0 Introduction: Scope of the Chapter

This chapter is an introduction: it sets the scene for the remainder of the book. The focus of our enquiry in this book is language and in particular we will be interested in the way that words are put together to form sentences. The study of sentence formation is usually referred to as **syntax**.

Syntax is a branch of **linguistics**. In this chapter we discuss the main properties of the methodology used in linguistics. We set the scene for the later chapters in that we will determine how we ought to go about it when studying syntax. The chapter is divided into three sections. In section 1 we discuss the methodological implications of the idea that linguistics is a scientific discipline. We will try to determine what the defining properties of scientific work are and to formulate some guidelines for our own work. Using the example of question formation in English, section 2 offers an illustration of the scientific methodology used in linguistics. Section 3 shows why, even when concentrating on the formation of English sentences, it is important to extend the data we examine beyond Modern English. Section 4 is a summary.[1]

1 Linguistics as the Science of Language

1.1 *Linguistics as a science*

1.1.1 SOME DEFINITIONS

Syntax, the area of study we are concerned with in this book, is a domain of linguistics. When we look up the word *linguistics* in a dictionary we find definitions such as the following:

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[1]   In this book footnotes will be used for the following purposes:

- to add various comments to the text – notes 2 and 6 of this chapter are examples;
- to refer to earlier or later sections in the book in which the issue under consideration or a related issue is discussed – notes 8 and 9 of this chapter are examples;
- to point the reader to relevant exercises – note 4 of this chapter is an example;
- to refer to the literature for more extensive discussion of issues dealt with in the text – notes 3 and 5 of this chapter are examples. In general the references will offer a more complete survey of the data and/or a more sophisticated theoretical analysis. The texts referred to will usually be more advanced and will probably not be accessible to the student-reader, at least not at the early stages of the book. When a text is itself introductory (and hence accessible) this will be signaled in the note.

Linguistics (i) The science of language(s), esp. as regards nature and structure. (*Concise Oxford Dictionary* (*COD*) 1976: 632)

(ii) The study of human speech in its various aspects (as the units, nature, structure, and modification of language, languages, or a language including esp. such factors as phonetics, phonology, morphology, accent syntax, semantics, general or philosophical grammar, and the relation between writing and speech) – called also *linguistic science, science of language*. (*Webster's Third New International Dictionary of the English Language* 1981: vol. II, 1317)

(iii) The study of language in general and of particular languages, their structures, grammar etc. (*Longman Dictionary of English Language and Culture* (*LDOCE*) 1998: 767)

The three definitions are similar, but careful readers may have observed that definitions (i) and (ii) contain the word *science*, and that the word is absent from definition (iii). Before we conclude that this means that the compilers of the *COD* and those of Webster's dictionary used to think that linguistics was a scientific enterprise but that those compiling the Longman dictionary no longer do, consider that in English other scientific fields of study are also referred to by words ending in *-ics*: physics and mathematics, for instance. The gloss for the ending *-ics* in the Longman dictionary is as follows:

-ics 1. The scientific study or use of ___: *linguistics* (the study of language), *electronics* (the study or making of apparatus that uses CHIPS, TRANSISTORS etc.), *acoustics* . . . (*LDOCE*: 1566)

In other words, combining Longman's definition (iii) of *linguistics* with its gloss for the ending *-ics*, we can conclude that the Longman dictionary makers also consider linguistics to be the scientific study of language.

Since dictionary makers try to reflect actual usage of language, linguistics can plausibly be defined as the science of language or the scientific study of language. However, while it is easy to provide such a definition of the discipline, it is much harder to go beyond that and to explain what it is that linguists do and in what way their work is supposed to be "scientific." Commenting on this point the English linguist David Crystal says:

> Linguistics, indeed, usually defines itself with reference to this criterion [being scientific]: it is the scientific study of language. But this is a deceptively simple statement; and understanding exactly what anyone is committed to once he decides to do linguistics is an important step, an essential preliminary to any insight into the essence of the subject. What are the scientific characteristics that make the modern approach to language study what it is? (Crystal 1971: 77)

Before embarking on the study of syntax, which is the branch of linguistics that concentrates on the formation of sentences, we should try to clarify what makes a

branch of study scientific. Once we have done that, it will be easier to understand why linguists in general, and syntacticians in particular, go about their work the way they do. Note that the brief presentation of our interpretation of the concept "science" is not at all an attempt to offer an introduction into the philosophy of science. Rather, by stepping back and reflecting for a moment on what we normally see as the defining properties of science, we can try to isolate the main features of the scientific method and then try to implement these same features when studying syntax.

Below are some definitions of the notion "science," taken from various written sources. Read them carefully and identify what you think the key concepts in these definitions are. Pay particular attention to concepts that occur more than once.

(1)   Systematic and formulated knowledge, pursuit of this or principles regulating such pursuit. Branch of knowledge (esp. one that can be conducted on scientific principles), or organised body of knowledge that has been accumulated on a subject. (*COD*: 1066)

(2)   Accumulated and accepted knowledge that has been systematized and formulated with reference to the discovery of general truths or the operation of natural laws; knowledge classified and made available in work, life, or the search for truth; . . . knowledge obtained and tested through the scientific method. (*Webster's Third New International Dictionary of the English Language* 1981: vol. II, 2032)

(3)   Science is a hunt for order, explanation and regularity. It explains the anomalous by reference to the law it seeks to establish. (Hywel Williams, *Guardian*, 7.8.2002, p. 8, col. 7)

(4)   Science, by definition, is the search for order in nature. (Newmeyer 1983: 41)

The concepts that occur frequently in the definitions above have been isolated and grouped:

knowledge (1), (2);
pursuit (1), hunt (3), search (2), (4), seek (3);
explanation (3);
laws of nature, natural laws (2), general truths (2), law (3);
order (3), (4), regularity (3), systematic (1), (2);
formulate/formulation (1), (2).

Not surprisingly, these extracts converge on the key concepts associated with science. They all agree that science aims at achieving knowledge and that science is an activity. Science is not an inert state of knowledge; science means doing something, engaging in some activity. Scientific activity is defined as a "search," a "hunt," a "pursuit"; in other words science is the active pursuit of a goal. Combining these two concepts

we can say that the search undertaken by the scientist has as its goal "knowledge," but the kind of knowledge that is achieved is in itself dynamic. The goal of scientists is not merely taking note of and recording certain phenomena and thus "knowing" about them: scientists want to explain the phenomena they have observed. Explanation leads to understanding: scientists want to understand why the phenomena observed are the way they are.

1.1.2   EXPLANATION: AN EXAMPLE

To clarify the notion "explanation" let us look at an example. We start from the following very simple observation. Snow that has fallen overnight often turns into water during the day. We refer to this natural phenomenon as "melting": a solid matter gradually turns into a liquid. When dealing with such a natural phenomenon, scientists will not be satisfied with mere observation. They will want to understand it. They will want to explain why the snow has melted and why other solid matters, say, a glass or a plastic cup or the mud in the garden or the sand on the beach or the tarmac on the roads, have not melted at the same time and/or in the same manner. Scientists will also want to understand why snow melts on certain days, but does not melt on other days. In order to explain the phenomenon observed scientists will try to relate it to other phenomena. So the goal of scientists will be to find the cause of the phenomenon observed. For our example, a fairly plausible hypothesis could be that snow melts on a certain day because during the day the temperature has risen, and as a result the snow reaches the critical temperature at which it turns into water, its melting point. If that particular temperature is not attained, snow will not melt. Scientists might formulate the hypothesis that there is a causal link between temperature and the solid/liquid states observed.

Scientists will not stop at snow turning into water. They will view the melting of snow in more general terms; they will look at other solids and examine whether these also change into liquids when heated. Metals, for instance, such as iron or steel or copper, also melt, but they require a much higher temperature than snow. In order to find out whether particular metals melt or not, scientists cannot just patiently wait and hope to come across them melting. For instance, if the melting point of a particular solid matter is 100 degrees centigrade, this temperature cannot be met with in everyday circumstances, even on a hot day. To go beyond the mere observation of phenomena in the natural environment and to find out more about melting temperatures, scientists can resort to experiments: they heat solids to a certain temperature and observe and record what happens. While doing so, scientists rely on the generalized hypothesis that all solids will melt under certain well-defined conditions, namely when they reach a critical temperature, their melting point.

As mentioned, when trying to assess the melting points of individual matters, scientists do not just wait for things to happen. Rather, what they do is create the relevant circumstances that can trigger the process under examination, in other words they will run an experiment. But note that before doing the experiment,

scientists must already have some idea what the relevant factors will be. For instance, if scientists think that heat is responsible for the melting process, they will apply heat to the material and they will keep all other elements constant. The experiment is guided by a **hypothesis**, namely that solids melt when heated to a critical point. The goal of the experiment is (i) to test the general hypothesis that all solids melt when they are at some particular temperature, and (ii) to identify the relevant critical temperature.

What scientists are doing is looking for **regularities** (here that all solids liquefy at a certain point), for systematic **patterns**. Scientists try to formulate **general laws** to cover the facts they observe. They are looking for **order**. In our example, these laws establish relations between temperature–matter–melting. We provide an **explanation** if we can account for the phenomena, if we can say that snow melts because the temperature rises above 0°C and that 0°C is the melting point of snow. On the other hand, a silver bracelet will not melt in the same circumstances because its melting point is much higher.

Scientists will not stop at the inventory of melting points. Having confirmed that a series of solids melt when heated to certain temperatures, they will then want to explain why different materials have different melting points. Again they will try to answer this question by observation, experimentation, and by forming hypotheses which they put to the test.

As a further step scientists will try to explain the difference in the melting points by looking more closely at the nature of the different materials under examination. Ultimately, they will devise an account which not only explains why the matters that have been observed melt at a particular temperature but they will also try to **predict** melting points for matters that they may come across in future. For instance, they will predict the melting point of a metal that consists of two parts zinc and one part copper. Note that this means in fact that by identifying a melting point for a solid matter scientists predict when the solid matter will melt and they also predict when it will not melt, i.e. when it remains solid. Once again, the prediction will be tested by experimentation.

1.1.3   LANGUAGE PHENOMENA: AN EXAMPLE

1.1.3.1   *Ambiguity*

The object matter that is studied in linguistics is language. If linguistics is a science, then we should not simply make an inventory of linguistic phenomena (i.e. language facts) and describe them but we also want to explain them. Let us just look at a simple point here to illustrate the nature of the task that awaits the linguist. Consider example (5a), taken from a British newspaper. How does this extract refer to the protesters? What kind of individuals would qualify as the relevant protesters?

(5) a Manchester's morning rush-hour traffic was brought to a near standstill yesterday as 150 black cab drivers staged a go-slow protest calculated to cause maximum disruption to commuters. (*Guardian*, 14.9.2000, p. 4, cols 2–3)

In the extract, the protesters are described by means of the string of words *150 black cab drivers*. What kind of individuals does this string pick out? The string of words *150 black cab drivers* has two interpretations or two **readings**: in one reading we are referring to 'those who drive cabs and are of a specific ethnic origin', and in the other we are referring to 'those who drive cabs which are of a particular color'. In both readings, the adjective *black* distinguishes the drivers in question from others: in the first reading the distinctive feature is the color of the driver's skin, and in the second it is the color of his cab. In example (5a) both readings are available.

Observe that the extract above is taken from a British newspaper. In Britain, taxis are indeed often black. But even in a context in which taxis tend to be a different color, say yellow, the string *150 black cab drivers* still potentially has the two interpretations described above. Linguistically speaking, the string is ambiguous regardless of which color taxis actually are.

The question arises why the string *150 black cab drivers* has these two interpretations. Are all strings of words necessarily ambiguous in this way? If not, what is the cause of the ambiguity of this example? Could it be the word *cab*, another word for *taxi*, that causes the ambiguity? To find out if the use of the word *cab* is at the basis of the ambiguity, we can experiment with the sentence and replace the word *cab* with the word *taxi*. Consider (5b): is this sentence ambiguous?

(5) b   Manchester's morning rush-hour traffic was brought to a near standstill yesterday as <u>150 black taxi drivers</u> staged a go-slow protest calculated to cause maximum disruption to commuters.

(5b) remains ambiguous. The presence of the word *cab* in (5a) as such is not the cause of the ambiguity. Does the presence of the numeral *150* have anything to do with the ambiguity? Or could the ambiguity be due to the fact that the noun *driver* is in the plural? Neither of these is probably at the basis of the ambiguity; to confirm this intuition let us again experiment with the sentences above. It is clear that both (5c), without the numeral *150*, and (5d), with a singular noun *driver*, remain ambiguous.

(5) c   Manchester's morning rush-hour traffic was brought to a near standstill yesterday as <u>black cab drivers</u> staged a go-slow protest calculated to cause maximum disruption to commuters.

d   Manchester's morning rush-hour traffic was brought to a near standstill yesterday as <u>a black cab driver</u> staged a go-slow protest calculated to cause maximum disruption to commuters.

Can we reword the string *150 black cab drivers* and make it unambiguous? One option is shown in (5e):

(5) e   Manchester's morning rush-hour traffic was brought to a near standstill yesterday as <u>150 drivers of black cabs</u> staged a go-slow protest calculated to cause maximum disruption to commuters.

Table 1 Classification of examples

Number	Example	Ambiguous?
(5a)	*150 black cab drivers*	+
(5b)	*150 black taxi drivers*	+
(5c)	*black cab drivers*	+
(5d)	*a black cab driver*	+
(5e)	*150 drivers of black cabs*	−

At this point, we could inventorize our observations and come up with the classification in Table 1. Why is (5e) no longer ambiguous? And why are the other examples ambiguous? The ambiguity relates to the position of the adjective *black* in relation to the other words of the segment. In the ambiguous cases *black* precedes *cab driver(s)* and it may either be taken to modify a string *cab driver(s)*, in which case *black* refers to the ethnic origin of the driver(s), or it may be taken to modify the noun *cab*, in which case it refers to the color of the cab. We can show these relations by using **square brackets** as in (6).

(6) a   150 [[black cab] drivers]
     b   150 [black [cab drivers]]

Square brackets show the grouping of words into larger units: in (6a) *black* is combined with *cab*, giving the unit [*black cab*]. The meaning of the unit [*black cab*] is calculated on the basis of the combination of the meanings of its component parts, the words *black* and *cab*. The meaning of *black* combines with the meaning of *cab*: in this grouping *black* refers to the color of the cab. The unit [*black cab*] is then grouped with *drivers* to form a more comprehensive unit [[*black cab*] *drivers*]. The meaning of the resulting unit is again based on that of its component parts: (i) *black cab*, and (ii) *drivers*. With the grouping in (6a), *black cab drivers* denotes a driver of black cabs.

In (6b) on the other hand, *cab* is first combined with *drivers* to form [*cab drivers*]. The meaning of this unit is calculated on the basis of the meaning of its two component parts *cab* and *drivers*: here *cab drivers* denotes people who drive cabs. Then we combine the unit [*cab drivers*] with the adjective *black* to form [*black* [*cab drivers*]]. Again the meaning of *black cab drivers* is based on that of its component parts, (i) *black* and (ii) *cab drivers*. In the grouping in (6b), the adjective *black* modifies the unit *cab drivers*; *black cab drivers* now denotes cab drivers who are black.

The fact that two groupings of words are available for one string of words is the cause of the ambiguity of the string. So we explain the observed ambiguity by relating it to a particular cause: the internal organization or **structure** of the string.

The ambiguity in the relevant examples is said to be **structural**. This means that we must assume that the relations between words have an impact on their interpretation: the string *150 + black + cab + drivers* has two meanings because the words in the string can be combined with each other in two different ways.

To remove the ambiguity we can combine the words *black, cab, drivers* differently, as shown in (5e). In (5e) the adjective *black* precedes *cabs* and it does not precede the noun *drivers*. In this example the adjective *black* is related uniquely to *cab*, and only one reading is available, the reading corresponding to that of (6a).

(6) c   150 drivers of [black cabs]

The following extract confirms the potential for ambiguity of the example in (5a):

(7) a   A few years ago a newspaper article about the dangers of women riding alone in cabs brought a long and furious tirade from a reader incensed by the way the drivers had been racially described. In fact the article had been using the phrase "black cab drivers" to differentiate those working in hackney cabs from mini-cab drivers. (*Independent*, 13.10.2000, Review, p. 5, col. 2)

Example (5a) actually appeared in the context (7b). In that context, a reader confronted with the ambiguous sentence (5a) would immediately have been able to select the appropriate grouping of the words with the associated reading: in (7b) reference is made to "black cabs," making *black* distinctive as a color of cabs.

(7) b   More than 70 black cabs travelled under police escort from Manchester airport to the city, driving four abreast and slowing early morning traffic to a 10mph crawl. (*Guardian*, 14.9.2000, p. 4, cols 2–3)

Examine the caption in (8a) which was used to characterize a person on TV: in what way is it ambiguous? What could be the cause of the ambiguity?

(8) a   a tall rose grower (BBC 1 television, 31.7.2002 (News, South))

The person we are talking about, the "referent" of the string of words in (8a), could be either a person of any height who grows tall roses (8b), or a tall person who grows roses of any height (8c).[2] We can again relate the ambiguity of (8a) to the structure of the sequence of words: that is, to the different ways the words *tall*, *rose*, and *grower* can be combined. In (8b) and (8c) square brackets again represent the two structures. In (8b) we first combine *tall* with *rose*, giving the unit *tall rose*. In this unit the adjective *tall* modifies *rose*: it denotes the size of the rose. This unit is in

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[2]   In the particular BBC broadcast the first reading was intended: the speciality of the particular gardener was growing tall roses.

turn combined with *grower*. The person denoted by this string of words grows tall roses. According to the grouping in (8c), *rose* first combines with *grower*, giving the unit *rose grower*. This unit denotes a person who grows roses. The adjective *tall* then combines with *rose grower*. In the second combination, *tall* modifies the unit *rose grower*, the adjective indicates the size of the rose grower.

(8) b   a [[tall rose] grower]
    c   a [tall [rose grower]]

Strings of words are sometimes ambiguous, and the ambiguity of the particular examples examined above was due to the organization of these words into larger units, their structure. In both the examples, *black cab drivers* and *tall rose grower*, the ambiguity is related to the sequencing of the combination of the elements. This means that the interpretation of a string of words is not merely the left-to-right sum of the interpretations of the individual words. It also depends on how the words are put together. We could think of a mathematical analogy here. The formula $(A - B) - C$ is not identical to the formula $A - (B - C)$. When $A = 6$, $B = 3$, and $C = 2$, for instance, the first equation equals 1, and the second equals 5. We can make this observation into a more general hypothesis and propose that in language, interpretation depends on the way the strings of words are composed, namely their structure:

(9)   **Compositionality**
    The meaning of a string of words is determined **compositionally**; i.e. it is determined by its component parts and by their relations.

1.1.3.2   *The data*

Out of context, the string *150 black cab drivers* (5a) has two interpretations; the string *150 drivers of black cabs* (5e) does not. This is a **fact** of language. We offered a first explanation in terms of the grouping of the words contained in the string. Before we continue the discussion, it is useful to think again about the kind of language material we have been using. Did we restrict ourselves to observing the language material available? Or did we also use experimental facts?

Sentence (5a) is an **attested** example, it was found in a newspaper. As speakers of English we are able to interpret it and we can assign two interpretations to it. In other words, we use our intuitions about the interpretation of the string. The dual reading of the example is due to the fact that there is an ambiguous string in the sentence, *150 black cab drivers*. We have relied on material found, an attested sentence, but not only that: we also rely on our linguistic competence. As speakers of English, we can work with the observed material: we assign an interpretation to the strings of words, and, using our knowledge of the language, we are able to reformulate these strings and compare the interpretations of various strings. Sentence (5a) does not come with a warning that it is ambiguous. We rely on our intuitions about the language to decide on its interpretation.

Sentences (5b–e) are not attested examples. Relying on our competence as speakers of English, we have constructed these sentences ourselves, using (5a) as our inspiration. If we want to understand why a sentence is ambiguous, we will not just examine it as it is. We will play around with the example, to see whether we can construct similarly ambiguous sentences, or ones that are unambiguous. We **experiment** with the data, relying on our **competence** of the language.[3]

As linguists we will, among other things, want to look at data such as those in (5) and try to explain why examples (5a–d) are ambiguous and why example (5e) is not. We rely on our own intuitions concerning attested data, and also on experimental data (sentences which we construct ourselves).

Though attested data may be useful, we definitely cannot confine or research to them. In addition to playing around with attested examples, as we have done above, we can also just construct examples "out of the blue" and experiment with them. For example, the string in (10a), which is again ambiguous, is not an attested example. It is a constructed example which serves to illustrate once again how the different groupings of words lead to ambiguity:

(10) a   a Flemish language teacher
      b   a [Flemish language] teacher
      c   a Flemish [language teacher]

1.1.3.3   Predictions

Recall that one of the goals of a scientific approach is also to predict what is possible and what is not possible. For instance, the melting point of a metal predicts both at which temperature the metal will melt and when it will not melt. Similarly, when dealing with language data we want to elaborate predictions. For instance, taking our example above, we don't only want to account for the ambiguity of a particular example, but we also want to predict when strings of words will be ambiguous. Based on the attested examples in (5a–d) and in (8a) and on the constructed example in (10a) we could formulate a first hypothesis that a string of words composed of the sequence adjective – noun – noun may lead to ambiguity. The ambiguity of such sequences is due to the fact that the adjective either bears on the noun that it immediately precedes or it bears on the combination of the two nouns that it precedes:

(11) a   [[adjective noun] noun]
      b   [adjective [noun noun]

Thus we generalize our findings and go beyond the description of some individual examples (attested or constructed) to formulate general principles. (11c–g) contains

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[3]   On the use of intuitions and attested data see also the recent (and fairly accessible) discussions in Borsley and Ingham (2002, 2003), Stubbs (2002), Lehmann (2004), and the papers in Penke and Rosenbach (2004).

some additional constructed examples of the same sequence adjective – noun – noun and indeed these examples are also ambiguous.[4]

(11) c   a French art student
     d   an American literature teacher
     e   an Italian restaurant owner
     f   a Dutch bicycle maker
     g   a trendy furniture designer

The example in (5e), which was not ambiguous and which we repeat here in (11h), does not display the relevant sequence. Here the adjective *black* preceded just the one noun *cabs*, which it modifies.

(11) h   150 drivers of black cabs

1.2   How to go about it

1.2.1   INDUCTION AND DEDUCTION

From the descriptions above we can also infer how not to proceed in scientific work. To reach the goal of explaining the data that we observe we cannot simply draw up a list of interesting observations. A mere list of phenomena does not lead to any understanding. When discussing an example such as (5a), for instance, we cannot satisfy ourselves with a mere anecdotal description of the example and how it may give rise to ambiguity and to misunderstanding (cf. (7a)). We should try to relate the observed language fact, the ambiguity of the example, to other language facts and to elaborate an explanation that goes beyond example (5a).

A starting point is identification and classification of the data, the material we wish to examine. We may, for instance, identify a set of ambiguous examples and oppose them to a set of non-ambiguous examples. Classification is followed by an attempt at explanation.

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[4]   Exercises 1, 2, and 3. Among other things, footnotes will be used to refer to the exercises. When a footnote reads "Exercise 1" this means that you can try Exercise 1 at that point in the chapter. You are advised to tackle the exercises at two points in time. First you can do each exercise at the point in the chapter when it is signaled by a note. The exercise will allow you to apply what you have just learnt and will provide more illustrations of the concept being discussed. You can also try to do the same exercise later on, when you have covered more ground. Doing this will ensure that you still remember the notions which you have learnt previously.

Sometimes a (partial) key will be provided in the exercises and additional discussion will be added under the heading "Key and comments." These supplementary discussions will alert you to specific points that have not been tackled in the main body of the text. In particular, sometimes such discussions will answer questions that you may have been wondering about.

When research starts from observation of empirical data, the procedure we adopt is referred to as **induction**. This type of approach is captured by Webster's dictionary in the following way:

NATURAL SCIENCE
A branch of study that is concerned with observation and classification of facts and esp. with the establishment or strictly with the quantitative formulation of verifiable general laws chiefly by induction and hypotheses. (*Webster's Third New International Dictionary of the English Language* 1981: vol. III, 2032)

By means of induction we attempt to uncover general principles (or "laws") that underlie the observed phenomena. We formulate hypotheses whose first goal is to account for the observed phenomena. Ideally, however, the hypotheses must always go beyond providing an account for what is observed. We also want to understand why we have observed just those phenomena and not others. We want to be able to predict which alternative phenomena COULD have been observed and which ones would NEVER arise. Put differently, we set out to define the bounds of what is possible.

In our melting point example discussed in section 1.1.2, scientists first observe and classify data in relation to the natural phenomenon of melting. At some point they will have established an inventory of melting points: for instance silver melts at 961°C, while gold only melts at 1063°C and platinum melts at 1769°C. As a second step, an attempt is made to provide an explanation for why silver melts at a lower temperature than gold. This difference will be related to the internal composition of the solid materials studied. A successful analysis should be able to account for the melting temperatures observed and it should also predict when solid matters will melt and when they will not melt. Similarly, when dealing with the ambiguity of (5a) we first classify a sample of language data with respect to their potential for ambiguity. The ambiguity is related to the internal composition of the data analyzed, in particular the ambiguous strings allow for two possible groupings of the sequence adjective – noun – noun. In so doing, we define the bounds of what is possible. We predict that *150 black cab drivers* is ambiguous, because it has the relevant structural property, and that *150 drivers of black cabs* is not ambiguous, because it lacks those properties. Thus, we go beyond the data observed and formulate predictions about what can arise and what will not arise.

When working on the linguistic examples we appealed to some hypotheses about language. For instance, we proposed that words are grouped, that language is structured. We needed these concepts to be able to isolate a string of words *150 black cab drivers*, from a sentence. We appealed to a general concept "**structure**" to refer to groupings of words in the string. But if we appeal to the concept structure, then we need to clarify at least two points. (i) We have to define the nature of linguistic structures, and (ii) we have to be able to make precise how "structure" is mapped into meaning or interpretation. In other words we have to elaborate a theory of language; we need a theory about how linguistic forms are structured and how

these structures relate to interpretation. Such a theory will provide the framework for the discussion and explanation of the data examined.

Scientific work is guided both by **empirical** considerations (observation of data and experimentation) and by **theoretical** concepts. With respect to linguistics, the interplay between empirical data and theory is expressed very clearly in the following extract by the Dutch linguist Simon Dik:

> In linguistics, as in other sciences, there is an essential interaction between data analysis and theory formation: an adequate analysis of the data of some particular language is impossible without some general theoretical insight into the principles underlying the structure and functioning of language in general; on the other hand, an adequate development of general linguistic theory presupposes the meticulous analysis of the facts of particular languages. (Dik 1989: 33)

In our example above, we proceeded from the observation of empirical data to the formulation of a hypothesis which provides an explanation of these data. This way of working is called induction. The combination of several hypotheses about a certain domain of enquiry (here language) gives rise to a more comprehensive network of hypotheses, a **theory**.

Having formulated a set of principles that are part of a theory, scientists (and hence linguists) may also proceed to working "**deductively**." That means that they examine a particular component of their theory (that is the network of hypotheses). Their aim will be to examine how the hypotheses that have been formulated interact with each other. For instance, they may look for internal inconsistencies that arise when two hypotheses lead to contradictory predictions. They may also examine whether there is any overlap between the different components of the theory, when the same facts are explained by two different hypotheses. This type of theoretical work may lead to the reformulation of some components of the theory. Thus novel hypotheses may emerge from theoretically oriented work and these new hypotheses will themselves have to be tested on the basis of the empirical data. Once again the data examined may consist of attested language material or of constructed language material.

In science, experimental, data-driven work and theoretical work continuously interact. Hypotheses are formulated on the basis of the observed data and these hypotheses are integrated into the theory. The theory itself is examined and streamlined; theoreticians formulate predictions on the basis of the reformulated theories and their predictions are tested by observations and experiments.[5]

1.2.2   EXPLICITNESS, SYSTEMATICITY

In our list of essential concepts in the definitions (1)–(4), we also signaled the terms *formulate* and *formulation* ((1), (2)). Some extracts from the dictionary definitions of the verb *formulate* that are relevant here are given in (12):

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[5]   For a general discussion of the relative impact of induction and deduction in various present day approaches to linguistics see also Stuurman (1989).

(12)   *formulate*   a   Longman   to express in an exact way
                     b   *COD*   set forth systematically
                     c   Webster   put into a systematized statement or expression

The definitions of *formulate* refer to expressing something systematically and in an exact way. Scientists have to formulate, i.e. to state, their basic assumptions, their hypotheses, their procedures, and their results precisely and explicitly. This will enable other scientists working in the same area to evaluate the work, to repeat experiments on which the research is based, and either to accept and implement (parts of) the findings contained in the work or to challenge them. To put it more succinctly: scientific research is "capable of replication and subject to peer review."[6]

In order to guarantee that their research can be replicated and reviewed by their peers, linguists also have to formulate their findings as precisely and explicitly as possible. Sometimes, mathematical types of formulae are used in linguistics. This is not really a requirement of scientific methodology, but it is a natural by-product of the wish to be as precise as possible. By using exact and generally unambiguous formulae, scientists ensure that there is clarity as to the interpretation of their statements.

Note that the term *formulate* implies a pre-requirement that scientists be able to define the terms they use. They must be able to describe their procedures, argumentation, etc. They cannot satisfy themselves with a vague description of results without, for instance, stating exactly how experiments were run and how the results were obtained. For linguistics, the same requirements of explicitness apply. Simply saying that (5a) has two interpretations and that this is due to the adjective *black* modifying either the noun *cab* or the noun *cab drivers* is not going to be sufficient. We must express quite precisely how the relation of modification is encoded in language. In our representation of the structure, we have tried to represent this by the squared bracketing convention, which is used to represent the grouping of words into units.[7]

Another point that comes up regularly in the definitions of the scientific enterprise is the concept **systematicity** (see definitions (1) and (2) and also (12c)). The linguist David Crystal (1971: 90) says: "The need to study phenomena using a procedure which is as methodical and standardized as possible is . . . obvious enough." He goes on to underline the importance of an underlying descriptive framework that provides the system in which the research is inscribed. Systematicity implies systemizing, i.e., looking at things against the background of a system. "Systemizing is the drive to analyse and explore a system, to extract underlying rules that govern the behaviour of a system" (Simon Baron-Cohen, *Guardian*, G2, 17.4.2003, p. 12, col. 1).

1.2.3   ELEGANCE, PARSIMONY, ECONOMY

It often happens that a number of scientists (or linguists) are simultaneously trying to account for a particular set of data and that each comes up with a different account

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[6]   Citation due to Dr David Gosling, letter to the editor: *Independent*, 15.7.2004, p. 22, col. 2.
[7]   A very accessible preliminary discussion of requirements in scientific work is given in Crystal (1971: 77–127).

for these data. Scientists will often be seen to elaborate competing accounts. The question arises of how to choose between competing accounts. What would make one explanation or one theory better than another? Newmeyer says:

> Science, by definition, is the search for order in nature. Scientists take it for granted that their goal is to formulate the most elegant (i.e. the most order reflecting) hypothesis possible, consistent with the data, about the particular area under investigation. (Newmeyer 1983: 41)

Let us go back to our example of the melting of snow. The initial observation was that the snow that had fallen overnight may melt during the day. Scientists working on this issue and who observe that snow melts when the sun comes up might have proposed that the melting process is due to the length of exposure to sunlight. In other words, they explain the melting by two factors: (i) sunlight, (ii) time. Even though these scientists might also be able to account for the observed fact, snow melting during the day, their account is not as highly valued as the one we elaborated above because it invokes two factors, sunlight and time, rather than one, temperature. If two accounts cover the same sets of facts, then an account relying on one factor is better than an account that requires two. Ultimately, in fact, the account which accounts for the melting of snow relying on sunlight and time can be reduced to an account in terms of temperature, because sunlight will give rise to an increase in the temperature. But we know that sunlight as such is not essential for snow to melt: a sudden increase in the temperature overnight will also make snow melt. Explanations and theories should use as few rules/principles as possible to account for the data.

The idea that scientific explanation should be as simple as possible is not new, it is sometimes referred to as "Ockham's Razor," due to the English theologian and philosopher William of Ockham (c.1285–1349), who said that *entia non sunt multiplicanda praeter necessitatem* – 'entities are not to be multiplied unnecessarily.' This means that, other things beings equal, the simpler of two explanations is to be preferred. In the same vein, Newmeyer writes:

> Certain points, I think, are uncontroversial. One is that, given two theories that cover the same range of facts, the one in which the facts follow from a small number of general principles is better than the one that embodies myriad disparate statements and auxiliary hypotheses. Another is that it is methodologically correct to reduce redundancy within a theory, to reduce the number of postulates while preserving the scope of the predictions. (Newmeyer 1983: 41)

Einstein put it more succinctly:

> The grand aim of all science is to cover the greatest possible number of experimental facts by logical deduction from the smallest number of hypotheses or axioms. (Einstein 1954, cited in Abraham et al., 1996: 4)

In linguistics too, we will value an account with a smaller number of rules more than one which requires more rules to explain the same set of data.[8]

1.2.4   DOUBT

A final essential ingredient of scientific work is doubt. This statement may come as a surprise, since a search for knowledge and understanding would at first sight seem to aim at certainty rather than doubt. When we say that doubt is an important component in scientific work this means that we should always remain aware that our answers to problems and the knowledge we acquire are hypotheses. New insights or new developments in research may well mean that we must go back on what we think we know and revise earlier proposals. The journalist Tim Radford cites the scientist Tom McLeish:

> Doubt, expressed most potently 3,000 years ago in the biblical book of Job, is the greatest scientific tool ever invented . . . To do good science you have to doubt everything, including your ideas, your experiments, and your conclusions. (*Guardian*, G2, 4.9.2003, p. 12, col. 4)

1.2.5   SUMMARY

In this section we have looked at the idea that linguistics is a science and we have gone over the main properties of the scientific method. Science is based on the interaction of the observation of phenomena ("data") and theory. The observation of data may lead to theoretical proposals or hypotheses. This is described by the term induction. Sets of hypotheses, or theories, may themselves also lead to new hypotheses; this is referred to as deduction. We have also seen that scientific work is systematic and explicit. It aims at providing simple explanations for complex data. We have mentioned that one should not take for granted whatever results one has arrived at and that any kind of research implies that the researcher is willing to question and challenge the results of his or her own work.

In the remainder of this chapter we will illustrate the kind of phenomena, the data, that are dealt with in syntax. We will look at a set of language phenomena and we will try to describe the data and evaluate some explanations for them. In the later chapters of this book, we will elaborate step by step analyses of specific problems, focusing on the overall question of how a sentence is structured. We will try to show in as precise a way as possible how a hypothesis can be developed and evaluated in linguistics, and how the proposals elaborated will lead to the formulation of a more comprehensive theory. We will repeatedly show that once we have developed a certain hypothesis we need to examine its consequences and that we continuously need to reconsider and revise the results of earlier work. The role of doubt in scientific work will thus be made clear throughout the discussion. Note that though

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[8]   For a concrete illustration of how the criterion of economy or simplicity can apply in syntactic theory see Chapter 2, section 2.4.2.

we will end up providing some interesting insights into language, in this book we are mainly interested in the process of the research, that is, how we have arrived at the results.

2 From Raw Linguistic Data to Generalizations: Word Order in English Questions

In this section we examine another concrete example of how we could go about analyzing language in a scientific way. We choose what looks like a well-known and very simple domain of enquiry, that of English question formation. The goal of the section is to show how even apparently simple linguistic phenomena require the greatest care when it comes to formulating hypotheses. It is important to bear in mind that the goal of this section (and indeed of this book) is not to elaborate a full-fledged and finished analysis of sentence formation, nor do we pretend to arrive at a complete explanation, but rather we try to illustrate one way we can "think" scientifically about language. What we will try to do is to "unpick" our thinking about a phenomenon, to dissect the argumentation into smaller building blocks. We will also show how we may compare various formulations.

In the discussion below it is important to actively try to do the thinking. When a question is raised in the text, first try to answer it before reading the account. It is important, then, to be an active reader who does not simply follow the text but who tries to carefully monitor each step of the discussion.

2.1 Introduction: Sentence meaning and word meaning

In the discussion above, we have introduced the idea that language somehow unites "form" with "interpretation." The "forms" of language are ultimately either sounds, or symbols on paper, "letters." Linguistic entities may be associated with interpretation. We say "may" because sounds as such do not necessarily have meaning. For instance, though the sound [a:] happens to correspond to a meaningful unit in many variants of English ("are"), other sounds [b] or [p] do not. Words, on the other hand, are meaningful units: *dog*, *cat*, *nose*, etc. are all words with an interpretation.[9] Some words may have the same meaning, for instance *cab* and *taxi*. Such words are said to be synonyms. Some elements may correspond to more than one meaning. A

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[9]   In Chapter 3, section 3 we will discuss how the kinds of meanings conveyed by words may be made more precise. For instance, the verb *examined* in example (i) seems, at first sight, to contribute more to the message conveyed by the sentence than the auxiliary *have*.

(i)   The students have examined the documents.

classic example is the word *bank*, which may refer to a riverbank or to a financial institution.

   Sentences consist of words, and the interpretation of a sentence is calculated (or "computed") on the basis of the combined meanings of the individual words. The words contribute their own meaning to the sentence, and the combination of these individual meanings provides us with the sentence meaning. Going back to (5a), for instance, if you replace the word *cab* by its synonym *taxi* the meaning of the sentence does not change. This is so because the contribution of *cab* to the meaning of the sentence is the same as that of the word *taxi*. If you replace *cab* by a word with a different meaning, say *bus*, then the meaning of the sentence will change:

(5) f   Manchester's morning rush-hour traffic was brought to a near standstill yesterday as 150 black <u>bus</u> drivers staged a go-slow protest calculated to cause maximum disruption to commuters.

Observe that (5f) remains ambiguous. In the sequence *black bus drivers* the adjective *black* might again refer to the ethnic origin of bus drivers, or it might set off black buses from other buses. The latter reading does presuppose that such a taxonomy of buses makes sense; one can easily imagine a context in which black buses might for instance be run by a low-budget company, or that they are specifically used for long-distance travel, etc.

   Sentence meaning derives from word meaning. However, we have seen that the meaning of sentences is not simply attained by adding up the meanings of the individual words. The meaning of a sentence is also determined by how the sentence is assembled, how the words are put together. This was illustrated by the discussion of (5a). In order to account for the ambiguity of this example, we elaborated the hypothesis that words in a sentence are grouped; in other words, they form units, which we indicated by means of square brackets: we repeat (6a–b) here as (13a–b):

(13) a   150 [[black cab] drivers]
      b   150 [black [cab drivers]]

(13a) serves to show that in the sequence adjective – noun – noun, the adjective *black* is grouped with the noun *cab*: the string *black cab* is a unit inside the larger unit *black cab drivers*. In this structuring of the words, *black* modifies *cab*; *black* refers to the color of the cab. In (13b) the noun *cab* is structured with the noun *drivers*, and to this unit is added a specification of color. *Cab* narrows down the type of driver we are talking about. In (13b) *black* modifies *cab driver*; *black* indicates the ethnic origin of the drivers. So sentence meaning is based (i) on the meaning of the individual words, and (ii) on the way these words have been assembled into larger units. The technical term to refer to the way words are assembled into sentences is *syntax*, which is based on Greek συν ("*sun*") 'together' and τασσω

("*tassoo*") 'put, arrange in a particular order'. In the next section we will explore further the idea that syntax determines sentence meaning.

2.2   Question formation

2.2.1   SUBJECT-AUXILIARY INVERSION

Consider the underlined sections in the following short extract: What does the punctuation mark "?" at the end signal? Suppose you replace the symbol "?" by the full stop. How would you minimally have to change the sentences?

(14)   She had meant to drive down to the quay and regain the yacht, but she now had the immediate impression that something more was to happen first. "<u>Which way are you going? Shall we walk a bit</u>?" he began . . . (Edith Wharton, *The House of Mirth*, 1998: 201)

We refer to the symbol "?" as a "question mark" because this symbol occurs at the end of a sentence which is used to ask a question. Sentences ending in a question mark convey that there is a certain amount of information which the speaker/writer doesn't have and he or she is trying to make the interlocutor supply that missing information. In the extract (14) the speaker ("he") asks two questions of his interlocutor ("she"). Let us isolate the questions in (14) and look at their form more closely.

(15) a   Shall we walk a bit?
     b   Which way are you going?

If we merely replace the question mark by a full stop and do nothing else, the sentences do not really work any more. There is something wrong with them; they are not really **acceptable** sentences of English. In (15c, d) below we use the asterisk (*) to signal that we find a sentence unacceptable. In fact, care must be taken here. Of course, the sequences of words in (15c, d) are as such not unacceptable, since they are perfectly natural questions (15a, b), but the problem with (15c, d) is that by removing the question marks and replacing them with full stops, we signal that the sentences should no longer be interpreted as questions. The asterisks in (15c, d) mean that these sentences become unacceptable if not interpreted as questions.

(15) c   *Shall we walk a bit.
     d   *Which way are you going.

To repair the sentences in (15c, d) we could propose the rewordings in (15e, f). These sentences can be used as **assertions**; they are not normally used as questions. The speaker does not indicate that he or she expects a response from the interlocutor; he

or she simply affirms something. The sentences in (15a, b) are **interrogative** sentences, those in (15e, f) are **declarative**.[10]

(15) e   We shall walk a bit.
      f   You are going this way.

Compare the forms of (15c, d) and of (15e, f). We see that the sentences in (15e, f) begin with the pronouns *we* and *you*; these pronouns function as the **subjects** of the sentence. The subjects are followed by *shall* and *are*, elements referred to as **auxiliaries**. A provisional (and very approximate) characterization of auxiliaries, to be refined in Chapter 3, is that they are elements that are typically followed by a verb: *shall* is followed by the verb *walk*, *are* is followed by the verb *going*.[11] The examples above show that the relative positions of the subject and the auxiliary in a declarative sentence are different from those in an interrogative sentence. Consider the extracts in (16). Identify the questions. For each question locate the subject and the auxiliary.

(16) a   Eventually the waitress came out of the kitchen with a tray the size of a table-top . . . "Can I get you anything else?" she said. "No, this is just fine, thank you." . . . "Would you like some ketchup?" "No, thank you." (Bill Bryson, *The Lost Continent*, 1990: 159)
      b   The people of Toronto are not wearing masks . . . Are we taking precautions such as washing our hands? Of course. Are we stopping our lives because of this? Certainly not. (*Guardian*, 26.4.2003, p. 11, col. 6, letter to the editor from Michelle Lee, Toronto)
      c   What are my borrowing options? . . . How much can I afford? . . . Where do I begin? (*New York Times*, 28.4.2003, p. A22, advertisement Fleet)
      d   Can she be held accountable for the problems that today's nurses are grappling with? (*Washington Post*, 29.4.2003, p. F1, col. 2)

The declarative sentences contain no special marking of the declarative force, the interrogative pattern is signaled by the word order: the auxiliary precedes the subject. We might propose that the interrogative pattern is formed by changing the position of the auxiliary with respect to that of the subject. We refer to this process as **subject-auxiliary inversion**, abbreviated as **SAI**. Now how exactly does SAI work? In a declarative sentence we find the order in (17a), in a question we get (17b):

(17) a   declarative: subject – auxiliary
      b   interrogative: auxiliary – subject   (SAI)

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[10]   In the following discussion we will often equate the concepts "question" and "interrogative sentence." This equation would have to be challenged in a more careful analysis and we should make a distinction between the two concepts. However in the framework of what we are trying to do in this chapter the distinction is not crucial. For a good and accessible discussion see Huddleston (1994).

[11]   Exercise 4.

Suppose we start from the order in the declarative sentence (17a) and try to attain ("derive" to use the technical term) the order in the question (17b). How can we relate the order in (17b) to that in (17a)? There are basically three options, which are schematically summarized in (18). (18) contains three hypotheses about how the order auxiliary – subject is formed or **derived**. The arrows are intended to show the **derivations**, that is, which constituent is moved and where it is moved. According to (18a), the auxiliary is moved to a position to the left of the subject; according to (18b), the subject moves to a position to the right of the auxiliary; according to (18c) subject and auxiliary switch places.

(18)　　SAI

a	declarative sentence		subject	auxiliary	verb
	interrogative sentence	auxiliary	subject		verb

　　　　　　　←—————————————

b	declarative sentence	subject	auxiliary		verb
	interrogative sentence		auxiliary	subject	verb

　　　　　　　　　————————————→

c	declarative sentence	subject	auxiliary		verb
	interrogative sentence	auxiliary	subject		verb

　　　　　　　←————————→

How can we decide between these derivations? For examples like those in (16) it is not clear how to decide. The three alternatives will produce the same end result: the subject will end up to the right of the auxiliary. How could we differentiate the three alternatives? In order to find out which of the three hypotheses is preferable we will run an experiment. We will create a sentence in which the outcome of the three procedures in (18) would be different. Here's an idea. Suppose we had a declarative sentence in which something intervened between the subject and the auxiliary, then the outcome of the different operations in (18) would be distinct. Consider the following example:

(19)　These new shops definitely are doing well.

Let us try out the three derivations for SAI illustrated in (18) on the basis of example (19). Each derivation leads to a different pattern, as illustrated by (20). In (20a) the auxiliary moves to a position to the left of the subject; in (20b) the subject moves to a position to the right of the auxiliary; in (20c) the subject and the auxiliary switch places. The acceptable word order is that in (20a). What would you conclude with respect to the precise formulation of SAI?

(20) a　Are these new shops definitely —— doing well?

　　　　←————————————

　　 b　*—— Definitely are these new shops doing well?

　　　　————————————→

c   *Are definitely these new shops doing well?

⟵———————⟶

The data in (20) show that SAI is an operation in which the auxiliary moves from a position to the right of the subject to a position to its left. We can now formulate a rule for the derivation of interrogative sentences in English as in (21a). To this we also add a specific formulation for deriving the order auxiliary – subject. (21b) makes explicit what the process of SAI involves.

(21) a   Interrogative sentences are formed by means of SAI.
      b   SAI: move the auxiliary leftward across the subject.[12]

To further test (21), we can invent additional examples with auxiliaries and check whether the corresponding questions would be formed by moving the auxiliary to the left of the subject. For example:

(22) a   The murderer has broken the window.
      b   The murderer was arrested last night.
      c   We really must go to that meeting.

The prediction of (21) is that questions corresponding to (22) will be as in (22′):

(22) a′   Has the murderer broken the window?
      b′   Was the murderer arrested last night?
      c′   Must we really go to that meeting?

(21) formulates a hypothesis for turning a declarative sentence into an interrogative sentence. Examples (22a′–c′) are compatible with this hypothesis. Observe that underlying the hypothesis is a much more general hypothesis that form (word order) and meaning are related. An additional underlying assumption in (21b) is that in SAI the position of the subject and that of the verb are themselves unaffected by SAI, only the auxiliary moves. SAI affects certain elements of the sentence but not others.

2.2.2   WHEN THERE IS NO AUXILIARY

We started out from the observation that sentences may serve to make a statement, in which case they are declarative, and they may be used to ask a question, in which case they are interrogative. The form of the sentence encodes the difference in interpretation: questions are formed by SAI, that is moving the auxiliary across the subject. The examples in (23) pose a problem for applying SAI (21). Why is that? How would we form the interrogative variant of the sentences?

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[12]   Exercise 12 provides an additional specification concerning the application of SAI.

(23) a   He wants to buy a house this year.
     b   She wanted to become a policewoman.

The problem with (23) is that the sentences lack an auxiliary. Their interrogative form is given in (24):

(24) a   Does he want to buy a house this year?
     b   Did she want to become a policewoman?

Once again, we see that an element precedes the subject, *does* in (24a) and *did* in (24b). Let us experiment with these sentences. Could the added elements have occurred in the position to the right of the subject?

(25) a   He does want to buy a house this year.
     b   She did want to become a policewoman.

Observe that the additional element *do* is inflected. The form of the ending of the verb in (23) corresponds to that of *do* in (24) and (25): in (23a) the verb *wants* has the third person singular ending *-s*; in (24a) and in (25a) *does* is a third person singular of *do*. Similarly, in (23b) *wanted* is a past tense form of the verb; in (24b) and (25b) *did* is a past tense form of *do*. The present tense form and the past tense form of the verb are called the finite forms of the verb. When a sentence contains a finite verb it is called a finite sentence. In the examples in (24) and (25) a finite form of *do* is accompanied by a non-finite form of the verb *want*.

Apparently, both in questions and in declarative sentences, the elements *does* and *did* can occupy the same positions as elements such as *shall* and *is*, the auxiliaries. We will assume that *does/did* are also auxiliaries. So in interrogative sentences with *do*, an auxiliary element is used to signal interrogative force, and the positions of the subject and the verb (*want* in (24)) do not change.

Things are becoming complex here. When there is an auxiliary in the sentence we move that auxiliary to the left of the subject to form a question. When there is no auxiliary, we insert a form of the auxiliary *do* and invert that with the subject. Could we have inserted *do* in sentences with auxiliaries? If you form questions on the basis of the declaratives in (22), but by inserting *do* to the left of the subject, the resulting patterns are those in (26), none of which is acceptable.

(26) a   *Do we must go to that meeting?
         *Do must we go to that meeting?
         *Must do we go to that meeting?
     b   *Does the murderer has broken the window?
         *Does has the murderer broken the window?
         *Has does the murderer broken the window?
     c   *Did the murderer was arrested last night?
         *Did was the murderer arrested last night?
         *Was did the murderer arrested last night?

Table 2   English question formation

Sentences with auxiliary	Sentences without auxiliary
Subject-auxiliary inversion (21b)	Insert *do* in the auxiliary position Subject-auxiliary inversion (21b)

On the basis of the examples given, we could conclude that questions are encoded by SAI. If there is already an auxiliary in the sentence we invert that auxiliary with the subject, if there is no auxiliary available, we choose a variant of the sentence with the auxiliary *do*, and invert *do* with the subject. We sum up our findings in Table 2. Again, the formulations in this table rely on additional tacit assumptions. For instance, the instruction to "insert *do* in the auxiliary position" implies that a sentence has an "auxiliary position." In more general terms, this implies that we think of sentences in terms of particular positions or slots into which elements are inserted and that certain types of units belong to certain types of positions. In the next chapters we will make these assumptions more explicit.

Obviously, we also want to know why questions are formed using SAI. We want to know why we insert *do* in sentences without auxiliaries. And we want to know why we do not insert *do* in sentences with an auxiliary. We will attempt to formulate a first rough hypothesis, to be refined in later chapters. We will say that questions can be formed by subject-auxiliary inversion. We will further propose that this is because the position to the left of the subject encodes question force.[13] If there is no auxiliary in the sentence, *do* is inserted as a sort of saving device, to enable us to form the question. If there is an auxiliary in the sentence, inserting *do* is uneconomical, since we already have all the ingredients to form a question. We only insert *do* as a **last resort**. We return to this issue later, but it is important to signal here that while formulating the proposal above we have introduced yet another general hypothesis. The idea that we only introduce *do* as a last resort suggests that question formation is somehow guided by a principle of "**economy**," which says "Do not insert elements if you don't need them."

At this stage the discussion of question formation remains highly informal, but hopefully it can serve to illustrate how we proceed when elaborating hypotheses in syntax. We start from some data, either attested data or constructed data, or a mixture, and we move on to formulate one or more hypotheses to account for the data. Then we increase the size of the data set and we test our hypothesis, modifying it whenever necessary. While formulating our hypothesis we will probably introduce further theoretical assumptions. We can introduce additional assumptions to enable ourselves to formulate a general rule. For instance, we assume that there is a relation between linguistic form and meaning. However, we must remain vigilant:

[13]   For more discussion of this idea see Chapter 5.

we should be aware of any additional assumptions that we have been relying on and we should be prepared to examine these additional hypotheses themselves, possibly at some later stage. When evaluating a particular hypothesis, we examine its empirical coverage (the data which it can account for) and we also have to examine what additional assumptions we have been relying on. It will be important to keep track of any additional hypotheses because we need to make sure, for instance, that they do not lead to contradictions in our system.

2.2.3   LANGUAGE AND ECONOMY

The idea that we only introduce the auxiliary *do* as a "last resort" suggests that question formation is somehow driven by a principle of "economy": "Don't insert forms if you don't need them." If we adopt this principle, another question arises: Is the scope of the principle of economy confined to question formation or does it apply more generally?

Actually, keeping strictly to the use of English *do*, we have already come across examples in which *do* occurs in a non-interrogative form. Was the use of *do* essential in (25)? Or to put it differently: Are the sentences with *do* in (25) and those without *do* in (23) exactly equivalent? If inserting *do* in non-interrogative sentences did not make any difference, then the examples in (25) would contradict the economy principle we have hinted at. They would be **counter-evidence** for the principle of economy. However, when we study the relevant examples carefully we note that the insertion of *do* in (25) (as compared to the original examples (23)) has some interpretive effect, though it may be hard to pin down. Try to think of circumstances where (25a) with *do* would be appropriate. One might imagine this in a context such as the conversation in (27), in which doubts have been raised about Bill's intention to buy a house:

(27)   Speaker A: I think Bill has changed his mind about buying a house. He is redecorating his flat.
　　　 Speaker B: <u>He does want to buy a house this year</u>. The redecoration of his flat is because he wants to add to its sales value.

The auxiliary *do* is inserted to strengthen an affirmation against a background in which some doubt has been raised about it. In (27B), the speaker uses *do* to counteract the doubt expressed by the preceding utterance. This suggests that the auxiliary *do* is not completely redundant in declarative examples and declarative sentences containing the auxiliary *do* are not in contradiction with the hypothesis that there is some principle of economy at work in language. Let us therefore maintain the hypothesis that economy is a guiding principle in the formation of sentences.

Consider the underlined examples of *do* in the following extracts. What effect does the presence of *do* have for the interpretation of the sentence?

(28)   a   Photographers aren't allowed to alter their photos in a way that misleads you, from posing a photo to digitally deleting a stray hair or telephone wire.

The Post <u>does</u> allow photographers to do some things to their pictures. They can "enhance for reproduction," meaning they can adjust the colors slightly so they will print better on the paper's presses. (*Washington Post*, 10.12.2002, p. C14, col. 3)

b   I am glad that Roy Grimwood points out the advantages our generation (1960s) has had from university and which, thanks to the Thatcherite legacy, we would deny others. However, while no doubt many graduates <u>do</u> earn extra because of their qualifications, it must not be assumed that all do. (*Guardian*, 7.12.2002, p. 11, col. 5, letter to the editor from Robert Bracegirdle, Rothley, Leicestershire)

In both examples, the underlined auxiliary (*does*, *do*) serves to oppose the affirmative content of the sentence to a denial explicit or implicit in the context. If we delete *do* we alter the meaning slightly in that we weaken the contrastive effect of the sentences.[14]

2.3   From form to meaning: Subject-auxiliary inversion and question formation

2.3.1   INTRODUCTION

We have seen that subject-auxiliary inversion (SAI) is used to form interrogative sentences in English. There is a relation between form, the position of the auxiliary in the sentence, and interpretation: SAI helps to show the difference between statements and questions. We have not been fully explicit, though, about the nature of the relation between SAI and interrogative interpretation. A more precise formulation is called for. Is the relation between SAI and interrogative interpretation a strict relation of cause and effect? Does the correlation imply that all English interrogative sentences are necessarily formed by SAI? Does the correlation mean that SAI necessarily gives rise to questions? Let us try to make the nature of the correlation more exact.

   We are investigating a form–interpretation relation: the form concerns a particular word order pattern: SAI. We have interpreted it as a leftward movement of the auxiliary across the subject. What exactly is the relation between SAI and interrogative interpretation? There are a number of possible relations that might obtain. We will compare the statements in (29) and try to assess which kinds of sentences would be covered by each of the statements. Though the statements are similar, it will soon turn out that the linguistic data they cover differ considerably. The statements lead to different predictions.

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[14]   Exercise 7.

    For more discussion of examples with *do* see also Chapter 3, section 1.2.3.2.

(29) a SAI can give rise to interrogative interpretation.
     b SAI always gives rise to interrogative interpretation.
     c Interrogative sentences can be formed by means of SAI.
     d Interrogative sentences are always formed by means of SAI.
     e SAI is always used to form an interrogative sentence, and interrogative sentences are always formed by means of SAI.

We will test the impact of these statements below. For each statement we will first make explicit its predictions and then we will try to test these predictions on the basis of empirical data.

2.3.2 SAI CAN GIVE RISE TO INTERROGATIVE INTERPRETATION/ SAI ALWAYS GIVES RISE TO INTERROGATIVE INTERPRETATION

The discussion above has shown that statement (29a) is valid. How does (29b) differ from (29a)? (29a) is a statement about a potential ("can") use of SAI. If we think about it carefully, we will conclude that (29a) is equivalent to (30a): the predictions of (29a) and (30a) are identical. (29a) says that SAI CAN be associated with question interpretation.

(30) a Some sentences with SAI are interrogative.

To formulate (29b) we have removed the modal auxiliary *can* and we have added the adverb *always*. Compared to (29a), (29b) is stronger: it says that whenever SAI applies you create an interrogative sentence. (29b) does not imply a POTENTIAL outcome of SAI, it implies a DEFINITE outcome. (29b) is equivalent to (30b):

(30) b All sentences with SAI are interrogative.

Consider the underlined fragments in the examples in (31). Do they bear on the statements we are examining? Let us first examine if they are compatible with the formulation in (29a).

(31) a All he wants to know is <u>which boxes have I ticked on the forms he keeps giving me to fill in</u>. (*Guardian*, G2, 15.3.2001, p. 9, col. 8)
     b People ask <u>why was I not at Coniston when Bluebird was raised</u>, but I would have been far too emotional. (*Guardian*, 15.3.2001, p. 5, col. 8)

With respect to (29a) there is no problem: the underlined strings in (31a) and (31b) display SAI and they are interrogative.[15] The interrogative sequences in (31) have been integrated into a larger structure. Sentences that become part of larger sentences

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[15] We will see later that there is something special about the word order in these sentences (Chapter 5, section 2.6), but this point is not relevant to the current discussion.

are said to be **embedded** or **subordinate clauses**.[16] In (31a) the string *which boxes have I ticked on the forms he keeps giving me to fill in* is an embedded clause which is also interrogative, an embedded interrogative for short. Embedded questions are also called **indirect** questions, or **reported** questions. (31c) is an independent question or a **direct** question: the sentence is addressed by a speaker to an interlocutor and the speaker expects an answer from the interlocutor.

(31) c   Which boxes have you ticked on the forms he keeps giving you to fill in?

We can form additional examples of direct questions of our own, which will again be compatible with (29a):

(31) d   Why were you not at Coniston when Bluebird was raised?
      e   Have you done linguistics before?
      f   Would all linguists agree that linguistics is a science?

Let us return to (29b). How could we evaluate its empirical coverage? We have seen that the claim in (29b) is stronger than that in (29a). (29b) says that whenever you have SAI you have an interrogative sentence, i.e. a sentence that can be used as a question. (29b) is a general rule for the interpretation of SAI. We reworded (29b) in (30b) above. (29b)/(30b) implies that there is a necessary link between the pattern of SAI and the interrogative force of the sentence. How can we evaluate this type of general statement?

   Let us think of similar general statements that are not about language. Consider the statement: "All swans are white." It is a universal claim about the color of swans. To prove the universal claim true it is not sufficient to find a number of white swans. Even having found thousands of white swans, we cannot be sure that the next swan might not be non-white. On the other hand, if we find just one non-white swan, we will have shown that the statement "All swans are white" is false. In other words, in order to evaluate a general statement, we do not really show the statement to be true, but we look for evidence to falsify it, for "**counter-evidence**."

   Now we return once again to (29b)/(30b). What kind of data would count as counter-examples to the generalization? Relevant counter-evidence would be sentences that display SAI and which are not interrogative. Are there such sentences? To test the claim, we could try to devise sentences of our own with SAI and which are not interrogative or we could try to find attested examples that contradict the claim. In the first procedure, we rely purely on our intuitions as speakers of English. This procedure might appear risky and less objective than the second procedure where we could claim the evidence is "objective" because it exists independently. However, note that this is not necessarily true: even in the second procedure we still need to rely on our intuitions because as speakers we have to decide whether the function of SAI in the relevant sentences is or is not that of forming a question. We

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[16]   We return to the form of embedded clauses in more detail in Chapter 5.

still need to interpret the evidence and for that, we need to rely on our intuitions. So whichever line of attack we use, our own intuitions are involved.[17]

Are there any sentences that display the SAI pattern and which are not interrogative? Consider the following examples: (32a) is constructed, (32b–c) are attested. Does SAI give rise to an interrogative interpretation in these examples? If not, what is the interpretive contribution of SAI in these sentences?

(32) a   Had I known you were coming, I would have baked a cake.
     b   The guests were being offered cushions to take with them should their free seats prove insufficiently comfortable. (*Guardian*, 1.7.2002, p. 4, col. 8)
     c   Had the money not been returned, the evidence would have pointed strongly to a conclusion that the NRCC "financed" the Forum. (*Washington Post*, 29.4.2003, p. A18, col. 3)

In (32a–c) SAI is used in conditional clauses. These examples can be paraphrased as in (33):

(33) a   If I had known you were coming, I would have baked a cake.
     b   The guests were being offered cushions to take with them in case their free seats should prove insufficiently comfortable.
     c   If the money had not been returned, the evidence would have pointed strongly to a conclusion that the NRCC "financed" the Forum.

Now consider the following examples:

(34) a   Not one word of evidence have they brought to support that. (*Guardian*, 11.12.2001, p. 4, col. 7)
     b   Within a year of Hague becoming leader, the party had a ballot of its membership to say that not within the lifetime of this parliament would Britain enter the Euro. (*Guardian*, G2, 13.5.2002, p. 7, col. 2)

In (34a) and (34b) the inverted auxiliary (*have, would*) is preceded by a negative element (*not one word of evidence, not within the lifetime of this parliament*). If these negative elements are removed from the initial positions, the SAI pattern is no longer possible (35). In (34a) and (34b) SAI seems to be caused ("**triggered**") by the presence of the negative element in initial position.[18]

(35) a   They have <u>not</u> brought one word of evidence to support that.
     b   Within a year of Hague becoming leader, the party had a ballot of its membership to say that Britain would <u>not</u> enter the Euro within the lifetime of this parliament.

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[17]   See also the discussions in Borsley and Ingham (2002, 2003) and Stubbs (2002).
[18]   This pattern is sometimes called **negative inversion**. Exercise 6 of Chapter 5 is an exercise on negative inversion.

We conclude that SAI may give rise to question formation but that it is not exclusively used for that purpose. SAI may also be used to form conditional clauses and in sentences with negative elements in the initial position.[19]

   We conclude from the discussion that (29b) and its paraphrase (30b) are not empirically adequate. If (29b)/(30b) were adequate we should not be able to create sentences like those in (32) and in (34), where SAI occurs in non-interrogative sentences.

2.3.3   INTERROGATIVE SENTENCES CAN BE FORMED BY MEANS OF SAI/INTERROGATIVE SENTENCES ARE ALWAYS FORMED BY MEANS OF SAI

Let us turn to the second set of statements, (29c) and (29d). They are repeated here, with (29a), for convenience's sake. First compare the formulation of (29c) with (29a). What makes them different?

(29) a   SAI can give rise to interrogative interpretation.
      c   Interrogative sentences can be formed by means of SAI.
      d   Interrogative sentences are always formed by means of SAI.

Both statements imply a causal relation: some factor A gives rise to/causes some result B. To bring out the causal relation more clearly, let us try to paraphrase the statements using a conditional sentence, i.e. using the pattern "if A then B." (29a) corresponds to (36a), (29c) to (36b):

(36) a   If we apply SAI to a sentence, it can become interrogative.
          SAI → question
      b   If we want to form an interrogative sentence, we can use SAI.
          Question → SAI

The paraphrases reveal that the two statements differ in the way they conceive of the cause-effect sequence. Statement (29a) takes the form (the word order arising by SAI) as the starting point and conceives of the interpretation ("question") as the result of that form; statement (29c) takes the interpretation as the starting point and predicts the form that will be used to convey it. We have looked at the empirical adequacy of (29a)/(36a) already. What kind of examples would support (36b)? (36b) predicts that interrogative sentences may display SAI. The examples discussed in the preceding sections are compatible with the statement. Some of them are straightforward illustrations of (36b) in that they illustrate questions formed by means of SAI. Examples in which SAI does not lead to interrogative sentences are irrelevant because like (29a), (29c) does not make a general over-arching statement about the shape of interrogative sentences. It does not raise the "white swan" problem posed by (29b) that was discussed above.

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[19]   One may try to propose a more general explanation to account for why inversion applies in just these three environments. We will not do this here.

   (29c) says that if we want to form interrogative sentences we SOMETIMES use SAI. By comparison, (29d) is much stronger. This is shown by the conditional paraphrase (36c):

(36) c   If we want to form an interrogative sentence we always use SAI.

Both (29c) and (29d) concern properties of interrogative sentences. (29c) says that an interrogative sentence MAY display SAI. (29d) says that it MUST display SAI, or, put differently, that SAI is a NECESSARY property of questions. (29c) corresponds to (37a), (29d) to (37b):

(37) a   Some interrogative sentences display SAI.
      b   All interrogative sentences display SAI.

How can we test these statements? We have assumed that the validity of (29c) was confirmed by the fact that some interrogative sentences have SAI. To test (29d), would it be sufficient to be able to construct or to find interrogative sentences with SAI? Would sentences such as those in (32) and (34), in which SAI is used in non-interrogative sentences, be relevant? The answer to both questions is negative. Take the second point first. The fact that SAI may be used in sentences which are not interrogative does not bear on (29d). It is irrelevant to the issue since (29d) is only concerned with sentences that are interrogative. Secondly, finding or constructing examples of interrogative sentences which display SAI does not "prove" that interrogative sentences must always be formed by SAI. We need to show that all interrogative sentences are formed by SAI. Again we are in a position in which we have to test a universal claim. What then would be counter-evidence for (29d)? What we need to find is interrogative sentences (i.e. questions) without SAI. Do such data exist? Consider the examples in (38) and compare them with (31a, b):

(38) a   All he wants to know is <u>which boxes I have ticked on the forms he keeps giving me to fill in</u>.
      b   People ask <u>why I was not at Coniston when Bluebird was raised</u>, but I would have been far too emotional.

In (38a) the underlined string is an indirect question: (38a) reports a question uttered by the person referred to by the pronoun *he*. Similarly (38b) reports a question asked by people. The indirect questions in the underlined sections in (38a) and (38b) differ from those in (31a, b) in that they do not display SAI. The auxiliaries *have* and *was* follow their respective subjects. In fact, there is dialectal variation in terms of the form of embedded questions. For many speakers of English, the SAI pattern in the embedded interrogatives in (31a, b) is slightly unusual and the non-inverted pattern in (38) would be more usual. To form an (embedded) interrogative sentence, SAI is not required. Statement (29d) is too general: it does not allow us to predict that the underlined strings in (38a, b) also qualify as interrogative.

   Would the examples in (38) pose a problem for statement (29c)? In other words, do they constitute counter-evidence to the claim that "some interrogative sentences have SAI"? Clearly not, (29c) leaves it open that there may be questions without SAI. The weaker formulation in (29c) is compatible with the data; as far as we can assess at this point, it is empirically adequate. The stronger formulation in (29d) is not empirically adequate because it would lead us to expect SAI always to apply in embedded questions, which is not the case. Because of these observations, we might wish to narrow down statement (29d) to apply only to direct questions. This is shown in (39a) and in its conditional paraphrase (39b):

(39) a   Direct questions are always formed by means of SAI.
     b   If you want to form a direct question you always use SAI.

The new formulations predict (39c):

(39) c   All direct questions display SAI.

At first sight, this universal claim may seem plausible, and we have found many examples that seem to confirm it. But consider the examples in (40). Are they direct questions? The answer is positive. Now let us locate the subject and the auxiliary and evaluate the empirical coverage of (39c):

(40) a   Which student will finish the exam first?
     b   How many images will be remembered or become symbols of the war in
         Iraq? (*Guardian*, G2, 16.4.2003, p. 11, col. 1)

(40) illustrates direct questions. In these examples, however, the subject is not preceded by the auxiliary. In (40a) the subject is *which student* and the auxiliary *will* follows it. Similarly, in (40b) the subject *how many images* is followed by the auxiliary *will*. In other words, these direct questions do not display SAI. So we cannot claim that all direct questions necessitate SAI.
   If we turn to the last statement in (29) repeated below, it is clear that this cannot work either:

(29) e   SAI is always used to form an interrogative sentence, and interrogative
         sentences are always formed by means of SAI.

(29e) conjoins statements (29b) and (29d), both of which were independently shown to give rise to counter-examples. The counter-evidence raised against the independent statements also falsifies (29e). We could replace (29e) by a weaker statement, the conjunction of (29a) and (29c):

(29) f   SAI can give rise to interrogative sentences, and interrogative sentences can
         be formed by means of SAI.

2.3.4 VERBS AND INVERSION

Statement (29f) summarizes our findings, but unfortunately it is relatively weak and not very insightful. It says that interrogative sentences may display SAI and that we may find SAI in interrogative sentences. We do not claim a strong correlation between the form (SAI) and the interpretation (question) and we also do not claim to be providing an explanation. We know that the statement is an appropriate summary of the data, it is **descriptively** adequate. But disappointingly, we have not really made any predictions as to the difference between data which will be found and those that will not be found. (29f) is not a general rule or a law, since it allows both for cases in which SAI does not give rise to interrogative sentences and for cases in which interrogative sentences do not display SAI.

However, in the discussion we did actually come across a pattern that is much closer to a general rule than (29f). Recall our discussion of question formation with respect to examples without auxiliaries such as (23), repeated here as (41) for convenience:

(41) a He wants to buy a house this year.
     b She wanted to become a policewoman.

We said that in order to form a question with inversion we inserted *do*, "as a last resort." Apparently when there is no auxiliary in a sentence we cannot simply invert the verb with the subject to form a question: the examples in (42) are unacceptable.

(42) a *Wants he to buy a house this year?
     b *Wanted she to become a policewoman?

Recall that we discovered that SAI is used in some other contexts. In the examples in (32) in section 2, SAI was shown to be used to form conditional clauses and in (34) we found it used in contexts with a sentence-initial negative element. In the underlined conditional clauses in (43) there is no auxiliary. Would these contexts allow a verb to invert with the subject?

(43) a <u>If I knew you were coming</u>, I could have baked a cake.
     b The guests were being offered cushions to take with them, <u>in case their free seats proved insufficiently comfortable</u>.
     c <u>If the money remained unaccounted for</u>, the evidence would have pointed strongly to a conclusion that the NRCC "financed" the Forum.

It is not possible to rephrase these examples using inversion of the verb and the subject:

(44) a *<u>Knew</u> I you were coming, I could have baked a cake.
     b *The guests were being offered cushions to take with them <u>proved</u> their free seats insufficiently comfortable.

    c   *<u>Remained</u> the money unaccounted for, the evidence would have pointed strongly to a conclusion that the NRCC "financed" the Forum.

The underlined elements in (45) are negative. Would fronting that constituent entail inversion of the verb and the subject?

(45) a They brought <u>not a shred of evidence</u> to support that claim.
      b Within a year of Hague becoming leader, the party had a ballot of its membership to guarantee that Britain <u>never</u> enters the Euro.

Once again, even if the negative elements were fronted, the verbs would not invert with their subjects:

(46) a *Not a shred of evidence <u>brought</u> they to support that claim.
      b *The party had a ballot of its membership to guarantee that never <u>enters</u> Britain the Euro.

These data do allow the formulation of a "general law": verbs, as opposed to auxiliaries, cannot invert with the subject in interrogative sentences, in conditionals or as a result of a sentence-initial negative constituent.

(47)   Verbs that are not auxiliaries do not invert with the subject.[20]

(47) is general and it does succeed in defining the bounds of possibilities in that it radically excludes sentences such as (42), (44), and (46). The statement allows us to predict that we will never find such sentences and that if we construct them they will be unacceptable.

   (47) raises questions. First we need to try to define auxiliaries and we need to make explicit how they differ from non-auxiliaries. We turn to this point in section 2.4.[21] Second (47) is still only a generalization of facts, (47) is not an explanation. We should not stop here but we should ask ourselves why it is that auxiliaries invert with the subject and verbs do not, in other words why they differ in their **distribution**. The question is like asking ourselves why snow melts in the sunshine and glass does not. We will return to an explanation of the difference in distribution between auxiliaries and verbs in Chapter 3, section 3.4.

2.4   *A brief discussion of definitions*

We have mentioned that scientific research has to be explicit. Being explicit means, among other things, that the terminology used is transparent, that terms are defined

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[20] Exercise 11 deals with an apparent counter-example to (47).
[21] We will come back to the distinction in Chapter 3, section 3.4.

clearly and unambiguously and that they are used in a systematic way. Obviously, in the preceding section we have not been fully explicit ourselves: we have not defined all the terms that we have been using, we have used some terms relying on a previous understanding of them, in a rather vague pre-theoretical way. This is because we all come to the task with some terminology and we have implemented that in order to be able to start dealing with some data. This type of approach is just about acceptable as long as we bear in mind that we have not yet defined our terms and that sooner or later (and preferably sooner rather than later) we will define the technical terms used.

In this section we briefly look at two terms that we have been using in a pre-theoretical sense and we will try to make them precise: these terms are **auxiliary** and **verb**. What is a verb? Consider the following examples and identify which words you think are verbs:

(48) a   They bought books for their children.
     b   They wrote novels about the war.

Probably you will pick out the words *bought* and *wrote*. Why do we call these words verbs? Often verbs are defined as words denoting an action. Using this definition as a guideline, which words would you identify as verbs in (49)?

(49) a   His actions seemed incoherent.
     b   Her friends' complaints remained secret.

In (49a) the word *actions* denotes actions but it will not normally be considered a verb. Similarly in (49b) the word *complaint* may be said to denote an action, but it is not a verb. On the other hand, words like *seemed* in (49a) and *remained* in (49b) are normally classified as verbs even though they do not denote actions. Why do we classify *seemed* and *remained* as verbs, with *bought* and *wrote*? What do these words have in common? What these words share is that they have a set of forms that differentiate them from the words that are not classified as verbs. For example, verbs have a form referred to as the "past tense"; *bought* in (48a), *wrote* in (48b), *seemed* in (49a), and *remained* in (49b) are all past tense forms. We experiment with the sentences in (48) and in (49) and remove the past tense form of the verbs. What does the difference in verb form do? Does it have an interpretive effect?

(50) a   They <u>buy</u> books for their children.
     b   They <u>write</u> novels about the war.
     c   His actions <u>seem</u> incoherent.
     d   Her friends' complaints <u>remain</u> secret.

While the sentences in (48) and (49) situate the state of affairs they denote in the past time sphere, those in (50) situate it in the present time sphere. The *-ed* ending of the past tense form here serves to indicate that the situation described by the

sentence is not to be situated in the present. The form *remained* is composed of two units: the verb *remain*, and the inflectional ending *-ed*. *Remain* means roughly 'stay', *-ed* means roughly 'not situated in the present/situated in the past'. Both components are units of form; they can be used in other circumstances: *remain* does not need to be associated with *-ed*, and *-ed* combines with other verbs than *remain*. The units *remain* and *-ed* themselves are units of meaning and they cannot be decomposed into smaller units with identifiable meanings. We call such units **morphemes** and we will say that *-ed* is an **inflectional** morpheme. The morpheme *-ed* is also called a **bound** morpheme because it can never be used on its own; it must be attached to another morpheme. *Remain* is a free morpheme: it can be used on its own.

Often grammarians will refer to the verb forms without *-ed* in (50) as the present tense. But note that there is in fact no real tense marking at all in the form of the verb. The past tense ending *-ed* is not replaced by a specific ending for the present, the form *remain* is simply the base form of the verb. In the present tense, the verb gets a special ending only in examples with third person subjects such as those in (51).

(51) a She buys books for her children.
     b She writes novels about the war.
     c His action seems incoherent.
     d Her friend's complaint remains secret.

The so-called present tense and the past tense are said to be **finite** forms of the verb. In the examples in (52a, b) the verbs *buy* and *write* combine with the ending *-ing*.

(52) a She is buying books for her children.
     b She is writing novels about the war.

-ing is also an inflectional morpheme. In (52a, b) it serves to create the so-called present participle of the verb, which follows *is*, itself a finite form of the auxiliary *be*. This auxiliary cannot be followed by the finite forms of the verb (present tense or past tense) (52c, d) and we have to use the *-ing* form. The *-ing* form of the verb is a **non-finite** form. Finite forms vary for tense (*is* is a present tense, *was* is a past tense), non-finite forms do not vary for tense.

(52) c *She is buys books for her children.
     d *She is writes novels about the war.

Observe that the past tense ending (*-ed*), the third person singular ending (*-s*), and the *-ing* ending typically are attached to verbs. They are not found on other categories such as nouns, such as *cat*, or *girl*.[22] So we can identify verbs by looking at their **morphology**, at the kinds of inflectional morphemes they combine with.

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[22]   When we find the *-s* ending on a noun it is used either for a plural (*cats*, *girls*) or to form a genitive (*cat's*, *girl's*). We assume that plural *-s* and genitive *-s* are different entities.

   The uninflected base form of the verb may typically be found in contexts such as these illustrated in (53):

(53) a   She will buy books for her children.
      b   To write a novel about the war would be hard.

Buy and *write* in (53) do not have any endings. Even though the subject in (53a) is a third person, *she*, the verb could not possibly be marked with the *-s* ending, nor could we replace *buy* by the past tense form.

(53) c   *She will buys books for her children.
      d   *She will bought books for her children.

Typically, words like *will* and the infinitive marker *to* are followed by the uninflected base form of the verb. This base form is also referred to as the infinitive of the verb. We can also use this **distributional** information to identify a verb: if a word can follow the auxiliary *will* or the infinitive marker *to*, then that word will be a verb.
   To find out if a word qualifies as a verb, we can check whether it has the morphological and distributional properties of verbs such as *buy* or *remain* in the examples above: that is to say we examine whether the word can associate with the typical verb endings (*-s*, *-ed*, *-ing*), and whether it can occupy positions typically occupied by verbs. Identify the verbs in the following example (which corresponds to example (31a) in section 2). You may obviously experiment with the sentence to check whether the items that you have identified as verbs have the various forms we have been talking about.

(54) a   All he wants to know is which boxes have I ticked on the forms he keeps giving me to fill in. (*Guardian*, G2, 15.3.2001, p. 9, col. 8)

In (54a) *wants* is a verb. For one thing it has the third person ending *-s*, and it can also be used in a past tense. In the non-finite form *want* can be used after *will* or after *to*:

(54) b   All he wanted to know is which boxes have I ticked on the forms he keeps giving me to fill in.
      c   All he will want to know is which boxes have I ticked on the forms he keeps giving me to fill in.
      d   All he seems to want to know is which boxes have I ticked on the forms he keeps giving me to fill in.

Other verbs in (54a) are *know*, *have*, *tick*, *keep*, *give*, *fill*. Recall that (54a) contains an indirect question signaled by the inversion of the auxiliary *have*. Using the formal criteria set out above, words that are referred to as "auxiliaries" are also verbs. The auxiliary *have* displays the morphological and distributional properties of a verb:

(55) a He <u>has</u> ticked the boxes.
    b I <u>had</u> ticked the boxes.
    c <u>Having</u> ticked the boxes, I handed in the form.
    d I will <u>have</u> ticked all the right boxes.
    e I expect to <u>have</u> ticked the wrong boxes.

(56) illustrates the so-called progressive use of *be*: the auxiliary *be* is used in combination with the present participle to express (roughly) an ongoing activity.[23]

(56) a The teacher <u>is</u> meeting the students.
    b The teacher <u>was</u> meeting the students.
    c The teacher has <u>been</u> meeting the students for a while.
    d The teacher will <u>be</u> meeting the students.
    e I expect to <u>be</u> meeting the students.

Morphologically and distributionally, auxiliaries are a subclass of verbs. Why then do we not just call them verbs? We saw in the preceding sections that auxiliaries have distinctive distributional properties that set them apart from the other verbs. Typically, auxiliaries can **invert** with the subject – for instance in interrogative sentences, in conditional clauses, or if a negative element has been fronted.[24] In the same circumstances, non-auxiliary verbs do not invert with their subjects.

    There are further properties that set apart auxiliaries among the class of verbs. Auxiliaries can be followed immediately by the negation marker *not*, and they can also contract with *not*. Ordinary verbs like *meet* do not invert with the subject and the use of the negation marker *not* in a finite sentence gives rise to the insertion of the auxiliary *do*.

(57) a The teacher is meeting the student.
    b <u>Is</u> the teacher meeting the student?
    c The teacher <u>is not</u> meeting the student.
    d The teacher <u>isn't</u> meeting the student.

(58) a The teacher met the student.
    b *<u>Met</u> the teacher the student?
    b′ <u>Did</u> the teacher meet the student?
    c *The teacher <u>met not</u> the student.
    c′ The teacher <u>did not meet</u> the student.
    d *The teacher <u>meetn't</u> the student.
    d′ The teacher <u>didn't meet</u> the student.

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[23] Exercises 5 and 6.
[24] Exercise 12 shows that not every sequence consisting of auxiliary *be* + subject instantiates SAI.

In what follows we will occasionally (re)define some traditional terms.[25] Since auxiliaries are verbs, it is difficult to set up the opposition shown in (59a). We need to differentiate verbs that are not auxiliaries from those that are. The terms that are usually used for this opposition are given in (59b, c).

(59)　a　auxiliary　↔　verb
　　　　b　auxiliary　↔　lexical verb
　　　　c　auxiliary　↔　full verb

The term *auxiliary* is related to a Latin verb *auxiliare*, which means 'help'. Informally, we could say that auxiliaries "help" the lexical verb that follows them. The term "full verb" suggests that auxiliaries, in contrast to full verbs, are "not full." Full verbs have a lot of descriptive content: a change of full verb in a sentence may radically change the action referred to in that sentence. A change of auxiliary will not alter the action referred to, but it will perhaps shift the action in time or make it less plausible. The term *lexical* is related to the word *lexicon*. The lexicon of a language is its dictionary, the list of its words. The list of what we call lexical verbs is open ended. We can add new lexical verbs to the language. Recent English words are *pedestrianize*, *download*, *digitize*, etc. Verbs are **open class** words (and so are nouns, adjectives, and adverbs). On the other hand, auxiliaries belong to a **closed class**. We do not normally expect people to start creating new auxiliaries.[26]

3　Language and Languages

3.1　*Going further afield: Comparative syntax*

We have discovered that the distribution of English auxiliaries differs from that of English lexical verbs. Section 2.4 briefly discusses how to set off the two subclasses of verbs by looking at their distributional properties. The question arises why lexical verbs cannot invert with their subjects in questions and why auxiliaries can. Before we can address this question, though, we must check how general this restriction on inversion is.

　　In the introduction to this chapter we said that linguistics is the scientific study of language. Language as an abstract concept manifests itself through individual languages: English, French, German, etc. We have discovered that English verbs do not invert with their subjects in questions. Before trying to account for this restriction, we might do well to check whether this ban on verb inversion is general. The reason why we should do this is the following: if we discover that the ban on inversion is universal, i.e. if it applies to all languages, then we can try to explain it by a very

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[25]　For a general discussion of the complexities of defining word classes such as verbs and auxiliaries see for instance Aarts and Haegeman (forthcoming).

[26]　We return to the oppositions in (59) in Chapter 3, section 3.4.

powerful linguistic principle, one that will not vary cross-linguistically. On the other hand, if we discover that subject-verb inversion is banned in English but is possible in other languages, then we know that we must provide a flexible explanation, one that can be adjusted to the properties of the individual languages. In other words, the following possibilities could be considered:

(60) a There is a universal ban on inverting the verb with the subject.
     b There is a language specific ban on inverting the verb with the subject. The ban applies in the following languages: English, . . .

To account for a **universal** pattern, we will have to invoke a universal principle that rigidly applies to all languages. If there is no such universal pattern, we will have to devise a **parameter** along which languages may vary. We will then try to relate the observed cross-linguistic variation to specific properties of individual languages. In what follows we will try to assess which of the two statements in (60) is correct.

3.1.1 FRENCH

Consider the French examples in (61) and their word-for-word glosses in English. Verbs and auxiliaries are given in bold. It is clear that for many of the examples, the word-for-word glosses would not qualify as English sentences. In the light of the discussion above, what conclusions could we draw with respect to inversion in French? Would you say that French is more "liberal" than English in its use of inversion? Or is it more restricted? Motivate your answer.

(61) a **Achetait**-elle le journal tous les jours?   **A**-t-elle **acheté** le journal?
       bought she the paper all the days   has she bought the paper
       'Did she buy the paper every day?'   'Has she bought the paper?'

     b **Ecrit**-elle des romans?   **A**-t-elle **écrit** des romans?
       writes she novels   has she written novels
       'Does she write novels?'   'Has she written any novels?'

     c **Vient**-il demain?   **Est**-il venu hier?
       comes he tomorrow   is he come yesterday
       'Is he coming tomorrow?'   'Did he come yesterday?'

     d Que **dit**-il?   Qu'**a**-t-il **dit**?
       what says he   what has he said
       'What does he say?'   'What has he said?'

The English versions of the examples in the left most column read as in (62).

(62) a Did she buy the paper every day?
     b Does she write novels?

    c   Does he come tomorrow?
    d   What does he say?

With respect to the position of lexical verbs, French seems to be more liberal than English in that such verbs invert with the subjects, as do auxiliaries. Let us refer to a pattern in which the full verb inverts with the subject as subject-verb inversion, or **SVI**. Languages differ with respect to whether they allow SVI: English doesn't allow SVI, French does.

3.1.2   GERMAN AND DUTCH

We conclude that the difference in inversion patterns distinguishes French from English. French is a Romance language, English is a Germanic language. Could it be that this difference accounts for the difference observed here? Perhaps Germanic languages in general never allow SVI. Let us look at some Germanic languages like German or Dutch. Do they allow verbs to invert with their subjects? If we turn to German, we find that there too the verb can precede the subject. Verbs and auxiliaries are in bold.

(63) a   **Kaufte** sie jeden Tag die Zeitung?   **Hat** sie jeden Tag die Zeitung **gekauft**?
           bought she every day the paper   has she every day the paper bought
           'Did she buy the paper every day?'   'Has she bought the paper every day?'

     b   **Schreibt** sie Romane?   **Hat** sie Romane **geschrieben**?
           writes she novels   has she novels written
           'Does she write novels?'   'Has she written any novels?'

     c   **Kommt** er morgen?   **Wird** er morgen **kommen**?
           comes he tomorrow   will he tomorrow come
           'Is he coming tomorrow?'   'Will he come tomorrow?'

     d   **Was** sagt er?   **Was** hat er **gesagt**?
           what says he   what has he said
           'What does he say?'   'What has he said?'

Similarly, the Dutch examples in (64) display SVI:

(64) a   **Koopt** zij elke dag de krant?   **Heeft** zij de krant elke dag **gekocht**?
           bought she every day the paper   has she the paper every day bought
           'Did she buy the paper every day?'   'Has she bought the paper every day?'

     b   **Schrijft** zij romans?   **Heeft** zij romans **geschreven**?
           writes she novels   has she novels written
           'Does she write novels?'   'Has she written any novels?'

c **Komt** zij morgen?   **Zal** zij morgen **komen**?
comes she tomorrow   will she tomorrow come
'Is she coming tomorrow?'   'Will she come tomorrow?'

d Wat **zegt** zij?   Wat **heeft** zij **gezegd**?
what says she   what has she said
'What does she say?'   'What has she said?'

From the **comparative** data above we conclude that there is **cross-linguistic variation** with respect to the possibility of SVI. This means that postulating a universal ban on SVI would lead to the wrong predictions. Any attempt at explaining the ban on SVI in English will have to take into account specific properties of that language.

3.2   Going back in time: Diachronic variation

We have shown the relevance of using comparative data for linguistics research. On the basis of the small sample of languages discussed in the previous section, we concluded that the ban on inverting English verbs with subjects should not be stated as a "universal law of language." Languages vary with respect to their word orders. Even if we are mainly (or only) interested in English, it is still useful to introduce the comparative angle, because this will mean that we can situate the English data in a wider perspective and we know what kind of explanation to look for.

Could we conclude that the ban on verb inversion is an inherent rule of English? Consider the data from Old English (or Anglo-Saxon) in (65). Auxiliaries and verbs are in bold. Do auxiliaries invert with their subjects in questions? Does Old English have verb inversion?

(65) a Hwi **sceole** we oþres mannes **niman**?
       why should-1PL we another man's take
       'Why should we take what belongs to another?'
       (Ælfric, *Lives of Saints*, 24, 188, Haeberli 2000: 110)

     b Hwi **noldest** ðu hyt **secgan** me?
       why NEG+would-2SG you it say me
       'Why would you not tell it to me?'
       (*Gen*, 31.27, Kroch and Taylor 2000: 152)

     c Hwilcne oþerne sige **sceolde** ure drihten **syllan**?
       what other victory should-3SG our Lord give
       'What other victory should our Lord give . . . ?'
       (*ÆLS*, 31.128–9, Pintzuk 1991: 53)

d   Hwæt **sægest** þu, yrðling?
      what say-2SG you, peasant
      'What do you say, farmer?'
      (*Acoll*, 22, Van Kemenade 1987: 138)

e   Hu **begæst** þu work þin?
      how beget-2SG you work your
      'How do you carry out your work?'
      (*Acoll*, 22, Van Kemenade 1987: 138)

f   To hwæm **locige** ic buton to ðæm eaðmodum?
      to whom look-1SG I except to the humble
      'To whom do I look except to the humble?'
      (*CP*, 41.299.18, Fischer et al. 2000: 54)

In each of the examples (65d–f) a full verb inverts with the subject. Old English seems to behave more like German, Dutch, and French than like Modern English. In particular, Old English displays SVI in questions. Why should that be? In order to understand this, we would have to examine Old English in more detail to detect what property or properties will set it off from present-day English and what makes it more similar to French or to Dutch and German.[27]

When we consider the historical development of a language we engage in what is called **diachronic linguistics**. We examine earlier stages of the language and compare them with later stages. Obviously, since there are no native speakers of Old English we have to turn to attested material.

3.3   Comparative data: Conclusion

We conclude that languages vary with respect to inversion patterns. Inversion affects full verbs in some languages but not in others. This is summarized in Table 3. A

Table 3   Inversion patterns: classification of languages

Language	SAI	SVI
Modern English	+	−
Old English	+	+
French	+	+
German	+	+
Dutch	+	+

[27]   We will attempt to offer an explanation for the difference in inversion patterns between Old English and Modern English in Chapter 3, sections 1.2.4.2, 1.2.4.3, and 1.2.4.4.

classification like that in Table 3 is only a first step in our research. Remember that our aim is to formulate the "laws" of language. In the next chapters we will, among other things, try to explain why languages differ in this particular way.

4   Summary

This chapter sets the scene for the remainder of the book. We have first discussed the properties of the scientific method. One core concern is that science presupposes that we aim at providing an explanation of data. We set out to provide general accounts for particular data. We try to attain this goal by formulating hypotheses that relate sets of empirical data in terms of cause and effect. Such hypotheses lead to the elaboration of theories, sets of interacting hypotheses. The hypotheses and the theory also allow us to make predictions about what will be possible (the data that we may find) and what will be impossible (the data that we should never find).

It is important to formulate the empirical observations and the hypotheses that account for them as precisely and explicitly as possible. The importance of precise and explicit formulation is illustrated in a discussion of the relation between a formal property of English – subject-auxiliary inversion – and an interpretative property – interrogative force. It has become clear from the data that we cannot strongly correlate SAI and interrogative force: not all examples displaying SAI are interrogative and interrogative force does not always lead to SAI. Any formulation of that correlation must refer to potential rather than general links between form and meaning.

One empirical generalization about English that does emerge from the discussion was that verbs do not invert with their subjects in English. In the final part of the chapter, we saw that this generalization cannot be stated as a universal linguistic ban on subject verb inversion and that in many languages, including earlier stages of English, verbs do indeed invert with their subjects.

In the discussion of the relation between form and meaning we have underlined the importance of structure, that is, the way that words are combined to form units and sentences. Our discussion of inversion patterns implies that we think of sentences as containing particular positions or slots into which elements are inserted and that certain types of units belong to certain types of positions. In the next chapters we will explore these underlying assumptions about sentences structure and we develop an explicit and systematic theory of the structure of sentences.