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Preface

Core syntax is a somewhat cheeky name for a textbook. There are many 'core' aspects of syntax, depending on the viewpoint you take. In this book, I have tried to highlight three aspects. Many working syntacticians will disagree that these are *the* core areas, but I hope that everyone will agree that they at least provide a consistent perspective.

First, I have tried to emphasize that an important part of doing syntax is constructing a consistent theoretical system within a broad research agenda. The research framework that I have adopted is that of the Minimalist Program, a perspective that has emerged from the work of Noam Chomsky. In the book, I develop certain theoretical ideas which stem from the concerns articulated by Chomsky, and I use these ideas to build a system. I have tried to make the system as consistent (both conceptually and notationally) as I can, and I have tried to emphasize the interactions between theory, analysis, and data, and how developments in any one of these areas affect the others.

The second way in which the material of the book could be considered 'core' is that I have tried to cover a broad range of phenomena which form a (somewhat nebulous) area of empirical importance as far as the recent history of the subject is concerned. These phenomena have also been chosen because they can be used to motivate or to challenge the theoretical ideas that are being developed. I hope that by doing this, students will acquire both an overview of some important areas of empirical concern, and an appreciation of how syntactic arguments are developed.

The third aspect on which I have concentrated is methodological, and it has to do with the importance of rigour in helping to clarify ideas, and the concomitant importance of formalization as a skill which will help students to think through syntactic questions. The strictly derivational approach I have adopted, and the explicit presentation of how derivations are constructed, should help students to learn to be comfortable with some of the formal aspects of syntactic theory.

I hope that the book's emphasis on these three aims will mean that it will outlive the details of current theoretical fashion. The particulars of the theory will certainly change, but the kinds of syntactic argumentation deployed in the field and the importance of rigour and consistency will surely

remain, as will, I think, the kinds of questions raised by the research agenda adopted here.

Aside from these three aims, I have also tried to tease out how a theory based on invariant syntactic principles, interacting with the parameterization of featural properties of functional heads, really does provide at least one answer to the Poverty of the Stimulus questions raised by Chomsky. The sections in the chapters which concentrate on this aspect of syntax also try to raise the further question about how parameterization itself can be restricted. This highlights a number of open questions, as does the approach to island phenomena sketched in the final chapters. I hope that at least some students will be encouraged to try to find out answers to these and related questions themselves.

Because the Minimalist Program is a research agenda rather than a particular theory, and because one of my main aims in this book is to introduce students to how internally consistent syntactic systems are constructed, I have melded argumentation and analyses from the literature with ideas that have developed from the particular theoretical choices I have made. For example, the checking theory I have adopted allows variation in the strength of the values of features, rather than in the features themselves, with effects on numerous analyses and on the encoding of parametric variation; the approach to verbal inflection I propose is different from others in the literature (although I do discuss the alternatives); the analyses I sketch for passivization, for subject wh-questions, and for verb-second, for example, are not derived directly from the primary literature, but rather arise from the particular implementation of Minimalism developed here. This was the best way I could see of achieving my three aims of theoretical consistency, a reasonable coverage of core phenomena, and a fair amount of analytical rigour. I hope that readers knowledgeable about the current Minimalist literature will forgive any liberties I have taken.

Finally, some thank-yous: first, to three anonymous OUP reviewers, two of whom later became onymous as Bob Borsley and Liliane Haegeman. All three reviewers went well beyond the call of duty, and provided the book with much needed direction, and I'm hugely grateful to them, as I am to my editor at OUP, John Davey, for advice and encouragement. I'd also like to thank Bob Friedin, Jason Merchant, and Andrew Radford for comments on an earlier draft and Bernadette Plunkett and Gillian Ramchand, both of whom used earlier versions of the book in their teaching, and who provided me with detailed comments about how it was structured. Many thanks too to all the students who have been subjected to earlier versions of this material, and whose patience and forbearance was, at times, amazing. I also need to acknowledge a debt to Donna Jo Napoli's

book *Syntax*, from which I have adapted many of my exercises. Bernadette and Gillian join a band of trusty linguistic old faithfuls who have been on call for me whenever I needed to check out that an idea wasn't completely insane. Others in this band are Daniel Harbour, Ian Roberts, George Tsoulas, and the Tequila Cabal. Final thanks are to Anson, *sine quo nihil*.

1

Core Concepts

1.1 What is a sentence?

1.1.1 Utterances, propositions, and sentences

Certain utterances of human languages seem to have a special status, in that they express what you might call 'complete thoughts'. So if I were to say, "It's rather hot, today", any native English speaker will interpret me as conveying a message which is somehow complete. Note that *you* could say exactly the same thing, "It's rather hot, today", which will also convey a complete message. However, if I do this on Sunday, and you do it on Monday, the message communicated is different. Linguists say that the **proposition** expressed is different.

A proposition is that aspect of the meaning of a sentence which allows us to say, "Yes, that's true" or "No, that's false". It describes a state of affairs that holds in the world, and its correspondence with that state of affairs allows us to attribute truth or falsity to the proposition. There are other aspects of sentence meaning which we will address later in the book, but propositional meaning will be the most relevant for us here.

Note that, even though we have expressed different propositions, we have both used exactly the same linguistic form. We have both said the same **sentence**. This little scenario gives us some grasp of a core idea in syntax, the idea of a sentence as an abstraction over **utterances** which have the same form. Linguistic form is not important to a proposition. The same proposition is conveyed by the English sentence (1), the French sentence (2), and the Scottish Gaelic sentence (3), even though these sentences are in different languages:

(1) John saw Stephan.

(2) Jean a vu Stephan.

(3) Chunnaic Iain Stephan.

So a proposition is that aspect of the meaning of a sentence which says something about a state of affairs, and an utterance is an actual use of a sentence. How do we define sentence itself then?

Take any act of linguistic communication, an utterance of (1) by me to you, for example. Somehow you glean a proposition from my utterance of (1). How do you do this? The common-sense answer is that it's because we both know the same language. Focusing in more precisely on the question of how we define sentences, it appears that there is something about my knowledge of English which is shared with your knowledge of English, and that this includes how to form sentences of English, and how the proposition expressed by a sentence depends on its form. Clearly the form is important, since if you were to utter some sequence of sounds that did not form a sentence of English, then I'd have a much more difficult task in understanding what proposition you were trying to convey.

Part of our shared knowledge of language, then, allows us to construct sentences, which we can then utter. Again, the idea of a sentence is more abstract than the idea of an utterance (which is something that you can hear, record, feed into a computer as sound waves, etc.). A sentence itself is something which can't be recorded, heard, or electronically manipulated, only uses of sentences can. These stretches of words that you are now reading, delimited by capital letters and full stops, and interspersed with other markings, are uses of sentences. The sentences themselves are defined by the knowledge of English that I put to use in writing them, and that you use in comprehending them. Although it sounds counter-intuitive, what you see on this page are teclmically utterances, in that they have an external, physical manifestation. Sentences, on the other hand, are internal, mental entities, which have an abstract form.

1.1.2 Acceptability, grammaticality, and stars

The form of sentences is what will mainly concern us in this book. The example I went through above showed that the same sentence form can be used to express different propositions on different occasions of utterance. We can also express the same proposition using different sentence forms. So most people would agree that essentially the same message is conveyed by both the sentences below:

(4) That monkey is eating the banana.

(5) The banana is being eaten by that monkey.

And most people would find it difficult to say what message is conveyed by (6) and would reject it as a sentence of English:

(6) By is eaten monkey banana that the being

Why is (6) not an **acceptable** sentence of English? Well obviously the **order** of the words matters. (6) uses exactly the same words as (5) but the order in which the words come in (6) is somehow not an order which English allows. Acceptability, however, doesn't just depend upon the order of words. (7) is just as unacceptable as (6), but the order of the words seems to be fine (it's just like the order in (4)), it's the *form* of the words that makes the sentence unacceptable, the word after *is* should have the form *eating*, not *ate*:

(7) That monkey is ate the banana

As well as clearly unacceptable sentences like (7) and (6), we also find sentences which seem odd in some way.

(8) The amoeba coughed

The acceptability of this sentence depends upon the context in which it is uttered. (8) is unacceptable to most speakers if someone just says it out of the blue. However, one can easily imagine contexts where (8) is quite fine: in a fantasy novel for example, or as a description about what's going on in a children's cartoon. The form of (8) does not appear to be a determining factor in our judgements of its acceptability, it is rather the proposition that is expressed which we baulk at. The acceptability of (8), then, appears to be dependent on our view of the world. In most people's view of the world, amoebas don't cough or faint, and so we judge (8) as unacceptable because it conflicts with our expectations about what words can mean, and about how the world works.

There are also cases of unacceptable sentences which appear to be semantically plausible, but which seem to be awkward. An example of such a sentence is (9):

(9) I looked the number which you picked out at random by using a needle and a phonebook up.

This sentence becomes more acceptable if the word *up* is placed immediately after the word *look*:

(10) I looked up the number which you picked out at random by using a needle and a phonebook.

Another way of making this kind of sentence more acceptable is by making the distance between *look* and *up* shorter:

(11) I looked the number up.

The unacceptability of (9) might have an explanation in terms of how we process the sentence. In an intuitive sense, the words *look* and *up* are closely associated with each other. In (10), they are pronounced together, while in (11) they are separated by a small number of words. In (9), however, there are fifteen words between *look* and *up*. One hypothesis to pursue would be that, on processing the sentence, the hearer accesses the word *look* and expects the word *up* to appear next. However, the hearer has to wait quite some time for the expected word to appear, and presumably process a fairly complex structure in the meantime. We might, therefore, put the unacceptability of (9) down to the fact that the connection between *look* and *up* is difficult to make because there is too much other processing going on.

This kind of explanation for unacceptability is known as a **parsing** explanation. It assumes that the problem with the sentence is not that it does not conform to the rules of the language, but rather that human beings processing (or parsing) the sentence have a hard time assigning the right structure to it. In the most extreme cases we might conclude that the sentence can't be parsed at all—it is **unparsable**.

Notice that this kind of explanation does not appear to be available for examples like (7). We cannot make the sentence any better by reducing the distance between the relevant words. The problem appears to be that the language simply requires a particular relationship to hold between these words, and in (7) it simply doesn't hold. This kind of explanation for the unacceptability of (7) is known as a **grammaticality** explanation, and sentences like (7) are termed **ungrammatical**.

Syntacticians express the claim that a particular sequence of words is not a grammatical sentence of the language under discussion, by marking that sequence with a star, like this:

(12) *By is eaten monkey banana that the being

(13) *The monkey is ate the banana

Sometimes a sequence of words is called a **string**. Putting a star at the start of a string is a claim that it isn't a grammatical sentence of the language in question.

Acceptability concerns making a judgement about the status of a string as part of a language, and as such it's an intuition that speakers of the language have. The claim that a sentence is difficult to parse, or that it is ungrammatical, is an attempt to explain its (un)acceptability. As linguists, we cannot know in advance whether a string of words is unacceptable because it is difficult to parse, because it is ungrammatical, or because of some other factor.

The acceptability of a sentence will also often depend upon whether the sentence expresses the intended meaning. Here the judgement doesn't state whether the string is acceptable or not, but rather whether the string is assigned the meaning that is specified. So sometimes you might see the claim that a sequence of words is 'starred (*) under the intended interpretation'. What this means is that the sentence is unacceptable as an expression of a particular proposition. This use of the star is most common when contrasting the meanings of sentences. For example, (14) has the meaning that there are some people in the garden, and not the meaning that it's generally a property of people that they're in the garden, while (15) works in the opposite way, it means that, as a rule, people are stupid. It cannot mean that there exist some stupid people. It is therefore said to be starred under this interpretation.

(14) People are in the garden.

(15) People are stupid.

What we have here is a case where the form of the sentence is fine, and the sentence is perfectly grammatical, but the interpretation of the sentence is not the one that one might expect, given the interpretation of other similar sentences.

Here is another example of the same kind of thing:

(16) How did Julie ask if Jenny left?

This sentence can be a question about the way that Julie asked something (loudly, rudely, etc.), and it is perfectly fine under this interpretation. However, the discussion of this example might make it clear that the intended interpretation is a question about the way that Jenny left (angrily, jauntily, etc.). This kind of interpretation is perfectly possible for a sentence like (17):

(17) How did Julie say that Jenny left?

However, this is *not* a possible meaning of (16). In that case, we would say that (16) is ungrammatical under this interpretation.

Why do linguists use the star to express the idea that a sentence doesn't have the meaning that might be expected, as well as the idea that a string isn't actually a sentence at all? The reason is that the propositions expressed by sentences are not just dependent on the words in a sentence, but also on the ways that those words are put together. It's our knowledge of language that allows us to put together words into sentences, and something about that knowledge simply stops us from putting the words in (17) together in the same way as those in (16). So speakers of English can't assign a structure to (16) that will give us the same interpretation as the structure for (17).

Remember that we assign a star to a sentence if we think that the explanation for its unacceptability is that it does not conform to the requirements of the **grammar** of the language under discussion (see Section 1.1.3). Put more directly, we assume that speakers can't legitimately assign a structure to the particular string in question at all. In the example we have just discussed, exactly the same situation obtains: speakers can assign two structures to (17) but only one to (16). The absence of one of the structures can be marked with a star, as long as we refer in the surrounding text to the intended interpretation, so that we know which structure is relevant.

1.1.3 Form and order

Let's go back to more obvious facts about the form of a sentence. We can see that the order of words is also relevant to the message (proposition) conveyed by the sentence, so (18) does not mean the same as (4), even though it consists of exactly the same words:

(18) That banana is eating the monkey.

As was mentioned above, there also appear to be certain relationships between the forms of the words in sentences. So in (18), the first and third words have the form they do because of the form of the second word. If we change the form of the second word, then the forms of the first and third words have to change too:

(19) Those monkeys are eating the banana.

The same relationship holds in (19), and we can't, for example, swap *are* for *is*, or vice versa:

(20) *Those monkey are eating the banana

(21) *That monkeys is eating the banana

Native speakers of English generally judge such sentences not to be part of their language, and therefore as ungrammatical. The relationship between the second word in these sentences, and the other words which seem to take their lead from it, is known as **agreement**, and we will come back to it later on in the book.

Word order and agreement are fairly obvious properties of sentences. When the right word order, or the right agreement relationships are not expressed in a sentence, native speakers know this, and judge the sentence as unacceptable. These phenomena are not obviously susceptible to an explanation in terms of parsing, and we hypothesize that the problem is a purely structural one.

The meanings of sentences are also things which native speakers have strong intuitions about, as we saw above. Most obviously, native speakers of English intuitively know that (4) and (18) differ in meaning, and that (22) has two meanings (i.e. it is **ambiguous**):

(22) The monkey wrote a poem on its favourite banana.

One meaning of (22) involves the banana being written about, while the other meaning has the surface of the banana actually being written on.

All of these phenomena, and this is only a tiny taster, arise because sentences of English, and all other languages, are not just built out of words strung one after the other in an utterance or on a page, but rather, as mentioned already, because they have a **structure** which specifies certain relationships as holding between the fragments of language that the sentence is made out of. One of the major tasks of linguists who are interested in syntax is to discover what the basic building blocks of language are and what relationships hold between them. The general term that is used to refer to these relationships is the **syntactic structure** of the sentence.

1.2 Tacit knowledge

When I used the word **knowledge** in the last section, I meant knowledge in the particular technical sense that's used in linguistics: knowledge of language isn't like knowledge of history. My knowledge of history is extremely **partial, forgettable, explicit,** and **learned**. I know that William Wallace was a Scottish Highlander who fought against the English some centuries ago. I'm not sure when he was born, or when he met his (rather grizzly) death—so my knowledge about him is partial. My knowledge of English structures is at the other end of

the spectrum. Although you might introduce a new word to me, it's unlikely that you'll be able to introduce to me a new way of building up a sentence of English (unless that structure is special because of the dialect you speak, or because it used to be a structure of English but is no longer). Similarly, I am sure that, at some time, I knew the date of William Wallace's death, but I've forgotten it. There's no sense in which I can be said to forget how to construct sentences of English, unless I suffer a serious brain trauma—something which certainly isn't necessary to make me forget historical dates.

Perhaps the most important difference between knowledge of language and other types of knowledge is that the latter are easily made explicit: I can tell you that Scotland merged its Parliament with that of England in 1707, and then opened a new devolved Parliament in 1999. However, trying to explain how sentences are constructed is something which isn't accessible to my conscious mind: all I can do is use various types of scientific method to try to uncover how it works. Even simple statements like 'a sentence is constructed from an initial subject followed by a predicate' immediately throws us into the realm of technical notions. What's a subject? What's a predicate? Is this the only way to build up a sentence, and if not, then what are the other things involved?

Yet we all possess a highly intricate system that allows us to determine whether certain utterances correspond to sentences of our native language. You know, for example, if you are a native English speaker, that I can utter (23), and that this corresponds to a sentence of English, whereas if I utter (24), although you might be able to glean some message from it, it simply doesn't correspond to any sentence of English:

(23) Anson is incredibly difficult to please.

(24) *Anson is incredibly difficult to be pleased

How do you know this? Are you able to articulate why (24) is unacceptable? In fact, it's just not obvious why (24) should be so bad. The kind of knowledge of language which allows you to make this judgement is not accessible to you—the term for this is **tacit knowledge**.

Finally, knowledge of language is acquired in a different way from other types of knowledge. Most children have a command over the core structures of their language by the time they are three. The following sentences were produced by a child at the age of three years and two months (see Pinker 1994, ch. 7):

(25) Can I put my head in the mailbox so the mailman can know where I are and put me in the mailbox?

(26) Can I keep the screwdriver just like a carpenter keep the screwdriver?

These sentences contain errors in agreement ((25) contains *I are* rather than *I am* and (26) contains *a carpenter keep* rather than *a carpenter keeps*), but display a complex structure involving combining sentences and operating on their parts. (You will meet many of the syntactic operations that are involved in constructing these sentences later on in the book.) Even more remarkable are experimental studies which show that children at this young age seem to have flawless access to aspects of the structure of sentences which do not seem to come from the data to which they are exposed.

One classic example comes from the syntactic rule which forms yes/no questions in English. Yes/no questions look as follows:

(27) Has Jenny eaten a cake?

(28) Will Anson come to the party?

Certainly, such questions appear in the data to which young children are exposed. It might seem a simple task to work out the rules for forming such a question. The examples above are clearly related to the following sentences:

(29) Jenny has eaten a cake.

(30) Anson will come to the party.

But notice that when a child hears a yes/no question like those above, that child might be able to dream up any number of rules to construct them from the related sentences:

(31)
1. Swap the first two words around.
2. Swap the first verbal element with the first noun phrase.
3. Put the verbal element that follows the subject in front of it.

It turns out that the right rule is the third one. If the child were to adopt the first rule, then he/she should produce sentences like the following, where the (a) examples give the plain sentence types and the (b) examples give the result of applying the rules:

(32) a. The man has eaten the cake.
b. *Man the has eaten the cake

(33) a. The woman who is singing is happy.
b. *Woman the who is singing is happy

If the child were to adopt the second rule, then we would expect the following results. Don't worry about the notion of **noun phrase** for the moment. It simply means that the first two words are grouped together:

(34) a. The man has eaten the cake.
b. Has the man eaten the cake?

(35) a. The woman who is singing is happy.
b. *Is the woman who singing is happy

However, Crain and Nakayama (1987) conducted a series of experiments and showed that the errors expected under these hypotheses never occurred. This was true for children as young as three years and two months. All the children appear to use the third, and apparently most complicated rule, and produce the correct results:

(36) a. The man has eaten the cake.
b. Has the man eaten the cake?

(37) a. The woman who is singing is happy.
b. Is the woman who is singing happy?

This kind of argument is known as a **Poverty of the Stimulus** argument: the idea is that the linguistic stimulus that a child is exposed to is not rich enough to provide the information the child needs to acquire the language. It attempts to show that children are in possession of kinds of knowledge about their language which simply isn't plausibly in the input data that they hear.

Even more thought provoking is that fact that, at this point in their development, children are immensely ignorant of the kinds of knowledge that become so important in later life for passing exams, earning money, and preparing food. Yet they can put together highly complicated sentences, with only small deviations from what adults do. The system of knowledge they have is developed to such an extent that it far outstrips any other aspect of their cognitive development which is not obviously instinctual (vision, locomotion, eye-contact, using emotional responses to control their environment). But this knowledge hasn't been taught to them by anyone. In fact, the idea of teaching one-year-old children that sentences are constructed out of subjects and predicates, or that they involve putting together nouns, verbs, and other things in particular ways, is absurd. In many senses, this tacit knowledge is far more like instinct than it is like other kinds of knowledge.

So why, you might ask, do we call it knowledge at all? The answer really has to do with a philosophical discussion that goes back to Plato in the fourth century BCE, who asked the question of how we can know so much with so little input (Plato's main area of discussion was geometry rather than language), a problem which Chomsky has christened **Plato's Problem**. Plato proposed, as a solution, that there are certain abstract forms which we grasp because we are human beings, and therefore our souls exist in the realm of these abstract forms. Knowing something corresponds to our souls grasping these abstract forms. Because the problem is so similar to the problem of how human beings grasp the abstract forms associated with language, we still talk about this as a **problem of knowledge**.

Philosophers often find linguists' use of the term knowledge for the relationship we bear to our language problematic because of the common-sense use of the word knowledge as 'being in possession of true facts', or 'true justified belief'. The linguists' response to this is that knowledge is as reasonable a word as any, but if philosophers want to maintain some special status for the word knowledge, then we'll use something else (for example, **cognize** has been suggested). The linguists' use of the term knowledge (and more especially tacit knowledge) should be taken as a technical term in linguistics.

Another common term for tacit knowledge of language is **grammar**. This is a word to be careful of because it is used in two technical ways: (i) a grammar is a speaker's tacit knowledge of their language; (ii) a grammar is a linguist's explicit theory of a speaker's tacit knowledge of their language. I will be careful in this book to distinguish the two, but it is as well to be sensitive to this distinction, since the two uses of 'grammar' are widespread. Chomsky tends to refer to grammar in the first sense as **I-language**, where I stands for Internal/Individual. So a speaker's I-language is his or her tacit knowledge of their native language and a linguist constructs a theory of this I-language.

We don't know a great deal about how I-language itself is manifested physically or biologically, although it's clear that at least some aspects of it are localized in particular positions in the brain. There are two areas of the brain's left hemisphere which appear to be particularly implicated in our linguistic abilities: **Broca's area** and **Wernicke's area**. We know that these areas are important because sometimes they are affected by some pathology or trauma, and particular linguistic deficits arise. For example, people with a trauma to Broca's area have selective problems in dealing with complex grammatical constructions, although their pronounciation may be fairly normal.

Some aspects of I-language are apparently determined by genetic factors. Researchers have studied families which appear to have a predisposition to **Specific Language Impairment** (SLI). SLI is a term for linguistic

impairments which cannot be easily tied down to more general cognitive difficulties. Myrna Gopnik and her colleagues have argued over a number of years that the SLIs of one particular family can only be properly explained by genetic factors, and moreover that these genetic factors affect language specifically. Studies of identical and non-identical twins appear to back up this idea, and recently, researchers in genetics have identified the mutation of a particular gene in affected individuals (see the Further reading section at the end of this chapter for details).

Other aspects of I-language are clearly determined by environmental factors. A child brought up in a linguistic conununity will acquire the language or languages of that community, no matter what that child's genetic inheritance. The environment provided by the community provides the linguistic data which the child needs and which she/he uses, in conjunction with what is provided innately, to acquire her/his I-language.

I-language, then, is the component of the mind of members of the human species which allows us to link together meanings (which are in part propositional in nature) with forms (sequences of sounds, strings of letters, collocations of body signs in sign languages). The nature of I-language seems to be that it is highly creative, in the sense that it can link an infinite array of meanings to an infinite number of sequences of signs. Because of this, human beings can communicate with each other in ways that no other species seems able to do, and our ability to conununicate is at least partially responsible for the astonishing evolutionary success of our species. Without I-language, that is, without an internalized syntax, we would be unable to communicate fluently, because we would be unable to externalize our messages except in the crudest ways. Syntax is, then, key to human achievement at a fundamental level. The project of modern linguistics is to investigate and try to understand this crucial phenomenon within the human mind, both as a goal in itself, and as part of a broader attempt to map our cognitive abilities.

1.3 Syntactic theories

We have so far come to two conclusions: (i) that a sentence is an abstract mental object, and (ii) that whether a sentence is part of a particular speaker's native language or not is something which that speaker tacitly knows. We are now in a position to make a first stab at saying what *syntactic* knowledge is: syntactic knowledge (or just syntax) is that part of an I-language that is concerned with the

ways that sentences are put together out of basic parts. This is what we construct a theory of.

What is a theory? In the broadest terms, a theory is a statement of **general principles** or laws which can be used to explain some phenomena. We can have theories which apply in many different domains: theories of poetics, of social interactions and structures, of biology, of the physical world. There is no a priori way of deciding what constitutes an appropriate domain for a theory; that is, we do not know in advance of investigation whether a theory developed to explain big things (like the motion of planets) will also explain very small things (like the motion of sub-atomic particles). We do not even really know, in advance of study, whether there is a difference between, say, energy and matter—these concepts, which seem so different from a common-sense perspective, may turn out, after theoretical investigation, to be better understood as the same.

Apart from the domain of a theory (that is, the phenomena which it purports to explain), we have to consider what kinds of statements we can make as part of the theory. What are the statements about, and what possible relations do we allow to hold in these statements? In economic theory, the statements might be about goods and services and the values attached to them; in social theory, the statements might be about the categories that group individuals together or force them apart; in Newtonian physical theory, the statements might be about mass, force, acceleration, and other properties of physical bodies. Notice, once again, that we don't know what the statements are about in advance of investigation. What we do is develop a body of theoretical knowledge, and then explore this theory to determine what its consequences are. A successful theory engenders new and interesting questions, and provides accounts of phenomena in general terms. Part of providing an account of a theoretical domain is giving explanations of phenomena which have already been observed. If the theory is to be really successful, though, it should extend beyond the observed phenomena and make predictions about novel situations. These predictions should be able to be tested, and it should be possible to challenge the theory as it stands if the prediction is wrong.

Some of the most successful theories we have are theories of the natural world: of physics and chemistry and biology. As human beings we have what you might call a **folk understanding** of the natural world, given to us by our biology and by our experience. We know that when it gets dark, it tends to get colder, that someone pushed off a cliff will generally fall, and that if you step on to some water you will generally not float on it. We have also developed scientific understanding of these phenomena involving concepts such as energy,

gravitation, and surface tension. Over the years, the theories of these concepts have become more and more remote from our folk understanding, requiring the development of highly abstract mathematical systems. Yet at the same time, these theories have become more successful: they make accurate predictions about what will happen in certain situations; they allow us to develop technologies to interact with the natural world in ways that our ancestors would have marvelled at; and they bring to light phenomena which were previously unobserved and help us to ask new and interesting questions about these.

One of the characteristics of theories of physics, genetics, biochemistry, etc. is that they have a **formal** aspect to them. By formal, we mean that they are developed as systems which are explicit and contain well-defined concepts. The importance of defining concepts explicitly is that it is then harder to misuse them. For example, if we have a definition of, say, a particular gene type which we use to explain some phenomenon, and then we try to use the same gene type to explain another phenomenon, we can check whether we really mean to use the same thing by investigating what the consequences of applying the same definition is in both cases. A formal approach is extremely useful, then, as a means of ensuring that our theory is really doing what we want it to do.

The approach to syntax that we will take in this book, and which is taken more generally in generative grammar, assumes that certain aspects of human psychology are similar to phenomena of the natural world, and that linguistic structure is one of those aspects. This approach is motivated by some of the phenomena we discussed in the last section: the physical structure of the brain and the genetic structure of human beings both appear to be implicated in linguistic structure. Given this, it might be possible to isolate those aspects of linguistic structure which depend on genetic and neural bases. Since those aspects of structure will have a physical base, it would be unsurprising if the kinds of theoretical approach which have been so successful in dealing with the natural world were helpful in understanding language.

Related to this perspective is a broader issue: one of the most interesting and successful endeavours in the field of human knowledge in general has been the general search for "mathematical patterns in nature" (Freidin and Vergnaud 2001, p. 647 refer to this research agenda as the **Galilean approach** after the famous Italian scientist (1564–1642)). On the assumption, motivated above, that at least some structural aspects of human language are part of nature, we can ask the question: what are the mathematical patterns in language?

Theoretical linguistics, as we will tackle it here, attempts to build theories of linguistic structure which posit various abstract concepts and determine the

relations that hold between them. The consequences of these theories are then explored, and the concepts and relations in the theory thereby undergo development. Part of the general idea of developing theories is to keep them as simple as possible. We try to posit as few concepts and relations as we can get away with (an idea that goes back to the mediaeval English philosopher William of Ockham (1280–1347) and which is sometimes dubbed **Ockham's Razor**). Of course the effects of the theory might be extremely complex, but the base of the theory is kept as simple as possible. This injunction is, in part, a methodological one: it is easier to work with fewer concepts than with more.

Syntacticians, then, are interested in positing general, explicit, falsifiable, and simple theories about syntactic structure. Part of these theories is a statement of what the basic units of syntax are (technically these are known as syntactic **primes**, or syntactic **formatives**), and in what ways these units can be related to each other (that is, the **syntactic relations**). With a theory in place, a syntactician will develop an **analysis** of some set of data. The analysis relates various aspects of the data to concepts in the theory: it states what constitute the syntactic primes within the body of data, and investigates how the syntactic relations between those primes are established. Many different analyses may be possible of a particular set of data within a theory, although the theory will constrain the space of possible analyses. A good analysis may have consequences for the theory: it may show that this theory successfully extends to a new domain of data or it may show that the theory has to be modified in some way.

Syntacticians usually want their theories and the related analyses to be as **descriptively adequate** as possible: this means that the theory should contain sufficient means to adequately describe all of the different structures found in the language under investigation, as well as capturing the myriad interactions between these, thereby providing analyses of the structures of all of the possible sentences of the language. Descriptive adequacy applied to linguistic theory in general requires that this be done for all possible human languages. Descriptive adequacy is a much more stringent condition on the theory than mere **observational adequacy**, which simply says, 'get the right words in the right order'. Descriptive adequacy requires the theory to assign the right structures to the sentences in question.

There is another level of adequacy, **explanatory adequacy**, which is concerned with capturing the commonalities that all languages share but, at the same time, allowing only those languages which are actually possible human languages. An explanatorily adequate theory will be able to explain how, given a particular set of input data, a child fixes on the I-language that they do, rather

than on some other I-language which is compatible with the data but makes the wrong predictions.

The aspects of I-language which are common to all of us are known as **Universal Grammar (UG)**, and a theory of Universal Grammar will state the commonalities that hold across all possible languages (often called **Principles** of UG) and in what ways individual I-languages may diverge from these commonalities (known as the Parameters of Variation of UG---or just **Parameters**). For example, UG may require that all languages have agreement relations between a verb and its subject, but some languages may not pronounce this relationship, or it may obtain also between a verb and its object.

Now, although there are only a few parameters, the interaction of these with each other may lead to fairly divergent structures in the sentences which particular I-languages allow. However, if you think of a child who is born with UG, she or he does not need much exposure to particular sentence types in order to be able to infer just how the parameters for the language they are acquiring need to be specified, because there are only a few parameters, so there are only a few possible analyses. This means that a theory structured in this way will stand a chance of explaining exactly why children acquire language so quickly, and on the basis of data which does not seem to contain enough information to develop the grammar *sui generis* (see Further reading for Section 1.2).

1.4 Back to sentences

One of the core properties of I-language is that it characterizes a potentially infinite number of sentences, and it is this that leads to language having such an amazing capacity to express abstract thoughts and concepts. Many of the sentences we use in our everyday life we've never spoken before, and we seem to have no trouble creating new sentences to describe new situations. We appear to be able to use our I-language to relate an infinite variety of thoughts to an infinite number of sentences. How can this be?

Perhaps human beings simply have this huge number of sentences stored in their brains, and I-languages are just lists of these. This is impossible. Imagine you were to start with a sentence like:

(38) Paul had an affair

and then add to it:

(39) Paul had two affairs

(40) Paul had three affairs...

(41) Paul had eighty eight billion sixty three million forty-four thousand nine hundred and twenty three affairs...

(42) Paul had eighty eight billion sixty three million forty-four thousand nine hundred and twenty four affairs...

As you can readily see, Paul's promiscuity is no match for the number of sentences we can have to describe it!

There are many ways to show that the human brain just isn't big enough to store all of the potential sentences. Consider (43):

(43) Anson thought Julie had fainted.

Notice that we can take this sentence, and **embed** it inside another sentence, to give:

(44) You said that Anson thought that Julie had fainted.

This process does not end here. We can now embed (44) inside another sentence:

(45) David wrote that you said that Anson thought that Julie had fainted.

Of course we can keep this going, in principle, forever. In practice, we will keel over from exhaustion, boredom, or death. But the point remains that there isn't an upper limit to the number of sentences that we can in principle produce or understand. Each time we perform the embedding operation, we have a new sentence. Since we can continue the embedding operation indefinitely (at least in principle), there are an infinite number of such sentences.

Our ability to do these things *in principle* comes from our I-language. This is distinguished from our actual performance, which is what happens every time we use our knowledge of language on a particular occasion to produce an utterance, a written form, or a series of physical signs, if the language we are using is a sign language. This distinction between **competence** (which is just another term for I-language) and **performance** (i.e. putting the I-language to use) is important, in that it allows us to focus on what our language allows in principle, rather than in practice. We have already met this distinction when we discussed the difference between grammaticality and parsability. Parsing is a matter of performance, while grammaticality is a matter of competence.

It is possible to study actual uses of language by constructing large corpora of the things people say when they are telling stories, or having discussions, but if we are actually interested in the properties of I-language, this usually won't be necessary (although for some types of linguistics it is crucial: historical linguistics, because we can't ask the speakers, and sociological linguistics, because we're actually interested in the particular use of linguistic forms by different members of speech communities). Moreover, a corpus is of restricted use in another way, since the crucial cases to test our theory may not be available in the corpus. Finally, corpora have no information in them about the ungrammaticality of sentences, and such information is often crucial in theory development.

The property that I-languages have that allows them to be so creative is absolutely dependent upon the fact that sentences of I-languages have structure. If you look again at the examples above, you'll see that what we were doing is constructing a sentence, and then putting that sentence inside another sentence. A general, explicit, and fairly minimal way that we could state this would be something along the lines of (46):

(46) S → *Paul had an affair.*

(47) S → *You said that* S

(47) and (46) are known as **Phrase Structure Rules** (PS-rules). They are a kind of theoretical system that was used in early generative grammar, but have since been superseded. You can think of a PS-rule as an instruction to start with the symbol on the left of the arrow and then rewrite it as whatever is on the right of the arrow. This gives us a **derivation** of a sentence using the rules.

A simple derivation giving one sentence goes as follows:

(48) a. S (apply rule (46))
b. Paul had an affair.

Now let us try another derivation:

(49) a. S (apply rule (47))
b. You said that S (apply rule (47))
c. You said that you said that S (apply rule (46))
d. You said that you said that Paul had an affair.

You can see that the output of applying (47) actually provides a new input to which (47) can apply. The rules in (46) and (47) give rise to (or technically generate), an infinite number of sentences. Now if we have a number of rules like these in our theory of language, and these rules introduce a range of different structures rather than just this very simple one, you can immediately see how the huge variety and infinite number of sentences found in human languages can arise on the basis of an extremely limited range of rules.

Sets of rules which refer back to themselves in this way (that is, where the same symbol occurs on both sides of the arrow) are called **recursive**, and languages which are generated by such rules are also called recursive languages. It is partly the fact that human languages are recursive that allows them to be creative in the specific sense mentioned above. And recursiveness is a simple, explicit property of certain kinds of rules. It seems that we have found a mathematical pattern in language.

Although this example is really just for exposition, it's easily seen that the recursiveness of human languages is a fundamental property that we want to be able to account for using as minimal a theory as possible. We will return to these issues more seriously in Chapter 3.

1.5 Summary

In this chapter we started off with the question: what's a sentence? We first distinguished semantic and physical properties of a sentence from its structural properties via the notions of proposition and utterance. We then came to the conclusion that human beings had the ability to assign a structure to a string of words via tacit knowledge of language. This conclusion was motivated by the different kinds of judgements we can make about strings of words: their parsability, their semantic well-formedness, and their structural well-formedness. We argued that tacit knowledge of language was unconscious, and partially innate, and we termed it I-language.

The next task was to work out how to build an understanding of I-language, and we proposed that one good way is to build a theory, which is formal, general, and maximally simple in its underlying concepts. This theory should provide us with the tools to develop analyses of particular sets of linguistic data, which will account for structural properties of sentences (form and order), and also, we hope, for how those structural properties interface with other language-related phenomena. One condition we would like our theory to meet is that it should provide an explanation for Poverty of the Stimulus facts, and for both linguistic universals and language variation. One candidate, we suggested, was a theory which

assumed some very basic syntactic principles, which interacted with limited possibilities of variation (parameters).

Another important requirement on our theory is that it should be able to account for the fact that human languages are recursive in nature, allowing linkage between an infinite array of meanings and an infinite array of structures. It is this linkage which allows human communication to exist at all, and it is human communication which is the basis of the success of our species.

Further reading

Section 1.1.1

For the distinction between utterance, sentence, and proposition, see Cruse (2000), ch. 2; Saeed (1997), ch. 1; Kempson (1977), §3.4.1; and Lyons (1977), §6.2. For a more detailed philosophical discussion, see Lemmon (1966).

Section 1.1.2

Chapter 1 of Chomsky (1965) has an excellent discussion of the difference between acceptability and grammaticality. Pinker (1994), ch. 7 provides a very accessible overview of the idea of parsing and how memory limitations affect it. A more detailed overview can be found in Frazier (1987).

Section 1.2

See Pinker (1994), ch. 9, for a brief introduction to some of the issues in language acquisition. Brown (1973) gives a good range of examples of the kinds of structures that children use early on in their development, as do de Villiers and de Villiers (1985). See Crain and Lillo-Martin (1999), ch. 17 for an accessible discussion of the Crain–Nakayama experiment. Legate and Yang (2002) show that the kind of data that would be needed to rule out the first two rules discussed in the text is either non-existent, or statistically negligible. See also Marcus (1993). See Geschwind (1974) for evidence for localization of linguistic abilities in the brain and Grodzinsky (1990) for a discussion of different types of aphasia and their implications for linguistic theory. Gopnik and Crago (1991) and Gopnik, Dalalakis, Fukuda, and Fukuda (1997) provide some of the basic argumentation for a genetic basis for SLI, and Tomblin and Buckwalter (1998) discuss implications from studies of twins. Lai, Fisher, Hurst, Vargha-Khadem, and Monaco (2001) have identified a particular gene whose mutation seems to be responsible for familial SLI. See Jenkins (2000) for a more general discussion of the biological aspects of language.

Section 1.3

An excellent introduction to the nature of theories in the physical sciences is Feynman (1965). Chomsky (1965), ch. 1, is a classic reference for levels of adequacy for syntactic theory, although Chomsky (1986*b*) updates the discussion. See the introduction to Hornstein and Lightfoot (1981) for a general discussion of questions of explanation in linguistics. For a justification of the idea that language can be treated in the same way as other objects of the natural world, see Chomsky (1995*a*). We will address the question of principles and parameters througout the book.

Section 1.4

See Chomsky (1957), especially ch. 4, for a discussion of phrase structure rules, and Bach (1964), ch. 3 for further detail. A modern take on some of these issues including a good discussion of recursion is provided in ch. 1 of Lasnik (2000), which is worth a read.

2

Morphosyntactic Features

2.1 Introduction

In this chapter we will try to get an answer to the question of what it is that syntax regulates, such that the various facts about form and order that we saw in the previous chapter arise. We will introduce the notion of **morphosyntactic feature**, and tease out the ways that syntacticians motivate the existence of such features. Features play a role in syntax which is a little analogous to the role that atoms play in classical physical theories: they are the basic building blocks of syntax, and the ways that they may be combined, and the ways in which they may relate to each other, are what give rise to the observed phenomena.

2.2 Introducing features

The first task, now that we've outlined our basic assumptions, is to work out what the 'bits and pieces' of syntax are. That is, what is the nature of syntactic **formatives**?

The most obvious answer to this question is that syntactic formatives are simply words. However, this doesn't seem to be quite right. Recall that we looked at agreement in the first chapter, and saw patterns like the following:

(1) The pig grunts.

(2) The pigs grunt.

(3) *The pig grunt

(4) *The pigs grunts

We find exactly that same pattern with completely different words:

(5) The bear snuffles.

(6) The bears snuffle.

(7) *The bear snuffle

(8) *The bears snuffles

So clearly it is not the actual word that is relevant here. What seem to be relevant are rather **properties** of words. In the examples above, when the second word ends in an *-s*, then the third word cannot. Maybe then, what the agreement relation relates is **word shapes**. The shape of a word is called its **morphological form**, and we might hypothesize that the agreement relation relates purely morphological properties, such as whether the word ends in an *-s* or not.

However, this can't be right. Consider:

(9) The man chuckles.

(10) The men chuckle.

(11) *The man chuckle

(12) *The men chuckles

In these examples, the second word never ends in an *-s*, rather the middle vowel of the word changes shape. But the *pattern* we see is exactly the same. Likewise, in the next set of examples, the second word changes shape by adding *-ren*, and the pronunciation of the first vowel also alters:

(13) The child wails.

(14) The children wail.

(15) *The child wail

(16) *The children wails

The term for when a word form is changed by adding something to the end (or the start) is **affixation**, and the *-s*, or the *-ren*, in the examples above, are called **affixes**. Affixes that come at the start of a word are called **prefixes**, and those that come at the end are called **suffixes**. In the case of the alternation between *man* and *men* we have a **vowel change**. Other examples of words which pluralize via a vowel change are *foot* ~ *feet* and *mouse* ~ *mice*. When the whole word changes, so that you can't tell by the form of the words that they are related, then this

is called **suppletion**. English does not have a clear case of a suppletive plural, but other languages provide examples: In Scottish Gaelic, the word for "wife", *bean*, has the plural *mnaoi*, and Tlapanec (a Mesomerican native language) has the contrast a^2da^3, "child" with e^3he^3 "children" (the superscripted numbers represent different tones of the vowels).

Now note that in the three sets of examples given above, the actual morphological forms are rather different, but the general pattern is the same. So the kind of property of words that we are looking for can't simply be stated in terms of morphological properties directly. This becomes actually even more obvious if we stop to think about other languages. Many languages have a relation of agreement like the one we have just seen in English, but the morphological resources that languages bring to bear in exhibiting agreement differ vastly. Some languages use suffixation, some use prefixation (such as Kiowa, a Kiowa-Tanoan language of Oklahoma), some use both (Georgian, a Kartvelian language of the Caucasus). But if the agreement relation is the same, then it can't relate word shapes directly. We need something more abstract, which is related by agreement, and which results in all these different word shapes. This more abstract thing is called a **morphosyntactic feature**, or just a **feature** for short.

A morphosyntactic feature is a property of words that the syntax is sensitive to and which may determine the particular shape that a word has. Features seem to be the core elements of languages that relate sound and meaning. To deal with the pattern above, we can say that the second and third word have to agree in their specification for a particular feature. In traditional terms, both must be either singular or plural. The singular form of the word *man*, is, simply, *man*; its plural is *men*. The plural of *child* is *children*, and of *cat* is *cats*. Some words have the same form for their singular and plural forms: *sheep* is an example. This word has no special form for its plural, but it triggers an agreement relation on the verb, just like the other words we have seen:

(17) The sheep bleat.

(18) The sheep bleats.

The plural feature clearly has an effect not just on the morphology of the word, but also on its meaning: in this case it affects whether we are talking about one child or more than one; one man or more than one, and so on. Features that have an effect on semantic interpretation in this way are called **interpretable** features. We shall see that the notion of interpretable features, and its opposite, **uninterpretable** features, will play a significant role when we come to build up our theory of syntax (see Section 2.4.3 for examples).

Other languages also display the agreement relation. For example, in Arabic, the verb and the subject agree in gender as well as in number. Look at the following example:

(19) Al-'awlaaduu qadim-uu
The-boy-[MASC.PLURAL] came-[MASC.PLURAL]
"The boys came."

This is an example of a sentence from Standard Arabic. The first word in the sentence includes a formative *al*, which corresponds to the English word "the", and a word *'awlaaduu*, which is a plural form of the word for "boy". This word is masculine. You can see all this information in an abbreviated form immediately under the word in the second line of the example. The second line of the example which specifies all this information is called a **gloss**. The second word in the Arabic corresponds to the word for "came" in English, but has some special marking on it to signify that it agrees with the first word. Essentially this is the *-uu* in the Arabic, which corresponds to the [MASC.PLURAL] specification in the gloss. Putting all this information together, we get the translation in the third line. This way of laying out examples from languages other than English is standard in syntax, and you'll soon get used to reading it if you are not already (see the helpful discussion in Tallerman (1999), ch. 1). The important thing to remember just now is that the first line is always the example, the second the gloss, and the third the translation.

Now compare this example with the following one:

(20) Al-bint-aani qadim-ataa
The-girl-[FEM.DUAL] came-[FEM.DUAL]
"The two girls came."

Here we see the word for girl (which is feminine), with the same *al* prefix we met above. Classical Arabic, as well as having a way of distinguishing between singular and plural, also has a dual, where words which have a dual form are interpreted as being in some kind of a pair. So the dual marking on the first word of the example signifies that there are two girls, as you can see by looking at the translation. Notice that the second word also takes on a special form signifying that it too is feminine, and, moreover that it is dual. If we try to put the Arabic word for "the boys", which has a masculine plural form together

with the word for "came" in its feminine dual form, the result is not a sentence of Arabic:

(21) *Al-'awlaaduu qadim-ataa
The-boy-[MASC.PLURAL] came-[FEM.DUAL]
"The boys came."

This shows us that the first and second words here are in an agreement relation. Given this, we can also predict that putting the Arabic word for "the two girls" together with the word for "came" in its masculine plural form will be ungrammatical, as, indeed, it is:

(22) *Al-bint-aani qadim-uu
The-girl-[FEM.DUAL] came-[MASC.PLURAL]
"The two girls came."

We can see, then, that the syntactic relation of agreement regulates dependencies between words in a systematic way in very different languages.

One of the tasks we will set ourselves in this chapter, then, is working out what features of words are relevant to syntax.

2.3 What are features?

A morphosyntactic feature, as we said above, is a property of a word. We just saw that in English there is a distinction between singular and plural words, and that this distinction usually (although not always) has an effect on the morphology of the word. We looked at singular and plural **nouns** and at **verbs** that agree with them (we'll use the terms 'noun' and 'verb' intuitively for the moment, and return to how these relate to features in Section 2.4.1). In an intuitive sense, the features responsible for the morphological difference are also responsible for a semantic difference. Usually a plural noun is associated semantically with a group of entities in the world, rather than with a single entity. However, once again the link between syntax and semantics is not strict: the word *scissors* is plural in form, but refers to an entity which is usually conceived of as a single thing.

As well as (usually) having an effect on the morphology and semantics of a word, a feature may also have an effect on the word's syntax. We saw in the previous section that an agreement relation might hold between nouns and verbs in sentences, and we will see in Section 2.4.3 that the featural content of a word also restricts the positions in which it can appear in a sentence.

2.3.1 Feature systems

How should we think of a feature? The simplest approach is to assume that a feature is just a property of a word in the same way as being hard is a property of glass and being bipedal is a property of human beings. Because we are developing a theory of syntax, we try to posit as small a set of features as we can which will allow us to explain the morphological, syntactic, and semantic behaviour of words in sentences.

Let us take the case of English first: we saw that English has a distinction between singular and plural nouns. We can capture this distinction with two features [singular] and [plural]. We can now give a (partial) feature specification for some English words:

(23) a. men [plural]
b. man [singular]
c. cat [singular]
d. cats [plural]
e. sheep [singular]
f. sheep [plural]

There are two problems with this approach to English: first, it is not as simple as it could be, and secondly, we might wonder why we cannot have words which are simultaneously [singular] and [plural]:

(24) *blurg [plural, singular]

The reason that this analysis is not as simple as it could be is that we can get away with just a single feature: its presence would signify plurality, and its absence, singularity. This would give us an alternative analysis, as follows:

(25) a. men [plural]
b. man [ ]
c. cat [ ]
d. cats [plural]
e. sheep [ ]
f. sheep [plural]

This second approach will work well fine for English, but what about Arabic, which appears to have a three-way distinction, between singular, dual, and plural. It is impossible to capture a three-way distinction with just one feature. With two features, however, it is possible to make a three-way distinction: [singular], [plural], [singular, plural]. Each of these **feature bundles** has its own

morphological form and semantic interpretation. Words which are specified just as [singular] are singular morphologically and are interpreted semantically as single entities. Words which are syntactically [plural] have a plural morphological form and are interpreted as referring to a group of entities. Words which have the feature specification [singular, plural] are dual in form and are interpreted as referring to pairs of entities.

Evidence that this might be an interesting direction to pursue comes from Hopi, an Uto-Aztecan language of Arizona. Like Arabic, Hopi has three distinct numbers: singular, dual, and plural. The dual seems to be made up, at least morphologically, of the singular and the plural. This can be seen from the following examples:

(26) Pam taaqa wari (singular)
that man ran-[SG]
"That man ran."

(27) Puma ta? taq-t yu?ti (plural)
those man-[PL] ran-[PL]
"Those men ran."

(28) Puma ta?taq-t wari (dual)
those man-[PL] ran-[SG]
"Those two men ran."

In the first example, we see a singular noun *taaqa*, "man" agreeing with the verb *wari*, "ran". In (27), we see a plural noun *ta?taq-t*, "men" occurring with the agreeing verb *yu?ti*, which is a suppletive plural of *wari*. To make the dual, we take the plural *ta?taqt* and the singular *wari*, put them together, and we get an interpretation that two men were running. This suggests that dual interpretations are constructed by having both [singular] and [plural] features in the same structure.

So, we could capture the difference between English and Arabic by assuming that English lacks the [singular] feature, while Arabic and Hopi both have it.

However, this explanation isn't really satisfying, since, with two features we would expect four possibilities, rather than three, and languages of the world don't seem to work like this: we simply don't find languages which distinguish four varieties of number feature, and treat them all on an equal basis. It is an interesting research question as to why this is.

One way of solving the problem is to say that languages always have a **default** feature that they fill in when there is no number feature specified. In English,

we could say that the feature that is specified on the noun is [plural], so that words like *men* come specified with [plural] but words like *man* are specified as just [ ]. The idea would be that the default feature [singular] is always added to a noun which is unspecified for a number feature by a general mechanism, rather than by special stipulation for each word. The relevant rule could look something like the following:

(29) Add [singular] to a noun which has no other number feature.

This will have the result that we don't get dual in English, because default number features are never added to a word if that word already has a number feature. So a word which is specified as [plural] will never have the default feature [singular] added to it.

This approach has the advantage that it predicts the appearance of three number categories rather than four in languages like Arabic and Hopi. This is because, if a word were to be unspecified for number, a default [singular] feature would always be added. It follows that, although there are four possibilities given by the two number features, only three surface in the languages of the world.

There are other alternatives which seek to deal with the same problem. Some linguists have argued that features are more complex than the simple properties we have assumed here, and they have tried to explain the fact that systems with dual numbers are cross-linguistically rarer than systems which just make a singular ~ plural distinction by proposing that the presence of certain features in a language depends on the presence of others (see Further reading at the end of this chapter for sources).

A closely related alternative to the view we have just been examining is to adopt the idea that features always have **values**, and that these values are **binary**. This means that a feature like [singular] will have the value [+] for a singular noun, and [−] for a plural noun:

(30) man [+singular, −plural]

(31) men [−singular, +plural]

A language with dual forms will allow [+singular, +plural] as a possible feature bundle, and will have a general constraint ruling out [−singular, −plural] bundles cross-linguistically.

In this kind of system, we need an extra constraint to force all the binary-valued features to appear in a bundle, and to always have a value. When this is

the case, we say that the word is **fully valued** in its feature specification. This constraint will rule out a case like the following:

(32) [+singular]

The reason we have to do this is to constrain the system so that it doesn't give us too many possibilities. If we allowed binary-valued features, and we also allowed these features to vary in whether they appear on a noun or not, then we immediately have nine possibilities:

(33) a. [+singular, +plural]
b. [+singular, −plural]
c. [−singular, −plural]
d. [−singular, +plural]
e. [+singular]
f. [−singular]
g. [+plural]
h. [−plural]
i. []

Natural languages don't appear to have nine morphologically or semantically distinguished numbers, so this is obviously not a good result.

A final approach to features is to assume that features may have other values than just [−] or [+]. Under this approach, we could treat [number] as the feature, and [singular] or [plural] as values of this feature. We might write this as follows:

(34) a. [number: singular]
b. [number: plural]

This system makes it more difficult to deal with dual forms by decomposing them into the interaction of singular and plural, but, it does give us a notation which makes it possible to refer to the natural class of number features. We will see, later in this chapter, that other features form natural classes as well.

The choice about which feature system is right is purely an **empirical** one; as far as number features go, the simplest system seems to be the one where a feature has no value, and may be present or not (such features are said to be **privative**). This system needs a single extra rule to add default features. The binary feature system gives rise to too many possibilities, and needs two extra constraints to rule out the non-occuring ones: the constraint against [−singular, −plural] bundles, and the constraint which forces words to be fully valued. The approach which assumes that there is a feature [number] which itself has the values [singular], [plural], and [dual], is simple, but has the disadvantage that, as it stands, it cannot express the idea that dual number is actually composed out of singular and plural.

On theoretical grounds, we should prefer the simplest system. However, there may be phenomena which force us to adopt a more complex approach. For now, we will adopt the privative feature system where possible. However, as we develop our theory of syntactic relations, we will have cause to treat some features privatively, but others as having values, as described above.

2.3.2 Interface rules

Once we've decided which features are necessary (and this can only be done by looking carefully at the facts of a language), we can use them to determine various things about the way that certain words are pronounced, or interpreted. That is, we can write **interface rules** which map from a syntactic structure consisting of features to a morphological (and eventually phonological) structure on the one hand, and to a semantic interpretation on the other. Take, for example, the following interface rule:

(35) Pronounce a noun specified with [plural] by pronouncing the noun stem and then *s*.

(35) is a morphological interface rule that relates a syntactic specification (i.e. a collection of features) to a particular morphological form (stem + *s*). A stem, for the purposes of this rule, is just a basic form of the word with no affixes attached. It uses the syntactic features to build a morphological form. We could also have a semantic interface rule of the following sort:

(36) Interpret a noun specified with [plural] as referring to a group of entities.

Neither of these two rules is correct as stated. The morphological rule ignores the fact, discussed above, that some nouns form their plurals in other ways than by addition of *-s*. It will therefore predict non-occurring forms like **mans*. Similarly, the semantic rule given here does not capture what it really means for something to be semantically plural, and it needs to be much more carefully worked out (so that the semantics of dual forms is correct, for example). However, the idea that the morphological and semantic components of the grammar **interpret** morphosyntactic features is a powerful one, and the examples given here just show that neither the morphology nor the semantics is trivial.

A syntactic feature like [plural], then, serves as a way of mediating sound and meaning: a particular feature gives rise to a particular morphological form which is pronounced, and a particular interpretation, thus acting as the link between how the sentence gets pronounced, and what it means. The syntax regulates how words with certain features relate to words with other features.

Before closing this section, we should address one further question. What is the set of features that human languages use? Unfortunately, no one has a definitive answer to this question. There is no linguistic equivalent to the periodic table. Human languages seem to make use of a wide variety of features, which relate to all sorts of aspects of our perceptions of the world: there are features which seem to relate to our core mental capacities such as location, time, measure, and counting; there are features that relate to core aspects of our use of language such as who is speaking, who is being addressed, what the topic of the conversation is, what has been mentioned already; there are also features which appear to relate to social and cultural factors such as who is considered to be in a position of authority in a verbal exchange. Finally, there are many features which seem to have no such provenance, and are internal to the linguistic system, signalling a particular syntactic position, or a particular kind of syntactic relation. We shall meet some of these features in this chapter, and others later in the book.

It may be the case that the set of features to which human beings' syntax is sensitive is universally available at the point of language acquisition and that the child's task is to pick out which particular ones are at play in his/her language. Alternatively, the set of features used in a particular language could be constructed on the fly, by the children learning it, or perhaps a mixture of these two positions it tenable, with notions like 'noun' and 'verb' being universal, but notions like 'subordinate in social standing' being constructed.

The question is hard to answer, but it is important to note that there are certain features that might be plausible, but that don't seem to occur in human languages: features whose semantic interpretation is "uttered on the day of a full moon", for example, or "to the left of the speaker's mother"; or features which have the morphological effect of reversing the word, or deleting every syllable which falls a prime number of syllables from the start of the word. Because of this, the more restrictive approach (and therefore the more explanatorily adequate) seems to be to assume that there is a set of universal features, and that the child's task is to select the features that are at play in the language he or she is acquiring.

The question, then, that can be asked, given our current stage of knowledge, is not "what is the set of features that we use?", but rather "what is the set of features that can be motivated in any particular analysis of a language?".

2.4 Motivating features

The way that we motivated the features discussed above ([singular], [plural]) was on the basis of the fact that: (i) there were relations between the shapes of words (recall that these are termed **morphological forms**), and (ii) there was an effect on semantic interpretation. This is the soundest basis on which to motivate a feature. There are weaker ways to do it too: we can motivate a feature if there is a variation in morphological form that makes no difference to semantic interpretation (form without meaning); or if there is an effect on semantic interpretation, but none on morphological form (meaning without form); or even if there is an effect on neither semantic interpretation nor morphological form, but the feature must be posited because a syntactic relation must be established or the wrong prediction about grammaticality will result. (We shall see that some case features fall into the latter category.)

2.4.1 Major category features

The most important set of features that is relevant to syntax is the set of **category features**. These are the features that are responsible for separating words into the traditional **word classes** of noun, verb, adjective, preposition, plus a few others. These features certainly seem to have some semantic basis: nouns, by and large, tend to pick out objects in the world, while verbs tend to pick out events, or actions. Of course, as is well known, this semantic criterion is by no means foolproof. A noun like *race*, for example, seems to pick out something that is clearly an event, and it's difficult to think of a verb like *exist* as denoting an event or action. However, there are also good morphological reasons to separate these two classes. In many languages, nouns and verbs have different morphological forms, and this can be seen to some extent in English:

(37)

Words ending in -tion, -al, -ment, ... (all nouns)	Words ending in -ise, ize, -ate, -en, ... (all verbs)
destruction, elevation, elation, station, eruption, removal, arrival, rebuttal, improvement, enlargement, involvement, replacement	improvise, despise, realize, compartmentalize, computerize, enervate, elevate, deflate, relegate, widen, shorten, blacken

Of course, appeal to these particular endings is not infallible. There are verbs that end in *-ment* (*ferment*), *station* can be used as a verb, and there are many words of all classes that end in *-ate*, and *-en* (*prelate, late, chicken, flaxen*). Moreover, there is a vast class of words in English which give no morphological signal as to their word class (*book, paper, clear, . . .*). However, there are enough words that can be categorized by these endings to make appeal to morphological properties reasonable for setting up word classes, and hence the features that distinguish word classes.

In addition to these considerations, it turns out that the morphological form of certain features will depend upon their word class. So, if you take words like: *emotion, kindness, removal, protest*, then they may all add an *-(e)s*:

(38) emotions, kindnesses, removals, protests

Compare this to words like: *listen, destroy, knead, predict.* These can all take the ending *-ed*:

(39) listened, destroyed, kneaded, predicted

If we try to put *-ed* endings on the words in (38), only one of these (*protested*) is any good:

(40) *emotioned, *kindnessed, *removaled, protested

If we try to put an *-s* ending on the words in (39), then all are fine, but they are certainly not interpreted in the same way as the words in (38):

(41) listens, destroys, kneads, predicts

If we ignore meaning for a moment, we can see that we can separate the two groups of words (with the exception of *protest*) into two different classes purely on morphological grounds. Some of these words allow us to express a [past] feature, which is usually signalled by *-ed* (we will discuss the feature [past] in Section 2.4.3). If we bring in meaning, we see immediately that *protest* can have a radically different meaning in (38) (where it can refer to an event) and (40) (where it describes an action). We can also see that the words in (41), with an *-s* ending, have a different kind of meaning from the words in (38). *Protest* behaves as though it can fall into either class morphologically, and it is semantically ambiguous. But even with *protest*, the word changes its stress pattern depending on what its interpretation is: as a noun it is stressed on the first syllable, and as a verb it is stressed on the second. The lesson we can draw from this is that we can split words in English into at least these two traditional classes on the basis of morphological and interpretative evidence.

So it seems as if we want to make the generalization that whole classes of words (nouns vs verbs) are restricted as to the features that may occur on them ([past] cannot occur on nouns). Moreover, at least some of the words in these classes show distinctive morphological endings that reflect the class they are in. Finally, the two classes broadly seem to have different interpretations. These considerations would be enough evidence to allow our language learner to determine that there are features in English that distinguish these classes. We therefore posit the feature [N] which is part of the featural specification of nouns and [V] which serves in the same capacity for verbs. A plural noun like *men* will then have the partial feature specification in (42).

(42) men [N, plural]

There is also morphological evidence that adjectives and prepositions constitute further separate classes. Many adjectives in English take on special morphological forms when used to compare things:

(43) She is shorter; happier; cooler; older than he is.

These comparative forms cannot be added to nouns:

(44) *emotioner, *kindnesser, *removaler

And when added to verbs, they give rise to a different interpretation, as can be seen from *protester*, which means "one who protests" and not "more full of protest" or some such.

As well as comparative forms, there are also superlative forms of adjectives, which involve the addition of *-est*. Again, these cannot be added to words in other classes:

(45) She is the shortest; happiest; coolest; oldest of the lot!

(46) *emotionest, *kindnessest, *removalest, *protestest

(47) *listenest, *destroyest, *kneadest, *predictest

The last major class, prepositions, do not, in English, change their form at all. So we cannot add any of the morphological endings we have seen so far:

(48) at: *atter, through: *throughs, on: *onned, by: *byest

In summary, then, we have four major word classes, which we usually abbreviate as just N, V, A, and P and which we could distinguish using the four features [N], [V], [A], and [P]. Another term for these features is **major category features**. We can refer to [N] as the N-feature of a word and [V] as the V-feature and so on. Note that since we have four categories, it is once again possible to define these by using two features. Here is one possibility:

(49) a. noun [N]
b. verb [V]
c. adjective [N, V]
d. preposition [ ]

This more minimal theory would predict that certain syntactic processes would class nouns and adjectives together and other processes would class adjectives and verbs together. It is difficult to show that this is correct before we know more about syntactic processes, so we will leave open the question of whether there is an empirical advantage to adopting the more minimal feature system.

This feature system also has the curious result that prepositions do not have category features. This is almost certainly not correct. An alternative, here, would be to adopt the binary system, giving the following feature specifications:

(50) a. noun [+N, −V]
b. verb [−N,+V]
c. adjective [+N, +V]
d. preposition [−N, −V]

In general, we will abstract away from the right choice of the particular feature system here, and simply adopt the idea that there are four category features. See the Further reading section for pointers to further discussion.

2.4.2 More on the content of words

So far we have been investigating what properties of words are relevant to the syntax. We haven't explicitly said what we mean by *word*. This is actually not an easy question at all. In literate societies, we can usually define a word by conventions as to how sentences are represented on the page; but this is not true of all literate cultures, and many linguistic communities are not literate and never have been. Moreover, the conventions for what words are may vary over time, with essentially the same forms being written with word boundaries or not. For example, Classical Sanskrit texts were written without word boundaries at all and English prevaricates between using *can not* and *cannot*.

The approach that we will take is that it is syntactic features that are crucial, and that languages make different choices as to how they collocate syntactic features into more complex structures, for which the usual term is **lexical items**. These lexical items and the features that they are composed of enter into various syntactic relations. Different languages have different lexical items, not only in terms of pronunciation, but also in terms of the basic featural groupings in the languages. This goes as much for the meanings of lexical items as for their syntactic or phonological specification. So there is absolutely no necessity that different languages should have words that cover the same set of semantic concepts, or have the same set of syntactic features. On this view, it should come as no surprise that a language might have, say, colour terms that do not match the colour terms of other languages. The basic underlying semantic atoms are the same, but the lexical items, that is the molecules that they build up, vary across languages.

As an example, compare English with a language like Scottish Gaelic, where the same colour term is used for the sky and for grass (the term is *gorm*). Scottish Gaelic speakers (most of whom are bilingual in English) are perfectly aware that there is a spectral difference between the colour of the sky and the colour of grass, but their colour vocabulary is not sensitive to the same spectral differences as is the colour vocabulary of English. This is true throughout the colour system of Gaelic: the words *ruadh* and *dearg* are both used to refer to red things, but something which is *ruadh* cannot be shiny, whereas something which is *dearg* cannot be dull. *Glas* can roughly be translated as "grey", as in the colour of stones used to build a house, but it can also refer to what an English speaker would usually categorize as light green. Either *gorm* or *glas* can be used for green things, but only if they are natural, rather than man-made. The term for something which is green because someone has dyed it that colour is *uaine*. What is relevant, then, for many colour terms in Scottish Gaelic, rather than just the particular part of the spectrum, is whether the object is shiny or dull, whether it is man-made or natural, whether it is dark or light, and so on. These properties are as much part of the specification of these lexical items as the fact that they are adjectives, and the features that encode these distinctions are termed **semantic features**.

It seems likely that semantic features are universal, common to us all, but that different languages group semantic features in different ways so as to reflect the artefacts and concepts that are important to the culture in which the language

is spoken. Of course, this cultural variation should not be over-emphasized: an enormous amount of what we think, perceive, taste, hear, etc. is common to all human beings as a result of our shared cognitive and physical limitations, and similar or identical collocations of semantic features will be involved in all languages for the lexical items that correspond to these concepts. It may even be the case that it is the universal aspects of our mental capacities that give rise to the basic semantic features. These are then combined in various ways to give rise to more complex concepts, which are then lexicalized (i.e. associated with a lexical item, including pronunciation and syntactic features) in particular languages.

Up to now, we have met number features ([singular], [plural]) and major category features ([N], [V], and possibly [A] and [P]). We have just seen that there are also semantic features. In addition, words have a pronunciation, which, if we are to be consistent, must be specified featurally as well. The features responsible for a word's pronunciation are termed **phonological features**, so a lexical item turns out to be a collection of phonological features, semantic features, and morphosyntactic features. It also appears to be the case that phonological features are universal in the sense of there being a universal set, some portion of which is selected in particular languages. Each language, then, specifies what its lexicon (i.e. its set of lexical items) is, constructing its lexical items from putatively universal featural domains. The child learning a language is faced with the task of internalizing this lexicon on the basis of the evidence that he/she hears and sees.

We will assume then, that for words which contain phonological and semantic features, these features are accessed by the interface rules in determining the actual pronunciation or interpretation. Note that nothing that we have said actually forces a word to have all three kinds of feature. In fact, we will encounter a number of syntactic formatives for which there is no good reason to assume a phonological feature specification, and whose pronunciation is determined wholely by the interface rules spelling out syntactic features.

If syntax relates features of words, then the question arises of whether phonological and semantic features of words are accessible to syntax. The standard view is that they are not. So the syntax only has access to the morphosyntactic features.

This is really a methodological restriction, but one with good support, at least on the phonological side. We haven't yet discovered any syntactic relations that hold between words with high vowels, or words that have nasalized first syllables. There are, of course, phonological effects of syntactic relations. So,

for example, Welsh nasalizes the first consonant after the preposition *yn*, "in", and the word *fy*, "my":

(51) Dolgellau ~ yn Nolgellau
Dolgellau ~ in Dolgellau
"In Dolgellau (a place name)"

(52) pen ~ fy mhen
head ~ my head

However, what we don't find are cases where some syntactic relation becomes established just because two words have, say, nasalized penultimate syllables. In this sense, syntax doesn't, in general, pay attention to what the phonology is doing, although it may dictate what the phonology must do. It makes sense then, to simply say that the syntax can't see the phonological features.

The argument is harder to make for semantic features. There do, in fact, seem to be syntactic processes that are sensitive to whether words denote males or females, singular entities or collections of them, and so on. We have seen examples of the latter already. The agreement phenomenon in English, which we have analysed as being sensitive to the feature [plural], could be thought of as a rule which is sensitive to the semantic category into which syntactically plural things fall. If this were the case, then we would have a syntactic relation (agreement) sensitive to a semantic feature (whether the object referred to is a single entity or a group of entities).

However, it actually seems to be the case that the syntactic rule does not care about whether the object referred to is semantically singular or plural, but rather it refers to whether the object is specified with the syntactic feature, [plural]. We can see this by taking a noun which is semantically singular, such as *scissors* and noting that it triggers plural agreement in a verb:

(53) The scissors are/*is lost.

A similar example comes from Classical Greek. In this language, neuter nouns, whether they are themselves morphologically singular or plural, always trigger singular agreement on a verb, but plural agreement on an adjective:

(54) kala en ta sphagia
good-[NEUT.PL] be-[PAST.SING] the sacrifice-[NEUT.PL]
"The sacrifices were good."

One might argue, in the face of this kind of evidence, that somehow scissors are conceived of as being semantically plural (perhaps because they are a pair),

and that in Classical Greek, agreement with verbs is waived when the subject is neuter. However, there is further evidence that agreement must refer to syntactic relations; this evidence comes from the behaviour of gender features.

Many languages have what is called **grammatical gender**, where words are assigned a gender category (masculine, feminine, neuter) which bears no obvious semantic relation to what the word refers to. A good example comes, again, from Scottish Gaelic, where the word for "woman", *boireannach* is grammatically masculine. We can see this from the behaviour of adjectives. When an adjective follows a noun in Gaelic, it agrees with that noun's gender: feminine nouns cause a change in the initial consonant of the adjective, while masculine nouns do not. This change (termed **lenition**) alters *m* to *mh* and *b* to *bh* (as well as affecting other consonants in other ways). The agreement effect can be seen in the following examples

(55) an duine mòr brèagha
the man big handsome
"the big handsome man"

(56) a' chaileag mhòr bhrèagha
the girl big handsome
"the big handsome girl"

Here we see that the initial consonant of both adjectives changes to signify agreement with the gender of the noun. However, the noun *boireannach*, "woman" patterns with masculine, rather than feminine nouns:

(57) am boireannach mòr brèagha
the woman big handsome
"the big handsome woman"

(58) *am boireannach mhòr bhrèagha
the woman big handsome
"the big handsome woman"

If one were to assume that somehow women are conceived of as masculine entities by speakers of this language, and hold to the idea that the agreement effect is sensitive to semantic features, then the following data become problematic:

(59) Thànig am boireannach mòr agus shuidhe i sios.
Arrive-[PAST] the woman big and sat she down.
"The woman arrived and she sat down."

Here we have the pronoun *i*, "she" clearly signifying gender features (it contrasts with the pronoun *e*, "he", which is unacceptable in this context). The pronoun is semantically referring to some entity, and that entity is, in the present case, the woman. Since the pronoun is feminine, it makes sense that the pronoun's features are the ones which are picking out something semantic, which means that there must be syntactic features on the noun to ensure the appropriate agreement with the adjective *mòr*. This means that the noun must have a syntactic feature [masculine] and a semantic feature [feminine]. Agreement accesses the syntactic feature, and pronominal reference the semantic feature. Agreement is, then, a syntactic process accessing syntactic (not semantic) features; it contrasts with pronominal reference, which is essentially semantic.

A similar example can be constructed in modern spoken Dutch. In this language the word *meisje*, "girl" is neuter. It occurs with the neuter **article** and triggers neuter agreement on **relative pronouns**. Consider the following contrast:

(60) De man *die* bet boek leest
the man that-[MASC] the book read-[PRES]
"The man who reads the book"

(61) Het meisje *dat*/**die* het boek leest
the girl that-[NEUT]/*that-[MASC] the book read-[PRES]
"The girl who reads the book"

Here we can see that there is agreement of the article (underlined) and the relative pronoun (italicized) with the noun. We will look at articles and relative pronouns in more depth later in the book. What is important here is that there is a clear agreement relationship showing up.

Once again, if we refer to the girl in question with a pronoun, we must use the feminine pronoun rather than the neuter one:

(62) Het meisje zei dat ze het boek leest
the girl say-[PRES] that-[NEUT] she-[FEM] the book read-[PRES]
"The girl says that she reads the book."

(63) *Het meisje zei dat het het boek leest
the girl say-[PRES] that-[NEUT] it-[NEUT] the book read-[PRES]
"The girl says that she reads the book."

On the assumption that the pronoun's function is the semantic one of picking out a referent, these examples show that the neuter agreement that the word *meisje*

triggers on a relative pronoun is sensitive to a syntactic rather than a semantic feature.

In general, then, we assume that syntactic relations like agreement access syntactic features, and not phonological or purely semantic features. Some syntactic features have a transparent effect on interpretation (so, by and large, nouns with a [plural] feature in English are interpreted as referring to more than one entity), but some do not. We will assume, then, that syntactic relations hold between purely syntactic features.

2.4.3 Some more minor features

Phi-features

Armed with these ideas, let's return to other features that are relevant to the syntax of English.

Consider the verb *be*. It varies its form in the following way:

(64)

Present	
I am	we are
you are	
he/she/it is	they are
Past	
I was	we were
you were	
he/she/it was	they were
Imperative	
be	

If we look at the past and present forms in the table, we can see that in both sets (a set of forms is called a **paradigm**), the verb has the same form for *we*, *you*, *they*, and plural nouns. Let us assume that the feature that distinguishes these is [plural], which we have met before. Notice that even though *you* will have the feature [plural], it does not necessarily pick out more than one entity, so we see that the morphosyntactic feature does not always have a predictable semantic interpretation, something which reinforces the idea that the semantic interpretation of a feature is not accessible to syntactic processes.

There is also a distinction in the present between *I*, and the other non-plural forms. The traditional way to distinguish between these forms is to appeal to

a feature which is related to who is speaking. This type of feature is termed person, and there are usually assumed to be three such features: [first], [second], and [third] (these are often just written as 1, 2, and 3). The pronouns *I* and *we* are specified as [1]; the pronoun *you* as [2]; and all other forms as [3]. Intuitively, the interpretation of [1] is related to the person speaking, or a group of people identified with that person; [2] is related to the person or persons addressed by the utterer; and [3] is related to anyone else.

(65)

I [1, singular]	We [1, plural]
you [2, singular]	you [2, plural]
He/she/it [3, singular]	they [3, plural]

Note that this analysis of the pronominal system seems to be rather unconstrained, since we have three-person features. If we were to allow the features to co-occur, in the same way as the feature bundle [singular, plural] co-occurs in our analysis of dual agreement, then we would expect languages to allow the following possibilities: [1], [2], [3], [1,2], [1,3], [2,3], [1,2,3], [ ]. Even if we exclude the empty bundle on the assumption that pronouns must have a person feature, we still have seven possible distinctions, whereas in English, we see only three.

We can rethink this system so that it is more minimal (and hence satisfies Ockham's Razor better) by assuming that we have only the features [1] and [2]. Third person would then simply be [ ], that is, someone who is not speaking, nor being talked to. Note that this analysis differentiates the person system from the number system: The former allows a pronoun to be unspecified for person, while the latter requires that nouns are specified for number (and imposes this requirement via a rule which adds a default [singular] feature):

(66)

I [1, singular]	We [1, plural]
you [2, singular]	you [2, plural]
He/she/it [singular]	they [plural]

Now in this system we predict four possibilities, rather than three. This, it's true, is better than eight, and so the system is more constrained, but this system still allows the possibility of a feature bundle which has both person

features specified: [1, 2]. Is there any evidence for this feature bundle in natural languages?

In fact, many languages from all over the world have a so-called 'Fourth Person': Dakota (a Siouan language of North America), Marghi (a Chadic language of Africa), Ngandi (a Gunwingguan language of Australia), and Fijian (a Malayo-Polynesian language). In these languages, there is a plural pronoun (the **inclusive pronoun**) which refers to the speaker, people who count as part of the speaker's group, and the addressee. It's used like the English pronoun "we" in an utterance like "Shall we all go to the cinema". There is also a distinct pronoun which refers to the speaker and people who count as part of the speaker's group, but, crucially, not the addressee (the **exclusive pronoun**). This would be like a use of "we" in "We're all going to the cinema, but you're not". Clearly, this extra pronoun can be simply dealt with by specifying the exclusive pronoun as [1, plural] and the inclusive one as [1, 2, plural].

One example of a language which makes distinctions between inclusive and exclusive pronouns as well as a singular ~ dual ~ plural contrast is Chinook, described by Boas (1911). The full person/number paradigm of Chinook pronouns is as follows. I have excluded gender from this table:

(67)

	[singular]	[singular, plural]	[plural]
[1]	naika	ntaika	ntshaika
[1, 2]		tchaika	lchaika
[2]	maika	mtaika	mshaika
[ ]	áchka	shtáchka	táska

In terms of person and number distinctions, this seems to be about as complicated as languages get (although Bouma Fijian has an extra number category **paucal** which is used to refer to small numbers of entities).

The existence of inclusive/exclusive distinctions seems like strong empirical backing for the more minimal system. Further evidence that this is the right way to think about things comes from the fact that we have not discovered any languages which display any more than four distinctions in the person system of their pronouns. So the analysis which assumes three-person features ([1], [2], [3]) **overgenerates**, that is, it predicts phenomena which do not occur. The more minimal system is observationally more adequate.

Note we haven't mentioned the difference between *she*, *he*, and *it*. These all, as we can see above, trigger the same agreement forms, but are clearly differentiated in other ways (by their **gender**). We saw examples above which showed that in some languages gender was a syntactic feature. In English, there do not seem to be any syntactic rules which refer to gender distinctions explicitly, and we will assume that gender in English is only a semantic feature.

These types of features, person, number, and gender, go under the general name of **Phi-features** (often written ϕ-features). Φ-features appear to be interpretable, and are motivated by both semantic and morphological facts. The agreement relation we saw above ensures that some subset of the ϕ-features on subjects agrees with those on verbs.

Case features

Pronouns also change form depending on syntactic relationships other than agreement. So the pronoun *him*, in (68), appears to have exactly the same kind of interpretation as the pronoun *he* in (69):

(68) We all thought **him** to be unhappy.

(69) We all thought he was unhappy.

This variation between *him* and *he* is usually described as a variation in **case**. Note that particular case forms are restricted to particular positions in sentences. For example, we cannot switch the two forms of the pronoun around:

(70) *We all thought he to be unhappy

(71) *We all thought **him** was unhappy

English is particularly impoverished with respect to case forms, which are only fully differentiated for pronouns, and there are really only three (at most) case forms.

Many other languages mark all nouns for case. One example is Classical Latin:

(72) Puer hominem vidit
boy-[NOM] man-[ACC] saw
"The boy saw the man."

(73) Puerum homo vidit
boy-[ACC] man-[NOM] saw
"The man saw the boy."

in (72), the word *puer*, "boy" appears in **nominative** case, while the word *hominem*, "man" is **accusative**. As you can see, (73) swaps the cases around, but leaves the word order intact. Changing the case in this way changes the

semantic interpretation of the sentence and you might think that this is because case features are interpretable, and give rise to a specification of the semantic *role* of the words in the sentence (basically, who does what to whom).

This appears to conflict with the examples from English that we saw above. In the English cases the semantic role of the pronoun whose case is being varied does not seem to change. In both cases, whoever the pronoun refers to is being unhappy. We will see in a later chapter that the semantic role of a word depends on aspects of its syntax other than case, and we shall assume, for the present, that the function of case is purely syntactic, and that it is an **uninterpretable** feature.

One example of how the syntactic structure of a sentence may affect the case of nouns comes from Russian. In this language, six cases are distinguished (nominative, accusative, genitive, dative, locative, and instrumental). Certain verbs force particular cases on nouns which appear in the same sentence. For example, the verb which translates English 'read' requires that its **object** be accusative:

(74) Ivan čital ètu knigu
Ivan read-[PAST] this-[ACC] book-[ACC]
"Ivan read this book."

However, when the sentence is negated, the object appears in the genitive case, rather than accusative:

(75) Ivan ne čital ètoj knigi
Ivan not read-[PAST] this-[GEN] book-[GEN]
"Ivan didn't read this book."

The names that linguists use for the various case forms are derived from traditional grammar, and are best just learned as labels. The three that we find in English are **nominative** (the form seen in 46), **accusative** (45), and **genitive** (to which we'll return later).

Here are the nominative and accusative case forms for the pronouns in English:

(76)

Singular		Plural	
Nominative	Accusative	Nominative	Accusative
I	me	we	us
you	you	you	you
he	him	they	them
she	her	they	them
it	it	they	them

Within the system we are developing here, we can posit two features [nom] and [acc], for nominative and accusative respectively. *I* would then be [1, singular, nom], and *me* [1, singular, acc], etc.

In fact, since we are assuming that there are special morphological interface rules which serve to pronounce feature bundles, it is more accurate to say that [1, singular, nom] is pronounced as *I* (or rather, as the phonology associated with the orthographic string *I*), and that [1, singular, acc] is realized as *me*, etc. Given that there is little phonological uniformity in the pronouns, we'll assume that they lack phonological features of their own, and that their pronunciation is determined entirely by the interface rules.

Note that some distinctions are simply not marked: the second person pronoun, for example, is invariant in its form. This means that we have a morphological rule which looks something like the following:

(77) Pronounce a pronoun bearing [2] as *you*, irrespective of any other (number or case) features.

The third case used in English is the genitive case. This is found on pronouns when they signify possession:

(78)

my book		our book
	your book	
his/her/its book		their book

The genitive case also appears to be marked on non-pronominal possessors:

(79) The girl's book

(80) The girls' book

In (80) the *s* sound signifies that the girl referred to is the possessor of the book, with a singular plural distinction being marked in writing, but not in speech, for nouns which pluralize in *s*. We will discuss genitive case in more detail when we come to look at the structure of nouns in Chapter 7.

Verbal features

We have already briefly met one of the main types of feature that are associated with verbs: the tense feature [past]. This feature is associated morphologically with the addition of an affix usually written *-(e)d* or sometimes as just *-t* to the verb stem, giving alternations such as *kick* ~ *kicked* and *push* ~ *pushed*. In

addition, many verbs in English have a vowel change associated with the [past] feature: *sing* ~ *sang* and *run* ~ *ran*. Other verbs appear to do both (*sleep* ~ *slept*) and we also find suppletion (*am* ~ *was*) and suppletion of the stem plus affixation of *-t* (*go* ~ *went*).

Semantically, the [past] feature is interpreted, very roughly, as signalling that the time at which the event took place is temporally before the time at which the utterance of the sentence takes place.

We also saw that agreement between the noun and the verb in a simple sentence occur in the present tense. There is no morphological signal of agreement in the past tense in English, so we do not get the following kind of contrast:

(81) a. The bears snuffled.
b. *The bear snuffleds

In English, it appears that there is no special morphology which can be used to motivate a future tense feature. The future is always signalled by the use of a modal auxiliary as in (82) or an expression using the verb *go*, as in (83):

(82) Milena will make carbonara.

(83) Richard is going to chop some wood.

If we take this observation seriously, then we have only a binary opposition in the tense system of English, and this might lead us to propose that there is actually no need for two tense features: there is just the feature [past] and this feature is absent in present tense verbs. Expressions which seem to semantically pick out present or future times are simply special non-past forms. The fact that (82) and (83) are morphologically present tense, and contrast with cases which contain *would* and *was going to* which are morphologically past, seems to back this up.

English contrasts with a language like Scottish Gaelic, in which verbs have a simple morphological past, and a form which is used to express future time, but which lacks present tense forms for all verbs except the auxiliary verb *bidh*, "be". In Gaelic we find the following kinds of example:

(84) Dh'fhàg mi e
[PAST]-leave I him
"I left him."

(85) Fàgaidh mi e
leave-[FUT] I him
"I will leave him."

Gaelic signals the [past] feature by prefixing the verb and altering its initial consonant, while it signals non-past by adding a suffix. Both of these languages express just a two-way contrast. English distinguishes morphologically between past and non-past, as does Gaelic. The difference seems to be in how the semantic rules interpret the lack of a past feature. In Gaelic we have the possibility of a future interpretation, while in English this is generally signalled periphrastically.

Interestingly, the Gaelic non-past and the English non-past are both able to be used to make generic statements of habit. Compare the use of the non-past Gaelic form with the non-past form used in the translation in (86).

(86) Leughaidh mi dàin
read-[FUT] I poems
"I read poetry."

This kind of situation, where there is only a past ~ non-past distinction, contrasts with a language like the closely related Modern Irish. The latter is a language which marks past ~ present ~ future distinctions via morphology on the verb. So we find:

(87) tógann sé
leave-[PRES.3] he
"He lifts."

(88) thóg sé
leave-[PAST.3] he
"He lifted."

(89) tógfaidh sé
leave-[FUT.3] he
"He will lift."

This language will require the use of at least two tense features: [past], [future]. The present tense will be unspecified for both of these features. Interestingly, Irish actually has a fourth morphologically simple tense, traditionally termed the imperfect, which is used for generic, habitual, or iterated actions in the past. Just as in Gaelic, the future in Irish may be used for generic statements about someone's present habits. Given this, it is tempting to make the tentative

suggestion that the imperfect in Irish might be profitably analysed as involving the feature bundle [future, past]:

(90) thógadh sé
leave-[IMP.3] he
"He used to lift."

Aside from tense and agreement features, verbs in English also appear in a number of other morphological forms. The most important ones are the forms traditionally known as **participles**. Participles come in two broad classes in English: one class can be distinguished morphologically by the fact that it suffixes *-ing* to the verb, while the other is morphologically more heterogeneous and may suffix *-en* or *-ed* or may employ a vowel change.

If we take a verb like *be*, which has the richest set of morphological forms in English, we find that, in addition to the present and past forms of the verb discussed above, there are three other forms that it takes:

(91) be, being, been

The latter two of these are participles. These verb forms appear when the tense feature is not marked directly on the verb. This can happen because there is no tense specification in the sentence, or because the tense marking is carried by something else (another verb—traditionally called the **auxiliary verb**. We take up the syntax of these constructions in Chapter 5):

(92) He has been happy.

(93) I am being whipped.

The form marked by the suffix *-ing* is traditionally called the **present participle**. The present participle can occur after the verb *be* to signify that an action is conceived of as ongoing, or continuous. This contrasts with the **past participle**, marked by *-en*, *-ed*, or a vowel change which occurs mainly after the verb *have*, to signify that an action has been completed. The semantic distinction between ongoing and completed action is one of aspect. Participial morphology, in conjunction with particular auxiliaries, is used in English to make certain aspectual distinctions.

We can distinguish participles from non-participles by use of a feature [part], so that a present participle will be [V, part] and a past participle will be [V, past, part]. The syntax of participles and auxiliaries in English is extremely complex, and we will return to it in detail in Chapter 5, where we will propose a featural

analysis of tense and participle forms as values of a general inflectional feature, which also encompasses agreement information.

Interestingly, in other languages, participles may show agreement. For example, in Friulian (a dialect of Italian), we find examples like the following:

(94) Piero el an mangiâs i pirus
Piero he have-[PRES.3.SING.MASC] eat-[MASC.PL.PART] the pear-[MASC.PL]
"Piero has eaten the pears."

(95) Maria e a mangiadis li caramelis
Maria she have-[PRES.3.SING.FEM] see-[FEM.PL.PART] the sweet-[FEM.SING]
"Maria has eaten the sweets."

In these examples the participle agrees in gender and number with the noun which immediately follows it (its object).

One final verbal form which we have not discussed as yet is the bare verb form found in English sentences like (96):

(96) I am to eat macaroni.

(97) I want to eat macaroni.

(98) I must eat macaroni.

Sometimes this bare form of the verb is called the **infinitive**. Infinitives generally do not mark for agreement (although a kind of agreement is found on infinitives in European Portuguese). We will posit a feature [inf] to characterize infinitives.

Other languages mark the infinitive with particular endings. For example, French verbs have different morphological forms for infinitives depending on the particular class of verb:

(99) a. Je pars
I leave-[1.SING.PRES]
b. partir
leave-[INF]

(100) a. Je mange
I eat-[1.SING.PRES]
b. manger
eat-[INF]

Once again the syntax of infinitives is complex, and we will address it in Chapter 8.

2.5 Summary

We have now covered many (by no means all) of the features that are relevant to the core syntax of English. We have motivated these features on the basis of differences in morphological form, and semantic interpretation. Other languages may have chosen different sets of features from the universal pool of features, and we may need to set up more features when we come to look at these languages. There are other features that will become relevant as we progress through the book, but we shall motivate these as we go along.

The table presents a summary of the most important features we have met so far:

Kind of feature	Features	Comments
tense	[past]	need [future] as well, for Irish
number	[singular][plural]	feature bundle [singular, plural] for dual number
person	[1], [2]	[1, 2] gives 'Fourth' person
gender	[masc], [fem]	need others for different languages
case	[nom], [acc], [gen]	again, may need others
category	[N], [V], [A], [P]	may be reducible to just [N], [V]
others	[part], [inf]	appear on verbs

We have seen that these features are bundled up with other features to make lexical items, so that a word like *trees* is associated with semantic features which are accessed only by the rules of semantic interpretation, (morpho)-phonological features (accessed only by the rules of phonology and morphology), and syntactic features like [N], [plural], [acc]. These syntactic features are accessed by the operations of syntax, and give rise to the particular pattemings of words that we recognize as grammar.

Syntactic features may also be accessed by the rules of morphophonology, giving rise to different morphological or phonological forms. We saw examples of this from Welsh nasalization effects.

Syntactic features may also be accessed by the rules of semantic interpretation. Those features which have this effect are called interpretable featurcs. These include features for number, person, and gender. We saw that the features of number and gender could be interpretable or not, depending on the language, in examples from Ancient Greek, Scottish Gaelic, and Dutch. In Scottish Gaelic, we saw that some words could refer to persons of a particular semantic gender (male or female), and we could see this clearly by looking at pronominal reference; however, the grammatical phenomena showed us that the syntactic gender feature of some of these words was different from its semantic gender: that is, the syntactic gender feature on these words was **uninterpretable**. Another clear example of a feature which is uninterpretable is nominative or accusative case. We saw that this feature appeared to simply regulate the syntactic position of words, while telling us nothing about the semantics of those words.

Before we leave this chapter, I'd like to make a comment on the differences between the information specified in the glosses, and the notion of features. Glosses are intended to be informal grammatical descriptions, which make no pretence of being a theory of any kind. They are just there to help the reader. The features we have been discussing in this chapter, on the other hand, are elements of a theoretical system, and, as such, are subject to the normal constraints on theories: they should be simple, minimal, and consistent. For this reason, you might notice discrepancies between feature specifications, and glosses. These are to be expected, for the reasons just mentioned. A gloss is not a theoretical analysis, and so may contain all sorts of extra information.

Exercises

Exercise 1 Reflexives and ϕ-features

This exercise is intended to begin to develop your skills in syntactic argumentation. Follow the instructions exactly. Do not try to do more than is asked for each section.

Part A

There is a class of words in English called **reflexive pronouns**. These words are formed from a pronominal plus the word *self* in its singular or plural form. Examples are:

myself	ourselves
yourself	yourselves
himself	themselves
herself	
itself	

In a simple sentence, these words are restricted in their distribution:

(1) *I kicked yourself

(2) *He kicked yourself

(3) You kicked yourself.

Notice that examples like (3) have a special semantic property. The person doing the action described by the verb, and the person affected by this action, are one and the same. In (3), *you* are the kicker and the kickee. The words *you* and *yourself* are said to be **coreferential**, since they both refer to the same person. Other examples of expressions that can be co-referential are *Anson* and *he* in the following sentences:

(4) Anson thought that he had bought the paint stripper.

(5) I asked Anson if he was happy.

In (4) and (5), the pronoun *he* appears to take on its meaning via the expression *Anson*. In these particular sentences, another reading is also possible. *He* can refer to someone else entirely, just as *she* does in (6):

(6) The boy thought she was happy.

In (6), *she* is not coreferential with *the boy*, since coreferentiality appears to require matching ϕ-features.

Let us state this idea as an explicit hypothesis, the **Coreferentiality Hypothesis:**

(7) For two expressions to be coreferential, they must bear the same ϕ-features.

We can see the Coreferentiality Hypothesis as a kind of general interface rule which relates syntactic features to semantic interpretation.

In the examples with reflexives we have a case of **obligatory coreference**. In (3), *you* and *yourself* are required to be interpreted as coreferential. The same can be said for the following cases:

(8) He kicked himself.

(9) We kicked ourselves.

(10) They kicked themselves.

Using this notion of coreferentiality, we can state a hypothesis that will differentiate between the good and the bad examples above. We will call this hypothesis the **Reflexive Generalization**, for ease of reference. Parts B–F of this exercise will be devoted to revising this hypothesis, so what we have here is just a first attempt:

(11) The Reflexive Generalization (First attempt):
A reflexive pronoun must be coreferential with another expression in the sentence.

The Reflexive Generalization has the consequence that a reflexive pronoun will have to be coreferential with another expression, and hence, have the same ϕ-features as that expression.

Task 1 Provide some further examples that support this result for person features.

Part B

Now look at the following data:

(12) You kicked yourselves.

(13) *We kicked myself

(14) *They kicked himself

Task 2 Explain how our generalizations account for these examples.

Task 3 Provide further examples that show the hypothesis working for number features.

Part C

Now look at the following data:

(15) *He kicked herself

(16) *She kicked itself

Task 4 Explain how these examples are captured by the hypotheses, and provide more examples which show that gender features are relevant.

Part D

The following examples show that this hypothesis is not enough to explain the distribution of reflexive pronouns:

(17) *Myself saw me

(18) *Himself saw him

Task 5 Explain why the Reflexive Generalization is not enough to rule out these examples.

Task 6 How might you alter the hypothesis so that it covers these examples? (Hint: there are two possibilities here: one involves the order of the words, the other involves the case of the pronoun inside the reflexive.)

Part E

Look at the following examples:

(19) *I thought he liked myself

(20) *You said she liked yourself

Task 7 Whichever hypothesis you came up with for Task 6, explain whether these data are problematic for it or not.

Part F Summary

These data show that the distribution of reflexives is not just conditioned by their ϕ-features, but that word order, case, and other aspects of syntactic structure may enter into their analysis too. This is a general fact about syntactic problems. They rarely confine their solutions to just one part of the grammar.

Exercise 2 Imperatives

This exercise draws upon the (admittedly incomplete) hypothesis developed in the last exercise. It involves structures like the following, known as **imperatives**:

(1) Close the door!

(2) Eat dirt!

(3) Know yourself!

The interesting thing about these examples is that they appear to have something missing. Compare these sentences to the following ones:

(4) Frieda closed the door.

(5) Kane ate dirt.

Traditionally, these sentences are said to have missing **subjects** (this is a notion we'll come back to).

There are, on the face of it, two obvious ways to think about these examples:

- **Hypothesis A**: imperatives are just like other sentences, and have a subject but this subject is just not pronounced.
- **Hypothesis B**: imperatives are not full sentences. They really don't have a subject at all.

Part A

Look at the following sentences:

(6) Keep yourself clean!

(7) Look after yourself!

Task 1 Assume that the Reflexive Generalization from the preceding exercise is correct (although we know it's not the whole story). How do the data in (6) and (7) suggest the correctness of Hypothesis A?

Task 2 Provide some more examples, along the lines of (6) and (7), which support your answer. This is extremely easy, but will get you into the habit of finding relevant examples, a useful skill in syntactic argumentation.

Part B

Look at the following sentences:

(8) *Keep myself clean!

(9) *Look after herself!

Task 3 Do this data back up the conclusion you reached in Task 1, or do they contradict it. Explain your answer.

Task 4 Provide further examples that make the same point.

Task 5 These data not only suggest that there is an unpronounced subject in these imperatives, but also suggest what that unpronounced subject is. Say what you think it is, and why.

Part C

Of course it is possible to maintain Hypothesis B and deal with the data we have seen here. What we need to do is adopt an extra hypothesis:

- **Extra hypothesis**: only second-person reflexives are allowed in an imperative.

What we now have is a choice between two grammars: Grammar A adopts Hypothesis A, while Grammar B adopts Hypothesis B plus the Extra hypothesis. Notice that both grammars get the data right. Grammar A says there is a pronominal subject in imperatives with the right ϕ-features to allow only a second-person reflexive in the imperative. Grammar B says that there is no subject at all in imperatives, and that, independently, only second-person reflexives are allowed in imperatives.

Task 6 Choose between grammars A and B, and say what motivated your choice.

Part D

Task 7 English has a construction known as the **tag-question**. Some examples are given below:

(10) Frieda closed the door, didn't she?

(11) I can come, can't I?

(12) You won't be there, will you?

These structures are called tag-questions, because they involve a simple sentence, with an extra 'tag' on the end. The generalization we can make about these structures is roughly as follows:

Tag Question Generalization: The tag in a tag question is constructed from the auxiliary of the main sentence, which is negated if the main sentence is positive, and which is positive if the main sentence is negative, followed by a pronoun which has the same ϕ-features as the subject.

Given this generalization, construct an argument from the following data for either hypothesis A or hypothesis B:

(13) Close the door, won't you!

(14) *Close the door, won't he!

Exercise 3 Pronouns and coreference

Part A

This exercise flows on from the last two, but looks at how pronouns and reflexives are distributed. Consider the following data:

(1) *I kicked me

(2) I kicked myself.

(3) *You kicked you

(4) You kicked yourself.

(5) *We kicked us

(6) We kicked ourselves.

Task 1 We can formulate a hypothesis to cover these data, using the same kinds of concepts. We will term this the **Pronoun Generalization**:

(7) A pronoun cannot be coreferential with another pronoun.

Task 2 Explain how this hypothesis extends to the following data:

(8) He kicked him.

(9) They kicked them.

(10) She kicked her.

(Hint: think carefully about the coreference possibilities in these sentences.)

Part B

Recall the two grammars that you chose between in the last exercise. Grammar A stated that imperatives had an unpronounced subject, while grammar B stated that imperatives had no subject at all, but that only second-person reflexives could appear in imperatives.

Now consider the following data:

(11) Kick me!

(12) Kick them!

(13) *Kick you!

Task 3 Assume Grammar A is the correct grammar, and that the Pronoun Generalization holds. Explain how the new data given above fall out in this grammar.

Task 4 Assume Grammar B is the correct grammar, and that the Pronoun Generalization holds. Explain how the new data don't immediately follow, and revise Grammar B by adding a new hypothesis to fix it.

Task 5 Now explain which of the two grammars is preferable, and why.

Further reading

Section 2.2

The notion of features in syntax derives from work on features in phonology. See Chomsky and Halle (1968) for discussion and further references. Matthews (1974) gives an overview of many of the kinds of morphological processes that are found in languages. For a more detailed overview of issues in morphology see the papers in Spencer and Zwicky (1998).

Section 2.3

See Dalrymple and Kaplan (2000) for a discussion of some of the issues raised by the text, and Harley and Ritter (2001) for an alternative using a feature geometry. The Hopi data are taken from the latter source. An excellent descriptive discussion of constraints on how languages vary with respect to the features they use is Greenberg (1966). The idea that morphology and semantics are both interpretative components of grammar goes back to early work of Chomsky (see Chomsky, 1970). Theories which adopt an interpretative morphology include

those of Anderson (1992) and Halle and Marantz (1993). For a collection of papers focusing on feature-theory, see Muysken and van Riemsdijk (1986).

Section 2.4.1

The use of morphological oppositions to set up major word classes derives from the American structuralist tradition (Bloomfield, 1933). The idea that categories can be defined as bundles of features is found in Chomsky (1965) and further developed in Chomsky (1970).

Section 2.4.2

For a discussion of semantic and grammatical gender see Corbett (1991) and for a more theoretical discussion (best not tackled until you have reached the end of this book) see Ritter (1993). The autonomy of syntax thesis is first (and best) defended in Chomsky (1957).

Section 2.4.3

Aside from the references mentioned above for Section 2.3, Corbett (2000) gives a good discussion of number. See Comrie (1985) and Comrie (1976) for good descriptive overviews of tense and aspect respectively. The agreeing participle data discussed in this section are from Paoli (1997), and see also the first two papers in Kayne (2000).

3

Constituency and Theta Roles

3.1 Introduction

This chapter introduces the idea that syntactic structures are **hierarchical** in nature, with smaller structures coming together to make larger structures, which, themselves, can be parts of yet larger structures, and so on. We shall motivate a syntactic operation, which we will call **Merge**, whose function is to build up larger structures out of smaller ones, with the smallest elements being lexical items.

This follows on from the ideas we developed in the last chapter: syntax starts off with features, as its basic atoms; these features are then combined into lexical items, which are essentially bundles of features, which we have assumed so far are unstructured. These lexical items then combine into larger and larger structures, in a way which we will motivate and make explicit. We shall see that some of the features of some of the lexical items project through the structures, so that larger structures end up having the properties of smaller structures within them. This phenomenon is known as **headedness**, and we will see how capturing headedness in our system allows us to account for some fairly diverse syntactic phenomena.

3.2 Constituents

Consider a sentence like:

(1) That bottle of water might have cracked open.

Intuitively, the string *that bottle of water* has a semantic cohesion that *of water might* doesn't, even though both are just sequences of adjacent words in the sentence (one word is **string adjacent**, or just **adjacent**, to another if it is right

next to it). The first of these sequences seems to be something that we can form a complete meaning out of, in contrast to the second.

What syntactic evidence is there that sentences are organized in this way? There are a number of syntactic **tests** which back up our semantic intuition. First, we can often **replace** a sequence of words with a single word in a sentence, with no change in acceptability, and only a minimal change in meaning. So, consider:

(2) It might have cracked open.

In (2), we have replaced the sequence *that bottle of water* with the single lexical item *it*. If *it* is a minimal syntactic object (i.e. just a lexical item), then the fact that we can replace the whole sequence *that bottle of water* with *it* suggests that *that bottle of water* is also a single syntactic object. There is no single word that we can use to replace *of water might*, so we don't have any real reason to assume that this sequence is a single syntactic object. Since this purely syntactic test comes up with the same structure that we wanted to posit for semantic reasons, we are on solid ground in claiming that it has some syntactic reality. This test, where we replace a string of a number of words with a single word, is called the **Replacement Test** (or sometimes the **Substitution Test**).

A group of words which can be picked out in this way is called a **constituent**, and tests like the replacement tests are called **constituency** tests. Essentially, a constituent is a group of words which has a certain internal coherence.

One of the ways that syntacticians represent the idea that something is a constituent is by enclosing it in square brackets, like this:

(3) [That bottle of water] might have cracked open.

The square brackets here enclose a constituent. Since the whole sentence is also a constituent, we can actually add square brackets around the whole sentence:

(4) [[That bottle of water] might have cracked open]

In fact, we also have evidence from replacement that the constituent *that bottle of water* itself has further structure, since we can replace *bottle of water* with the single word *one*:

(5) That one might have cracked open.

In this example, the word *that* is used to pick out an item which bears some relation to the spatial position of the speaker (compare with *this bottle of water*).

What characterizes the entity picked out is that it must be a bottle of water. The string *bottle of water* semantically constrains the relevant property of the real-world object picked out by *that*. Once more, the semantic and syntactic tests give the same result.

Using the square bracket notation, this gives us the following, more complicated structure:

(6) [[That [bottle of water]] might have cracked open]

What these examples show is that sentences are organized into constituents, and constituents themselves are organized into smaller constituents. The smallest constituent is simply the lexical item. The usual convention is to use the word constituent to talk about syntactic objects which consist of more than one lexical item.

Turning to the remainder of the sentence, we can replace *cracked open* with *done*, again with no real change of meaning:

(7) That bottle of water might have done

This suggests that *cracked open* is a constituent. We can also replace *have cracked open* with *do*:

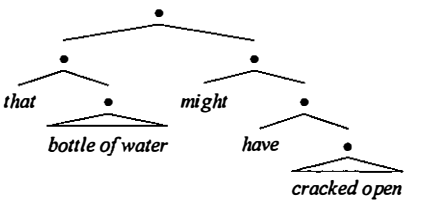
(8) That bottle of water might do.

The meaning of the sentence changes more radically here, since we have removed the verb *have*, which signified that the action described by the sentence is to be viewed as being completed (recall we discussed the contribution of *have* followed by a past participle in the last chapter). However, once we take this into account, the examples in (7) and (8) suggest a fairly intricate structure for this sentence, with constituents embedded inside other constituents. We can display this in square bracket notation, but you can see that this gets rather hard to follow:

(9) [[That [bottle of water]] might [have [cracked open]]]

One way of representing the constituent structure of a sentence, which is a little easier on the eye (and brain) is to explicitly represent each constituent in a sort of **tree structure**, as in (10).

(10)



Each bullet point in the tree structure in (10) represents a constituent made up of the two syntactic objects that are just underneath it in the tree, joined to it by the two lines (or, since this is a tree-like structure, **branches**). The leftmost bullet point is a constituent made up of the word *that* and another more complex constituent built up out of the words *bottle of water*. Where you see a triangle in the tree, this just represents structure for which we have decided not to put in a detailed analysis.

What this procedure shows us is that there are good syntactic reasons to say that a string of words which makes up a sentence has the kind of internal structure shown in the tree in (10). Note that the tree structure in (10) and the bracketed string in (9) are two ways of representing exactly the same thing about the constituent structure of the sentence.

A test which is closely related to replacement is the **ellipsis** test. A constituent is said to be **ellipted** if it is deleted from the structure. In the examples we looked at above, we can ellipt *cracked open*, instead of replacing it with the appropriate version of the word *do* (past participle, past tense, etc.):

(11) That bottle of water might have.

(12) That bottle of water might.

In addition to Replacement and Ellipsis diagnostics for constituency, there's also the fact that we can move certain sequences of words around in a sentence with minimal change of meaning. So if we take a sentence like:

(13) Anson danced extremely frantically at Trade.

We can also say

(14) At Trade, Anson danced extremely frantically.

or

(15) Extremely frantically, Anson danced at Trade.

but not

(16) *Frantically at, Anson danced extremely Trade

or

(17) *Danced extremely, Anson frantically at Trade

All of these examples involve taking a string of adjacent words and moving them to the start of the sentence. But (16) and (17) are unacceptable. The simplest thing to say would be that it is constituents which are susceptible to syntactic processes like movement. This means that, when we move something, we are moving a constituent. So, in the examples above, *extremely frantically* is a single constituent, while *frantically at* is not.

So there are two core tests to see whether sequences of words are constituents: **replacement** of the sequence with a single word and **movement** of the sequence to another position in the sentence. It is important to note that when these tests are successful then what you have is an **argument** that a particular sequence forms a constituent, rather than proof that it does. It is even more important to notice that when one of these tests fails, we cannot conclude that the sequence is not a constituent, we can only conclude that there is no evidence that it is.

This last point is something that often confuses people. To see why this is so, consider the following examples:

(18) The old house collapsed.

(19) *house the old collapsed

The word *house* is trivially a constituent, because it is a lexical item, and lexical items are the basic minimal constituents. However, we cannot move this constituent to the start of the sentence to form (19). Why is this?

We shall discover in later chapters that movement processes, although they uniformly apply to constituents, are subject to other constraints. One of these constraints forbids movement out of a subject, and this will **independently rule out** the sentence in (19).

This means that the ungrammaticality of (19) is not due to the fact that we have moved a non-constituent, but rather because we have moved a constituent illegitimately. This is a general lesson about movement tests: when they fail, they don't tell us anything for sure about constituency, because there may be independent reasons for their failure.

There are other tests for constituency, which generally are just more complicated forms of the movement test. The most useful is possibly the **clefting** test.

A cleft is a sentence that has the general form:

(20) It's BLAH that BLAH

or

(21) It was BLAH that BLAH

For example:

(22) It's [Anson] that I like.

(23) It's [under the bed] that's the best place to hide.

(24) It was [Julie and Jenny] that arrived first.

(25) It was [over the hill and through the woods] that they came running.

Some of these examples sound a little stilted, but most people agree that they are grammatical.

If we look carefully at the cleft sentences, then we see that they are related to simpler sentences:

(26) I like Anson.

(27) Under the bed is the best place to hide.

(28) Julie and Jenny arrived first.

(29) They came running over the hill and through the woods.

There's a simple formal relationship. The cleft is formed by taking a string of words from the simple sentence, putting that string after the words *It's* or *It was*, and then glueing on the new sequence to the front of the remainder of the simple sentence with a *that*:

(30) a. I like Anson →
b. Anson + I like →
c. It's Anson + I like →
d. It's Anson that I like.

(31) a. Julie and Jenny arrived first →
b. Julie and Jenny + arrived first →

c. It was Julie and Jenny + arrived first →
d. It was Julie and Jenny that arrived first.

Now clefting only seems to affect constituents, and can be used as evidence that some sequence of words is a constituent. So the sentence in (31) is good evidence that *Julie and Jenny* is a constituent of this sentence. This argument is backed up by the replacement test, since we can replace *Julie and Jenny* with the single word *they*:

(32) They arrived first.

When clefting fails, then we have no evidence that the sequence isn't a constituent, but no evidence that it is. Let's try with arbitrary sequences from one of the sentences above:

(33) a. Julie and *Jenny arrived* first →
b. Jenny arrived + Julie and first →
c. It was Jenny arrived + Julie and first →
d. *It was Jenny arrived that Julie and first →

We can immediately see that the (d) example in (33) is ill-formed, and so we have no evidence that *Jenny arrived* is a constituent of this sentence.

Sometimes, the results of constituency tests can be apparently contradictory. Let's take the sequence *arrived first* in our sentence above. If we perform the clefting procedure with this sequence we get:

(34) *It's arrived first that Julie and Jenny

but we can replace our sequence *arrived first* with *did* with perfectly fine results:

(35) Julie and Jenny did.

It appears that replacement tells us one thing but movement tells us another.

However, these results aren't really contradictory. The example in (34) allows us to draw only the conclusion that there is no evidence from clefting that *arrived first* is a constituent. The example in (35) suggests that there is an argument that can be made from replacement. On balance, then, we'd say that *arrived first* does form a constituent, since there could be independent reasons why (34) is ungrammatical. This is why it's important to try different constituency tests. It could be that there are independent factors leading to why one test or another fails.

We've just seen that the syntactic formatives in sentences seem to be organized into various groupings. Moreover, it looks as if larger constituents contain smaller ones, which, in turn, contain even smaller ones. So our theory of the fundamental syntactic relation will have to ensure that it has these properties.

In the next section, we'll define the operation Merge, which takes two syntactic items and joins them to make a larger one. In effect what we'll be doing is building a system which will give us directly the kinds of constituent structure we've just seen.

3.3 Fundamental notions

Recall that our purpose in this book is not just to describe language, but rather to develop a theory. We have seen, in the previous section, that there is a great deal of motivation for the idea that syntactic structures are hierarchical in nature. What we shall do in this section is begin to develop a theory that will give rise to these hierarchical structures.

To this end, we're about to introduce some new terminology and some very simple formalism. We need the terminology so that we can talk about the ways that structures are built up, and we need the formalism so that we can be sure that we are being as explicit as possible. Remember that we want to build a general, explicit, and minimal picture of what's going on in sentence structures.

What we want our syntactic theory to do is to provide some operation that will build structures out of lexical items, and larger structures out of smaller ones. Let us, then, posit an operation, which we call **Merge**, which has the property of joining two syntactic objects together. This operation is motivated by the facts that we saw in the previous section, which showed that words in sentences group into constituents. Merge is essentially a constituent building operation.

The way that this operation is usually notated is by first giving the objects that are being joined **labels**. Usually, the label that is used is some subset of the features of the object, most commonly the major category feature, but other features may also be relevant. We then join both the merged objects to a point placed higher up on the page, to form a new object, the label of which is written on the higher point. So in the example in (36), the labels of the two objects we are merging are X and Y. We merge them to form a new object whose label is Z.

(36)

It's important to note that the new object is the whole structure, and not just the letter Z itself. Z is just the label of this whole structure. The lines joining the labels are called **branches**, and the whole structure is called a tree, just as we saw above. The new object created by Merge is said to **immediately contain** the original objects.

The tree in (36) is a representation of the syntactic object Z, which reflects the idea that Z is built up out of two other objects, X and Y. This is just the kind of thing we need to capture the constituency relations between elements of the sentences we saw above.

Trees are by far the most common way of representing complex syntactic objects, but it is easy to come up with other kinds of representation. We've already seen the bracket notation, and it is trivial to add labels to the brackets, giving a **labelled bracketing notation**:

(37) $[_Z X\ Y]$

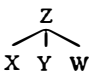
In (37), I've used X and Y and Z to stand for arbitrary labels. Z is the label of the whole syntactic object, which consists of two other syntactic objects labelled X and Y. Z is said to immediately contain X, and also to immediately contain Y. Another way of saying this is to say that Z is the **mother** of X and Y, or that X and Y are the **daughters** of Z, and that X and Y are consequently **sisters**.

One final piece of tree terminology for now: the sections of the tree connected by the branches are called **nodes**, with the lowest nodes (i.e. the representations of the lexical items) called **terminal nodes**, and the topmost node of a tree called the **root node**. So the tree is upside down.

We have just stipulated that Merge joins *two* syntactic objects together. Of course it would be possible to define Merge so as to put three objects together, or seventeen, or to put no specific limit on how many elements a single application of Merge can join into a single object. We will adopt the idea that Merge joins two elements together as a **working hypothesis**. This will mean that all of the syntactic structures that we propose will be **binary branching**. We'll see some evidence which supports this hypothesis in the next chapter.

The Binary Branching hypothesis means that the following structures cannot be formed by Merge:

(38)



(39)

A second point to note about Merge is that it doesn't distinguish between (40) and (41):

(40)

(41)

That is, Merge does not specify the **linear order** of the elements that it merges. Of course, we have to write down the structures somehow, so we either write (40) or (41), but from the point of view of Merge these are exactly the same syntactic object. They are both composed out of the same two syntactic objects.

However, we know that order is crucial to natural languages. It is the order of the words that makes (42) acceptable, while (43) is ungrammatical:

(42) Harry collapsed.

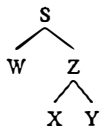
(43) *Collapsed Harry

So we need to impose some ordering on the structures built up from Merge in some other way. The usual term for this is that we need to **linearize** the structures. We will come back to this in Section 4.2.

Since Merge forms syntactic objects out of syntactic objects, it is a recursive operation, in the sense we discussed in Chapter 1. This means that we can build

ever larger constituents using just Merge:

(44)



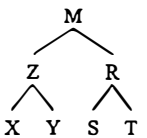
Here, we've taken the object Z and merged it with W to make a new object S.

Finally, Merge only combines objects at their root nodes. So if we have two objects like those in (45) and (46), we can only merge them as in (47):

(45)

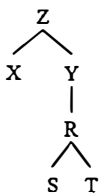
(46)

(47)



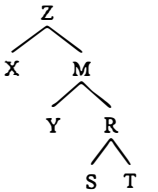
The example in (48) is not well formed, given this property of Merge:

(48)



The simplest way to think about this is, again, to keep your mind firmly on the idea that Merge combines whole constituents: it cannot therefore insert one constituent inside another. In (47), we have Merged the constituent labelled by Z with that labelled by R. We can legitimately do this by creating a new constituent labelled by M which immediately contains Z and R. In (48), however, we have taken R and tried to Merge it with Y. The resulting tree is unary branching and therefore ill formed. We could try to create a new node which contains Y and R, and which is contained by Z. This will give us (49):

(49)



As is fairly obvious, this operation is rather more complicated than simple Merging at the root, since we essentially have to pick apart the object Z and insert a new object inside it. Unless there is a good reason not to, we adopt the simplest operation, and will assume that Merge only applies to root nodes. This condition will rule out the structures discussed above.

We will see in the next chapter that this approach actually makes the right empirical predictions.

Summarizing, we have defined an operation Merge which takes two syntactic objects and creates a new object out of these which immediately contains each of the objects that we started with.

We haven't yet said how the label of the new object is computed. We shall see in the next section that the label of the new object is determined by its head.

3.4 Determining the head

There are two ways to think about the notion head. One is practical: how do we determine the head of a constituent? The other is more theoretical: what is it that makes a particular syntactic object a head?

The answer to the first question can be given intuitively as follows: the head of a constituent is the most important element in it. The vague term 'most important' here covers a multitude of sins, but essentially it picks out the element that is most characteristic of the constituent as a whole.

For example, the following two sentences are well formed:

(50) Pigs love truffles.

(51) Humans love to eat pigs.

But they contrast with the following example:

(52) *Peter is pigs

So we can say that *pigs* has a restricted **distribution** in sentences: it can't just turn up anywhere. In fact, all words have a somewhat restricted distribution in English (and in other languages), although some are more restricted than others.

Now, we can show, using constituency tests, that the italicized sequences in the following four sentences are constituents:

(53) *Those pigs* love truffles.

(54) *The old pigs* love truffles.

(55) *Some happy pigs which can fly* love truffles.

(56) *Some disgruntled old pigs in those ditches* love truffles.

In all of these cases the italicized strings can be replaced with the pronoun *they*.

Notice that all of these constituents appear in the same **sentence frame** as the simple noun *pigs*. That is, immediately before *love truffles*. Furthermore, all of these constituents can appear in the same position as the simple noun in the sentence frame in (57), i.e. after *humans love to eat*:

(57) Humans love to eat *those pigs*.

(58) Humans love to eat *the old pigs*.

(59) Humans love to eat *some happy pigs which can fly*.

(60) Humans love to eat *some disgruntled old pigs in those ditches*.

In all of these examples the italicized sequences are also constituents. We can see this by the fact that the pronoun *them* can replace any of these strings, and also by the fact that they can be moved to the start of the sentence by clefting.

(61) Humans love to eat them.

(62) It is *some disgruntled old pigs in those ditches* that humans love to eat.

However, just like the simple noun *pigs*, these sequences are ungrammatical in a sentence frame like that in (63):

(63) *Peter is *those pigs*

(64) *Peter is *the old pigs*

(65) *Peter is *some happy pigs which can fly*

(66) *Peter is *some disgruntled old pigs in those ditches*

So we can conclude that all of these sequences share their distribution with the simple noun *pigs*. In some sense, it is the simple noun here that dictates the syntactic behaviour of the other elements that combine with it to form a larger constituent.

Now, of course, it can't be the case that there's something special just about the word *pigs*. We could have chosen any word to make the point. Somehow, in these particular sequences, *pigs* ends up being the most important word, and our syntactic system must tell us why that is the case. We can say that *pigs* is the head of each of the constituents we have been discussing in the sense that it determines the distribution of the constituent.

Notice that in all of these cases it is also the head that determines agreement with the verb. All of the italicized constituents in the examples given above have plural heads, and the verbs in each case show plural agreement. So the head of a constituent determines both its distribution, and the effect that it has on agreement relations.

There's another sense in which *pigs* is important. If we think of the meanings of the sentences we've been looking at, we can intuitively see that each of the italicized constituents picks out something in the world which we could characterize as a set of pigs, and not, for example, as a set of ditches. The head of this constituent determines an important fact about its **reference**, which is the real-world object that the word is used to pick out in an utterance of the sentence in question.

So we have two important criteria for picking out heads: (i) the head of a constituent conditions the distribution of the constituent of which it is a part, (ii) the head of a constituent is the most important element of the constituent semantically.

We can make the example slightly more complicated. Say we take a constituent like *owners of pigs*. Here we have a constituent made up of two nouns and a preposition between them. Which of these things is the head of the constituent? We can discount the idea that it is the preposition *of*, since *owners of pigs* clearly has a different distribution from a prepositional phrase, like *at the cinema*.

Given this, the head of this constituent must be one of the two nouns. Notice that the constituent more or less has the same distribution as the simple

noun *pigs*:

(67) *Owners of pigs* love truffles.

(68) Humans love to eat *owners of pigs*

(69) *Peter is *owners of pigs*

So can we conclude that *pigs* is the head of our phrase? No, because the simple noun *owners* also has the same distribution:

(70) *Owners* love truffles.

(71) Humans love to eat *owners*.

(72) *Peter is *owners*

In fact, it turns out that all simple nouns in the plural share this distribution. The feature [N], then, appears to be one of the features that regulates word order in English.

Since we can't tell on purely distributional grounds which of the nouns in our constituent is the head, we must appeal to something else. It turns out that the two nouns in this construction are not equal when it comes to determining the agreement on the verb. Consider the following contrasts:

(73) Owners of a pig love to eat truffles.

(74) *Owners of a pig loves to eat truffles

In both of these examples, we have made the second noun singular. However, the agreement on the verb is plural. This suggests that it is the noun *owners* which is the head.

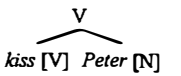
So the main answer to the practical question of how we identify the head of a constituent is that the head is the semantically most important element in the constituent, and it is the element that determines its distribution and the agreement relations that the constituent establishes with other components of the sentence.

It's very easy to capture the idea that the head determines the distribution and agreement properties of a constituent in the system we have so far. We adopt a new notion **projection**, where features from a daughter node project on to the mother node in a syntactic object.

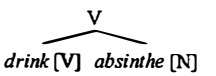
To capture the idea that the distribution of a constituent is determined by its head, we simply say that it is the features of the head that project in any merged

structure. Since the syntax is sensitive to these features, it will be able to treat a head with a feature, and a projection of that head, in the same way. So the fact that *kiss Peter* behaves in the same way as *drink absinthe* can be captured by the claim that the heads of both of these constituents are the verbs that they contain. In a tree structure, we have:

(75)



(76)



In each of these cases the new constituent which has been formed by Merge is labelled by the features of its head. I have used the category label as an abbreviation for the features of the head. Sometimes you might see the orthographic form of the head used as the label. I have chosen the former approach as it makes things more transparent when we come to talk of noun phrases and verb phrases in the next chapter.

We've seen that we can determine the head of a constituent, given the constituent, and facts about its reference and distribution. The question is, can we *predict* which element will be the head, were we only to have the syntactic objects out of which the constituent is built up? Put another way, if we Merge two syntactic objects to form a constituent, can we predict which one will be the head, and therefore have the head-like properties we've just discussed? This is the issue addressed in the next section.

3.5 Predicting the head—θ-roles and selectional features

This section introduces a new idea and proposes one particular theoretical implementation of this idea. The idea is that lexical items, as one of their properties, have a need to combine with other syntactic objects. That is, certain lexical items are unable to stand on their own as syntactic objects. Unless they Merge with something else, the structure in which they occur will be ill formed.

The way we will implement this idea is by extending the concepts we already have: in particular we will use the idea of features, and the interpretability property of features.

3.5.1 θ-roles and the θ-criterion

Before developing an argument which will show that certain lexical items need to Merge with other syntactic objects if they are to be well formed, we will introduce some ideas from semantics which will be relevant.

The first idea follows from our discussion of proposition in Chapter 1. When you take a word like *demonize*, on its own it certainly doesn't express a complete proposition. Minimally, *demonize* expresses a relationship between two objects in the world, where one demonizes the other. Compare this with a verb like *disappear*. *Disappear* intuitively involves only one object in the world, the object that disappears. *Demonize* and *disappear* contrast with words like *donate*, which intuitively involves three objects: someone donates something to someone.

Semantically, these words correspond to what you might think of intuitively as **concepts**. Some of these concepts, or combinations of them, are important enough for human communication to be fossilized into meanings of words. Once a concept has been fossilized into a linguistic meaning, it is said to be **lexicalized**. The concepts that are lexicalized in a particular language are called **predicates**. A predicate is something that can be used to characterize a situation in the world, but often the predicate needs more linguistic material to complete the message. This is what we saw above with the predicates *demonize*, *disappear*, and *donate*. On their own, these verbs aren't propositions. They need help.

When a predicate needs one other (possibly complex) concept to combine with it in order to express a proposition (like *disappear*), then it's said to be a **one-place predicate**. When a predicate needs two other constituents (*demonize*), it's a **two-place predicate**, and **three-place predicates** require three. Human languages don't seem to lexicalize predicates which have more than three places, although it is possible to conceive of verbs like *buy* and *sell* as requiring someone to do the selling, something to be sold, someone to receive it, and a sum of money which is exchanged.

There are some predicates that do actually express a proposition on their own. Weather verbs like *rain*, *snow*, etc. are usually thought of like this. These are called **zero-place predicates** and, semantically, need nothing else to express

whole propositions. You might be puzzled by this, since, in English, these predicates do appear with other material in sentences:

(77) It rained.

(78) It snowed.

However, the *it* that appears with these predicates doesn't really seem to be semantically active. That is, it doesn't contribute anything extra in building up the proposition. Somehow, it is required syntactically, although it is not required semantically. Notice that you can never say the following:

(79) *The weather rained

(80) *The day snowed

These sentences are conceptually plausible, but are still unacceptable. Why? Because the constituents *the weather* and *the day* have some real semantic content, unlike the *it* seen in (77) and (78). Semantically, these weather predicates seem to be sufficient to characterize a situation on their own and, in fact, putting in another expression with its own semantic content is impossible.

Now predicates seem to subclassify the kinds of expressions they need into different semantic types. If you consider the verbs in the following examples, you'll see that they are 1-place predicates, and that the expression that they combine with appears to play the role of initiating the action described:

(81) Alison ran.

(82) Anson joked.

(83) The horse galloped.

These verbs are said to combine with an expression which plays the role of the **Agent** of the proposition (or sometimes the **Causer** or **Actor**). This contrasts with the following 1-place predicates, where the expression plays the role of the thing that undergoes some change of state or position:

(84) Alison collapsed.

(85) Anson appeared.

(86) The horse fell.

In these examples, the predicate is said to combine with a **Theme**; a Theme is understood to be something which undergoes physical movement because of the

effect of the predicate. One-place predicates which combine with an Agent are called **Unergative** predicates, while one-place predicates which combine with a Theme are called **Unaccusative** predicates. This is a very important distinction which has implications for syntactic structure, and we will come back to it below.

Many two-place expressions combine with both an Agent and a Theme:

(87) Anson kicked the cat.

(88) Jenny swallowed the fly.

(89) Truman punched Johnson.

These two-place predicates are called **Transitive** predicates.

There are various other roles that we will come across (**Goal, Source, Experiencer**), and one way to think about them is to see them as generalizations over parts of the semantics of predicates. Certain predicates share the property of combining with Themes, forming a single semantic sub-class of predicates, that is differentiated from those that combine with Agents.

Linguists usually refer to these properties of predicates as **thematic roles**, and conceptualize of predicates as having thematic roles as part of their lexical semantics. In general, thematic roles only have a limited place in syntactic theory: they are really a concept which is relevant to lexical semantics. For this reason, we will not go into the different roles in any depth here. See the Further reading section for other works that discuss these.

There is a convention in linguistics that, if we are talking about how many thematic roles a predicate assigns, we refer to **theta-roles** (where theta is short for thematic, and itself is often abbreviated to θ). So instead of saying that a predicate needs two expressions with semantic content to make up a proposition, we can say that the predicate has two **θ-roles to assign**. The notion of assignment here is a convenient metaphor; we will return in Section 3.5.2 to the details of the actual mechanism that we need to implement it.

A one-place predicate, then, has one θ-role to assign, a two-place predicate has two and so on. Unaccusatives and Unergatives are alike in having only one θ-role to assign (and this whole class of predicates with only one θ-role to assign is called the class of **Intransitive** predicates). **Transitives**, on the other hand, have two θ-roles to assign. There are also, of course, predicates with three θ-roles, so called **Ditransitives**:

(90) Arthur gave the tapestry to Lancelot.

(91) The butler sent the poison to Dinah.

In (91), the butler is acting as the Agent, the poison is the Theme, and Dinah is said to be the **Goal** of the action.

The θ-roles assigned by predicates are of course purely semantic, but they seem to have an effect on the syntax. When a predicate has a θ-role to assign, but there's nothing in the sentence to which the θ-role can be assigned, then the sentence is usually judged as unacceptable:

(92) *Anson demonized

(93) *Anson put a book

These data suggest that every θ-role must be assigned to a constituent in the sentence. Moreover, each θ-role can be assigned to only one constituent. So we do not find a situation where a single constituent is assigned two θ-roles:

(94) *Dantes accused

(94) cannot have the interpretation where Dantes is both the accuser and the person accused. This interpretation is ruled out if a constituent cannot be assigned more than one θ-role, since (94) would involve both the Agent role and the Theme role being assigned to the constituent *Dantes*.

Let us state this as a generalization, which we will come back later to derive from other theoretical principles:

(95) **The Unique Θ Generalization**

Each θ-role must be assigned but a constituent cannot be assigned more than one θ-role.

Notice that the Unique Θ Generalization does not say that every constituent needs to be assigned a θ-role. There is empirical evidence against making this claim. Take an example like

(96) Anson demonized David every day.

Here *demonize* is assigning its two θ-roles to *Anson* and *David*. What about the constituent *every day*? We've seen already that *demonize* only has two θ-roles, and they're both assigned here. *Every day* is therefore not assigned a θ-role. So although every θ-role must be assigned to a constituent, not all constituents are assigned θ-roles.

Only some of the constituents of a sentence are assigned θ-roles, and these are known as **arguments**. So, an argument is defined as a constituent in a sentence which is assigned a θ-role by a predicate.

Let's summarize this discussion:

1. A predicate has θ-roles to assign.
2. These θ-roles are assigned to constituents in the sentence.
3. The constituents to which the θ-roles are assigned are called arguments.
4. Every θ-role must be assigned to a constituent.
5. A constituent cannot be assigned more than one θ-role.

3.5.2 Unassigned θ-roles

The situation is a little more complicated than this. There are some predicates that seem to allow their θ-roles to remain unassigned. Examples include the verb *donate*:

(97) The landlord donated a helicopter.

Donate is a three-place predicate, but only two of its θ-roles have been assigned in (97). There does not appear to be a constituent that is assigned the Goal θ-role. But notice that this sentence has to be contextualized. It isn't acceptable to utter it to someone out of the blue. The person who is being spoken to must know where the helicopter is being donated to. It's almost as though the θ-role is being assigned to the topic of the discussion. The question, then, is whether the topic of a sentence is a constituent, just one which is not overtly expressed in this example. If it is, then we can maintain the generalization that every θ-role is assigned to exactly one constituent.

There are also some predicates that are tricky in that they appear to allow θ-roles to be unassigned in the absence of context.

(98) The students demonstrated (the technique) this morning.

(99) I have eaten (my hat) already.

The bracketed phrases in (98) and (99) are optional. Why should this be?

The answer to the question just posed depends on the semantics of the verbs in (98) and (99). It turns out that these verbs are ambiguous between being one-place and two-place predicates. Take *demonstrate* first. In one meaning, this verb implies that the subject shows someone a way to carry out an action; this is the transitive (two-place) predicate. In the other meaning, the predicate also implies that there is a display of some kind going on, but there is no intention that the display is for the purpose of showing someone how an action is carried out, rather it is intended to show someone that the referent of the subject of

the sentence is concerned about something. Exactly how to relate these two meanings is again a matter for lexical semantics, rather than for syntax.

Similar remarks can be made about *eat*. In its intransitive incarnation, this verb means to ingest the normal kind of food one requires for nourishment. In the transitive version, however, the verb just means to apply the same kinds of actions one usually applies to food ingested for nourishment to something or other. This is why, when there is no object, it is entailed that whatever was eaten was eaten for nourishment, while, in the presence of an object, this is not entailed, as you can see by the example above. This second example is far more subtle, but shows once again that there is enough in the way of a lexical semantic distinction to motivate two different syntactic specifications in terms of θ-role assignment.

All in all, it looks as if our generalization that every θ-role must be assigned to exactly one syntactic constituent holds quite well (although we have not given any good arguments that the topic of a sentence is a syntactic constituent with no phonological expression). As mentioned above, the Unique Θ Generalization allows us to predict much of syntactic structure from the properties of lexical items, which is theoretically a good move (since we need to specify the semantic properties of lexical items anyway) and which is also a useful practical aid in drawing tree structures for sentences.

3.5.3 Selectional features and lexical representation

The discussion above seems to suggest that syntax is somehow derived from semantic properties of lexical items. However, this is not quite the case. The point is that the Unique Θ Generalization is rather a useful generalization about how the syntactic structures interface with semantic interpretation. We still need to define a number of *syntactic* properties of lexical items, aside from their semantic properties.

Take, for example, a verb like *feel*:

(100) Julie felt hot.

(101) Julie felt he was there.

(102) Julie felt a twinge in her arm.

All three of these sentences have an interpretation where Julie experiences some internal sensation. What θ-role will we assign to the constituent that plays the role of engendering the feeling? A fairly standard analysis would be to say that *Julie*

is assigned an **Experiencer** θ-role, while *hot*, *he was there*, and *a twinge in her arm* are assigned a Theme (or perhaps **Source**) θ-role. But *hot* is an adjective, *a twinge in her arm* is nominal in nature, and *he was there* is a whole sentence. So the Theme θ-role can be realized as any of these syntactic categories. This means that it is not possible to predict the syntactic category from the θ-role. It must be independently specified.

It follows from this that we need to define a mechanism whereby certain syntactic properties are associated with particular θ-roles; the θ-assigning properties of lexical items don't, on their own, allow us to determine the category of a syntactic argument.

The argument goes the other way too. We have seen proper names acting as Agents, Themes, and Experiencers so far. So we can't predict from the category of a constituent (assuming proper names are nouns) what θ-role it will be assigned. This means that, even though there is a tight relationship between semantic roles and syntactic requirements, the latter can't be straightforwardly predicted from the former.

The standard way to express statements about the category of the constituent to which a particular θ-role is assigned is by means of **categorial selectional features** (usually abbreviated to **c-selectional features**), and it is to these that we now turn.

A c-selectional feature is a categorial feature on a lexical item, which does not determine the distribution of the lexical item itself; rather it determines the category of the elements which will be able to Merge with that lexical item.

This sounds complicated, but an example should make it clear. Take a word like *kissed*: this clearly has a V-feature since it is the past tense of a verb, but it also has (at least one) **c-selectional N-feature**. This N-feature signifies that something that Merges with *kiss* must itself have a categorial N-feature. So we can Merge a noun like *pigs* or like *Peter* with *kiss*, but we cannot Merge another verb, or a preposition:

(103) kissed Peter; kissed pigs; *kissed eat; *kissed by

Another name for c-selectional features is **subcategorization features**.

What are c-selectional features? Recall the distinction we made in Chapter 2 between interpretable and uninterpretable features. Interpretable features are those features which have an effect on the semantic interpretation of a category. Uninterpretable features are features which seem to make no difference to the semantics of a sentence, but which are somehow required if we are to explain

the (un)grammaticality of certain sentences. Case features, for example, simply regulate the position of certain nouns in certain structures.

We will now adopt an idea about uninterpretable features which we will use throughout the book: we will assume that the syntactic structure to which the semantic interface rules apply should consist only of interpretable features. If this structure contains uninterpretable features, then the semantic rules will not be able to assign a complete interpretation to everything in the structure. We will call this general constraint **Full Interpretation**:

(104) **Full Interpretation**: The structure to which the semantic interface rules apply contains no uninterpretable features.

It follows from Full Interpretation that uninterpretable features must be eliminated from the syntax before the semantic interface rules apply. The intuition we will pursue is that this is what the job of syntactic operations is: they apply in order to eliminate uninterpretable features.

There are a number of ways of implementing this idea. The one we will adopt for concreteness is the following: if an uninterpretable feature enters into a syntactic relation with another feature of a particular sort, the uninterpretable feature is marked for elimination. Features which are marked in this way undergo a sort of self-destruction when they appear at the level where the semantic interface rules apply. They all vanish.

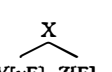
Let's now look at how to apply these ideas to c-selectional features: we will say the following:

(105) The **Checking Requirement**: Uninterpretable (c-selectional) features must be checked, and once checked, they can delete.

(106) **Checking under Sisterhood**: An uninterpretable c-selectional feature F on a syntactic object Y is checked when Y is sister to another syntactic object Z which bears a matching feature F.

To see this in action, imagine we have a tree like that in (107):

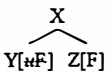
(107)



I have notated that the feature F on Y is uninterpretable by prefixing it with *u*. Now, by the statement in (105), *u*F on Y must be checked and it gets to be checked by being in a syntactic relation with another F feature

somewhere else. Since Z is a sister to Y, the syntactic relation of sisterhood allows feature matching to take place, and *u*F to be checked. We will notate this by marking *u*F with a strikethrough. So the tree in (107) will transform into the tree in (108):

(108)



When the derivation stops and the semantic interface rules apply, all the checked uninterpretable features self-destruct, so that the final representation consists only of interpretable features, as required by Full Interpretation.

From this perspective we can now see c-selectional features as simply uninterpretable categorial features on a head. So a word like *kiss* has an interpretable [V] feature (which contributes to its interpretation as involving an event) and an uninterpretable [*u*N] feature. If *kiss* Merges with a noun bearing an interpretable [N] feature, then this Merge allows the checking of the uninterpretable [N] feature on the verb. As a tree we have:

(109)

This tree is generated from the lexical item *kiss*:

(110) kiss [V, *u*N]

This featural specification will rule out the starred examples in (103), since in both the bad cases *kissed* is combining with something which is not nominal. This means that its uninterpretable (c-selectional) [*u*N] feature will not be checked. If, however, *kiss* Merges with *pigs*, then they are in a syntactic relation and the N feature of *pigs* and the [*u*N] feature of *kiss* match. This checks the [*u*N] feature on the verb, leading to eventual grammaticality.

This same idea immediately allows us to deal with the examples which we ruled out via the Unique Θ Generalization. The verb *demonize* takes two arguments. Concentrating just on the Theme argument, we need to specify a c-selectional feature on *demonize*. Since this verb needs to combine with

a nominal, we'll assume that it has a c-selectional N-feature (the "..." here just signifies that the verb has other features, in which we are not interested here):

(111) demonize [V, *u*N, ...]

This **lexical specification** will rule out examples where *demonize* combines with an adjective or prepositional constituent:

(112) *Anson demonized old

(113) *Anson demonized up the Khyber

However, it will also rule out a case where the verb has no argument of any sort:

(114) *Anson demonized

This is because the *u*N feature on the verb will not be matched by anything else in the structure, and will therefore not be checked, contrary to what is required by the Checking Requirement.

What we have done here is provide a syntactic implementation of the Unique Θ Generalization: we say that each θ-role is associated with a c-selectional feature of some sort, and therefore a syntactic constituent must Merge with the lexical item bearing this feature. It then follows that each θ-role will be associated with a selected constituent in the sentence.

3.5.4 S-selectional features

Now c-selectional features appear actually to do only part of the job that we need to have done. This is because lexical items constrain more than just the syntactic category of the constituents with which they combine. They also constrain the semantics. In the following examples, you can see that the verb *intone* can be followed either by a nominal, or by something which looks much like a simple sentence:

(115) Genie intoned the prayer.

(116) Genie intoned that she was tired.

So, in terms of category, we would want to say that *intoned* can have either of the following c-selectional features: [*u*N] or [*u*Sentence] (we will come back to the real category of a sentence later on). However, not just any nominal will do:

(117) *Genie intoned the mirror.

In this sentence, there is a semantic mismatch between the requirements of the verb, and the nominal that is merged with it. We can represent this by semantic features: in this case we might say that the sister of the verb *intone* must be [+sayable]. Likewise, we could rule out examples like the following by requiring that the single argument of the predicate be [+animate]. Ratherthan c-selectional features, the concept that is relevant here is **s(emantic)-selectional features**:

(118) *The bookcase ran

(119) *The airport panted

(120) *The fig chortled

We will not go through all the kinds of s-selectional features that have been proposed, since this, once again, is really a matter for lexical semantics, rather than syntax. However, there are three semantic categories that are very important for an understanding of the interface between semantics and syntax. These are: **proposition, entity,** and **property**. Propositions we have already met. The difference between a predicate like *eat* and a predicate like *intone* is that *intone* can s-select a proposition, while *eat* only s-selects an entity (that is, something which semantically is some kind of object, or thing), giving us the following pattern:

(121) I intoned that she was happy.

(122) *I ate that she was happy

(123) *I intoned fruit

(124) I ate fruit.

Properties are best thought of as some kind of attribute of an entity. So an entity like an apple might have the property that it is green, or that it is rotten, or that it is poisoned. One good way to think about properties is to think about how propositions are built up. Usually we talk about propositions as describing a situation, or state of affairs. They do this by attributing a property to an entity. So the proposition that the apple is poisoned is built up out of the property of being poisoned and the entity the apple by stating that the property holds of the entity.

Certain verbs need to Merge with syntactic objects which are, semantically, properties, rather than propositions or entities. A good example is a verb like *become*:

(125) *Anson became that he was happy

(126) Anson became happy.

(127) Anson became the Mayor.

Clearly *become* cannot combine with a proposition (125). If you think carefully about the meaning of (126) and (127), you'll see that they involve the entity Anson changing the set of properties that he has by adding a new property (that of being happy, or that of being the Mayor). (127) does not mean that there is some entity that is the Mayor (who has a name, lives in a big house, and runs the city) and Anson becomes him or her, rather it means that Anson takes on the property of being the Mayor (which is really a role of some kind, rather than an object).

Properties, propositions, and entities, then, are our major semantic categories that lexical items s-select for. Each of these categories has a number of subcategories: so entities might be animate or inanimate, abstract or concrete, etc. (It might seem odd to talk of inanimate abstract entities, because we usually associate the word entity with something animate; however, we are using entity here in a technical sense to mean just something which human beings conceive of as, somehow, a thing.) Propositions might be factual or non-factual, assumed by the speaker to be true or not, and so on. Properties seem to have a wide range of possibilities, such as being audible, coloured, etc. (witness the weirdness of examples like *That bookcase is loud* or *This song is red*). Notice that properties, like entities and propositions, can be fairly complex:

(128) He became [fond of peanuts].

(129) He is [unhappy about his contact-lenses].

You might wonder if it isn't somewhat of an overkill to have both c-selectional and s-selectional specifications. In fact, a continuing strand of research over the last twenty-five years or so has attempted to derive c-selectional features from s-selectional features, but no one has been completely successful yet. For our purposes, we'll simply assume that both are required.

However, although s-selectional features are important for capturing our judgements about unacceptability of sentences, we will assume that Merge itself is blind to these properties, following our more general perspective on the idea that semantic properties do not drive syntactic operations:

(130) Merge does not inspect s-selectional properties.

This means that sentences which violate some s-selectional requirements will be syntactically well formed. Our system will generate such sentences, and the

rules of semantic interpretation will construct a semantic representation out of them. However, that representation will be semantically anomalous.

Selectional features of both types are associated with θ-roles. A useful way of thinking about this is to imagine that lexical items have, as part of their specification, a slot for each θ-role that they assign. These slots are arranged into a list, called a **θ-grid**. Each slot has two aspects: one looks at the lexical semantic part of the word, and states what particular thematic role and s-selectional properties are associated with the slot; the other looks at the syntactic aspect of the slot, and states what syntactic category features are associated with it. So a lexical item like *donate* has the following internal structure:

(131)

Donate V	Syntax (*c-selection features*)	θ-grid (*i.e. list of θ-roles*)	Semantics (*s-selection features*)	Thematic roles
	N	x	entity	Agent
	N	y	entity	Theme
	P	z	entity	Goal

The table in (131) specifies part of the lexical entry for the verb *donate*. I have represented the θ-grid as a list of letters (x, y, z). The θ-grid just tells us how much of the verb's lexical semantics is syntactically active (in this case the lexical semantics is partitioned into three parts for use by the syntax). The relations between the θ-grid and the lexical semantics of the predicate tell us what thematic roles and s-selectional properties are associated with each element of the θ-grid, while the c-selectional features tell us what categories of the syntactic arguments are assigned those roles.

3.6 Triggering Merge by feature checking

We have now built up the following definition of Merge:

(132) **Definition of Merge:**

1. Merge applies to two syntactic objects to form a new syntactic object.
2. The new syntactic object is said to contain the original syntactic objects, which are sisters but which are not linearized.

3. Merge only applies to the root nodes of syntactic objects.
4. Merge allows the checking of an uninterpretable c-selectional feature on a head, since it creates a sisterhood syntactic relation.

Setting up the definition of Merge in this way gives us an independent way of determining the head of a Merged structure:

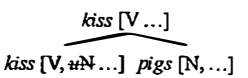
(133) **Definition of Head:** The head is the syntactic object which selects in any Merge operation.

Recall that we implemented selection by assuming that c-selectional features were uninterpretable, and we stated the following requirement:

(134) **The Checking Requirement:** Uninterpretable features must be checked, and once checked they delete.

We've seen how this works schematically already (in Section 3.5.3). I repeat the basic structure here for ease of reference:

(135)



The verb *kiss* has a c-selectional feature [*u*N] and the noun *pigs* has the categorial feature N. This means that Merge can take place between the V and the N and that the [*u*N] feature of the verb is checked by the categorial feature of the noun.

As already mentioned, this idea now gives us a handle on the facts that we earlier captured by appealing to the Unique Θ Generalization. Recall that the Unique Θ Generalization required that each θ-role be assigned to a constituent. Now, if a head bears a number of c-selectional features, each associated with a θ-role via a θ-grid, and if c-selectional features are uninterpretable and must be eliminated, then it follows that each c-selectional feature will have to be checked, leading to the assignment of each θ-role. Examples like (136) will be ungrammatical because a c-selectional feature of *put* has not been checked:

(136) *Anson put a book

Given our definition of head, this system of feature checking also ensures that the verb is the head of the new constituent in a structure like (135). This follows

since the verb selects, and hence, is the head. The defining property of heads is that they project their features. Let us state this as follows:

(137) Headedness: The item that projects is the item that selects.

We predict, then, that the constituent *kiss Peter* should have the same distribution as other verbs, rather than as other nouns. This seems to be exactly right:

(138) I want to [kiss pigs].

(139) I want to [sing].

(140) That I should [kiss pigs] is my fondest dream.

(141) That I should [dematerialize] is my fondest dream.

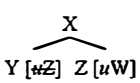
(142) *[Kiss pigs] is my happiest memory

(143) *[Computerize] is my happiest memory

We can now return to a question about how Merge works that we raised in Section 3.3. In that section, we proposed that Merge always applies to the root nodes of two trees. Putting this together with our approach to heads, we now predict that it is impossible for a syntactic object A to Merge with object B, checking B's selectional features, if A still has selectional features which are unchecked.

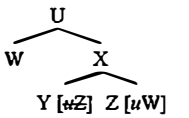
Why is this? Well, if we were to Merge with an element with unchecked selectional features, then these features could never be satisfied by an application of Merge, because they would be 'stuck inside' the structure. Schematically, we rule out structures like (144):

(144)



In the tree in (144), Z checks the c-selectional feature of Y (which is [*u*Z]), and Merge forms the syntactic object X out of Y and Z (where Y is the head of X, by our definition). However, there is nothing around to check the c-selectional feature of Z itself (that is, [*u*W]). Even if we merge some W later on, it will never be a sister to Z, and so never be able to check the c-selectional feature of Z, since c-selectional features are only checked under sisterhood.

(145)



This means that we will be left with an unchecked uninterpretable feature, and this will violate Full Interpretation.

This all sounds rather abstract, but it has inunediate desirable consequences. Take an example like the verb *become*, which we looked at earlier. *Become* s-selects for a property, and c-selects for an Adjective, so we have examples like:

(146) Anson became [$_A$ muscle-bound].

(147) Daniel became [$_A$ blond].

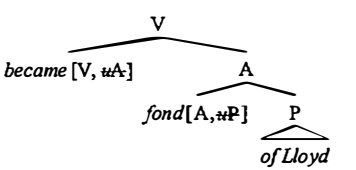
But if we have an adjective like *fond*, which itself has selectional requirements, we find that we have to satisfy these:

(148) *Julie became [$_A$ fond]

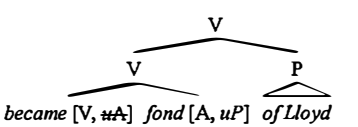
(149) Julie became [$_A$ fond of Lloyd].

Now, the system we have setup forces us to generate a structure for (149) where *fond of Lloyd* is a constituent, ratherthan one where *became fond* is a constituent, that is, we have (150) rather than (151):

(150)



(151)



Why is this? If you look at the tree in (151), you can see that the adjective *fond* has a c-selectional feature [*u*P], but this feature has not been checked, and never can be. This problem does not occur in the topmost tree (150).

This turns out to be the right result. Pseudoclefting tests show us that while there is evidence for *fond of Lloyd* being a constituent, there is no evidence that *became fond* is a constituent (see exercise 1 of this chapter for pseudoclefts):

(152) What Julie became was [fond of Lloyd].

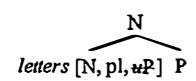
(153) *What Julie did of Lloyd was [become fond]

We can conclude then, that a fairly abstract property of our system gives the right results for particular facts about English syntax. This is obviously the kind of result we want.

A good example of this whole system in action comes from nouns that have θ-roles to assign. We can deal with an example like *letters to Peter* by adopting the idea that *letters* has a θ-grid with a single argument on it. This argument is associated with: (i) an optional c-selectional feature [*u*P] which allows a prepositional element to merge; (ii) the semantic specification that this entity has the thematic role of Goal. Concentrating on the c-selectional requirement, it seems, at first glance, that we incorrectly predict that an example like the following should be grammatical:

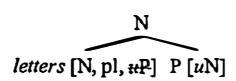
(154) *letters to

(155)



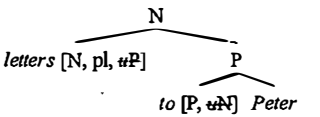
Here the c-selectional feature of *letters* has been checked by the P-feature of the preposition. To ensure that (154) isn't generated, we assume that *to* itself has a c-selectional feature. Let's assume that *to* has a selectional N-feature, [*u*N]. Given that selectional features must be checked, we now rule out structures like (156) and hence examples like (154):

(156)



The structure in (156) will always have the unchecked N feature of the preposition, because, no matter what else is Merged, it will be merged higher up in the tree. This entails that the c-selectional feature of *to* will never be checked. The only way out of this dilemma, as in the case that we saw above, is to satisfy the selectional feature of *to* before merging with the noun.

(157)

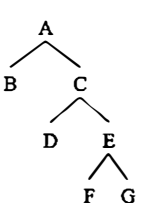


The proposal that Merge always applies to root nodes, then, receives strong empirical back-up. We can derive this requirement from a more general fact about the way that syntactic derivations work, if we say that syntactic operations in general always apply to the root projection of a tree. In the examples we have seen above, Merge applies between two syntactic objects, one of which bears a c-selectional feature. The checking of this feature is also a syntactic operation, which applies to the head of the root of the tree, matching this with another feature. Checking and Merge, then, always apply at the root, so that syntactic derivations are **extended** by the application of operations to the root projection of the tree. Let us state this as a general constraint:

(158) The **Extension Condition**: A syntactic derivation can only be continued by applying operations to the root projection of the tree.

The Extension Condition effectively prohibits setting up syntactic relations between objects which have already been constructed inside a structure. For example, imagine the following schematic tree:

(159)



On the assumption that A is the projection of the head B, it will be possible to set up syntactic relations between B and C for checking purposes. In fact, we will see in later chapters that it is also possible to set up syntactic relations which span more distance in the tree: between B and F, for example. However, the

Extension Condition prohibits a syntactic operation applying to, say, D, since it is not the root projection of the tree in (159). Any operation involving D must apply before B is Merged (i.e. it must apply while D is the head of the root). This will disallow Merge of some object with D, and it will also disallow checking between D and, say, F.

Summarizing, the (syntactic) head of a constituent built up by Merge is the lexical item that projects its features to the new constituent. That lexical item will be the one that triggered application of Merge in the first place by being specified with c-selectional features that need to be checked. All c-selectional features must be checked by applications of Merge. Unchecked features on a tree result in the structure being ill formed. Finally, syntactic operations always apply to the root projection of the tree.

3.7 Summary

This chapter has gone from the concrete to the abstract at a fairly fast pace. The important conceptual points are the following:

(160)

- Sentences have a complex hierarchical structure.
- This can be captured by the binary tree-building operation Merge.
- Properties of heads project through this structure.

We proposed a number of principles:

(161) **Full Interpretation:** The structure to which the semantic interface rules apply contains no uninterpretable features.

Pursuing the intuition behind (161), we suggested that one of the roles of syntactic operations was to eliminate uninterpretable features from syntactic representations. We implemented this intuition by assuming two further ideas:

(162) **The Checking Requirement:** Uninterpretable (c-selectional) features must be checked, and once checked, they can delete.

(163) **Checking under Sisterhood:** An uninterpretable c-selectional feature F on a syntactic object Y is checked when Y is sister to another syntactic object Z which bears a matching feature F.

And we saw that the following generalization followed from the mechanisms we proposed:

(164) **The Unique Θ Generalization:** Each θ-role must be assigned but a constituent cannot be assigned more than one θ-role.

We also imposed a strict condition on how derivations run:

(165) **The Extension Condition:** A syntactic derivation can only be continued by applying operations to the root projection of the tree.

This condition allows derivations to continue only by application of operations to the outermost layer of the tree.

We also met a number of general phenomena for which we provided theoretical explanations.

Phenomenon	Explanation
constituency	Binary Merge interacting with the checking requirement on c-selectional features
headedness	Unchecked features of the selector project to the mother node
classes of predicates	θ-roles are associated with selectional features via the θ-grid
selectional restrictions	C-selectional features as uninterpretable categorial features which have to be checked under sisterhood

Exercises

Exercise 1 Pseudoclefts

There is another type of sentence which is often used to provide constituency tests: the *pseudocleft*. Pseudoclefts work in a similar way to clefts: they involve removing a constituent from a sentence and then joining it back on with other stuff in the way. Some examples should make this clear:

(1) I love focaccia and sun dried tomatoes.

(2) What I love is focaccia and sun dried tomatoes.

(3) We donated a chopper to the new hospital.

(4) What we donated a chopper to was the new hospital.

(5) Alison and David soaked their feet after dinner.

(6) When Alison and David soaked their feet was after dinner.

(N.B. This last sentence is, again, a little stilted. It sounds better if you put *The time* before *when*. The same applies to the where-pseudocleft in (8): it sounds better if you prefix *The place* before *where*)

(7) Alison and David soaked their feet in the kitchen.

(8) Where Alison and David soaked their feet was in the kitchen.

Part A

Task 1 Write down a procedure, as explicitly as you can, which explains how to form a pseudocleft out of a simple sentence.

Part B

Task 2 Does your procedure extend to the following example? If not, alter it so that it covers all the examples so far.

(9) What Alison and David did was soak their feet in a bucket.

Part C

Task 3 Now apply your procedure to the following sequences from (5):

their feet after dinner;
Alison and David;
soak their feet

Discuss what your results mean for the constituency of this sentence.

Part D

Task 4 Now use all the other constituency tests you can and state what you think are the major constituents of (7).

Exercise 2 Replacement tests

Work out the constituency of the following sentences, using replacement, movement, clefting and pseudoclefting tests.

For replacement, try to use the following single words to replace sequences: pronouns, *one*, *this*, *these*, *that*, *those*, forms of the verb *do* (sometimes these sound better if followed by the words *so* or *that*), *there*, *then*.

(1) Anson shot the pterodactyl with his rifle in the jungle.

(2) Julie and Fraser ate those scrumptious pies in Julie's back garden.

(3) Michael abandoned an old friend at Mardi Gras.

(4) In every club in London, people threw up their hands in the air.

(5) We decided to paint the bathroom a lurid lime green colour.

Exercise 3 Phrasal verbs

Part A

The following two sentences look superficially similar:

(1) He looked up the number.

(2) He walked up the hill.

However, it turns out that they have rather different constituent structures. The most striking fact is that in (1) but not (2) the word *up* can appear at the end of the sentence:

(3) He looked the number up.

(4) *He walked the hill up

Traditionally, verbs which behave like *look up* are called **phrasal verbs**.

Task 1 Think up five more examples of phrasal verbs, and five examples of verbs which are not phrasal but can appear in sentences like (1) and (2) with the same superficial structure.

Task 2 Show, using the clefting test, that your phrasal verbs and your non-phrasal ones have a different constituency.

Task 3 Show, using replacement, that your phrasal verbs and your non-phrasal ones have a different constituency. (Hint: use the word *there* as a test for a PP constituent.)

Task 4 Show, using a simple movement test, that your phrasal verbs and your non-phrasal ones have a different constituency.

Part B

Phrasal verbs differ in their syntax from non-phrasal verbs in a number of other ways. For example, phrasal verbs with pronominal object tend towards unacceptability if the prepositional element precedes the pronoun:

(5) He looked it up.

(6) *He looked up it

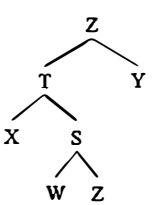
Task 5 Test to see whether this is true for your own examples, and show any contrasts with non-phrasal verbs.

Task 6 Try to think up other ways in which the syntax of phrasal verbs differs from the syntax of non-phrasal ones. (Hint: think about the position of adverbials like *slowly, often,* prepositional constituents like *in the town,* and expressions like *as quickly as he could.*)

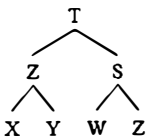
Exercise 4 Trees

Study the trees below. For each tree state: (i) the root node; (ii) the terminal node(s); (iii) the node(s) that are immediately contained (dominated) by the root node; (iv) the node(s) that immediately dominate a terminal node; (v) the sister(s) of the nodes you picked out in (iii); (vi) the sisters of the nodes you picked out in (iv).

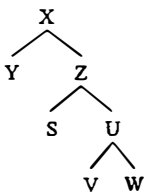
(A)



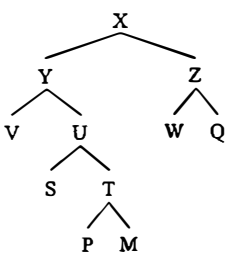
(B)



(C)



(D)



Exercise 5 Merging trees

Now draw the trees that result from merging the following. Since Merge does not determine linear order there are two answers for each:

(i) (A) and (B); (ii) (A) and (C); (iii) (C) and (D); (iv) (B) and (D).

Exercise 6 Distribution and heads

Make up sentences which show whether the following pairs of constituents have the same distribution. Remember that you are looking for judgements of grammaticality, so you might have to come up with odd contexts to make the

sentence acceptable. Once you have done this, hypothesize which word is the head, and give a justification for your hypothesis. I have done the first one for you as an example:

(1) on the boat; inside an egg

These do share distribution. The following examples suggest this:

(2) He wrote the book on the boat/inside an egg.

(3) He put his money on the boat/inside an egg.

(4) The chicken gestated on the boat/inside an egg.

(5) I live on a boat/inside an egg.

I hypothesize that the heads are *on* and *inside* respectively, since removing them results in a completely different distribution.

(6) on the boat; there

(7) six shot glasses; drinking the absinthe

(8) coffee-flavoured; very interested in cocktails

(9) drank tequila; fond of tequila

Further reading

Section 3.2

The basic constituency tests go back to Bloomfield (1933), Wells (1947), and Harris (1951), to name but a few of the practitioners of American Structuralist syntax. More up-to-date discussion can be found in most of the standard textbooks (Haegeman and Guéron 1999, Radford 1981, Ouhalla 1998).

Section 3.3

Terminology for trees can also be found in most standard textbooks. The idea that syntactic structures are binary goes back to work of Richard Kayne (especially Kayne 1984).

Section 3.4

See the papers in Corbett, Fraser, and McGlashan (1993) for discussions of the notion head in grammatical theory, and Lyons (1968) for an early but thorough theoretical discussion.

Section 3.5

The notion of thematic role goes back to Fillmore (1998) and Gruber (1965). Today this notion continues to be a controversial one. See Dowty (1991), Jackendoff (1987) and the papers collected in Wilkins (1988) for discussion. An accessible discussion can be found in Saeed (1997). The difference between c-selection and s-selection was first explored in depth by Grimshaw (1979). See also the discussion in Chomsky (1986*b*). For the idea that intransitive verbs split into two different syntactic classes, see Perlmutter (1978) and Burzio (1986).

Section 3.6

The main ideas from this section (feature checking) come from Chomsky (1995*b*), ch. 4 and Chomsky (2000), although Chomsky does not implement c-selection in the way that I have done here. For the precise definition that Chomsky gives for Full Interpretation (adapted slightly in the chapter) see these works.

4

Representing Phrase Structure

4.1 Introduction

The previous chapter introduced the idea that the syntactic operation Merge combines lexical items into larger syntactic objects, and then combines these into larger objects still, giving rise to complex hierarchical structure. In the current chapter, we will see that the hierarchical structures we met in the last chapter are organized into **phrases**, and that this organization derives from their selectional properties.

We will concentrate on one of the most important aspects of sentence structure, the structure built up around the verb. We will see that verb phrases arise from the interaction between the selectional properties of the verb, and the way that phrase structure is built up through syntactic operations.

We will also introduce a new syntactic relation: **c-command**. We will see how c-command can be used as a diagnostic tool to probe into the internal workings of the verb phrase, and we will use it to motivate various aspects of the internal structure of the verb phrase.

Finally, we will round off with an overview of the general architecture of the theoretical system we are engaged in developing.

4.2 The structure of phrases

In the previous chapter, we saw that sentences have a complex hierarchical structure, and we captured this by proposing that sentences are built up using the binary operation Merge, which combines syntactic objects together. The idea that it is the properties of the selecting head that project into the higher structure allows us to capture the fact that the most important element inside a structure

determines its distribution. In this section we will focus on how far the properties of a head project up through the structure.

4.2.1 First Merge—Complements

Recall that one of the important predictions made by our system was that all the c-selectional features of an element have to be checked before that element is Merged with a c-selecting head. This was what ruled out examples like (1):

(1) *letters to

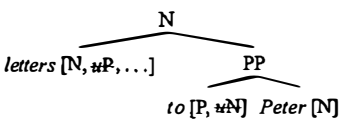
This is ruled out because *to* has a c-selectional [*u*N] feature which has not been checked. Since c-selectional features are checked under Merge, and Merge always takes place at the root node, there is no way for this feature of the preposition *to* ever to be checked. It is 'trapped' inside the structure.

On the other hand, if we check the [*u*N] feature of *to* by first Merging a noun with the preposition, then we get grammaticality:

(2) letters to Peter

Syntactic objects which have no c-selectional features to be checked (such as the constituent *to Peter* in (2)) are called **maximal**, since they project no further. A maximal syntactic object of category X is abbreviated XP, and is said to be a **phrase** of category X. So a maximal object which is nominal is NP, a maximal object which is prepositional is PP, and so on. This means that we can annotate a tree for (2) above in the following way:

(3)



I have not put a phrasal annotation on the root node of the tree, as we don't yet know whether it will be the head of some further Merged structure (i.e. I have not specified whether there are further selectional features that need to be satisfied, hence the '. . .' in the feature specification of *letters*).

I have also not marked the teminal node *Peter* as a phrase although, technically, it is one. It has no selectional features to be checked, and so, given our definition,

it is a maximal projection. It is also a **minimal projection**, since it is just a lexical item (but see Chapter 7 for further discussion).

The preposition *to* on its own is minimal (since it is a lexical item) and not maximal (since it has a feature to check). The syntactic object containing *to* and *Peter* is maximal (since it contains no selectional features), and not minimal (since it is not a lexical item). The following table summarizes this, and adds comments on the other nodes in the tree:

(4)

Node	Minimal	Maximal	Comments
Peter	yes	yes	A lexical item with no c-selectional features
to	yes	no	A lexical item with a c-selectional feature
to Peter	no	yes	Neither a lexical item nor has c-selectional features
letters	yes	no	A lexical item with a c-selectional feature
letters to Peter	no	??	Not a lexical item; may still have features to be checked

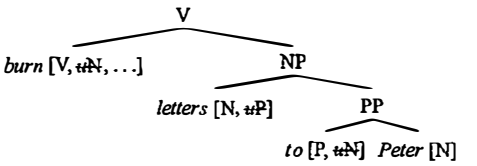
It is very important to note that the phrasal status of a node is derived from its featural composition: if a node has no c-selectional features to be checked then it is maximal. This means that if a lexical item like *to* checks its c-selectional features by Merging with a noun like *Peter*, the new object constructed by Merge does not have any c-selectional features to be checked, and hence is phrasal.

It follows from this discussion that only maximal projections can be sisters of c-selecting heads. If a non-maximal projection is Merged, its unchecked c-selectional features will be 'trapped', leading to ungrammaticality (since all uninterpretable features must be checked).

As an example of how the phrasal status of a node changes when Merge applies, take a verb like *burn*. *Burn* has two θ-roles, both associated with c-selectional N-features. Concentrating on the theme role, we can Merge the

tree in (3) with the projection of *burn*, to give:

(5)



Notice how the projection of *letters* which is merged with the verb is now phrasal, since all of its selectional features have been checked. It turns out that there were no further c-selectional features hidden inside the [...] of its feature bundle as specified in (3) (this is not always the case for nominals as you will see in Chapter 7). This NP itself satisfies the c-selectional feature of *burn*. Again, I have not marked the projection of the verb as phrasal, since its phrasal status is not determined until it has Merged with yet further material.

Notice also how the constituent structure we have derived gives the right results. If (6) is an order or a command, then we can have the three following sentences (recall the imperative structures introduced in Exercise 2, Chapter 2):

(6) Burn letters to Peter!

(7) Burn letters to him!

(8) Burn them!

We can see from the replacement test in (8) that we have the right constituency here.

The kind of structure we are building up here, where a possibly complex phrasal element merges with a lexical item which projects, is called a **head-complement structure**. Head-complement structures arise from the first application of Merge to satisfy a selectional feature of a head.

The NP *letters to Peter* is said to be the **complement** of *burn* in (5). The PP *to Peter* is the complement of *letters*, and the NP *Peter* is the complement of *to*. In English, complements come to the right of the head that selects them. This is also true for languages like French, Gaelic, and Arabic. Other languages, like Japanese, Korean, and Turkish, have complements which precede their selecting

heads, as you can see from the following example from Japanese:

(9) Hanako ga Taro o tataku
Hanako subj Taro obj hit
"Hanako is hitting Taro."

Whereas *Taro*, the complement of the verb *tataku*, "hit", follows its verb in English, it precedes it in Japanese (marked bold in the example).

Nominals in Japanese also take their complement to the left rather than to the right:

(10) buturigaku no gakusei
physics genitive student
"The student of physics"

A traditional name for nominal complements of verbs is **objects**. So in an example like (11), *Meg* is the object of *met*, and also its complement. Languages where the object comes after the verb are usually termed Verb-Object languages (abbreviated to VO). Languages where the object comes before the verb are Object-Verb languages (OV).

(11) Michael left Meg.

In general then, when a head X combines with only a single complement (i.e. it has just one selectional feature to satisfy) then we find the following two **linearizations** of the basic head-complement structure:

(12)

(13)

In this book we will assume that the different orders arise because of different linearization properties of head-complement structures, as outlined here. However, see the Further reading section for pointers to alternative analyses of this sort of linguistic variation.

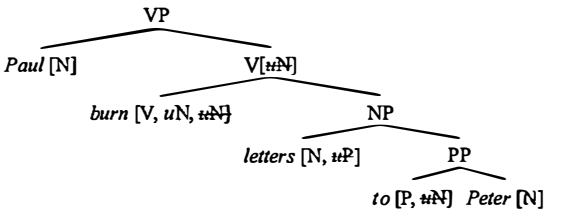
4.2.2 Second Merge—Specifiers

In our example above, we assumed that *burn* has two elements on its θ-grid. One of these was associated with a Theme θ-role and selectional N-features. The other is associated with an Agent θ-role, as in:

(14) Paul burns letters to Peter.

Here *Paul* is assigned the Agent θ-role, and *letters to Peter* is assigned Theme. We said above that checked c-selectional features delete and therefore they cannot project any further. However, there is still an unsatisfied selectional feature associated with the verb which remains after the complement has been Merged. In order for this selectional feature to be satisfied, another nominal must be Merged, and this nominal will then be assigned the Agent θ-role. Let us see how this might work:

(15)



In this tree, we can mark the root node as phrasal, since we now know there are no more selectional features of V to be checked. I have explicitly shown two selectional N-features on the verb: one is checked by the merged complement, but the other, because it is not satisfied by the first application of Merge, is checked by the NP *Paul*. This happens in this way because one of the c-selectional features of the verb is unchecked, and projects to the next node up in the tree. At this point, it can be checked when an NP Merges as its sister.

Notice that we now have three levels of projection for the verb: we have the lexical item itself (the **minimal projection**, written as X^{min}—in this particular case we have V^{min}). A minimal projection isn't really a projection of anything; it is simply the lexical item. The second level is the **maximal projection**, which results when all selectional features have been checked (written as XP (VP), or sometimes as X^{max} (V^{max})). Finally, we have an **intermediate** projection, sometimes called the **bar-level projection**, and written as X' (V') or $\bar{X}$ ($\bar{V}$). The intermediate projection is not a lexical item, but there are still selectional

features left to check. It is extremely important to note that the different levels of projection are derived from feature checking, rather than being extra primitives that we have introduced into the theory.

Recall that we defined 'complement' above as the sister of a lexical item or, equivalently, as the product of the first Merge operation with a head. The sister of an $\bar{X}$ projection (*Paul* in the tree above) is termed a specifier. Specifiers are the outcome of the second Merge operation. In contrast to complements, specifiers in English are linearized to the left of their head.

Once again, we find languages with apparently different linearizations of Specifier-Head structures. For example, whereas in English the Agent precedes the remainder of the VP, in Malagasy, it appears to follow it:

(16) Manasa lamba ho an' ny ankizy ny lehilahy
PRES-wash clothes for ACC the children the man
"The man is washing clothes for the children."

However, the idea that what we have here is a rightwardly linearized specifier is once again controversial. The actual structure of these sentences is far more complex (again, see the Further reading section).

One point about abbreviations: the abbreviation for 'maximal projection' is X^{max}, or more usually, XP; the abbreviation for 'minimal projection' is X^{min} or just X. In the example above *burn* is a V^{min}, but this is equivalent to just saying that it is a V. *Peter* is also a minimal category (an N^{min} or just N), but at the same time it is a maximal category (N^{max} or NP).

4.2.3 Adjunction

We now return to some data that we introduced when discussing θ-roles. Recall that some of the constituents in sentences are assigned θ-roles by heads. We gave the following example:

(17) Anson demonized David every day.

Here the two θ-roles that are associated with the θ-grid of *demonize* are assigned to *Anson* and *David*. We can capture this by saying that *demonize* has two c-selectional N-features associated with its two θ-roles, and that, since these features have to be checked, both θ-roles are assigned.

The other major constituent in the sentence (*every day*) does not receive a θ-role from *demonize*, or from anything else in the sentence. Semantically it seems to have the function of placing in time the situation described by the rest

of the sentence. Here are some other examples of constituents which also have a modificational rather than an argumental role:

(18) Anson demonized David at the club.

(19) Anson demonized David almost constantly.

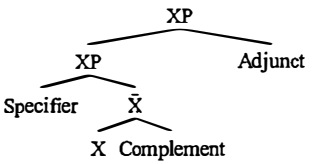
(20) Anson very happily demonized David.

These constituents are known as **adjuncts**. Adjuncts are elements that are somehow incorporated into a sentence, but not via the checking of selectional features.

Note that the term adjunct is not a term for categories, but rather a term for syntactic objects which occupy a particular position in the tree, much like the terms complement and specifier. Adjuncts may be of all sorts of categories. We will see that Adjectives and their AP projections may function as adjuncts in nominal phrases (Chapter 7), and that PPs may function as adjuncts in both NPs and VPs (you can see a PP adjunct in (18)). The category for the adjuncts in (19) and (20) (*constantly* and *happily*) is **Adverb** (abbreviated **Adv**). Adverbs are usually related to adjectives in terms of their morphological form. Both the adverbs in (19) and (20) are formed from related adjectives by adding the affix *-ly*. You can see that the adverbs in these examples combine with other elements to form **adverbial phrases** (AdvPs), in the same way as all other categories may project.

The mechanism by which adjuncts are incorporated into phrase structure is still a major research topic. In this book we'll adopt a fairly conservative position: adjuncts are sisters of phrasal nodes. This approach ensures that there is parallelism between adjuncts and specifiers and complements. Complements are sisters of lexical items; specifiers are sisters of $\bar{X}$ nodes, and adjuncts are sisters of XP nodes:

(21)



Notice that the phrasal level of XP does not change, since there is no satisfaction of a selectional feature.

The question here, then, is what triggers the integration of an Adjunct into the tree. When we discussed Merge above, we suggested that it only applied when triggered by a selectional feature. But no selectional feature appears to be satisfied here. Moreover, we cannot put a selectional feature on the adjunct, since then the adjunct would be the head of the construction. However, the evidence is that adjuncts are never the heads of their constructions: a constituent which has an adjunct **adjoined** to it behaves distributionally just as though the adjunct wasn't there.

We can see this by taking an adverb like *quickly*. If we adjoin this to a verb phrase, then the verb phrase's distribution is exactly the same, as you can see from the following examples:

(22) a. Burn the letters (quickly)!
b. I burnt the letters (quickly).
c. I plan to burn the letters (quickly).
d. *Burn the letters (quickly) is the best thing to do.
e. Burning the letters (quickly) is the best thing to do.

We don't need to know about these different structures to tell that whether we have the adjunct or not makes no difference to the distribution of the verb phrase: it is (un)acceptable in exactly the same sentence frames, whether the adverb is present or not.

So adjuncts are not incorporated into the sentence by Merge. We will assume, instead, that there is another basic operation, which we will call **Adjoin**, and which, unlike Merge, does not need to be triggered. Adjoin is somewhat like the version of Merge that we rejected above, which inserted one syntactic object into another, although it is far more restricted. Adjoin inserts a phrasal object into another phrasal object at its outermost level. It does not create a new object, it expands one of the old ones by stretching its outermost layer into two parts and inserting the adjoined object between them:

(23)

Any phrase can be adjoined to another phrase, and adjunction in English is assumed not to be linearized, so that an adjunct can usually appear on either side of a phrase.

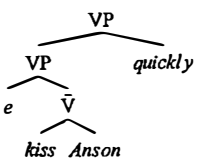
The properties of adjoined elements that follow from this approach are that they are always hierarchically outside complements and specifiers; that they may appear on either side of the phrase they are adjoined to; that they don't receive θ-roles, and, via a stipulation, that they are phrasal.

If we go back to our previous examples, we can deal with a case where the VP is modified by the adverbial adjunct *quickly* in the following way:

(24) Kiss Anson quickly!

Recall that imperatives have an unpronounced Agent. For the moment we will just assume that this Agent is in the specifier of VP, and we will notate it as *e* for 'empty element'. This gives us the following tree:

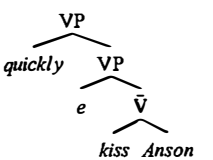
(25)



Since adjuncts can adjoin on either side, we can also have:

(26) Quickly kiss Anson!

(27)



We will return to the syntax of adjuncts in more detail in the next couple of chapters. The crucial points to remember are that adjuncts freely target phrasal categories, and that they adjoin to these creating an adjoined structure.

Before leaving Adjuncts, we should note a problem which we will deal with in the next chapter: if adjuncts target phrasal nodes, and the subject of a verb is in the specifier of that verb's VP, then how are sentences like (28) possible?

(28) Julie quickly answered the question.

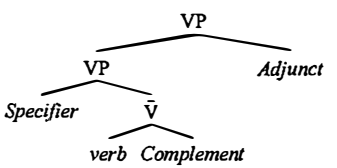
Here we have a case where the adverb comes between the subject and the verb, but we've just said that our system predicts that adjuncts will always be hierarchically

external to specifiers (and complements). In this example, at first blush anyway, it looks as though the adjunct gets Merged before the specifier, so that when we pronounce the sentence, the specifier *Julie* is pronounced first. Let us leave this problem for the moment, and address it in the next chapter.

4.2.4 The structure of the verb phrase

We have now built up a picture of the phrasal projection of the verb: the VP. We have seen that the verb Merges with a complement to give a $\bar{V}$, and then with a specifier, satisfying all its c-selectional features and giving a VP. We have also seen that adjuncts may adjoin to this VP. This means we have the following schematic structure for a transitive verb phrase:

(29)



We have also seen that Specifiers and Complements have to be phrasal (that is, they must have no c-selectional features).

The system we have been developing seems to allow more than one selectional feature to appear on a lexical item (this was the analysis of verb phrases we discussed above). This raises the question of the order of checking of features; how does the system determine which one gets checked first?

The reason that this question is important, even for the simple examples that we have looked at so far, has to do with the semantics we want to give our syntax. In an example like (30), there is no ambiguity as to which noun phrase is interpreted as the agent, and which as the theme:

(30) Jenny poked Jonathan.

However, under the system we have so far set up, c-selectional features are matched with θ-roles via the θ-grid. If we check the wrong feature first, then we would predict that the θ-roles would be assigned the other way around (with Jonathan being the poker, and Jenny the pokee). This is, of course, a matter for how we configure the interface between the syntax and the semantics, and we will address it in Section 4.5.

The structure that we have built up is only preliminary, and will need some modification. Specifically, we need to address the question of the structure of intransitives and ditransitives. We also need to address the question of how the verb phrase is integrated into the rest of the sentence (a task which we will postpone until the next chapter).

4.2.5 $\bar{X}$–Theory

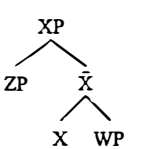
We have now developed a system which gives us much of what is traditionally known as $\bar{X}$–Theory (pronounced X-bar theory). $\bar{X}$–Theory was originally conceived of as a set of constraints on phrase structure (recall the phrase structure rules introduced in Chapter 1), which stipulated that all phrases have to have heads, and that the two crucial types of phrase are the head-complement structure, and the specifier-$\bar{X}$ structure. $\bar{X}$–Theory was commonly stated as a set of general constraints that require all phrase structure rules to have the following general format:

(31) $XP \rightarrow ZP\ \bar{X}$

(32) $\bar{X} \rightarrow X\ WP$

Trees generated by such rules will always have the general form in (33), where I have used the variables X, Z, and W to stand for arbitrary labels.

(33)

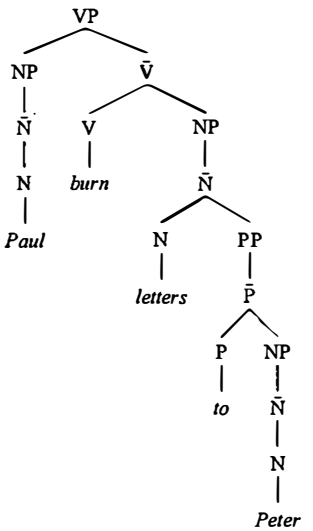


ZP here is the specifier of X, while WP is its complement.

Often you will see trees which are drawn along these lines. There are two major differences between these trees and the tree structures we have developed above. The first is that many proponents of $\bar{X}$–Theory assume that lexical items are dominated by or contained within the minimal projection level rather than actually *being* that minimal level. The second is that $\bar{X}$–Theory enforces projection through *all* the levels. These two properties taken together mean that every phrase immediately dominates a bar-level projection which immediately dominates a minimal level projection which immediately dominates the lexical

item. This is true, in $\bar{X}$–Theory, whether there is a specifier or complement or not. The tree in (15) would look as follows under the $\bar{X}$ system:

(34)



As you can see, the only real difference is that, when a head has no complement or specifier, in the $\bar{X}$ system, each level of projection is nevertheless filled in. The $\bar{X}$ system leads to trees that are more uniform, but, on the other hand, there are many extra layers of structure in this tree.

In contrast, because the phrasal status of a node is derived from its lexical properties in the system we have been developing, bar-level projections only appear when there is a specifier. If the head combines with just a complement, and all of its features are satisfied at that point, then the complement is automatically phrasal. Likewise, if a head has neither complement nor specifier, then it is automatically phrasal. So, as we have seen already, proper names and pronouns (under the analysis we have so far given them, which may be too simple—see Chapter 7) are automatically phrasal, and at the same time automatically minimal, since they are lexical items.

4.3 C-command

We are now going to introduce a new syntactic relation aside from sisterhood. We shall see that this syntactic relation is implicated in the analysis of reflexives,

and that it gives us an extremely useful tool for diagnosing structure. Once we have developed a theory of this relation, we will use it to choose between a number of different structural hypotheses which are available for the analysis of ditransitives.

4.3.1 Defining the relation

As we have seen, the operation Merge builds up tree-like structures. In any tree, the most important syntactic relation that holds between two nodes is that of sisterhood, which is built up by the fundamental operation, Merge. In addition to sisterhood, there is another important syntactic relation which holds between nodes in a tree: this is the relation of **c-command** (an abbreviation of constituent-command).

We shall define c-command in the following way:

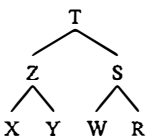
(35) A node A **c-commands** a node B if, and only if A's sister either:
   a. is B, or
   b. contains B.

Let's look more carefully at this definition. The 'if, and only if' part (sometimes abbreviated to 'iff') means that whenever either of the two conditions hold, then A will c-command B, and whenever A c-commands B, one of those two conditions has to hold. This is a common way of writing definitions in syntax.

The first condition is straightforward enough. The second condition is best thought of as an instruction: if you want to see whether one node c-commands another, see whether its sister contains that other node.

An example:

(36)



Here, X c-conunands Y, but nothing else. This is because Y is X's sister. Since Y doesn't contain any other nodes, it turns out that X c-commands only Y in this tree. Z, however, c-conunands S (because S is Z's sister) and also W and R (since W and R are contained in S).

Note that S c-commands Z, X, and Y (nothing in the definition refers to precedence, so a node can c-command preceding as well as following nodes).

The node T doesn't c-command anything, nor is it c-commanded by anything, since it contains all the other nodes and hence has no sister.

Before we go on, it will be useful to see examples of c-command in action. Remember from Exercise 1 in Chapter 2 that there is a class of words called reflexives in English which have to have the same ϕ-feature specification as another word in the sentence in which they occur. We saw in that exercise that certain relationships had to hold between the reflexive and the word with which it had to share features (known as the **antecedent** of the reflexive). It turns out that one of these relationships is c-command. The next section goes through an argument to this effect, and in the following section, we will explore another argument that c-command is a crucial syntactic relation.

4.3.2 Reflexive binding

The following contrast is a stark one:

(37) I shaved myself.

(38) *Myself shaved me

If we take the Reflexive Generalization we started with in Exercise 1 in Chapter 2, then we can see that nothing in this generalization helps us explain this contrast. The generalization looked as follows:

(39) **The Reflexive Generalization**
A reflexive pronoun must be coreferential with another expression in the sentence.

We also assumed the following:

(40) For two expressions to be coreferential, they must bear the same ϕ-features.

Now, in both of our examples we have two expressions which share ϕ-features, one of which is a reflexive. The generalizations we have here, then, don't seem to be able to capture the contrast between the two examples.

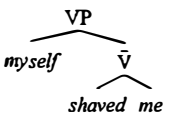
We can improve on this situation by revising the Reflexive Generalization:

(41) **The Reflexive Generalization (revised)**
A reflexive must be coreferential with a c-commanding expression.

Now, since an object is c-commanded by a subject (since the object is contained in the subject's sister ($\bar{V}$, under our current assumptions), but not vice versa, the contrast follows. In (38), the reflexive is not coreferential with

a c-commanding expression, because, even though it is coreferential with *me*, it is not c-commanded by *me* as you can see from the following tree:

(42)



The new Reflexive Generalization, making reference to c-command, gives us the theoretical power to explain the contrast we are interested in.

You might think that the Reflexive Generalization should be thought of as involving precedence, rather than c-command. Imagine, for example, we say that a reflexive has to be coreferential with a preceding expression. This will also capture our contrast.

(43) **The Reflexive Generalization (revised)**
A reflexive must be coreferential with a preceding expression.

However, this new hypothesis does not extend well to other data. Consider the following examples:

(44) The man I saw left.

(45) *The man I saw shaved myself

In this example, the pronoun *I*, which can usually be a perfectly fine antecedent for *myself* (see, for example, (37)), precedes the reflexive, but the sentence is not well formed. However, we can show by constituency tests that *the man I saw* in other grammatical sentences is a constituent:

(46) The man I saw left.

(47) He left.

(48) You wanted to meet the man I saw.

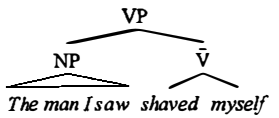
(49) It was the man I saw that you wanted to meet.

Since *the man I saw* is a constituent, it contains the pronoun *I*. The structure is, roughly:

(50) *[The man I saw] shaved myself

Now let's look at the relationship between *I* and *myself*. We can see immediately that *I* does not c-command *myself*, since there is a node above it which does not contain the reflexive. In a tree structure, we have the following kind of rough structure:

(51)



We will see in the next chapter that there is further structure for this sentence than what is shown here. However, this is not relevant, since what is crucial for testing our hypothesis is the relationship between *I* and *myself*. We can see immediately that the V̄ which contains *myself* is not the sister of *I*. Nor is this VP contained in a sister of *I*, since any such sister will have to be contained within the NP *The man I saw*. So we can conclude that *I* does not c-command *myself*, although it does precede it. It appears, then, that the notion we need is c-command, rather than precedence, if we are to deal with these kinds of data. We therefore reject the version of the Reflexive Generalization which involves precedence, and maintain, instead, the version which makes reference to c-command.

A similar story will explain the ungrammaticality of (52):

(52) *[My mother] hated myself

The possessive pronoun *my* here is inside the subject *my mother* and hence does not c-command the reflexive, thus violating the Reflexive Generalization.

4.3.3 Negative polarity items

There are a number of words in English known as Negative Polarity Items (usually abbreviated as NPIs—not to be confused with NPs!). These are words like *any* and *ever*, which appear to require a negative element to appear in the sentences in which they occur:

(53) *I wanted any cake

(54) I didn't want any cake.

(55) *I saw him ever

(56) I didn't see him ever.

Let us state this as a basic generalization, which we will then revise when faced with further data:

(57) **The NPI Generalization:** NPIs must occur in a sentence which is negative.

Just as the Reflexive Generalization needed to be revised, so does the NPI Generalization. This can be seen from the following contrast:

(58) No one wanted any cake.

(59) *Any boy saw no one

Assuming that a sentence containing the words *no one* is counted as a negative sentence, then in (58), we have a negative sentence containing the NPI *any*, and our generalization correctly predicts this to be grammatical. However, in (59), we have a negative sentence containing *any*, but the sentence is ungrammatical.

We can revise the NPI Generalization using the notion of c-command to capture these facts:

(60) **The NPI Generalization (revised):** NPIs must be c-commanded by a negative element.

We have already seen that objects are c-commanded by subjects, but not vice versa. Given this, example (59) is ruled out because the *any boy* is in subject position and therefore not c-commanded by *no one*.

This new approach extends to further cases fairly naturally. Take an example like (61):

(61) *The picture of no one hung upon any wall

In this example, *The picture of no one* is a constituent, as can be seen from replacement tests:

(62) It hung on the wall.

Given this, the negative element *no one* is inside this constituent, and therefore cannot c-command the NPI *any*, thus ruling out the sentence. Once again we see that what is relevant here is a structural notion (c-command), rather than a purely linear one (precedence) or even a semantic one (negativity).

4.3.4 Summary

We have seen that the notion of c-command is relevant to explaining the distribution of reflexives and NPIs. We will see that it is also relevant for explaining the behaviour of pronouns and other NPs in the exercise section of this chapter.

If our explanation for reflexives and NPIs is correct, then what we have is a tool for diagnosing the structure of sentences. If we are careful, we can put reflexives or NPIs in various positions in sentences that interest us, and use the resulting patterns of grammaticality to see whether c-command relationships obtain. This is an important result, since it adds new diagnostic tools, in addition to constituency tests, to our syntactic toolbox. In the next section we will use all of these tools to try to work out the structure of ditransitive verb phrases.

4.4 Ditransitives

The basic structure that we have built up for transitive verbs looks to be in trouble when we come to predicates with three arguments. Under the system we have built up so far, we have seen that verbs have a Complement, which is the first phrase to be Merged with the head, and a Specifier, which is the second. In this section we will look at what happens when we have a third argument.

4.4.1 Three-argument predicates

As we saw in Chapter 3, some predicates have three arguments. The relevant examples contain predicates like *give* and *receive*:

(63) Benjamin gave the cloak to Nathan.

(64) Nathan received the cloak from Benjamin.

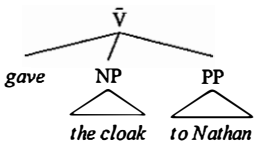
Clearly in (63) and (64), there are three participants in the event: Benjamin, Nathan, and the cloak. Accordingly, the NPs and PPs in the syntax are assigned θ-roles by the predicates *give* and *receive*. These predicates, like the predicate *donate* that we met in the last chapter, are three-place predicates.

4.4.2 Ternary or binary branching?

The immediate question that arises with three-place predicates is the question of constituency. How is a ditransitive VP structured? In this section we shall look at two analyses, one involving a ternary branching structure, and the other involving a binary structure.

The first analysis is one which involves a **ternary-branching** structure. This looks as follows:

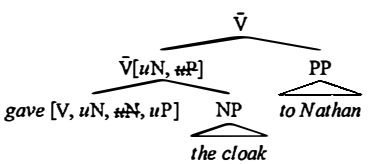
(65)



Note that this analysis is not available to us if we maintain just the binary operation Merge. In order to construct a structure like in (65), we would need an operation which builds ternary syntactic structures as well as binary ones.

There is another analysis which is open to us within the theoretical restrictions set by Binary Branching. We simply say that *to Nathan* and *from Benjamin* are merged with the projection of the verb after the object has been Merged. In each case the Merge of the PP checks off a selectional feature on the projection of the verb. This gives us structures like the following:

(66)



To make this work, we need to say that *give* has three selectional features, and so it is specified as [*u*N, *u*N, *u*P]. One of the N-features is checked by the object and the other by the subject. The selectional P-feature is checked off by the Goal. Notice that this analysis involves the recursion of the V̄ level, which is something we haven't seen as yet. This might be a little worrying, since the only cases where we have seen recursion of a node like this is with adjuncts, and adjuncts, unlike Goals, don't get a θ-role.

This analysis also raises, once again, the question of the ordering of checking. This time, this question is more urgent, since we need to ensure that the P feature is not checked off before one of the N-features. If the system allowed this, then

we would expect the PP to be sister to the verb, predicting the following word order:

(67) ??Benjamin gave to Lee the cloak

This sentence is unacceptable, unless it carries a very special intonation (with a pause before *the cloak*) which, we will assume, is associated with a special structure where the object has moved rightwards over the PP. The unacceptability of these examples is increased when we put a pronoun in for the object, backing up the idea that there is something special going on in such structures. We therefore don't use structures where the PP precedes the NP as evidence for determining the basic analysis of ditransitives:

(68) a. *Benjamin gave to Lee it
b. Benjamin gave it to Lee.

Notice that the ternary branching analysis and the $\bar{V}$-recursion analysis make different claims about constituency. Under the latter analysis, the verb and its object form a constituent, while this is not the case in the ternary branching approach.

Can we find evidence which will support one constituent analysis over the other?

It seems that movement tests do not support the binary branching analysis. It is not possible to cleft VPs in most dialects of English, but there is a construction, called **VP-Preposing**, where the VP moves to the left of the sentence.

(69) a. Benjamin said he would run away and he did [run away].
b. Benjamin said he would run away and [run away] he did.

(70) a. Madeleine planned to catch the sardines and she did [catch the sardines].
b. Madeleine planned to catch the sardines and [catch the sardines] she did.

When we apply this constituency test to our ditransitive examples, we find that it is possible to VP-prepose the verb together with the object and the Goal:

(71) Benjamin said he would give the cloak to Lee and [give the cloak to Lee] he did.

However, it turns out not to be possible to prepose just the verb and its object:

(72) *Benjamin said he would give the cloak to Lee and [give the cloak] he did to Lee

The Binary Branching analysis treats *give the cloak* in this sentence as a verbal constituent, and we might, therefore, expect to be able to prepose it. However, this is impossible, so we have no evidence that this is the correct constituency.

What about other constituency tests? Replacement/Ellipsis seems to give the same results:

(73) a. Who gave the cloak to Lee?
b. *Benjamin (did) to Lee

The (b) example shows that we cannot take the string *give the cloak* and ellipt it or replace it with the simple auxiliary *do*.

One final constituency test we might try is **co-ordination**. In English, the word *and* can be used to conjoin two phrases:

(74) [The intrepid pirate] and [the fearful captain's mate] sank the galleon.

(75) Owly hated [the evil bat] and [the wise eagle].

(76) Owly [hated the evil bat] and [loved the wise eagle].

(77) The [very old] and [extremely wise] owl.

In (74), we have co-ordinated two NPs in subject position; in (75) we have co-ordinated two NPs in object position; (76) shows the co-ordination of two verbal projections and (77) the co-ordination of two APs. Co-ordination does not seem to apply to non-constituents, as the following examples show:

(78) *Owly hated [the evil] and [the wise] eagle

(79) *Owly [hated the] and [loved the] bat

Co-ordination, however, sometimes gives results which aren't immediately consistent with other constituency tests, and so it's a test to be used carefully. For example, the following examples are possible, even though it is unlikely that the co-ordinated strings are constituents:

(80) [Lee's youngest] and [Dawn's oldest] son ran away.

Note that this sentence has a particular intonation, with a long pause after the words *youngest*, and a special intonation on the word *son*. Why should this be? One possibility is that this is really a case of constituent co-ordination, but the noun in the first noun phrase has been ellipted, so that (80) is really (81), without the first occurrence of *son* being pronounced. Since the first constituent has an ellipted element in it, the word *son* is pronounced in a

special way to signal that this word provides the interpretation for the ellipted element.

(81) [Lee's youngest 0] and [Dawn's oldest son] ran away.

With this in mind, we can look at our ditransitives. Note that, in this case, we can have the following, which is on the margins of acceptability:

(82) Benjamin [gave the cloak] and [sent the book] to Lee.

Once again, however, we need to have a substantial pause after *cloak* as well as odd intonation on the PP *to Lee*, suggesting that we have a case of deletion again:

(83) Benjamin [gave the cloak 0] and [sent the book to Lee].

Given the results of the other tests for constituency of verb plus object in ditransitives, and given the alternative explanation for the grammaticality of (82), it seems that we must once again draw the conclusion that this binary branching analysis is not supported by any evidence from constituency.

We have seen, then, that there is no evidence that the verb and the object form a constituent to the exclusion of the PP. This seems to rule in favour of the ternary structure, even though we have adopted only binary Merge. However, it turns out that there is some evidence for another binary constituency pattern in a ditransitive VP, where the object and the PP form a syntactic unit. We shall explore the consequences of this idea in the next section.

4.4.3 A binary alternative

It is co-ordination, interestingly, that provides some evidence for an alternative view of the constituency of ditransitive VPs. Consider the following example:

(84) Sam gave [the cloak to Lee] and [the magic chalice to Matthew].

This appears to be evidence for a different constituent analysis, with the object and the Goal in constituency. Given the discussion above, should we analyse this kind of sentence as involving VP co-ordination and deletion of the verb instead?

(85) Sam [gave the cloak to Lee] and [0 the magic chalice to Matthew].

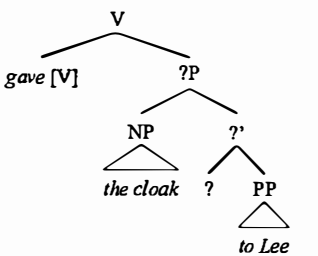
There doesn't appear to be the same kind of phonological pause that we saw in the examples above. If the intonational evidence is worth taking on board, the grammaticality of (84) with no special intonational pattern would lead us to

propose that *the cloak to Lee*, and *the magic chalice to Matthew*, are just plain old constituents.

This is a fairly weak argument so far, but suggestive. Let us take this evidence at face value for the moment and see whether an alternative binary branching analysis, which treats the object and the goal as forming a constituent together, might work.

The rough structure of ditransitives, from this perspective, will look something like the following:

(86)



In this structure, the PP is the complement of some other head which has the object in its specifier. The phrasal projection of this head (just marked with a question mark in the tree for the moment) is the complement of the verb. To deal with the co-ordination data, we simply allow co-ordination of whatever ?P is.

Notice that this structure is compatible with the lack of evidence for a verb object constituent that we reviewed above, since, like the ternary structure, it makes no claim that the verb and the object are a constituent in a ditransitive structure.

One point that might cause us concern is that there is no evidence from movement for the existence of the constituent marked '?' above:

(87) *Benjamin thought he would give the cloak to Lee and [the cloak to Lee] he gave.

However, it is not implausible that there are independent factors ruling (87) out. The VP-preposing operation may be sensitive to the category of the constituent being preposed, and ?P may just not be the right kind of constituent.

We now have three different structural hypotheses on the table: one is a ternary branching hypothesis, and the other two are binary branching. Of the latter two, the first hypothesis assumes that the Goal is essentially right adjoined to $\bar{V}$, while the second assumes that there is a new constituent so far just labelled '?', which contains both the object and the Goal. The only structure which is consistent

with the (admittedly weak) evidence from co-ordination is the third one, with the new '?' constituent.

Is there some other way that we can distinguish between the ternary and binary branching structures? One avenue that has been suggested is a set of asymmetries in c-command relations in some closely related structures called **double object constructions.**

A double object construction is a ditransitive which is lacking a preposition. The following examples illustrate:

(88) a. Benjamin gave Lee the cloak.
b. Calum sent Nathan the binoculars.
c. Lee showed Benjamin the unicorn.

The Goal in a double object construction is usually called the **indirect object**. Each of these examples has a corresponding sentence which contains a preposition (this is true for many, but not all, double object verbs):

(89) a. Benjamin gave the cloak to Lee.
b. Calum sent the binoculars to Nathan.
c. Lee showed the unicorn to Benjamin.

Notice also that the co-ordination data work out in the same way for double object constructions as for ditransitives. It is possible to co-ordinate the direct and indirect objects together, as though they were constituents:

(90) Benjamin gave [Lee the cloak] and [Nathan the chalice].

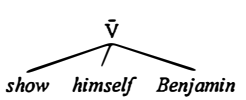
The interesting thing about double object constructions is that there is an asymmetry in the way that reflexives can be bound in these constructions. We can see this in examples like the following:

(91) *Emily showed himself Benjamin in the mirror

(92) Emily showed Benjamin himself in the mirror.

Now, we have seen that the Reflexive Generalization requires a reflexive to have a c-commanding antecedent. If we adopt the ternary branching structure, then the indirect object and the direct object c-command each other:

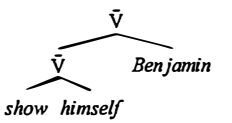
(93)



Remember that the Reflexive Generalization, as we formulated it above, does not make reference to linear order (precedence), only to c-command. If this is the correct formulation, then the ternary branching structure would lead us to expect that the reflexive would be well formed in indirect object position, contrary to fact (91). This is because *Benjamin* c-commands *himself* in (93), since these two nodes are sisters.

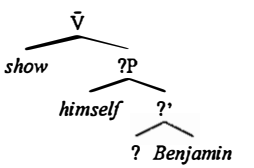
The Binary Branching structure which assumes that one of the arguments is adjoined to V̄, suffers from the same problem; once again *Benjamin* c-commands the reflexive, yet the sentence is ungrammatical:

(94)



The Binary Branching structure which assumes the ?P, however, turns out to make the right predictions. We have the following structure:

(95)



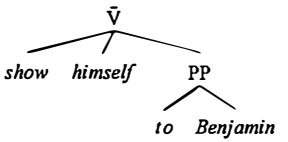
Notice in this structure that *Benjamin* does not c-command *himself*, correctly predicting that the reflexive will not be able to take Benjamin as its antecedent.

We can't make the same argument for the simple ditransitives with a Prepositional Goal, since the preposition will always block c-command from its complement to the object of the verb, whether we adopt a ternary or binary analysis. This means that the ungrammaticality of (96) is consistent with a ternary branching analysis as well as with a binary branching one incorporating ?P:

(96) *Emily showed himself to Benjamin in the mirror

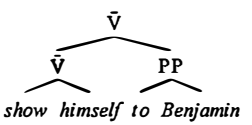
To see this, look at the following ternary structure:

(97)



Since *Benjamin* is contained inside the PP, it can't c-command the reflexive. The same point can be made for the Binary Branching analysis with a V̄-adjoined Goal:

(98)

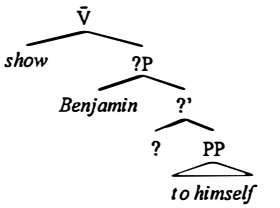


This means that the cases with PP goals don't help us to choose between the possible analyses; only the Double Object constructions can be used in this way. When we look at Double Object constructions, we see that there is an asymmetry in c-command relations between Goal and Object, suggesting a structure with the extra constituent labelled '?'. This is consistent with the argument we made earlier from co-ordination.

We have just seen that we can't make exactly the same argument for simple ditransitives (with PP goals) as for double object constructions. However, this doesn't mean that the analysis for the latter doesn't extend to the former. Since we need a ?P to deal with double object constructions, and since ?P allows us to maintain binary branching, it seems reasonable to adopt the assumption that simple ditransitives also contain a ?P, an assumption which also makes sense of the co-ordination data. We shall therefore assume the following structure for

simple ditransitives:

(99)



Summarizing, although there is only weak evidence from constituency tests (from co-ordination) that we should adopt the ?P analysis of ditransitives, we can use the behaviour of reflexives to determine the c-command relationships inside the VP, and thereby motivate one structure over another.

4.4.4 Causatives and little *v*

We now need to think about what the featural content of the head marked '?' might be. There have been a number of different answers adopted in the literature (see the Further reading section of this chapter). The approach we will initially adopt here is one which assumes that the syntactic relation between the verb and '?' is one which mimics a semantic relation: that of **causality**.

Many languages have structures, traditionally called **causatives**, which involve the juxtaposition of a verb with a special particle or auxiliary marking causation. Even English has structures a little like this:

(100) a. Emily caused Benjamin to see himself in the mirror.
b. Benjamin caused Lee to have the cloak.
c. Benjamin caused the book to go to Ross.

It is immediately obvious that these sentences are rough **paraphrases** of simple ditransitives:

(101) a. Emily showed Benjamin himself in the mirror.
b. Benjamin gave Lee the cloak.
c. Benjamin sent the book to Ross.

The intuition is that the paraphrases involving *cause* are actually very much like the basic structure that Merge produces for the examples with simple

ditransitives. Notice that we can **transform** the causative examples into the ditransitives by some simple steps:

(102) a. Emily caused Benjamin to see himself in the mirror. -> delete *to*
b. Emily caused Benjamin see himself in the mirror. → move *see* to a position adjacent to *caused*
c. Emily caused + see Benjamin himself in the mirror. → replace *caused-see* with *showed*
d. Emily showed Benjamin himself in the mirror.

Other languages display aspects of these operations more clearly than English. French, for example, is a language where the subject usually precedes the verb:

(103) Georges mange.
Georges eat-[PRES, 3SG]
"Georges eats."

However, in a causative construction, the verb precedes the subject:

(104) Pascale fait manger Georges.
Pascale make-[PRES.3SG] eat-[INF] Georges
"Pascale makes George eat."

It appears that we have a **Movement** operation, which takes a structure formed by applications of Merge, and then moves one of the elements of that structure into another position in the tree. In this particular case, the verb moves in front of the subject. We will mark the position which has been left behind by enclosing the words that were there in angled brackets:

(105) Pascale fait manger Georges ⟨manger⟩.
Pascale make-[PRES.3SG] eat-[INF] Georges
"Pascale makes George eat."

Another language which seems to show the same syntactic process is Chichewa (a Bantu language). In Chichewa, the position of the causative element may be filled by an auxiliary, or the verb itself may appear in this position. We can see this in the next example:

(106) Mtsikana ana-chit-its-a kuti mtsuku u-gw-e
girl [AGR]-do-cause-[ASP] that waterpot [AGR]-fall-[ASP]
"The girl made the waterpot fall."

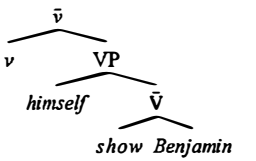
In this example we have two verbs, both of which mark for agreement (as a prefix) and for aspect (a suffix). The verb *-chit-*, "do" is followed by a particle (*-its*) marking that the sentence is a causative sentence. The verb *-gw-*, "fall", assigns its theme role to *kuti mtsuku*, "the waterpot". The word for girl receives an Agent role because it is a causer. We will assume that this role is assigned by the particle *-its*. Now consider the following example:

(107) Mtsikana anau-gw-its-a kuti mtsuku ⟨gw⟩
girl [AGR]-fall-cause-[ASP] that waterpot
"The girl made the waterpot fall."

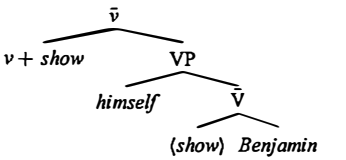
Here, the same verb *-gw-*, "fall" has moved into the higher complex, constructing the morphologically complex verb *make-fall*.

Given that this kind of example is found in other languages, we will adopt the hypothesis that the derivation we gave above for *show* from (roughly) *cause to see* actually reflects what is going on, and that the ? is really a projection of the verb which then undergoes movement into a higher position, which encodes causality. We will notate this new causal category *v* (pronounced 'little *v*'). The structure before and after movement looks like this:

(108)



(109)



Rather than saying that *show* is literally *cause-see*, we assume that *show* basically has the meaning "see" but must move into a verb with the meaning "cause". As usual, we have labelled the nodes of the tree with just the category

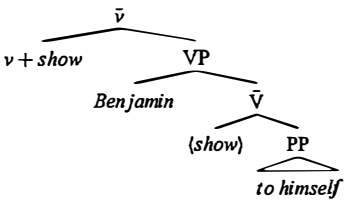
feature of the head, so the VP containing the object and indirect object is a projection of the verb *show*. This is true even once *show* moves into a position adjacent to the causal verb. This causal verb is often known as a **light verb** and this kind of analysis is known as a **VP-shell** analysis.

We will return later to the exact structure which is the output of the movement operation of *show* to *v*. For the moment we will just notate it as *v* + *show*.

Notice that this has the curious consequence that the constituent labelled VP doesn't have an overt verb in it. It has a sort of 'ghost' of the moved category in it, which does not feed the rules of morphology or phonology, in that it is not pronounced. These 'ghosts' of moved elements are usually called **traces**, and we will notate them (as we have already done informally), by enclosing them in angled brackets.

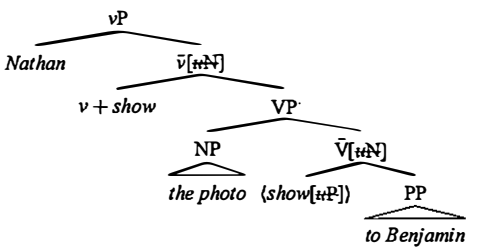
This same causative analysis will extend to cases where we have PP goals:

(110)



So far in this discussion, we have not addressed the question of how selectional features work. Recall that we originally proposed that the verb contained a number of c-selectional features that were checked off when various arguments were Merged. We will maintain this view here, so that *show*, above, is specified as [V, *u*N, *u*P], and little *v* as [*v*, *u*N]. This will give a representation which looks as follows:

(111)



Here we see c-selectional features being checked under sisterhood. V first checks its [*u*P] feature via Merge of a PP. The unchecked [*u*N] feature is projected to V̄ and is checked by Merge of the NP sister to V̄ (i.e. the specifier of V). Little *v* then Merges with the complete VP (see below for the relation between these two categories) and projects its c-selectional [*u*N] feature to *v̄*. Merge of the NP Agent then checks this selectional feature.

When a selectional feature projects to a bar-level category, we will normally just represent it as being on that category. However, it is important to remember that such c-selectional features are actually lexically specified on the head, and only come to be on the bar-level category due to projection.

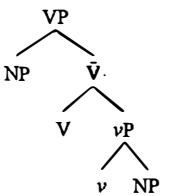
We also need to have some way of ensuring that little *v* is projected. One approach we might take would be to say that little *v* c-selects VP. However, this would be rather different from what we have said already about selection: up until this point we have assumed a tight relationship between selectional properties and *θ*-roles. But there is no clear sense in which little *v* is assigning a *θ*-role to the VP.

In order to keep the relation between little *v* and VP conceptually distinct from selection, we will just assume that there is a special **Hierarchy of Projections**, such that whenever we have a little *v*, it always has a VP complement. In an intuitive sense, little *v*P is an extension of the projection of VP, in that it is still verbal, but it adds further semantic information. We will state the Hierarchy of Projections as follows:

(112) *v* ⟩ V

If the Hierarchy of Projections is not met, then the structure will be ruled out. This means, for example, that the following structure is not generated by the system:

(113)



This new analysis, then, allows us to maintain a single version of Merge, which allows only binary branching structures. It also links ditransitive structures in

English to causative structures in general, attempting to explain their properties by tying them down to properties of other structures.

The analysis that we have developed is more complicated than anything else we have seen so far. As well as the syntactic operation Merge, it involves a new operation **Move**. This is a clear theoretical cost at the moment, and it's not clear why it's any better, from a theoretical point of view, to have binary Merge and Move, rather than binary and ternary Merge. We could imagine, for example, allowing ternary Merge and dealing with the reflexive data by refining the Reflexive Generalization, or by assuming a different kind of structure for Goals in Double Object constructions (perhaps they have an unpronounced preposition attached to them).

We will adopt the Merge and Move approach, however, and explore its consequences. We will see in Chapter 5 that there is evidence for movement of certain auxiliaries and in Chapter 6 that the subject in English sentences also moves. When we come to look at the structure of noun phrases in Chapter 7, we will see further evidence for movement processes, and after that point, movement will become fairly ubiquitous in our system and it will bear a heavy explanatory burden. We will not, in general, explore whether a non-movement analysis of these constructions is possible (it often is) or preferable. I will provide references in the Further reading section to non-movement approaches.

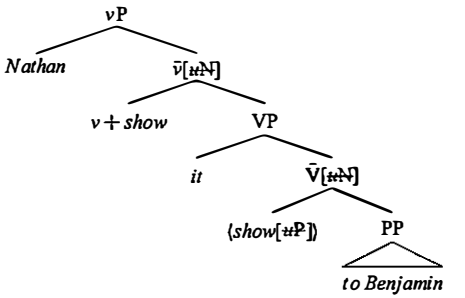
We have come to the conclusion in this section that ditransitives are more highly structured than they, at first blush, appear. We have argued (on the basis of co-ordination) that the object and the prepositional phrase are contained in a single constituent, and that the former c-commands the latter (on the basis of the behaviour of reflexives). In the next section, we will explore whether this VP-shell analysis can be extended to simple intransitives and transitives.

4.5 Linking

We now return to a question that we raised in Section 4.2.4, but which we have not dealt with yet: how do we constrain the order of checking so that the syntax semantics interaction works out correctly. Put more concretely, if we take a verb like *show*, then we need to say that it has two selectional features. We proposed

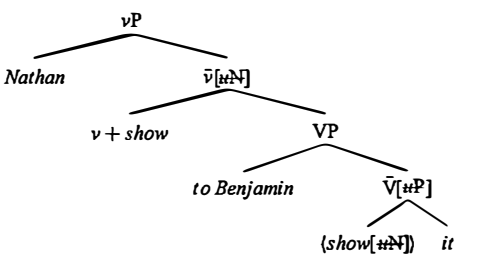
above that these features were checked as follows:

(114)



However, the question is why they could not be checked the other way around:

(115)



If this were possible, then we would generate the following ungrammatical sentence:

(116) *Nathan showed to Benjamin it

Recall that we argued that sentences where the PP appeared closer to the verb than the object were only possible because of a separate movement process, and that this movement process was unavailable for pronouns. This means that the only possible parse for a sentence like (116) is one where the object and PP arguments are in their base position. This sentence clearly shows that the base position of the object is the specifier of the verb, rather than its complement.

The question, then, is how to constrain the order of checking for c-selectional features. The answer we will propose comes out of another question: how do we reconcile the analyses we have put forward for transitive and ditransitive predicates?

The VP-shell analysis for three-place predicates puts the Agent of the predicate in the specifier of the little *v*, and the Theme in the specifier of VP. If we compare this to the analysis we gave of transitive verbs, we see that analysis put the Agent in the specifier of VP, and the Theme in the complement of V.

These two analyses are compatible, but they lead to the idea that there is no uniform way that particular θ-roles are represented in the syntax. The Theme appears in either the complement, or the Specifier of VP, depending on which particular predicate you're looking at.

Many linguists have found this state of affairs to be rather unsatisfactory, mainly because it would mean that children acquiring the language would have to learn which particular structures occur with which predicates. This is often referred to as the **Linking Problem**. If, on the other hand, each θ-role had a particular syntactic configuration associated with it, then children acquiring the language can predict the syntactic structures that various predicates project on the basis of the θ-roles assigned by that predicate.

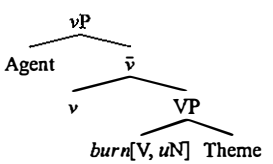
These linguists advocate a very tight relationship between θ-structure and phrase structure which is embodied in a hypothesis called the **Uniformity of θ-Assignment Hypothesis** (UTAH). The UTAH is seen as a solution to the Linking Problem and can be stated as follows:

(117) **UTAH:** Identical thematic relationships between predicates and their arguments are represented syntactically by identical structural relationships when items are Merged.

The UTAH would rule out cases where the Theme is variously a specifier or a complement, or the Agent can be either the specifier of *v*P or the specifier of VP. You can see that the function of the UTAH is to rule out classes of analyses. It is a guiding hypothesis, which may turn out to be wrong, much like the Binary Branching hypothesis. It will be supported if the analyses it rules out turn out to be worse at capturing the empirical facts than the analyses it rules in.

Let us assume the UTAH. How can we make our two previous analyses compatible with each other assuming the UTAH? One way would be to assume that all Agents appear in the specifier of little *v*P, so that a simple transitive verb, like *burn*, would have the following representation:

(118)



Thinking again about paraphrases, this kind of structure could be roughly paraphrased as follows:

(119) X causes Y to burn.

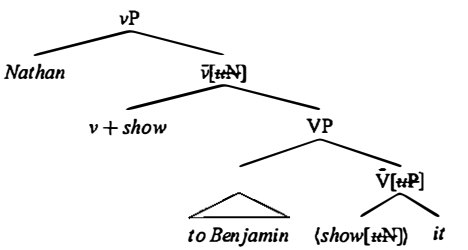
If we look at this tree, and compare it to the tree we decided upon for three-place predicates, then we can see that the Agent is the specifier of *v*P. What about the Theme? It looks as if it is a complement here, but a specifier in the case of three-place predicates. However, we can use the fact that in both cases the Theme is the daughter of VP. We can then define Goal as the daughter of $\bar{\text{V}}$. Each of the Thematic roles can then correspond to a unique phrase-structural configuration:

(120) a. NP daughter of *v*P → interpreted as Agent
b. NP daughter of VP → interpreted as Theme
c. PP daughter of $\bar{\text{V}}$→ interpreted as Goal

We will explore some of the consequences of this approach in the exercises at the end of this chapter. Notice that the double object construction discussed in the last section seems to pose immediate problems for this approach. We will address these problems in Exercise 1.

Adopting the UTAH also gives us an answer to the question of the order of checking of selectional features. If the features are checked 'the wrong way round', then the UTAH will be violated. Take, for example, the ill-formed structure in (115), repeated here as (121). It is immediately evident that no interpretation can be given for the PP, since it is not the daughter of $\bar{\text{V}}$:

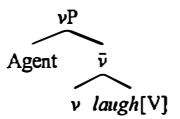
(121)



Of course, theories incorporating the UTAH also make very specific predictions about the structures associated with unergative and unaccusative predicates.

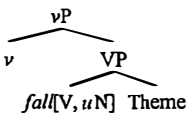
Since unergative predicates have a single Agent argument, that argument will have to appear as the daughter of *v*P, and since unaccusative predicates have a single Theme argument, that argument will appear as the NP daughter of VP. We get the following two structures:

(122) Unergatives like *run, laugh, jump*:



Intuitively, this structure means something like "X is the cause of an event of laughter". This contrasts with the following structure for an unaccusative verb:

(123) Unaccusatives like *fall, collapse, wilt*:



The rough paraphrase for unaccusatives is something like: "X undergoes an uncaused falling event". Note that we are using the notion "cause" here in a very abstract sense, essentially to indicate whether there is an agent involved in the event.

I have assumed here that there is also a *v*P in unaccusatives, but that the head of this *v*P is semantically non-causal, and so does not have an Agent in its specifier. An alternative, also consistent with the UTAH, would be to say that there is no little *v* in this structure. We will adopt the former assumption so that we can maintain the Hierarchy of Projections. This will mean that we always have a syntactic little *v* projection above a VP, but that the semantics of this little *v* may vary depending on the semantics of its VP complement. Once again, this is a controversial assumption, and one that we are adopting for convenience only here (see the Further reading section).

This idea, that Unaccusatives and Unergatives have different structural configurations associated with them, as well as different thematic roles to assign, is forced upon us, if we accept the UTAH. It predicts that unaccusatives and unergatives should display syntactic differences, which can be tied down to the distinct positions of the verb's single argument.

There is good evidence that this is the case. Take the two following sentences from Italian:

(124) Molte ragazze telefonano.
many girls phone
"Many girls are phoning."

(125) Molte ragazze arrivano.
many girls arrive
"Many girls are arriving."

The verb *telefonare*, "to telephone" is clearly unergative, since its single argument is interpreted as an Agent, in control of and causing an event of telephoning to take place. In contrast, the verb *arrivare*, "to arrive", is usually assumed to have a single theme argument. If you arrive at a destination, you have clearly undergone motion, and there is no necessary implication that you were the cause of this motion (you could have arrived by being driven in someone else's car, for example), or that you acted in any way to ensure that the arrival event happened (compare this to telephoning, where you have to be engaged in the activity of telephoning throughout).

Given this, the UTAH will predict that we have two different structures for these apparently parallel sentences. This seems to be a correct prediction, since these two sentences behave differently with respect to a range of syntactic diagnostics.

The most famous of these is auxiliary selection. When we put these sentences into the perfect tense, different auxiliaries appear with each:

(126) Molte ragazze hanno telefonato.
many girls have phone-[PAST PART.3SG]
"Many girls have phoned."

(127) Molte ragazze sono arrivate.
many girls are arrive-[PAST PART.3PL]
"Many girls have arrived."

In addition, we see different patterns of ϕ-feature agreement on the past participles, with the unaccusative verb agreeing with the subject, while the unergative verb does not.

We are not in a position to provide analyses of why we find these differences (see the Further reading section), but the fact that unaccusatives and unergatives display different syntactic characteristics is just what we expect from the UTAH. We will return to cases that further motivate this difference in Chapter 6.

4.6 The architecture of the system

We are now in a position to look at the general properties of the system we have been developing. Recall that we are trying to build up a theory of I-language, which captures the underlying structures of the sentences we use and understand. The approach we have taken relies on what is technically known as a **derivation**. A derivation can be thought of as the result of successively applying syntactic operations (in this case, the movement operation, which we will just call **Move**, plus Merge and Adjoin) to syntactic objects to form successively larger syntactic objects.

In the examples we have seen so far, we start off with a lexical item (say a verb) and merge another one (say a noun) with this. The outcome is a new syntactic object. This new object may then combine with another, and so on. Each application of Merge (or any other syntactic operation) moves the derivation a step forward. At some point, the derivation stops, because no further syntactic operations can be applied. The syntactic object at the final stage of the derivation is interpreted by the conceptual and semantic systems of the mind.

Notice that a derivation of a sentence will involve many smaller sub-derivations that will construct the constituent parts of a sentence. If we are to adjoin a VP to a PP, then smaller derivations must construct the PP and the VP separately.

What kinds of things are inputs to a derivation? The smallest elements in a derivation are lexical items which consist of phonological, semantic, and syntactic features. So a derivation starts off with a collection of lexical items, and provides a route from this collection to a well-formed sentence, if possible. A collection of lexical items is technically known as a **numeration**, although we will not be concerned with the technicalities of this here.

The syntactic system takes a numeration as its input, and gives, as output, a series of syntactic objects. So the first task of a derivation is to **Select** an element from a numeration. Since none of our syntactic operations can apply to a single lexical item and nothing else, the operation Select will apply again, and introduce another item. Now the syntax can merge or adjoin these two items to form a new syntactic object. Once a syntactic operation has applied, we have a step in the derivation.

(128) a. Step 1: Select A.
b. Step 2: Select B.

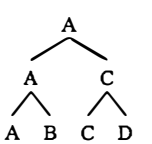
c. Step 3: Merge A and B.

We now have a single syntactic object, so Select applies again, furnishing a new element from the numeration. At this point we may Merge/Adjoin this new element with our old syntactic object, or we may apply Select again and Merge/Adjoin the two selected elements to form a new syntactic object. Let us follow this latter possibility:

(129) a. Step 4: Select C.
b. Step 5: Select D.
c. Step 6: Merge C and D.

We could now apply Merge/Adjoin to the two constructed syntactic objects, or we could apply Select once more, and so on. If we take the former route, we have:

(130) Step 7: Adjoin the output of Steps 3 and 6:



At some point, we will have exhausted the numeration, and we will not be able to apply any more syntactic operations. At this point, the derivation **terminates**. What we have now is a series of syntactic objects, one of which is the terminal object. This can have no further syntactic operations applied to it. When a derivation successfully terminates with all its uninterpretable features checked, it is said to **converge**; if it terminates but there are unchecked uninterpretable features, it is said to **crash**, by analogy with a computer program.

So far we have just seen this applying abstractly. Now let's have a look at a concrete example:

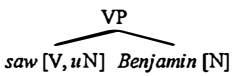
Numeration

{saw, *v*, Sam, Benjamin}

Derivation

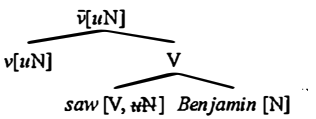
Step 1 Select *saw* and *Benjamin*, Merge, satisfying *u*N feature of *saw*.

Output



Step 2 Select *v* and Merge with output of Step 1, respecting the Hierarchy of Projections.

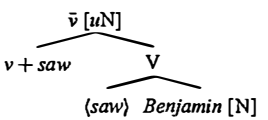
Output



Since no selectional feature is checked in Step 2, the c-selectional feature of *v* projects along with its other features to the $\bar{v}$ mother node. The checked c-selectional feature of *saw* does not project.

Step 3 Move *saw* to *v*.

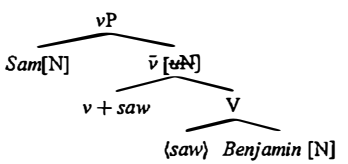
Output



We have not yet provided a trigger for the operation that moves the verb to *v*. This operation is obligatory (or else we would predict the wrong order of verb and object in ditransitive constructions). We return to the mechanism that implements movement of this type in the next chapter.

Step 4 Select *Sam* and Merge with output of Step 3, satisfying *u*N feature of $\bar{v}$:

Output



You can see that the derivation itself is fairly simple. When Merge takes place, it simply takes either a lexical item, or the outputs of previous operations, as its inputs.

Move is much more complex: it zooms in on part of a tree which has been constructed as an earlier output (in our case the lexical item *saw*) and makes a copy of that item, which it then Merges with another part of the tree (in this case the little *v*). It leaves behind the trace of the extracted item. In the current derivation, we see an example of movement of a lexical item. As we continue to develop the theory, we will also see the movement of phrases is possible.

All of the outputs of a derivation are, of course, syntactic objects.

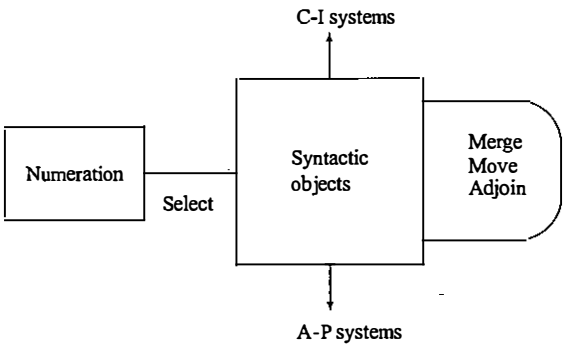
One of these syntactic objects will interface with the parts of the mind which are concerned with meaning, sometimes called the **Conceptual-Intentional (CI)** system. It will be able to do so because of the way that the syntactic system has arranged the semantic features of lexical items. This is why word order and morphological inflections have an effect on meaning. The syntactic object which has this function is commonly known as **Logical Form (LF)**, and it is said to be an **Interface Level**, since it is where the interface rules apply. Most usually LF is taken to be the terminal syntactic object.

One might imagine that, in a similar fashion, some syntactic object in the derivation will interface with the parts of the mind which are concerned with the physical realization of the object in terms of sounds, or gestures, sometimes called the **Articulatory-Perceptual (AP)** system (another interface level). However, research into phonology and phonetics over the last forty years or so has suggested that the level that interfaces with the AP system isn't a syntactic object, because other processes than purely syntactic processes are involved in constructing it. Instead, the assumption has been that a particular syntactic object in the derivation is the input to these extra processes which are concerned with pronunciation, morphological rules, etc. Such an object is known as the point of **Spellout**. Spellout is assumed to be a set of operations that apply to a syntactic object to give rise to a representation which interfaces with the AP system. This representation is known as **Phonetic Form (PF)**. It is important to distinguish the Spellout point from PF. The latter is a level that interfaces with language external systems, while the former is just a tree structure to which various non-syntactic operations might still apply.

Because the syntax relates a numeration to both sound and meaning, it allows us to establish a link between them, thus accounting for the communicative power of language. In the rest of this book we will be mainly concerned with the properties of the syntactic derivation, rather than with properties of the interface

levels. However, we will see that whether a phenomenon is to be handled by the syntactic component, or by the interface between syntax and either semantics or phonology, is often quite obscure, and requires careful argument.

The general architecture of the system we are assuming, then, looks as follows:



We have a numeration, drawn from the lexicon, to which the Select operation applies. This puts various lexical items on what you might think of as a syntactic tabletop; a workspace for the application of the syntactic operations Merge, Move, and Adjoin. These operations apply recursively, as marked by the arrow, so that after each application the state of the workspace changes. One of the syntactic objects interfaces with the Conceptual-Intentional systems (this object is called LF), and another interfaces with the Articulatory-Perceptual systems (this object is the Point of Spellout). All of these syntactic objects are tree-like in nature.

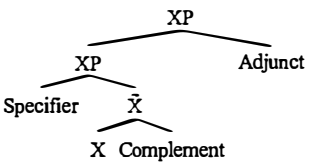
There are of course many other ways to configure the syntax, and the system outlined here hypothesizes that syntax is highly derivational. Other theories propose that there is no derivation, but rather a set of interacting constraints imposed by syntax-internal rules and language external interface levels. There is a great deal of debate in the field as to which approach is empirically or theoretically better.

4.7 Summary

In this chapter we have seen how the idea that syntactic objects are built up via the operation Merge, together with selectional properties of heads, leads to some fairly complex structures. We developed tools for annotating syntactic

structures, developing the ideas of complement, specifier, and adjunct. This gave us the following basic structure for a phrase:

(131)



We then explored a new kind of syntactic relation: c-command. C-command is somewhat like an extended version of sisterhood. A node c-commands its sister, and everything contained within its sister. We saw how reflexives and negative polarity items were sensitive to this relation, and then we used it as a tool to probe the structure of ditransitives.

We adopted the following definition of c-command:

(132) A node A c-commands a node B if, and only if A's sister either:
  a. is B, or
  b. contains B.

Putting together conclusions from co-ordination and c-command, we proposed that ditransitives, rather than having a ternary structure, were organized into a layered or shell-like verbal phrase, with a little *v* head taking a VP as its complement. Rather than assuming a selectional relation between *v* and its VP complement, we adopted the idea that syntactic structures had to conform to a Hierarchy of Projections, and proposed the following as a fragment of this:

(133) *v*) V

We then extended our analysis of ditransitives by introducing the UTAH. This hypothesis is one way of accounting for how children are able to project syntactic structures on the basis of their input data. It states the following:

(134) **UTAH:** Identical thematic relationships between predicates and their arguments are represented syntactically by identical structural relationships when items are Merged.

As one specific instantiation of this idea, we proposed the following linkages between thematic and syntactic structure:

(135) a. NP daughter of *v*P --> interpreted as Agent

b. NP daughter of VP → interpreted as Theme
c. PP daughter of $\bar{V}$→ interpreted as Goal

The idea is that children can associate the semantics they have for certain verbal concepts with situations they see in the world. With this semantics in place, children can then use the UTAH to partially determine the relevant syntactic structures. Using what they know about other syntactic principles, and their possible parameterizations, children can then subconsciously work out what particular kind of grammatical system they are acquiring on the basis of the utterances associated with the situations. Children therefore use a complex array of syntactic and semantic clues to determine the properties of the language they are acquiring.

We noted that the UTAH was a very strong hypothesis, which could well turn out to be wrong either in general, or in the particular version supposed here; the way to test such a hypothesis is to see whether the kinds of analyses it rules out should, indeed, be ruled out on empirical grounds, and vice versa for those analyses that it rules in. We saw a very sketchy example of this with unaccusatives and unergatives.

Taking the UTAH at face value, we then were forced to reappraise our earlier analysis of transitive and intransitive verb phrases. We proposed that all verb phrases had the same basic skeletal structure, with a little *v* taking a VP complement. We assumed essentially two versions of little *v*: one which had a specifier and which was roughly interpreted as having causal (or, more loosely, agentive) semantics, and one which had no specifier, and was semantically vacuous. The latter version of *v* appears with unaccusative verbs to maintain the Hierarchy of Projections.

Finally, we took a look at the general structure of the whole system: it is derivational, and essentially rules sentences as grammatical or not depending on whether a well-formed derivation can be constructed for them. When a well-formed derivation can be constructed from an input of a set of words, and the final syntactic object that is built up contains no unchecked uninterpretable features, then we have a grammatical sentence. Otherwise the sentence is ungrammatical. Of course, the sentence can be perfectly grammatical, but still unacceptable, for semantic reasons, or because of parsing problems.

In summary, here are the most important phenomena we met, and the basic components of the explanations we provided for them.

Phenomenon	Explanation
Variation in word order	Linearization of head complement and head-specifier structures
Distribution of reflexives	C-command and the Reflexive Generalization
Distribution of NPIs	C-command and the Reflexive Generalization
Co-ordination and reflexives in ditransitives	VP-shell structures
Word order in ditransitives	Movement of V to little *v* and the Hierarchy of Projections
Different behaviour of unaccusatives and unergatives	UTAH

Exercises

Exercise 1 UTAH

Task 1 Give derivations, along the lines of that given in the text, for the *v*Ps in the following two sentences:

(1) Romeo sent letters to Juliet.

(2) Romeo sent Juliet letters.

Task 2 Explain whether the UTAH correctly predicts the interpretation for these sentences. Make reference to (120) in the chapter.

There have been a number of proposals in the literature about how to reconcile the UTAH and these two constructions. See the Further reading section.

Exercise 2 Pronouns and c-command

This exercise and the next give you some practice with incorporating the notion of c-command into syntactic arguments. You are already familiar with the Pronoun Generalization, from Chapter 2.

(1) **The Pronoun Generalization**
A pronoun cannot be coreferential with another pronoun.

Part A

Task 1 For each of the following sentences, say whether the grammaticality judgement given is predicted by the Pronoun Generalization, on the assumption that the words in bold are coreferential, and explain why you think the judgement is predicted or not:

(2) *Anson kissed **him**.

(3) *Moya played football with **her**

(4) *She intended Jenny to be there

Part B

Task 2 Now assume the following revised generalization, and explain how it is empirically superior:

(5) **The Pronoun Generalization (revised)**
A pronoun cannot be coreferential with another NP.

Part C

Task 3 The revised generalization, however, does not predict the following cases. Briefly explain why.

(6) **Moya's** football team loved **her**.

(7) That picture of **Jenny** in a rubber dress doesn't flatter **her**.

(8) **Anson's** hen nibbled **his** ear.

The sentences which are not predicted by the Pronoun Generalization are, of course, reminiscent in their structure to those sentences which caused us to revise the Reflexive Generalization. If we revise the Pronoun Generalization in the same way, we can capture these data:

(9) **The Pronoun Generalization (revised)**
A pronoun cannot be coreferential with a c-commanding NP.

Task 4 Show, using replacement and movement tests, that this revised generalization makes the correct predictions for the problematic sentences.

Exercise 3 R-expressions and c-command

Part A

Task 1 The new Pronoun Generalization does not predict the correct judgements for example (4) above or for the following sentences. Explain why.

(1) *He liked Anson

(2) *They shaved David and Anson

Part B

Examples like these have prompted linguists to propose another generalization for referring expressions, like proper names. Referring expressions (often abbreviated as R-expressions) have their own reference and appear to be unable to be coreferential with any c-commanding antecedent. Here is a simplified version of that third generalization:

(3) **The R-Expression Generalization**
An R-expression cannot be coreferential with a c-commanding NP.

Task 2 Explain how the full set of judgements from this and the previous exercise is now explained by the three generalizations.

Part C

We will now rephrase these three generalizations in terms of another concept: **binding**. We shall define binding as follows:

(4) A binds B iff A c-commands B and A and B are coreferential.

We can now state our three generalizations as follows:

(5) a. A reflexive must be bound.
b. A pronoun cannot be bound.
c. An R-expression cannot be bound.

Task 3 Using the terms binding, reflexive, pronoun, and R-expression, explain how the following sentences fall under the Binding Generalizations or not.

(6) His hen loves Anson.

(7) ?Anson saw Anson. (Assume that this is basically OK)

(8) That picture of her flatters Jenny.

(9) *She liked Moya's football

(10) Moya said she liked football.

(11) *She said Moya liked football

We will return to the contrast between (10) and (11) in later chapters.

Exercise 4 NPIs

Part A

Task 1 Explain why (2) is problematic for the NPI Generalization given in this chapter and repeated here:

(1) The NPI Generalization (revised)
NPIs must be c-commanded by a negative element.

(2) No one's mother had baked anything.

Part B

Task 2 Using NPIs, make up examples with three-place predicates, along the lines of the examples with reflexives in the text, which construct an argument for or against the VP-shell hypothesis.

Make sure you check the judgements on your examples with at least four native speakers of English.

Exercise 5 Derivations

In the text, we saw a full example derivation for a *v*P. You should use this as a model to construct similar derivations for the *v*Ps in the following sentences:

(1) Anson gave Flutter to Jenny.

(2) Julie filed letters to herself.

(3) Mary fell. (Remember that *fell* is unaccusative.)

(4) Mary ran. (Remember that *ran* is unergative.)

Further reading

Section 4.2

The system developed in this chapter relies mainly on Chomsky (1995*b*), ch. 4, although the notion of checking was introduced in Chomsky (1993) and some of these ideas go back further still. The $\bar{X}$ system grew out of Chomsky (1970), and later work by Jackendoff (1977) and Stowell (1981). The question of linearization has been of major theoretical importance lately, starting with the proposals of Kayne (1994), who argued against the earlier idea that there were different linearizations of head complement and head specifier structures across languages (this earlier idea is due to Travis (1984)). Kayne proposed that different linearizations arose from movement. For arguments that leftward complements arise from movement see especially Zwart (1993), and see Guilfoyle, Hung, and Travis (1992) and Rackowski and Travis (2000) for contrasting views of apparent rightward specifiers. Cinque (1996) is a good overview of the movement approach to deriving linearization. Chomsky (1995*b*) does not propose a separate operation for Adjoin, but incorporates it into Merge. The question of how adjunction works is a fraught one. See Kayne (1994) and Cinque (1999) for theories which have no adjunction operation at all.

Section 4.3

The first careful discussion of c-command is Reinhart (1976) although the notion of some kind of extended sisterhood relation goes back to very early generative grammar. Chomsky (1980) discusses issues in the syntax of reflexives, pronouns, and c-command. The notion of c-command is pervasive in syntactic theory; the definition we have used is adapted from Chomsky (1995*b*). The use of co-ordination as a constituency test is discussed by Radford (1981), ch. 2, and see Dougherty (1970) for an early but detailed discussion. The definition adopted here follows a suggestion of Jason Merchant's.

Section 4.4

The binary branching approach to ditransitives adopted in the text derives from Larson (1987). See Pesetsky (1995) for further discussion, Jackendoff (1990) for an alternative view, and Larson (1990) for a reply. Barss and Lasnik (1986) provide a discussion of a range of c-command effects in double object constructions.

Sections 4.4.4 and 4.5

Baker (1988) is a defence of the UTAH which discusses causatives and a range of other constructions that appear to require the kind of movement process adopted in the text and develops a theory of this kind of movement (**incorporation**). Baker (1996) is a good discussion of double object constructions, ditransitives, and the UTAH. Pinker (1984), developing insights of Grimshaw (1981), argues that children make use of linking principles in language acquisition. See also

Atkinson (1992), ch. 7. See Kratzer (1996) for the viewpoint that there are different types of little *v* with different semantic properties.

Section 4.6
The architecture outlined here is that of Chomsky (1995*b*) with some updating. This is the best place to look for a discussion of the concepts discussed in the text, although it is difficult reading.

5

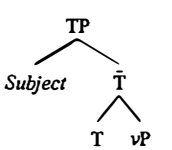
Functional Categories I—TP

5.1 Introduction

One of our initial primary aims was to characterize the notion of sentence in I-language terms. We are now in a position to do this: we know that sentences consist of constituents, which may be embedded within each other, and which bear θ-relations, selectional relations, and modification relations to each other; we know that these constituents are characterized by features that are projected from the lexical items which head them, and we have developed in some detail a view of the particular elements that go into making up *v*P.

In this chapter, we shall see that sentences have a core consisting of the projections of a lexical category (the verbal cluster) surmounted by a series of other categories, which project, but do not assign θ-roles. The most important of these categories is T: the category that hosts the tense features for the whole sentence. We shall see that there is evidence that sentences are really projections of T, with the subject in the specifier of TP, and the *v*P being the complement of T, giving the following schematic structure:

(1)



We have already developed an analysis of the structure of the lexical category at the core of TP: the verb phrase. We argued for the idea that the verb phrase consists of two parts: a 'little' *v*, which is responsible for assigning the Agent θ-role, and a 'big' V, which assigns Theme and Goal roles. We assumed that 'big' V raises and adjoins to 'little' *v*, an assumption which was necessary to reconcile the