin{array}{l} \text{synsem} \left[\begin{array}{l} | \text{cat} \quad v \\ | \text{max} \quad + \end{array} \right] \\ \text{rel} \quad \left[\text{gf subj} \right] \end{array} \right]$$

Figure 6

Figure 6 contains the same information as Figures 5 and 4, in slightly less abbreviated form than in Figure 5. We will sometimes wish to abbreviate in the less extreme fashion illustrated in Figure 6.

6.3.2 Some Sample Valence Descriptions

We will find convention (21) useful in laying out the forms of the valence sets for some of the most common kinds of complementation structures.

For simple intransitive verbs, like *sleep*, *vanish*, *wander*, *die*, *collapse*, etc., we need only specify that the valence set includes a NP subject:

$$\left\{ \left[\begin{array}{ll} | \text{cat} & \text{n} \\ | \text{max} & + \\ | \text{gf} & \text{subj} \end{array} \right] \right\}$$

Valence Set for a Simple Intransitive Verb

For ordinary transitive verbs, like *hit*, *kick*, *love*, *see*, *know*, *possess*, *assist*, etc., we need to include a subject and a direct object.

$$\left\{ \left[\begin{array}{ll} | \text{cat} & \text{n} \\ | \text{max} & + \\ | \text{gf} & \text{subj} \end{array} \right], \left[\begin{array}{ll} | \text{cat} & \text{n} \\ | \text{max} & + \\ | \text{gf} & \text{obj} \end{array} \right] \right\}$$

Valence Set for a Simple Transitive Verb

For verbs that take that-clauses, like *think*, *hope*, *believe*, *know*, *suppose*, *suggest*, etc., the valence set needs to include, in addition to the subject complement, a *that*-clause complement.

$$\left\{ \left[\begin{array}{ll} | \text{cat} & \text{n} \\ | \text{max} & + \\ | \text{gf} & \text{subj} \end{array} \right], \left[\begin{array}{ll} | \text{cat} & \text{v} \\ | \text{max} & + \\ | \text{vif} & \text{fin} \\ | \text{srs} & + \\ | \text{mkr} & \text{that} \\ | \text{gf} & \text{comp} \end{array} \right] \right\}$$

Valence Set for a That-Clause-Complement Verb

For verbs that take marked infinitive phrases, like *try*, *want*, *hope*, *expect*, *fail*, *manage*, *like*, etc., the valence set must include a marked infinitive VP complement.

$$\left\{ \left[\begin{array}{ll} | \text{cat} & \text{n} \\ | \text{max} & + \\ | \text{gf} & \text{subj} \end{array} \right], \left[\begin{array}{ll} | \text{cat} & \text{v} \\ | \text{max} & + \\ | \text{vif} & \text{bse} \\ | \text{srs} & - \\ | \text{mkr} & \text{to} \\ | \text{gf} & \text{comp} \end{array} \right] \right\}$$

Valence Set for a To-VP-Complement Verb

For verbs that take participial complements, such as aspectual verbs like *keep*, *start*, *stop*, *try*, *continue*, *cease*, etc.:

$$\left\{ \left[\begin{array}{ll} | \text{cat} & \text{n} \\ | \text{max} & + \\ | \text{gf} & \text{subj} \end{array} \right], \left[\begin{array}{ll} | \text{cat} & \text{v} \\ | \text{max} & + \\ | \text{vif} & \text{ing} \\ | \text{srs} & - \\ | \text{mkr} & \text{null} \\ | \text{gf} & \text{comp} \end{array} \right] \right\}$$

Valence Set for a Participial-Complement Verb

Some transitive verbs take *that*-clauses as their third complement. examples: *persuade*, *tell*, *show*, *convince*, etc.

$$\left\{ \left[\begin{array}{ll} | \text{cat} & \text{v} \\ | \text{max} & + \\ | \text{gf} & \text{subj} \end{array} \right], \left[\begin{array}{ll} | \text{cat} & \text{n} \\ | \text{max} & + \\ | \text{gf} & \text{obj} \end{array} \right], \left[\begin{array}{ll} | \text{cat} & \text{v} \\ | \text{max} & + \\ | \text{vif} & \text{fin} \\ | \text{srs} & + \\ | \text{mkr} & \text{that} \\ | \text{gf} & \text{comp} \end{array} \right] \right\}$$

Valence Set for a Transitive That-Clause Complement Verb

Some transitive verbs take infinitive phrases as third complements. Examples: *persuade*, *convince*, *tell*, as above, but also *help*, *get*, etc.

$$\left\{ \left[\begin{array}{ll} | \text{cat} & \text{v} \\ | \text{max} & + \\ | \text{gf} & \text{subj} \end{array} \right], \left[\begin{array}{ll} | \text{cat} & \text{n} \\ | \text{max} & + \\ | \text{gf} & \text{obj} \end{array} \right], \left[\begin{array}{ll} | \text{cat} & \text{v} \\ | \text{max} & + \\ | \text{vif} & \text{bse} \\ | \text{srs} & - \\ | \text{mkr} & \text{to} \\ | \text{gf} & \text{comp} \end{array} \right] \right\}$$

Valence Set for a Transitive Infinitive-Phrase-Complement Verb

Some transitive verbs take participial third complements, such as *keep*, *get*, etc.

$$\left\{ \left[\begin{array}{ll} | \text{cat} & \text{n} \\ | \text{max} & + \\ | \text{gf} & \text{subj} \end{array} \right], \left[\begin{array}{ll} | \text{cat} & \text{n} \\ | \text{max} & + \\ | \text{gf} & \text{obj} \end{array} \right], \left[\begin{array}{ll} | \text{cat} & \text{v} \\ | \text{max} & + \\ | \text{vif} & \text{ing} \\ | \text{srs} & - \\ | \text{mkr} & \text{null} \\ | \text{gf} & \text{comp} \end{array} \right] \right\}$$

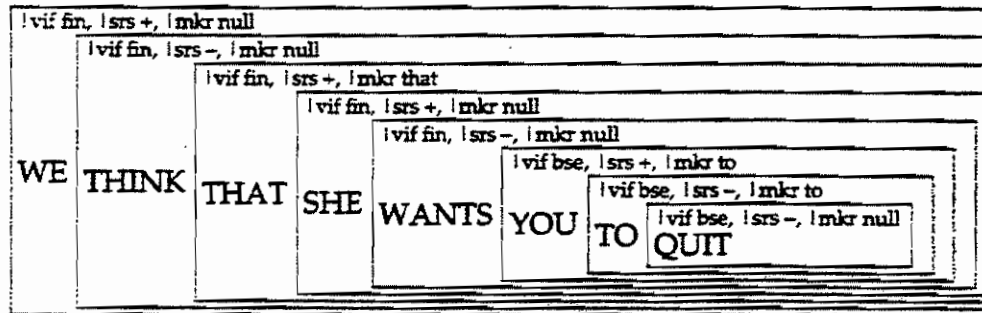
Valence Set for Transitive Participial-Complement Verbs

(In a later chapter we will provide more abbreviated and streamlined representations of the various valence types.)

6.3 An Exercise

The following diagram takes the sentence WE THINK THAT SHE WANTS YOU TO QUIT and classifies each 'cat v', 'max +' constituent in it in respect to the three attributes vif, srs and mkr. It represents the following facts:

- "We think that she wants you to quit" is an unmarked finite clause;
- "think that she wants you to quit" is an unmarked finite verb phrase;
- "that she wants you to quit" is a that-marked finite clause;
- "she wants you to quit" is an unmarked finite clause;
- "wants you to quit" is an unmarked finite verb phrase;
- "you to quit" is a to-marked base-verb clause;
- "to quit" is a to-marked verb phrase;
- "quit" is an unmarked infinitive VP.



Find or invent three fairly interesting sentences with multiple instances of [|cat v, |max +] constituents and label them in ways suggested by the diagram you have just seen. You are not likely to find, and you are not encouraged to invent, a completely right-branching sentence like the one just displayed.

Null Instantiation and Coinstantiation

7.1 Varieties of Instantiation Revisited

We saw at the end of Chapter 4 (Valence) that the complements of a predicator or valence-bearing word can be satisfied in a number of ways.

Sisters of Lexical Verbs. In constructs that are instances of the VP construction, we find the non-subject arguments of a verb realized, inside a VP phrase, as structural sisters to the lexical verb. Examples are given in (1).

- (1) a. gave [raisins] [to the children]
 b. named [the baby] [Harry]
 c. put [the flowers] [in the vase]

Sisters of Other Lexical Heads. In the case of predicators which are not verbs (these will be discussed in a later chapter) we will see complements of adjectives realized as sisters of the lexical adjective (*afraid [of controversy]*), complements of prepositions as sisters of the preposition (*into [its mouth]*), and complements of nouns as sisters of the lexical noun (*faith [in a free market]*).

Subject. In the Subject/Predicate construction we saw that one privileged element of a verbal valence (the one to which [rel [gf subject]] is assigned) appears as the left sister of a constituent with the features 'cat v, max +, srs -', resulting in a structure with the features 'cat v, max +, srs +'. Examples of such subject instantiation are found in the bracketed constituents in the examples gathered in (2). In (2)a-c the bracketed elements are the subjects of finite sentences; in (2)d-e, they are the subjects of non-finite clausal complements, the contexts being of the type discussed in Chapter 6.

- (2) a. [The monster] gave raisins to the children
 b. [Harriet] named the baby Harry
 c. [We] put the flowers in the vase
 d. (I wanted) [Pat] to leave
 e. (We shouldn't let) [those kids] get in
 f. (I'm unhappy about) [Kim] being here

Left Isolation. In various constructions in English, a constituent realizing a valence element is located to the left of a VP or clause which contains, somewhere within it, the predicate whose valence requirement that constituent satisfies. These we refer to as Left Isolation constructions. In examples (3-6) brackets surround each constituent of the Left Isolation construction, and comments are added on the role of the LI element and the nature of its link to the predicate whose valence it satisfies.

- (3) [[These] [we refer to as Left Isolation constructions]]
 (Topic: *These* is simultaneously the "topic" of the sentence and the object of *to* in the phrase *refer to*)
- (4) [[Where] [do you think we ought to put it]]?
 (Interrogative word in a question: *Where* is simultaneously the marker of an interrogative clause and a directional complement of *put*)
- (5) I wonder [[what] [they expected me to say]]
 (Interrogative word in a subordinate clause: *what* is simultaneously the marker of an interrogative clause and the object of the verb *say*)
- (6) The box [[which] [they sent the present in]]
 (Relative Pronoun: *which* is simultaneously the marker of a relative clause and the object of the preposition *in*)

"Double" Instantiation. In some cases a valence element is, as it were, instantiated twice, one such instantiation serving purely a formal or 'place-holding' function, and one, clausal or infinitival, expressing the intended meaning. We can refer to these as instances of Double Instantiation. The most typical case is the class of constructions that go by the name of "IT"-

Extraposition. The place-holding member of such pairs of instantiations is, in English, the word *it*, a word which has the same form as the neuter singular pronoun. Examples of double instantiation are seen in the following sentences; the place-holding element is in bold print, the semantic element is in brackets:

- (7) **It** is likely [that she won't marry me]
- (8) I find **it** impossible [to deal with you]
- (9) Could you see to **it** [that the kids are dressed and ready to go by noon]?
- (10) I take **it** for granted [that this service is free]

In sections 4.5.3 and 4.5.6 of Chapter 4 we introduced the notions of Null Instantiation and Coinstantiation. The remainder of this chapter is concerned with a fuller discussion of these phenomena.

7.2 Null Instantiation

In each of the instantiation types surveyed and illustrated in the preceding section, it was possible to find, for a given valence requirement, a constituent of the sentence which directly satisfied that requirement. In the current chapter we examine two types of situations in which such a simple relationship between the valence needs of a predicator and actual segments of the surrounding sentence does not hold. In the first, a particular complement is simply absent, although its semantic role is clearly seen to be a part of the interpretation of the sentence. This we refer to as Null Instantiation. The second is the situation in which a valence requirement of one predicator is linked to a specific valence requirement in another predicator. This we refer to as Coinstantiation; it is treated in section 7.3 below.

In this section¹ we distinguish and discuss three varieties of Null Instantiation: Indefinite Null Instantiation (7.2.1), Definite Null Instantiation (7.2.2), and Free Null Instantiation (7.2.3). In some cases we mention two kinds of contexts for the licensed omission of particular complements: those that are determined by particular grammatical constructions, and those that are determined by particular lexical items.

7.2.1 Indefinite Null Instantiation

In Indefinite Null Instantiation (INI), the speaker omits mention of one of the valence elements without having in mind a particular participant which the hearer is assumed to be able to identify.

Lexically Licensed INI. Complements with INI omissibility that must be described as part of the description of individual lexical items are found in a fairly small class of verbs, including *eat*, *drink*, *sing*, *cook*, *sew* and *bake*.

There appear to be two semantic types of INI omission in the case of (otherwise) simple transitive verbs: one in which the missing element is considered to be of a particular type (limited to a subtype of the possible types of objects), and one of considerable generality. With respect to the verbs *eat* and *drink*, the distinction can be seen by comparing the uses of *drink* and *eat* in (11)a-b with those in (12).

- (11) a. Uncle Harry ought to stop drinking
 b. I haven't eaten yet
 (12) With my tongue so swollen I can't eat or
 drink

The unexpressed patient of *drink* in (11)a, while not assumed to be identifiable by the hearer, is nonetheless understood to be restricted to alcohol; the unexpressed patient

¹ Much of this section is taken more or less directly from Fillmore, Charles J., 1986, Pragmatically Controlled Zero Anaphora, *BLS* 12, 96-107.

of *eat* in (11)b is understood to be a meal. But no specific sort of food or drink is assumed in interpreting (12).

The indefinite null object of a transitive verb is **MARKEDLY INDEFINITE**, by which we mean that whatever it is, it is not something that is present in the context shared by the speaker and the hearer. This point can be illustrated by recognizing the oddity of the following conversation between speaker "A" and speaker "B":²

- (13) A: "What happened to my sandwich?"
B: "The dog just ate"

The context for a cooperative interpretation of B's response – assuming that it was A's sandwich that the dog just ate – couldn't possibly be unclear; but the sentence with *eat* lacking an object simply cannot be understood as meaning 'The dog just ate it'. If we actually overheard a conversation like (13), we would understand speaker B as engaged in some kind of verbal play.

7.2.2 Definite Null Instantiation

Some instances of DNI are associated with particular grammatical constructions; others with particular lexical items.

Constructionally Licensed DNI. Some of the constructions which license argument omission were discussed at the end of chapter 4. As was pointed out there, the Imperative construction stipulates a specific pragmatic interpretation of its subject, i.e., as the addressee of the sentence. We might add to that a different kind of DNI, related to the interpretation of one kind of relative clause in English. One of the possible forms of the English relative clause does not make use of a relative pronoun, a constituent which could be seen as satisfying a valence requirement in its clause and as obligatorily unifying with the noun modified by the relative clause. The two types of relative clauses are seen

² This point is due to Adrian Akmajian, in conversation.

in (14). With respect to example (14)b we think of the missing object of the locative preposition *in* as an instance of DNI, suggested by the paraphrase 'a room such that we can store your furniture in it'.

- (14) a. a room which we can store your furniture in
 b. a room we can store your furniture in

Lexically Licensed DNI. Some lexical predicates license the omission of specific valence elements only when the speaker assumes that the hearer already knows what entity in the discourse context fits the frame element corresponding to the omitted valence element. Very often DNI is possible with valence elements that are otherwise instantiated by oblique phrases in the sentence. In a sentence like (15) we assume that the intended destination of the parental travel is already known to the addressee, and in a sentence like (16) it can be assumed that the contest in which the speaker participated is known to the addressee. Sentences that are instances of DNI omission cannot be the opening contribution to a conversation in which the conversants know nothing about each other. There has to be something "in the air" which is shared by both conversants. Such sentences require that the speaker be able to take for granted that the hearer knows the identity of certain things that the speaker has in mind. An interesting fact about English, as opposed to other languages which freely omit constituents that are contextually obvious, is that in English such omissions are licensed by specific lexical items.

- (15) Our parents have arrived
 (16) I won

There are numerous semantic regularities connected with the DNI phenomenon, so much so that one might expect that the classes of predicates permitting it could be characterized semantically. One initial generalization is a negative one: valence elements with the thematic role of patient or theme do not appear to be omissible under DNI conditions. In other

words, the large class of verbs to which *break*, *bend*, *create*, *destroy*, *move* and *lift* belong do not have omissible patient/themes under DNI interpretations.

Verbs of induced action that take personal direct objects can have their infinitival complement omitted under DNI conditions, as shown in (17). (Without the contextual support that goes with a DNI context, examples (17)a-c call for a *to*-marked infinitive complement (e.g., *to go home*); examples (17)d-e call for a bare infinitive complement (e.g., *go home*).³

- (17) a. I asked him
 b. I ordered them
 c. They dared me
 d. She made me
 e. Why didn't they let me?

The semantic properties common to these verbs include more than just causation: it appears that in each case a *social* act is necessarily involved. Verbs like *cause* and *get*, requiring a *to*-marked infinitive, do not have this property; nor does *make*, which takes an unmarked infinitive complement. (In the examples in (18), the asterisk in front of the parenthesized constituent has the meaning that a constituent of that type cannot be omitted under a DNI interpretation.)

- (18) a. You caused me *(to miss my train)
 b. They finally got me *(to sign the contract)
 c. She had him *(see a psychiatrist)

It would appear that most instances of aspectual complementation allow DNI omissions. That is, the event or action complement can go unmentioned, after such verbs as *start*, *stop*, *continue*, *finish*, *resume* and *begin*, in a setting in

³ Something should be said about the fact that for these cases of DNI, the human recipient of the social act in question is best expressed as a definite pronoun. Some of these sentences do not sound appropriate if the direct object of the inducement verb is a full lexical NP.

which an understanding of the event in question is conversationally given. Examples in (19):

- (19) a. When do we start?
 b. What time did they finish?
 c. It's time to stop.

Although there seem to be many semantic regularities and sub-regularities in the meanings of verbs with DNI omissibility features, we find numerous pairs of words which are near-synonyms but which differ from each other in that some allow DNI omission and some don't. Examples:

	Allowing DNI omission	Not allowing DNI omission
(20)	I insist	*I require *I demand
(21)	She promised	*She vowed *She guaranteed
(22)	We tried	*We attempted
(23)	They accepted They approved They concurred They agreed	*They endorsed *They authorized *They acknowledged
(24)	He found out	*He discovered
(25)	I looked everywhere	*I sought everywhere
(26)	We're still waiting	*We're still awaiting
(27)	When did she leave	*When did she vacate? *When did she abandon?
(28)	I protest I object	*I oppose

These examples make it clear that, independently of meaning, some lexical items simply do, while others do not, welcome DNI omission. But the lexical specificity is more complex still. It is not that the case that we can attribute DNI omissibility to particular lexemes as such. As the following examples show, the presence or absence of licensed DNI can vary across the senses of an individual word. In the following table, phrases representing DNI-omissible valence elements are indicated with plain parentheses, phrases representing

unomissible valence elements are indicated with asterisked parentheses.

	Allowing DNI omission	Not allowing DNI omission
(29)	She opened (the shop) early	She opened *(the envelope)
(30)	She closed (the shop) early	She closed *(the drawer)
(31)	I remembered (to fix it)	I remembered *(my keys)
	She remembered (that I was here)	
(32)	I forgot (to fix it)	I forgot *(my keys)
	I forgot (that she was married)	
(33)	They know (that she resigned)	They know *(Louise)
(34)	I saw (that it had stopped raining)	I saw *(the accident)
(35)	I heard (that you resigned)	I heard *(the song)
(36)	He noticed (that she was blind)	He noticed *(the mouse)
(37)	We won (the game)	We won *(the first prize)
(38)	He lost (the game)	He lost *(his wallet)
(39)	They approached (me)	They approached *(the solution)
(40)	She arrived (at the summit)	She arrived *(at the conclusion)
(41)	We returned (to the camp)	We returned *(to the task)
(42)	They accepted (my offer)	They accepted *(my gift)
(43)	I approve (of the decision)	They approved *(the request)
(44)	I applied (for the job)	I applied *(the bandage)
	This clause applies (to my case)	
(45)	She blamed me (for the mess)	She blamed the mess *(on me)

It is clearly the *participant role type* which determines, for these cases, which elements can be omitted and which cannot. For both *win* and *lose* ((37) and (38)) the meaning of the omitted element fits such notions as contest, election, race, game, competition, etc., but not prize, money, gold medal, blue ribbon, etc. For the verbs of cognition ((31) to (36)) facts or acts are DNI-omissible, but physical objects are not.

The case of *contribute*. In the valences of some verbs we find one element which is subject to INI omission and one which is subject to DNI omission. Such a verb is *contribute*. This verb has three valence elements, corresponding, very much like *give*, to the giver, the gift, and the recipient. In its semantics this verb adds to the simple notion of 'giving' the idea that there are multiple givers. (The members of a club contribute to a fund for another member's wedding president,

the citizens of a community contribute to a charitable organization, voters contribute money to the support of their party or their candidate, etc.) The patient/gift complement of *contribute* is omissible under an Indefinite Null Instantiation interpretation; the goal/recipient element is omissible under a Definite Null Instantiation interpretation. In (46)a, all elements are present. In (46)b, the gift is omitted under INI; in (46)c, the recipient element is absent, under DNI; and in (46)d, both elements are missing.

- (46) a. I contributed twenty dollars to the Red Cross
- b. I contributed to the Red Cross
- c. I contributed twenty dollars
- d. I contributed

When we claim that in (46)b the omitted element is merely not mentioned, we mean that it could be quite normal for an interlocutor to ask for the nature or quantity of the gift. But in describing (46)c as an instance of DNI, we are claiming that the omitted mention of the recipient participant is possible only when both speaker and hearer are currently thinking of the Red Cross as the recipient of donations. In such a state it would be odd for an interlocutor to inquire as to the identity of the recipient. ("Oh really? Who did you give it to?")

This omissibility pattern we see in (46) can also be observed in example (47) below, where we are again concerned with omissibility possibilities linked to particular senses of words. The verb *give* has the omissibility properties of *contribute* only when it has the meaning of *contribute*.

- (47) a. I gave twenty dollars to the Red Cross
 b. I gave twenty dollars
 c. I gave to the Red Cross
 d. I gave ("I gave at the office")
- (48) I gave *(a box of chocolates) *(to my sweetheart)

7.2.3 Free Null Instantiation

A characteristic of INI is that the missing constituent behaves like an indefinite pronoun, in the sense of not being interpretable as specifically referring to something in the conversational context. (Recall the discussion of the bizarre conversation represented in (13) above.) A characteristic of DNI is that it requires an appeal to something in the conversants' context for its interpretation. In the case of Free Null Instantiation (FNI), there is no contextual constraints on its interpretation. All of our examples of FNI will concern people. There will be cases in which the missing element is interpreted as "referring"⁴ to people in general, as in a completely generic sentence; to the speaker or the addressee; or to someone whose point of view is being represented in the sentence.

Constructionally Licensed FNI: The Passive Agent. One context for an FNI interpretation is that of the missing "Agent" phrase in a passive sentence.⁵ In a sentence like (49a) the Agent is unexpressed, though of course it could be expressed in the form of a prepositional-phrase headed by the preposition *by*, as in (49b).

⁴ The hedged use of "referring"; suggested by the quotation marks, is because it's ordinarily not expected that an absent element can refer to anything.

⁵ "Agent" is the usual name given to the omissible element in a passive sentence; the word is in quotes because the missing element does not need to have the semantic role of Agent.

- (49) a. The packages were delivered on time
 b. The packages were delivered on time by the owner's son

In the case of an omitted passive agent, no understanding is required concerning whether or not the omitted element is "understood in the context". In an earlier tradition, the omitted agent phrase in a passive sentence was sometimes explained in terms of the deletion of the phrase "by someone". That phrase is incompatible with a situation in which the context makes it clear what has been left unmentioned. Thus, for example, if I am reporting to my boss that I have done everything that could be expected of me this day, I might say, "Well, the windows have been washed, the grass has been cut, the trash has been dumped," and the like, but I could not really add "by someone" at the end of each of these passives. This is because it is clear that I am the one whose activities are in question, and the addition of "by someone" would suggest that I don't know that fact.

Constructionally Licensed FNI: Pragmatically Interpreted Subjects. There are gerunds 'cat v, max +, srs -, vif ing' and infinitival phrases of the sort exemplified in (50) ('cat v, max +, srs -, vif bse, marker to'), whose subjects are "free" in the sense we have in mind. As pure self-standing sentences, (50)a-b and (51)a-b can be interpreted as purely generic. But for the sentences in (52) the missing subject could easily be interpreted as some contextually given individual, for example, the speaker of the sentence in (52)a, the addressee in (52)b or either folks in general or a specific individual in (52)c.

Infinitival

- (50) a. To err is human
 b. To know me is to love me

Gerundial

- (51) a. Living here would be like living in paradise
 b. Seeing is believing

- (52) a. To know him was rewarding [for me]
 b. Was it rewarding to know him? [for you]
 c. I have been told (by Sydney) that it was rewarding to know him [for Sydney, for folks in general]

Lexically licensed FNI. There are two contexts for lexically licensed FNI, the first of which involves the theta-role we have called **Experiencer**. The Experiencer can occur as the subject of active transitive verbs, as in (53), as the object of such a verb, as in (54), and as an oblique phrase, as in (55) and (56).

- (53) [Pat] enjoys talking with children
 (54) Talking with children amuses [Pat]
 (55) Talking with children is interesting [to Pat]
 (56) Talking with children is fun [for Pat]

The oblique experiencers show up with predicates (many of them adjectives) which predicate something of (1) an act or experience and (2) a human being (or other sentient being) who engages in that act or experience. The selection of preposition (*to* or *for*) that we see in (55) and (56) seems to depend on a subtle semantic difference: if what is expressed is a matter of the experiencer's judgment, the preposition *to* is selected; if it is a matter of the experiencer's involvement in some activity, the preposition *for* is selected. See examples (57-60), in which the determining lexical item is in bold face.

Judgment cases:

- (57) [To me] the lecture was quite interesting
 (58) The house seems big [to me]

Involvement cases

- (59) [For me] that kind of activity is impossible
 (60) Math wasn't easy [for me]

In those cases in which the experiencer can be expressed with a prepositional phrase, it is omissible, and its interpretation is "free". The possibilities are as follows. The missing element can 'refer', for example: (i) to people in general, as in (61); (ii) to the speaker of the sentence

(especially in the case of an expressive assertion), as in (62); (iii) to the addressee of the sentence (especially in the case of a question), as in (63); (iv) to the subject of *find*, as in (64); or (v) to the individual whose point of view is represented in a context representing speech or thought, as in (65).

- (61) NYT crossword puzzles tend to be quite **difficult**
(for folks in general)
- (62) Wow that was **fun!**
(for me)
- (63) Did Sylvia **seem** to be ready?
(to you)
- (64) We found your restaurant quite **satisfactory**
(to us)
- (65) Kim knew it wasn't going to be **easy**
(for Kim)

The second type of lexically licensed FNI involves what we will awkwardly call 'Evaluees'. There is a small class of adjectives which can predicate of a person (the 'evaluee') something which expresses an evaluation of that person's involvement in a particular behavior. Such predicates have two arguments: the evaluee and the behavior. Either the evaluee is expressed as the subject and the behavior as an infinitival phrase (VP[inf]) in a Comp grammatical function (that is, within the verb phrase) or the VP[inf] expressing the behavior appears as the subject (possibly extraposed and replaced by the word *it*) and the evaluee is expressed as the object of the preposition *to* or omitted entirely. In the examples below the evaluee appears as subject and the behavior (*to do that*) as a VP[inf] in comp function. In the b versions the behavior appears as subject and the evaluee in an *of*-prepositional phrase. The c versions are extraposed variants of the b versions. Finally, in the d versions the evaluee is not expressed: this non-expression is an instance of FNI.

- (66) a. You were stupid to do that
 b. To do that was stupid of you
 c. It was stupid of you to do that
 d. It was stupid to do that
- (67) a. We were wrong to do that
 b. To do that was wrong of us
 c. It was wrong of us to do that
 d. It was wrong to do that
- (68) a. Jim was clever to do that
 b. To do that was clever of Jim
 c. It was clever of Jim to do that
 d. It was clever to do that

We see in these examples a type of valence variation that we have not yet had a chance to speak about, and instances of infinitive-phrase extraposition that will be discussed in detail later on. But it is clear, at any rate, that we have here another kind of example of FNI interpretation when the "of NP" phrase is omitted.

- (69) a. It's wrong to betray one's friends (generic –
 of people in general)
 b. That was pretty stupid! (of you)
 c. Wasn't it clever to do what I did? (of me)

7.3 Coinstantiation

There are times when a single constituent of a sentence can be seen as simultaneously satisfying valence requirements of more than one predicate. We shall refer to this as Coinstantiation. In sentence (70), *Joe* is the subject of *try* and is also taken as satisfying the subject requirement for *understand*.

- (70) Joe tried to understand you

In sentence (71), *Joe* is the object of *expect* and is also taken as satisfying the subject requirement of *marry*.

(71) We expected Joe to marry you

And in sentence (72), (*for*) Joe expresses the experiencer of *fun* and satisfies the subject requirement of the VP *to sit outside*.

(72) It wasn't much fun for Joe to sit outside during the concert

For each of these sentences, the main predicate in the main clause takes as one of its complements an infinitival VP ('srs -, vif bse, marker *to*') which, of course lacks a subject. These predicates allows one of their complements to provide the interpretation - through unification - of that missing subject. For *try* it's the subject; for *persuade* it's the object⁶; and for *fun* it's the oblique experiencer. We will say that the constituent in question ("Joe" in each case) directly instantiates a complement of the main-clause predicator (*try, persuade, fun*) and coinstantiates a complement of the embedded infinitive phrase (*understand, marry, sit*).

It is obvious that information about such coinstantiation patterns is to be contained in the valence description for the predicators in the main clause in each of these cases. That is to say, in the three examples just reviewed, the coinstantiation requirement has to be stated as a property of the predicators *try, persuade, and fun*, and not *understand, marry and sit*.

In the case of *try*, illustrated above, we associate with the lexical description of that verb information of the following kinds: (1) that it takes an agent constituent and an infinitival verb-phrase; and (2) that the agent of its verb-phrase complement is construed as being the same individual the agent of *try*. This set of relationships is expressed in Figure 1:

⁶ In the sentence given here it is indeed the direct object; but we will want to characterize the coinstantiation relation as involving the theta-role in the upper clause, since what is here the object of the transitive sentence could as well have been the subject of the corresponding passive sentence. ("Joe was persuaded to marry you.")

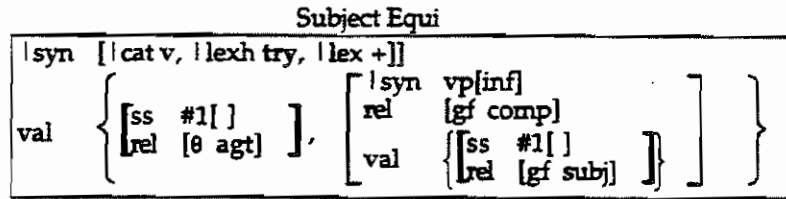


Figure 1

We see in Figure 1 that the verb *try* has a bipartite valence, consisting of an agent (θ agent) and an infinitival complement (shown here as *vp[inf]*, an abbreviation for [|cat v, |max +, |srs -, |vif bse, |marker to]).

Unification indices in Figure 1 inform us that the syntactic and semantic information associated with the agent of *try* is to be unified with such information associated with the subject of its complement. Since the complement of *try* is a VP, and hence is a constituent which does not contain its own subject, the provision that *its* subject's syntactic and semantic requirements are satisfied by the subject of *try* guarantees that all of its valence requirements can be satisfied.

It is important to notice that the unification indices apply to the inherent features (synsem value) of the agent of *try* and the subject of its *comp*, and not to the *rel*(ational) features. This is because the *rel* values features are not required to be identical. The thematic role of the subject of *try* (let us say) is *agt* (agent), but the thematic role of the subject of its complement can be (almost) anything. Taking the subject of *understand* as having the thematic role *exp* (experiencer), we find that in sentence (73)a, the same constituent, *Harry*, has an agentive relation to one verb and the experientive relation to the other. We can assume further that the subject of locative *be* is patient (or theme), and that the subject of *kick* has the thematic role agent. In short, the subjects of *try* and the main verb of its infinitival complement do not have to agree in respect to their thematic role.

- (73) a. Harry tried to understand me
 b. Harry tried to be at your wedding
 c. Harry tried to kick me

But now look at sentence (74).

- (74) Harry seems to understand you quite well

In saying that the subject of *try* was agent, we are saying that this constituent is limited to NP-expressions that can designate things which are capable of acting on their own. Thus, in the sentences of (73), *Harry* has to satisfy the semantic requirements of the subject of *try* as well as the semantic requirements of the subject of its complement. It is from what *try* means that we give its subject the thematic role of agent. But it is not so easy to see what thematic role can be assigned to the subject of *seem*. The subject of *seem* (in this construction) can be anything capable of being the subject of its infinitival complement.

The subject of *seem* (in this construction) can coinstantiate the subject of a predicate which assigns to its subject an agentive role, as in (75)a an experientive role, as in (75)b, a patientive role, as in (75)c, and a semantically empty role, as in (75)d.

- (74) a. She seems to fight with everyone she knows
 b. The puppy seems to like this stuff
 c. The key seems to fit the lock
 d. It seems to be getting dark outside

The verb *seem* is like *try* in taking an infinitival VP complement, but it differs from *try* in that it assigns no thematic role to its own subject. An abbreviated lexical description of *seem* is given as Figure 2.

Subject-to-Subject Raising

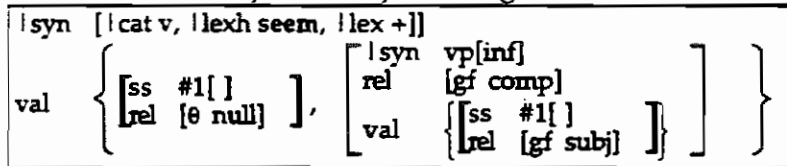


Figure 2

On examining Figure 2 we notice that it has the same structure as what we saw in Figure 1 with an important exception: that the subject of *seem* is given a null theta-role (θ null).

We can now notice that the title of Figure 1 is Subject Equi and the title of Figure 2 is Subject Raising. The interpretation is that in the former case the two subjects have to be equivalent in respect to their inherent syntactic and semantic features (though, as we saw, their relational properties could be quite distinct); in the Raising case, by contrast, the properties of the subject of *seem* have to be determined exclusively by the co-indexing, since the verb *seem* itself contributes nothing to the interpretation of its subject. If we can think of the complement VP as 'lower' than the main verb *seem*, we can understand that the subject properties of a *seem* sentence get 'raised' into subject position by copying information from a 'lower' predicate. The verb *seem* (above) acquires its subject only by unification with the subject of its complement (below).

We move on now to somewhat more complex examples. Consider (76).

(76) We persuaded Joe to install an answering machine.

We will find that for various reasons *Joe* counts as the direct object of *persuade*. One reason for making this assumption is that if we had a case-bearing element instead of *Joe*, it would bear non-subject case. That is, we would get (77)a and not (77)b.

- (77) a. We persuaded *him* to install an answering machine.
 b. *We persuaded *he* to install an answering machine.

We also note that the direct object of *persuade*, as with other direct objects, is capable of appearing as the subject of a corresponding passive sentence. In this case, the passive sentence would be (78).

- (78) Joe was persuaded to install an answering machine.

A third reason for regarding *Joe* as the direct object of *persuade* in (76) is that that position could be occupied by a reflexive pronoun, anaphoric to the sentence's subject – a relationship that is generally expected to be possible between subjects and direct objects. Thus, in (79), we see *Joe* as both the persuader and the persuaded.

- (79) Joe persuaded himself to install an answering machine

The gf role of *Joe* in our sentence, then, is that of *obj* in our notation. We now consider whether *Joe* has a thematic role with respect to this verb. It seems clear that *persuade* is a three-place predicate, whose three elements are (i) the one who does the persuading, (ii) the person who undergoes the persuasion, i.e., the person whose mental state changes as a result of the persuader's actions, and (iii) the act which the persuaded person intends to carry out as a result of the persuasion.⁷ These we can refer to as agent, experiencer, and content respectively.

But, as we said, *Joe* also counts as the understood subject of *installs* in the complement VP. For example, it satisfies the

⁷ We have noted earlier that the third complement can be syntactically a *that*-clause, in which case it represents a proposition that the experiencer is induced to believe, rather than an activity which the experiencer is induced to carry out.

theta requirement of the subject of that verb (the installer can be taken as the agent of an act of installing something), and it can serve as the antecedent of a reflexive in the complement verb phrase, as in (80).

(80) We persuaded Joe to shoot himself.

A way of summarizing this information is given in Figure 3:

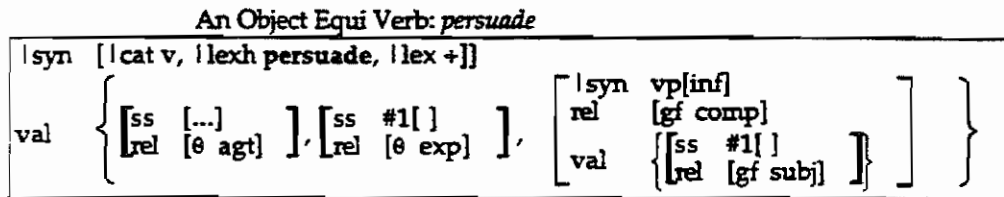


Figure 3

In Figure 3 we see the valence of *persuade* listing three elements – thematically as agent, experiencer and content – and we see, through the coindexing of the inherent semantic and syntactic properties of the experiencer of *persuade*, and those of the subject of the infinitival complement, that the experiencer of *persuade* must unify with the subject of that complement in its synsem properties.

Since it is part of the meaning of *persuade* that the experiencer forms the intention of performing some act, it is usually the case that the subject of the complement has the thematic role agent. Typically, then, the thematic roles of the unifying elements will be different, and thematic role cannot be among the features that require unification. Similarly, the grammatical functions cannot unify, since the coinstantiating constituent is the object of one verb and the subject of the other.

Figure 3 has the label Object Equi, suggesting that each of two verbs has its respective object and subject, but that they must be identical (or rather, must unify) in respect to some of their features. The terminology is standard within the transformationalist tradition, but as you see, the lexical

description of persuade does not mention the grammatical function of the coinstantiating element. It needs to be emphasized that it is a semantically defined element in the "upstairs" clause (in this case 'experiencer') and a syntactically defined element in the "downstairs" clause (always the subject) which get unified in Equi constructions.

We now turn to Figure 4, representing the verb *expect* as it would be found, and interpreted, in a sentence like (81).

(81) Everybody expects Joe to succeed.

A Subject-to-Object Raising Verb: *Expect*

|syn	[|cat v, |lex persuade, |lex +]]		
val	{ [ss [...] rel [θ exp]] , [ss #1[] rel [θ null] ] , [ |syn vp[inf] rel [gf comp] val { [ss #1[] rel [gf subj]] }] } }		

Figure 4

The form of Figure 4 is very similar to that of Figure 3, except that in the case of *expect*, in contrast to *persuade*, the second valence member has a null thematic role. The structure of Figure 4 reveals that *expect* is semantically a two-place predicate, whose elements are (i) the person whose psyche houses the expectation, and (ii) the content of that expectation. But, at the same time, it is syntactically a three-place predicate, since its argument set has three elements. The non-argument complement (i.e., the middle valence element in Figure 4) bears the coinstantiation with the downstairs subject. This element is said to be the 'controller' of the 'downstairs' subject.

The controller of *expect* is a direct object in active uses of the verb. This claim can be argued along the lines we considered in the case of *persuade*. Relevant examples are in (82).

- (82) a. We expect him to succeed.
b. *We expect he to succeed.
c. He is expected to succeed.
d. He expects himself to succeed.

The claim that this element unifies with the subject-requirement of the complement can be argued in the way that we saw for *persuade*, with the use of a downstairs reflexive object.

- (83) We expected Joe to shoot himself.

And the argument that the object of *expect* has no thematic role assigned to it can be supported in the same way in which a null thematic role was supported in the case of the subject of *seem*.

- (84) I expect it to be obvious to everyone that ...
(85) We expect there to be significant changes before you resubmit the paper.

We find that oblique experiencers and evaluatees of the sort discussed at the end of the last section can also coinstantiate the subjects of infinitival complements, even when they are subject to FNI omission! In other words, the coinstantiation relation can hold between the subject of a complement VP even if the valence element which provides the coinstantiation is itself not overtly expressed in the sentence. In the relevant examples, the infinitival VP is a (typically extraposed) subject. The details will not be worked out until we are ready to examine extraposition, in a later chapter; but the examples should be fairly transparent.

- (86) It was interesting to Harry to find that out.
(Harry found it out)
- (87) It would be fun for Lou to go skiing with us
(Lou's going skiing with us is in question)
- (88) It's fun to watch rain falling
(It's fun for anyone to watch rain falling)
- (89) Was it enjoyable to meet Lou's family?
(Was it enjoyable for you to meet Lou's family?)
- (90) It was difficult to have to say that
(It was difficult for me to have to say that)
- (91) She found it easy to speak to the President
(She found it easy [i.e., easy for her] to speak to the President)
- (92) Lou wonders if it would be interesting to study linguistics
(Lou wonders if it would be interesting for him to study linguistics)
- (93) It was wrong to speak to your teacher like that
(It was wrong of you to speak to your teacher like that)
- (94) Wasn't it clever the way I solved the problem
(Wasn't it clever of me to solve the problem the way I did)
- (95) It was very nice to greet your auntie so courteously
(I was very nice of you to greet your auntie so courteously)

7.4 Adjectives and Subject Coinstantiation

A treatment of auxiliaries and the copula is reserved for a later chapter; but we will find it useful in this chapter to introduce the means of providing subject instantiation for predicators which are not verbs. Since subjects are directly instantiated only in the Subject/Predicate construction, and since the right daughter of such a construction is necessarily a verb-headed constituent, predicates which are not verbs can only have their subjects indirectly instantiated, as the coinstantiating subject or object of a verb for which the adjective is a complement. One verb for which this is a major function is the copula *be*. As a first approximation to our theory of *be*, we can say that it serves the function of occurring as the head of a VP and having its subject coinstantiate the subject of a complement adjective phrase. If we regard the subject of *unhappy* as an experiencer, then we can interpret *be* in (96) as being a subject-raising verb in which the subject is entirely provided by the adjective *unhappy*. *Be*, like other pure raising verbs, does not impose any of its own requirements on the subject, but takes any subject allowed by its complement adjective phrase.

(96) Joe is unhappy

Adjectives can also have non-subject complements. In a sentence like (97), the *that*-clause complement of *aware* is realized as structural sister to *aware* within the adjective-phrase *aware that her mother is planning to remarry* and the experiencer subject of *aware* is coinstantiated by the subject of *be* in a raising structure.

(97) Pam is aware that her mother is planning to
remarry

Adjectives can also have VP-complements, that is, complements without self-contained subjects, hence complements which themselves must participate in coinstantiation patterns. Again there are two kinds, depending on whether the adjective does or does not assign a

thematic role to its subject. The two possibilities can be illustrated with *eager* and *likely*.

Briefly, in the *eager* case, the experiencer subject coinstantiates the subject of its infinitival complement, and in turn is coinstantiated by the subject of *be*, in sentence (98).

(98) Joe is eager to succeed

In the *likely* case, a semantically empty subject coinstantiates the subject of its complement, as in (99).

(99) Joe is likely to succeed

Again, the subject of the Equi version is limited to NPs which can be construed as sentient beings capable of experiencing the emotion of eagerness; but the subject of the Raising version is unlimited. Relevant examples, with raising cases in the a sentences and equi cases in the b sentences, follow:

- (100) a. Pat is likely to succeed
b. Pat is eager to succeed
- (101) a. It is likely to be obvious to everyone that you've left
b. *It is eager to be obvious to everyone that you've left
- (102) a. There is likely to be a problem
b. *There is eager to be a problem
- (103) a. That she took the job is likely to surprise her parents
b. *That she took the job is eager to surprise her parents

The structures are given in Figure 5 and 6.

Example of an Equi Adjective: *Eager*

|syn	{ |cat a, |lexh eager, |lex +}
val	{ [ss #1[] [rel [gf subj,θ exp]] , [rel [gf comp] val { [ss #1[] [rel [gf subj]] }]] }

Figure 5

Example of a Raising Adjective: *Likely*

|syn	{ |cat a, |lexh likely, |lex +}
val	{ [ss #1[] [rel [gf subj,θ null]] , [rel [gf comp] val { [ss #1[] [rel [gf subj]] }]] }

Figure 6

7.5 Coinstantiation Construction

What is common among the six valence structures we have just examined can be isolated as defining what we may call the Coinstantiation Construction, where we need specify only that the inherent semantic and syntactic properties of *some* valence requirement of a verb unifies with the subject requirement of one of its other valence elements, as indicated in Figure 7.

Coinstantiation Construction

|syn	{ |lex +}
val	{ [ss #1[] , [ss { |srs - vai { [ss #1[] [rel [gf subj]] }]]] }

Figure 7

What is specified in the Coinstantiation Construction is that a complement requirement whose subject is not internally satisfied (srs -) can unify the synsem of this ('downstairs') subject requirement with the synsem of one of its valence sister (an 'upstairs' element), thereby satisfying the downstairs subject requirement via the direct instantiation of the upstairs element.

We turn now to the upstairs element, the controller. In the raising cases (those in which it has no semantic role vis-a-vis its own predicator), this is necessarily the semantically disconnected valence element, that is the one with a null theta role. (A null theta value for a valence element indicates a sem value which unifies with nothing in the external sem value of the governing predicator). This result follows from the general theoretical principle of *semantic integration*. That principle restates the idea, introduced in Chapter 4, as "We mustn't find anything we can't use." Semantic integration insists that the semantics of a sentential construct must be 'connected' in the sense that the value of every sem attribute must occur within the single feature structure that is the value of the top sem attribute (which of course is projected there by the main verb). By this principle a sentence like

(104) *Trout relish worms minnows

fails because only one of the constituents *worms* and *minnows* can unify with the obj valence element and so only one of the sem values of these two constituents can become part of the sem value of the verb *relish*, and hence of the main sem value of the sentence. In (103) either the sem value of *worms* or the sem value of *minnows* must remain isolated from the single AVM which provides the semantic structure of the sentence as a whole. Intuitively, the idea of semantic integration is that the semantics of a sentence has to cohere, to 'fit together'.

In a raising-type case, one of the valence values has no semantic role, which means that the sem value of this valence element doesn't unify with anything in the sem value of the lexical predicator in whose valence it occurs. The sem value, call it *sv*, of this semantically disconnected valence element is of course going to get filled in by direct instantiation, but unless the content of *sv* is unified with the sem value of another valence element which is connected to a sem value, semantic integration will be violated because there will no way for *sv* to get included in the external sem value of the sentence.

The only way the content of *sv* can get connected with the semantics of the sentence as a whole is through some special unification (in particular, the one induced by coinstantiation), since it is otherwise not unified with anything else. Coinstantiation will thus have to pick out the valence element containing 'sv' as its upstairs terminus to prevent violation of semantic integration.

We will not provide an exhaustive discussion of how the upstairs participant in coinstantiation is selected in the equi cases, that is how we know that examples (105)a and (106)a have the glosses shown in the b versions rather than those of the c versions.

- (105)a. John persuaded Mary to sing
b. John persuaded Mary that she should sing'
c. ≠ John persuaded Mary that he should sing'
- (106)a. John promised Mary to sing
b. John promised Mary that he would sing'
c. ≠ John promised Mary that she would sing'

Many linguists, including the present authors, believe that general semantic principles can be found which predict a great number, if not absolutely all, such choices, that is that the upstairs member, the 'controller', in equi-type coinstantiation is determined by the semantic properties of the relevant verb.

This is currently a matter of active research and we have no simple formula to present here regarding the semantic principles governing the choice of equi controllers.⁸

⁸ However, much is known in this area, some of it too technical for the present exposition. The interested student should consult Ivan A. Sag and Carl Pollard, 'An integrated theory of complement control', *Language*, 67: 63-113, 1991 for a promising approach to the problem of the semantic determination of equi controllers.

One of several alternative views is that grammatical function, rather than semantic role, determines which argument is the equi-controller. See, for example, Joan Bresnan 'Control and Complementation' in *The Mental Representation of Grammatical Relations*, ed. Joan Bresnan, Cambridge, Mass: MIT, 1981

CHAPTER 8

LINKING

0. Preamble: Simplifying the notation of valence

The main body of this chapter is concerned with the 'linking' constructions, which connect grammatical functions to semantic roles in the valence elements of predicators. These constructions unify with minimal lexical constructions, whose valence elements are not usually specified for grammatical function, and assign gfs to these elements. They are called 'linking' constructions because they *link* thematic roles to grammatical functions (and sometimes to syntactic categories). For example, the minimal lexical entry for the verb *harm* will contain one valence element in which nothing is specified other than 'rel [θ patient]'. The linking construction for Transitive will unify with the minimal lexical entry for *harm* and in so doing determine that the valence element with the specification 'rel [θ patient]' also receives the specification 'rel [gf object]'.

Detailed lexical constructions – with all their attributes and values displayed, especially valence values – can be complex notational objects, as you had the opportunity to observe in the preceding chapter. In order to visually simplify the representations in this and later chapters, it is desirable to have a shorthand method for representing the valence properties of lexical items, both minimal and otherwise. In this preamble, we present a method of representing many of the properties of a valence set in an abbreviated and more readable form.

We present abbreviated valence descriptions in a rectangular array enclosed in curly brackets. Columns correspond to individual valence elements, rows correspond to attributes, and the value in the i th row of

the j th column represents the value on the i th attribute of the j th element of the valence set being represented, as suggested by the following schema.

$$\left\{ \begin{array}{cccc} gf_1 & gf_2 & gf_3 & \dots \\ \theta_1 & \theta_2 & \theta_3 & \dots \\ syn_1 & syn_2 & syn_3 & \dots \end{array} \right\}$$

The topmost row presents the grammatical function (gf) attribute, for which the possible value choices are **sbj**, **obj**, **obl**, and **comp**. We allow only one each of the first two, but we permit an unlimited number of **obl** and **comp** values. (Information given in the other rows will keep valence elements (columns) which are alike in grammatical function value distinct from each other.)¹

The second row corresponds to the thematic role attribute. A '0 null' entry indicates the absence of an assigned thematic role for the valence element represented by the column. Otherwise the entry in a given column presents the theta role for the valence element corresponding to that column.

The entry in the third row presents, in abbreviated form, the syntax value for the valence element represented by the corresponding column. The major abbreviations for syntax values to be used in abbreviated valence descriptions are given in Table 1, below.

Abbreviation (in third row)	Syntax AVM so abbreviated ²
N	[cat n, max +]
A	[cat a, max +]

¹ In languages where case information (such as nominative, accusative, dative, etc.) is part of valence requirements in addition to, or instead of, grammatical function information, provision is made for case information in abbreviated valence descriptions.

² For the representations in this column we allow ourselves to ignore the differences between head features and level features. Thus, '[cat n, max +]' is really 'syn [head [cat n], level [max +]]'.

P	[cat p, max +]
V+	[cat v, max +, srs +]
V-	[cat v, max +, srs -]
V	[cat v, max +, srs []]

Table 1

Note that V+ denotes a clause, V- (read 'V minus') denotes a verb phrase and plain V indicates a [cat v, max +, srs []] constituent. (The utility of the 'plain V' notation will be considered in a later chapter.) Additional abbreviations will be proposed as we go along, augmenting the set in Table 1, as a means of indicating more detailed syntactic valence requirements, such as those studied in the last chapter. Thus, we will have occasion to avail ourselves of abbreviations for finite clauses: V+[fin] =_{df} [cat v, max +, srs +, vif fin]), *to*-marked infinitive VPs: V-[to] =_{df} [cat v, max +, srs -, vif bse, mkr to]), preposition phrases headed by *to*: P[to]³, and several others.

A fourth row is set aside for coinstantiation information, when appropriate. Predicative complement requirements which lack internally satisfied subjects must, as we saw in the last chapter, have their subject requirements satisfied via coinstantiation, that is, unification of their synsem value with the corresponding value of another element of the valence of the governing predicator. In the subject control case, we divided the territory into subject equi and subject-to-subject raising, depending as the controller, the upstairs subject, plays a role in the semantics of the governing predicator or not; the object control cases were called, in parallel fashion, either object equi or subject-to-object raising, according as the controller, the upstairs transitive object, or passive subject, does or does not play a semantic role with respect

³ Discussion of the AVM for which 'P[to]' is an abbreviation will have to await the chapter on prepositional phrases. For the moment our purposes will be served by noting that 'P[to]' denotes a constituent that is (a) prepositional (b) maximal and (c) headed by the lexical preposition *to*.

to the governing predicator. In abbreviated valence diagrams we indicate subject control coinstantiation by putting the symbol *s* in the fourth row of the (comp/V-) column and object control coinstantiation by putting the symbol *o* in the fourth row of the (comp/V-) column. The presence of a non-null semantic role value in the second row of the column corresponding to the controller distinguishes the equi from the raising cases.

The valences of simple intransitive verbs such as *jump* and *fall* (where we assume that *jump* is an agent subject verb and *fall* is a theme subject verb) are thus represented as follows.

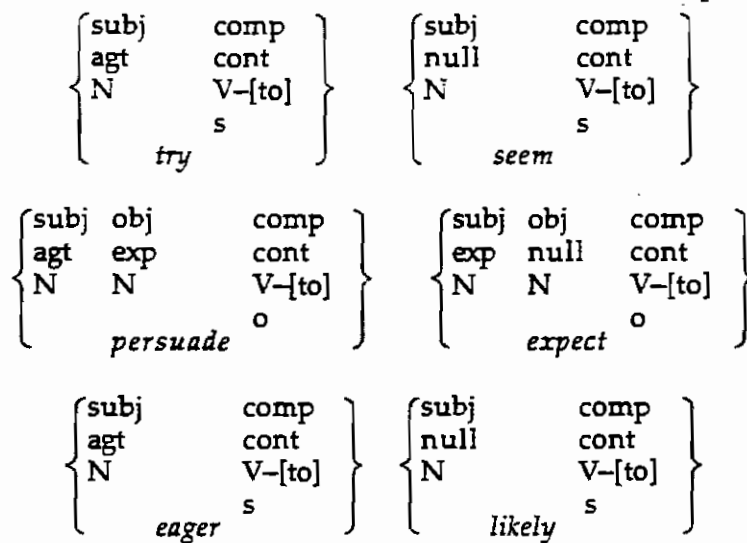
$$\left\{ \begin{array}{l} \text{subj} \\ \text{agt} \\ \text{N} \\ \text{jump} \end{array} \right\} \qquad \left\{ \begin{array}{l} \text{subj} \\ \text{theme} \\ \text{N} \\ \text{fall} \end{array} \right\}$$

The valences of two-place verbs, like the forms of *push*, *amuse*, and *believe* illustrated in sentences (1), (2) and (3) are represented in the abbreviated valence diagrams which follow.

- (1) She pushed him.
- (2) He amused her.
- (3) She believes (that) he's ready.

$$\left\{ \begin{array}{ll} \text{subj} & \text{obj} \\ \text{agt} & \text{theme} \\ \text{N} & \text{N} \\ & \text{push} \end{array} \right\} \quad \left\{ \begin{array}{ll} \text{subj} & \text{obj} \\ \text{stim} & \text{exp} \\ \text{N} & \text{N} \\ & \text{amuse} \end{array} \right\} \quad \left\{ \begin{array}{ll} \text{subj} & \text{obj} \\ \text{exp} & \text{cont} \\ \text{N} & \text{V+[fin]} \\ & \text{believe} \end{array} \right\}$$

Valences involving coinstantiation, which were the topic of the last chapter, may be represented as follows:



The abbreviated valence diagrams for *eager* and *likely* are the same as those for *try* and *seem*, respectively. Abbreviated valence diagrams, such as those shown here, do not reflect the fact that the former are adjectives and the latter are verbs, facts which are, of course, represented in the full constructions for these lexemes.

The 'null' entry for theta role (second row) in the cases of *seem*, *expect* and *likely* for the subject, object and subject requirements, respectively, matching the *s*, *o* and *s* coinstantiation indications in the fourth row of the corresponding valence descriptions, mark these as predicators of the raising (vs. equi) variety. Contrast the valence descriptions for *try*, *persuade* and *eager*, which differ from the foregoing three only in providing *agt*, *exp*, and *agt* roles, respectively, for the controllers of coinstantiation.

Example (4) illustrates the adjective *interesting*, provided with a valence specifying a stimulus subject expressed as a V-[to] and an experiencer argument which may be either expressed as an oblique P[for] or interpreted freely (FNI).

- (4) To meet Maurizio Zapp would be interesting for you/for me/for anyone/ \emptyset .

The valence for *interesting*, as it appears in example (4), can be represented in abbreviated form as follows:

subj	obl
stim	exp
V-[to]	P[for]
e	(fni)
	<i>interesting</i>

The coinstantiation indicator 'e' in the fourth row of the first column indicates that the subject requirement of the stimulus V-[to] is controlled by the experiencer argument regardless of whether the latter is expressed in an oblique *for*-phrase or is left unexpressed and freely interpreted.

1. Linking:

In Chapter 4, section 4.5, the distinction between minimal valences and fully specified valences was introduced. Recall that the minimal valence of the verb *persuade*, for example, provides for an agent (the persuader), an experiencer (the person who is persuaded of something), and a complement (whatever the latter person is persuaded of). The θ values *agt*, *exp* and *cont* will thus appear in the minimal valence set of the lexeme *persuade* and also in the fully specified valence of every lexical form of *persuade*. But we noted further that the assignment, or linking, of these θ roles to grammatical functions differs in, for example, active and passive sentences employing distinct forms of the verb *persuade*. In an active sentence the agent is expressed as the subject and the experiencer as the object, while in a passive sentence the agent is expressed, if at all, in an oblique prepositional phrase headed by the preposition *by* and the experiencer is expressed as the subject. Hence, in the fully

specified valence of the forms of *persuade* which are employable in active sentences, the notation [rel [θ agt]] appears in the same valence element as the notation [rel [gf subj]], while in the fully specified valence licensing a passive sentence the notations [rel [θ exp]] and [rel[gf subj]] appear in the same valence element. When we say that a particular fully specified valence links theta role *x* with grammatical function *y*, we mean that in that fully specified valence 'θ *x*' and 'gf *y*' occur in the same element of the valence set.

In the current chapter we begin our investigation of some of the constructions that effect the linking of theta roles with grammatical functions, thus establishing the connection between the minimal valence of a lexeme and the fully specified valences of its various lexical forms. These linking constructions may also contain morphological information (e.g., *vif* and tense values and active or passive voice) and also information regarding the syntactic form of the required complements. Although we will pay some attention to the latter matters as well, the primary focus of the chapter will be on the role of linking constructions in associating thematic roles with grammatical functions (and sometimes with major syntactic categories).

1.1. Some Data

Our illustrative subject matter will consist initially of the interaction of two prominent syntactic alternations in two major dialects (or dialect groups) of English, which we will loosely designate 'British English' and 'American English'.⁴ The two syntactic alternations are those between (1) passive sentences and their active, transitive counterparts and (2) sentences in which a goal thematic

⁴ The two speech varieties in question have geo-social distributions much more complicated than what is suggested by the labels 'British' and 'American'. We are concerned here only with the grammatical similarities and differences between these forms of speech, not with their geographical or social correlates. The labels 'British' and 'American' are not to be interpreted literally.

role is linked with an oblique *gf* and expressed syntactically by a preposition phrase headed by *to* and sentences in which the goal role is expressed by a bare NP in oblique grammatical function.

The following sentences (and non-sentences) display some of the relevant facts regarding the interaction of these two alternations.

- (5) Agent 007 gave a thermometer to Goldfinger.
- (6) Agent 007 gave Goldfinger a thermometer.
- (7) A thermometer was given to Goldfinger (by Agent 007).
- (8) Goldfinger was given a thermometer (by Agent 007).
- (9) *Agent 007 gave a thermometer Goldfinger.
- (10) *Goldfinger was given a thermometer to (by Agent 007).
- (11) ^{ok}Br./*Am. A thermometer was given Goldfinger (by Agent 007).
- (12) *Which spy do you think Agent 007 gave a thermometer?
- (13) *Which spy do you think a thermometer was given?

1.2. Broad Outlines of the Analysis

The analysis we will propose groups together sentences (5) and (6) as active and transitive against sentences (7), (8) and (11), which are passive. It also groups sentences (5) and (7) together as having prepositional expression of the goal argument against (6),

(8) and (11), in which the goal argument is expressed by a bare nominal.

Sentence (11), which displays both passive and nominal goal phenomena, is acceptable in British English but not American. It is clear, nonetheless, that these two dialects have a great deal in common with regard to the transitive/passive and prepositional goal/nominal goal alternations, jointly accepting sentences (5-8) and rejecting (9, 10, 12, and 13). Our job will be to capture the generalizations not only within each dialect but across the two dialects, while nevertheless providing an account of the fact that one dialect accepts (11) while the other rejects it. In outline, our approach will be to formulate a Transitive, a Passive, an Oblique Goal and one nominal goal construction shared by the two dialects which jointly license examples (5-8) and block examples (9, 10, 12, and 13). Then an additional passive-nominal-goal construction will be posited for British English only, which will license sentence (11). This construction will have all the properties of the ordinary passive construction; in addition the goal NP will occur as subject rather than in oblique function.

1.3. Plan of the Remainder of this Chapter

The rest of the present chapter will proceed as follows. First we will look at the construction for the lexeme *give*, with its minimally specified valence, and at the lexical constructions for the various forms of *give* employed in examples (5-8 and 11), with their fully specified valences. We will then turn our attention to some questions regarding the nature of thematic roles and their formal representation. Following this, the linking constructions required to license the forms of the verb *give* in examples (5-8 and 11) will be displayed and discussed. Then, there will be a discussion of the way the various linking constructions we have presented are unified with each other and with the underspecified minimal valence of the lexeme *give* to produce the fully specified valences of the forms of *give* exemplified in

sentences (5-8 and 11). Finally, we will introduce the reader to a broader range of English linking phenomena of which the oblique goal/nominal goal alternation forms a part. In the course of the latter discussion, the subject of constructional *inheritance* will come up. Roughly, a construction A is said to *inherit* a distinct construction B just when A has all the properties of B and (in the non-vacuous case) some more of its own.

2. Lexical Constructions

Figure 1 displays the minimal valence for the lexeme *give*.

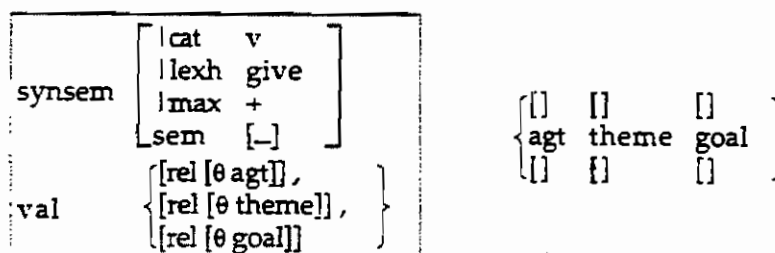
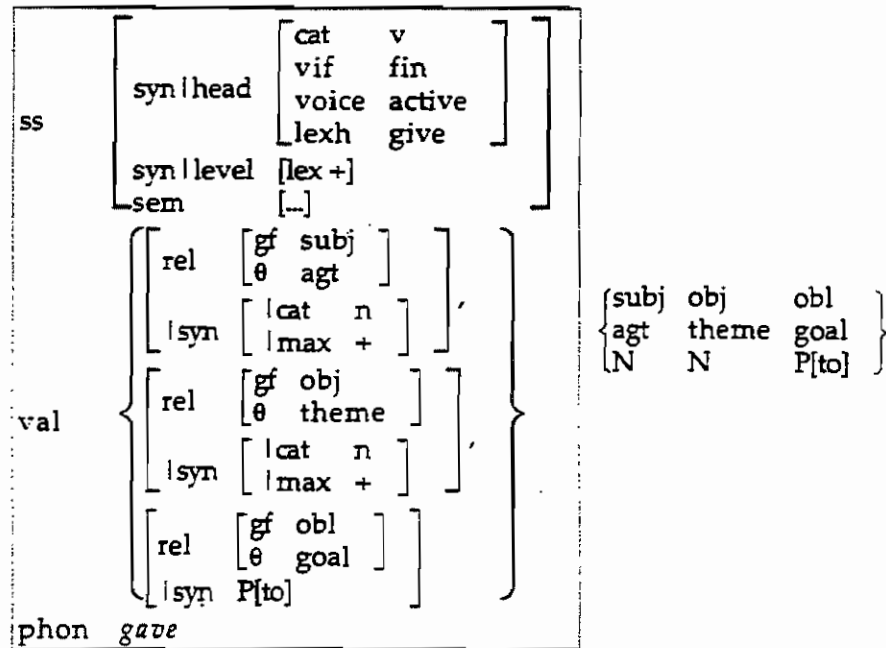


Figure 1

The box diagram on the left in Figure 1 gives, in familiar form, (a partial version of) the full construction for the lexeme *give*. To its right we see the abbreviated valence diagram of this same lexeme. You should satisfy yourself that the latter contains the same information as the valence set in the box diagram on the left. In the abbreviated valence diagram, the top row of three empty square brackets denotes the three unspecified grammatical functions, corresponding to the agt, theme and goal thematic roles, respectively, that will have to be filled in by the linking constructions in order to create a fully specified valence for any particular lexical form of *give*. Analogously, the bottom row of square brackets denotes the syn values of the corresponding elements of the valence of the lexeme *give*. These also will have to be specified in any full valence of a form of *give*.

Figure 2 presents the lexical entry for the active, past tense form *gave*, which appears in sentence (5). Again (and in subsequent figures) the box digram for the lexical entry itself appears on the left and the abbreviated valence diagram for the same lexical form on the right.

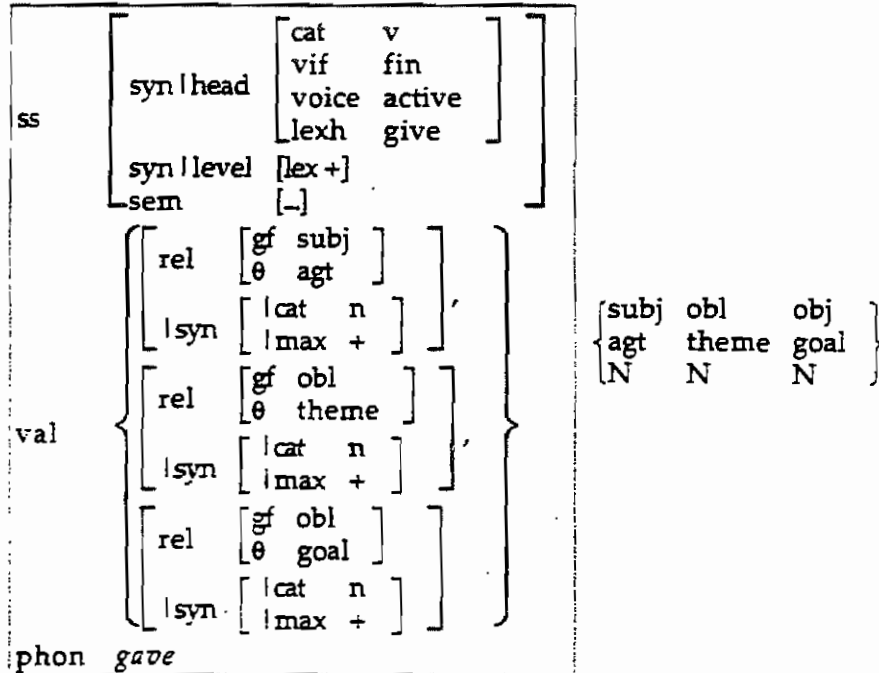


(5) Agent 007 *gave* a parcel to Goldfinger
Figure 2

In Figure 2 the agent thematic role is assigned the grammatical function subject and the syntactic form NP, the theme is assigned the object gf and NP syntactic form, while the goal argument is assigned an oblique gf and the syntactic value of a prepositional phrase headed by *to*, 'P[to]' (Recall footnote 2).

The grammatical function and syntactic form assignments stipulated in the fully specified valence of Figure 2 are realized in the matching example sentence (5): the agent is realized as a subject NP, the theme as an object NP and the goal as an oblique PP headed by *to*.

Figure 3 provides an analogous display for the fully specified valence realized in a sentence such as example (6).



(6) Agent 007 *gave* Goldfinger a thermometer

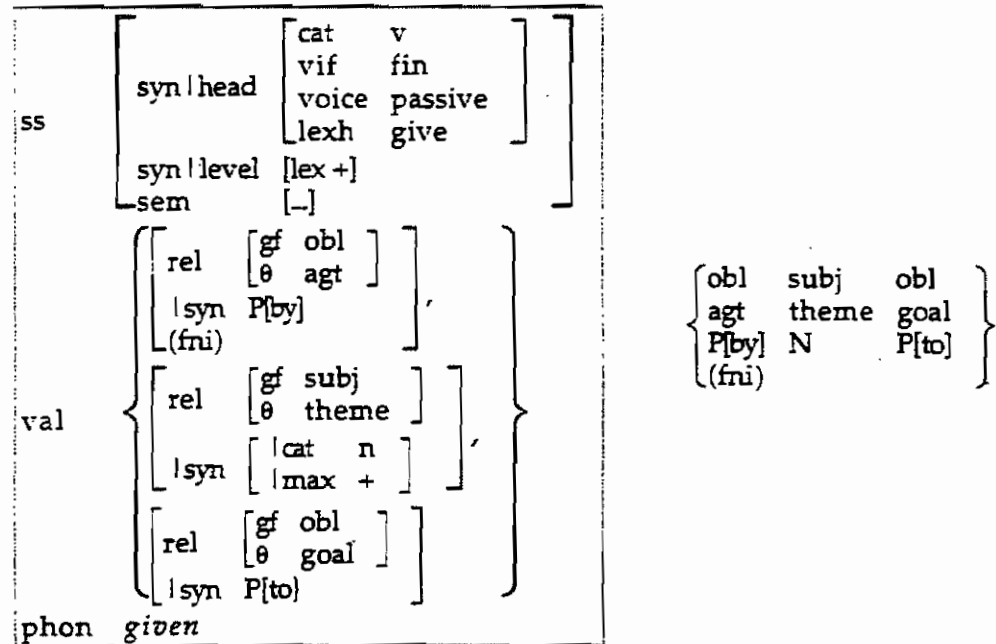
Figure 3

In Figure 3, while the agent is still assigned to the subject gf (reflecting active voice), the theme and goal receive new grammatical function assignments. The goal is now direct object, [gf obj], and the theme is realized as an oblique NP. As far as the word order of a sentence like (6) is concerned, we recall that the direct object (obj) in English always precedes any other gf in the verb phrase – except when postponed by the word-order construction which causes 'heavy' constituents to be realized later in the verb phrase. In nominal goal sentences, 'heavy NP shift' is not possible, as illustrated in example (15).

- (14) Lynn gave to Pat [a leather-bound copy of a famous novel by a nineteenth century Russian author]
- (15) *Lynn gave a ticket [the strange fellow who arrived late wearing a dinner jacket and basketball shoes]

The construction which orders 'heavy' NPs to the right of 'lighter' constituents will be constrained so as to prevent its placing an oblique NP to the left of an object. That is, the constraint illustrated by (15) is attributed, not to a nominal goal *linking* construction, but rather to the *ordering* construction licensing "Heavy NP Shift" structures.

Figure 4 depicts the valence of a passive sentence with oblique expression of the goal argument, as illustrated in sentence (7).

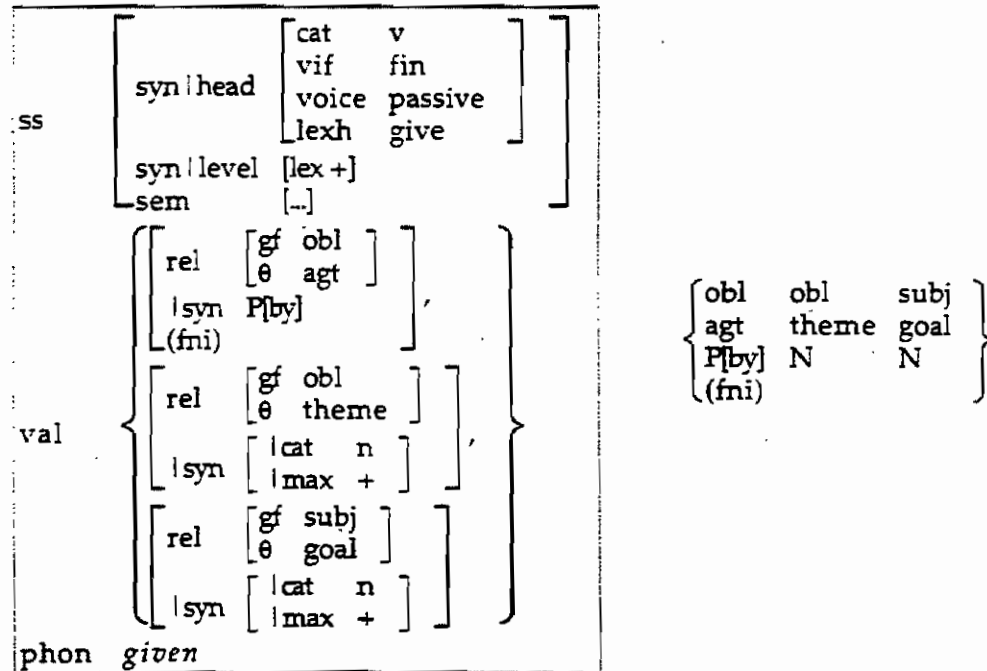


(7) A thermometer was *given* to Goldfinger (by Agent 007)

Figure 4

Here the agent role is linked to an optional, oblique *by*-phrase; if the *by*-phrase does not appear, free (null) interpretation is imposed, as indicated by the notation '(fni)'. The theme is assigned the subject function and the goal is expressed as an oblique-*to*. Once again, in reading this figure, and all the figures of this type, you should satisfy yourself that the information contained in the abbreviated valence description on the right is the same as that contained in the valence set depicted in the box diagram on the left.

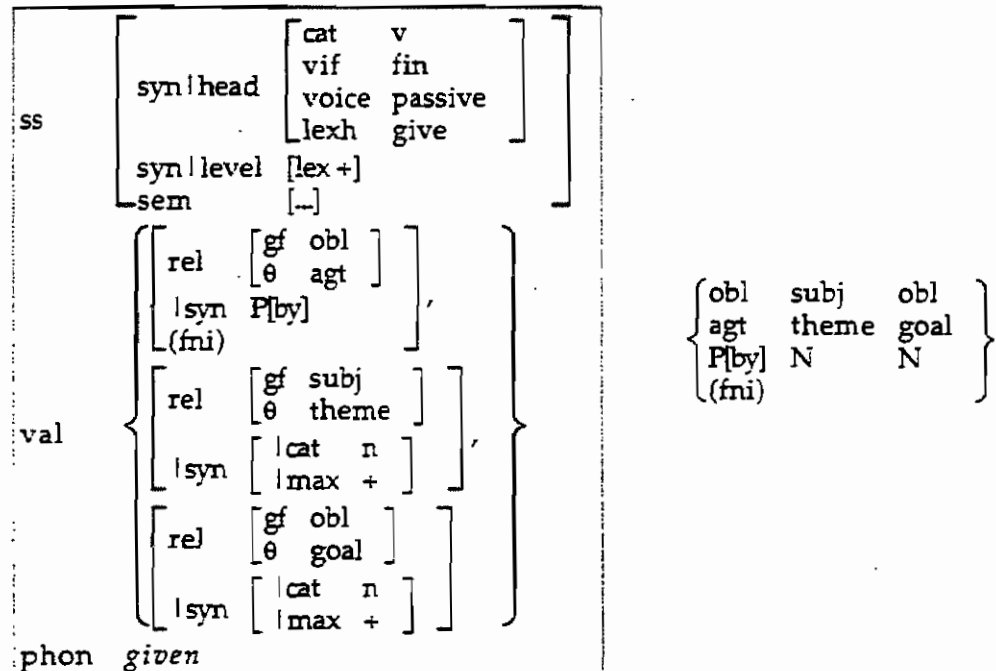
Figure 5 shows the fully specified valence of the form of *give* that occurs in a sentence such as (8), in which both the passive and nominal goal patterns are present and the subject function is assigned to the goal argument. As we have mentioned, sentences of this form are acceptable in both British and American English.



(8) Goldfinger was given a thermometer (by Agent 007)

Figure 5

Figure 6 depicts the fully specified valence corresponding to the form of *give* occurring in a sentence such as (11), which is acceptable in British, but not American, English. As mentioned earlier, this is a passive, nominal goal sentence in which the subject function is assigned to the theme argument and the goal is realized as an oblique NP. In formulating the relevant constructions for British and American English, we will make sure that valences of the form shown in Figure 6 are licensed by the former but not the latter.



(11) A thermometer was *given* Goldfinger (by Agent 007)
 Figure 6

2.1. Theta Roles and Theta Frames

It was pointed out in Chapter 4, section 4.4.3, that minimal lexical items may assign to a given event type two or more distinct arrays of thematic roles. It was

further noted that: (1) a theta role is to be understood as the relation between a participant and the event type in which it occurs *viewed under the conceptual analysis of that event type imposed by a particular theta frame*, and (2) a verbal (or other valence-taking) lexeme may display varying syntactic behavior either because (a) it evokes a single theta frame whose component roles receive varying grammatical function assignments or (b) a given or two distinct lexical items evoke distinct theta frames. Section 4.4.3 investigated alternations of type (b), in which a given set of frame specific roles can be accorded distinct theta schematizations (recall the *buy* versus *sell* kind of alternation). The present chapter is concerned with alternations of type (a), those in which the observed differences in syntactic behavior result from a given set of theta roles being assigned alternative sets of grammatical functions (by linking constructions).

2.2. The Distinguished Argument

In examples (16-19) the a versions are active sentences and the b versions are passive sentences.

- (16) a Everyone enjoyed the concert.
b The concert was enjoyed (by everyone).
- (17) a The explosion frightened the guard.
b The guard was frightened (by the explosion).
- (18) a A girl broke the window with a rock.
b The window was broken with a rock (by a girl).
- (19) a A rock broke the window.
b The window was broken (by a rock).

In (16) the role which appears as active subject and passive *by*-oblique is experiencer, in (17) it is stimulus, in (18) it is agent and in (19) it is instrument. In example (16), the theta frame includes the roles experiencer (*everyone*) and content (*the concert*); in example (17) the

theta frame includes the roles stimulus (*the explosion*) and experiencer (*the guard*); in example (18) the theta frame includes the roles agent (*A girl*), patient (*the window*), and instrument (*a rock*); in example (19) the theta frame includes the roles instrument (*a rock*) and patient (*the window*).

Sentences (16) and (17) both express an experiencer role, but it is only in example (16) that the experiencer figures in the alternation active-subject/passive-*by*-oblique. Sentences (17) and (18) both express an instrument role, but it is only in example (18) that the instrument figures in the alternation active-subject/passive-*by*-oblique. Two things are evident. First, the choice of thematic role which may occur in the syntactic alternation active-subject/passive-*by*-oblique is not restricted to agents. Secondly, the choice of the thematic role which occurs in the syntactic alternation is not predictable from the identity of the role alone. This choice depends on the full theta frame being employed. In an {experiencer, content} theta frame, it is the experiencer which figures in the active-subject/passive-*by*-oblique alternation, but in a {stimulus, experiencer} theta frame it is the stimulus which does so. When an {agent, patient, instrument} theta frame is operative, it is the agent which figures in this syntactic alternation; with an {instrument, patient} theta frame in use, it is the instrument.

We postulate that the grammar of each language is equipped with a set of theta frames. A theta frame is a constellation of theta roles which corresponds to a perspective for conceptualizing an event (or state of affairs). We further postulate that in a language like English, in which the theoretical concept of grammatical function is an essential part of the machinery of the grammar (this may not be the case for all languages), each theta frame identifies one role which we call the *distinguished argument* role. In the examples we have been considering, it is the distinguished argument role that figures in the active-subject/passive-*by*-oblique

alternation.⁵ For example, in the theta frame that includes an experiencer and a stimulus (example 17), it is the stimulus role which is distinguished; in the theta frame that includes experiencer and content roles (example 16), it is the experiencer role which is distinguished. For convenience of expression, we will henceforth shorten the term 'distinguished argument role' to 'distinguished argument', or simply 'DA'.

It is not a theta role in isolation which influences the choice of the DA but rather the theta role as a member of a specific theta frame. For example, in sentences (16) the experiencer (*Everyone*) is the DA but in sentences (17), although there is an experiencer (*the guard*) it is not the DA, rather the stimulus (*the explosion*) is the DA. We can't say that the DA property is purely semantic, since we have just observed that sometimes experiencers are DAs and sometimes they aren't. The same examples also show that the DA property is not a strictly syntactic one. For each of the examples (16-19), in the a version the DA is realized as subject but in the b version it appears, optionally, as a *by*-phrase. That is, the syntactic function played by an argument is not deducible from the fact that it is the DA. The notion of distinguished argument belongs neither to the syntactic nor the semantic plane exclusively, it is an 'interface' notion, which means that it makes sense only in terms of the relation between the semantic and syntactic aspects of the grammar. Each theta frame 'appoints' so to speak one of its collection of roles to the syntactically privileged status of distinguished argument.⁶

⁵ When we speak of the "passive *by*-oblique" we include tacitly the FNI possibility.

⁶ There is long and valuable tradition of study, both within and without generative grammar, seeking to derive distinguished argument status (or something similar) from semantic considerations. Early works in this area include Fillmore, Charles J., 1977, 'Studies in Lexical Semantics', in Peter Cole (ed) *Current Issues in Linguistic Theory*, Bloomington: Indiana University Press. More recently, Dowty, 1991, 'Thematic Proto-Roles and Argument Selection', *Language*, 67, 547-619, reviews much of the extensive literature on this topic. An interesting

2.3. The Transitive/Passive and the Oblique Goal/Nominal Goal Alternations

The Transitive, Passive, Oblique Goal and nominal goal constructions are the ones we have selected to introduce linking constructions because of the interesting ways in which these constructions interact in producing sentences like (5-13)⁷. Table 2 gives some examples of theta frames that highlight various properties of these constructions, with examples of corresponding verbs.

1 agt	theme		<i>grasp, drop</i>
2 exp	cont		<i>fear, enjoy</i>
3 stim	exp		<i>frighten, please</i>
4 goal	theme		<i>receive, inherit</i>
5 agt	theme	goal	<i>give, contribute*, spare*, send*</i>
6 theme	measure		<i>cost*, weigh*</i>
7 speaker	topic	cont	<i>said*, reputed*, alleged*, rumored*</i>

Table 2

In each row of the table, the distinguished argument of the theta frame represented in that row appears in **boldface**. The first five rows represent five distinct theta frames, whose member verbs participate in the transitive/passive alternation. Row 1 displays the {agent, theme} variety of vanilla transitive verb. Rows 2 and 3 include verbs discussed in connection with examples (16 and 17) and so should require no further

recent theory of this sort within the construction grammar framework is proposed in Koenig, Jean-Pierre (1994), *Lexical Underspecification in Syntactic Theory*, Ph D. Dissertation, Department of Linguistics, University of California, Berkeley. See Chapter 4.

⁷ There are two distinct nominal goal constructions, one present in both American and British speech and one in British speech only. There is no single construction named "Nominal Goal." That is why 'nominal goal' has not been capitalized (except in section titles).

discussion. Row 4 corresponds presents an unusual theta frame, having few members. The more usual situation is for the theme of a {theme, goal} theta frame to be the distinguished argument (*The boat reached the island, Water filled the tub*).

Starting in row 5 with the verb *contribute**, it may be noticed that each sample verb is followed by an asterisk. The asterisk indicates that the verb in question fails to participate fully either in the transitive/passive alternation or in the oblique goal/nominal goal alternation. Consider

- (20) a We contributed twenty dollars to the relief fund
 b *We contributed the relief fund twenty dollars

Sentence (20)a displays the oblique-goal alternant, which is acceptable with *contribute*; (20)b displays the nominal goal alternant, which is not acceptable with *contribute*. There is a large number of English verbs, most of which are either of Latinate origin, of polysyllabic form, or both, that resist the nominal goal pattern. In early transformational grammar, these verbs were said to be 'exceptions to the rule of dative-shift'. In the constructional framework we deal with 'exceptions' like this by specifying in the *minimal* valence of the verb (lexeme) those links between theta roles and grammatical functions which occur in every form of the verb. In this case, the minimally specified link is the one between the goal role and the oblique P[to] realization. In Figure 7, the minimal valence of *contribute* is shown (in abbreviated form) and the minimal valence of the non-exceptional verb *give* is repeated from Figure 1 for purposes of comparison.

$\left. \begin{array}{ccc} \{\} & \{\} & \{\} \\ \text{agt} & \text{theme} & \text{goal} \\ \{\} & \{\} & \{\} \end{array} \right\}$ <p style="text-align: center;"><i>give</i></p>	$\left. \begin{array}{ccc} \{\} & \{\} & \text{obl} \\ \text{agt} & \text{theme} & \text{goal} \\ \{\} & \{\} & \text{P[to]} \end{array} \right\}$ <p style="text-align: center;"><i>contribute</i></p>
---	---

Figure 7

Since the goal role is associated in the minimal valence of *contribute* with P[to] syntactic expression, this minimal valence will not be able to unify with either of the nominal goal constructions.

More generally, 'exceptions' to various linking constructions are handled in construction grammar by providing the minimal valence of a 'defective' verb with that linking information which is present in all forms of the verb and which therefore conflicts with the kind of linking information that needs to be blocked in the valence of this verb. Thus, the minimal valence of the defective verb is prevented from unifying with the linking construction(s) which would provide it with the fully specified valence possibilities it is 'defective' in not exhibiting.⁸

The next verb, *spare**, provides another example of this type. Pause in your reading for a moment, and ask yourself which kind of fully specified valence *spare* does not accept that one might expect it to accept. Since *spare* accepts the nominal goal valence, as illustrated in (21)a, we might expect it to accept the oblique goal valence as well. But the unacceptability of (21)b shows that this is not the case.

- (21) a Spare me your apologies.
 b *Spare your apologies to me.

⁸ The same underspecification/prespecification strategy is employed in the case of DA assignment in the work referred to in note 7. Koenig presents constructions which, when unified with a minimal valence, assign DA status to one argument of an array of arguments of a particular semantic type (his 'semantic type' is analogous to, but not identical with, our 'theta frame'). Predicators which behave idiosyncratically in their assignment of DA (i.e., whose DA assignment doesn't fit any of the DA-assigning constructions) prespecify the DA in the minimal valence, thereby blocking unification with any DA construction.

Figure 8 compares the minimal valences of *give*, *contribute* and *spare*.

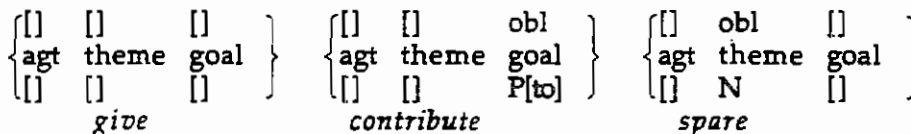


Figure 8

Whereas *contribute* minimally links goal θ to oblique P[to], *spare* minimally links theme θ to oblique NP.

The verb *send** has been included to illustrate a point about the semantics of the nominal goal pattern. (Our earlier statement that each of the starred verbs fails to participate fully in one of the alternations is not really accurate as a description of the facts about to be discussed regarding *send*.) Note the contrast in acceptability of (22)c and (22)d.

- (22) a Lynn sent a letter to Pat.
 b Lynn sent a letter to Pat's house.
 c Lynn sent Pat a letter.
 d *Lynn sent Pat's house a letter.

The unacceptability of (22)d illustrates the fact that the nominal goal pattern has a more constrained semantics than the oblique goal construction. In particular the nominal goal constructions require a special kind of goal, often called a recipient. No one has given an exact description of the special semantics of the nominal goal constructions which has satisfied all scholars concerned, but there is fairly general agreement on a few ideas: the recipient, that is, the goal, must be thought of as sentient, must in some sense or other come into 'possession' of the theme (or be intended or supposed to come into possession of it) and, in many cases at least, is (or would be) in some way affected by the fact of coming into possession of the theme. (The parenthetical insertions in the preceding sentence are meant to cover the cases of verbs of *non-transmission*, like *spare* or *deny*.)

A nominal goal construction requires that the verb whose valence it unifies with have a semantics that includes the {agent, theme, goal} theta frame, and the construction itself adds to that semantics something about a sentient goal who comes to possess the theme as a result of the transmission event (actual or potential).⁹

The items *cost** and *weigh** in line 6 of Figure 8 exemplify verbs which do not accept passive.

- (23) a *Three pounds were weighed by my dissertation.
 b *Three dollars were cost(ed) by Pat's hamburger.

The minimal valence of such verbs assigns the subject function to the theme role. (It would take us too far afield to enter here into consideration of the valence representation of the measure phrase for these verbs.)

Finally, the verbs in row 7 of Table 2 occur (when they bear these three theta roles) in passive but not in transitive sentences.

- (24) a [He]_{topic} is said [to be a fool]_{cont} ([by everyone]_{spk}).
 b *Everyone says him to be a fool.
- (25) a [She]_{topic} is reputed [to know the Princess personally]_{cont} ([by many influential columnists]_{spk}).
 b *Many influential columnists repute her to know the Princess

⁹ That is, 'adds' semantics if it isn't already there. In the case of a verb like *give*, the semantics that has to be added to *send* to make it fit the nominal goal pattern is already present. In this case the semantics of a nominal goal construction simply unifies with elements of the semantics already present in the minimal representation of *give*.

personally.

- (26) a [Bush]_{topic} was alleged [to have known
everything about Iran- contra]_{cont} ([by Ollie]_{spk}).
b *Ollie alleged Bush to have known
everything about Iran- contra.
- (27) a [Leona]_{topic} is rumored (?[by many]_{spk}) [to be
a light tipper]_{cont}.
b *Many rumored Leona to be a light tipper.

In the minimal valence descriptions of the verbal lexemes *said*, *reputed*, *alleged* and *rumored*, which realize this particular theta frame, the speaker argument is linked to the optional *by*-oblique of passive.¹⁰

2.4. An Alternative to Theta Frames and the DA

In keeping with our practice of occasionally warning you that a particular aspect of the approach taken in this text represents a minority view among contemporary syntacticians, we should mention the 'theta hierarchy', which in some contemporary approaches to the problem of linking (i.e., the linking of grammatical functions with thematic roles) does a job roughly comparable to the one done for us the concept of a theta frame which possesses a distinguished argument. We will not give any of the competing approaches a full presentation or provide an analytical comparison of the lot, but will try to present briefly the concept of the theta hierarchy and why we reject it in favor of the concept of theta frame with DA.

There are linking approaches in which the notion of theta frame is lacking and in its place theta roles are treated as atomic concepts, arranged in a linear hierarchy.

¹⁰ Or perhaps in the case of *rumored* only to the FNI option of passive, the *by*-oblique option not being available with this verb for some speakers.

There are several detailed versions of this hierarchy, one of which is the following.¹¹

- (28) agent > beneficiary > experiencer/goal > instrument
> patient/theme > location

What the hierarchy does in effect is determine which theta role is to be linked with the subject function: after other processes – which are partially analogous to our linking constructions – effect links between non-subject gfs and θ s, the unlinked θ role highest on the hierarchy (farthest left in 28) is linked with the subject. For example, if a verb minimally specifies only agent and theme roles (e.g., *stir*), and the passivization processes does not apply to link the agent to an oblique gf, the agent is linked with the subject function because 'agent' outranks 'theme' in the hierarchy.

One reason for rejecting this kind of approach in favor of one based on theta frame plus DA is that a hierarchy of isolated roles takes no account of their relational nature. Such an approach ignores the underlying fact that it is the (theta) *frames*, each schematizing an event-type, which are ontologically primary. Without something like the notion of theta frame, a linear hierarchy, such as that depicted in (28), predicts the possibility of myriad theta arrays which never appear in fact. As we have mentioned, it is in the nature of what we mean by a 'goal' that there must be a theme in the same event and that it is an essential aspect of this kind of event that the theme travels (possibly only potentially and possibly only metaphorically) to the goal.

But a hierarchy such as (28) does not recognize that 'goal' is a relational aspect of a kind of scene (theta frame). As a result, the hierarchy approach allows for the possibility of theoretically impossible, and empirically

¹¹ From Bresnan, J. and J.M. Kanerva (1989) "Locative inversion in Chichewa: A case study of factorization in grammar" *Linguistic Inquiry* 20, 1-50.

unattested, theta arrays, such as {goal}, {beneficiary, goal}, {instrument, goal}, and so on. If we conceive of theta roles as derivative of theta frames, we get an explanation of why most of the mathematically possible combinations of theta roles don't occur in the valence of any lexical item. The idea of an event notionally parsed into, say, a location and an experiencer is incoherent because 'experiencer' makes no sense without the presence of the cause or content of an experience and 'goal' makes no sense outside of the kind of scene in which some theme moves toward an intended destination. Similarly, the presence of a beneficiary implies the presence of an agent because 'beneficiary' means something like 'the social/human being *intended by a conscious, voluntary actor to benefit* ...

Despite these drawbacks, the theta hierarchy approach has led to revealing analyses of syntactic facts in a variety of languages and is not without its virtues and its adherents. A text the length of this book could be written about the various treatments of theta roles and related matters in the existing literature which are in one way or another in competition with the theta-frame plus DA approach advocated here. We will leave the matter with this warning to the reader.

2.5. The Subject Principle

In this section we present the linking constructions required to account for the transitive/passive and oblique goal/nominal object alternations. In the following section, we examine how these constructions are unified with the minimal valence of *give* to produce our data sentences (5-8 and 11).

Before taking up the linking constructions proper we consider the consequences for English of an important typological distinction among languages. In some languages all sentences, and hence all predicators, require grammatical (if sometimes semantically empty) subjects. In other languages subjectless sentences, and subjectless

predicators, are possible. This typological difference seems to cut across language families, not respecting genetic relationships. For example, while French is an obligatory subject language, its Romance cousins Italian, Portuguese and Spanish are not. In French, as in English, an argumentless ('zero-adic') predicate requires a grammatical, albeit semantically null, subject when it appears in a finite clause. Thus, sentences (29)a,b,c say the same thing in French, English and Portuguese, respectively.

- (29) a Π pleut
 b It's raining
 c Chove

This fact about English, and similar languages, is reflected in what we will call the *subject principle*.

- (30) **The subject principle (SP):** Every fully specified verbal valence has a subject gf.

The way we propose to implement the subject principle in English has two parts: (1) English contains a Subject Construction (See Figure 9), which specifies a valence set containing an element whose gf value is subj and (2) every English verbal lexeme inherits this construction.

Subject Construction

|syn	[|cat v, |lex +]
val	{|rel [gf subj]}

Figure 9

There are other considerations which lead to the postulation of a subject principle, for English and for other languages, beyond the matter of whether every finite clause has an explicit subject. For example, in any language that has a coinstantiation construction which, like the English one, links the *subject* of the downstairs verb with some argument of the governing verb, each verb must have a subject gf whether or not this argument

is directly instantiated. Recall that in sentences like *Lynn persuaded Pat to be examined by a doctor*, *Lynn persuaded a doctor to examine Pat*, *Pat was persuaded (by Lynn) to be examined by a doctor*, and *A doctor was persuaded (by Lynn) to examine Pat*, the generalization covering all four cases of coinstantiation is that the theme of the *persuade* valence is unified with the subject of the *examine* valence. In English-style coinstantiation, the controller (the upstairs argument) is selected semantically while the controllee (the downstairs argument) is determined by the grammatical function subject.

It is assumed by many syntacticians that all languages place a *gf* subject requirement on every verb, but this assumption, and even the weaker assumption that all languages have grammatical functions at all (as contrasted to nominal cases), can be disputed. Examination of these complex questions is beyond the scope of this introductory work. We take it as established that English places a subject requirement on each verbal predicator and leave open for your future study of syntax the larger questions which are thereby introduced.

The subject principle supplies every fully specified verbal valence with a subject function, unlinked, of course, to any particular theta role or syn value. (We could say, equivalently, that the subject principle provides every *minimal* valence with an unlinked subject *gf*.) This principle interacts with the linking constructions and minimally specified valences to produce fully specified valences, as we will see in the following section. There may of course exist, independent of the subject principle, linking constructions which associate the subject with a particular argument. Such constructions do not conflict with the subject principle.

3. Minimal and Fully Specified Valences Revisited

We will indicate the distinguished argument by the feature 'DA +' in the rel value of each element of a predicator. As mentioned, every verb has one valence

element that is marked 'DA +' (unless it has no arguments, as is the case with weather verbs). New versions of the minimal valence representation for *give* are presented in Figure 12 (Compare Figure 1).

Minimal *give* with DA Indicated

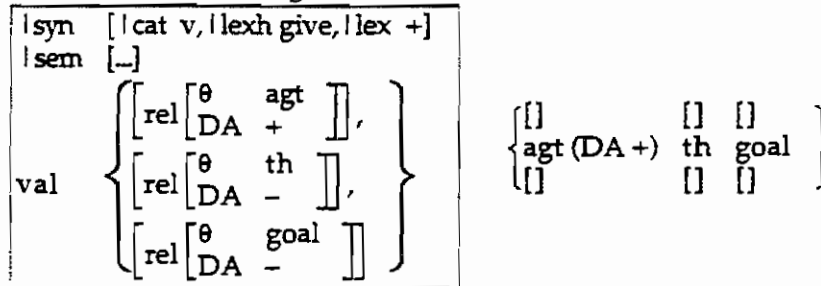


Figure 12

In the abbreviated valence diagram representation of the construction, we do not bother to mark the non-DA elements as such, since this is predictable.

It might be well to recall at this point that every valence element in a construct must be fully specified, that is, every attribute in each valence element has to have a specified value. This follows from the fact that all feature structures in constructs are fully specified. (See Chapter 2, section 2.8.4.3). Thus, if we want to use the processual metaphor of 'putting together' constructions to create a construct, we can say that 'before' a valence-bearing item can be 'put together' with another structure, its valence must be fully specified. The following 'Principle' is thus not an empirical claim but a logical consequence of the formalism.

- (31) **Full Specification Principle.** In a valence element occurring in a construct, every *gf*, θ , *syn* and *DA* attribute receives a specified value.

3.1. The Transitive (Trans) Construction

The Transitive construction links 'gf obj' to a non-DA argument. Figures 13 and 14 represent the Transitive Construction.

Transitive (Trans) Construction

syn	[voice active]
val	{ role [gf obj] }
	[DA -]

Figure 13

Trans Construction in Abbreviated Valence Description Form

obj
DA -
[]

Figure 14

In a transitive clause with a two-argument verb, since the non-DA is linked to object and since there is necessarily a subject element (see 30), the DA will have to be linked to the subject in order to satisfy the Full Specification Principle (31). In active clauses it frequently occurs that the DA is linked to subj, but this pattern is not without exception. Consequently we do not assert any general association of active voice with DA-subject linking.¹²

12. Passive

The Passive construction either assigns the DA free null instantiation or links it to an oblique *by*-phrase.¹³

¹² Clauses of the so-called middle form, such as (i), involve the linking of a non-DA to subject in the valence of a predicator (*sell*) marked for active voice.

(i) Her book is selling wonderfully.

¹³ The last statement is not quite true; the DA is not actually linked to the PP headed by *by*, but rather to the NP which serves as object of this PP. The passive *by* has no semantic arguments of its own; it serves only to mark its object as the DA of the passive verb. (If the theorem was proved *by* the student, the student wasn't necessarily 'by' anything.) In the present chapter we ignore this complication. The expression of an

Figure 15 presents the Passive linking construction. In this figure, and in subsequent figures presenting linking constructions, we present the abbreviated valence description version to the right of the full representation of the construction.

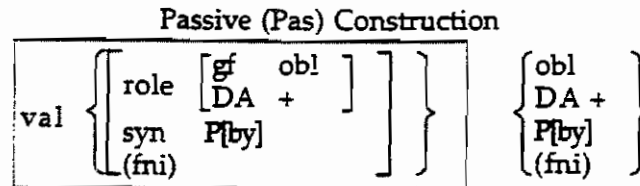


Figure 15

We have proposed a single formulation of Passive for both the British and American dialects. As discussed earlier in this chapter, the dialects do not differ regarding passive sentences which do not involve a nominal goal construction. The Passive construction itself has nothing to say about which θ ends up linked to the subject function. This allows, in particular, that in British sentences which are both passive and extra-object the subject function may realize either the goal or the theme θ role. The special British extra object construction that licenses sentences like (11), repeated, will inherit the Passive construction, as given in Figure 15.

- (11) ^{ok}Br./^{*Am}. A thermometer was given Goldfinger (by Agent 007).

3.3. Oblique Goal

argument of a verb as a complement of a 'case-marking' preposition governed by that verb is a topic we will take up in more general form later. For now we will pretend that it is the *by*-PP itself, and not its object NP, which realizes the argument of the governing verb. In the chapter on prepositions, the formulation of the Passive linking construction will be revised according to a general treatment of the representation of arguments of verbs that are realized as the objects of case-marking prepositions.

With regard to the Oblique Goal construction, again a single version for both British and American dialects suffices. This is provided in Figure 16.

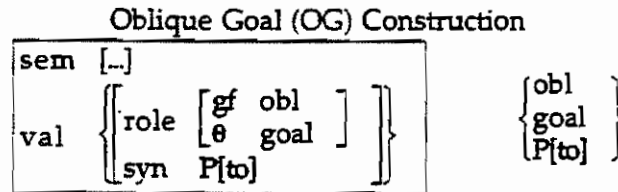


Figure 16

We have indicated in Figure 16 that the Oblique goal construction has a semantics of its own, via the notation 'sem [...]'. The oblique goal construction may unify with minimal valences that realize a theta frame which itself contains no goal, but which contains a theme.

- (32)a The batter hit the ball
 b The batter hit the ball to the center fielder
- (33)a The bottle floated
 b The bottle floated to the bank

3.4. The Shared Nominal Goal Construction

In a nominal goal sentence like (6) or (8), repeated below, there is always an agent, a theme, and a goal. The theme is realized as an oblique NP and the goal is marked as the object in active clauses and as an optional *by*-oblique in passive clauses.

- (6) Agent 007 gave Goldfinger a thermometer.
- (8) Goldfinger was given a thermometer (by Agent 007).

In the nominal goal pattern of (6) and (8) (the 'American' pattern), the theme is always realized as an oblique NP. For that reason, we will christen the construction which licenses this pattern the Nominal Oblique Theme (NOT)

construction. In a later section, we will consider the relation of the NOT construction to two other oblique theme constructions: the *With*-Theme construction illustrated in (34)a and the *Of*-Theme construction, illustrated in (34)b.

- (34) a Lynn spread her pork chop with peanut butter.
 b Marion rid our basement of fleas.

The NOT Construction is given in Figure 17 in abbreviated valence description form.¹⁴

Nominal Oblique Theme (NOT) Construction

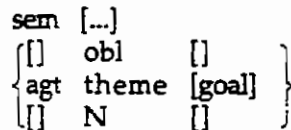


Figure 17

In Figure 17 (and also in the British nominal goal construction given in Figure 18 below) the notation 'sem [...]' appears. This indicates that the construction requires semantically, not only a movement theta frame, involving an agent, a theme and a goal, but that it also requires the additional semantics that we discussed in connection with examples (19), involving the verb *send*, in which the goal is interpreted as a sentient recipient (potentially) affected by the receipt (or non-receipt) of the theme.

3.4.1. Nominal Goal Constraint on Left Isolation

There is another property of this construction which is not noted in Figure 17 (or Figure 18 below). It is

¹⁴ This version of the construction is preliminary because it needs to be complicated to account the facts in sentences (12) and (13), so far undiscussed.

the constraint on 'extraction' displayed by the starred examples (12) and (13), repeated.

(12) *Which spy do you think Agent 007 gave a thermometer?

(13) *Which spy do you think a thermometer was given?

In (12) a goal participant is questioned (via the Left Isolation Construction, to be discussed in a later chapter) which otherwise would have occurred as the direct object in an active, nominal goal sentence. In (13) the constituent illegitimately questioned is the oblique nominal goal in the peculiarly British type of passive nominal goal sentence in which the theme occurs as subject. The issue is not really one of a constituent's being questioned, but rather of its being left-isolated ('extracted'), as we see in examples (35) and (36), in which left isolation serves the purpose of relative clause formation rather than question formation.

(35) *I saw the spy that Agent 007 gave a thermometer.

(36) *I saw the spy that a thermometer was given.¹⁵

While the constraint prohibits the left-isolation of goals which are objs or oblique nominals, it does not prohibit the left-isolation of goals which are realized as subjects in (passive) sentences which contain nominal goals. That is, the constraint does not apply to all goals in

¹⁵ Incidentally, if sentences (12) and (35) sound pretty dam good to you, and (13) and (36) seem to you like they ought to be good for any British-type speaker who can get (11), you may take consolation in the fact that one of your authors shares these misgivings about the judgments presented with those four examples. It is, however, a fact that these judgments represent the speech of a large number of speakers and therefore must be accounted for. Of course the grammar of an English speaker whose nominal goal sentences do not exhibit any constraint on left isolation simply requires no embellishment of the nominal goal constructions as presented in Figures 17 and 18.

sentences which employ an nominal goal construction, only to goals which would otherwise be realized in the verb phrase.

- (37) a Which spy (do you think) was given a thermometer.
 b I saw the spy which (I think) was given a thermometer.

The constraint on left-isolation of non-subject goals can be stated quite simply in our notation, but, in order to do this we will need to have discussed the Left Isolation construction in detail, so this matter is postponed to a later chapter in which the phenomenon of distant instantiation is treated. For the moment, you are asked to take on faith that the nominal goal constructions contain a statement of the constraint barring left isolation of non-subject goals.

3.4.2. 'British' Nominal Goals

We have seen that the 'American' nominal goal construction (NOT) links the theme with an oblique NP. This has the effect – which we will investigate further in considering our example sentences in detail below – of forcing the goal to link with the obj when the transitive construction is employed and of forcing the goal to link with the subject in passive valences. The 'British' nominal goal facts are not so simple: in the transitive case (10) we find, as in American, links of goal to obj and theme to oblique nominal, but in the passive case (8, but also 11), there is, in addition to the pattern just described for American, a second possibility: goal links to oblique nominal and theme links to subject. This is what we see in example (11). The additional construction required to license a sentence like (11) is given in Figure 18 in abbreviated valence description form.

'British' Nominal Goal (BNG) Construction

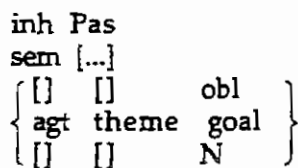


Figure 18

The BNG has (so far as we know) the same semantics as NOT and the same constraint on left isolation (extraction); these properties need therefore not be further discussed here.

4. The Linking Constructions in Action

We are now prepared to assemble the fully specified valences required by our sample sentences (5-8 and 11) by beginning with the minimally specified valence of *give* and unifying it with every possible combination of constructions that will produce a well formed fully specified valence, that is, a valence set in which each element is specified with respect to its θ , gf and syn values. For your convenience, the linking constructions to be used below are listed in their abbreviated forms in Figure 19, the bottom row of each diagram representing in **boldface** an abbreviation of the name of the construction. (Some abbreviations have been shortened in ways that shouldn't cause confusion. We have suppressed in the nominal goal constructions - NOT and BNG - the notations pertaining to semantics and inheritance.)

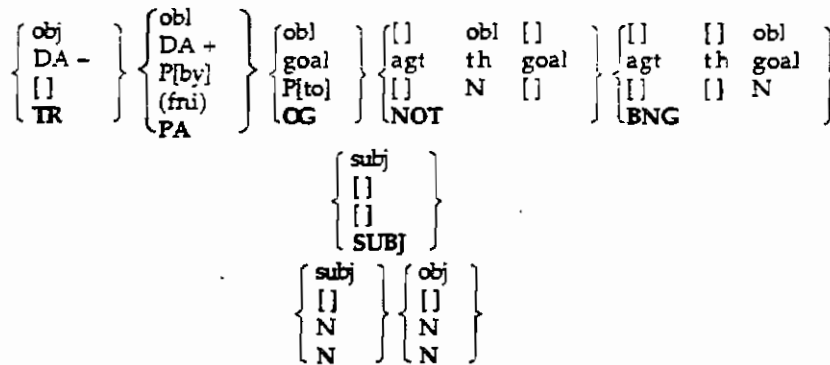


Figure 19

The last two constructions in Figure 19 have not been previously discussed. They license subject and object gfs to be expressed syntactically by noun phrases, regardless of the theta role assigned to them. The single abbreviation N is assigned with deliberate ambiguity to both of these constructions, as their operation is marginal to the main point.

Our format for analysis of examples (5-8 and 11) is as follows. We first present the example sentence. Then we present, for the convenience of the reader, the subset of the constructions listed in Figure 19 which are unified with the minimal valence of *give* and with each other to produce the fully specified valence of the form of *give* that appears in the sentence under analysis. (It is assumed, according to the Subject Principle, that the Subject Construction is present in each example. The marking of the agt of *give* as DA + is also suppressed throughout these demonstrations for ease of reading.) Following the list of constructions relevant to the example there is presented a row of abbreviated valence diagrams, starting on the left with the minimal valence of *give*. Between each pair of adjacent valence diagrams in this row is an indication of the construction that is unified with the diagram on its left to produce the diagram on its right. The rightmost valence diagram in the sequence is the fully specified valence of the form of *give* that occurs in

the sentence being analyzed. Following each analysis in this format is a brief discussion.

You should be aware that, although the unifications are performed in the course of the demonstrations in *some* linear order, the particular linear order chosen is of no significance. You should verify for yourself that the same results are obtained if the constructions employed in a given demonstration are applied in any other of the possible linear orders. (Frequently the one we have chosen is the one that requires the least space to display because it produces the smallest number of branching possibilities.)

You should also satisfy yourself that the five demonstrations given below represent all and only the fully specified valences for *give* that are licensed with this set of constructions. In particular, you should investigate on your own how examples (9) and (10) fail to be licensed by this set of constructions.

(5) Agent 007 gave a thermometer to Goldfinger			
$\left\{ \begin{array}{l} \text{obj} \\ \text{DA -} \\ [] \\ \text{TR} \end{array} \right\}$	$\left\{ \begin{array}{l} \text{obl} \\ \text{goal} \\ \text{P[to]} \\ \text{OG} \end{array} \right\}$	$\left\{ \begin{array}{l} \text{subj} \\ [] \\ \text{N} \\ \text{N} \end{array} \right\}$	$\left\{ \begin{array}{l} \text{obj} \\ [] \\ \text{N} \\ \text{N} \end{array} \right\}$
$\left\{ \begin{array}{l} [] \quad [] \quad [] \\ \text{agt} \quad \text{th} \quad \text{goal} \\ [] \quad [] \quad [] \end{array} \right\}$	$\text{OG} \rightarrow \left\{ \begin{array}{l} [] \quad [] \quad \text{obl} \\ \text{agt} \quad \text{th} \quad \text{goal} \\ [] \quad [] \quad \text{P[to]} \end{array} \right\}$	$\text{TR} \rightarrow \left\{ \begin{array}{l} [] \quad \text{obj} \quad \text{obl} \\ [] \quad \text{th} \quad (\text{DA -}) \quad \text{goal} \\ [] \quad [] \quad \text{P[to]} \end{array} \right\}$	$\text{SUBJ} \rightarrow$
$\left\{ \begin{array}{l} \text{subj} \quad \text{obj} \quad \text{obl} \\ \text{agt} \quad \text{th} \quad \text{goal} \\ [] \quad [] \quad \text{P[to]} \end{array} \right\}$	$\text{N} \rightarrow$	$\left\{ \begin{array}{l} \text{subj} \quad \text{obj} \quad \text{obl} \\ \text{agt} \quad \text{th} \quad \text{goal} \\ \text{N} \quad \text{N} \quad \text{P[to]} \end{array} \right\}$	
<p>We begin with the minimal valence for <i>give</i>. The result of unifying Oblique Goal with the minimal valence for <i>give</i> associates the goal role with an obl gf and P[to]. Unifying the Transitive construction with the result furnishes an obj function assigned DA -; the theme role is forced to link with the obj function because theme is compatible with DA -, while agent is DA + and goal is already linked. Unifying with SUBJ gives a subj gf, which has nothing to link with except agt. It remains only in the last step to use the N constructions to assign nominal syntax to the subj and obj elements.</p>			

Figure 20

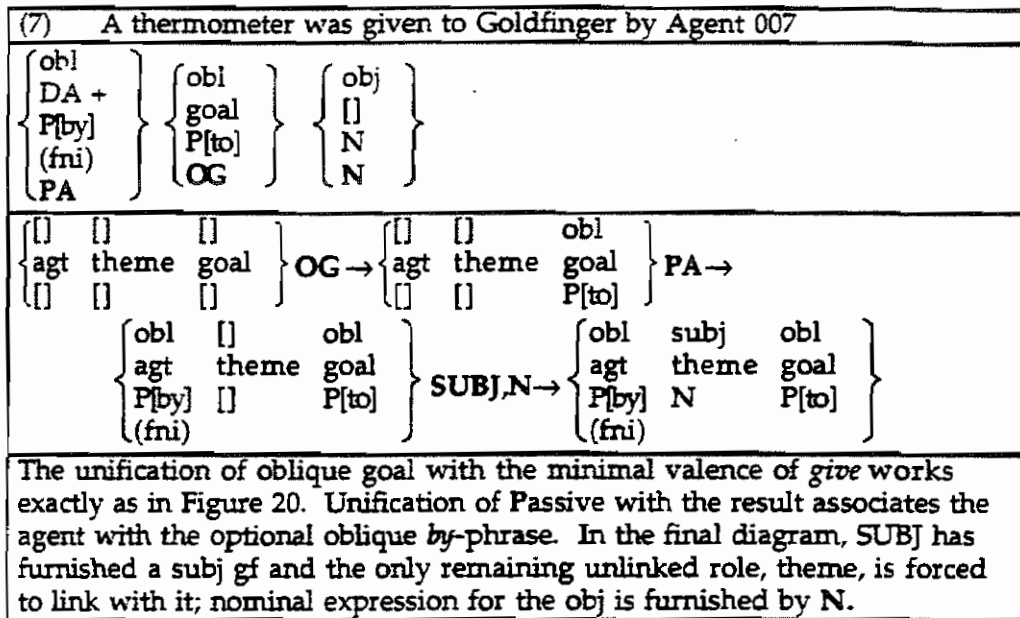


Figure 21

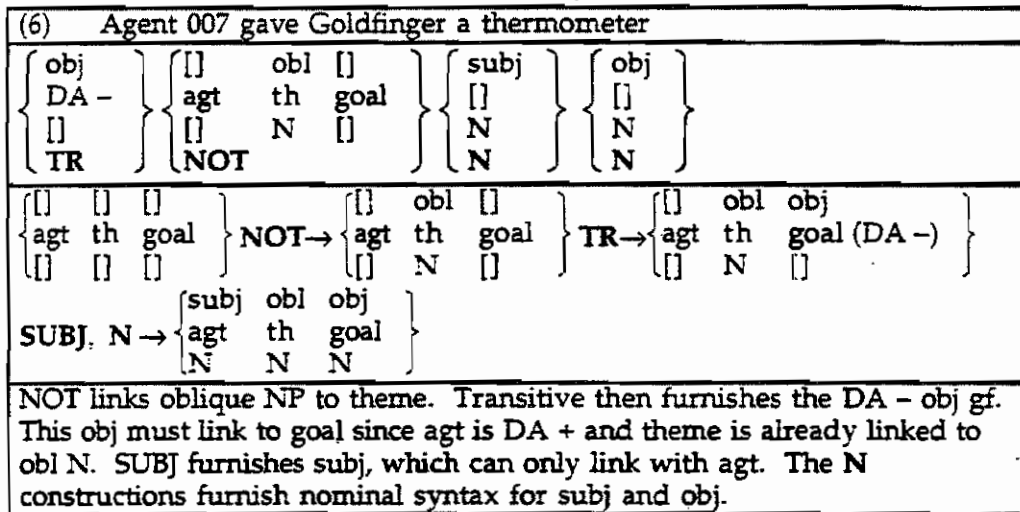


Figure 22

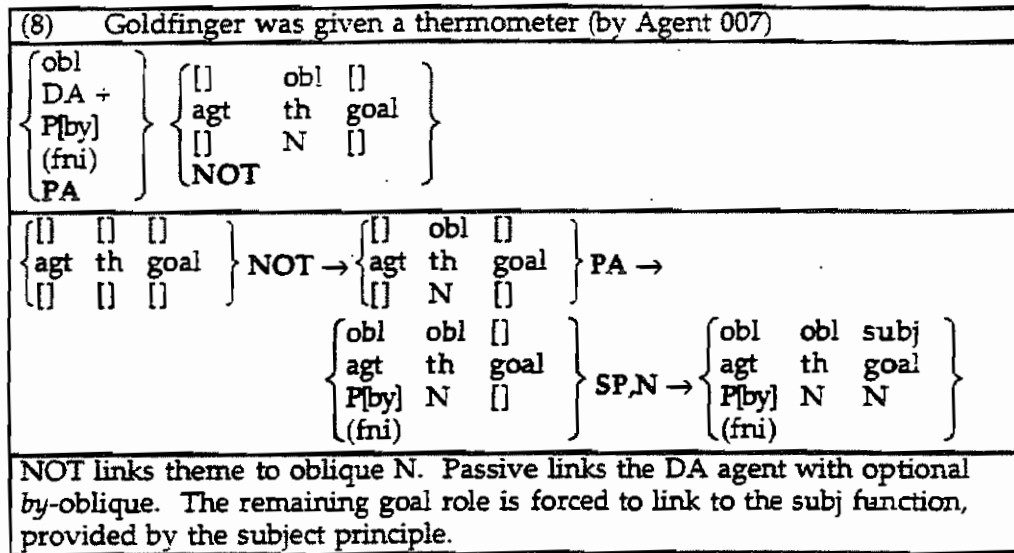


Figure 23

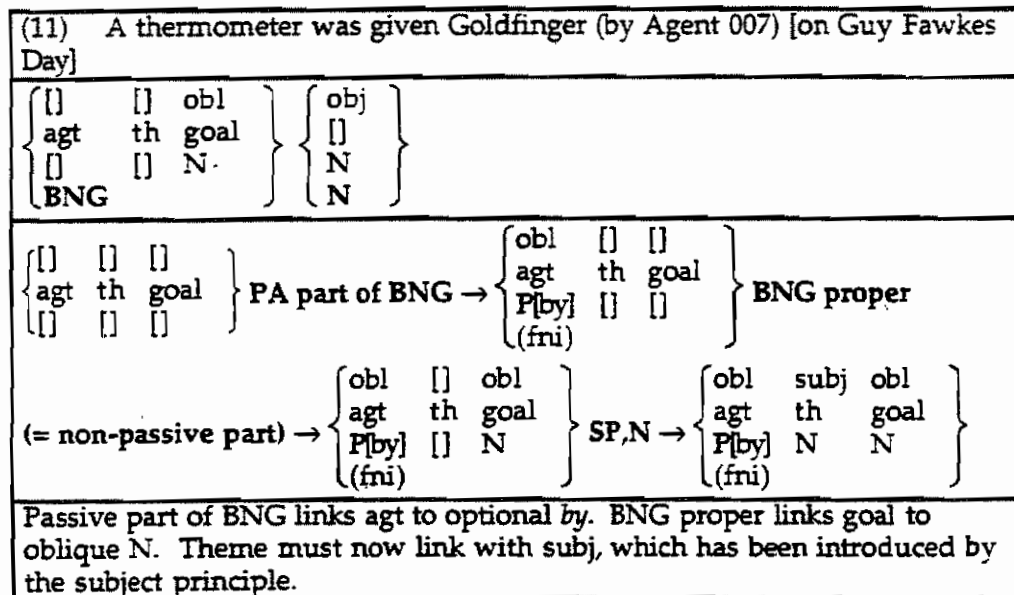


Figure 24

5. The Oblique Theme Family of Constructions

It was mentioned in section 14, that the NOT construction is part of a family of constructions which give oblique expression to themes. NOT has the peculiarity of expressing an oblique function by a bare NP. This is unusual in English, oblique functions ordinarily being expressed by PPs, with bare NPs being reserved for subjects and objects. But oblique NPs are not unheard of.

- (38) a He died the next day.
 b *The next day was died (by him).
- (39) a She walks the same way.
 b *The same way is walked (by her).
- (40) a Fly United Starjets to Belgium.
 b *United Starjets should be flown to Belgium (by you).

The post-verbal NPs in (38-40) do not passivize. Their semantics is of the sort usually expressed by obliques: *on the next day, in the same way, on United Starjets*. The argument is not knock-down, but if we assume that these post-verbal NPs in active sentences are minimally assigned to oblique gfs, not only does our assignment of gfs follow the general semantic tendency of the language, but also we are able to make the clean statement that all arguments that appear as objects may also be realized as passive subjects, and conversely. We conclude that there is motivation for positing NPs appearing as obliques – aside from our positing an oblique NP theme as our solution to the nominal goal problem.

We have analyzed the alternation in (41) versus (42) in terms of the expression of the theme as oblique in (41) but non-oblique (object or passive subject) in (42).

- (41) a A gent gave the thesis to Golda.
 b The thesis was given to Golda (by a gent).
- (42) a A gent gave Golda the thesis.

- b Golda was given the thesis (by a gent).

In particular, we have argued that in (42) the goal is non-oblique (subject or object) while the theme is oblique.

There are two other alternations which invite analysis in terms of oblique versus non-oblique expression of a theme. In examples (43) and (44) we find a theme and a goal.

- (43) a Tim smeared grease paint on/across/all over his forehead.
 b Grease paint was smeared on/across/all over his forehead (by Tim).
- (44) a Tim smeared his forehead with grease paint.
 b His forehead was smeared with grease paint (by Tim).

In (43) there are several prepositions that can be used to express the oblique goal but in (44) there is only one preposition that can be used to mark the oblique theme. This suggests that sentences like (43) contain either Transitive (43)a or Passive (43)b and in addition contain one of a range of oblique goal constructions, each of which furnishes a particular goal-introducing preposition. That is, the examples in (43) are essentially like our familiar oblique goal sentences including (41) and (5,7), differing from these only in their goal-introducing preposition. Sentences (44), on the other hand, are similar to examples (42) and (6,8). These are sentences in which a theme argument is expressed obliquely. Moreover, as in the case of NOT, expression of the theme as a *with*-oblique depends on arguments other than the theme itself (unlike the oblique goal constructions). There is no construction that says *simply* that a theme argument can be expressed a *with*-oblique; there must be a goal involved as well.

- (45) a *Tim threw with a ball.
 b *Sheila kicked with a rock out of her way.
 c *I put with several books into the bookcase.
 d *We cleared the site with the debris.
 [meaning 'of the debris']
 e *She pushed with the suitcase into the closet.

We saw that the NOT construction required an agent as well as a goal. It appears that the (oblique) *With-Theme* construction does not require a third argument, beyond the goal. We thus find *with-theme* intransitive sentences.

- (46) a The cup filled with water.
 b The sack was bulging with potatoes.

A situation parallel to the one that pairs a *with-oblique* theme and a goal, pairs an *of-oblique* theme and a source. Although there are not many intransitive verbs that accept *of-oblique* theme arguments (*empty* and perhaps one or two others), we do find both transitive and intransitive examples.

- (47) a The pool emptied of water.
 b They emptied the pool of water.
 c They cleared the site of rocks.

To summarize so far, it appears that we have, along with NOT, which links a theme to an oblique NP in the presence of a goal and an agent, two other oblique theme constructions: one which links theme to oblique P[with] in the presence of a goal and one which links theme to oblique P[of] in the presence of a source. These three constructions – NOT, *With-Oblique Theme* (*With-OT*) and *Of-Oblique Theme* (*Of-OT*) – share the properties of expressing a theme argument obliquely in a scenario of directed motion, that is, motion along a path either from a source or toward a goal (or both).

Theme arguments usually show up as objects of transitives or as subjects of passives or of intransitives. It

is therefore especially interesting that the occasions on which themes show up as obliques share this much in common. We wish then to gather the common properties of NOT, *With-OT* and *Of-OT* together in a single (abstract) linking construction and have each of the three 'on line' constructions inherit that abstract construction. This will provide our first illustration of constructional inheritance.

As we mentioned earlier, the intuition of constructional inheritance is that one construction (the 'descendant') contains all the information of another (its 'ancestor'). Equivalently, we may say that the inheriting construction (descendant) is a special case of the construction it inherits (the ancestor). In the present instance, we will say that the three specific oblique theme constructions, NOT, *With-OT* and *Of-OT*, inherit the abstract Oblique Theme (OT) construction. When constructional inheritance is notated in diagram form for a construction B which inherits another construction A, we write 'inherit A' (or 'inh A') at the top of the diagram for construction B.¹⁶ A heuristic interpretation of such a diagram lets one imagine that all the stuff that is written in the diagram for construction A is present (although not shown) in the diagram for construction B – along, of course, with whatever other information is present in the diagram for construction B.¹⁷

The OT construction is depicted in Figure 25. The concept of directed motion we discussed above is represented by the abbreviation 'motion'.

¹⁶ This looks like an attribute-value pair but it isn't! There is no attribute which accepts the names of constructions as values.

¹⁷ The mechanism of inheritance is not to be interpreted, however, as a mere ink-saver, a technique for notating constructions economically. Inheritance relations provide a major means of capturing linguistic generalizations. Usually the indication of inheritance in a construction diagram does save space, but that is not the point. In the example of NOT, to be discussed just below, the inheritance notation actually saves little space.

Oblique Theme (OT) Construction (bound)¹⁸

sem	[motion +]
val	{rel [gf obl θ th]}

Figure 25

The NOT construction, originally presented in Figure 17, is presented anew in Figure 26 to show its inheritance of OT.

NOT (showing inheritance of OT)

inherit	OT
sem	[...]
val	{ [rel [θ agt]], [rel [θ goal]], [rel [gf obl θ th] [syn [cat n]]] }

Figure 26

The *With*-OT and *Of*-OT constructions are presented in Figures 27 and 28, respectively.

With-Oblique Theme (*With*-OT)
Construction

inherit	OT
val	{ [rel [θ goal]], [rel [θ th] [syn P[with]]] }

Figure 27

Of-Oblique Theme (*Of*-OT)
Construction

inherit	OT
val	{ [rel [θ source]], [rel [θ th] [syn P[of]]] }

Figure 28

¹⁸ A bound construction cannot be used to license a construct, only its descendants can. Some ancestor constructions are bound and others are not. (Non-ancestral bound constructions would have no point.) We will return to the matter of bound constructions in a later chapter.