A spectator's guide to syntactic theories

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ABSTRACT

This article[1] is intended for non-specialists who would like to understand the state of play in syntactic theory. It introduces nine different syntactic theories which count as 'important' in some sense, and explains some of the assumptions that they make about sentence structure. It also discusses the various kinds of solutions that have been offered for one problem, that of discontinuities produced by topicalisation, and introduces a tenth theory which rests on fundamentally different assumptions.

1. The aim of the game

Current work on syntax is like a game of football, in which each good idea counts as a goal. There is just one set of goal-posts (though from time to time a group of players may try to shift them), and one goal-keeper: The Facts. The balls which the players try to get past the goal-keeper are theories, rules, principles - ideas about the workings of grammars of particular languages or of languages in general. In principle, the winner at any given time is the person or group with the highest number of goals scored; but in reality there's some confusion not only about the scoring system but even about which balls have scored at all. There's no referee, and new facts are coming to light all the time, so some of today's apparent goals may be disqualified by tomorrow's new facts. Most people who are actually playing the game seem to enjoy it - why else would they be playing? However, inexperienced spectators can find it all rather confusing, and it is for them that this article is intended.

Let's start by looking at the balls. Unlike real football, there isn't just one, but an unlimited supply (so in this respect the game is more like playing with a pin-ball machine than football). Another difference is that the players

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themselves have to make the balls before they try to kick them through the goal-posts, because each ball is an idea. For example, suppose you were working on the syntax of questions in English and you had noticed examples like the following.

(1) a. It is hot in Barcelona.
     b. Is it hot in Barcelona?

You know that *is* is a verb, and that *it* is its subject, so your first idea might be that you form questions by putting the verb before its subject. Unfortunately this won't score a goal, because it comes up against the fact that the question corresponding to (2a) is (2b) and not the form predicted by your idea, (2c) (which is ungrammatical, as shown by the *).

(2) a. It gets hot in Barcelona.
     b. Does it get hot in Barcelona?
     c. *Gets it hot in Barcelona?

Something is wrong with this idea, so you have to change it into a different one, and you go on changing it until it gets past the goal-keeping facts. It doesn't matter if someone else has already scored with that ball; we often reinvent one another's ideas, or reuse them, and in the long run all that counts is whether an idea is true, and not where it came from or who invented it.

The aim of the game, then, is to work out ideas which fit the facts. Ideas come in many different shapes and sizes, differing both in generality and abstractness. Here is a sample of ideas of increasing degrees of generality:

(3) a. *Is* must have a subject.
     b. In English, a tensed auxiliary verb must have a subject.
     c. In English, a tensed verb must have a subject.
     d. In English, a verb must have a subject.
     e. In every language, a verb must have a subject.

Provided we can recognise a subject, it is relatively easy to decide whether (3a) is true, but it becomes increasingly difficult to check the claims as we go down the list. Similarly for abstractness; the following statements all relate to sentence (1a).

(4) a. *Is* consists of *i* followed by *s*.
     b. *Is* consists of a stem *i* followed by a suffix *s*.
     c. *Is* is the 3rd-singular present form of the verb BE.
     d. *Is* has a subject, *it*.
     e. *Is* is the 'main verb' of the sentence.

Obviously there is a limit to the number of goals that can be scored with ideas that are very concrete and very specific; the prizes go to those who can climb these hierarchies. In general, the hierarchies are closely related: as claims become more general, they have to be stated in terms of more abstract concepts. And more importantly, the more general or abstract we get, the more interconnected each claim is with other claims - e.g., we can't decide whether every language requires its verbs to have subjects until we know whether every language has verbs and subjects, which we can't decide without clear notions of the concepts 'verb' and 'subject'.

Every player faces this same need to match very specific facts with more general ones, but of course different players have different personalities and different interests. Some are happy to focus on a narrow range of facts with the aim of discovering more and better general facts underlying them; others prefer to keep a wide range of phenomena in their sights in the hope of discovering links among them; and others again have practical interests such as language-teaching which oblige them to consider the full range of facts, without necessarily pushing for much generalisation. All these interests are legitimate and mutually supportive, but I think it is important to beware of claims that 'description' and 'explanation' are alternatives. We can't explain things we can't describe, nor can we describe things we can't understand.

What sorts of facts are syntacticians responsible for, as syntacticians? We all agree that syntax is the study of how words combine with one another, so we are at least responsible for the study of word-order and for the choice of words where the choice of one word is dependent on some other word with which it cooccurs - for the fact that in (1a) *Barcelona* must follow *in*, that *is* must be accompanied by a nominal such as *it*, and that this must be singular rather than plural.

There is some disagreement about the extent of our responsibility for the internal structure of words; e.g. is it the syntactician's job to break *gets* into *get* plus *s*? There is also disagreement about where the game of syntax changes into semantics; an example of this disagreement would be whether we are playing syntax or semantics when we say that *in Barcelona* defines a location. I discuss this in section 4. These disagreements are important, as we shall see, but the shared ground makes it quite clear that basically we are all playing the same game, with the same aim.

2. Introducing the players

The typical syntactician is an academic working in a university or research institute, but an increasing number of syntacticians are to be found in organisations with more immediate aims which include the production of computer software for handling ordinary language, translation of religious texts and diagnosis of medical conditions connected with language. An important area

of activity is the training of school teachers and preparation of materials for use in schools, where modern syntax has many possible applications.

Even if we simplify the picture by ignoring syntacticians who have clear applications in view, there are considerable differences of which any spectator should be aware. Some syntacticians work on rather concrete and particular matters such as writing a dictionary of some language, or working out all the finer details of some small but complex area of English syntax (e.g., what are the rules for using the word AS?); others choose to concentrate on much more general and abstract things, tackling questions like 'What kinds of word-order rules are there?' Some concentrate on English, others work on some other language, while others again study a small range of phenomena across hundreds of languages at the same time. Some like to keep firmly within syntax, as narrowly defined, whereas others try to relate their work on syntax to more general issues and to the analysis of other parts of language. All these differences are healthy and potentially productive (of new discoveries and insights, all potential goal-scorers).

Unfortunately there are other differences which are less welcome, and which are probably counterproductive because they quite unnecessarily prevent cross-fertilisation of ideas. These differences include one which is symbolised by the slogans 'functional grammar' and 'formal grammar' (see Lightfoot 1992 and Thompson 1992 for clear and brief summaries of these ideologies). 'Functionalists' like to emphasise the social and communicative functions of language, whereas the 'formalists' tend to emphasise its formal patterns.

For example, we might compare a functionalist and a formalist answer to the question why moving *is* before *it* in (1) should produce a question. A functionalist (e.g., Halliday 1985) might answer that *is* carries the sentence's 'polarity', the contrast between positive and negative, so if you wanted to show that the sentence was 'about' the truth of the proposition that it is hot in Barcelona, it makes sense to start with the word that is most directly related to truth, namely *is*. In contrast, a formalist (Chomsky 1986) would look for a 'formal' explanation, in terms of formal patterns; e.g., one notices that the position of *is* looks like that of a subordinator such as *that* in (5).

(5)   a.   I know that it is hot in Barcelona.
                      | | |
       b.   Is it _ hot in Barcelona.

The 'formal' explanation, then, is that *is* fills the slot which is also available for *that*. If *is* which is inverted round the subject competes for a single 'slot' with *that*, this would explain why inversion never occurs with *that* (or, for that matter, with other subordinating words like *whether*, which presumably fit into the same slot):

(6) a. * I wonder whether is it hot in Barcelona.
     b.   I wonder whether it is hot in Barcelona.

Both the formal and the functional explanations have some plausibility, so which is right?

The rhetoric around the distinction between functionalists and formalists sometimes suggests that the battle is between hearts and minds (heartless concentration on mere form, or mindless concentration on rather nebulous function). But this is nonsense, because when pushed every formalist would agree whole-heartedly that language has communicative and social functions, and every functionalist would also agree that language is a system of formal patterns. Both the formal patterning and the functions are among the data which the goal-keeper knows about, and the only ideas about language that will score are those which are compatible with all the relevant data.

Returning to our example, it is quite possible, in principle, that both accounts of the position of *is* in (1b) are correct: what *is* and *that* have in common is that they indicate the relation of the clause's basic meaning to the context, and it is (functionally) helpful to the hearer to have this information before starting to process the rest of the sentence. If they share a (formal) slot in the sentence's structure, there may be a functional explanation for it. As a matter of fact, this particular formal analysis may not be right because *that* and inverted *is* can in fact cooccur, as in (7).

(7) I know *that* only in summer *is* it hot in Barcelona.

But whatever the merits of this analysis, the point remains that the inverted verb and the subordinators like THAT are formally similar inter alia in that they both occur near the start of the clause, and we can't tell in advance whether the explanation for these similarities will be in purely formal terms or purely functional ones or a mixture of the two. Formal and functional approaches are complementary and mutually dependent, so spectators, as potential 'customers', should beware of high-pressure sales rhetoric.

3. Some important teams

Syntax is complicated, and any syntactician, however modest their aims may be, needs an intellectual framework within which to locate each claim - a set of general categories (such as 'verb' or 'subject'), and a set of general ideas about how sentences are structured and about the workings of a grammar. There is a widely agreed set of general categories, many of which are traditional both in their names and in their meanings; but there is no generally agreed framework. Instead, there are a relatively large number of competing alternatives.

Faced with these choices, one option for a syntactician is to play a lone game using a more or less 'theory-neutral' set of assumptions but avoiding issues that require a more sophisticated set of assumptions. Another option is to follow the even more lonely road of building a coherent framework of one's own. But the most popular option is to adopt one of the available frameworks. Although this requires time and effort, it is the easiest of the options because inventing your own theory is a life's work, and the 'theory-neutral' option is very limiting - rather like playing football with bare feet, when it is wise to think twice before kicking any given ball in case it damages your toes. A professionally constructed theory is like a good pair of boots, which will allow the wearer to tackle all sorts of interesting problems that couldn't even be stated without a theory.

Moreover, by opting for theory X you automatically join the ranks of syntacticians who use theory X, the theory X 'team'. This is important because you can communicate easily with other members of the same team, you can use their ideas, and (hopefully) they will use your ideas. The intellectual bonds may lead to friendships, jobs, fame, ... There are all sorts of reasons for joining a team, not all connected, or at least not directly, to the correctness of the team's theory.

What, then, are the most important teams in the syntax game? It all depends on what you mean by 'important', but by almost any standards of importance, the one that comes out on top is *Government-Binding Theory* (*GB*, alias *Principles and Parameters Theory*, alias, in the dim distant past, *Transformational Grammar*; Salkie 1990, Lyons 1970/91). The tradition including GB and its precursors is the brain child of Noam Chomsky, who must be the most famous linguist (certainly the most famous syntactician) in the world, measured in terms of media coverage and general fame beyond the academic community.

Partly because of its popularity, there is actually enormous diversity among practicioners of GB, and much more so than in any of the other theories which I shall mention below, so it would probably be more accurate to describe GB as a family of theories. After 35 years of theory-building Chomsky is still a fast worker, and his thinking is currently going through a particularly radical revision; so all of his followers are (by definition) to some extent out of date, and some are extremely so. Moreover, although he is clearly the leader of the team, many of the members are outstandingly good syntacticians and thinkers, capable of disagreeing with him on important issues. Consequently two articles both claiming to apply GB theory may well presuppose radically different, and incompatible, assumptions on key issues.

The dominant position of GB becomes evident from the professional journals that regularly carry articles on syntax. GB is the only theoretical framework that needs neither justification nor explanation because it is generally assumed that the typical reader already understands, and probably accepts, some version of GB. The same is true of conference papers presented to societies such as the Linguistic Society of America and the Linguistics Association of Great Britain.

Having said this, though, I must make it clear that other theories are important, in one sense or another, as well. Let's consider first the matter of social importance - the size, coherence and organisation of the teams. By this criterion we must recognise three other theories as important: *Systemic (Functional) Grammar* (Halliday 1985, Butler 1985), *Functional Grammar* (Dik 1989, 1991, Siewierska 1991) and *Cognitive Grammar* (Langacker 1987, 1990, 1991). All these teams have a newsletter or a journal and annual meetings which are held in a variety of countries and involve hundreds of participants. The same is true of GB, which qualifies as important in any case. Interestingly the first three teams are strongly committed to the slogans of the 'functional' approach, even to the extent of denying the existence of formal patterns in syntax (in the case of Cognitive Grammar); while the GB team is equally dedicated to the 'formal' approach. One suspects that the slogans may have an important social function for the teams.

Another test of importance is the extent of representation in the international refereed journals. Here too we find the GB team well ahead of its rivals, but in this case the rivals are a completely different set. A few years ago it could have been said that the main two were *Lexical-Functional Grammar* (Bresnan 1982, Wescoat and Zaenen 1991) and *Generalised Phrase-Structure Grammar* (Gazdar et al 1985); these two, plus GB, were singled out for special treatment in two excellent introductory books, Sells (1985) and Horrocks (1987). More recently, though, the field has changed somewhat. LFG is still represented, but GPSG has generally been abandoned in favour of *Head-driven Phrase-Structure Grammar* (Pollard and Sag 1987). Borsley 1991 is a good introduction to both GPSG and HPSG, as well as to GB. Meanwhile there has been an increase in output from two older theories, *Categorial Grammar* (Wood forthcoming) and *Relational Grammar* (Blake 1990, Aissen 1991).

In spite of the word 'Functional' in the name of LFG, all these theories tend to focus on formal patterning, though without precluding functional links to meaning, to processing and so on. The functional approach tends to be represented in the professional journals by rather theory-neutral analyses of large amounts of cross-linguistic data in the 'typological' tradition (Comrie 1981/89).

A third measure of importance is in terms of applications, i.e. 'spectators' of the syntax game who are basically not playing the game but using the ideas. This is the one criterion by which GB does not emerge as the leader; indeed, it would be fair to see that in most applications GB is nowhere in sight (though this may change if current activity in GB bears fruit). In the field of language teaching, the most widely applied theory of syntax is probably Systemic Functional Grammar (SFG). In computer applications too SFG is popular, as are also Lexical Functional Grammar, Generalised Phrase Structure Grammar, Head-driven Phrase Structure Grammar and Categorial Grammar (Winograd 1983).

None of these measures is inherently and directly connected to the question of truth (compatibility with all known facts). It is quite possible for a theory to be extremely popular, and widely used in the professional literature, and widely used in applications, without being the best available in objective terms - i.e., the nearest to the truth. It would probably be fair to say that most syntacticians apply the theory that they learned first, because that is the theory they understand best, and not because they have seriously compared it with its rivals. The theory learned first depends on the linguistics department where syntax was first studied, which in turn depends on all sorts of social, geographical, economic and academic considerations. Nor does publication in a refereed journal guarantee truth; all it means is that typical readers will relate easily to the contents. And would-be-appliers of syntactic theories tend to want a detailed and reasonably coherent and explicit description, rather than a theory as such. So it may be that the prize for truth could still go to the future descendant of a theory which is still out of sight in terms of our three criteria. (I hope this is so, at any rate, for reasons which will become clear at the end of the article!)

The general conclusion of this discussion is that all these theories are claimed, by their proponents, to be more or less true; how could it be otherwise? Moreover although their proponents typically have different interests, ultimately they are all going to have to mesh, sooner or later, with the same reality. Nor can we realistically divide the theories, as some people like to do, into those which aim at 'description' and those whose aim is 'explanation'. Once again, their proponents or users may differ but I don't know of any theory which provides a description of a range of facts without also trying to explain at least some of them. Advocates of GB are particularly prone to claim that in some sense GB is especially good at explaining things, or at least that explanation is particularly high on the agenda in GB work. In my experience this is simply false in both directions. The other theories all aim at explanation, and I know linguists who use GB simply as a descriptive framework, without paying much attention to its success in explaining.

We have arrived at the following list of syntactic theories which count as important by one or more of the above criteria:

Categorial Grammar
Cognitive Grammar
Functional Grammar
Generalised Phrase Structure Grammar
Government Binding Theory (GB)
Head-driven Phrase Structure Grammar
Lexical-Functional Grammar
Relational Grammar
Systemic Functional Grammar

4. Syntax and meaning

Everyone agrees that words, when combined together, express meaning, and that the meaning that a string of words express varies according to how the words are combined. The meanings that are expressed form some kind of specifically 'semantic' structure, so we all agree that a string of words (let's call it a sentence) has a semantic structure. We don't agree on what belongs in this semantic structure, but at least it must show the sense of each word, and whatever semantic relations there are among the words. We also agree that a sentence has a phonological structure, describable in terms of syllables, consonants, vowels and so on. The question for us to consider is what role syntax plays between the semantic and phonological structures.

One of our theories, Cognitive Grammar, claims that there is no specifically syntactic structure, since each word is a Saussurean 'sign' with just two parts, a meaning (signifié) and a phonological form (signifiant). There are syntactic rules, but all they do is control the mapping relation between the phonological and semantic structures; for example, some rules control the order in which phonological structures occur. There are no specifically syntactic categories like 'verb' or 'subject', because all such categories are claimed to be definable in semantic terms.

Speaking personally, I am convinced this claim is wrong, but I have to admit that it is surprisingly hard to argue the case against it. A particularly serious obstacle is the uncertainty about semantic structures; one of the characteristics of Cognitive Grammar semantic structures is how closely they correspond to syntactic structures in other theories - e.g., it is claimed that there is a semantic category that is shared by all and only nouns, in spite of the apparent diversity among nouns like *John, milk, beauty* and *explosion*.

At the other extreme, GB claims that the specifically syntactic structure of a sentence is very rich indeed, and incorporates information which other theories would put only in the semantic structure. For example, take sentence (8).

(8)   Everyone told one person their name.

Does this mean the same as (9a) or (9b), and whose name was it that was told - the teller's, or the hearer's, or someone else's?

(9)   a.   For everyone there was one person to whom they told their name.
      b.   There was one person to whom everyone told their name.

These are considered to be syntactic questions in GB, and the syntactic analysis of a sentence includes one sub-structure, the 'Logical Form', whose purpose is to provide the answers. Rather strangely, there is very little discussion

of the semantic structure as such, and in particular no discussion of whether it makes Logical Form redundant.

It would be fair to say that GB incorporates a lot of what others call semantics into the syntactic structures, whereas we saw that Cognitive Grammar does the opposite, incorporating 'syntactic' information into the semantic structure. Another rather unhelpful slogan that divides syntacticians is the question of whether or not syntax is 'autonomous'. Not too surprisingly, GB supporters claim that it is and people with more functional inclinations disagree; and the sides claim to be disagreeing over whether there are syntactic structures controlled by purely syntactic rules. But in view of the ease with which syntactic information slops into the supposedly semantic structures, and vice versa, it is hard to see what the argument is really about.

Most of the other theories represent a third position, which recognises a syntactic structure distinct from a semantic one and puts semantic phenomena like the ambiguity of (8) only in the semantic structure. The syntactic structure describes the words and phrases of the sentence in terms of categories like 'noun' and (possibly) 'subject', in contrast with the semantic structure which in most cases is some form of the predicate calculus.

A fourth possibility is to recognise a single structure which combines syntactic and semantic information on equal footing - a 'syntactico-semantic' structure. This position is taken by two of our theories: Systemic Functional Grammar and Head-driven Phrase Structure Grammar. Not surprisingly, it is quite hard to see exactly how this view is different from the no-syntax view of Cognitive Grammar; but it is equally hard to distinguish it from the ignore-semantics view of GB. On the other hand, it is quite easy to distinguish from the third position, where the two structures are kept clearly separate.

To summarise, we have seen a good deal of disagreement over the relations between syntactic and semantic structures. This is one of the main sources of difficulty in comparing syntactic theories, because theories differ over the phenomena that syntax is supposed to deal with, from very little (Cognitive Grammar) to virtually everything (GB).

5. Phrases

Another point of general agreement is that the syntactic organisation of a sentence (regardless of whether or not this is distinct from its semantic organisation) is hierarchical, in the sense that smaller units cluster to make up larger units, with the whole sentence as the largest unit of all.

This structure is typically shown by a tree, as in (10) (a vastly oversimplified example, as you will probably realise).

(10)

```
                    S
            ┌───────┴───────┐
           NP              VP
                      ┌─────┴─────┐
                     V            NP

        Dogs    chase           postmen
```
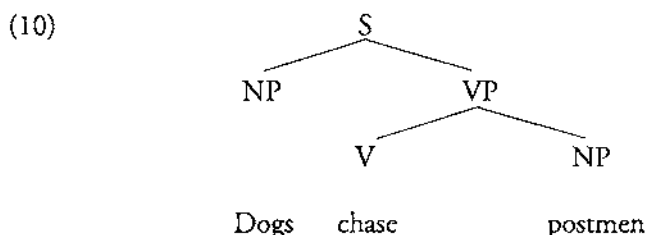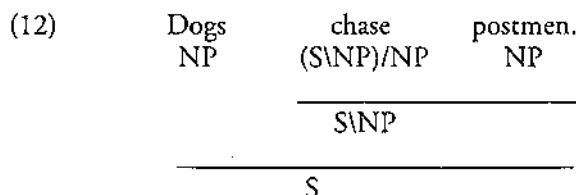
In this diagram, S and V stand for 'sentence' and 'verb' respectively, but you can interpret 'NP' as you prefer: either as 'noun-phrase', or as 'noun or pronoun'. The first is the modern view, the latter the traditional one.

Tree-diagrams like (10) are not the only notation available; there are a number of alternatives. One is a labelled bracketing such as (11); this is common in the GB literature, and also in Functional Grammar.

(11)　　　 s[NPDogs vp[vchase NPpostmen]]
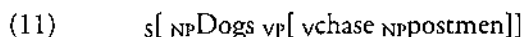
Another is an upside-down tree (perhaps more accurately, a 'non-upside-down tree'), using the special category-system of Categorial Grammar:

(12)　　　 Dogs　　　 chase　　 postmen.
　　　　　　 NP　　 (S\NP)/NP　　 NP
　　　　　　　　　　────────────────────
　　　　　　　　　　　　 S\NP
　　　　　　────────────────────────────
　　　　　　　　　　　　 S

In this system, the category 'transitive verb' is represented as '(S\N)/N', meaning 'a word which, having combined with a following NP, then combines with a preceding one, the result being S'.

Yet another notation that is widely used is like a conventional tree rotated through 90 degrees, with brackets instead of branches. The various labels are assigned to slots with names like 'CAT(egory)' and 'FORM':

(13)

```
┌ CAT:S                                              ┐
│                                                    │
│       ┌ CAT:NP              ┐                       │
│       └ FORM:dogs           ┘                       │
│       ┌ CAT:VP                                      │
│       │                                             │
│       │         ┌ CAT:V           ┐                 │
│       │         └ FORM:chase       ┘                │
│       │         ┌ CAT:NP           ┐                │
│       └         └ FORM:postmen     ┘                │
└                                                    ┘
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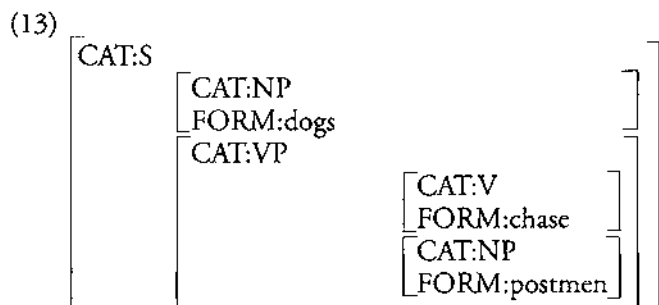
This notation is common in Lexical-Functional Grammar, Generalised Phrase Structure Grammar and Head-driven Phrase Structure Grammar.

These notations all reflect the same basic insight, namely that a sentence can be divided into successively smaller units.

6. Features and functions

Each of these notational systems has its advantages and its disadvantages, but one of the main differences involves theoretical assumptions about the location of information. Basically, any syntactic diagram has two parts: the geometry and the labels. The geometry shows what is related to what - i.e., in the cases considered so far, what is part of what, and what comes before what (e.g., that *chase* is a part of *chase postmen*, and precedes *postmen*). The geometry depends on the shape of the tree, the order of words and the brackets round them, and so on. The labels are attached to the parts related by the geometry. Where theories differ radically is in their claims about the balance of information load between geometry and labels. At one extreme is GB, which puts most of the information about sentence structure into the geometry, and very little into the labels. In most GB discussions the labels are simple atomic categories like 'NP' and 'V' and a set of 'size' labels, to distinguish between single words and phrases. For example, while a single noun is labelled 'N', a complete phrase consisting of a noun and all its associated words is labelled 'NP', for 'noun-phrase'. Between N and NP comes N' (read 'en-bar'), which is a noun plus its complements (its most closely related dependent phrases). A standard (though somewhat old-fashioned) example of this kind of analysis is (14).

(14)
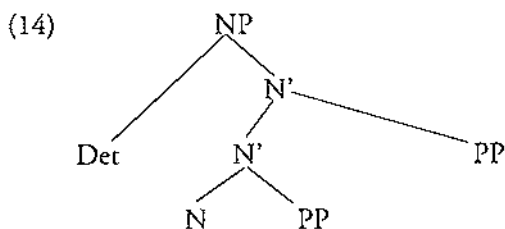
A   student of linguistics with long hair

Other theories differ from this extremely geometrical approach in various ways. Generalised Phrase Structure Grammmar, for example, makes a great deal of use of syntactic 'features', or cooccurring categories, for classifying words and phrases; thus a verb might have a dozen or so features showing its tense, its subject-agreement, its transitivity, and so on, in addition to the fact that it is a

verb. (In principle features are also available in GB, but in fact they are rarely used.) Categorial Grammar provides a very complex decomposable label for each word which shows directly how it can combine with other words (e.g., 'S\NP' is the label for an intransitive verb, showing that it will combine with a preceding noun to make a sentence). The use of these rich labelling systems reduces the informational load on the geometry; indeed, in the case of Categorial Grammar it is sometimes claimed that the geometry carries no information at all.

Relational Grammar, on the other hand, puts a great deal of information into function labels like 'subject' and 'object', which are completely absent (as a matter of principle) from the basic categories of GB, Generalised Phrase Structure Grammar and Categorial Grammar structures; but it makes virtually no use at all of classificatory categories. Some theories use both kinds of label; this is true of Lexical Functional Grammar, Functional Grammar and Systemic Functional Grammar, and to a lesser extent of Head-driven Phrase Structure Grammar.

The reason why these theoretical differences affect one's choice of notation is that if you have a great deal of information to put into the labels, then you need plenty of space to write it all down. At one extreme, the one-dimensional labelled brackets of example (11) are absolutely useless from this point of view; but at the other extreme, the boxed two-dimensional brackets of (13) are ideally suited to carrying a lot of information in the labels. This is why theories which emphasise labels rather than geometry prefer this notation.

There is a rather obvious pay-off between the two approaches. The more information you put into the geometry, the more complex it has to be; and the more information you put into the labels, the less complex the geometry is. This is especially so when the extra information in labels is functional information, i.e. relating to the function of the word or phrase concerned in relation to the rest of the sentence.

A very simple example of this balance involves the basic structure of a simple clause like our earlier example, *Dogs chase postmen*: does the clause have three parts (subject, verb and object) or just two (subject and predicate or 'verb-phrase'), the second of which can be split further? Suppose you exclude labels like 'subject' and 'object'; how then will your sentence diagrams distinguish the subject from the object, given that they are both NP? If the distinction can't be made in the labels, it must be made in the geometry; we might consider defining the subject simply as the noun that comes before the verb, but that wouldn't work in view of examples like our (1b), where the subject and verb are inverted; therefore the only possibility is to use phrase structure, i.e. by introducing an extra phrase. This is the verb-phrase, labelled 'VP' in the example structures.

But what if you do allow functional labels like 'subject'? In that case of course the problem disappears; you identify the subject simply by applying the label 'subject' to it. There may be other reasons for grouping the verb and object

together as verb-phrase, but at least the matter is open to debate. A very simple generalisation about syntactic theories is that every theory which disallows functional labels does require the verb-phrase; this is the kind of analysis assumed in all the earlier examples. But there are also theories in which the verb-phrase plays no part: Relational Grammar, Systemic Functional Grammar and Functional Grammar; and what these theories all have in common is that they do allow functional labels. This is a simple example of the fundamental ways in which the theoretical assumptions you start with may affect your analysis of a sentence's structure.

7. The need to enrich phrase-structure

We have assumed so far that the syntactic analysis of a sentence is rather simple: you divide the sentence into its parts, and go on dividing these until you reach the smallest units (which, rather controversially, we shall take to be single words). You show how these parts and subparts fit together by some kind of diagram; and you add labels to the parts, showing how they can be classified (as nouns, noun-phrases, etc) and/or what their function in the sentence is (as subject, etc.). Unfortunately, this is far too simple to cope with the patterns that are actually found in language.

To see the problem, consider the apparently simple sentences in (15a).

(15) a. Fred likes syntax.
      b. Syntax Fred likes.

In (15a) it is clear that *Fred* is the subject of *likes syntax* (or, if you prefer, of *likes* - or even of the whole sentence); a suitable tree would be the one in (16).

(16)

```
                    S
                  /   \
             Subj:NP   Pred:VP
                        /   \
                       V    Obj:NP

          Fred      likes    syntax
```
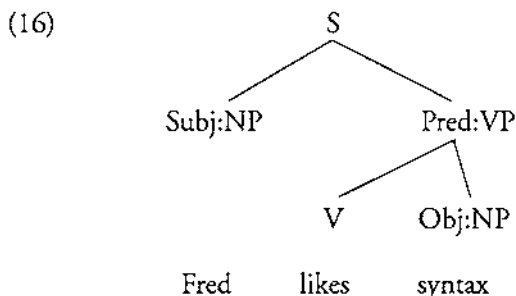
You will notice that I have made all the most favourable possible assumptions, by using not only a verb-phrase, but also functional labels ('Subj', 'Obj').

Consider next sentence (15b). In case you think this is a rather odd, un-English sentence, imagine it as part of a larger sentence, such as *Syntax Fred*

likes, but semantics he can't stand. Syntacticians often call a front-shifted element like *syntax* in this sentence the 'topic'. The structure for this sentence is presumably something like the following:

(17)

```
                                   S
          ┌─────────────────────┬──────────────┐
   Topic, Obj:NP            Subj:NP          Pred:VP
                                                │
                                                V
      Syntax                 Fred             likes.
```
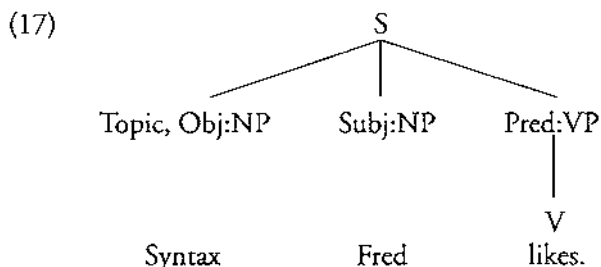
I have again made the most favourable assumptions I could about the shape of the tree and its labels, but in spite of these, a serious problem has emerged: *syntax* now has a divided allegiance, between the sentence (of which it is the topic), and the verb-phrase (of which it is the object). The problem is that this kind of analysis does not allow us to show both of these relationships. We are restricted to dividing the sentence into smaller and smaller parts, and if we take *syntax* as one of the main parts of the whole sentence, we can't also take it as a part of one of these parts, the verb-phrase.

One initially attractive reaction to this problem is to opt for the 'object' link, i.e., to pretend that this sentence, *Syntax Fred likes,* is just the same as *Fred likes syntax.* The trouble is that they are in fact different in ways that any grammarian must pay attention to. For example, we ought to be able to say how 'topicalised' objects are used (e.g., for contrast with a topicalised object in a neighbouring clause); but we can't say anything about them without distinguishing them. Moreover, we must say whereabouts in the sentence a topicalised object can occur - e.g., before the subject, but after a time expression and also after a subordinating word like THAT which marks the sentence as subordinate:

(18) a. * Fred syntax likes.
     b.   Nowadays, syntax Fred likes.
     c. * Syntax nowadays Fred likes.
     d.   I think that Fred likes syntax.
     e.   I think that syntax Fred likes, but ...
     f. * I think syntax that Fred likes, but ...

In short, we can't ignore the fact that *syntax,* when it is topicalised, behaves as though it were an immediate part of the whole sentence, rather than of the verb-phrase.

Nor, however, can we take the opposite tack, namely pretending that *syntax* is only the topic. *Syntax* counts as the object of *likes* just as much when it is

topicalised as when it is in its normal position. For example, omitting it leads in both cases to ungrammaticality, for the simple reason that *likes* needs an object. But aren't we in fact showing this relation by labelling *syntax* 'Obj' in diagram (17)? (I should emphasise that most of the theories in our collection would not in fact use functional labels like 'Obj', so we are considering the most favourable possible analysis.) No, we aren't; and the reason is that although we may be marking *syntax* as the object of something, the label 'Obj' doesn't, in itself, tell us what *syntax* is the object of. When it is in its normal position, we can tell easily that it is the object of *likes*, because the convention is that an element marked 'Obj' is the object of the verb inside the same verb-phrase. But what if *syntax* is not inside any verb-phrase, as in the analysis in (17)? The convention breaks down.

It would be reasonable to see this as making a mountain out of a very small mole-hill. All we need is an extra convention, for topicalised objects: 'if something is labelled both Obj and Topic, treat it as the object of the next verb-phrase.' This would work for our current example, but unfortunately, it doesn't solve the problem because topicalisation can move an object out of its own clause into a 'higher' one. To see this, consider the next two examples.

(19) a. Fred denies that he likes syntax.
      b. Syntax Fred denies that he likes.

Here is a structure for the second of these examples:

(20)
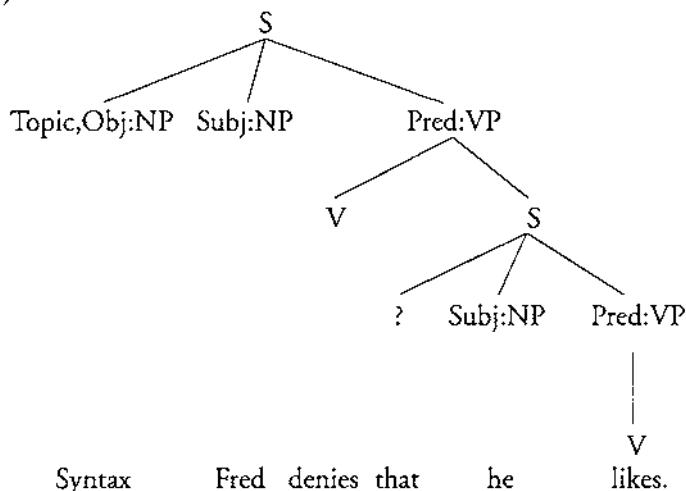
Once again I have made the most favourable assumptions that I could; but the problem remains. *Syntax* is indeed labelled as the object, but the object of what?

What we want to show is that it is the object of *likes*, but this is not what the diagram is actually showing.

This is only one example of the kind of problem that faces any grammarian grappling with the complex realities of natural languages. Many of the other problems are similar to this one, arising from the possibility of using elements in positions other than the ones where they might normally be expected; but many of them involve other kinds of complexity. In the following section I shall hint at some of the solutions that have been suggested to this one problem, but some of these solutions are sufficiently general to solve problems of many different kinds.

8. Some ways to enrich phrase structure

The problem, then, is how to show that *Syntax* is both the topic of the top clause and the object of the lowest one in (19b):

(19) b. Syntax Fred denies that he likes.

All the solutions that we shall consider in this section build on the view of sentence-structure as a hierarchy of increasingly large 'phrases', but enrich the basic view that I have sketched. However, it is important to repeat that they don't all start from the same basic view; in particular, some theories allow functional labels like 'subject', and others don't. This difference is important when it comes to enrichments.

The best-known solution is probably the transformational one, adopted by GB (and, in a slightly different way, by Relational Grammar). Since a single structure won't allow us to show both of the links that involve *syntax*, we use (at least) two structures, one showing *syntax* as the topic of the whole sentence, and the other showing it as object of *likes*. Each of these trees is a very simple structure, with the simplest kind of (non-functional) labels on its joints and twigs, but by combining two of these very simple trees we can deal with very complex sentence-patterns. These trees are bound together, as part of the total analysis of a single sentence, by means of rules called 'transformations' which transform one tree into another - thereby allowing an item like syntax to be moved out of its 'lower' object position into the 'higher' topic position. The latter position is where it actually occurs - i.e., where we see it - in (19b), so it can be described as relatively concrete (or 'surface'), whereas the other position is much more abstract.

The logic of this kind of analysis encourages linguists to accept increasingly abstract analyses in which neither the number nor the order of elements bears any simple relation to the elements in the surface structure. To simplify somewhat, the hall-mark of GB analyses is their use of extremely abstract trees with very simple labels. (You will recall that I said earlier that GB builds a great deal of information into the geometry of trees.)

Some other theories solve the problem by enriching the labels rather than increasing the number and abstractness of the trees. In Generalised Phrase Structure Grammar, for example, we give (19b) a single surface tree similar to the following:

(21)

```
                      S
                    /   \
                  NP     S/NP
                        /   \
                      NP     VP/NP
                            /    \
                          V       VP/NP
                                 /    \
                                ?      S/NP
                                      /   \
                                    NP     VP/NP
                                          /    \
                                         V      NP/NP
    Syntax  Fred  denies that  he      likes
```
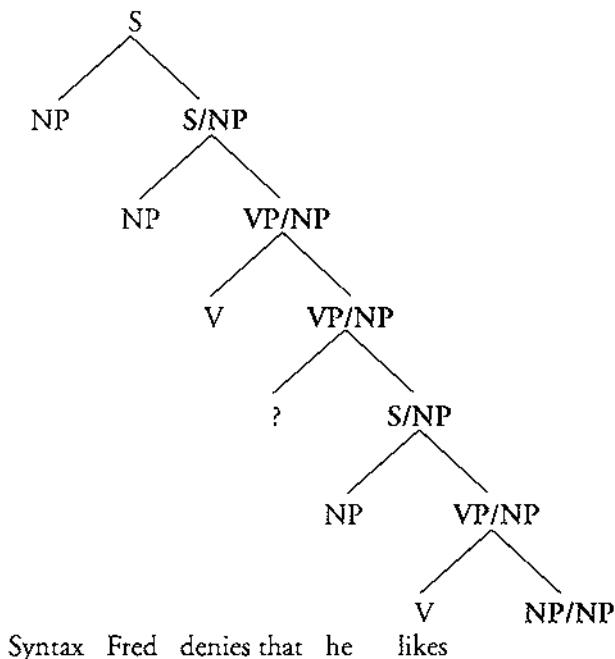
The main thing to notice about this tree is the series of extra labels which I have highlighted. In each case, the normal label (S, VP) is combined with '/NP' (to be read as 'slash NP'), which gives the extra information that a noun-phrase is missing from somewhere inside the sentence or verb-phrase concerned. These labels are like a trail of footprints to guide the rules which will eventually try to find an object for *likes*: if you can't find an object noun-phrase in the usual position, because it has gone elsewhere, try to find it by following its footprints up the tree. Technically, the slash label is a feature (a named variable which can have some value), and it is typical of the Generalised Phrase Structure Grammar approach to dealing with complexity by enriching the feature labels attached to a single concrete tree. Head-driven Phrase Structure Grammar and Categorial Grammar both take a rather similar approach to the problem.

Lexical Functional Grammar adopts a third solution to the problem of enriching the basic structure. Like GB, it does not restrict the syntactic structure of a sentence to nothing but a single, surface structure. But unlike GB, it adds

just one extra structure, and this extra structure is labelled exclusively with functional categories like 'subject' (hence its name, 'functional structure'). The two structures offer an easy and natural analysis of the problem sentence: *syntax* is at the start of the sentence in the surface structure, but in the functional structure it is the object of the lower clause. The two positions are connected by a special rule for finding a 'path', which has similarities both to the transformations of GB and to the slash 'footprints' of Phrase Structure Grammar.

In short, those theories that have solved this problem have found three quite different kinds of solution, all of which involve in some way enriching the kinds of structure that can be used for showing the syntactic analysis of a tree:

- a. more information can be shown in the trees by increasing the number and abstractness of the trees for each sentence, but without any increase either in the complexity of the individual subtrees or in the labelling;
- b. more information can be packed into the labels, without any increase in the number or abstractness of the trees;
- c. more information can be shown by adding one extra tree which uses functional labels.

Needless to say, theoretical linguists would very much like to know which of these approaches is nearest to the truth; in principle this is a researchable question, because the different approaches can be tested against the facts (our goalkeeper, if you remember). But at present the outcome of the game is still completely open.

9. Advertiser's announcement: word grammar

As I have already explained, linguists are all shooting at the same goal, which we can call 'truth', and we would all like to believe that either we personally, or the team to which we belong, is doing well in terms of goals scored. My own view is that all these teams, for all their importance, are missing a lot of goals, and I should like to end by introducing a group of players that I haven't mentioned so far. I think it would be fair to say that most members of the nine teams listed above would be united in considering this group unimportant (which is why I have ignored it so far), but it does pass one of our importance tests, and may even be capable of out-scoring the other teams.

Let me start by contrasting the beliefs of this group with the starting-point shared by all the others: the belief that the structure of a sentence is based on a hierarchy of phrases (clauses or sentences, noun-phrases, and so on). This view is rather like an analysis of a community of people which says that its structure can be defined *only* by identifying successively smaller sub-communities. For example, the only relation that I can have to any of my colleagues, according to this theory, would be fellow-membership of groups such as

departments, faculties, committees and so on. There would be no way to say
that I was a friend of X, or collaborating with Y, because these are direct
relations between them and me. Direct relations between individuals have no
place in this kind of analysis. Similarly for syntax: direct relations between
words have no place in a theory which is based on phrases.

This is not the only possible view, though most of its adherents pay little or
no attention to any alternatives. Nor is its history very long, compared with
the history of grammatical theorizing (which in Europe dates back to the
Ancient Greeks); it was only introduced in the 1930's, by the American linguist
Leonard Bloomfield (1933). The alternative is, of course, to recognise direct
relations between words, and to take these word-word relations as the basis for
syntactic analysis. This alternative has for a long time been accepted in the
teaching of grammar in schools throughout Europe (though it has died, with
all grammar-teaching in UK schools). This is especially true in Eastern and
Central Europe.

To see what difference these theoretical abstractions make, consider what
the two approaches say about sentence structure. If we take the phrase-based
approach, we say that a clause or sentence has a subject, which is a noun-phrase;
but if we take the other approach, it is not a clause or sentence, but a verb (i.e.,
a word) that has the subject, and the subject is not a noun-phrase, but a noun.
Both kinds of analysis allow the subject noun to be accompanied by other words
(adjectives, determiners and so on), but the word-based analysis treats this
entirely as a private matter (so to speak) between the noun and its companion
words, without setting up a 'noun-phrase' to hold them all together.

These word-word relations are called 'dependencies', because they are always
asymmetrical, one word being the 'dependent' of the other, its 'head'. Tradition-
al grammar uses words like 'govern', 'modify' and even 'belong' or 'take' to
describe dependencies, as in the following statements:

(22) a. In German, the preposition ZU governs a dative noun.
     b. *Big* modifies *book* in the combination *big book*.
     c. In *I told him yesterday that syntax was fun*, the word *yesterday*
         belongs to *told*).
     d. The verb OUGHT takes *to* (or a 'to-infinitive').

Various systems have been used for displaying dependency relations, inclu-
ding one which looks remarkably similar to the tree notation for phrases. Here,
first, is a simplified 'phrase-marker' (i.e., a phrase-based tree) for *It is hot in
Barcelona:*

(23)

```
                              S
                          ╱     ╲
                      NP           VP
                     ╱            ╱   ╲
                    ╱          VP       PP
                   ╱          ╱ │      ╱ ╲
                  ╱          ╱  AP    ╱   NP
                 ╱          ╱   │    ╱    │
                N     V     A    P    N
                It    is   hot   in  Barcelona
```
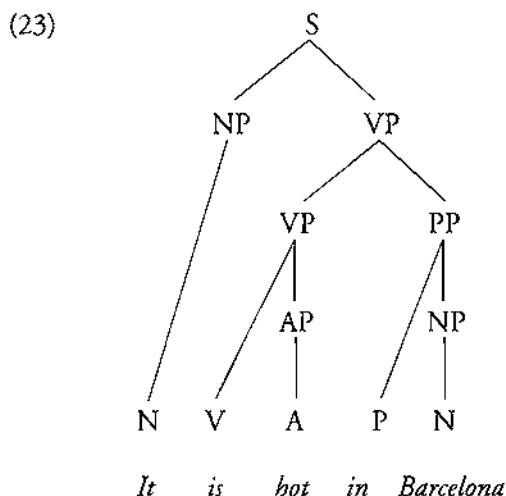
The crucial thing to notice here is that there are labelled nodes in the tree not
only for the five words (classified as 'noun', 'verb', 'adjective' or 'preposition'),
but also for seven phrases. Now contrast this with what we might call a
'word-marker' for the same sentence:

(24)

```
                     V
                  ╱  │  ╲
               s╱   c╲   ╲a
              ╱      ╲    ╲
             N        A    P
                             ╲
                            c ╲
                               ╲
                                N

        It       is     hot      in              Barcelona
```
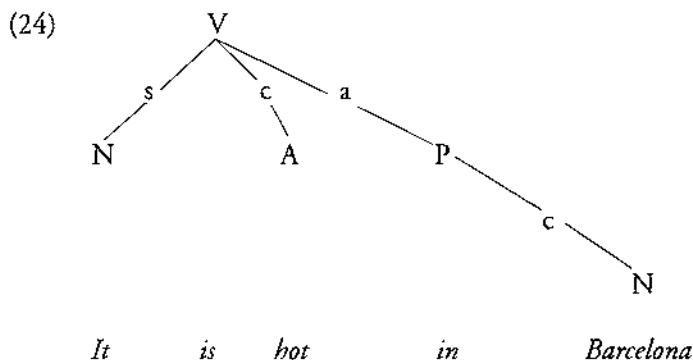
In this diagram, there are no phrase nodes, and the vertical dimension shows
dependency, not the part-whole relation of the phrase-marker. It is true that
some phrases are implicit in the word-marker (e.g. you can see that *in Barcelona*
is a phrase, whereas *hot in* is not), but they can stay implicit because, according
to this approach, they are redundant. The labels on the diagonals name the
relations (subject, complement, adjunct) between the words concerned.

Diagrams like this word-marker are used by some linguists, but for various
reasons I prefer a different notation, in which the direction of dependency is
shown by arrows rather than by using the vertical dimension. In these diagrams,
the arrow points from the head to the dependent:

(25)

The vertical arrow linking *is* to nothing at all shows that this word is the 'root' of the whole sentence, because it depends on no other word within the sentence (or anywhere else, for that matter). Once again, the thing to notice is the complete absence of any unit larger than a word - not even the sentence appears, as such, in the diagram.

Is this word-based approach really different from the phrase-based approaches? After all, phrases lurk beneath the surface of this diagram, as I have already pointed out, because the dependencies group the words into phrase-like clusters. Each of these 'phrases' has a single word as its root, just as the whole of this sentence is rooted in *is*; and similarly, *in Barcelona* counts as a phrase (rooted in *in*). Does it really matter then whether we show these patterns in terms of phrases, or in terms of word-word dependencies?

Yes, it does. For one thing, it makes a radical difference to the way we analyse a sentence's structure. As we noted earlier, phrase-based approaches differ according to whether or not they recognise a phrase (the 'predicate' or 'verb-phrase') consisting of the verb plus all its dependents except the subject. But if we start from dependencies, it is quite simply impossible to recognise such a phrase, even implicitly, because the subject is a dependent of the verb along with its other dependents. Does this limitation count for or against dependency analysis? If it really is essential to recognise verb-phrases, because there are facts which simply can't be stated in any other terms, dependency analysts should seriously consider abandoning the match (or switching sides). But if verb-phrases can be dispensed with (given the other assumptions of dependency analysis), then we can celebrate a victory because our theory predicts that such phrases are dispensable - and is vindicated by the facts. The issues are complex, but on balance things look good for dependency grammar.

Another difference between word-word dependencies and phrases as the basis for analysis lies in the treatment of discontinuous phrases , phrases which are split by other words which don't belong to them. These are very common, and are one of the main head-aches for any syntactician (because it is generally agreed that they are atypical - most languages are organised in such a way that most phrases are continuous). We have already looked at one example, produced by topicalisation as in (19b), *Syntax Fred denies that he likes*. Here the discontinuous phrase is *syntax ... he likes*, which is rooted in *likes* (notice that *he* is its subject, and *syntax* is its object). As we saw, a range of clever tricks have

been developed for dealing with examples like this, but one option is excluded in principle by most of the theories we have considered: that of allowing a phrase to be discontinuous.

This exclusion is fundamental to most of the notations we considered; for instance, how could we use brackets to mark off a discontinuous phrase? Any brackets we put round *syntax ... he likes*, for example, will also include words which are not part of this phrase (*Fred denies that*). Now let's suppose we start with dependencies as the basis for analysis. We can easily recognise that phrases are normally continuous; to achieve this, all we need to say is that dependency arrows normally mustn't tangle. But this is just the normal pattern, and we may well expect exceptions (just as we expect exceptions in other parts of the grammar, such as in the rules for forming past-tense verbs). Provided we can make it clear precisely which patterns are allowed to break the rule, we can allow phrases to be discontinuous. This leads to dependency diagrams like (26), in which we give *syntax* two different dependencies in the same structure, one to *denies*, as its 'topic', and one to *likes*, as its object. Rather conveniently, we can separate the arrows for these dependencies by drawing one above the line of word-class labels and the other below it.

(26)

| Syntax | Fred | denies | that | he | likes. |
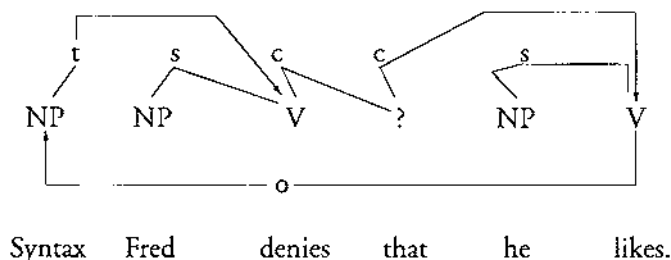
The social background to dependency analysis is quite important in understanding why it has had so little impact on theoretical syntax. Part of the explanation lies, I suspect, in its very success in school-teaching. In countries where it is the basis for grammar-teaching in schools, it is naturally accepted as unproblematic by those who apply it in academic research. In Europe a lot of highly regarded linguists use it; for example, a European mega-project on automatic translation, called Eurotra, uses dependency analysis as the basis for its syntactic processing. However, using something is not the same as theorising about it, and on the whole those who have used it have taken it for granted as something so familiar and well developed that there's no need to agonise about its theoretical bases. Since they publish few theoretical articles about it (least of all in English), it is not surprising that linguists who do theorise about grammar have little reason to think about it or to consider it as an alternative to phrase-structure.

In spite of this basically non-theoretical stance of dependency analysts, dependency grammar has recently started to have more influence on western linguistic theories. Most obviously, many of the phrase-based theories that I described recognise the asymmetrical relations among the words in a phrase by picking out one of them as the phrase's 'head' (what I have been calling its root; some theories use other terms). This is true of Categorial Grammar, Generalised Phrase Structure Grammar, GB, Head-driven Phrase Structure Grammar (notice the name!) and Relational Grammar. GB has gone even further, as it includes an elaborate subtheory called 'government theory' (reflected in the name of the whole theory, 'Government and Binding theory'), which allows us to build what is (in all but name) a dependency structure on top of a phrase structure. These dependency features (and others) have been added during the last two decades, and have been presented as theoretical innovations, but they have rather obvious roots in traditional grammar.

A few of us have gone even further, by developing theories in which dependency-like ideas aren't just glued onto phrase-based theories, but in which these ideas are fundamental. (I should add that this process can be painful, but stimulating; I myself started from a phrase-based theory, Systemic Functional Grammar, and was very surprised, and disturbed, to find how weak the evidence for the phrase-based approach was.) My own work has led to a theory called *Word Grammar* which I have described in a number of works including two books (Hudson 1984, 1990). Unfortunately, by none of our criteria does this theory count as important, but I think I have scored enough goals to make it worth pursuing the ideas in the theory, though some shots still bounce back to me (as they do, incidentally, for everyone else too!). Maybe it will turn out to be fundamentally wrong, and popular choice will have been vindicated; if so, only a handful of people (a few of my research students and myself) will have wasted their time. But we have to explore every idea, because at this stage of the game we really have no idea which ideas will eventually turn into the Eventual Winner.

10. The great cup final

Any reader with some experience of traditional grammar and none of modern theoretical grammar may well be wondering at this point why we are taking so long to get syntax sorted out, especially since we are building on two thousand years of work dating back to Greek and Latin grammarians (who supplied notions like 'noun', 'tense' and 'subject'). The problem is that grammar turns out to be very, very complicated. The individual structures and rules are often reasonably simple, but what is complex is the way they interact not only with one another, but with virtually everything else in our minds as well - with what we know about the immediate past (for which notions like 'topic' are

relevant), with what we know about human behaviour, and with a good deal of what we know about the world at large. Added to which, grammar is ultimately located in the minds of individual speakers, each of whom is unique in the tiny details but who also form extremely complicated alliances called dialects and languages. All these complexities are grist for the grammarian's mill.

One thing is absolutely certain: there is no chance of a definitive, stable, universally-accepted general theory of syntax in the 20th century. We are certainly further from the beginning of the journey than we were, say, 30 years ago; but the end is still nowhere in sight, and it is only optimism that allows the belief that we are getting nearer to it all the time.

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