

Formal approaches in linguistics

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1. Linguistic competence

What do we mean when we say that someone speaks a language, for instance English? We mean that that person has a certain type of knowledge which allows him to produce and understand *words* (*mots*, throughout the following course notes, the French equivalents of the vocabulary introduced are given in parentheses), *phrases* (*groupes* ou *syntagmes*) and *sentences* (*phrases*) in that language. Knowledge of language — which we will call *linguistic competence* (*compétence linguistique*)— is normally acquired during early childhood, in an automatic and effortless way, without any form of explicit instruction. It is important to realize that knowledge of language is unconscious knowledge. This idea of unconscious knowledge is not as surprising as it may seem initially. Indeed, for instance, your ability to walk around without falling or running into obstacles requires huge amounts of very complex knowledge, of which you are not at all aware, and which you would be completely incapable of explaining (e.g. physical laws of motion and gravity, capacity to analyze two dimensional visual data into a three dimensional space, etc.). It is interesting to note, in this regard, that the apparently simple ability of move around without falling or running into obstacles, which any human being (or animal) learns without any special effort is based on types of knowledge which are in fact much more complex than for instance the ability to play chess well. Proof of this is that it has been relatively easy to program computers so that they can play chess excellently (and in fact to beat humans at it), but that it turned out to be much more difficult to program a robot to e.g. play soccer.¹ Similarly, it is not yet possible to program computers so that they can simulate human linguistic competence in a realistic way (though significant progress is being made in this direction). The reason why the ability to walk or talk seems so easy to us, whereas e.g. the ability to play chess well seems difficult, is related to the fact that all human beings have specific predispositions for movement in 3 dimensional space and language, which allow them to learn these skills automatically and effortlessly, without instruction, whereas they have no specific predispositions for chess, which has to be learned on the basis of explicit instruction.

Turning more specifically to linguistic competence, what is it that people know, when they know a language? What is the nature of linguistic competence? We can divide linguistic competence into several subtypes, corresponding to the major branches of linguistic science.

- Phonology and phonetics: knowledge of the sound system of a language.
- Morphology: knowledge of the structure of words.
- Syntax: knowledge of the structure of phrases and sentences.

¹ See e.g. <http://www.tech.plym.ac.uk/robofoot/video/2003FIRAINAUSTRIA.wmv> for an idea of what robots can do.

- Semantics: knowledge of the meaning of words (lexical semantics) and of phrases and sentences.
- Pragmatics: knowledge of the meaning and use of language in context.

The purpose of this course is to investigate in some detail the knowledge that speakers of English have of the syntax of their language, i.e. their ability to combine words to form phrases and phrases to form sentences. This will also lead to discussion of the semantics of the constructions examined.

One of the central facts that any theory of syntax must account for is that speakers are able to produce and understand sentences that they have never heard before. For instance, in all likelihood, you have never heard sentence (1), but, you have no problem understanding it. You can explain under what external conditions it would be true or false in a given situation (i.e. in the context of a cartoon involving animals playing soccer). Also, under the appropriate circumstances, you would have no problem uttering (1), if its semantic content was what you wanted to convey.

(1) The blue mouse scored a goal against the chipmunk team.

This ability to produce and understand sentences one has never heard before entails that sentences are not learned on a one by one basis. What speakers learn are, on the one hand words, and, on the other, rules for combining words into phrases and sentences. It is these kinds of rules that we will be investigating.

More strikingly, a little thought shows that there is in principle no limit on the number of sentences that a speaker can produce or understand (i.e. there is an infinity of such sentences). This is because there is no principled limit on the length of wellformed sentences, as illustrated in the following examples:

- (2)
- a. Mary will return.
 - b. John thinks that Mary will return.
 - c. Ann knows that John thinks that Mary will return.
 - d. John thinks that Ann knows that John thinks that Mary will return.
etc.
 - e. I invited Mary.
 - f. I invited Mary and the girl next door.
 - g. I invited Mary, the girl next door, and a friend of mine.
etc.

In practice, there are limits on the length of the sentences people actually use. These limits are due to what we will call *linguistic performance* (*performance*). Linguistic performance is our capacity to put our linguistic competence to use. It can be affected by a variety of factors, from limitations of short term memory (forgetting how we began a sentence before getting to the end of it), to tiredness or alcohol. From the point of view of linguistic competence, however, there is no principled limit on the length of wellformed sentences.² For any given sentence, it is always possible to find a longer sentence which is wellformed.

²The distinction between competence and performance is similar, though not identical, to the distinction between 'langue' and 'parole' proposed by Ferdinand de Saussure.

2. Sentences and grammaticality

Sentences can be viewed as *sequences* or *strings (suites)* of words. Sentences of English are, in this view, strings of English words. However, not just any string of words is a *wellformed (bien formé)* sentence. In this section, we will briefly discuss different ways in which a sentence can be anomalous. Consider the examples in (3).

- (3)
- a. The girl can see the book.
 - b. *The girl can the book see.
 - c. *The girl can to see of the book
 - d. *This is a book which the very idea that John has read it surprises me.
 - e. #The book can see the girl.
 - f. #Colorless green ideas sleep furiously. (Chomsky 1957, p.15)
 - g. %The girl might could come.
 - h. %I didn't see nobody.
 - i. %I came for to see the doctor.

A first distinction we want to make is between *grammatical (grammatical)* and *ungrammatical (agrammatical)* strings of words. (3a) is a grammatical string of words: it conforms to the rules of English sentence construction (i.e. English syntax). Thus, (3a) is a sentence of English. (3b,c,d), on the other hand, are ungrammatical strings of English words. In each of these, there are violations of the rules of English sentence construction (constraints on word order are violated in (3b); constraints on the form of complements are violated in (3c), *can* takes a bare infinitive, not a *to* infinitive; constraints on relative clause formation are violated in (3d)). Thus, these are not sentences of English.³ We note that a sentence is ungrammatical by prefixing a star (asterisk, *) at the beginning of it.

Let us now turn to (3e,f). These sentences are anomalous. However, the anomaly here is of a different kind than that which characterized (3b,c,d). The problem with (3e,f) lies in their meaning, which does not conform to our expectations about the world. Under normal circumstances, books cannot see. Ideas do not have colors, nor do they sleep; and things which are green cannot be colorless. Sleeping is not done furiously. These sentences are said to be *semantically deviant (sémantiquement déviantes)*. We will note the fact that a sentence is semantically deviant by prefixing it with a cross-hatch (or sharp sign) #.

On the other hand, sentences (3e,f) do not raise any problems of grammaticality: they conform to the rules of English syntax. This can be shown intuitively by pointing out that if we change some of the words in these sentences, replacing them by words of the same grammatical category (so that we are not changing the *structure* of the sentence), the sentences become perfectly normal (e.g. in (3e), replace *girl* by *book* and *book* by *girl*; in (3f), replace *colorless* by *big*, *ideas* by *bugs* and *furiously* by *deeply*). Similarly, (3e) might be perfectly normal in the context of a fairy tale, or a dream (or *Alice in Wonderland*, for that matter). This is because such contexts suspend various expectations we have about how the world works. Sentence (3f) is slightly more complex, since it appears to be self-contradictory in a

³In what follows, conforming to current usage, I will often say things like ‘sentence (3b) is ungrammatical’ or ‘(3b) is an ungrammatical sentence’, using ‘sentence’ instead of ‘string’ or ‘sequence’. Strictly speaking, these expressions are nonsense, since we are specifically defining sentences as strings of words which do not violate rules of English syntax. However, misunderstandings are unlikely to arise from this informal way of speaking.

more radical way (e.g. one cannot easily imagine, even in a cartoon, something that is both colorless and green). However, these types of expressions can be used for specific purposes in poetical and other contexts as in e.g. "what if a dawn of a doom of a dream // bites this universe in two, // peels forever out of his grave //and sprinkles nowhere with me and you?" (E. E. Cummings).

It is important to note that grammaticality on the one hand, and meaningfulness or comprehensibility on the other, are not the same thing. A sentence can be ungrammatical and still be perfectly understandable. (3b) and (3d) raise no problem as to their meaning. A Dutch speaker just starting to learn English might utter (3b), since the order of the words conforms to the normal order in the corresponding Dutch sentence *Het meisje kan het boek zien*. Any cooperative speaker of English would understand what such a person was attempting to convey to him — even though the sentence is radically ungrammatical in English. As for (3d), it might actually be said by a speaker of English, getting bogged down in the construction of a complex relative clause, and no one would have any trouble understanding it, even though such sentences are judged to be ungrammatical. Sentence (3c) deviates in a more complex fashion from normal English sentence construction and it might not be intelligible to a speaker of English. And of course, it is possible to put together strings of English words which are both ungrammatical and totally unintelligible (e.g. **The the an an are can.*). The fact that a string of words can be ungrammatical but understandable has a very important consequence, namely, it justifies the existence of syntax as a field of study separate from semantics. Indeed, if the only constraints on sentence construction were based on meaning, we would expect any meaningful sentence to be wellformed.

Let us now turn to sentences (3g,h,i). These sentences have yet a different status than the ones we have discussed up to now. They are ungrammatical in standard English, but well attested in various dialects and sociolects and are consequently grammatical in those dialects and sociolects. It can be very interesting to examine this kind of variation since it presumably allows us to make distinctions between properties of a language which are very deeply embedded in the system and properties that are peripheral: indeed different dialects can be assumed to differ in ways that tend to affect peripheral rather than core properties. To give you an idea of the kind of variation involved, see figure 1 below. This is a map from the *Linguistic Atlas of England* which shows the variation (in the rural England of the 1950s⁴) with respect to the standard English *I came to see the doctor*. The standard variant is used in the areas marked 1, whereas (3i), *I came for to see the doctor*, is the most usual form in the areas marked 2. The areas marked 3 mostly use *I came for see the doctor*, and the areas marked 4 mostly use *I came see the doctor*. Many villages use more than one form, as shown by the annotations of the type \cap which corresponds to the 4th variant (*came see, no to*): if a village in, for instance, zone 2 uses not only the 2nd variant (*came for to see*), but also the 4th, then it will be marked with \cap .

The various types of judgements on sentences discussed so far are all based on an analysis of the types of deviance exhibited by the sentence. Such judgements thus presuppose a theory (or at least theoretical intuitions) about how to recognize what exactly is anomalous in a sentence, and are consequently not directly accessible to naive informants. We can characterize the unanalyzed reactions of a naive speaker in

⁴ The data come from surveys of agricultural workers over 60 years old living in small villages all over England and were collected between 1950 and 1961 and are thus representative of traditional regional dialects at that time. They should not be taken as representative of the speech of the whole population, and even less so of speech in the year 2006.

terms of the pretheoretical notion of *acceptability* (*acceptabilité*). We will say that a sentence is *acceptable* (*acceptable*) or *unacceptable* (*inacceptable*). We note (degrees of) unacceptability by prefixing (one or more) question marks in front of a sentence. Unacceptability can result from all sorts of problems, e.g. strict ungrammaticality (naive informants will not hesitate to judge (3b,c) unacceptable); semantic deviance (most naive informants would probably say that (3f) is unacceptable); or complexity. Here is a final set of examples illustrating this notion.

- (4)
- a. The butcher served his client.
 - b. The butcher that the affair concerned served his client.
 - c. ?The butcher that the affair that the janitors have been talking about concerned served his client. (compare: The affair that the janitors have been talking about concerned the butcher.)
 - d. ??The butcher that the affair that the janitors that Paul hired have been talking about concerned served his client. (compare: The janitors that Paul hired have been talking about the affair.)

There are general grammatical rules of English which allow one to add a relative clause to a noun phrase (NP, *syntagme nominale*), deriving a larger NP. E.g., we get (4b) from (4a) by adding the relative clause ‘that the affair concerned’ to the NP ‘the butcher’. However, when this process is repeated in certain configurations — specifically, when the new relative clause is embedded inside the previous one— the sentences which result become almost impossible to process. Thus, when we add the relative clause ‘that the janitors have been talking about’ to ‘the affair’ in (4b), resulting in (4c), the result is very hard to process, and many speakers would probably claim that it is unacceptable (this would certainly be true if (4c) were presented in isolation; however, in an appropriate discourse context, where the butcher, the affair and the janitors were all given protagonists, the sentence would probably be interpreted without much of a problem, and thus claimed to be acceptable). When we add a third relative clause to (3c), resulting in a triply embedded relative clause, the result becomes quite uninterpretable, and hence unacceptable. Note however that we want to say that such a sentence *is* grammatical. Indeed, all the steps in its construction conform to the rules of the grammar of English, i.e. it conforms to the rules of *competence* of English speakers. However the resulting sentence (4d) is too complex to process under normal circumstances, that is, it raises *performance* problems.

3. Ambiguity

A sentence is said to be *ambiguous* (*ambigu*) if it has more than one meaning (thus ambiguity is a semantic property). Sentences (5) are all ambiguous.

- (5)
- a. Mary went to the bank.
 - b. Visiting professors can be interesting.
 - c. The girl hit the table with a vase.
 - d. Anne wants to marry an Englishman.

Semantic ambiguity can arise from different sources. Sentence (5a) is said to be lexically ambiguous. Indeed, its ambiguity stems simply from the fact that the noun ‘bank’ can mean either the edge of a river, or a type of financial institution. Apart from that, both interpretations share the same syntactic and semantic structure.

Sentences (5b) and (5c) are said to be syntactically ambiguous. Indeed these sentences allow two different syntactic structures, which lead to different meanings. (5b) can mean either that professors who are visiting can be interesting, or that going to visit professors can be interesting. In the first case, *professors* is the head noun of the NP *visiting professors*, and *visiting* is an adjectival modifier. In the second case, *visiting* is the gerund of the verb *visit* and is the head of the NP *visiting professors*, and *professors* is the object NP of the gerund. Sentence (5c) can mean either that the girl used a vase as an instrument to hit a certain table, or that the girl hit a certain table, distinguished by the fact that it has a vase on it (as in: *she hit the table with the vase, not the one with the lamp*). In the first case, *with the vase* characterizes the act of hitting; in the second it is a modifier of the noun *table*. (5c) is especially interesting because under both of its possible interpretations, all of the words have the same category. Thus it is strictly the syntactic structure which leads to ambiguity.

Finally, let us turn to (5d). Either there is a specific Englishman who Anne has in mind and wants to marry, or Anne simply has the desire to marry someone English, without having found any specific candidate yet. This sentence can be said to be strictly semantically ambiguous. Indeed, its ambiguity involves neither a syntactic, nor a lexical ambiguity.⁵ The syntactic structure of the sentence, and the meaning of the different lexical items seem to be identical under both readings. It is at the level of the way the meaning of the whole sentence is built from the meanings of the parts that two possibilities arise.

Here are two further sentences (one in French, one in English), which are extremely ambiguous. Try to find as many of the possible meanings as you can, including meanings which are semantically deviant.

- (6) a. Time flies like an arrow.
b. La belle ferme le voile.

4. Syntactic categories

The central purpose of this course is to provide a characterization of the grammatical sentences of English, and of certain aspects of their meaning. That is, among all possible strings of English words, which ones are well-formed sentences, and which ones are not? The concept of *syntactic category* (or simply, *category*, also known as *part of speech*, (*catégorie grammaticale*, *partie du discours*) is indispensable in this enterprise. Every word of a language has a syntactic category, e.g. *disappoint* is a verb, *the* is a determiner, etc.⁶ Indeed, having categories allows us to say things like: “one way of forming a sentence in English is to put a determiner, a noun, a verb, a determiner, and a noun, in that order.” This tells us correctly that *The girl saw the boy* is a sentence of English. (Note that it also tells us incorrectly that **The girl laughed a sincerity* is a sentence of English; this characterization is only given here as an example.)

A question that arises in this context is how to determine the syntactic categories of lexical items. These are clearly a part of the unconscious knowledge that

⁵Under some theories of the syntax/semantics interface, sentences like (5d) are analyzed as having a different syntactic structure on each reading, but it is beyond the scope of this class to examine why one would want to assume this.

⁶Of course, there are words which can belong to more than one category, e.g. *work* is both a noun and a verb. We will consider here that there are two distinct lexemes *work*, one a noun, the other a verb, related by a morphological process of conversion.

speakers have of their language. For instance, it is because speakers of English know that *love* is both a noun and a verb, whereas *adore* is only a verb, that they know that (7a), (7b), and (8a) are grammatical, and that (8b) is ungrammatical. Notice that this knowledge is completely independent of anything you might learn in school. Anyone who knows English can make the grammaticality judgements shown in (7) and (8), even if they have never had any instruction in grammar and have no idea what a noun or a verb might be.

- (7) a. Mary loves peanuts.
 b. Love is a powerful emotion.
- (8) a. Mary adores peanuts.
 b. *Adore is a powerful emotion.

Traditional school grammars sometimes give semantically based criteria for distinguishing the grammatical categories of words, such as those given in (9).

- (9) a. A noun designates a thing, a living creature, or a quality.
 b. A verb designates an action or a state.

Such definitions have some validity. Prototypical nouns and verbs tend to conform to them. However, they are not sufficiently precise. Note for instance that the very word ‘action’ used in (9b) to define verbs is in fact a noun. In order to obtain a more systematic definition of grammatical categories, it is necessary to use the notion of *distribution* (*distribution*). The distribution of a word is the set of environments in which it appears. We will say that two words belong to the same category if they have the same types of distributions. To give a simplified example, we can say that all the words that can appear in the place of ____ in (10) are of the same category

- (10) John wants a ____.

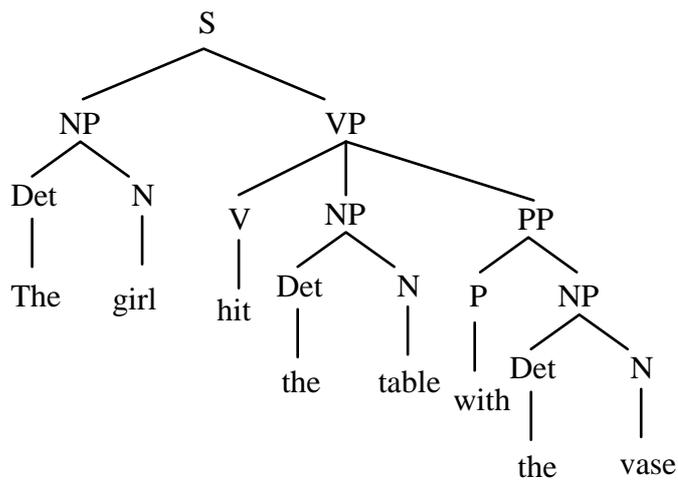
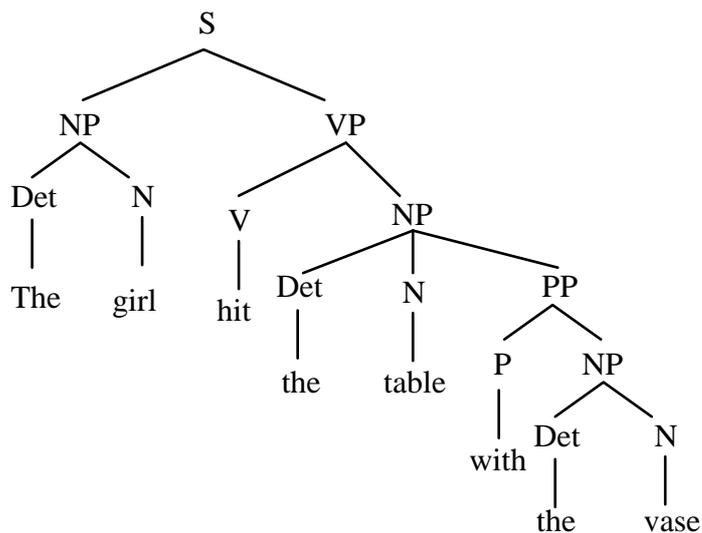
In fact, these words will all be nouns, e.g. *puppy*, *cup*, *chance*. By looking at large numbers of contexts like that shown in (10), it can be shown that these lexical items will all be specifically of the subcategory of singular count nouns with an initial consonant. The general category noun can be reconstructed from such results by showing that the different subcategories of nouns share a set of distributional properties which are not shared e.g. by subcategories of verbs.

5. Constituent structure

Let us return to sentence (5c) for a moment.

- (5c) The girl hit the table with a vase.

As was pointed out earlier, this sentence is ambiguous, even though under both of its possible readings all of the lexical items have the same grammatical category. We can account for the ambiguity of (5c) by proposing that the sentence allows two different syntactic structures, which we can represent as tree 1 and tree 2.

Tree 1**Tree 2**

Tree 1 and tree 2 are graphs known as *phrase structure trees* (*arbres syntagmatiques*), or *trees* (*arbres*) for short (throughout the following discussion, the French equivalents of the vocabulary introduced are given in parentheses). These trees are written using the following notational conventions. S = Sentence (*P* = *Phrase*); NP = Noun Phrase (*SN* = *Syntagme Nominal*); VP = Verb Phrase (*SV* = *Syntagme Verbal*); PP = Prepositional Phrase (*SP* = *Syntagme Prépositionnel*); N = Noun (*N* = *Nom*); V = Verb (*V* = *Verbe*); P = Preposition (*Prép* = *Préposition*, *!!P* = *Phrase*); Det = Determiner (*Dét* = *Déterminant*).

Let us also introduce the following vocabulary for talking about trees. A tree is a set of *nodes* (*noeuds*) and *branches* (*branches*) which join the nodes. Each node is *labeled* (*étiqueté*) with either a syntactic category (S, NP, V, ...) or a word (*the*, *girl*, ...). A node labeled A *directly dominates* (*domine directement*) a node labeled B if there is a branch linking A to B, and A is above B (e.g. in tree 1, S directly dominates NP and VP; VP directly dominates V, NP and PP; P directly dominates NP and VP; PP directly dominates P and NP; NP directly dominates Det and N).

with, etc.). A node A *dominates* a node B if A is linked to B by a series of nodes forming a *path (un chemin)* from A to B such that direct domination holds between each pair of nodes on the path (e.g. in tree 1, S dominates every other node in the tree (e.g. there is a path from S to *girl*, S—NP—N—*girl*, such that S directly dominates NP, which directly dominates N, which directly dominates *girl*). In a tree, there is a unique node which dominates all the other nodes of the tree and which is not dominated by any other node. This node is the *root (la racine)*, e.g. S is the root in both tree 1 and tree 2. Every other node in the tree is directly dominated by one and only one node. Nodes in the tree which do not dominate any other nodes are called *leaves (feuilles)*, e.g. in tree 1 *The, girl, hit, ...* are leaves.

By analogy with family trees, family relation terminology is used in talking about nodes in a tree. Note that in English it is traditional to use female family relations for this purpose. E.g. one will say that in tree 1, S is the *mother* of NP and VP; VP is the mother of V, NP and PP; PP is the *daughter* of VP; *table* is the daughter of N; P and NP are *sisters*, etc. (In French, because *noeud* is masculine, it is customary to use male family relations: *noeuds père, fils, frères, ...*).

Phrase structure trees give the following information about the structure of a sentence. (a) The words in the sentence; (b) the order of the words; (c) the syntactic category of the words; (d) the way the words are grouped into phrases (or *constituents*, which we will be using as a synonym for *phrase*) and the phrases are grouped into yet larger phrases — this is what is known as the *phrase structure* or *constituent structure (structure de constituants)* of the sentence; (e) the syntactic category of each phrase. The information (d) and (e) is the crucial information that a phrase structure tree conveys, the information which provides an analysis of the sentence as more than just a sequence of words. A phrase structure tree says that a subsequence of words in the sentence is a constituent of the sentence if there is a node which dominates all and only the words in that subsequence. So, for instance, *with the table* in tree 1 is a constituent because the node labeled PP dominates those three words, without dominating any others. A phrase structure tree also tells us which sequences of words do *not* form constituents. E.g. *table* and *with* do not form a constituent in tree 1 because there is no node which dominates both *table* and *with*, but which does not dominate anything else.

For example, tree 1 tells us that (a) the words in the sentence are *The, girl, hit, the, table, with, the, vase*; (b) that they appear in the order just given; (c) that they are respectively a determiner, a noun, a verb, a determiner, a noun, a preposition, a determiner, and a noun; (d) that *the girl, the table, and the vase* are constituents of category NP; that the preposition *with* and the NP *the vase* form a constituent of category PP; that the verb *hit*, the NP *the table*, and the PP *with the vase* form a constituent of category VP; that the NP *the girl* and the VP *hit the table with the vase* form a constituent of category S that is not itself a constituent of a larger entity, i.e. that forms a complete sentence.

Let us now show how the two possible phrase structures for sentence (5c), given in tree 1 and tree 2 provide an account of the ambiguity of the sentence. In tree 1, the VP is made up of three constituents, a verb (*hit*), an NP (*the table*) and a PP (*with the vase*), i.e. the verb has two complements, an NP and a PP. In tree 2, on the other hand, the VP is made up of only two constituents, a verb (*hit*) and an NP (*the table with the vase*). The latter NP contains a PP (*with the vase*). To see how this difference is relevant to the problem at hand, consider first what happens when we make a passive sentence corresponding to the active sentence (5c). The general

principle for making a passive sentence consists in (a) placing the NP which follows the verb (the direct object) before the verb (in subject position); (b) placing the NP which is before the verb (the subject) at the end of the sentence, preceded by the preposition *by*; (c) adding the auxiliary *be*. Applying this procedure to sentence (5c) gives two different results, depending on whether tree 1 or tree 2 is chosen as the appropriate structure. If tree 1 is chosen, the NP following the verb is *the table* (*with the vase* is not part of this NP). We thus obtain the passive sentence in (11a). If tree 2 is chosen, the NP following the verb is *the table with the vase* (*the table* by itself does not form an NP in this structure). We thus obtain the passive sentence in (11b).

- (11) a. The table was hit with the vase by the girl.
 b. The table with the vase was hit by the girl.

Notice that neither of these sentences is ambiguous. (11a) allows only the reading where the vase is the instrument, whereas (11b) only allows the reading where the table has a vase.

Similarly, it is possible in an appropriate context to replace an NP by a pronoun. Note that this is only possible for a whole NP, it cannot be done to a subpart of an NP.⁷ Replacing the NP after the verb by *it* in (5c) gives two different results depending on which tree is chosen. If tree 1 is chosen, we get (12a). If tree 2 is chosen, we get (12b).

- (12) a. The girl hit it with the vase.
 b. The girl hit it.

Again, it should be noted that sentence (12a), based on the structure in tree 1, only has the interpretation where the vase is an instrument.

This discussion thus suggests that tree 1 is an appropriate structure for the meaning where the vase is the instrument, and that tree 2 is appropriate for the other reading, where the table is characterized by the fact that it has a vase on it. This can be yet further corroborated by the following intuition. The meaning corresponding to tree 1 can be seen to be a ternary (=threeway, *ternaire*) relation of hitting, involving: (i) the hitter; (ii) the thing hit; (iii) the instrument used to hit. And tree 1 has three separate constituents (two NPs and a PP) corresponding to these roles. On the other hand, the meaning corresponding to tree 2 can be seen as a binary relation of hitting, involving (i) the hitter; (ii) the thing hit. And tree 2 has only two separate constituents corresponding to these roles. Though there is a PP in tree 2, it is within the postverbal NP, and thus is not *separate* from it.

We thus see how postulating a constituent structure for sentences can help us understand syntactic ambiguity: a sentence can have more than one structure and the different structures can lead to different meanings. It is important to note that these differences in structure are reflected in the construction of related sentences, involving passives or pronouns, with similar meanings such as (11) and (12) above. This shows us that it is indeed the differences in structure which are at the source of the differences in meaning.

⁷ E.g. in (i), the whole NP *the girl from Lille* can be replaced by *she* as shown in (ii), whereas it is impossible to replace just the beginning of the NP, leaving the PP complement *from Lille* behind as shown in (iii).

(i) The girl from Lille has a dog. (ii) She has a dog. (iii) *She from Lille has a dog.

Representing constituent structure with labeled bracketings

Phrase structure trees can be cumbersome to write out, and take up a lot of room. It is possible to represent exactly the same information using what is called a *labeled bracketing* (*parenthétisation étiquetée*). Trees 1 and 2 will be represented as follows:

Tree 1 = [S [NP [Det the] [N girl]] [VP [V hit] [NP [Det the] [N table]] [PP [P with
[NP [Det the] [N vase]]]]]]

Tree 2 = [S [NP [Det the] [N girl]] [VP [V hit] [NP [Det the][N table] [PP [P with
[NP [Det the][N vase]]]]]]]]

Left brackets are labeled, the label indicating the category of the constituent formed by the sequence of words between a left bracket and the corresponding right bracket.

When every detail of the structure is represented in the labeled bracketing, as done above, it is not a very perspicuous notational device: the information is much easier to read off the corresponding tree. However, it is often the case that we will be interested only in certain aspects of the constituent structure, for instance the contrast in the attachment of the PP between tree 1 and tree 2. A simplified labeled bracketing can be useful for representing such information:

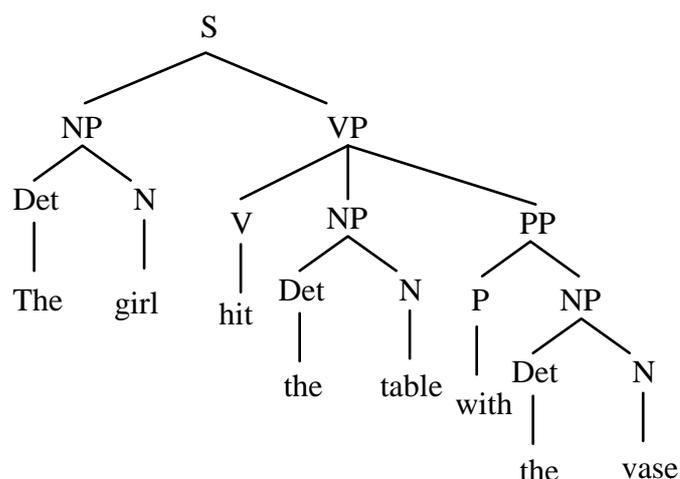
Tree 1 \approx [S the girl [VP hit [NP the table] [PP with the vase]]]

Tree 2 \approx [S the girl [VP hit [NP the table [PP with the vase]]]]]

6. Phrase structure rules

Recall that the central purpose of this course is to provide criteria for distinguishing grammatical strings of English words (sentences) from ungrammatical strings (nonsentences). More specifically, we want a mechanism which tells us explicitly whether a sequence of words is grammatical or not. The concept of phrase structure tree can be used as a tool in this enterprise. What we are going to do now is to introduce a mechanism, called a *phrase structure grammar* (*grammaire syntagmatique*), which produces trees, and hence sentences. This will allow us to try to characterize English (in fact, small subparts of English; dealing with every aspect of the language at once is far too difficult), by providing a phrase structure grammar which produces English sentences.

A phrase structure grammar is a set of *phrase structure rules* (*règles syntagmatiques*). These rules tell us what types of constituents can combine to make a larger constituent. Consider tree 1, repeated here.

Tree 1

One thing that this tree shows us is that a sentence can be made up of an NP and a VP. We can note this property by the phrase structure rule given in (13a). The right hand side of the rule (the part on the right of the arrow) tells what kinds of things can make up the left hand side. Similarly, the tree shows us that an NP can be made up of a determiner and a noun. We can note this property by the phrase structure rule in (13b). The tree also shows that a VP can be made up of a verb, an NP and a PP, which we note as in rule (13c). Finally, this tree shows us that a PP can be made up of a preposition and an NP, which we note as in rule (13d).

- (13) a. $S \rightarrow NP VP$
 b. $NP \rightarrow Det N$
 c. $VP \rightarrow V NP PP$
 d. $PP \rightarrow P NP$

Looking at the types of trees we propose for other sentences will allow us to extend our set of rules. Tree 2, for instance, suggests that we add the following new rules:

- (14) a. $VP \rightarrow V NP$
 b. $NP \rightarrow Det N PP$

These new rules show us the importance of our use of the word *can* in explaining what a phrase structure rule means. Indeed, (13c) tells us that a VP *can* be made up of a verb, an NP and a PP, and (14a) tells us that a VP *can* be made up simply of a verb and an NP. There is no contradiction here, both are possible.

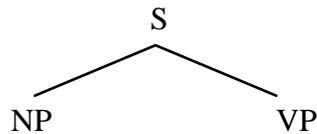
It should be noted that the rules given in (13) and (14) are far more general than the trees they are inferred from. These rules are general rules of English sentence structure which are put to use in producing unlimited numbers of sentences. Tree 1 and tree 2, on the other hand, simply gives us the structure of a single specific sentence.

Such rules can be understood as instructions on how to construct phrase structure trees. We start by taking as the root node, the category of which we want to produce an example. Say we want to produce a sentence S. We take S as the root, as is done in tree 3.

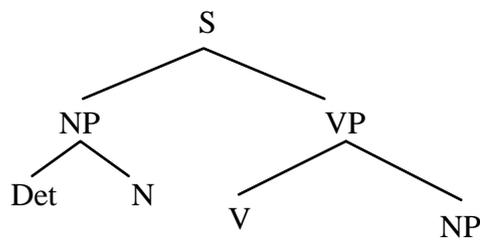
Tree 3

S

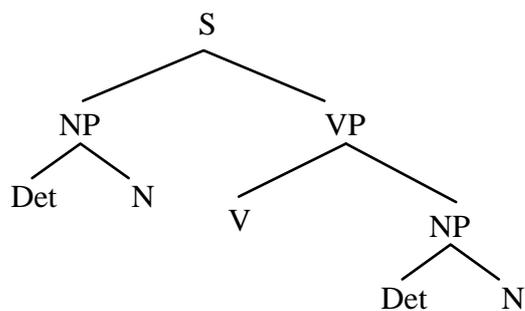
We look among the phrase structure rules for any rule which has S on its left hand side. In this case, there is only one such rule, namely (13a). This rule is interpreted as allowing us to attach the items on its right hand side as daughters to the element on the left hand side, resulting in tree 4.

Tree 4

We continue building the tree by doing the following for each leaf: we look for a phrase structure rule with the label of the leaf on the left hand side; if there are more than one such rules, we choose one; we add as daughters to the leaf the elements that are on the right hand side of the chosen rule. These elements are then new leaves in the tree, to which the same procedure can be reapplied. For instance, if we choose rule (13b) for the NP in tree 4 and rule (14a) for the VP, we will get the result shown in tree 5.

Tree 5

At this point, we can apply rule (13b) to the NP leaf, and we obtain tree 6:

Tree 6

In order to obtain a complete phrase structure tree from tree 6, it is sufficient to add lexical items (words) of the appropriate category below each leaf, e.g. *the, girl, ate, an, apple*. This would give us the phrase structure tree for *The girl ate an apple*. We thus see how the rules we have inferred from trees 1 and 2 are much more general in their application: they allow us to produce entirely new types of sentences and structures.

How do we know which words can be inserted in which places? This knowledge comes from the *lexicon (lexique)*. A lexicon is a list of words, with various properties listed for each. A speaker's mental lexicon is a central part of their linguistic competence. Speakers know huge amounts of information about the individual words of their language, which they store in their mental lexicon. This information includes at least (i) phonetic information (pronunciation); (ii) morphological information (the internal structure of the word, if it has one, the morphological classes it belongs to, any irregular inflected forms it has, etc); (iii) syntactic information (the category and subcategory of the word); (iv) semantic information (meaning); (v) register information. The study of the mental lexicon is an extremely complex enterprise, which is beyond the scope of this course. We will limit our analysis of words here to assigning them a syntactic category (and, if necessary a subcategory). Here is an example of a very small lexicon of this type.

(15)	boy, N	hit, V	the, Det
	mouse, N	break, V	a, Det
	cat, N	see, V	with, P
	table, N	put, V	to, P
	chair, N	give, V	on, P
	vase, N	eat, V	at, P

A *phrase structure grammar (grammaire syntagmatique)* is a set of phrase structure rules of the type illustrated here, associated with a lexicon. We are using the term *grammar* here in a specific sense, namely, an explicit characterization of a set of sentences. Indeed, the rules in (13) and (14), in combination with the lexicon (15) characterize a specific set of sentences. We will say that this grammar *generates (génère, engendre)* that set of sentences. Even with this small set of rules, we can generate an infinite set of sentences, among which the following.⁸

- (16) a. The cat broke the vase on the table.
 b. The cat ate a mouse.
 c. The boy put a vase on a chair on a table.
 d. The boy hit the cat on the vase on the chair on the table.
 e. The chair gave a mouse to the vase.
 etc.

The reason for which even this very small grammar allows an infinite number of sentences is that the grammar is *recursive (récuratif)*. What this means is simply that a category can contain a smaller occurrence of the same category. This is the case, for instance in tree 2, where the NP *the table with the vase* contains the smaller NP *the vase*. More precisely, rule (14b) for NPs allows an NP to contain a PP. And rule (13d)

⁸Note that for the moment we are leaving aside matters of *inflection (flexion)* for tense, number, and agreement. We assume that having e.g. *see* listed as a V tells us that the *inflected* forms (*formes fléchies*) *sees, saw, seen, seeing* are also verbs, and that agreement is taken care of by some presently unspecified mechanism. We will return to these questions later.

for PPs allows a PP to contain an NP. This process allows NPs to be embedded within NPs (and PPs within PPs) without any restriction on the depth of embedding. For instance, in (16d), the NP *the cat on the vase on the chair on the table* contains the NP *the vase on the chair on the table*, which itself contains the NP *the chair on the table*, which itself contains the NP *the table*. Nothing in our competence prevents us from constructing even more complex NPs. However, performance constraints limit the complexity of NPs actually used.

Note that our grammar, as shown in example (16e), generates sentences which are semantically deviant. However, as we argued at the beginning of the course, this is in fact what we want since such sentences are syntactically well formed and should thus be generated by the grammar.

To conclude, a phrase structure grammar is a device which allows us to specify a set of sentences explicitly. We will say that that set of sentences is the *language* (*langage*) generated by the grammar. The purpose of this course can be summed up as specifying an explicit grammar of the English language, that is, a grammar which will generate all and only English sentences. This goal will turn out to be beyond our reach (and in fact, it is has not been fulfilled by modern linguistic science). However, in seeking to attain it, we will be led to discover many interesting facets of the syntactic structure of English. What we will do is to set up grammars which specify progressively larger subparts of English. The advantage of having an explicit grammar is that we know exactly where we stand: it is easy to see if the grammar fails to generate sentences that it should generate (i.e. well-formed English sentences), or does generate sentences that it should not (ungrammatical strings). In the former case, we will say that the grammar *undergenerates*; in the latter case that it *overgenerates*. It is thus possible to improve the grammar by reducing both undergeneration and overgeneration.

7. Subcategorization of verbs

The grammar proposed in the preceding section presents a very obvious problem however, which we will now address. Namely, our grammar overgenerates, that is, it produces sentences which are in fact not syntactically wellformed sentences of English. Here are a few examples.

- (17) a. *A boy put the vase.
 b. *The cat ate the mouse to the chair.
 c. *The girl gave a vase at the boy.

The problem in each case is that the verb is not followed by appropriate types of complements. Verbs require and/or allow certain types of complements, e.g. *put* requires an NP and a PP complement; *eat* does not allow a PP complement with the preposition *to*, etc. We can show that sentences (17) are truly ungrammatical, not just semantically deviant, i.e. that meaning based properties are not sufficient to account for the type of unacceptability illustrated in them. One major argument in favor of the idea that there is something syntactically — rather than simply semantically — wrong with these sentences comes from contrasting the complementation properties of French and English verbs with similar meanings. Consider for instance the following pairs.

- (18) Context: Two people are looking for a specific book in a room. One person finds it and says:
- a. *I found. We can stop looking. (ok: I found it.)
 - b. J'ai trouvé. On peut arrêter de chercher.
- (19) a. *His behaviour surprises. (ok: His behaviour surprises me/people/everyone.)
- b. Son comportement étonne.
- (20) a. *This situation concerns. (ok: This situation concerns me/people/everyone.)
- b. *Cette situation concerne. (ok: Cette situation me concerne / concerne tout le monde, ...)
- (21) a. Peter ate.
- b. Peter a mangé.
- (22) s. Marie is listening to a record. (*listening a record)
- b. Marie écoute un disque. (*écoute à un disque)

In English, the verb *find* is strictly transitive, i.e. it requires a direct object NP. Even in a context like the one in (18), where the specific entity which is being searched for is known to both speaker and hearer, it is impossible to omit the direct object NP, as shown in (18a); it must appear e.g. as the pronoun *it*. In French, on the other hand, the verb *trouver* can be used without an object in the same situation. Similarly, in English, verbs denoting psychological states like *surprise*, *amuse*, *please*, etc. require a direct object, as shown in (19a), even if the intended meaning is simply that the object is to be understood as generic (*people*, *everyone*).⁹ The French translations of some of these verbs can appear without a direct object, with a generic interpretation. On the other hand, as shown by (20,b) verbs like *concern*, and its French translation *concerner* both require a direct object, even if the intended meaning is that the situation concerns people in general, without stating who specifically is concerned. This contrasts with examples (21a,b), which show us that other verbs, such as *eat* and *manger*, allow their direct objects not to be expressed if the intent of the sentence is simply to state that the subject has eaten something, regardless of what it is exactly. These examples show us that both in French and English there are verbs that strictly require a direct object, and others which take an optional direct object, and that French and English verbs with similar meanings do not necessarily show the same properties (note that in general, obligatory transitivity is more frequent in English: it is not clear that there are verbs which require a direct object in French, but whose English translation does not require one). Finally, (22) shows a completely classical example where the French translation has a direct object NP, whereas the English has a PP with *to*. This shows us that what appears as a direct object of a verb in one language may appear as an indirect object of a verb with a similar meaning in the other language.

⁹Note that *His behaviour is surprising* is perfectly grammatical. But, in this case, *is surprising* is not the verb *surprise* in the progressive, but the copula *is* followed by the predicative adjective (*adjectif attribut*) *surprising*. It is important to keep this distinction in mind. There are simple tests to check whether a V-ing form is a predicative adjective or a present participle in a progressive construction. If adjectival modifiers such as *very* can be added, then the form is an adjective. Compare: (i) *This is surprising*. (ii) *This is very surprising*. (iii) *John is eating*. (iv) **John is very eating*. (v) *This is surprising me*. (vi) **This is very surprising me*. In (i), (ii), *surprising* is a predicative adjective; in (iii)-(vi), it is a present participle in the progressive construction.

The point of this comparison is not to say that the types of complements a verb takes have no relation to its meaning. We will see in this course that this is not true. We simply want to show, by examples like (18)-(22), that the meaning of a verb is not sufficient to entirely determine its complementation. Indeed, to the extent that these sentences are translations, the verbs have the same meanings (at least in these contexts), yet they differ in their possible complementation.

We thus require a syntactic means for noting the types of complementation that a verb allows. Verbs can be divided into *syntactic* subcategories according to their complementation. This is in fact a classical idea, reflected in the traditional classification of verbs as transitive, intransitive etc. The following examples illustrate the variety of types of complementation attested in English (note that this is not a complete list).

- (23)
- a. John laughed. [—]
 - b. John laughed at Peter [—PP[at]]
 - c. Mary saw John. [—NP]
 - d. Mary spoke to John [—PP[to]]
 - e. Mary spoke to John about Peter. [—PP[to] PP[about]]
 - f. Mary put the book on the table. [—NP PP[loc]]
 - g. Mary gave a book to Ann. [—NP PP[to]]
 - h. Mary gave Ann a book. [—NP NP]
 - i. Mary became angry. [—Adj]
 - j. Mary considers John unhappy. [—NP Adj]
 - k. Mary decided to leave the room. [—VP[to]]
 - l. Mary considered leaving the room. [—VP[ing]]
 - m. Mary persuaded Peter to leave the room. [—NP VP[to]]
 - n. Mary said that she would come. [—S]

In each of these examples, we have put after the sentence the type of syntactic context in which the verb appears. The dash (—) indicates the position of the verb, and the categories following the dash indicate the types of complements following it, and their order. We call these notations *subcategorization frames* (*cadres de souscatégorisation*). We can consider that each subcategorization frame defines a class of verbs, namely those that can occur in the context it specifies. So, for instance, verbs like *concern*, *eat*, *see*, *know*, ... will belong to the subcategory [—NP], because they can be followed by an NP. Note that this does not mean that they do not also belong to other subcategories. For instance, *eat* also belongs to [—], i.e. the subcategory of verbs that can occur without a complement. These two subcategories of verbs have names in traditional grammar terminology, namely intransitive and direct transitive. The problem with the traditional terminology is that it is neither rich enough nor precise enough to distinguish all of the relevant types of verbs. The advantage of using subcategorization frames for this purpose is their clarity (it is immediately obvious what the properties of the class defined are, in each case), and the fact that we can define as many types as we need.

Furthermore, subcategorization frames allow us to express indispensable information such as the type of preposition required by a verb as the head of a PP complement. For instance, *laugh* takes a PP complement with the preposition *at* (cf. *John laughed at/*on/*to/*of Peter.*). The verb *put* does not require a specific preposition, but requires any preposition with a locative destination meaning, which

we have indicated here by ‘[loc]’.¹⁰ Similarly, we can express the fact that some verbs take *to*-infinitival VP complements (23k), which we note [—VP[to]],¹¹ whereas others take a gerund VP (23l), noted [—VP[ing]].

In our grammar, the possible subcategorization frames for a given verb will be noted in the lexicon, since they are lexical properties of the verb. Note that this does not mean that the complementation properties of verbs are strictly idiosyncratic. We will see that the lexicon is a complexly structured component of grammar. Most verbs allow more than one subcategorization frame, as illustrated in the following examples. In some cases, we collapse different subcategorization frames together using obvious notational conventions (note however that we are not claiming that these are more than simple abbreviations, that is, we consider that we are saying the same thing in assigning *eat* to both the subcategories [—] and [—NP] or just to [—(NP)]). Note again that the following examples are not claimed to be exhaustive!!

- | | | |
|------|-----------------------------------|---------------------------|
| (24) | laugh, V, [—(PP[at])] | see, V, [—(NP)] |
| | speak, V, [—(PP[to]) (PP[about])] | put, V, [—NP PP[loc]] |
| | give, V, [—(NP) NP] | give, V, [—(NP) (PP[to])] |
| | become, V, [—Adj] | consider, V, [—NP (Adj)] |
| | decide, V, [— (VP[to])] | consider, V, [—VP[ing]] |
| | persuade, V, [—NP (VP[to])] | say, V, [—S] |

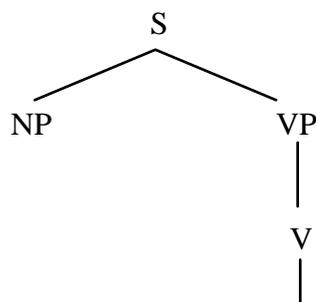
Let us now consider how this kind of information fits in with our definition of phrase structure grammars. First, it is obvious that we have to augment the number of phrase structure rules available for VPs. Second, we need to explain how the subcategorization information for a verb restricts that verb to syntactic contexts with which it is compatible. We can begin by the latter problem, which has a simple solution. We adopt the convention that a verb can be inserted under a V node if all and only the complements required by one of its subcategorization frames appear as sister(s) of that V node in the tree.

Consider tree 6 above. In this tree, the V appears with a single sister to its right, namely an NP. Given our convention, it is possible to insert into this V position the verbs *give*, *persuade*, *see*, and *consider*, among those given in (24), since they are the only ones that have a subcategorization frame of the form [—NP]. Thus, we rule out nonsentences such as **John laughed the boy*. (Again, contrast this with the semantically similar *John mocked the boy*: *mock* does have the subcategorization frame [—NP]). Indeed, the subcategorization frame for *laugh* requires either no sister to V, or a PP with the preposition *at*. *Laugh* can consequently be inserted under V in either of the trees 7 or 8.

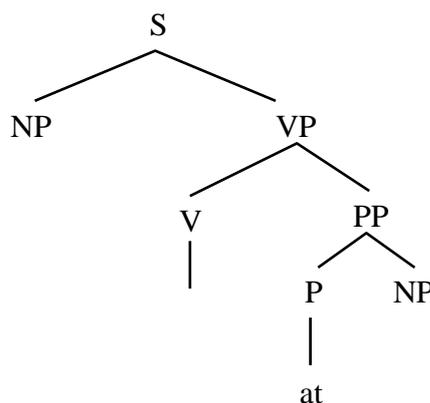
¹⁰It might be argued that this is not a legitimate syntactic property, but rather a property related to the meaning of *put*, and hence that it should not appear in the subcategorization frame. If that choice was made, we would be claiming that *John put the book from the table* is semantically deviant, whereas given the choice made above, it is claimed to be syntactically ungrammatical.

¹¹For a variety of reasons, to which we will return below, we cannot consider the infinitive marker *to* as syntactically identical to the preposition *to*. (One simple syntactic difference between the two is that the VP complement of the infinitival marker can be ellipsed if it is mentioned in the immediately preceding discourse, whereas this is not possible for the NP complement of the preposition: *John decided to leave the room, but Mary refused to*. (= *refused to leave the room*) vs. *Anne went to his room but *Mary wouldn't go to*. [= *go to his room*].)

Tree 7



Tree 8



Let us now turn to the question of phrase structure rules for the VP. Obviously, our two VP rules (13c) and (14a) are quite insufficient. Neither of the trees 7 or 8 conform to them. In (25) we give a new phrase structure rule for VPs.

(25) $VP \rightarrow V (NP) (NP) (Adj) PP^* (S)$

Note that (25) is in fact a *rule schema*, that is an abbreviation for a set of rules. In fact, it is an infinite *rule schema*, that is abbreviation for an infinite set of rules. The abbreviation conventions are as follows: (i) elements appearing between parentheses are optional; (ii) elements appearing with an asterisk on the right (here, PP^*) can be repeated any number of times, including zero times, i.e. they can simply not be there. It is the presence of the element PP^* in (25) which makes it an *infinite* rule schema. Examples of rules subsumed by the rule schema in (25) are given in (26), with examples of the types of verbs that will be insertable in the structures resulting from them, given the subcategorization frames in (24):

- | | | | |
|------|----|------------------------------------|------------------------------------|
| (26) | a. | $VP \rightarrow V$ | laugh, speak, see, ... |
| | b. | $VP \rightarrow V NP$ | give, persuade, see, consider, ... |
| | c. | $VP \rightarrow V PP$ | laugh, speak, give, ... |
| | d. | $VP \rightarrow V NP PP$ | give, put, ... |
| | e. | $VP \rightarrow V NP NP$ | give, ... |
| | f. | $VP \rightarrow V PP PP$ | speak, ... |
| | g. | $VP \rightarrow V Adj$ | become, ... |
| | h. | $VP \rightarrow V NP Adj$ | consider, ... |
| | i. | $VP \rightarrow V S$ | say, ... |
| | j. | $VP \rightarrow V Adj PP PP$ | ?? |
| | k. | $VP \rightarrow V NP NP Adj PP PP$ | ?? |

Two things should be pointed out about rules (26). First, we have ignored the case of VP complements of verbs, as exemplified in (24) by *decide*, V, [$-(VP[to])$], *persuade*, V, [$-NP (VP[to])$], *consider*, V, [$-VP[ing]$]. At this stage in the course we will not be considering such cases, which we will return to later. Second, beyond the legitimate possible VP rules illustrated in (26a-i), it should be noted that rule schema (25) also allows VP rules (in fact an infinite number of such rules) which create structures corresponding to no actual English VPs. For instance, there are no VPs in English with the structures illustrated in (26j,k). In fact, this is a direct consequence of the fact that there are no verbs in English which require such lists of

complements. Specifically, following the chosen examples (26j,k), there are no verbs with the subcategorization frames [— Adj PP PP] or [— NP NP Adj PP PP]. The absence of such verbs in English insures that the rules in question will never be useable in a completed syntactic tree: if such a rule is used, we obtain a configuration where there is no verb that can be inserted into the V position of the tree, and hence no sentence will correspond to the tree. Thus, given the way we have constrained the insertion of verbs into phrase structure trees, in terms of their subcategorization frames, the very general statement of the structure of VPs given in (25) does not lead to overgeneration by our grammar. One can characterize this mechanism informally by saying that the options offered by rule schema (25) are filtered by the possible subcategorization frames for verbs.

Note finally that we are ignoring numerous important constructions of English at this point, e.g. modal auxiliaries, verb-particle constructions, passives, etc. We will return to these as the course proceeds.

8. The basic structure of NPs

At this point, we have only mentioned two possible structures for NPs, namely those provided by phrase structure rules (13b) and (14b), i.e. $NP \rightarrow \text{Det } N$ and $NP \rightarrow \text{Det } N \text{ PP}$. The following examples will allow us to increase the coverage of our grammar.

- (27)
- a. Cats are mammals with claws.
 - b. Sincerity is an important quality.
 - c. A big black hairy frightening cat appeared.
 - d. Peter saw a beautiful vase from China with green stripes.
 - e. The man who Mary met crossed the Nile.

As shown by the NPs *cats*, *mammals with claws*, *sincerity*, *Peter*, *China* in these sentences, certain nouns can appear without a determiner. The factors which determine these possibilities have been well studied in previous grammar courses you have taken, and we will not return to them here in any detail. We can simply note that we need to allow for subcategories of nouns with different properties in their selection of determiners, i.e. which determiners are obligatory or optional with them. E.g. noncount nouns, count nouns (for which the plural vs. singular distinction is further relevant to determiner selection), different classes of proper nouns (note the contrast between **the/∅ Peter* and *the/*∅ Nile*). These properties of nouns will be noted in their lexical entries. Just as an example, we might have the property –Det in the entry for *Peter*, indicating that this proper noun does not allow determiners (in its basic uses at least, there are of course cases like *there is a Peter in my class*; *he is no longer the Peter I used to love*). Note that there are obvious correlations between the semantics of nouns and their properties with respect to determiner selection, and that these should be expressed in a suitably structured theory of the lexicon. But there are cases where it appears that the selection properties are not predictable from meaning properties, e.g. the fact that nouns like *furniture* or *information* are noncount. Furthermore, it should be noted that the other elements appearing in the NP (e.g. adjectives, PPs, relative clauses) can affect determiner selection.

The above examples also show that a noun can be preceded by an arbitrary number of adjectives (see especially (27c)), that nouns can be followed by arbitrary numbers of PPs (see especially (27d)), and by relative clauses (27e). We will ignore

relative clauses at this point. But we can account for the other possibilities described here by the following phrase structure schema:

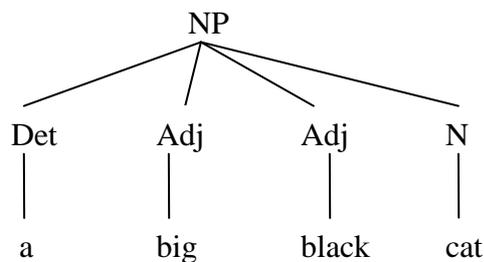
(28) $NP \rightarrow (Det) Adj^* N PP^*$

This will allow us to assign structures like the following:

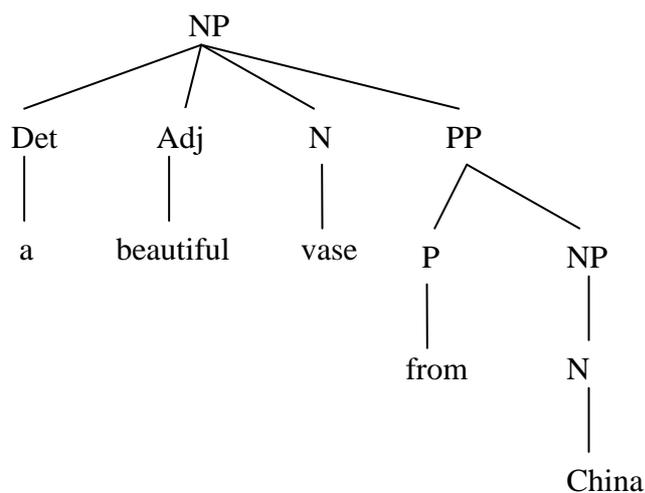
Tree 9 a



Tree 9 b



Tree 9 c



To conclude this section, let us repeat that this is a very superficial treatment of the NP. There are numerous phenomena which we have ignored, e.g. quantifiers, numerals, possessives, etc. The purpose of this section is just to provide a basic idea about the structure of the NP, for use in our discussions of other examples. The NP will not be at the center of our investigations in this course.

9. Subcategorization of other grammatical categories

Other grammatical categories than verbs also impose constraints on the types of complements that they can occur with. Let us briefly consider here the case first of prepositions, then of nouns. Consider the data in (29):

(29) a. Mary spoke to John / *to.

- b. Mary laughed at John / *at.
- c. Mary spoke before John / before.
- d. Mary walked down the stairs / down.
- e. Mary walked out / *out the house / out of the house.
- f. Mary came up / up the path / up to the path.
- g. Mary came before John left.
- h. Mary was surprised at who John chose.

Many prepositions require a following NP complement. This is the case for instance of *to* and *at*, as illustrated in (29a,b), and of many other prepositions such as *for*, *of*, *with*, ... We can indicate this by assigning them the subcategorization frames in (30).

(30) *to*, *at*, *for*, *of*, *with*: P, [— NP]

Other prepositions are optionally followed by an NP. As shown by (29c,d) this is the case for *before*, *down*, ... We can indicate this by assigning them the subcategorization frames in (31).

(31) *before*, *down*: P, [— (NP)]

Yet other prepositions take as complements categories other than NPs, specifically PPs or sentences. This is illustrated in (29e), which shows that *out* can either appear without a complement, or with a PP[*of*], but not with an NP.¹² On the other hand, *up* can appear alone, with an NP complement, or with a PP[*to*]. (29g,h) show that prepositions can be followed by sentences, a simple clause in (29g), and a Wh-exclamative clause in (29h). We can represent these facts by assigning them the subcategorization frames in (32).

- (32) a. *out*: P, [— (PP[*of*])]
 b. *up*: P, [— (PP[*to*])], [— (NP)]
 c. *before*: P, [— (S)]
 d. *at*: P, [— S]

A number of remarks are in order on the analysis presented here. First, even those prepositions such as *to*, *at*, *for*, ... — which we said required a complement — can appear without one in cases where the complement is, informally speaking, *displaced*. This can happen in question or passive sentences such as (33). For reasons which will become clear later in the course, we do not consider these sentences as exceptions to the above statements:

- (33) a. John was not often spoken to.
 b. Who(m) did Mary laugh at.

Second, it is important (though not always trivial) to distinguish the behaviour of prepositions illustrated here from their potential behaviour as ‘particles’ in *verb-particle* (or *phrasal verb*) constructions. Prepositions which usually require a complement can sometimes appear without one when they are a part of a phrasal verb, as illustrated in (34a). One case where it is relatively easy to distinguish prepositions from particles is when there is an accompanying NP. We can see that *down* and *up* are prepositions in (29d,f) by the fact that they cannot appear after the NP, which is

¹² As usual things turn out to be more complex when looked at in detail. *Out* has certain ‘direct transitive’ uses, specifically in cases like *John kicked the ball out the window*, where it can be replaced by *through*.

typically possible in verb particle constructions with a direct object, as illustrated in (34d).

- (34) a. Mary finally came to. (i.e. regained consciousness)
 b. *Mary walked the stairs down.
 c. *Mary came the path up.
 d. Mary called up the boy / called the boy up.

Third, traditional grammars would say that words like *before*, *down*, and *out*, are adverbs when they are not followed a complement. Similarly, traditional grammars would say that *before* in (29g) is a subordinating conjunction. However, since even the most traditional definition of prepositions requires us to allow them to be followed by NPs, PPs and sentences (e.g. *at*, in (29h)), it is clear that different subcategories of prepositions must be set up, in function of the types of complements they allow. Once this is accepted, it is simpler to adopt an analysis where *before*, in its ‘adverbial’ uses, is simply an intransitive preposition, and in its ‘subordinating conjunction’ uses, is simply a preposition subcategorizing a sentence.

To conclude this section, it should be noted that nouns also impose constraints on the types of complements by which they can be followed. We will briefly return to this subject later in the course, but we can point out immediately that, in general, gerunds and nouns that are morphologically derived from verbs take complements of the same category as those of the corresponding verb, except that if the verb has a direct object, the derived noun usually takes a PP[*of*] (gerunds can take direct objects).

- | | | | |
|---------|---------------------------|---|----------------------------|
| (35) a. | To destroy a house | | The destruction of a house |
| | V, [—NP] | ↔ | N, [—PP[<i>of</i>]] |
| b. | To live in Canada | | Life in Canada |
| | V, [—PP[<i>in</i>]] | ↔ | N, [—PP[<i>in</i>]] |
| c. | Suggest something to John | | A suggestion to John |
| | V, [—PP[<i>to</i>]] | ↔ | N, [—PP[<i>to</i>]] |

10. Semantic roles

Consider the way we interpret sentences with and without an object, depending on the choice of the verb.

- (35) a. John ate the apple
 b. John ate.
 c. #The apple ate.
- (36) a. John broke the branch.
 b. #John broke.
 c. The branch broke.
- (37) [— (NP)]

We understand the verb *eat* as describing a relation between two entities: an eater and a thing eaten. When we say (35a), we understand that John, the referent of the subject, is the eater, and that the apple, the referent of the direct object, is the thing eaten.¹³ If we use *eat* without an object, as in (35b,c), we understand the subject in the same way as in the transitive use, namely as the eater, and we understand the sentence to mean that the subject ate some unspecified entity. Hence the strangeness of (35c), which entails that the apple is the eater, a situation which we know to be unlikely in the real world. This explains why (35a) entails (*a pour conséquence logique*) (35b)

On the other hand, the verb *break*, though it has the same subcategorization frame (37) as *eat*, given our current assumptions, is interpreted in a completely different way. When it appears with a subject and a direct object, we interpret the subject as the cause of the breaking and the object as the entity which breaks. When it appears with only a subject, this subject is interpreted as the entity which breaks, and no cause is expressed. Hence, (36c) is entailed by (36a), but (36b) is not. (36b) cannot be interpreted as meaning that John broke some unspecified thing. It has a completely different (and implausible) interpretation where John is not the cause of a breaking event, but rather the thing which breaks in that event.

Consider also the following examples:

- (38) a. Mary gave the book to John.
 b. Mary gave John the book.

Here, we see a situation where the same relation of giving, i.e. with Mary the giver, the book the thing given and John the recipient, is expressed with two different structures, one where the thing given appears as an NP, and the recipient appears as a PP[to] which follows, the other where both the thing given and the recipient appear as NPs, with the recipient necessarily preceding the thing given.

In order to be able to describe these types of data, which are crucial to the way we interpret sentences, we introduce the notion of *semantic roles*, also known as *thematic roles*, or *thematic relations* (*rôles sémantiques*, *rôles thématiques*, *relations thématiques*). We will say for instance that in (35a) John has the *agent* role (*rôle agent*) with respect to the verb *eat*, and that the apple has the *patient* role (*rôle patient*). In (35b,c) the subject has the same role of agent (hence the strangeness of (35c) since agents are typically interpreted as animate). In (36a), we will say that the

¹³Note my use of *referent* here is important: indeed, it is not the subject as such which is the eater, but the referent of the subject. Since confusion is unlikely, however, in what follows I will not continue to be unnecessarily precise, and will allow myself to say things like: “the subject is the eater”.

branch has the *theme* role (*rôle thème*) with respect to the verb *break*, and that John has the role *cause*. In (36b,c) where there is no object, the subject is interpreted as having the theme role (hence the oddity of (36b)). In (38a,b), we will say that, in the event of giving, Mary is the agent, the book is the theme, and John is the *recipient* (*récepteur*).

One of the central problems in any discussion of semantic roles is choosing and defining a specific set of roles. Although we have certain strong intuitions, there are many complex cases, and many different proposals have been made in this regard by different linguists. As an example of the types of difficulties involved, consider why we said that John was an agent in (35a), but a cause in (36a). The distinction involves the question of animacy and intention. The subject of *eat* must be animate, and must be intentionally participating in the act (i.e. one would not say of a force-fed prisoner that s/he had eaten).¹⁴ On the other hand, the subject of *break* (when it has a direct object), is neither necessarily animate (e.g. *The wind broke the branch*) nor intentionally participating in the event (e.g. *John broke the vase by accident*).

One way to completely avoid the vexed question of arriving at an exhaustive and well-defined list of semantic roles is to resort to the notion of *individual* semantic roles (as you will see, they are *individual* in the sense that they are defined specifically for each individual verb; this is to be distinguished from labels like agent or patient, which are assumed to be assigned by many different verbs to their arguments, i.e. to have a significance beyond any given individual verb). This is essentially what was done above when we referred to the verb *eat* as having as arguments an **eater** and an **eaten**, and to *give* as having as arguments a **giver**, a thing given (or **givee**) and an entity to whom the givee is given (what we called a **recipient**, but note that recipient is not an individual semantic role, but a general semantic role like agent). This is of course an essentially uninteresting way of discussing semantic roles, since it proposes no generalizations across verbs. What it does in fact is to individually **index** the different roles assigned by a verb, allowing us to refer to them. This can be useful in that it allows us to say things like we did above about (38a), namely that the referent of the NP has the same role in the giving event as does the referent of the second NP in (38b), namely the givee. In such a statement, we are not being in anyway specific about what that role is. The individual role givee simply allows us to indicate (cf. *index*) which role in the event we are talking about.

On the other hand, though they can serve a useful indexing function in talking about the arguments of verbs, individual semantic roles fail to give any insight at all with respect to how roles played by arguments of different verbs are similar or different. They do not allow us to make any general statements over sets of verbs based on the fact that they assign a given role to their subject. This is, however, one of the major reasons why roles are interesting entities to study. For instance, consider the following statements:

- (39) a. If a verb assigns the role agent to one of its arguments, that argument will appear as the subject of the verb in active sentences.
 b. If the verb does not assign the agent role, but does assign an instrument role, the instrument will appear as the subject in active sentences.

¹⁴Many of the statements made here of the type ‘the subject of eat must be animate...’ should be taken with a grain of salt. We are simplifying things here to make the central points and not taking into account all sorts of cases such as e.g. metaphor (*Rust had completely eaten the iron*).

- c. If the verb assigns neither agent nor instrument, but does assign a theme role, that role will appear as subject.

This is illustrated in the following sentences:

- (40) a. Mary opened the door with the key.
 b. The key opened the door.
 c. The door opened.
 d. *The key opened the door by Mary.
 e. *The door opened with/by the key.

We see that it is impossible, if the agent is present, as in (40d), for it to appear in another syntactic position than subject (if the verb is active, of course). Similarly, in (40e), we see that if the instrument is present, it cannot appear as a PP.

The statements in (39) are a simplified subpart of what is often called the theory of *linking*, from the idea that certain semantic roles are normally linked to certain syntactic positions. This is an extremely interesting general theory about the interface between syntax and semantics, about what types of syntactic constructions will exist for different verbal meanings. For instance, it predicts that there will never be a verb with a meaning similar to *open*, say *nepo*, but which has a different syntactic construction, namely one where, in the active, the agent is the direct object and the theme is the subject. That is, the theory predicts the fact that it is not by chance, but on principled grounds that there is no such verb, where *The door nepoed Mary* would mean *Mary opened the door*. (Note that not all verbs behave this way, compare: *Mary fears the dark* and *The dark frightens Mary*. However it can be shown that this is not an exception by arguing that in such sentences neither Mary, nor the dark is an agent. It is usually assumed that *Mary* is an **experiencer** (*expérient* ou *experienceur*), and that *the dark* is a **stimulus**). A theory of linking of the type illustrated in (39) can only be formulated within a theory which countenances general semantic roles, since it requires being able to refer to similar roles across classes of verbs. The problem is that at present, there is no consensus among linguists as to the precise list and definition of roles. However, there is some agreement on a series of prototypical cases. To conclude this section, here is a brief list of the most often used roles for which there is some consensus, with informal definitions and examples.¹⁵

Agent. *Mary threw the apple*. Agents are typically animate and intentionally involved in the event. A good test for recognizing agents is the possibility of adding *on purpose* to the sentence, e.g. *Mary threw the apple on purpose* is ok.

Cause. *The wind broke the fence*. Causes are typically unintentionally involved in the event and inanimate, but they are autonomous, they are not under the control of another entity. (Note the strangeness of *The wind broke the fence on purpose*, which shows that the wind is not an agent).

Experiencer. *Mary heard the song*. Experiencers are animate like agents, but unintentionally involved in the event (contrast *hear* with e.g. *listen*, where the subject is an agent: #*Mary heard the song on purpose*; ok: *Mary listened to the song on purpose*).

Instrument. *The knife cut the bread*. Instruments are similar to causes, in that they are typically inanimate and unintentional, but they lack the autonomy of a cause. In

¹⁵Note that the terminology here is more detailed than in the correction of homework 2, and that this sometimes leads to minor inconsistencies (i.e. using *patient* for *theme* and *beneficiary* for *recipient*).

this example, there necessarily was a third entity involved which caused the knife to cut the bread.

Stimulus. *Mary saw **the house**. Mary likes **candy**.* Entity which is the stimulus of the experience, for a verb which takes an experiencer role argument.

Theme. *Mary threw **the apple** to Tom.* Themes are entities which change of state as a result of the event (e.g. change in location, as illustrated here, change in possession as illustrated in the above examples with the verb *give*, where the givee is a theme).

Patient. *Mary ate **the apple**.* Patient can be characterized as a subtype of theme, but where the entity is causally affected by the event, in the sense of a change in its internal state.

Location. *Mary danced **in the kitchen**.* Location is the place where an event took place.

Source. *Mary took the apple **from the kitchen**.* Location from which a theme is displaced.

Goal. *Mary took the apple **to school**.* Location to which a theme is displaced.

Maleficiary. *John took the apple **from Peter**.* Animate source, with loss of possession.

Recipient. *John gave the apple **to Peter**.* Animate goal, with gain of possession.

Beneficiary. *John washed the car **for Peter**.* Person for whose benefit the event is carried out.¹⁶

Many theories of semantic roles assume that an argument receives only a single role. However, others assume that combinations of roles are possible, and that is the position we will take here. E.g. In *John bought the book for Peter*, we will assume that Peter is both a recipient and a beneficiary, whereas in *John washed the car for Peter*, we will assume that Peter is the beneficiary, but not the recipient. Similarly we assume that the subject of *listen* is both an agent and an experiencer, whereas that of *hear* is only an experiencer.

Since the purpose of our grammar is to provide a formally explicit representation of the competence of a native speaker of a language, and since the assignment of certain semantic roles to certain syntactic positions is obviously a part of that competence, we must modify our grammar so that it accounts for semantic roles. Since it is the choice of the verb that determines the semantic roles of its *arguments* (French: *arguments*) (that is, the NPs and PPs which are in construction with it: subject, objects), the most obvious place for this information is in the lexical entry of each verb. And since the roles are assigned to syntactic positions defined in the verbs subcategorization frame, attaching the roles to these positions seems to be a natural way of representing this information. One problem, however, is that it is obvious that the verb assigns a semantic role to its subject, but we have not included the subject position in the subcategorization frame for verbs. Henceforth, we will include the subject in the subcategorization frame.¹⁷ Given this choice, we can choose

¹⁶Note that we are using *recipient* as the opposite of *maleficiary* (i.e. animate goal vs. source), rather than *beneficiary*, which has a different status.

¹⁷We will see that there are in fact more clearly syntactic reasons for doing this later in the course, for instance, the fact that some verbs allow sentences as subjects, whereas others do not, even though semantically it might seem that they should be able to. Similarly the fact that some verbs require specific subjects, e.g. the *it* of meteorological verbs.

a representation like the following for the subcategorization and semantic role information of the verbs *eat*, *break* and *give*.

- (41) a. eat, [NP — (NP)]
 | |
 agent patient
- b. break, [NP —]
 |
 theme
- c. break, [NP — NP]
 | |
 cause theme
- d. give, [NP — (NP) (PP[to])]
 | | |
 agent theme recipient
- e. give, [NP — NP NP]
 | | |
 agent recipient theme

11. Complements vs. adjuncts

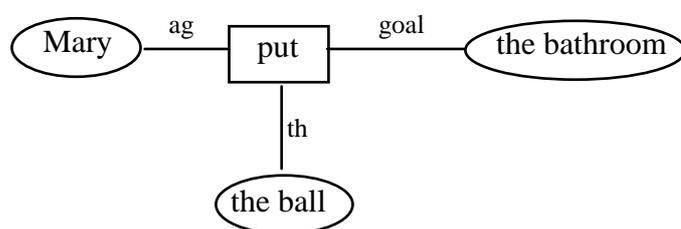
In this section, we discuss the syntactic and semantic relations to the verb of what the French school grammar tradition calls ‘compléments’ (compléments d’objet directs ou indirects, compléments circonstanciels), and we propose an alternative distinction between what we will call **complements** and **adjuncts** (adjuncts are also sometimes called *modifiers*, French: *circonstants*, *modifieurs* or *adjoints*). The following examples will allow us to intuitively present the intended distinction, before discussing it in more detail.

- (42) a. Mary put the ball in the bathroom.
 b. Mary washed the ball in the bathroom
 c. Mary threw the ball in the bathroom.

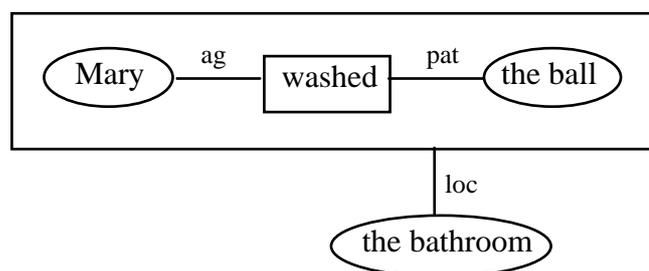
If you think about the meaning of these sentences, you will see that the PP *in the bathroom*, which would be called, in the terms of French school grammars, a ‘complément circonstanciel de lieu’, in fact plays different roles in them, both from a semantic and from a syntactic point of view. Sentence (42a) describes a ternary relation, an event involving three participating entities: Mary, who is the agent; the ball, which is the theme; and the bathroom, which is the goal. The meaning is that the theme is transferred from some unspecified source to a specific goal (or destination), namely the bathroom. On the other hand, sentence (42b) describes a binary relation, an event involving two participating entities: Mary, who is the agent; and the ball, which is the patient. The location, in the room, has a different status: it indicates where the event of washing takes place. It is understood as specifying the whole event, rather than as a participant in the event. This distinction appears clearly in the case of (42c), which is ambiguous between these two types of interpretations. (42c) can either be understood as a ternary relation, where the arguments Mary, the ball and in the

room have roles similar to those in (42a), or as a binary relation, where they have roles similar to those in (42b). In the first case, the bathroom is the destination of the ball. It is the place where the ball ends up. Note that under this reading, it is not at all necessary for Mary herself to have been in the bathroom. She could have been in the hall, and have thrown the ball from there. In the second case, the bathroom is a location where the throwing event takes place, and all the participants involved in the event are thus in the bathroom. No goal is specified. Under this interpretation (which is slightly less natural out of context than the former), Mary must be in the bathroom. Note also that under this interpretation, a goal complement can be added: *Mary threw the ball into the closet in the bathroom.*¹⁸ We can give an intuitive representation of the two types of semantic relations discussed here using the following diagrams:

(43)



(44)



In these diagrams, predicates and events/processes have been put in boxes, whereas arguments and adjuncts have been put in ellipses. In (43), the predicate *put* has three arguments, between which it establishes a ternary relation, describing a certain type of event/process. In (44), the predicate *wash* has two arguments, between which it establishes a binary relation, describing an event/process of washing, which is contained in a larger box. That event of washing is furthermore modified by the adjunct *in the bathroom*, which indicates the location at which the event takes place. Sentence (42c) allows both these types of semantic interpretations.

One of the consequences of the difference in the way complements and adjuncts affect the meaning of a sentence is the following. The meaning contribution of a given adjunct to a sentence will be essentially identical, whatever the semantic content of the sentence, specifically, it will be essentially independent from the meaning of the verb. For example, if you add *in the room*, as an adjunct, to a sentence which has as its

¹⁸Note that this sentence is in fact ambiguous: *in the bathroom* can also be a modifier of the noun *closet*, i.e. part of an NP *the closet in the bathroom*. We are interested here in the reading where the sentence means the same thing as *In the bathroom, Mary threw the ball into the closet*.

semantic content an event/process X, the meaning contribution of this PP will be the same in all cases, namely that the event/process X took place in the room, that is, it will indicate the location of the event/process. The meaning contribution of a given complement, on the other hand, cannot be specified independently of the semantic content of the sentence: it is crucially dependent on the meaning of the verb. This property is extremely clear for direct objects, which are the most typical subclass of complements. A direct object can contribute extremely different types of meanings to a sentence, depending on the choice of the verb. Here are a few examples, where the role of the direct object is indicated in parentheses:

- (45) a. John broke the lamp. (patient)
 b. John put the lamp on the table. (theme)
 c. John reached the lamp. (goal)
 d. Dark rooms scare John. (experiencer)
 e. Mary left the country. (source)

Now that we have exemplified the general idea of the distinction between complements and adjuncts, let us try to show more specific syntactic correlates of this distinction. A first thing to note is that in our discussion of the subcategorization properties of verbs in section 7, we only took into account phrases that we are now calling complements. None of our examples involved adjuncts, for reasons that will become clear in what follows.

Direct objects

We can define a direct object of a verb as an NP sister of the verb. Direct objects are always complements, never adjuncts. This gives us a first criterion for distinguishing complements and adjuncts.

Criterion 1

An NP following a verb is a complement of the verb, not an adjunct.¹⁹

Obligatoriness vs. optionality

In our discussion of the subcategorization properties of verbs, we saw that some complements are obligatory. They must be syntactically realized. From a semantic point of view, we can say that the verb requires a certain argument to be syntactically expressed. It should be noted, on the other hand, that adjuncts are never obligatory. We thus have a partial criterion for distinguishing complements and adjuncts:

Criterion 2

If a PP is obligatory, then it is a complement.²⁰ If it is optional, then it can be either a complement or an adjunct.

¹⁹This criterion actually needs to be made a bit more selective to avoid classifying certain time adjuncts that appear as NPs as complements, for instance: *John danced two days / the day before yesterday / last month / ...* These cases are intuitively easy to distinguish, and we will not discuss them further here.

²⁰Note that this criterion means that: (a) Adverbs can be complements, for certain verbs. For instance, the verb *behave* cannot appear without a manner complement, which can be an adverb:

- (i) *Mary behaved.
 (ii) Mary behaved politely / badly / in a polite way / the way we expected / like a fool.
 (b) With certain specific verbs, time NPs of the type discussed in the preceding footnote can be complements:
 (i) *The film lasts. (iii) *The job took.
 (ii) The film lasts two hours. (iv) The job took two years.

Fronting

Both complements and adjuncts can undergo so-called ‘fronting’, i.e. movement to the initial position of the sentence. However, the discourse effects are very different. A sentence with a fronted complement will only be appropriate in certain specific types of previous discourse contexts, and will result in certain types of focussing or contrasting effects, which are usually correlated with a specific pattern of intonation (e.g. contrastive stress on the fronted complement). Sentences with fronted adjuncts do not show these effects, at least not to the same degree. Here are some examples:

- (46) a. That boy, Mary never saw.
 b. In the kitchen, Mary put a ball.
 c. In the kitchen, Mary went every five minutes.
 d. In the kitchen, John baked a cake.
 e. In the kitchen John danced all afternoon.
 f. At 6pm, John drank some tea.

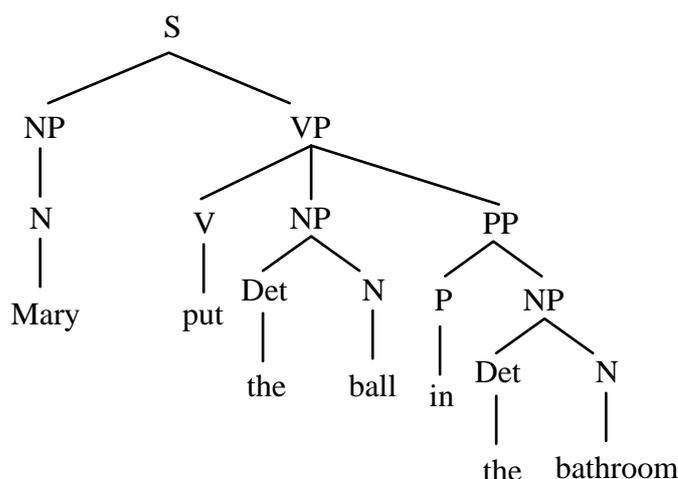
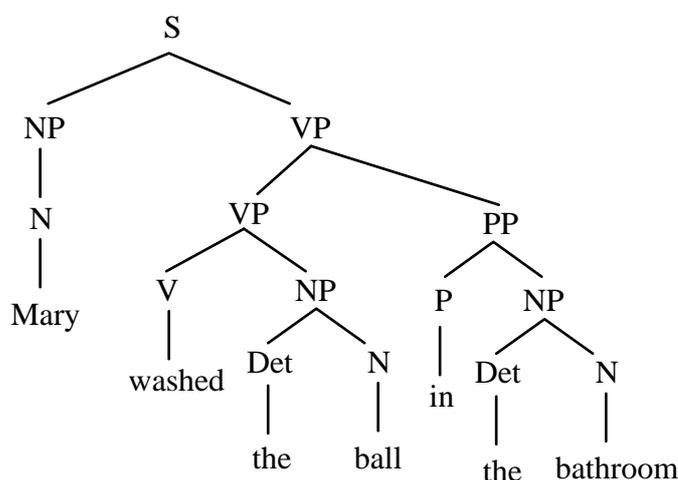
Sentences (46a,b,c) have fronted complements. They are only natural in certain types of discourse contexts. For instance, they would be strange as the opening sentence of a discourse. They also sound much better if there is contrastive stress on the fronted phrase. Sentences (46d,e,f) on the other hand, have fronted adjuncts, and they do not exhibit the same types of discourse constraints, and do not require any kind of marked intonation. This gives us a third criterion for distinguishing complements and adjuncts.

Criterion 3

If a postverbal phrase can be fronted without imposing special discourse appropriateness constraints and special intonation patterns, then it is an adjunct. If not, it is a complement.

Let us now briefly consider how we should integrate the distinction between complements and adjuncts in our grammar. A first thing to note is that only complements should appear in the subcategorization frames of verbs. Indeed, the previous discussion has shown that adjuncts, contrary to complements, are essentially independent of the choice of the verb, both from a semantic and from a syntactic point of view. In this respect, subjects, which we chose to enter into the subcategorization frame of verbs at the conclusion of section 10, are like complements, and unlike adjuncts. Indeed, the very reason for which we chose to add subjects to the subcategorization frame was that their semantic role with respect to the verb depends crucially on the choice of the verb.

We shall assume that sentences (42a) and (42b) respectively have the following structures.

Tree 10**Tree 11**

These trees embody the following assumptions: complements appear in the tree as sisters of the verb, whereas adjuncts appear as sisters of a VP. We shall further assume that only sisters of the verb can satisfy the subcategorization requirements of the verb, other than the subject requirement. This means that the verb *put*, which has the subcategorization frame [NP—NP PP[loc]], cannot appear in place of *washed* in the structure given in tree 11. Indeed, the obligatory PP[loc] is *not* present as a sister of the verb. Tree 10 can be derived by the familiar phrase structure rules introduced in section 6. Tree 11, on the other hand, requires us to assume a new phrase structure rule, namely (47), to introduce adjuncts.

(47) VP → VP PP

We can justify this choice of representations in the following way. Assigning a structure like that in tree 11 to sentence (42b) directly accounts for the fact that the adjunct is optional. Indeed, the form of rule (47) is such that its application is necessarily optional. Since the symbol VP appears both to the left and to the right of the arrow, one is never forced to use such it. For example, in tree 11, at the level of the VP sister of the subject, we obviously could have applied the rule VP → V NP

directly, without applying (47), in which case we could have obtained the same sentence, but without the adjunct, namely *Mary washed the ball*. The same reasoning shows that the rule (47) can reapply to its own output, creating structures with two adjuncts, where each adjunct forms a larger VP with the preceding VP, e.g. Mary [VP [VP [VP washed the ball VP] in the bathroom VP] at 10 pm VP]. Finally, the fact that the verb and its complements are more closely linked in the tree, as sisters, than adjuncts and the verb reflects the closer semantic link between complements and verb, illustrated in the contrast between (43) and (44) above.

In the rest of this section, we will discuss three syntactic constructions which provide further justification for the distinction between adjuncts and complements, and for the way we have chosen to represent it in trees 10 and 11, namely the pseudocleft construction, VP ellipsis and VP fronting. Note however that the discussion of VP ellipsis is less reliable than the others.

The pseudocleft construction

The following sentences illustrate a construction which is known as the pseudocleft construction:

- (48) a. What the girl found was the book.
 b. What the girl sat on was a chair with a high back.
 c. What the boy hit with a vase was the table.

The pseudocleft construction is characterized by an initial occurrence of the word *what*, followed by a sentence in which there is a missing NP, followed by the verb *be*, and ending with the missing NP.²¹ In (48a), for instance, we have *what + the girl found + was + the book*, where *the girl found* is the sentence, missing its NP object (recall that *find* obligatorily takes a direct object), and *the book* is the missing NP object. For any pseudocleft sentence, there is a corresponding simple sentence, where *what* and *be* disappear, and the missing NP appears in its usual place in the sentence. The sentences in (48) correspond to those in (49).

- (49) a. The girl found the book.
 b. The girl sat on a chair with a high back.
 c. The boy hit the table with a vase .

This construction is interesting because it can serve as a test for constituency. Indeed, the sequence of words which appears after *be* must be a complete NP in the corresponding simple sentence. So, for instance, there is no possible alternate pseudocleft corresponding to (49b), where only *a chair* appears after *be*: **What the girl sat on with a high back was a chair*. This is because the only plausible reading for (49b) is one where *a chair with a high back* forms a single NP, i.e. *with a high back* is a modifier of *chair*. Similarly, whereas (49c) is ambiguous, as was discussed above in section 4, the corresponding pseudocleft (48c) is unambiguous: it can only be obtained from the analysis of (49c) where *with a vase* is an instrument, rather than a modifier of the noun *table*. Indeed, under the analysis where *with the vase* is a noun modifier, the whole NP must appear after *be*, resulting in the pseudocleft *What the boy*

²¹In fact, the initial part of the pseudocleft sentence, e.g. *what the girl found*, is a headless (also called *nominal*) relative clause, a construction which can function generally like an NP, and which in the pseudocleft construction is the subject of *be*.

hit was the table with the vase. Thus, the two possible structures for (49c) lead to two different pseudocleft sentences.

The interesting thing about the pseudocleft construction in this context, is that it is also possible to have pseudoclefts where a VP is missing (rather than an NP), and where the missing VP appears after the verb *be*. The only difference is that the VP does not entirely disappear, but is replaced by the verb *do*, as illustrated in (50).

- (50) a. What Mary did was (to) knock on the door.
 b. What Mary did in the bathroom was (to) wash the ball.
 c. What Mary did was (to) wash the ball in the bathroom.
 d. What Mary did was (to) put a ball in the bathroom.
 e. *What Mary did in the bathroom was (to) put the ball.

Note that the postposed VP can appear either in the *to* infinitive or in the bare infinitive (or *base*) form. As shown by the contrast in grammaticality between (50b,c) and (50d,e), this construction justifies the structures chosen for the related simple sentences in trees 10 and 11. Recall that one constraint on pseudoclefts is that the words that appear after *be* have to form a constituent in the corresponding nonpseudocleft sentence. Indeed, in tree 11, both *wash the ball*, and *wash the ball in the bathroom* are constituents, namely VPs. And, as shown by the grammaticality of (50b,c), either of these VPs may be placed after *be* in the corresponding pseudoclefts. Specifically, it is possible to move only the smaller VP behind *be*, leaving the adjunct *in the bathroom* before *be*. In tree 10, however, only *put the ball in the bathroom* is a VP. In fact, *put the ball* is not a constituent at all in that tree. Since only complete constituents, in these cases VPs, can be replaced by *do* and moved behind *be* in the pseudocleft construction, by adopting the structure in tree 10 for sentences with *put*, we predict the contrast in grammaticality between (50e) and (50b). (50e) is impossible because there is no analysis of (42a) where *put the ball* is a VP. Note that these facts not only confirm the distinction between adjuncts and complement proposed above, but also provide justification for the idea that a VP combined with an adjunct forms a larger VP, as established by rule (47), and illustrated in tree 11.

One final remark on this usage of the pseudocleft construction to test for adjunct vs. complement status. The verb *do* that appears in the pseudocleft is in fact the main (lexical) verb *do*, rather than the auxiliary *do*. This is important because main verb *do* can only replace verbs of which it is a hyperonym, i.e. verbs which are subsumed under its very general meaning, namely activity verbs, but not stative verbs for instance. (Auxiliary *do* can replace all verbs, even stative verbs, as we will see in the section on VP ellipsis). This means that this test cannot be used to test whether a PP is a complement or an adjunct with stative verbs, or other verbs which are not hyponyms main verb *do*. For instance, though other criteria suggest that *remained in the room* is a VP in (51a), there is no corresponding pseudocleft, with or without the PP *in the room*.²²

- (51) a. The book remained in the room.
 b. *What the book did was remain in the room.
 c. *What the book did in the room was remain.

²²We can confirm the fact that it is main verb *do* that appears in pseudoclefts by showing that negation requires the appearance of auxiliary *do*:

- (a) What John didn't do was clean his room.
 (b) *What John didn't was clean his room.

We thus get a fourth criterion for distinguishing complements and adjuncts:

Criterion 4

If a PP can be left behind in a pseudocleft construction where a VP is postposed behind *be*, then that PP is an adjunct. If the PP cannot be left behind, but must go to the end with the rest of the VP, then it is a complement. (This criterion is not applicable if the main verb is not a hyponym of *do*)

VP Ellipsis (or Post-Auxiliary Ellipsis)

In English, there is a general rule that allows ellipsis of a VP after an auxiliary or *to*, on the condition that it has been previously uttered in the discourse context. If there is no auxiliary present in the sentence, the finite VP can be ellipsed and replaced by auxiliary *do*. This construction, called VP ellipsis (or VP deletion or Post-Auxiliary Ellipsis) is illustrated in (52).

- (52) a. Mary put a book on the table before John did.
 b. Mary put a book on the table and John will too.
 c. Mary put a book on the table but John didn't manage to.

In all three sentences, the VP *put a book on the table* is missing in the subordinate clause. In (52a), the non-ellipsed version (*John put a book on the table*) has neither an auxiliary, nor *to*, and consequently auxiliary *do* appears.²³ In (52b,c) the presence of the auxiliary *will* and of *to* respectively allows the simple ellipsis of the VP.

The structures in trees 10 and 11 make different predictions about the possible application of VP ellipsis. In tree 10, there is only one VP, namely *put the ball in the bathroom*, whereas in tree 11, there are two VPs, namely *washed the ball* and *washed the ball in the bathroom*. Thus we predict that there is a single possibility of applying VP ellipsis in tree 10, but two possibilities in tree 11. In fact, this turns out to be true, as examples (53) show. In (53c), we do ellipsis on the larger VP *washed the ball in the bathroom*, whereas in (53d), we do ellipsis on the smaller embedded VP *washed the ball*. Since there is no such smaller VP in tree 10, the corresponding (53b) is impossible.

- (53) a. Mary put the ball in the bathroom, before John did. [did = put the ball in the bathroom]
 b. *Mary put the ball in the bathroom, and John did in the living room [did = put the ball]
 c. Mary washed the ball in the bathroom, before John did. [did = washed the ball in the bathroom]
 d. Mary washed the ball in the bathroom, and John did in the living room [did = washed the ball]

Thus we get a fifth criterion for distinguishing complements and adjuncts:

²³Note that by contrast with the pseudocleft construction discussed earlier, it is auxiliary *do*, rather than main verb *do*, which appears in cases of VP ellipsis. All possible tests show that this is the case: (i) There is no semantic restriction on the verbs that can be replaced by *do* (Contrast the following sentence with (51b,c) given above: *The book remained in the room longer than the record did.*) (ii) In cases of VP ellipsis, *do* behaves like an auxiliary with respect to questioning and negation:

- (a) John cleaned his room, but Peter didn't. (*but Peter didn't do.)
 (b) John cleaned his room. Did Peter? (*Did Peter do?)

Criterion 5

If a PP can be left behind by VP ellipsis, then it is an adjunct. If it must disappear along with the rest of the VP, then it is a complement.²⁴

VP fronting

Finally, we turn to the last construction that is of interest here, namely VP fronting. This construction is somewhat rare, and is highly marked, in the sense that it is only natural in very specific discourse contexts. It consists in fronting a VP to the initial position in the sentence, leaving behind either an auxiliary or *to* (in the case where there is no auxiliary or *to*, *do* appears, as in the case of VP ellipsis). This is illustrated in the following examples.

- (54) a. John said he would go to the party, and [_{VP} go to the party] he will.
 b. John said he went to the party, and [_{VP} go to the party] he certainly did.

Once again, the different structures illustrated in trees 10 and 11 predict different possible applications of VP fronting, a single possibility in tree 10, but two in tree 11, since there are two VPs in it. And indeed, we get the expected results:

- (55) a. Mary said she would put the ball in the bathroom, and put the ball in the bathroom she did.
 b. *Mary said she would put the ball in the bathroom, and put the ball she did, in the bathroom.
 c. Mary said she would wash the ball in the bathroom, and wash the ball in the bathroom she did.
 d. Mary said she would wash the ball in the bathroom, and wash the ball she did, in the bathroom.

We thus obtain a sixth criterion for distinguishing adjuncts and complements, namely:

Criterion 6

If a PP can be left behind by VP fronting, then it is an adjunct. If it must be moved to the front with the rest of the VP by fronting, then it is a complement.

To conclude this section, let us apply these tests to the status of the instrumental complements with the preposition *with* which we used in our discussion of syntactic ambiguity in trees 1 and 2 of section 4, repeated here under (56)

- (56) The girl hit the table with the vase.

In tree 1, we had attached the PP *with the vase* as a complement: sister to the V under VP. Was this the correct decision?

Criterion 1 is inapplicable, since we are examining a PP. Criterion 2 gives us no answer, since *with the vase* is optional, but optionality is compatible with both statuses. Criterion 3 does not give a clear result here either. But Criteria 4, 5 and 6 do give us relevant evidence, as the following examples show:

²⁴As mentioned earlier in the text, this criterion is in fact not as reliable as the preceding ones. Indeed, it is possible, though somewhat marginally, to have verbal ellipsis before a clear complement (e.g. even before direct objects), in a construction which is sometimes called pseudogapping, and which is illustrated in the following examples:

- (i) John saw Mary before Anne did Paul. [did = saw]
 (ii) John has seen Mary and Peter has Anne. [has = has seen]

Examples of this sort are not often discussed, but they show that it is possible for verbal ellipsis not to involve a whole VP.

- (57) a. What the girl did with the vase was (to) hit the table. (Criterion 4)
 b. The girl hit the table with the vase, and the boy did with the hammer. (Criterion 5)
 c. The girl said she would hit the table with the vase, and hit the table she certainly did, with the vase. (Criterion 6)

All these criteria indicate that *hit the table* forms a VP on its own, and that *with the vase* is an adjunct, which can be left behind by the various constructions affecting the VP (moving it or deleting it). Thus, the structure given in tree 1 is not in fact the structure we would want for this example. We want a structure parallel to that in tree 11.

A final note on terminology. We have shown that the traditional French notion of *Complément circonstanciel* covers both PP complements and adjuncts. French terms corresponding to the complement vs. adjunct distinction made here are for instance *complément* vs. *circonstant* or *complément régi* vs. *complément non régi* (in this case, the idea of *rection* corresponds to the idea that the verb selects what we have been calling complements).

12. The Passive Transformation

Consider the following pairs of sentences:

- (58) a. Mary ate the apple.
 b. The apple was eaten by Mary.
- (59) a. John put the book on the table.
 b. The book was put on the table by John.
- (60) a. Mary broke the vase.
 b. The vase was broken by Mary.

The (b) sentences here are known as the *passive* sentences corresponding to the *active* (a) sentences. The nature of the correspondence is intuitively obvious, and easy to characterize. For a given active sentence, you obtain the corresponding passive by emptying the subject position, placing the direct object NP in it, adding *be* in front of the verb, in the tense which the verb has in the active sentence, followed by the verb in the past participle form, and finally placing the subject NP of the sentence in final position, preceded by the preposition *by*. We should note that this last operation is not obligatory: the passive sentence is wellformed without the presence of the PP[by]. However, if the PP[by] is not specified, then the passive sentence has a much less specific meaning than the active, since one participant in the event described is not specified. It should be noted that in normal writing and speech, passives without the PP[by] are in fact much more frequent than passives with the PP[by]. Passives without the PP[by] are often called *short passives* as opposed to *long passives*, which have the PP[by]. One of the main uses of passive sentences in discourse is to avoid specifying the participant in the event corresponding to the active subject, for instance because the speaker does not want to mention him/her, or because his/her identity is irrelevant, or unknown...

If we look at the passive sentences here, we see that the verbs *eat*, *put* and *break* appear in syntactic environments that are not usual for them, as is to be

expected given the informal characterization of passive sentences just proposed. In our discussion of subcategorization, we assigned the following subcategorization frames to these verbs:

- (61) a. eat: [NP — (NP)]
 b. put: [NP — NP PP[loc]]
 c. break: [NP —]; [NP — NP]

The case of *put* in (59b) is especially interesting, since we know that, usually, *put* strictly requires an NP direct object. However, in the passive sentence it can, and in fact, must appear without one. The presence of such an NP direct object would make the sentence ungrammatical, as shown by (62a). More generally, none of these verbs, in the active sentences we have previously examined, appear with a PP[by] as a complement (62b).

- (62) a. *The book was put the plate on the table by John.
 b. *John put the book on the table by Peter.

From the point of view of the assignment of semantic roles, passive sentences are also markedly different from their active counterparts. The subject of the passive sentence is not understood as having the same role with respect to the verb as the subject in the active sentence. For instance, the usual role assigned by *eat* to its subject position is agent, as is the case in (58a). In the passive (58b), however, the subject of *eat* has the role patient, which is the one assigned to the direct object position by the verb *eat* in the active. Consider also the case of *break*. We noted that this verb assigns the theme role to its subject when it appears in the subcategorization frame [NP —] (i.e. when it is used intransitively), but that it assigns the cause role to its subject and theme role to its object when it appears in the subcategorization frame [NP — NP]. In (60b), the verb appears without a direct object, and the theme role is assigned to the subject; however the cause role is also assigned, but here to the PP[by] position. Again, all these data follow from the intuitive characterization of the correspondence between active and passive sentences that was given above.

If we were to try to characterize passive sentences using the tools that we have introduced so far, namely phrase structure rules and subcategorization frames, we would have to introduce new subcategorization frames for all passive forms of verbs, with new assignments of semantic roles. For instance, we would need the following for *eaten*, *put* and *broken*.

- (63) a. eaten: [NP — (PP[by])]

patient	agent
- b. put: [NP — PP[loc] (PP[by])]

theme	goal	agent
- c. broken: [NP — (PP[by])]

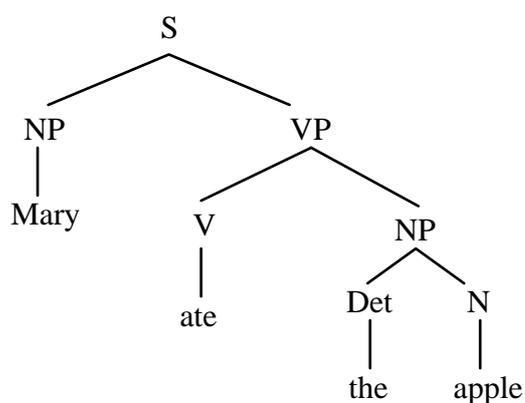
theme	cause

We would also need a way of specifying that these verbs must appear after the passive auxiliary *be*. However, handling passive sentences by simply listing new subcategorization frames for the passive versions of verbs fails to capture the obvious generalization relating active and passive sentences. Simply listing the new

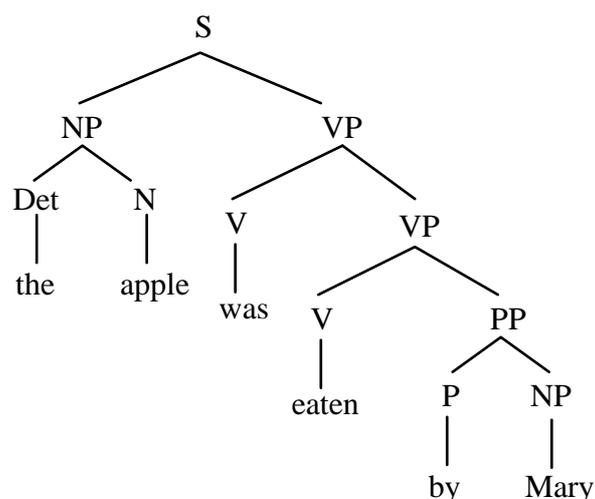
subcategorization frames does not indicate that their form is systematically related to the form of the active versions. Also, there is no reason, under such an analysis, that there should not be passive verbs for which there is no corresponding active, since nothing would prevent us from simply listing the passive subcategorization frame for such a putative verb.

It is possible to capture the intuitive correspondence between passive and active sentences, without postulating new subcategorization frames for verbs, by introducing a new mechanism into our theory of grammar, namely the notion of *transformation*. A transformation is an operation on syntactic trees, which maps a given tree onto a new tree, if certain conditions on the initial tree are satisfied. The idea that we are going to pursue here is that passive sentences result from the application of a transformation, called the *passive transformation*, to the structure of the corresponding active.²⁵ In fact, the initial intuitive characterization of the relationship between active and passive sentences that we gave at the beginning of this section is in essence an informal statement of the passive transformation. Tree 12 shows the structure we have been assuming for (58a). Tree 13 shows the structure that we will be assuming for the corresponding passive. It is obvious that the general shape of tree 13 follows from our intuitive characterization above, though of course the details of the choice of the structure have not yet been justified (e.g. the fact that we have represented the auxiliary *be* as a sister to a smaller VP, and the fact that we have grouped together *by* and the following NP into a PP).

Tree 12



²⁵We will qualify this statement further along in the course.

Tree 13

(64) The passive transformation

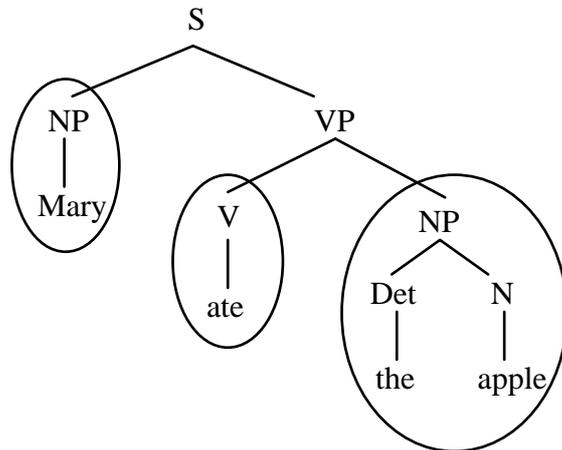
$$\text{SA NP} - \text{V}_\alpha - \text{NP}$$

$$\text{SC } 1 \quad 2 \quad 3 \Rightarrow 3 - \text{be}_\alpha - 2_{\text{psp}} - \text{by} - 1$$

In (64) is proposed a formulation of the passive transformation, which applied to tree 12 results in tree 13. A transformation is made up of two parts, known as the Structural Analysis (SA, *Analyse structurale*) and the Structural Change (SC, *Changement Structural*). The Structural Analysis is a statement of the conditions that must be satisfied by the tree in order for the transformation to be applicable to it. More generally, it *analyses* the tree into the different subcomponents that are manipulated by the transformation. The Structural Change is a description of the way a tree is to be restructured, if it satisfies the Structural Analysis. The SA here simply requires the presense of an NP, followed by a verb in the tense α (α = present or past tense), followed by a second NP. This essentially represents the requirement that there be a direct object present in order for there to be a passive. It also singles out the other aspects of the structure of the sentence which were referred to in our informal characterization of passive at the beginning of this section, namely the subject, the verb, and the tense of the verb. The SC simply tells us that the 3rd item in the SA (namely the direct object NP) ends up first, followed by *be* in the tense α , followed by the second element of the SA in the past participle form (psp), followed by *by*, and finally ending with the first element of the SC, namely the subject NP. The SC as given here actually only gives us information on the ordering of the items in the new tree, not on the structure of the new tree. It is possible to give a more complex formulation to both SA and SC, in order for the structure of the new tree to be entirely explicit. However, this is technically complex and is not crucial to the present course, so we will stick to the informal type of presentation illustrated in (64). We will rely on our intuitive understanding of sentence structure in choosing the types of structures resulting from a transformation, e.g. as in this example, grouping together the preposition *by* with the following NP *Mary* to form a PP *by Mary*, rather than just leaving them unconnected.

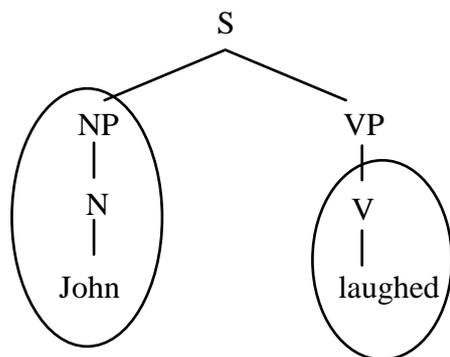
Let us insist a little bit on the exact interpretation of SAs, i.e. the conditions that must be satisfied by the input tree for the transformation to be applicable. Tree 14 shows precisely why the SA of the passive transformation is satisfied by tree 12. We can find the three items, NP, V, and NP, required by the SA, in the appropriate order.

Tree 14



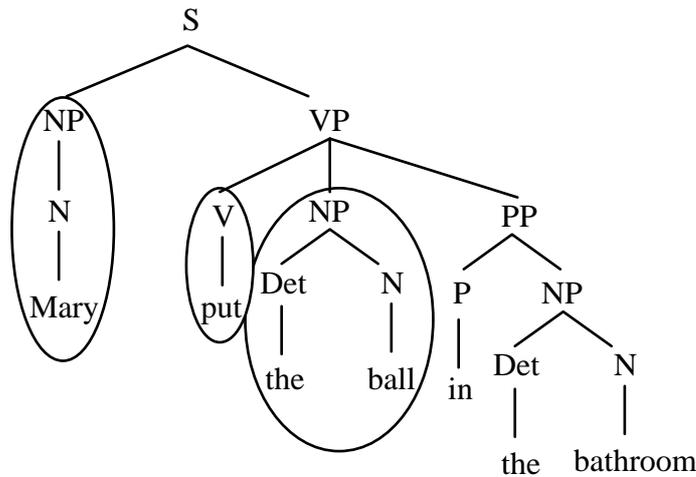
Tree 15, on the other hand, shows why the structure for *John laughed* does not satisfy the SA of the passive transformation: We can find an NP and a V, but not the 3rd required element, NP. The conditions of the SA are not satisfied because not all the elements required are present.

Tree 15

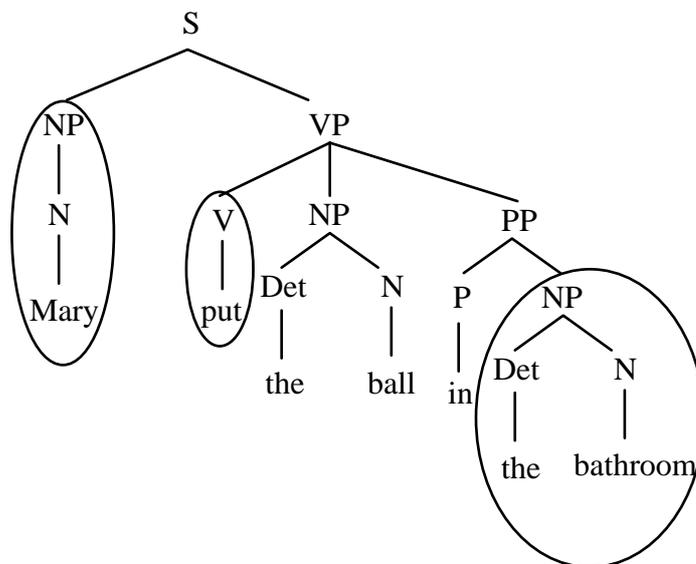


Tree 16 shows that the sentence *Mary put the ball in the bathroom* satisfies the SA of the passive transformation. Tree 17 gives a different analysis of the same tree, which is not allowed by the SA of the passive transformation. In tree 17, it is not the fact that some required elements are missing, but the fact that the required elements are not contiguous, which leads to the SA not being satisfied. Indeed, the words *the ball in* appear between the required V and the second NP.

Tree 16



Tree 17



Note that it is a good thing that the analysis of structure proposed in tree 17 does not satisfy the SA of the passive transformation because, if it did, the resulting passive sentence obtained by applying the SC would be the ungrammatical (65).

(65) *The bathroom was put by Mary the ball in.

Similarly, the structure for a sentence like *John went into the room* will not satisfy the SA of the passive because the preposition *into* separates the 2nd (*went*) and 3rd (*the room*) elements required by the SA which are thus not contiguous, which means that our present formulation of the passive will not produce **The room was went into by John*. This formulation of the passive transformation thus predicts that certain types of passives, such as (65) are ungrammatical.

Let us sum up the advantages that the transformational analysis of passive gets us. First, from a strictly syntactic point of view, it obviates the need to systematically

postulate new subcategorization frames for the passive uses of verbs. In the original structure, before application of the transformation, verbs systematically appear with their usual subcategorization frames, i.e. in their usual syntactic environments. Second, from the point of view of semantic roles, we can make the following hypothesis: semantic roles are assigned to arguments of a verb at the level of the original underlying structure, on the basis of the linking between syntactic positions and semantic roles given in the subcategorization frames. The application of the passive transformation does not change the linking of roles. In *The apple was eaten by Mary*, the roles assigned to Mary and the apple in the underlying structure remain assigned to them after the passive transformation. This accounts for the systematic meaning relation between corresponding active and passive sentences.

One thing we should note at this stage is that there are a small number of verbs which are exceptions to the passive transformation, in the sense that they do not appear in the passive, even though the structures they appear in apparently satisfy the constraints imposed by the passive transformation. A first group of verbs of this type are certain stative verbs such as *have* ('main verb' *have*) and *resemble*. illustrated in (66). A second group is that of all verbs which take measure phrase complements, illustrated in (67).

- (66) a. *A car is had by John. (cf. John has a car.)
 b. *Anne is resembled by Mary. (cf. Mary resembles Anne.)
- (67) a. *Ten dollars were cost by the book. (cf. The book cost ten dollars.)
 b. *Two miles were run by Mary. (cf. Mary ran two miles.)

Explanatory hypotheses can be made as to why these verbs do not allow the passive, specifically, we might take this as evidence that despite their surface resemblance to ordinary sentences with direct transitive verbs, these sentences in fact have a more complex structure. Or one might try to provide some sort of further semantic condition on the passive transformation, that such verbs do not meet. This discussion, however, goes beyond the scope of this course, and we will simply consider that these verbs are marked as exceptions in the lexicon, refusing to undergo the passive transformation.

Passives of idiomatic expressions

We can give further evidence in favour of the analysis of passive proposed here on the basis of passivizable idiomatic expressions. Recall that an *idiomatic expression* or *idiom* (*expression idiomatique*) is a phrase, or part of a phrase, or combination of such, such that the meaning of the expression cannot be obtained from the meaning of its parts, under the usual meaning combination rules of the language, i.e. the meaning is *non compositional* (*non compositionnel*). There are many idiomatic expressions involving a verb and a following NP. Among these, some are passivizable — keeping the idiomatic meaning, whereas other are not. This is illustrated in the following pairs of examples.²⁶

- (68) a. The FBI kept close tabs on the senator.
 b. Close tabs were kept on the senator by the FBI.

²⁶Note that the * on (70b) is intended with regard to the idiomatic meaning, which is unavailable. With the literal meaning, (70b) is fine.

- (69) a. John's arrival broke the ice.
 b. [The party was going pretty badly but finally] the ice was broken by John's arrival.
- (70) a. The old man kicked the bucket.
 b. *The bucket was kicked by the old man.

In order to account for the idiomatic readings of such sentences in the active, we can use a special subcategorization frame for the verbs appearing in them, specifying the specific NP object required for the idiomatic meaning to be available. Such frames are provided in (71a,b,c).

- (71) a. keep, V, [NP — [NP close tabs] PP[on]], 'keep careful watch on'
 b. break, V, [NP — [NP the ice]], 'ease the formality or the nervousness in a social situation by a friendly act'
 c. kick, V, [NP — [NP the bucket]], 'die', -passive

These frames provide the specific object necessary for the idiomatic reading, and give an informal representation of the idiomatic meaning. In the case of sentences like (68a) and (69a), obtained using the entries (71a) and (71b) respectively, the passive transformation will automatically produce the passives (68b) and (69b), if nothing is done to prevent it. And furthermore, the idiomatic meaning will be preserved, since the semantic relations of the underlying structure are not modified by transformations. For (70a), in order to prevent the application of the passive, we need to specifically add to the idiomatic entry for *kick*, with *the bucket* as object, that it is not passivizable, which we indicated by "-passive" in (71c).²⁷

If our grammar did not establish an explicit link between actives and the corresponding passives, as is done here by the passive transformation, we would have to say that it is completely by chance that active and the passive forms of verbs like *keep* and *break* can be used in idiomatic expression with the same meaning. For example, we would have to have a separate subcategorization frame for passive *kept*, as given in (72), to obtain the idiomatic reading of (68b).

- (72) kept, V, [[NP close tabs] — PP[on] PP[by]], 'be kept careful watch on by'

The grammar would be establishing no link between the existence of this passive idiomatic expression and the active idiomatic expression (71a). On the other hand, of course, our grammar must explicitly mark those idioms which do not allow passive by the feature -passive in their lexical entries (as was suggested above for those exceptional verbs such as *have*, *resemble*, etc. which do not allow passive).

The interaction of passive and subject-verb agreement

Up to this point in our discussion of the syntax of English, we have not raised the issue of subject-verb agreement. We know that English present tense verbs are morphologically marked for 3rd person singular subjects. Within the perspective of phrase structure rules, one idea for accounting for subject-verb agreement would be to complicate the phrase structure rules, so that sentences with 3rd person singular

²⁷ Note that in fact the possibility of passivizing idiomatic expressions or not is not entirely arbitrary. It can be shown that the more transparent an idiomatic expression is semantically (i.e. if the underlying metaphor is clearly intelligible), the more likely it is to be able to undergo transformations; on the other hand, if the expression is semantically opaque — as is the case with 'kick the bucket', it is less likely that it will be able to undergo transformations.

subjects are treated differently than others. E.g. one might imagine separating the rules $S \rightarrow NP VP$ into two rules: $S \rightarrow NP_3 VP_3$ and $S \rightarrow NP VP$, and similarly separating the VP rules $VP \rightarrow V \dots$ into $VP_3 \rightarrow V_3 \dots$ and $VP \rightarrow V \dots$. Similarly, we would need to split the NP rule into two, one with an NP_3 on the left hand side and an N_3 as head on the right hand side and one with simply NP. We assume that an N_3 is a 3rd person singular noun and a V_3 is a third person singular form of the verb, whereas N is any non 3rd singular noun and V non 3rd singular verb. In effect, what this amounts to is splitting in two all the phrase structure rules involved in producing the subject and the verb, so that one set of rules accounts for the sentences with 3rd singular subjects (the ones with the subscript 3 indices), whereas the other parallel set accounts for the other sentences. This solution however is not very elegant, in that it does not capture the idea of agreement in a unified way, and does not give any theoretical status to the relation between the two rule sets (in this set up, there is no reason why the 3rd person singular sentences should not have an entirely different structure from other sentences). As we shall see now, the interaction of passive and agreement raises deeper problems for this way of treating agreement.

Consider the following sentences and the corresponding passives.

- (73) a. Many people drink wine.
 b. Wine is drunk by many people. (*Wine are drunk by many people.)
- (74) a. This idea pleases many people.
 b. Many people are pleased by this idea. (*Many people is pleased by this idea.)

In these sentences, the number of the subject and object is different. In (73a) we have a plural subject and singular object, and in (74a) we have the opposite situation. What is important here is the question of the interaction of subject-verb agreement and passive. As shown by the examples, the agreement properties of the verb are not the same in the active and in the passive sentences. What we see is that in the passive, the verb agrees with the new derived subject, rather than with the NP which was subject in the underlying structure. Because of the way we have defined the interaction of transformations and phrase structure rules, the former operating on the trees produced by the latter, this raises a problem for any attempt to account for subject-verb agreement using the phrase structure rules, such as the one sketched above. Indeed, any such account will lead to having the verb agree with the subject of the original underlying active sentence, which, as the examples show, is wrong. Two solutions to this problem can be imagined. On the one hand, we could redefine the passive transformation so that it alters the agreement properties of the verb, making it compatible with its new subject. This however is inelegant, in that (a) it leads to a non-unitary account of subject verb agreement, which works differently in actives and passives; (b) it involves undoing formerly realized agreement properties. In order to avoid these problems, we could imagine a different way of treating agreement, arranging things so that agreement properties are taken into account only after application of the passive transformation. Given the interaction of transformations and phrase structure rules in our grammar, this means that agreement cannot be taken care of in the phrase structure component. It must be done by a new transformation, which will apply after the passive transformation. Intuitively, this new transformation should copy the agreement features of the subject NP onto the verb. We can propose the following formulation for such a transformation:

(75) Subject-verb agreement transformation

$$\begin{array}{l} \text{SA NP}_\alpha \text{ — V} \\ \text{SC } 1 \quad 2 \Rightarrow 1 \text{ — } 2_\alpha \end{array}$$

In (75), α stand for any combination of person and number properties, e.g. 3sg, 1pl, ... Note that it is crucial that this transformation apply after the passive transformation, in order to guarantee that it is the new subject of the passive which imposes its agreement properties on the verb. If we had chosen the opposite ordering, we would have obtained the opposite result, namely agreement with the underlying subject.

Comparing the passive and subject-verb agreement transformation also leads us to the idea that some transformations are obligatory, whereas others are optional. The passive transformation is a typical optional transformation. If its SA is satisfied, it can either be applied or not be applied. In the first case, the resulting sentence will be passive, in the second, it will be active. Subject-verb agreement on the other hand is a typical obligatory transformation. If its SA is satisfied by a sentence, it must be applied. Otherwise we would get sentences where agreement is not enforced. Note also that since passive is optional, if it does not apply, the subsequent application of the subject-verb agreement transformation will lead to having the verb agree with the subject of the active sentence, which is exactly the correct result.

Deep and surface structure

At this point, we can make a more explicit description of the nature of the model of grammar that we are developing. On the one hand we have a set of phrase structure rules and a lexicon, which produce trees which we will call *deep structures*. Deep structures are the input to a second component of the grammar which consists in a series of transformations, applying in a specific order. We will call the final result of the application of the transformations the *surface structure*. Between deep and surface structure, the sequential application of different transformations will produce intermediate structures. We are assuming that arguments are linked to their semantic roles in deep structure, and that this linking is preserved throughout the application of transformations, which do not alter the meaning relations within the sentence. We see now why it is not literally the case that passive sentences are derived from their active counterparts. What is true is that both the active sentence (58a) and its passive counterpart (58b) derive from the same deep structure, namely that given in tree 12. However, that structure is not in fact marked for agreement properties: the verb is in a pre-agreement form. Thus, the deep structure does not correspond directly to the active sentence. To obtain the active, one must choose not to apply the optional passive transformation, but one must apply the obligatory subject-verb agreement transformation. To obtain the passive, on the other hand, both transformations must be applied, in the correct order.

Passive and double object constructions

In a previous exercise on subcategorization, we discussed a class of verbs in English which can be used either with the subcategorization frames [NP — NP PP[to/for]] or [NP — NP NP] (the former is called the prepositional construction, the latter the double object construction), such as *give*, *lend*, *buy*, *tell* etc. One point that we made is that there is a systematic correspondence between the constructions with

respect to the semantic relations between the arguments and the verb, as shown in the following examples:

- (76) a. Mary gave a book to John.
b. Mary gave John a book.

In the exercise, we had simply listed such verbs with two subcategorization frames. Now that we have the concept of transformations as a tool of grammatical analysis, an alternative way of analyzing the relationship between these two types of sentences comes to mind. We could say that they share the same deep structure, which would account for the meaning correspondence between them, and that they diverge by the application of a transformation. This would also, as in the case of the transformational analysis of passive, allow us to reduce the number of subcategorization frames necessary in the lexicon.

One question which comes up in this context is whether we want to choose a deep structure that is similar to the prepositional construction or one which is similar to the double object construction. In either case, only one of the two subcategorization frames would be necessary. The configurations not accounted for by the chosen frame would be the result of the transformation. Is there then any principled reason to choose one as the deep structure construction, and the other as the transformationally derived construction? A number of points are relevant here. The main point is that there are many verbs which can appear in the prepositional constructions, but not in the double object constructions.²⁸ For instance, *donate*, *say*, *declare*, *wash* etc. can take the prepositional construction, but not the double object construction:

- (77) a. John donated the painting to the museum. *John donated the museum the painting.
b. John said the words to Mary. *John said Mary the words.
c. John declared his love to Mary. *John declared Mary his love.
d. John washed the car for Mary. *John washed Mary the car.

Two types of restrictions apply. First a semantic restriction. The referent of the PP[to] or PP[for] must be interpreted as the recipient of the direct object (the theme), i.e. there must be a change of possession involved (note that the change of possession can be metaphorical, as in *tell someone a story*). This can be shown clearly by the fact that some verbs allow the double object construction, but with restrictions on the semantic role played by the PP[to] or PP[for], specifically that the referent of this PP must be a recipient in the event, not simply a destination or a beneficiary in the general sense. This is shown in examples (78):

- (78) a. John sent the package to Mary. John sent Mary the package.
b. John sent the package to Chicago. *John sent Chicago the package.
c. John built a house for Mary. John built Mary a house.

In (78a), Mary is the recipient of the package: she gains possession of the theme in the event described. On the other hand, in (78b), Chicago is simply a destination: there is no gaining possession on the part of the city of Chicago. In (78c), the prepositional variant is ambiguous: Mary can either be the recipient, i.e. the person who will own the house, once it is built; or she can be e.g. an architect, with John being e.g. a contractor who builds the house as part of their contract, but Mary in that case is not

²⁸Note that there are a few verbs that take only the double object construction, e.g. *The book cost me ten dollars* (compare **The book cost ten dollars to/for me*).

the recipient of the house (the unmentioned client who ordered the house would be the recipient, under this scenario). Interestingly, in the double object version of (78c), the latter interpretation is impossible: the sentence can only be interpreted as signifying that Mary is the prospective possessor of the house. It is not ambiguous. Similarly, the reason that the double object variant of (77d) is strictly ungrammatical is that there is no plausible interpretation where washing a car for someone can be interpreted as an event whereby the person gains possession of the car.

A second constraint is that only verbs with stems belonging to the morphological class of native verb stems can appear in the double object construction, i.e. verbs that are mono- or disyllabic and which have initial stress. This explains the impossibility of the double object versions of (77a, c), *donate* and *declare* having second syllable stress. (Note that the class of native verb stems is synchronically defined in terms of phonological properties of verbs: if a verb comes from French or Latin, but has the relevant phonological properties, it will be classified synchronically as native, and will be able to appear in the double object form, if it satisfies the other constraints. This is the case e.g. for *promise* and *offer*.)

All this leads to the conclusion that, if we choose to analyse the alternation between the double object construction and the prepositional construction by a transformation, the double object construction must be derived from the more general prepositional construction, putting the PP[to] or PP[for] in front of the direct object NP, and deleting the preposition in the process. This transformation is, like passive, but even more so, restricted in its applicability, e.g. by the constraint that the semantic role assigned to the PP must be the recipient role. Note that the opposite solution, deriving the prepositional construction from the double object construction, would require strongly ungrammatical deep structures for a whole series of verbs (e.g. **donate* + NP + NP), and impossible semantic role assignments in deep structure (e.g. *send the package to Chicago* would derive from *send Chicago the package*, which we saw cannot be interpreted with Chicago simply as a destination, whereas this is the interpretation of the prepositional variant).

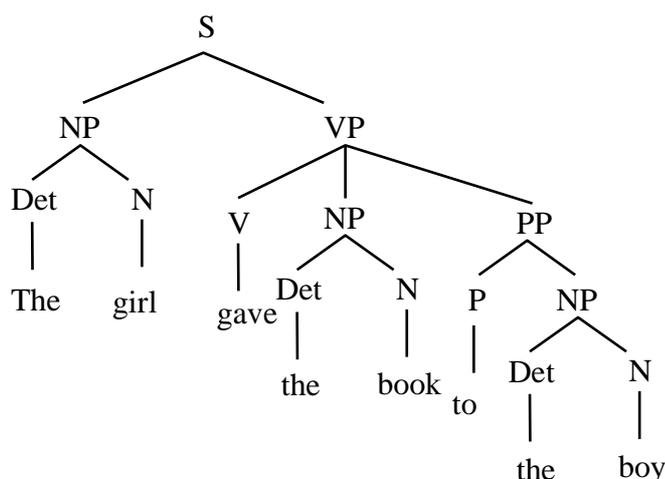
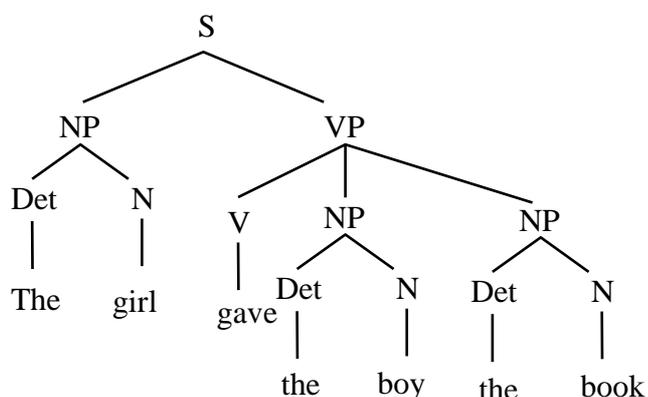
We can formulate the relevant transformation, usually called *dative shift*, as follows:

(79) Dative shift transformation

$$\begin{array}{ccccccc} V & - & NP & - & P[\text{to/for}] & - & NP \\ 1 & & 2 & & 3 & & 4 \end{array} \Rightarrow 1 - 4 - 2$$

Conditions: 4 must have the semantic role recipient with respect to 1; 1 must be a monosyllabic or disyllabic verb with initial stress.

The application of this transformation is illustrated in the following trees.

Tree 18**Tree 19**

We can sum up the advantages of having the dative shift transformation generate double object sentences as follows: (a) it allows us to reduce the number of subcategorization frames required for verbs, basically eliminating double object structures from deep structure (with the exception of a few cases like *cost*, mentioned in fn. 28); (b) it allows us to account for the similarity in semantic relations in the double object constructions and the corresponding prepositional construction from which they derive, as well as for the restricted range of the double object construction from the point of view of semantic relations; (c) it does both these things by establishing a general and principled relationship between the two classes of sentences, in terms of the dative shift transformation. Obviously, the dative shift transformation must be considered to be an optional transformation.

Let us now consider the interaction of the dative shift transformation and the other transformations we have discussed up to now. There is basically no direct interaction between dative shift and subject verb agreement, since the former does not mention nor affect the subject. It cannot, therefore, change the agreement properties of the sentence.

On the other hand, there is an obvious possible interaction between dative shift and passive, since dative shift creates a new NP directly following the verb. Thus, if dative shift is allowed to apply first, the results of passive will be different depending

on whether or not dative shift has applied. On the other hand, if passive applies first, passive will never be applicable to the result of dative shift, and we will have no sentences exhibiting a combination of the properties of passive and of the properties of dative shift sentences. It is easy to check the data to find out which one of these two possible orderings gives results corresponding to what is in fact the situation in English. The following examples provide the necessary data.

- (80) a. Mary gave a book to John \Rightarrow dative shift
 b. Mary gave John a book \Rightarrow passive
 c. John was given a book by Mary.
- (81) a. Mary gave a book to John, no application of dative shift, \Rightarrow passive
 b. A book was given to John by Mary.

Under the ordering dative shift before passive, we can generate all of (80) and (81), as desired. On the other hand, under the opposite ordering, we could never get (80c), since at the point of application of passive, *John* could never have become an NP immediately following the verb.

Before closing this chapter on passive, let us look into two problems raised by what we have said up to now, passives without PP[by] phrases and so called prepositional passives. As mentioned in the introduction, the PP[by] is optional in the passive. We could account for this by for instance simply putting the elements *by* — *I* in parentheses in the SC of the passive transformation (64), as shown in (82).

(82) The passive transformation

$$\begin{array}{ccccccc} \text{SA NP} & \text{---} & \text{V}_\alpha & \text{---} & \text{NP} & & \\ \text{SC 1} & & 2 & & 3 & \Rightarrow & 3 \text{ --- } \text{be}_\alpha \text{ --- } 2_{\text{psp}} \text{ --- } (\text{by --- } 1) \end{array}$$

However, this would mean that a sentence like *John was hit* could have as its deep structure any sentence of the type *NP hit John*, where NP could be *Mary*, *the girl next door*, *the door*, ... This would mean that there is a loss of meaningful elements between the deep structure and the surface structure, a situation we would like to avoid. Another idea would be to have a second transformation which can delete the PP[by], restricting it to cases where the NP following by is *something* or *someone*. But note that even this entails a deep structure which is more semantically specific than the surface structure, since *John was hit* is compatible both with his being hit by an animate and by an inanimate object, whereas *Someone hit John* and *Something hit John* are compatible with only one interpretation. Another way of thinking about this would be to allow a completely empty subject, a zero subject (similarly to the idea of a zero determiner in an NP). Only PP[by] with the zero subject could be deleted, and they would have to be. For such a solution to work, we have to ensure that the zero subject cannot appear as subject in an active sentence, since e.g. **Ø hit John* is not a grammatical sentence of English. We will not discuss the technical details of how to go about preventing this.

Let us now briefly discuss prepositional passives, illustrated in (83).

- (83) a. This ballroom has been danced in by numerous generations.
 b. This subject is often talked about.
 c. *The room was went into.

Prepositional passives are passive sentences where it is not the direct object which replaces the active subject, but the NP of a PP complement (83b) or adjunct (83a), the

preposition itself being left behind. A first thing to note is that not all PP complements and adjuncts allow the prepositional passive (cf. e.g. (83c)). The conditions under which it is possible are complex, and we cannot discuss them in detail here (one central point is that the referent of the object must be affected in the event). A second point is that our formulation (64) of the passive transformation does not account for any prepositional passives, since it requires contiguity of the verb and the NP which follows it. We need to modify the formulation of our transformation to account for prepositional passives, but also to set things up so that it only can apply in those cases where it is possible, avoiding e.g. (83c), but this is beyond the scope of this course. Finally, note that the prepositional passive is completely impossible in French (**Cette salle a été dansé dans par de nombreuses générations. *Ce sujet a été parlé de par de nombreuses personnes.*)

13. Wh- Movement

Consider the following examples:

- (1) a. I wonder which book John put on the table.
 b. I wonder on which table John put the book.
 c. I wonder which table John put the book on.
 d. I wonder who put the book on the table.
- (2) a. I wonder who(m) this story concerns.²⁹
 b. I wonder what concerns Mary.

These examples are all cases of *indirect interrogatives* (*interrogatives indirectes*), that is, interrogative constructions appearing in a subordinate clause.³⁰ The problem that will concern us in this chapter is the status of the *wh- phrases* (*syntagmes qu-*) in these sentences, i.e. phrases such as *which book*, *on which table*, *who*, *what*, etc.³¹ The reason that we have chosen indirect interrogatives, rather than direct interrogatives to illustrate this is the following. In direct interrogatives, in addition to the phenomena which are of interest to us in this chapter, there is also in many cases an inversion of the subject and an auxiliary, as shown in the direct interrogatives corresponding to the embedded sentences in (1), which are given in (3).

²⁹As you know, there is variation among speakers of English in the use of *whom* vs. *who* as the object form for the interrogative and relative pronouns. This question is not of interest to us here.

³⁰The choice of the word *interrogative* rather than *question* is significant here. We will use the term *interrogative* to talk about a kind of sentence structure, opposed for instance to *declaratives*, *imperatives*, and *exclamatives*. These structures can be distinguished by various formal syntactic features. On the other hand, we will use the terms *question*, *assertion*, *order*, *exclamation*, etc. to refer to various kinds of speech acts that one can perform using these structures. The details of these issues are beyond the scope of this course, but it is crucial to keep in mind, for instance, that though interrogative structures are regularly used to ask questions, they can also be used to perform other types of speech acts: e.g. if at the table someone asks you *Can you pass me the salt?* you interpret this as a *request* and not as a *question*. I.e. you simply pass the person the salt (an action that satisfies the request) rather than saying "Yes." (which would be an appropriate answer to a yes/no question, but is felt as completely inappropriate here).

³¹These phrases are called *wh- phrases* because they most often involve a word with beginning with *wh-* in English. The corresponding French term, *syntagmes qu-*, is chosen because similar phrases in French most often involve a word with *qu-* (*qui*, *que*, *quel*, ...)

- (3) a. Which book **did** John put on the table?
 b. On which table **did** John put the book?
 c. Which table **did** John put the book on?
 d. Who put the book on the table?

On the other hand, inversion of the subject and the auxiliary does not occur in subordinate clauses. We will return below to the problem of the status of auxiliary verbs and to the problem of subject-auxiliary inversion, arguing that these questions are best described independently of the problem of the position and form of *wh*-phrases, which we discuss in this chapter. Thus, in order to avoid these problems in this section, we will focus on *wh*- phrases in subordinate clauses, and more specifically on indirect interrogatives.³² Also, we discuss the status of subordinate clauses in more detail later.

Let us return then to sentences (1) and (2). Consider first the syntactic environments in which the verbs *put* and *concern* appear here, contrasting them with the usual syntactic environments for these verbs as discussed previously. We argued above that these verbs required the subcategorization frames [NP — NP PP[loc]] and [NP — NP] respectively. That is, *put* requires an obligatory direct object and locative PP, and *concern* requires an obligatory direct object. This is based on the clear ungrammaticality of examples like **John put on the table*; **John put the book*; **This story concerns*. Sentences (1a,b) and (2a) appear to violate the proposed subcategorization frames, since they are grammatical, even though the verbs lack a complement which we claimed to be obligatory. Note also that if we add a complement of the type which appears to be missing the sentences become ungrammatical.

- (4) a. *I wonder which book John put the jackets on the table.
 b. *I wonder on which table John put the book on the desk.
 c. *I wonder who(m) this story concerns many people.

On the other hand sentences (1a,b) and (2a) have an additional phrase in sentence initial position, namely *which book*, *on which table*, *who(m)*. Note also that the nature of the initial phrase is determined by that of the phrase missing after the verb. In (1a), an NP is missing after the verb, and we find an NP *which book* in initial position. In (1b), a PP[loc] is missing after the verb and we find a PP[loc] in initial position. Neither an NP, nor a PP with another type of preposition are allowed in initial position in sentence (1b), as shown by (5a,b).

- (5) a. *I wonder which table John put the book.
 b. *I wonder of which table John put the book.

We see that there is a systematic correspondence between what is missing after the verb, and what appears in initial position. How should we analyze this phenomenon?

As was the case in our discussion of passive constructions, there are two obvious directions that can be chosen: either we add additional subcategorization

³²We could also use relative clauses to illustrate *wh*- phrases in subordinate clauses, as in the following examples:

- (i) The book which John put on the table is red.
 (ii) The table on which John put the book is round.
 (iii) The table which John put the book on is round.
 (iv) The person who put the book on the table is here.

However, we will not have time to discuss relative clauses in more detail in this course, and we will not use such examples here.

frames for verbs like *concern* and *put*, and new phrase structure rules allowing sentence initial wh- phrases; or, taking advantage of the systematic correspondence we have noted, we introduce a transformation which moves wh- phrases from a usual complement position to the initial position of the sentence, creating the appearance of a missing complement in surface structure.

A first central problem with the first analysis is controlling the fact that the initial wh- phrase and the corresponding complement are in *complementary distribution* (*distribution complémentaire*), that is that if one appears, the other does not appear (as shown by the ungrammaticality of (4a,b,c), but that one of the two must appear. The second problem is accounting for the fact that there is a systematic correspondence in the form of the missing complement and the initial wh- phrase. Thus, the question of whether e.g. *put* appears followed by NP PP[loc] or by NP, or by PP[loc], depends on whether there is an initial wh- phrase, and on the form of that wh- phrase. We might consider accounting for this by adding the initial wh- phrase to the subcategorization frame, e.g. giving the following frames for *put* where (6a) is used for ordinary sentences such as *John put the book on the table*, (6b) is used for sentences like (1a), and (6c) is used for sentences like (1b).

- (6) a. [NP — NP PP[loc]]
 b. [NP[+wh] NP — PP[loc]]
 c. [PP[loc, +wh] NP — NP]

However, this idea poses a problem with respect to the further data illustrated in (7).

- (7) a. I wonder on which table Mary thinks that Anne said that John put the book.
 b. I wonder which book Mary thinks that Anne said that John put on the table.
 c. I wonder who(m) Mary knew that Anne thought that the problem concerned.

What these sentences show is that the wh- phrase does not necessarily appear in the initial position of the subordinate clause where there is a corresponding missing phrase (the underlined subordinate clause in these examples). In cases of multiple subordination, as illustrated in (7), it can appear in front of larger embedded sentences. This is shown more explicitly in the structure (8), for (7a).

- (8) I wonder [_{S1} on which table Mary thinks [_{S2} that Anne said [_{S3} that John put the book _{S3}] _{S2}] _{S1}]

The PP[loc] is missing after *put*, the verb of the triply embedded sentence S3, but the corresponding wh- phrase appears in the initial position of the largest embedded sentence S1. There is the same type of complementary distribution between these two positions in such examples as that discussed above for (1) and (2): it is because *put* is missing a complement in S3 that we can get an extra initial wh- phrase in S1. It is impossible to have both positions filled at the same time. Similarly, it is because a PP[loc] is missing after *put* in S3 that we find a PP[loc] type wh- phrase in initial position of S1, rather than some other category.

In our theory, it is crucial that subcategorization frames describe constraints on the immediate (or *local*) environment of a verb. We cannot accept the idea that a subcategorization requirement could be filled by an arbitrarily distant phrase,

otherwise we would clearly get inappropriate results.³³ Consequently, examples like (7) show us that we will not be able to account for these types of sentences by assigning additional subcategorization frames to verbs. The problem is that subcategorization frames control the local environment of the verb, but that the phenomenon of complementary distribution that we are studying is not restricted to local environments.

Let us now consider the second analysis suggested, namely the idea that the *wh*-phrase is moved to a sentence initial position by a transformation, which we will call *wh*-movement. This idea considers that, in deep structure, the embedded clause in e.g. (1a) has the *wh*-phrase in the usual direct object NP position following *put* and that the *wh*-phrase is moved by a transformation to the initial position of the embedded clause, where it appears in surface structure. This is illustrated in (9).

- (9) a. I wonder [_S John put [_{NP} which book] on the table] (deep structure)
 b. I wonder [_S [_{NP} which book] John put on the table] (surface structure)

This idea provides a simple account of the two central facts that we have discovered, namely complementary distribution and form of the *wh*-phrase. First, since the *wh*-phrase is moved from one position to another, we necessarily have complementary distribution: there cannot be both a *wh*-NP and a normal NP object in the single deep structure object position of *put*. Hence, it is impossible to get an example like (4a) where there is both a normal direct object and an initial *wh*-NP. This would indeed require both *which book* and *the jackets* to be in the same deep structure object position. Similarly, this idea accounts for the fact that it is impossible to get examples like **I wonder John put on the table*, since in such an example the NP object requirement of *put* is not satisfied in deep structure. Second, since the *wh*-phrase is moved from a complement position to the initial position, it will necessarily have a form that is allowed by the verb for the missing complement. If the missing complement in surface structure is a PP[loc], then the initial *wh*-phrase has to be a PP[loc], so that it could legitimately appear in complement position in the deep structure. This explains the ungrammaticality of (5a,b) where the necessary deep structures would be those in (10a,b), which violate the subcategorization requirements of *put*.

- (10) a. **I wonder* [_S John put the book [_{NP} which table]]
 b. **I wonder* [_S John put the book [_{PP}[of] of which table]]

As for the data illustrated in (7) and (8), they are easily accounted for by allowing the *wh*-movement transformation to move *wh*-phrases over nonlocal (unbounded) domains. That is, we assume that there is no limit on the distance over

³³To see the problem, consider a verb like *persuade* which has as one of its subcategorization frames [NP — NP S], i.e. it can take an NP direct object and a sentential complement. This is illustrated in example (i):

- (i) Mary persuaded [_{NP}John] [_Sthat the solution was correct].

If we allowed the NP object requirement of *persuade* to be satisfied by an arbitrarily distant NP, following the verb, we would predict that sentences like (ii) or (iii) are ok, which they are clearly not.

- (ii) **Mary persuaded* [_S that Anne laughed [_{NP} John]]
 (iii) **Mary persuaded* [_S that Anne saw [_{NP} John]]

In (ii), *John* could be considered as simply satisfying the NP requirement of *persuade*, and not bearing any relation to *laugh*; in (iii), *John* could be considered to satisfy both the obligatory NP requirement of *persuade*, and the optional NP requirement of a verb like *see*. Neither of these ideas is tenable, obviously.

which the transformation can move a wh- phrase.³⁴ We can give the following formulation to wh- movement:

(11) Wh- movement transformation

$$\begin{array}{ccccccc} [S & \text{---} & X & \text{---} & NP[+wh]/PP[+wh] & & \\ 1 & & 2 & & 3 & & \\ & & & & & \Rightarrow & 1 & 3 & 2 \end{array}$$

In (11), X is called a *variable* (*une variable*): X can stand for any arbitrary piece of structure between the initial sentence boundary, 1, and the NP[+wh] or PP[+wh]. This transformation expresses the following analysis. It tells us that if there is an NP[+wh] or PP[+wh] in a sentence, it gets moved, over any intervening material X, to a sentence initial position. This is illustrated in the following examples, where the (a) sentence is the deep structure and the (b) sentence is the result of wh- movement. We represent in the (b) sentence the position from which the wh- phrase originates by an underlined space (___). Such a position is often referred to as the *gap*, or *empty position*, left behind by wh- movement.

(12) a. I wonder [S John put [NP which book] on the table] \Rightarrow wh- mvmt
 b. I wonder [S [NP which book] John put ___ on the table]

(13) a. I wonder [S John put the book [PP on which table]] \Rightarrow wh- mvmt
 b. I wonder [S [PP on which table] John put the book ___]

It should be noted that the formulation given in (11) for wh- movement immediately accounts for two types of sentences given in (1) and (2), but which we have not yet examined in detail, namely examples like (1c), where an NP complement of a preposition is moved to initial position, leaving the preposition behind (this is called *preposition stranding* / *préposition orpheline*), and examples like (1d) and (2b), where the wh- phrase is in subject position in deep structure. The analysis of cases like (1c) is transparent: all that needs to be done is to consider the preposition to be among the things subsumed by the variable X, as shown in the following analysis, where we have underlined in the deep structure (14a) the portion of structure subsumed by the variable X.

(14) a. I wonder [S John put the book on [NP which table]] \Rightarrow wh- mvmt
 b. I wonder [S [NP which table] John put the book on ___]

The case of subject wh- NPs is also simple: we said that the variable X could stand for any arbitrary piece of structure. Included among these is simply no structure: one possible instantiation of X is nothing at all. In that case, the transformation has no effect, since moving over nothing is simply the equivalent of staying in the same place. Thus, in sentences like (1d) and (2b) the NP[+wh] subject does not change positions in the passage from deep to surface structure. It remains in the usual sentence initial subject position, as is shown in (15) and (16) which are both the deep and surface configurations corresponding to (1d) and (2b).

(15) I wonder [S [NP who] put the book on the table]

³⁴Note that this is crucially different from passive, which must be restricted to apply within a single sentence. For instance, it is impossible to passivize *Mary said that John saw Tom* as **Tom was said that John saw by Mary*, taking *Mary* and *Tom* as the NPs inverted by passive. Note that the way we formulated the passive transformation correctly avoids producing such structures.

(16) I wonder [_S [_{NP} what] concerns Mary]

We should note that there are in fact cases where a subject NP[+wh] does move to a higher sentence initial position, as in (17).

- (17) a. I wonder [_S₁ Mary thinks [_S₂ [_{NP} who] saw John] \Rightarrow wh- mvmt
 b. I wonder [_S₁ [_{NP} who] Mary thinks [_S₂ ___ saw John]

Here, the NP[+wh] *who* is subject of *saw* in deep structure, and is moved to the sentence initial position of S₁ (i.e. to the beginning of the indirect interrogative) by wh- movement. Thus, in (17a), the variable X subsumes the structure corresponding to *Mary thinks*.

To sum up, the transformational analysis of sentence initial wh- phrases provides a simple account for the major syntactic properties we have pointed out, namely the systematic correspondence between sentence initial wh- phrases and a corresponding gap somewhere else in the sentence, more specifically, the fact that there is a gap corresponding to a sentence initial wh- phrase (except if that wh- phrase is in subject position in deep structure, as in examples (15), (16)), and the fact that the initial wh- phrase is of precisely the category that is missing someplace else in the sentence.³⁵

The semantic role of wh- phrases

We can provide further evidence for the correctness of the wh- movement analysis proposed above by considering the semantic roles of sentence initial wh- phrases. First, recall our discussion of the way transformations interact with semantic role assignment. We proposed that semantic roles are assigned, in deep structure, to NPs (or PPs) by the verb of which they are an argument and that once a role is assigned to a phrase, the phrase keeps the role throughout the transformational derivation (recall that this explains why the surface subject of a passive sentence is interpreted as having the role of the object of the corresponding active sentence). Thus, we predict that a sentence initial wh- phrase will have the semantic role assigned by the verb to its corresponding deep structure position. This is indeed exactly what we find. The role of *which book* in (12b) is theme, because it appears in the direct object position of *put* in the deep structure (12a), and *put* assigns the theme role to its deep structure direct object. Similarly, the role of *on which table* in (13b) is goal, because it appears in the PP indirect object position of *put* in the deep structure (13a) and *put* assigns the goal role to this position. Finally, *who* in (17b) has the experiencer role because it appears as the NP subject of *saw* in the deep structure (17a) and *saw* assigns the experiencer role to its deep structure subject.

Thus, the movement analysis proposed also automatically accounts for the systematic correspondence in semantic roles between sentence initial wh- phrases and the positions they correspond to syntactically in deep structure.

³⁵We can provide further evidence for this systematic category correspondence for the higher register variant of English which has the *who/whom* distinction. In this variant, the choice between *who* and *whom* depends on whether the deep structure position of the NP is a subject position or an object position (object of a verb or of a preposition). That is, if an object is missing in the sentence we find the corresponding object form in sentence initial position, as in (2a), whereas if a subject is missing in the sentence we find the corresponding subject form in initial position, as in (17a,b).

Interaction of wh- movement and passive

Let us now consider the interaction of wh- movement and passive. Is there any reason to order one transformation before the other? To check this, we simply see what each possible ordering predicts. If we order passive before wh- movement, we predict that wh- movement can apply to the output of passive, but that passive cannot apply to the output of wh- movement. On the other hand, if we order wh- movement before passive, we predict that passive can apply to the output of wh- movement, but that wh- movement cannot apply to the output of passive. It is easy to check which of these predictions is correct, by looking at the predicted results, given in (18) to (21). Note that the examples chosen to test the predictions have to be such that, a priori, the conditions of application of both transformations can be met. For passive, this means that we need a sentence with a direct object, and for wh- movement, that there has to be a wh- phrase in the sentence. If either of these conditions was not met, the sentences could not serve as a test for the interaction of the two transformations, since one of the two could obviously not apply.

- (18) a. I wonder Mary saw who \Rightarrow passive
 b. I wonder who was seen by Mary \Rightarrow wh- mvmt
 c. I wonder who was seen by Mary
- (19) a. I wonder who saw Mary \Rightarrow passive
 b. I wonder Mary was seen by who \Rightarrow wh- mvmt
 c. I wonder who Mary was seen by
- (20) a. I wonder Mary saw who \Rightarrow wh- mvmt
 b. I wonder who Mary saw \Rightarrow passive
 c. I wonder who Mary saw
- (21) a. I wonder who saw Mary \Rightarrow wh- mvmt
 b. I wonder who saw Mary. \Rightarrow passive
 c. *I wonder Mary was seen by who

(18) and (19) are the results predicted by ordering passive before wh-mvmt. We see that this ordering correctly allows us to produce the passive indirect interrogatives (18c) and (19c). On the other hand, the opposite ordering, illustrated in (20) and (21), does not allow us to produce these sentences. After the application of wh- mvmt to (20a), the resulting structure no longer satisfies the structural analysis of passive, which cannot apply. On the other hand, the application of wh- mvmt to (21a) leaves the sentence unchanged (since the wh- phrase is already in sentence initial position). This structure satisfies the passive transformation which can apply. If we do apply it, we get (21c), which is ungrammatical. Thus, ordering passive after wh- movement not only makes it impossible to get the grammatical sentences (18c) and (19c), but furthermore produces the ungrammatical (21c). The other ordering gives us well-formed results.

Wh- movement in English vs. mouvement qu- in French

There is a major contrast between the conditions of application of wh- movement in English, and the corresponding transformation in French, mouvement qu-. It appears in main clause (direct) interrogatives. In French, in main clause interrogatives, mouvement qu- is optional. The structure is well-formed even if the wh- phrase stays in its deep structure position. This is shown in examples (22), where both the moved and the nonmoved variants are correct. In English, on the other hand,

it is in general impossible to leave the *wh*- phrase in its deep structure position, if the sentence is a direct interrogative. It must be fronted by *wh*- movement, as shown in (23).

- (22) a. Pierre a vu qui?
 b. Qui Pierre a-t-il vu?
 c. Marie a parlé avec qui?
 d. Avec qui Marie a-t-elle parlé?
- (23) a. *Peter saw who?
 b. Who did Peter see?
 c. *Mary talked with who?
 d. Who did Mary talk with?

In fact, we need to qualify the * judgements assigned here to (23a) and (23c). These sentences can be used, but only in a very specific discourse context, namely as an *echo question*. That is, these sentences can be used if a speaker says e.g. *Peter saw Mary*, and the hearer does not understand the second NP. In such a context, the hearer can respond using (23a), expecting the first speaker to repeat the name, *Mary*. Similarly, (23a) could be used to express incredulity on the part of the speaker, i.e. meaning something like "I can't believe I heard correctly, of all people you saw *Mary*?!" It is impossible, however to use such a sentence to begin a conversation, and more generally, in any nonecho context. In French, on the other hand, it is completely natural to use sentences like (22a) and (22c), and there are no restrictions on the context of their use. E.g. it is perfectly possible to start a conversation by saying (22a). These sentences are in fact more colloquial than the variants with *qu*-movement. (There is yet a 3rd possibility in colloquial French, which we cannot go into, namely *Qui est-ce que Pierre a vu?* which has *qu*- movement plus the appearance of *est-ce que*).

Another difference in the application of *wh*-/*qu*- movement in French and English is what happens when the *wh*- word is part of a PP. We saw that in English, preposition stranding is possible, i.e. it is possible to move the NP to sentence initial position, leaving the preposition behind, as in (23d). In French, preposition stranding is impossible. The stranded variant of e.g. (22d), **Qui Marie a-t-elle parlé avec?* is clearly ungrammatical. Note that this is a general property of French, which also appears in the fact that prepositional passives — which similarly result in a stranded preposition — are always impossible in French. French simply does not allow the object of a preposition to be moved, leaving the preposition behind.

14. Auxiliaries, Subject Auxiliary Inversion, and *do* support

A certain number of verbs are classically called *auxiliaries* in English Grammar, namely, the modal auxiliaries, *may, can, must, shall, will, ought; be*, be it the aspect auxiliary forming the progressive, the passive auxiliary, or the copula; the aspectual auxiliary *have* serving to form the perfect (and some uses of so called possessive *have* in some variants of English); and *do*.³⁶ A first simple question is the justification for grouping these verbs together into a specific subclass of auxiliaries (as opposed to e.g. *want, begin, seem* or *make*, which are also followed by verbal

³⁶As you know from other classes, *dare* and *need* can also be used as auxiliaries, in certain forms, and in these they share the distributional properties of the other auxiliaries.

complements). The crucial reasons for this grouping are that the auxiliaries³⁷ share a certain number of distributional properties. First, they are the only verbs in Modern English which can be inverted with the subject to form a yes-no interrogative, as illustrated in (1). Second, they are the only verbs in Modern English which can be negated simply by adding *not* after them and also the only verbs where the negation can appear in the so called “contracted form” *n't*, as shown in (2). Third, the verb phrase complement following these verbs can be omitted if it occurs in previous discourse, as shown in (3) (cf. the discussion of VP ellipsis in Chapter 11 above).

- (1) a. John can help Mary. Can John help Mary?
 b. Mary has seen John. Has Mary seen John?
 c. Mary is happy Is Mary happy?
 d. Mary wants to see John. *Wants Mary to see John?
 e. John saw Mary. *Saw John Mary?
- (2) a. John cannot/can't help Mary
 b. Mary has not/hasn't seen John.
 c. Mary is not/isn't happy.
 d. *Mary wants not/wantsn't to see John.³⁸
 e. *John saw not/sawn't Mary.
- (3) a. John may go to Paris. Ann certainly will. (= Ann certainly will go to Paris)
 b. Mary had seen John before Ann had. (= before Ann had seen John)
 c. Mary is happy, and John is too. (= John is happy too)
 d. *Mary wants to see John and Ann wants too. (≠ Ann wants to see John too).
 e. *John began eating before Ann stopped. (≠ before Ann stopped eating).

Verbs which are not auxiliaries require the introduction of the auxiliary *do* in all these syntactic constructions, as shown in the following examples, where (4a,b) and (5a,b) give the correct versions for (1d,e) and (2d,e) respectively, and (6a,b) give examples of VP ellipsis where the VP is not preceded by an auxiliary:

- (4) a. Mary wants to see John. Does Mary want to see John?
 b. John saw Mary. Did John see Mary?
- (5) a. Mary does not/doesn't want to see John.
 b. Mary did not/didn't see John.
- (6) a. John saw Mary before Ann did (= saw Mary)
 b. Mary wants to eat and Ann does too (= wants to eat too)

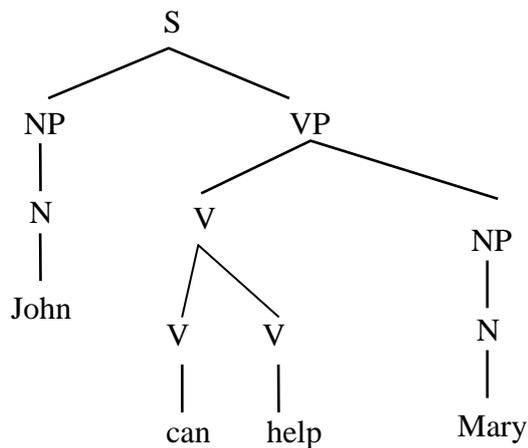
³⁷ Etymologically, the term *auxiliary verb* means ‘helping verb’. The idea is that the auxiliary provides certain types of specifications to the so called *main* verb, e.g. in (1b) it expresses that the verb *see* is in the perfective aspect. Thus, from a strictly etymological point of view, the concept of auxiliary is indissociable from that of accompanying a main verb. This raises a problem for copular *be*, as in (1c), for in such uses there is no other verb than *be*. Linguists and grammarians have taken two positions with respect to this dilemma. One can adopt a new, non etymological, definition of *auxiliary verb* for English, where it no longer means ‘helping verb’ but simply ‘verb having the special distributional properties described in (1), (2), (3)’. This is what we will do in this course. The other possibility is to introduce a new term for this meaning (people who do this often use the term *operator*).

³⁸Note that the non-contracted variant of (2c) is grammatical if the negation has scope on *to see John*, rather than on *want* (i.e. *what Mary wants is not to see John*, rather than *what Mary doesn't want is to see John*). This is irrelevant here, though since we are discussing the possibility of negating *want*.

Constituent structure and ordering of the auxiliaries

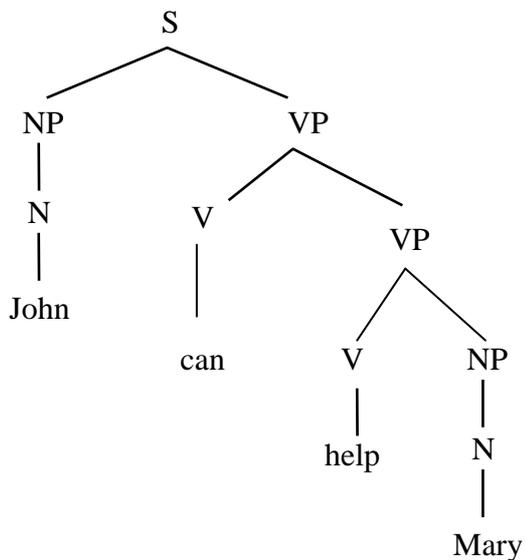
Consider a sentence with an auxiliary and a main verb, e.g. (1a). What constituent structure should we assign to such a sentence? One idea, which is suggested by traditional grammar is that the auxiliary and the main verb form some kind of complex verbal form, which is followed by the complement(s) of the main verb. This is illustrated in tree 1.³⁹

Tree 1



Another idea is to consider that the auxiliary is in fact the head verb of the sentence and that it takes a VP complement, as in tree 2.

Tree 2



³⁹Note that this putative complex verbal form cannot be considered to be a single word: indeed, other words and phrases, specifically adverbials, can appear between the auxiliary and the main verb: *John can very easily see Mary*. Single words cannot be separated into two parts by other words.

What criteria can allow us to decide between these two possible structures? In Chapter 11, we discussed three constructions that involved VPs, namely VP pseudoclefts, VP ellipsis and VP fronting. Interestingly, these three constructions are applicable to a sequence following an auxiliary, as shown in examples (7a,b,c) illustrating these constructions.

- (7) a. What John can do is **help Mary**. (John can help Mary)
 b. John can help Mary, and Ann can too. (Ann can help Mary)
 c. **Help Mary**, John certainly can. (John can certainly help Mary).

These data argue in favour of a structure like that given in tree 2. Indeed, according to that tree, *help Mary* is a VP constituent. On the other hand, according to the structure given in tree 1 *help Mary* is not a VP, and it is in fact not a constituent at all. This raises a problem, since we have seen that operations involving movement and ellipsis, like those illustrated in (7) usually affect constituents, rather than arbitrary sequences of words. Thus, we will adopt a structure like that in tree 2.

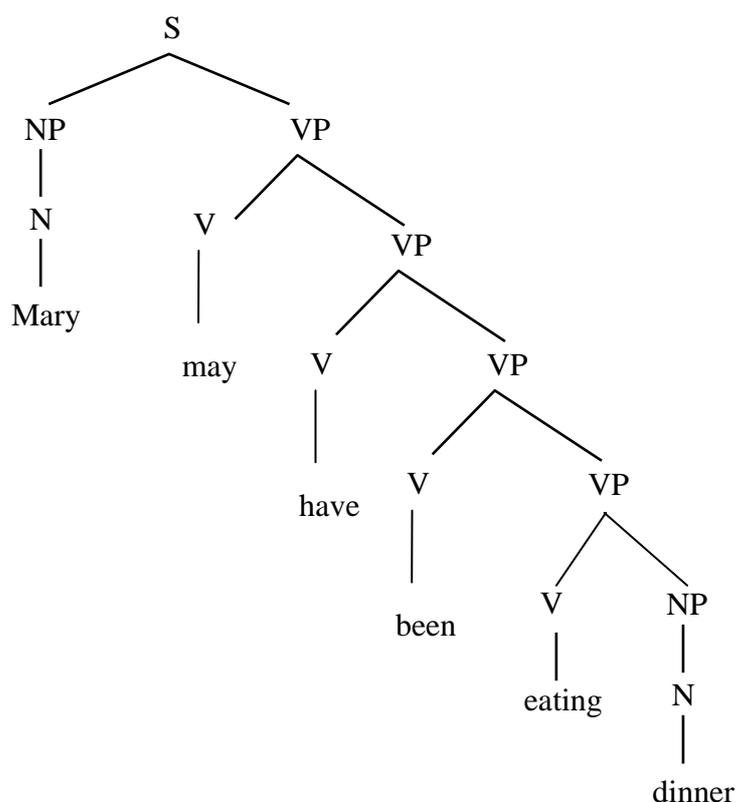
It is possible for more than one auxiliary to precede the main verb in a sentence. In this case, there are rigid constraints on the ordering and compatibility of auxiliaries. As is well known, we get the ordering (8a), illustrated in (8b-g)

- (8) a. Modal — Perfect have — Progressive be — Passive be — Main verb.
 b. Mary will have eaten. (Modal — Perfect)
 c. Mary will be eating. (Modal — Progressive)
 d. Mary will be seen. (Modal — Passive)
 e. Mary has been eating. (Perfect — Progressive)
 f. Mary may have been eating. (Modal — Perfect — Progressive)
 g. Mary may have been being watched closely. (Modal — Perfect — Progressive — Passive).
 etc.

Only one occurrence of each type of auxiliary is possible, i.e. it is impossible to get two modals, or two instances of perfect *have*, etc.⁴⁰ In such cases, we will assume that each auxiliary is followed by a VP, giving us a structure with embedded VPs like that illustrated in tree 3, for (8f).

⁴⁰Note that there are dialects of English (both in Britain and in the US) which allow certain combinations of modals (e.g. %*John might could do that* ≈ standard: *John might be able to do that*). Also note that French does allow double occurrences of perfective *avoir* in the so called *surcomposé* forms: *Quand il a eu terminé, il est rentré chez lui*. So there is no absolute a priori reason why standard English shouldn't allow similar forms.

Tree 3



This structure is justified by the fact that VP-ellipsis, VP pseudoclefting and VP-fronting can affect the embedded VPs in such structures.

Furthermore, we know that in each case, the choice of the preceding auxiliary determines the form of the head verb of the following VP: after a modal, the following VP has a base form head verb (V[BSE]) (= *infinitif sans 'to'*); after perfect *have*, and passive *be*, the following VP has a past participle form head verb (V[PSP]), and after progressive *be* the following VP has a present participle head verb (V[ing]). We can account for this in the following way. Each auxiliary subcategorises a certain type of VP complement, a VP[BSE], a VP[PSP] or a VP[ing].⁴¹

- (9) a. may, can, will, ... [—VP[BSE]]
 b. have [—VP[PSP]]
 c. be [—VP[ing]]

We define a VP[BSE] as a VP which has as its head verb a V[BSE], and a VP[PSP] as a VP which has as its head verb a V[PSP], etc. Under these hypotheses, the subcategorization frames given in (9) will ensure that every auxiliary is followed by a verb in the appropriate form.

At this point we still have not given any account of the ordering and compatibility constraints on auxiliaries. One way of doing this that works, though it is not especially insightful, is based on the defective nature of auxiliary paradigms, i.e. the fact that auxiliaries usually do not have all of the forms that are possible for verbs.

⁴¹Passive *be* is not mentioned in (9) since we assume that it is not present in deep structure, but introduced by the passive transformation. Recall that subcategorization only constrains deep structures.

This is well known for the modals, which only have finite forms: they have neither base, nor infinitive, nor past participle, nor *-ing* forms. Since modals do not have these forms, it is obvious that they cannot appear after any other auxiliary, since the VP following any auxiliary is nonfinite, (i.e. either [BSE], [PSP], or [-ing]), and a VP headed by a modal can only be finite. If we assume that perfective *have* lacks the [-ing] form used in constructing the progressive, but has both base forms and finite forms, then we account for the fact that perfective *have* cannot appear after progressive *be*, since the latter requires a following [-ing] form VP.

Subject Auxiliary Inversion (SAI)

A number of sentence types in English involve an inversion of the ordering of an auxiliary and the subject. Here are some examples:

- (10) a. Has Mary seen John?
- b. Who(m) has Mary seen?
- c. Never would Mary do that again.
- d. Had he returned earlier, John would not have been punished.

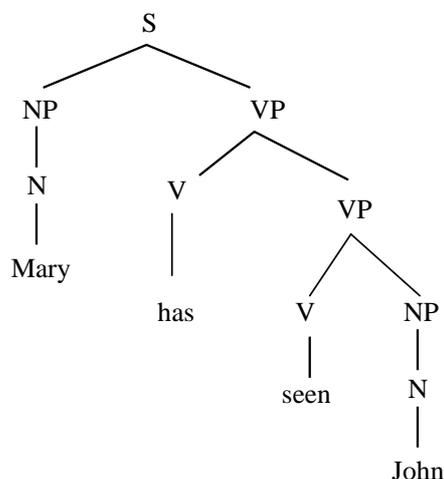
We pointed out in our discussion of wh- movement in chapter 13 that SAI was not a systematic feature of wh- interrogatives: it doesn't occur in subject interrogatives (e.g. Who saw John?), nor in indirect interrogatives (I wonder who(m) Mary has seen). This and the fact that SAI is involved in other types of constructions than interrogatives suggests that it should be treated as a specific construction type, which can be triggered by certain other types of constructions. This leads us to suggest a Subject Auxiliary Inversion transformation as a way of producing these types of sentences. We can give the following initial formulation to the SAI transformation:

(11) SAI transformation (initial formulation)

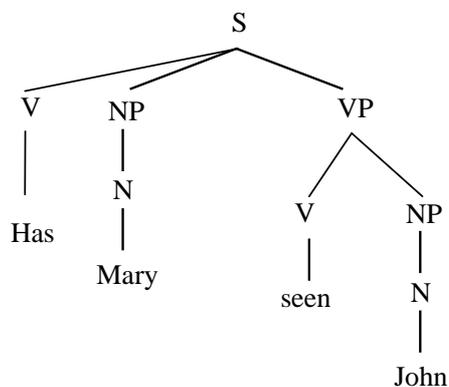
SA NP — V[aux] — VP
 SC 1 2 3 ⇒ 2 — 1 — 3

The Structural Analysis requires the presence of an NP, an auxiliary verb and a following VP, and the Structural Change inverts the auxiliary verb and the NP. The transformation is illustrated in tree 4 and tree 5.

Tree 4



Tree 5



This transformational analysis has the typical advantages which he have discussed for e.g. passive and wh- movement. First, it avoids introducing new phrase structure rules allowing sentences beginning by an auxiliary verb, which would be necessary if we wanted to get inverted sentences in deep structure. Second, given the hypotheses made in the preceding section, it ensures that the form of the VP in an SAI sentence will be the same as what you would get in the noninverted sentence. E.g. if a modal is inverted, the VP following the subject will be a base VP. This is an automatic consequence of the fact in the deep structure, the modal constrains the form of its VP sister through its subcategorization frame. Also this formulation automatically guarantees that if there is more than one auxiliary, it is the first one in the corresponding deep structure order (the one immediately following the subject NP) which is inverted. Third, this formulation explains why the inverted subject has the same semantic role with respect to the main verb as a non-inverted subject. Indeed, the subject is in the usual subject position in deep structure, where it gets assigned its role, and it keeps that role throughout the transformational derivation. Finally, having SAI done by a transformation accounts for some of the interactions of SAI with other transformations. For instance, the passive transformation introduces the passive auxiliary *be*. This auxiliary will be inverted in SAI, if it is the first auxiliary after the subject (e.g. *Was John seen by Mary?*). Since the auxiliary is introduced by the passive transformation, it cannot have been present in deep structure. Consequently, if SAI constructions were to be produced at the deep structure level, we would incorrectly predict that passive *be* does not invert.

What happens when there is no auxiliary present in the deep structure? Elementary English grammar tells us that in that case, the auxiliary *do* appears. It appears in the same tense and person as the verb does in deep structure, and the main verb appears in the base form in the inverted structure.

- (12) a. Mary knows John. Does Mary know John?
 3pers present 3pers present base
- b. Mary saw John. Did Mary see John?
 past past base

This operation is traditionally known as *do*-support. We will see that it applies systematically in constructions which require the presence of an auxiliary, for instance negation and VP ellipsis.⁴² In all these constructions, when the necessary auxiliary is absent, *do*-support introduces the auxiliary *do*, which we suggest is a simple grammatical marker, having no intrinsic semantic content.⁴³ We assume that if there is no auxiliary present in deep structure, the SAI transformation constructs an empty auxiliary position. Thus we revise (11) as shown in (13).

(13) SAI transformation (final version)

SA NP — (V[aux])— VP
 SC 1 2 3 ⇒ 2 — 1 — 3

⁴²Also in so called emphatic constructions, where an auxiliary is stressed, which we will not discuss here.

⁴³We would claim that the meaning which is often attributed to *do* is in fact related to the application of the SAI transformation (or, in more theory-neutral terms, to the presense of inversion). Notice that the question meaning associated with inversion also appears if there is simple auxiliary inversion, without the appearance of *do*.

The following condition must be stated on (13): If no V[aux], 2, is present, the V[aux] position is constructed by the transformation, and is specified as having the same tense and person as the main verb of the VP, 3, and that VP is specified as being in the base form in the output structure.

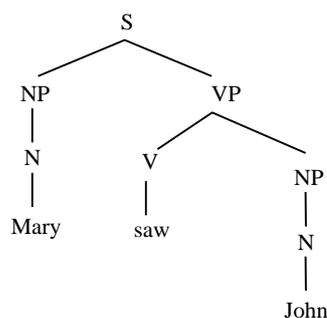
Furthermore, we assume that an empty V[aux] position is filled by the auxiliary *do*, as a result of the application of the *do*-support transformation, which is obligatory.

(14) *do*-support

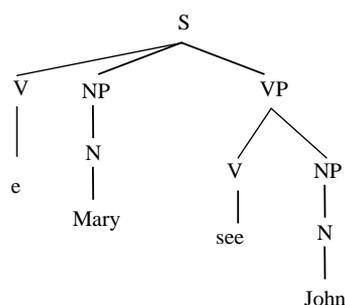
SA	V[aux]
	e
SC	V[aux]
	do

In (14), the ‘e’ in the SA designates an empty V[aux] position. The operation of (13) and (14) is illustrated in trees 6, 7 and 8.

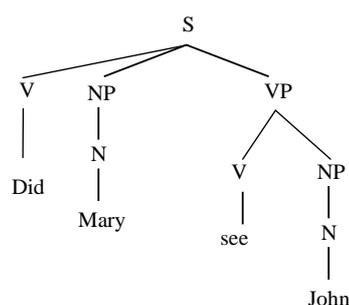
Tree 6



Tree 7



Tree 8



Let us sum up a few more things about SAI, which have been discussed above in separate places. First, SAI only applies in main clauses, never in subordinate clauses. Transformations having this property are known as *root* transformations. Second, SAI is obligatory in main clause yes-no interrogatives; it is obligatory in main clause *wh*-interrogatives except if the subject of the main clause is questioned, in which case it does not occur. Third, SAI is also obligatory in a certain number of noninterrogative constructions, e.g. (10c,d) above, and constructions like the *so do(es) NP* construction, the *neither do(es) NP* construction, etc.

Sentential negation with *not*

A second construction which involves an auxiliary position, and can trigger *do*-support environments if no auxiliary is present, is the sentential negation construction with *not*, illustrated in (15).

- | | | |
|------|------------------------|-------------------------|
| (15) | a. John has seen Mary. | John has not seen Mary. |
| | b. John can seen Mary. | John cannot see Mary. |
| | c. John saw Mary. | John did not see Mary. |

The presence of *not* in a finite VP requires the presence of an auxiliary position, just like SAI does. We can propose a negation transformation, which introduces *not*, and which is very similar in crucial respects to the SAI transformation in (13).

(16) Negation transformation

SA NP — (V[aux])— VP
 SC 1 2 3 \Rightarrow 1 — 2 — not — 3

The conditions on this transformation are similar to those on SAI, given after (13), especially the fact that if the V[aux] is absent, the Structural Change creates an empty V[aux] position, which will cause the subsequent application of the *do*-support transformation (14).⁴⁴ This situation is illustrated in (15c).

The interaction of the Negation transformation and SAI is of some interest. Indeed, there is a further transformation, which we can call *not*-contraction, which replaces the structure *Aux + not* (e.g. *will not*, *does not*, ...) by an auxiliary with a contracted negation (e.g. *won't*, *doesn't*, ...). What is of interest here is that the way the SAI transformation applies to a negative sentence, depends on whether *not*-contraction has applied or not. If it hasn't, then the auxiliary is simply inverted, and *not* is left behind the subject. If *not*-contraction has applied, then the contracted negative auxiliary is inverted. This is illustrated in (17a) and (17b) respectively.

- (17) a. John will see Mary \Rightarrow^{Neg} John will not see Mary
 \Rightarrow^{SAI} Will John not see Mary?
 (Note: *Will not John see Mary?)
- b. John will see Mary \Rightarrow^{Neg} John will not see Mary
 $\Rightarrow^{\text{not-contr}}$ John won't see Mary
 \Rightarrow^{SAI} Won't John see Mary?

(17b) shows us crucially that the Negation transformation and the contraction transformation have to apply before the SAI transformation, since SAI can invert a negative auxiliary.

VP-Ellipsis (also called Post-auxiliary ellipsis)

In chapter 11, we gave an initial characterization of VP-Ellipsis. We also mentioned this transformation in our discussion of the constituent structure of sentences with auxiliaries.⁴⁵ Here are a few examples.

- (18) a. John can see Mary and Peter can too. (=can see Peter too)
 b. John saw Mary before Peter did. (= saw Mary)
 c. John may see Mary but Peter will not. (= will not see Mary)
 d. John will see Mary, and Peter will try to. (= to see Mary)
 e. John is happy and Mary is too. (= is happy too)

⁴⁴Once again, as suggested in the preceding footnote, we would claim that the negation meaning is not related to the presence of *do* but rather to the application of the negation transformation. Note specifically that the negative meaning is present without *do* when there is another auxiliary in the sentence.

⁴⁵ Notice that in example (18e), what is ellipsed is not a VP, but an AP. In fact, any complement of an auxiliary, including predicative complements of copular *be*, can be ellipsed, whatever its category. Thus, the label *post-auxiliary ellipsis* is more suitable. However it is so common to call this VP-ellipsis that we have kept to this usage despite the fact that it is somewhat misleading.

We see that VP-ellipsis requires the presence of an auxiliary verb followed by a VP which is identical in content to a preceding VP in the discourse.⁴⁶ In fact, VP-ellipsis is also possible after infinitival *to* as shown in (18d). We can formulate a VP-Ellipsis transformation as follows:

(19) VP-ellipsis transformation

SA NP — (V[aux]/to)— VP
 SC 1 2 3 ⇒ 1 — 2

Again, this transformation shares the properties of SAI, given in (13), especially the fact that if no auxiliary or *to* is present, an empty auxiliary position is created, which subsequently is obligatorily filled by *do*-support (this is illustrated in (18b)).

The status of auxiliary *do*, introduced by *do*-support

It is important to distinguish the auxiliary *do* (the one introduced by *do*-support) from main verb *do*. Though these two verbs are historical descendants of the main verb *do* in older varieties of English, the synchronic properties of the language show that they are crucially different both from a syntactic and from a semantic point of view. From a syntactic point of view, it is clear that main verb *do* is not an auxiliary verb: it does not allow any of the specific constructions which are possible with auxiliaries. This is shown in the following examples which contrast main verb *do* and auxiliary *do*.

- (20) a. Mary didn't see Ann. John did.
 Did John? *Did John do?
 b. Mary did here homework. *Did Mary her homework.
 Did Mary do her homework.
 (21) a. Mary saw Ann. John didn't.
 *John didn't do.
 b. Mary did her homework. *Mary didn't her homework.
 Mary didn't do her homework.

Examples (20a) and (21a) show that auxiliary *do* does not require (or even allow) *do*-support either in interrogatives or in negation. On the other hand, (20b) and (21b) show that main verb *do* does require *do*-support, both in interrogatives and in negation. This shows us that main verb *do* is not an auxiliary syntactically.

The semantics of the two verbs is also different. This was already mentioned in the discussion of *do* in pseudoclefts vs. *do* in VP-ellipsis, in the discussion before examples (51) of chapter 11, and in notes 18 and 19 of the same chapter. We first showed that the *do* in pseudoclefts is main verb *do* whereas the *do* in VP-ellipsis is auxiliary *do*. From the point of view of semantics, we concluded there that main verb *do*, can only replace verbs which are hyponyms of main verb *do*, i.e. which denote a kind of activity. On the other hand there are no semantic restrictions on the types of verbs that auxiliary *do* can replace. It can replace any verb, including e.g. stative verbs

⁴⁶Note that the antecedent of VP-ellipsis has to be *said* in the discourse, it cannot be derived from the context of utterance: e.g. you can't say *you can't* to someone who is doing something, meaning *you can't do what you're doing*, the action in question being obvious from context. You would have to say e.g. *You can't do that*. On the other hand, there is a certain flexibility in the identity requirement: an utterance such as *John has seen Mary but Peter will not* is ok, even though the ellipsed VP would have to be *see Mary*, not *seen Mary* as in the antecedent.

(with the exception of the auxiliaries, of course). This is also clear in the *do so* construction, where *do* is an instance of main verb *do*.⁴⁷ *Do so* can replace a VP, but with similar semantic constraints to those of the pseudocleft examples. This contrast is clear in examples (22).

- (22) a. *What Mary did was seem tired.
 b. *Mary seems tired and Peter does so too.
 c. Mary seems tired and Peter does too.

In these examples, the verb *seem* is stative and cannot be replaced by main verb *do*, as shown in (22a,b). It can be replaced by auxiliary *do* as shown in (22c).

⁴⁷ This is shown by the SAI and negation facts:

- | | | |
|------------------------|--------------------------|----------------------|
| (i) John helped Peter. | (iii) John didn't do so. | (v) *John didn't so. |
| (ii) Mary did so too. | (iv) Did John do so? | (vi) *Did John so? |

Clearly, the *do* in *do so* requires *do*-support in these constructions, and is consequently main verb *do*.

15. Complex sentences

In this last section of the course, we will briefly provide an introductory discussion of complex sentences. Complex sentences are sentences which contain smaller sentences inside of them. There are two major ways of building complex sentences, coordination and subordination, illustrated in the following examples:

- (1) [S [S Mary saw John] and [S Ann saw Peter]]
- (2) a. [S Mary said [S that Ann saw Peter]]
 b. [S Mary saw [NP the boy [S who Peter talked to]]]
 c. [S Mary saw John [S before Ann saw Peter]]

Sentence (1) is a coordinate sentence. It is the result of coordinating two sentences together, as shown by the bracketing. The central property of coordinate sentences is that none of the sentences included in the coordinate structure (e.g. *Mary saw John*, *Ann saw Peter*) can be considered to be dependent on the other; none can be considered to be the head. Their status is equal. We will not discuss coordination any further in this course. Sentences (2) are examples of subordination. In all of these examples, there is a sentence within a larger sentence, and this embedded sentence can be considered to be a dependent unit within the larger clause. Three major types of subordinate clauses can be distinguished. First, subject and complement clauses (*complétives*). These clauses occupy the position of a subcategorized argument of a head which can be a verb, an adjective or a noun. Such clauses can function as subjects and objects. In (2a), the subordinate clause *that Ann saw Peter* is a complement clause, which is the direct object of the verb *said*. The second major type of subordinate clauses are relative clauses (*subordonnées relatives*), illustrated in (2b). Relative clauses are modifiers of nouns, they have essentially the same type of role in an NP as an attributive adjective (*adjectif épithète*) and they are sometimes classified in the a general class of *attributive modifiers*. In (2b), the relative clause *who Peter talked to* is a modifier of the head noun *boy*. The third type of subordinate clauses are adjunct clauses (*subordonnées circonstancielles*), illustrated in (2c). These clauses play the same role in sentences as PP adjuncts. This is clear from the fact the adjunct clause *before Ann saw Peter* could be replaced by a PP adjunct, e.g. *before dinner*. In fact, it was suggested on p.22 above that *before* is a preposition in such cases, which takes an S complement. Under such an analysis the the adjunct clause is a PP adjunct which has a sentence as the complement of the preposition.

We will limit our discussion here to the case of subject and complement clauses. Consider the following examples.

- (3) a. [That John went to the party] surprised Ann.
 b. Ann knows [that John went to the party]
 c. [That Magellan was able to sail around the globe] finally proved [that the earth is not flat]
 d. John was happy [that Mary could come to the party]
 e. The idea [that Mary would not come to the party] surprised us.

(3a) contains a subject clause, subject of the verb *surprised*. Note that it could be replaced by an NP, e.g. *John* (*John surprised Ann*). (3b) contains a direct object clause, which is the direct object of the verb *knows*. Note again that it could be replaced by a simple NP, e.g. *the answer* (*Ann knows the answer*). (3c) contains both a

subject clause and a direct object clause. (3d) contains a clause which is the complement of the adjective *happy*. Note that this clause could be replaced by a PP complement of *happy*, e.g. *happy with the news*. Finally, (3e) contains a clause which is the complement of the noun *idea*. (Note that this is not a relative clause, a simple test that shows this is that you cannot replace *that* with a relative pronoun such as *which*: **The idea which Mary would not come to the party surprised us.*). We will be assuming structures of the following type for these sentences.

- (3)
- a. [CP [COMP That] [S John went to the party]] surprised Ann.
 - b. Ann knows [CP [COMP that] [S John went to the party.]]
 - c. [CP [COMP That] [S [Magellan was able to sail around the globe]]] finally proved [CP [COMP that] [S the earth is not flat.]]
 - d. John was happy [CP [COMP that] [S Mary could come to the party]]
 - e. The idea [CP [COMP that] [S Mary would not come to the party]] surprised us.

Note that we are considering that the introductory word *that* is part of the subordinate clause. In English terminology, words like *that* are often called complementizers (COMP) as done in the above structures. The idea is that adding *that* in front of a sentence turns it into a complement clause. It is important to notice that the sentence following *that* in the above subject and complement clauses is just a normal complete finite sentence. Such sentences could stand on their own. This is why they have been labeled S in the tree. On the other hand, the entity formed by adding *that*, or another complementizer to a sentence is not a normal complete sentence. *That John went to the party* cannot stand alone as a sentence. It has to be a complement or subject within another sentence. This is why it cannot be considered to be simply of category S. Earlier version of generative grammar assumed that a COMP and the following S formed a kind of sentence, and labeled it S'. However, many more recent versions of generative theory have opted to consider the complementizer as the head of what is traditionally called the subordinate clause, and the following S as the complement of the complementizer. Under this interpretation, the COMP and the following S form a CP (complementizer phrase) in the same way that a verb and its complements form a VP. It is beyond the scope of this course to justify this position.

We can characterize the structure of the CP by the phrase structure rule (4a). We also need to add new phrase structure rules so that a CP can be in subject or object position, as in (4b, c) for verbs, and (4d, e) for nouns and adjectives

- (4)
- a. CP → COMP S
 - b. S → CP VP
 - c. VP → V (NP) (NP) (Adj) PP* (CP)
 - d. NP → NP → (Det) Adj* N PP* (CP)
 - e. AP → A CP

We also need to add new subcategorization frames for the verbs, nouns and adjectives involved, e.g.

- (5)
- a. surprise [CP — NP]
 - b. know [NP — CP]
 - c. prove [CP — CP]
 - d. idea [— CP]
 - e. happy [— CP]
- etc.

Note that not all verbs allow CPs as their subject or object:

- (6) a. *John ate that Mary cooked the potatoes.
 b. *That Mary cooked the potatoes ate John.
 c. *Mary enjoys that John is a good cook.

It is obvious that some of the restrictions involved are of a semantic nature: the type of referent of a sentence (e.g. a state of affairs) is not semantically appropriate as a subject or object for the verb *eat*. However, it is not clear that the relevant distinctions can always be made in terms of semantics: what semantic reasons might make an example like (6c) unacceptable? Specifically it is not clear why (6c) shouldn't mean that Mary enjoys a certain state of affairs, namely that John is a good cook. This appears to be a strictly syntactic constraint on the verb *enjoy*, which does not have a subcategorization frame of the type [NP — CP]. Thus it appears that (6c) is not just semantically deviant, but also syntactically deviant, i.e. ungrammatical.

The examples we have given up to now all involve finite complement clauses. Different main verbs, however, have different requirements as to the form of their complement clauses, as shown in the following examples.

- (7) a. Mary said that John smokes cigars. (*Mary said for John to smoke cigars, *Mary said John to smoke cigars)
 b. Mary demanded that John smoke cigars. (*Mary demanded that John smokes cigars, *Mary demanded for John to smoke cigars).
 c. Mary prefers for John to smoke cigars. Mary prefers that John smoke cigars. (*Mary prefers that John smokes cigars).

As shown in (7a), the verb *say* requires a finite clause. It does not allow either an infinitive clause (i.e. one where the verb is in the *to* + V form) or a base clause (one where the verb is in the base form). On the other hand, the verb *demand* requires a base form clause, and does not allow a finite clause or an infinitive clause, as shown by the data in (7b). Finally, the verb *prefer* allows either a base form clause, or an infinitive clause, but does not allow a finite clause, as shown in (7c). We can account for all these data by making appropriate specifications in the subcategorization frames of the verbs:

- (8) a. know [NP — CP[fin]]
 b. demand [NP — CP[base]]
 c. prefer [NP — CP[inf]] or [NP — CP[base]]

If one looks at different adjectives and nouns, it can be seen that they also impose syntactic constraints on the form of their complement clauses.

Let us now turn to the problem of complementizers. All of our examples up to now have involved the complementizer *that*. There are other possibilities in English, however.

- (9) a. John knows that / whether / Ø / *for Mary will come.
 b. John declared that / *whether / Ø / *for Mary will come.
 c. John asked *that / whether / *Ø / *for Mary would come.
- (10) a. John demanded that / *whether / *Ø / *for Mary return.
 b. John prefers for / *whether / *Ø / *that Mary to smoke cigars.

We see that with a finite clause, depending on the verbs, the complementizer can be *that*, *whether* or Ø. (Note that *if* is also possible in many cases where *whether* is). Any verb that allows *that*, will also allow Ø. If a verb requires *whether/if* as is the case for *ask*, then Ø is impossible, which shows us that Ø is a variant of *that*. (We are

implicitly assuming here that in sentences with no visible complementizer (e.g. *John knows Mary will come*), the complementizer position is present in the syntactic structure, but is not filled, i.e. there is a 'zero' complementizer in such sentences).

On the other hand, in base clauses, as illustrated in (10a), only the complementizer *that* is possible, and that in infinitive clauses, as illustrated in (10b) only the complementizer *for* is possible. (Again, we are assuming without justification, for reasons of space, that *for* here is not the same item as the preposition *for* in the synchronic grammar of present day English). More generally, it appears from these data, that the possible complementizers depend in part on the form of the complement clause, and on the choice of the specific verb.

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