

Advance Reading:

(SOME)
LINGUISTIC
FOUNDATIONS

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1 Preamble

The term 'computational linguistics' is being used to cover a wide variety of projects and programmes which deal with the processing of natural language and linguistic data on machines – a scientific field as diverse as linguistics itself comprising numerous programs and applications.

Some examples: programs for the analysis and/or generation of written language (*text*) or spoken language (*speech*), programs that automatically translate from one language into another, programs that model human linguistic competence on various linguistic levels such as phonology or morphology, specialised software such as screenreaders for people with handicaps, programs for processing large amounts of linguistic data and analysing text statistically and many more.

Some of these applications may be vaguely familiar to you – you may have tried and failed to order a train ticket via the *Deutsche Bahn Reisedialogsystem*, in which case you have dealt with a speech analyser and generator, or you may have had some fun with *Babelfish* and its merry translations (can you guess the English original for 'Linguistik ist alle aber bohrend'?).

Actually, though, snide remarks about the inadequacy of current commercial applications in the field of computational linguistics are cheap to come by and show no more than a lack of understanding concerning the intricacy of the underlying task. Accordingly, one aim of this class is to create a basic comprehension of the magnitude of problems that computational linguists deal with.

Although this field seems overwhelmingly complex at first glance, we can roughly make out two different general aims within computational linguistics.

On the one hand, research is driven by the attempt to create commercial programs (such as the software mentioned above), i.e. actual applications to be used for specific tasks. In some cases, the linguistic basis for these applications is more or less vague (the need for such a basis even being questioned, as the oft-cited quote from a former head of IBM's Continuous Speech Recognition group demonstrates: "Every time I fire a linguist, the performance of our speech recognition system goes up"). Here, then, natural language processing was viewed as more of an engineering problem than linguistic science proper.

Quite contrary to this view, another aim of computational linguistics is to facilitate the implementation of insights from theoretical linguistics, thus creating a working environment in which linguistic theories on all linguistic levels may be tried and tested.

In modern research, this division of aims is not that easy to distinguish anymore, i.e. the boundaries within are often in a constant state of flux. Still, as a cue as to what to expect from this seminar, it serves a useful purpose: we will focus on the latter view in our class. We do not aim for executable programs and will work with actual implementations only cursory. Instead, we will have a closer look at some of the underlying concepts and approaches of theoretical linguistics, namely those that have had and still have a direct influence on computational linguistics. Our main emphasis will be the area of syntax, which we will use as a point of origin for the introduction of some of the methodology and terminology to be communicated in our class.

We start very gently with a few remarks concerning science and scientificity by introducing terms such as theory, classification, hypothesis, generalisation,

formalisation and so forth. Although the concrete function of these terms may not be obvious to you straight away, we will keep returning to them later on.

We will then go on with a chapter on syntax, where we will try to kill two birds with one stone: you will become acquainted with such central terms such as 'class', 'structure' and 'structuralism', 'constituent' and so forth; at the same time, you are to develop a very basic toolkit enabling you to do syntactic analyses on your own.

What this text provides you with is in other words a small introduction to some of the **LINGUISTIC FOUNDATIONS** that you will need to have at your disposal when it comes to the analysis of sentences.

The approach that we follow is for the most part formal in nature: we will look at sentences more or less in isolation of questions that concern (a) the semantics of the structures we investigate and (b) the context they occur in.

These questions will be dealt with in the two *addenda* of this text, where we will expand our investigation of sentences with respect to certain semantic aspects and the various different ways that (one and the same) semantic information may be structured.

2 Science and scientificity

In general, a science (Latin *scientia*, from *scire*: "know") is a system of knowledge that is concerned with the fundamental laws that underlie certain aspects of the physical world.

Most sciences take physically perceivable phenomena as their subject matter: the scientist sees or hears or feels something and wonders why it is the way it is. This kind of curiosity can be regarded as basic for any science. The scientist would next try to come up with one or more hypotheses on the basis of his observations. The word 'hypothesis' is a familiar term from every-day-language, where it is roughly equivalent to any explanation for which there is no evidence – comparable to our every-day language use of the term 'theory'. Within science, though, the terms 'hypothesis' and 'theory' have a more special meaning. Since these terms will crop up repeatedly throughout this text, we will devote some paragraphs to clarify more precisely what we understand them to mean.

2.1 Hypothesis

A scientific **HYPOTHESIS** is a statement that attempts to generalize observed phenomena in order to express a general truth.

Take an informal, non-linguistic example: if you put your car keys, your little nephew's matchbox car and a pair of scissors in a bowl filled with water, you would observe that all of these objects sink to the ground. If, on the other hand, you did the same with a twiglet from the tree in your garden and a burnt match you would note that these objects do not sink but instead float. Two possible hypotheses that would generalize your observation could be:

Hypothesis 1): all metal objects sink

Hypothesis 2): all wooden objects float.

With these hypotheses, you leave the level of the concrete data: first, you **CLASSIFY** the objects in question with respect to some shared feature (in this case the material

they are made up of, ie. metal vs. wood), next you formulate a **GENERAL LAW** for these very classes.

By doing so, you not only account for the data that you observed but you also predict data that so far have not been gathered: according to your hypothesis, a coin, say, or a bottle opener or any other metal object would sink.

This method can easily be transferred to linguistic data, as the following informal example shows. The sequences of words in examples (1) and (2) are grammatical sentences of English, those in (3) and (4) are not (as indicated by the asterisk preceding them):

- (1) John slept.
- (2) Mary cried.
- (3) *died Sue.
- (4) *laughed Rita.

How can we describe these data? Following the steps mentioned above, we could start off by allocating each element in these examples to two different classes, namely proper nouns (*John, Mary, Sue, Rita*) and intransitive verbs (*slept, cried, died, laughed*). Next, we can postulate the following hypothesis:

In English, proper nouns have to precede intransitive verbs.

This hypothesis does not only describe the data in (1) to (4) – it also predicts that

- (5) *shivered Frank.

is ungrammatical, while (6) is grammatical:

- (6) Lisa wept.

The interesting question is: how valid are your hypotheses? Well, a scientific hypothesis is only as good as the evidence that supports it – or, more to the point, the lack of evidence that would refute it. In other words, to evaluate the soundness of any hypothesis it needs to be tested.

Testing a hypothesis can be done in two different ways: the scientist can either try to **VERIFY** it by demonstrating that the hypothesis does correctly predict the complete set of data to which it can potentially be applied.

This, of course, is often out of the question – just imagine what it would mean to verify your Hypothesis 1): you would have to travel the world and try it out on any metal object there is, which is of course an impossible task.

Another, and more practicable way of testing a hypothesis is to aim specifically for those data that may contradict it. This method is called **FALSIFICATION** and entails the systematic search for data that are not accounted for by the hypothesis. As long as no such cases are found, that is as long as the hypothesis can not be falsified, it is regarded as valid.

This shows, by the way, that within an empirical science (ie. a science that has some observable data to collect and account for), there is no such thing as the absolute truth. Most of our hypotheses are not verifiable, they simply can not be checked in all possible cases as there are too many of them. Strictly speaking, then, we work with certain hypotheses not because they have been proved to be true but because they have not been proved to be false. A hypothesis can be (more or less) trustworthy or sound, but it can never be either completely right or completely wrong.

2.2 Theory

To arrive at the above mentioned aim of any science, namely creating a system of knowledge for a given subject-matter, sciences usually combine a large number of different scientific hypotheses. A well-known name for such a system of hypothesis is the term **THEORY**.

A theory can thus be described as a system of hypotheses that serves to describe and explain the behaviour and appearance of a given set of phenomena and enables predictions about other phenomena.

Theoretical constructs

Note that any science employs a vast amount of **THEORETICAL CONSTRUCTS** that make up a large part of the science's **SCIENTIFIC TERMINOLOGY** to formulate its theories and to connect the various hypotheses within the theory.

Let us flesh this out with another informal example. Our two hypotheses about the behaviour of wooden and metal objects are not related to one another – there is no explanation that would account for both of them. The introduction of a theoretical construct from physics does just that. The construct in question is 'density' (dt. *Dichte*) and refers to an object's mass per unit of volume. You do not need to know about this concept to follow our line of argumentation, the important point is that metals tend to have a higher density than water; wood, on the other hand, a lower density. We can now formulate a mini-theory – again a generalisation – that connects both our hypotheses:

Theoretical statement: All objects with a higher density than water sink, all others float.

By employing the theoretical construct 'density', we thus arrive at a statement that can serve as an explanation for two seemingly unrelated hypotheses.

Linguistic terminology

What does this have to do with linguistics, you may wonder – well, linguistics, too, employs a large set of specific theoretical constructs. We have already seen this in connection with examples (1) – (6): 'proper noun' or 'intransitive verb' are instances of theoretical constructs used within linguistics.

The need for terminology is based on a number of different factors. First of all, when trying to explain any subject-matter in detail, you will necessarily have to come up with the appropriate terminology to do so, and for many of a science's concepts there just are no words in everyday language. As you will know from your own experience, as soon as you try to discuss and describe something in more depth, say a piece of music or the way a computer program works, you will have to resort to a special vocabulary to do so.

In some cases our every-day language does seem to provide terms that could potentially be used in linguistics. Unfortunately, these terms lack for the largest part the precision that would render them useful. Take the term 'word' as an example. Although you will have no problem recognizing all the words in this text, you will have a much harder time when it comes to defining precisely what the term 'word' stands for. What

exactly is a word? For a scientific purpose, our every-day notion of 'word' is much too vague and therefore not practicable. One of the criteria that make a science scientific is accuracy, and for this criterion to apply the terminology that is used has to be unambiguous and exact.

When encountering linguistic terminology, keep in mind that it always serves a purpose, namely to account for linguistic data in an accurate and non-arbitrary way. Terms like 'proper noun' and 'intransitive verb' were not invented to pester pupils or students but to enable classification and thus generalized statement about language.

Do also keep in mind, though, that any kind of scientific terminology is the result of human thought and resourcefulness and as such not an unquestionable instrument.

In the section on hypotheses, we mentioned the fact that a hypothesis can never be proved to be true or false in the mathematical sense, and actually, something similar holds for scientific terminology: any science will constantly scrutinize and question its theoretical constructs. This is also true for modern linguistics. As a consequence, we may occasionally encounter situations in which you will be presented with terms that are interpreted and applied slightly differently by various linguists, or you may find that one classificatory system does not exactly match another. This should not worry you too much, because it is no more than an indication of the fact that modern linguistics is an active and lively science.

To put not too fine a point on it: university is not a Taliban school, ie. you should not expect to be presented with any kind of God-given truth to be learned by heart. Instead, one of the further aims of your education is for you to be able to deal with and evaluate an array of different opinions.

2.3 Science & sciences

Depending on the kind of data under observation we can recognize quite a number of different sciences: psychology studies individual human behaviour, chemistry investigates the properties of substances and the way in which they combine, sociology deals with the behaviour of humans within a group, linguistics is concerned with language.

An important point to note is the fact that a single science will always comprise many different theories (even about one and the same phenomenon). This should not be surprising: actually, this is what scientific discourse is all about. Determined by the specific data under observation and the individual aims, interests and convictions of the scientists, disciplines such as physics, sociology, biology and so forth comprise many different subfields, each of which may consist of various different theories or partial theories. Linguistics is no exception: depending on the individual perspectives linguists take on their subject matter, language can be studied from numerous points of view. You will most likely be familiar with dichotomies such as synchronic vs diachronic linguistics, theoretical and applied linguistics and so forth. Each of these disciplines investigates language from a different stance (which is not to say that there are no common interests).

2.4 Scientificness

Irrespective of the perspectives and aims of the linguist, all the approaches in question need to fulfil certain requirements in order to be recognized as scientific. When we

discussed the importance of scientific terminology above, we already mentioned that **ACCURACY** is one of the crucial prerequisites for any scientific research. This means - amongst others - that scientists have to make their methodology and terminology transparent, they have to describe precisely how they reach their conclusions and which evidence they have to support them. Closely connected with this requirement is the need for **FORMALISATION** within a given scientific field. In view of the ambiguity of natural language, it is not surprising that many sciences have tried to devise specific **FORMAL LANGUAGES** which are free of the inadequacies of natural language in order to precisely express their insights and theories. A formal language is made up of a defined set of basic elements, its *vocabulary* or *alphabet*, and a defined set of rules stating how to combine these elements to create well-formed expressions. Generally speaking, the basis of any formal language is meaning-free (in German, this would be called *Kalkül*). By allocating one and only one specific meaning to each element, the resulting language is free of ambiguity. One of the most popular formal languages used within science is **PREDICATE CALCULUS** (*Prädikatenlogik*), which is deployed in various different sciences to express and clarify certain insights and concepts. Within linguistics, for example, you will find that most modern theories of semantics will make use of predicate calculus in one form or the other, while other, more specific or problem-tailored formalisms also abound: phonological rules, feature structures, syntactic transformations and so forth are all expressed in a formalised way.

Although formalisation is of special interest to our class as we need to express any hypothesis or term in formalised way in order to communicate it to a computer, we will not elaborate this issue further at this point.¹

Closely connected with the requirement of accuracy is the need for **OBJECTIVITY**: a theory must be free of individual beliefs and personal opinions. That does not mean that a scientist cannot choose a subject-matter freely or come up with hypotheses about his data that are based on educated guesses. What it means is that the final conclusions he proposes must be of a sort that any other individual would also arrive at were he or she to apply the same methodology, irrespective of personal beliefs.

¹ Note that formalisation is dealt with more thoroughly in LS-2: 'Mathematisch-logische Grundlagen der Linguistik'

3 Syntax

Traditionally, syntax (from the Greek *syntaxis*: 'order, arrangement') is described as the subfield of linguistics that studies the combination of words to form sentences. To get an idea of what this study entails, let us start with a simple example:

(7) He fooled her.

Example (7) is a combination of three words: the personal pronouns *he* and *her* and the verb *fooled*. Our intuitive knowledge, our syntactic competence concerning these words and the way they combine is considerable. We know, for instance, that none of the words can be omitted. None of the following sequences are English sentences (and are accordingly marked with an asterisk), since each is somehow incomplete:

(8) *fooled her

(9) *He fooled

(10) *He her

We also know that the linear sequence of the elements in (7) is not arbitrary: we cannot say

(11) *He her fooled

(12) *Her he fooled

On the other hand, it is possible to re-phrase sentence (7) as follows:

(13) Her, he fooled.

Obviously, then, there is a systematic relationship between sentences (7) and (13), and we also know that there are other sentence types that are related to sentence (7):

(14) She was fooled by him.

(15) It was he who fooled her.

(16) It was she who was fooled by him.

(17) Did he fool her?

Let us now compare example (7) to the following sentence:

(18) The sleazy con artist fooled the rather gullible heiress.

This sentence is of course comparable to sentence (7) since the verb is the same. Instead of the personal pronouns *he* and *her*, however, we now have sequences of words, namely *the sleazy con artist* and *the rather gullible heiress*. Quite intuitively, we feel that each of these sequences forms some kind of unit within the sentence, and this intuition is substantiated by the following sentences, which pick up examples (14) to (17):

(19) The rather gullible heiress was fooled by the sleazy con artist.

(20) It was the sleazy con artist who fooled the rather gullible heiress.

(21) It was the rather gullible heiress who was fooled by the sleazy con artist.

(22) Did the sleazy con artist fool the rather gullible heiress?

Note that in each of these examples, the sequences *the sleazy con artist* and *the rather gullible heiress* stay 'intact' - we cannot, for example, say something like

(23) *Heiress was fooled by the sleazy con artist the rather gullible

(24) *It was con artist who the sleazy fooled the rather gullible heiress

These examples show that sentences like (18) have some kind of internal structure as some sequences of words are clearly more 'closely' connected than others.

These findings indicate two big areas of interest for syntax, each of which will be dealt with in the sections to come, namely

1. the internal structure of sentences
2. various types of sentence

We begin with a closer look at the internal structure of sentences such as

(25) John slept.

(26) Mary bought a car.

(27) John gave Bill the book.

Formally, these sentences all belong to the type 'active-indicative' (see below), which is considered the basic or 'underlying' type in virtually all modern grammars. Accordingly, this type of sentence is often called 'kernel' sentence. As we shall see later in this chapter, other types of sentence (other indicative sentences as well as interrogatives and imperatives) are then derived from this form - that means that we will describe 'non-kernel' sentences by describing the differences they show in comparison to a corresponding kernel sentence. Sounds a bit complicated, but the following example might clear things up:

(28) John wrote the letter.

(29) The letter was written by John.

Sentence (28) is in the 'basic', ie. kernel-form: it carries the features 'INDICATIVE' and 'ACTIVE'. Sentence (29) is also an indicative sentence, but it carries the feature 'PASSIVE'. The description of passive sentences does not start 'from scratch', if you like, instead, we refer to the active sentence in order to describe the passive form. As concerns our example, we could say something like 'in the passive form, the object of the active sentence appears as the subject, the auxiliary 'be' is inserted and the main verb appears in its past-participle form, the active subject appears as the complement of a prepositional phrase headed by *by*'. (See the appendix for a more precise description). As you can see here, we need quite a lot of terminology in order to account for the difference between active and passive sentences, and it is the job of the following sections to introduce this terminology.

Before we begin, we need to discuss some very basic terminology used within syntax, namely the concepts **SENTENCE** and **CLAUSE**. This is of special interest to us, as there is no commonly accepted German equivalent for the concept 'clause'.

3.1 Clause vs Sentence

If you compare the following sequences of words

(30) the boy

(31) John met Mary

you will note that we can only ask 'Is it true that X' in the case of sequence (31):

(32) Is it true that John met Mary? (yes/no)

(33) *Is it true that the boy?

This has to do with the fact that only one of the sequences actually describes some state of affairs or situation which we can question, namely that John met Mary, while the other does not. Within semantics, such a description of a state of affairs is called **PROPOSITION**, and - technically speaking - the salient feature of any proposition is the fact that it can always be allocated a **TRUTH-VALUE**: it is either true or false. We can thus say that the sequence *John met Mary* expresses a proposition (which is either true or false), while the sequence *the boy* does not.

How does this relate to clauses and sentences? Well, in English grammar, the term for a sequence of words that expresses a proposition is **CLAUSE**. Therefore, sequence (31) is a clause. Hold on, you may say, clearly sequence (31) is a sentence - are clause and sentence synonyms, then? As a matter of fact, many speakers of German that deal with English grammar do use these terms synonymously, but this is not quite correct. In the specific case of *John met Mary*, we do in fact have a clause that is a sentence at the same time. But have a look at the following example:

(34) Bill told Fred that John had met Mary.

This sequence of words does not express one, but **two** propositions: namely that Bill told Fred something **and** that John had met Mary. Here, then, we have a sentence that contains two clauses. As a matter of fact, you now know the basic distinction between simple and complex sentences: a simple sentence encodes one, a complex sentence encodes more than one proposition. This can be shown nicely in the following examples:

(35) John knows the answer. (one clause: simple sentence)

(36) John knows that dogs bark. (two clauses: complex sentence)

3.2 The basic elements of syntax: word-classes

The classification of words into word classes is one of the most fascinating and heatedly discussed topics within modern linguistics and authors vary with respect to which inventory of word-classes they recognize. We will not go into too much detail in this text, nevertheless, some elementary comments are necessary.

We usually use terms such as *noun* and *verb* and *adjective* without any further discussion; most of you will have come into contact with such expressions in your days at school. Therefore, the allocation of words to word-classes in the following sentence should not pose too big a problem:

(37) The little boy opened the red box carefully.

Here we have the following allocations:

the: article (definite), *boy*, *box*: noun, *little*, *red*: adjective, *opened*: verb, *carefully*: adverb.

The interesting question is of course: what is this allocation based on? What makes us say that something like *boy* or *box* is a noun, or *opened* is a verb? In other words, how can we define what word-classes such as 'noun' or 'verb' or 'adjective' actually are (and we are not talking about an extensional definition here)?

In many school-grammars, word-classes are defined with reference to aspects of meaning. You might have learned definitions such as

- nouns refer to things (cf. *Dingwort*)

- verbs refer to actions (cf. *Tuwort*)
- adjectives refer to properties (cf. *Eigenschaftswort*)

Unfortunately, though, these definitions are only a first basis for defining classes of words. Why? Because

- there are nouns that refer not to things at all, but for example to activities (e.g. the noun *destruction*) or verbs that do not refer to actions at all, but for example states (e.g. in *John is dead*, *This place stinks*) and so on,
- there are classes of words where it would be difficult to come up with a semantic definition – or how would you describe the semantics of the class that comprises the words *whether*, *if*, *but* and *or*?
- most convincingly, we can usually decide whether something is a noun, or a verb, or an adjective etc. without any knowledge whatsoever of its meaning.

The last item on this list can best be motivated by using a concrete example.

Let us take a phantasy word such as *drobe*. This is not a word of the English language, we therefore do not know what it means. Curiously, though, we have no trouble when it comes to specifying whether *drobe* is a noun, a verb or an adjective in the following sentences:

(38) We always drobe on Sundays. (*drobe*: verb)

(39) This is a really cool drobe. (*drobe*: noun)

(40) What a drobe day! (*drobe*: adjective)

(41) He just drobed on and on. (*drobed*: verb)

(42) Well, my car is certainly drober than yours. (*drober*: adjective)

(43) She keeps her drobes in the cupboard. (*drobes*: noun).

How do we do this? Obviously, the environment of a word plays a crucial part when it comes to establishing its category, and so does its morphological shape. We could argue, for example, that we recognise *drobe* as a verb in sentence (38) because it appears in exactly the same environment that other verbs appear in:

(44) We always $\left\{ \begin{array}{l} \text{drobe} \\ \text{play} \\ \text{bathe} \\ \text{smoke} \\ \text{sleep} \\ \text{swim} \\ \text{dance} \end{array} \right\}$ on Sundays.

In sentence (39), on the other hand, *drobe* appears in a noun environment:

(45) This is a really cool $\left\{ \begin{array}{l} \text{drobe} \\ \text{book} \\ \text{movie} \\ \text{pizza} \\ \text{idea} \\ \text{car} \end{array} \right\}$

Obviously, then, one important feature when establishing word-classes is **DISTRIBUTION** and the question as to which words occur in **PARADIGMATIC RELATION**.

These two concepts are of utmost importance within modern structural linguistics as they form a basis for the classification of linguistic elements. They are relevant not only for syntax but all levels of linguistic description and are therefore being devoted a few passages.

3.2.1 Environment, Distribution and Classification

Originating in phonology (this concept was first applied systematically in the so-called *Prague School of Linguistics* at the beginning of the last century), the term 'distribution' refers to the totality of environments that a specific linguistic element may occur in. The environment of a linguistic element is constituted by those elements that precede and/or follow it.

Let us illustrate this point with an informal, non-linguistic example.

(46)



As concerns the possible environments of the circle, you will note that whatever arrangement we have, this element is always preceded by the square and always followed by the star: ■ ● ★. This, then, is 'totality of environments', i.e. the **DISTRIBUTION** of the circle in our set of data. In order to see how this concept may be used for classification, consider the following data:

(47)



What you see here is that the pentagon occurs in the very same environments as the circle: it is also always preceded by the square and followed by the star: ■ ● ★. Thus, the circle and the pentagon share the same environments, they have the same distribution:

(48)



Elements with identical distribution are said to be in **PARADIGMATIC RELATION** with one another, and as a rule of thumb we can say that those elements may be grouped in one **CLASS**.

Coming back to word-classes and our phantasy-word *drobe*, we can say that it is in paradigmatic relation with a set of verbs in (44) and in paradigmatic relation with a set of nouns in (45) and can thus be allocated to these classes.

In sentences (41), (42) and (43), there are additional features that allow us to recognise *drobe* as noun, verb or adjective, namely the kind of inflectional suffix it takes. In (41), we have *drobe* + *-ed*, i.e. the past-tense form of the verb, in (42), it is *drobe* + *er*, i.e. the comparative of the adjective, and in finally, in (43), *drobe* + *-s*, i.e. the plural of the noun.

What these examples show are two formal, that is non-semantic, criteria that play an important part when it comes to defining word-classes, namely

1. distribution and
2. morphological shape.

It is these criteria that help us decide that a word like *light* is a noun, or a verb, or an adjective (in that order) in

(49) The lamps emitted strong light

(50) He wanted me to light the candle

(51) We had a light dinner.

We will return to this point in class in connection with automatic tagging. The question of how to decide whether, say, *round* is an adjective as in *A round table* or a noun as in *He bought the last round* is something that poses no big problem in human language processing.

A computer, though, has a much tougher time when it comes to resolving this kind of class-ambiguity, and you can guess that distribution and environment play a crucial role when it comes to tackling this task.

As mentioned before, we will not deal with the finer aspects of word classification in this text but instead work with a rather traditional assortment of classes, namely

Word class		Examples
Verb	V	<i>be, drive, grow, sing, think, give</i>
Noun	N	<i>brother, car, house, idea, selection</i>
Proper Noun	Pn	<i>Mary, John, London, Thames</i>
Pronoun	Pro	<i>he, she, they, us</i>
Determiner	Det	<i>a, an, my, some, the, his, that</i>
Adjective	A	<i>big, foolish, happy, talented, tidy</i>
Adverb	Adv	<i>happily, recently, soon, very, rather</i>
Preposition	P	<i>at, in, of, over, with, from, to</i>
Conjunction	Conj	<i>and, because, but, if, or</i>

Table 3: Word classes (lexical categories)

3.3 Internal structure

As concerns the internal structure of sentences, one of the most crucial points to note is the fact that words in a sentence are not just strung together like beads in a string in a 'one-after-the-other' fashion, but instead form complex, **HIERARCHICAL** structures.

3.3.1 Structure and hierarchy

Very informally, we can define **STRUCTURE** as a **SET OF ELEMENTS** *plus* the various **RELATIONS** that hold between these elements. Take a non-linguistic example:



Fig. 1: some Simpsons

What we have here is a number of elements (Lisa, Bart, Homer, Grampa, Maggie, Patty and Selma), between whom a number of different relationships hold: Grampa is the father of Homer, Patty is Homer's sister-in-law, Bart and Lisa are siblings and so forth. Taken together, these form (part of) the Simpson's family structure.

A closer look at these relations shows that we can distinguish two different kinds: namely relations that are **SYMMETRIC** (for example the 'sibling-relationship': if Bart is Lisa's sibling, it follows automatically that Lisa is Bart's sibling) and relations which are **ASYMMETRIC**, for example the father-relationship between Homer and Maggie which is not reversible.

An important point to note is that it is the set of asymmetric relationships that form a **HIERARCHICAL STRUCTURE**.

One possible way of depicting hierarchical structures is by using a tree-diagram consisting of **NODES** (which represent the various elements) and **ARCS** (which represent the relations).

The tree to the right shows a cross-section of the Simpsons' family structure where the arcs denote the 'father-of' relationship and the vertical arrangement of the nodes indicates which element is father, which is child. Formally, we say that the node on top **GOVERNS** (German: *regiert*) the node below.

In this tree, we can also make out partial structures, for example the subtree which is headed by Homer. In Fig. 2, this substructure is indicated by a rectangle.

Let us introduce the term **CONSTITUENT** for a structure of elements which is part of a larger structure. We will hear more about constituents later in this text.

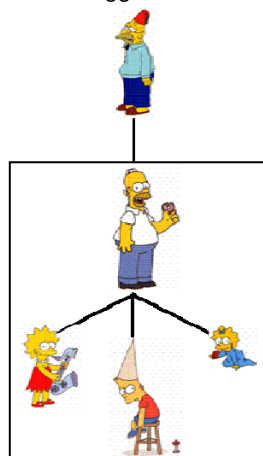


Fig. 2: Structure

3.4 Sentence structure I: Dependency

Having a slightly more informed idea about structure (a set of elements and the relations between them) and hierarchical structures (those that are comprised of asymmetric relations), let us return to the structure of sentences.

In syntax, 'elements' means 'word forms' (or groups of word-forms). What we need to elaborate, then, is: what kind of syntactic relationships can we make out between the words in a sentence?

Actually, this question boils down to one answer, as there is just one primary relation between words in sentences; this relation is called **DEPENDENCY**.

3.4.1 Dependency

Coming back to examples (8) to (10), we noted that these are deficient – in each case, there is something missing that would render the sequence a proper sentence.

Interestingly, we are not only aware of the fact that something is missing, but we also have a rather clear idea about what type of element is missing and where this element would have to be placed. Let us look again at example (8), here renumbered (52):

(52) *fooled her.

If we tried to use this as a basis for a proper sentence, we know that

- the missing element has to precede the verb:
*fooled her the boy vs The boy fooled her
- not just anything fits into this slot. The sequence *the boy* works, but none of the following:

$\left\{ \begin{array}{l} \text{*In the car} \\ \text{*Him} \\ \text{*Very sad} \end{array} \right\}$ fooled her.

This intuitive knowledge has of course to do with what we know about the verb **FOOL**, namely that **FOOL** describes an action-process which has two participants: an agent carrying out the action and a patient; none of which can be omitted.²

We also know that the arguments of **FOOL** must comply with certain restrictions. First of all, they have to be nominal expressions. Since *the boy* is such a nominal expression, *the boy fooled her* is ok. However, *in the car* and *very sad* are not nominal and thus cannot fill the appropriate slot.

Furthermore, if the nominal expression is a pronoun, it has to appear in a certain case form. *He fooled her* (where *he* carries subjective case) is ok, **him fooled her* (*him* being objective case) is ungrammatical. This of course holds for the other argument as well: we cannot say **he fooled she*, but we have to say *he fooled her*.

What we have here is classic dependency: one element, in this case the verb **FOOL**, 'demands' or 'requires' the existence of other elements, its arguments, and may also influence their formal shape.

On the basis of these insights, we can now define dependency as a binary relation between two words in which one word determines the occurrence and/or formal shape of the other. A very traditional term for one word determining occurrence and/or shape of another is **GOVERNMENT** (German: *Rektion*). In the above example, we can say that **FOOL** governs the nominal expressions it appears with, because it determines their occurrence and their respective case forms.

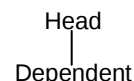
The word governing the other is called **HEAD**, the other word is accordingly called **DEPENDENT**. In the sentence *He fooled her*, *fooled* is the head and *he* and *her* are the dependents of this head:

² If you want to know more about the semantics of verbs, semantic roles such as agent, patient, instrument etc. and the arguments of a verb, please refer to the 'addendum' at the end of this text.

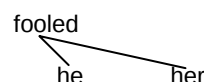
He fooled her	
Head	Dependent
fooled	he
fooled	her

Table 1: Dependency relations in *He fooled her*.

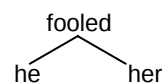
Another way of representing dependency is by using tree diagrams. In a dependency tree, the head of the pair is notated above the dependent and both are linked by a branch:

**Fig. 3: Dependency tree (general)**

This gives us the following representation for *He fooled her*:

**Fig. 4: Dependency tree for *He fooled her*.**

Note that **Fig. 2** only shows the dependency relations – it does not reflect linear order. In order to do that, we can renotate it as follows:

**Fig. 5: Dependency & linear order in *He fooled her*.**

Read from left to right, we get the words in the order in which they appear in the sentence. Figs. 4 and 5 make it obvious that hierarchy (i.e. which element is head, which element is dependent) and linear order are in fact two different aspects when it comes to the description of sentences.

If we compare our sample sentence with sentences like

(53) He slept –She adores him

we see that what they differ in is the valency of the verb (SLEEP is monovalent; ADORE is bivalent), but apart from that, the same mechanisms are at work:

Head		Dependent
He slept		
slept		he
She adored him		
adored		she
adored		him

Table 2: Dependency relations in various sentences.

Based on these observations, we posit the following hypothesis:

(54) **Generalization I:** Verbs govern nominal expressions

The next question is of course: what exactly do we mean by 'nominal expression'? An easy answer to this question is this: anything that can take the place of a pronoun:

(55) {
 He
 This guy
 Some very evil woman
 The mother of this boy
 A poorly dressed female with dark hair
 } fooled her.

The expressions bracketed in example (55) are in paradigmatic relation, we can exchange them for one another, they have the same distribution. What we termed 'nominal expression' can thus itself be a lengthy sequence of words. The following examples specify each sequence by naming the word-classes that the individual elements belong to:

(56) this guy: Det–N

(57) some very evil woman: Det–Adv–A–N

(58) the mother of this boy: Det–N–P–Det–N

(59) a poorly dressed female with dark hair: Det–Adv–A–N–P–A–N

The interesting question is: can we make out dependency relations here, too, and can we also come up with generalizations like the one in (54)? The answer is 'yes'.

Let us start off with example (56): *this guy*. What we have here is a sequence of determiner and noun, and the question is: which one is the head; which one the dependent? Actually, opinions vary considerably on this point: some claim that the noun is the head, others, though, consider the determiner to be the head. There are a number of good reasons to adopt the second of these viewpoints; incidentally, it is the personal belief of your humble author that a sound analysis of language does not, in fact, leave you many options to do otherwise. Accordingly, you will find this opinion reflected in most contemporary 'formal' grammars. We shall have some more to say on this topic in class.

Traditionally, though, and in many descriptive grammars, you will find linguists arguing the other alternative, thus recognizing the noun as the head. We shall –for the sake of comparability – adopt this viewpoint here as well.

(60) **Generalization II** (with reservations): Nouns govern determiners

In example (57), the 'nominal expression' contains the string *very evil*, that is a combination of a degree adverb and an adjective. Of these two, the adjective is obviously the head: although the formal shape of degree adverbs is not variable, their occurrence depends on the adjective:

(61) *[Some very women] fooled her

The adjective itself is dependent on the noun – no noun, no adjective:³

(62) *[Some very evil] fooled her

These insights lead us to our next two generalizations:

(63) **Generalization III:** Adjectives govern degree adverbs

(64) **Generalization IV:** Nouns govern adjectives

³ Please note that the instances of dependency introduced next are not between head and argument(s) – nonetheless, they are dependency relations. More about this in section 3.5.1

Finally, in sequence (58), the 'nominal expression' is embellished with a preposition and a sequence of determiner and noun (*of this boy*). In this sequence, *boy* governs *this*, but to which element is *boy* itself connected?

The head noun itself, i.e. *mother*, is a relational noun, and we know that semantically *mother* and *boy* are closely related. In a way, then, we would argue that *boy* has to be dependent on *mother*.

In this case, though, the relation is not direct, instead, it is **MEDIATED** (dt. *vermittelt*) by the preposition *of*.⁴ Incidentally, we cannot use just any preposition here, we cannot say, for example, **the mother on this boy*, **the mother under this boy*, **the mother to this boy* and so on. We can argue, therefore, that *mother* governs *of*, and *of* itself governs *boy*. The latter of these insights can again be validated on formal grounds – not only can we not just omit the preposition, cf.

(65) **[The mother this boy] fooled her*

but in those cases where we have a pronoun instead of the sequence Det-N the pronoun has to appear in a certain case-form (objective), too:

(66) *[The mother of {him} / *he] fooled her.*

If we take these findings as a foundation for generalization, we can propose two more hypotheses:

(67) **Generalization V:** Nouns govern prepositions

(68) **Generalization VI:** Prepositions govern nouns

Whoa, you may think – hold on – how can this work? Would this not, in fact, lead to something like an infinite loop (*Endlosschleife*)? Something like "nouns govern prepositions govern nouns govern prepositions govern nouns" ad infinitum? Well, you are right – but this is well founded: one of the interesting properties of natural language is the fact that it allows for just such constructions. As concerns the noun-preposition-situation, think of something like

(69) *the stone under the tree behind the house near the lake in the forest...*

Another, often cited example:

(70) *This is the dog that bit the cat that chased the mouse that ate the cheese...*

What (69) and (70) have in common is the fact that they could just go on and on and on. The mechanism behind this 'infinity' is easy to explain: we simply embed a construction of a certain type into another one of the same type. The scientific term for this has already been introduced in the section on morphology: these are all **RECURSIVE** constructions. Taken together, generalizations V and VI do no more than capture recursiveness in syntax.

Before we come to our final generalization, let us have a little respite and **APPLY** our findings to the whopper in (59), i.e. *a poorly dressed female with dark hair*.

According to generalizations II to VI, we can make out the following dependency relations in this sequence:

Head	Dependent
<i>female</i> (N)	<i>a</i> (Det)
<i>female</i> (N)	<i>dressed</i> (A)
<i>female</i> (N)	<i>with</i> (P)
<i>dressed</i> (A)	<i>poorly</i> (Adv)
<i>with</i> (P)	<i>hair</i> (N)
<i>hair</i> (N)	<i>dark</i> (A)

Table 3: Dependency relations in a poorly dressed female with dark hair

The same again in the shape of a tree diagram, this time enriched with information about linear order:

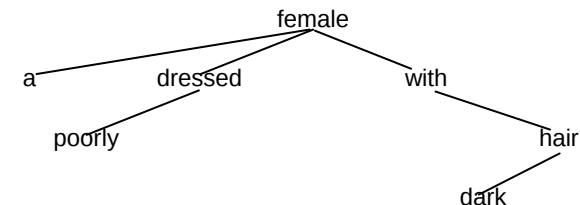


Fig. 6: Dependency tree for a poorly dressed female with dark hair

Our last generalization leads us back to verbs. Let us look at the following sentence:

(71) *Mary gave the book to him.*

The verb *GIVE* is trivalent, in other words, it has three arguments. Only two of these, namely *Mary* and *the book*, are realized as nominal expressions. The third argument, *him*, is introduced by the preposition *to*. Adopting the argumentation presented in connection with *the mother of the boy*, we can again presume that the job of said preposition is to mediate the relation between *gave* and *him*, that, in other words, *gave* governs *to* and *to* governs *him*:

Mary gave the book to him	
Head	Dependent
<i>gave</i>	<i>Mary</i>
<i>gave</i>	<i>book</i>
<i>book</i>	<i>the</i>
<i>gave</i>	<i>to</i>
<i>to</i>	<i>him</i>

Table 4: Dependency relations in Mary gave the book to him

⁴ Note that in German, we can quite often express this relation without the use of a preposition, namely by using the case-form genitive: *Die Mutter von dem Jungen / Die Mutter des Jungen*.

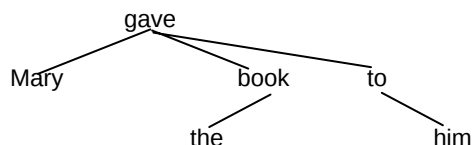


Fig. 7: Dependency tree for *Mary gave the book to him*

The following hypothesis rounds off our list of generalizations:

(72) **Generalization VII:** Verbs govern prepositions.

Note that this set of generalizations is of course incomplete – we have not mentioned, for example, that verbs govern adverbs or conjunctions, too.

Next, we ought to deal with the perennial question of all students: *schön und gut - aber was soll das alles, bitteschön?! What is the point of all this? Why do we draw little tree diagrams that represent the structure of a given expression such as a poorly dressed female with dark hair or Mary gave the book to him?*

Well, drawing trees for individual sequences of words does not, in fact, have much of a 'nutritional value': in itself, it is neither very interesting nor very rewarding. But – and this is a crucial *but* – the point of tree diagrams is not only to account for the structure of individual sequences. Instead, we can take these diagrams and, together with our generalizations, derive templates for millions and millions of other sequences. To really get the point, you have to remember the aim of linguistics, namely to account for a vast, potentially infinite set of language data. What we are interested in is not an arbitrary, individual string of words, but the generalization that a systematic study of this string would allow us to postulate. To get a first notion about this point, let us look at the structure of the following string of words:

(73) in the closet

On a word level, example (73) can be represented as in Fig. 7. This structure, though, can be generalized by using the lexical categories (word-classes) in the tree and thus be seen as a **TEMPLATE** for a multitude of well-formed expressions:

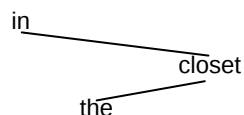


Fig. 8: *in the closet*

Note that this harmless looking scheme yields 5 x 5 x 5 (125) well formed sequences of words:

in the closet, on the closet
under the closet, behind the closet,
next to the closet, in this closet, on this closet,
under this closet, behind this closet, next to this closet, ...

GENERALIZATION:

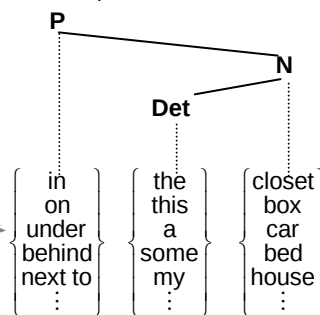


Fig. 9: generalized tree

We will hear more about generalization in the next section, which deals with another key construct of syntax, namely **CONSTITUENCY**.

3.5 Sentence Structure II: Constituency

Many linguists consider **CONSTITUENCY** as the most fundamental notion when it comes to describing sentence structure and accordingly, delve right in and use this notion in introductory textbooks without further ado. A true understanding of constituency, though, requires knowledge of dependency: although many fail to mention this, constituency as practiced in virtually all modern grammars is derivative of dependency. Since we have dealt extensively with dependency in the paragraphs above, you will find the concept of constituency (and related concepts, such as constituent classes or phrases) easy to grasp.

We introduced the term **CONSTITUENT** previously in the section on structure, where it was described as a partial structure contained in a larger structure. We can generalise this notion as follows: a constituent is a unit of linguistic elements that is part of a larger unit.

Take an example from morphology: in the compound

(74) steam ship captain

steam and *ship* form a constituent – we are talking about the captain of a [steam ship], not a [ship captain] with/of steam: [[steam ship] captain] vs ??[steam [ship captain]]

We have of course also seen instances of constituents in syntax – when we talked about sentence (18), renumbered here as (75)

(75) [The sleazy con artist] fooled [the rather gullible heiress].

we noted that the sequences *the sleazy con artist* and *the rather gullible heiress* each forms a unit, i.e. a constituent. As syntactic constituents are called phrases, we can say that each *the sleazy con artist* and *the rather gullible heiress* is a **PHRASE**.

We can also argue that all the strings presented in Fig. 8 are phrases (and do remember: we are talking about 125 different sequences of words) – *in the closet*, *under the bed*, *in my house*, *next to the car*, *behind the box* etc. etc.

The crucial question is, of course: what kind of phrase are these? Obviously, there is a difference in phrase type between *the sleazy con artist* and *on the bed*. What is this difference, and how can we account for it? Well, this is the point where our elaborations on dependency come in extremely handy, because we can easily define different classes of phrases with respect to different types of head. Let us postulate the following generalization:

A governing head X plus all its dependents (if present) constitutes an X-Phrase.
 'X' stands for N, V, P, A (and some say Adv, too)

Coming back to *the sleazy con artist* and *the rather gullible heiress*: both of these are **NOUN PHRASES (NP)**, since in both cases, 'X' (i.e. the governing head) is a noun. Each of these noun phrases contains an **ADJECTIVE PHRASE (AP)**, too: *sleazy* in the case of *the sleazy con artist*; *rather gullible* in the case of *the rather gullible heiress*.

As concerns the sequences in Fig. 8 (*in the closet*, *under the bed*, *in my house*, *next to the car* and so on), these are of course **PREPOSITIONAL PHRASES (PP)**, as the preposition heads the whole unit. Inside these prepositional phrases, we find noun phrases again (*the closet*, *the bed*, *my house*, *the car*). The following series of tree diagrams (based on Fig. 6 from above) shows the systematic relation between dependency and constituency:

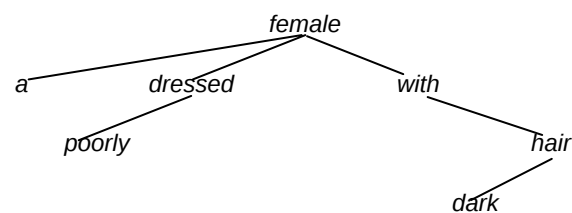


Fig. 10: Dependency tree

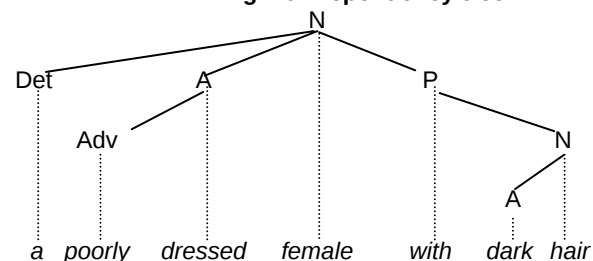


Fig. 11: Dependency tree with lexical categories

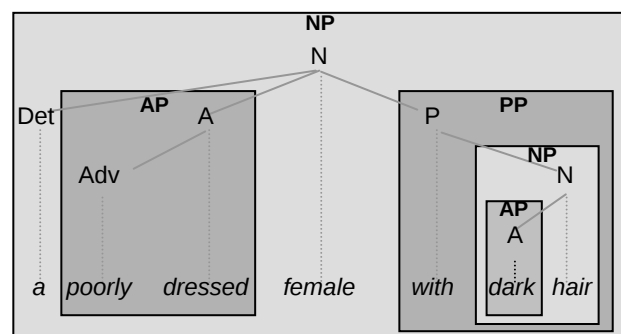


Fig. 12: Annotated dependency tree

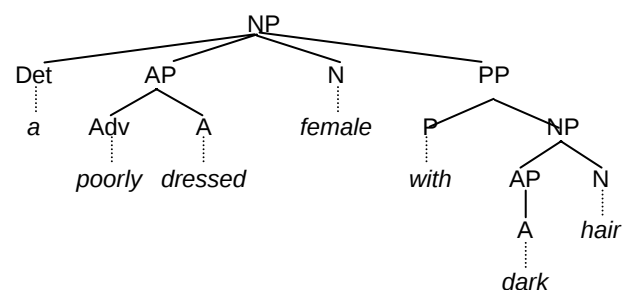


Fig. 13: Phrase structure tree (aka phrase marker)

The following phrase markers show the internal structure of two of the phrases discussed above:

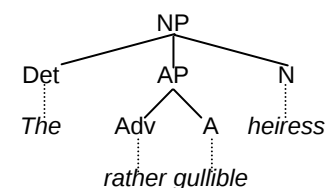


Fig. 15

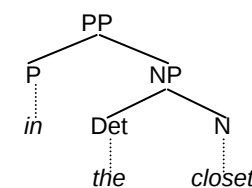


Fig. 15

As Figs. 9 to 12 show, phrase markers match their corresponding dependency trees. Although they do not show the dependency relations explicitly, we know which element is the head, since this element gives the phrase its name.

On the previous page, it was said that the NP *the sleazy con artist* contained an AP, which is represented just by the head *sleazy*, or that the adjective *dark* is an AP. Many students find this difficult to comprehend: why is a single word a phrase? Well, the answer to this question actually kills two birds with one stone, because we can use it to demonstrate the 'generalizing' function of this approach again.

A phrase (no matter what type) can be seen as a constituent class. Example (55), here renumbered as (76), showed this for noun phrases:

- (76) {
 He
 This guy
 Some very evil woman
 The mother of the boy
 A poorly dressed female with dark hair
 } fooled her.

We see that all the elements in brackets have the same distribution, they form a class of constituents **irrespective** of their internal make-up – a noun phrase consisting just of a pronoun (as in *He*) is as good a noun phrase as one consisting of a determiner, an AP, a common noun and a PP (e.g. *a poorly dressed female with dark hair*).

The same, of course, goes for adjective phrases. Compare

- (77) John was {
 sad
 very sad
 sad about the result
 very sad about the result
 } .

Here, you see that the distribution of the single adjective *sad* is identical to that of adverb + adjective (*very sad*), adjective + PP (*sad about the result*) or adverb + adjective + PP (*very sad about the result*). Again, we can say that the single adjective *sad* is as good an AP as all the other sequences.

You see, when analysing sentences on the phrase-level, you are trying to come up with constructs that allow for maximal generalization. If we wanted to devise a rule for a well-formed noun phrase of English, we could come up with something like this:

Rule 1: a well-formed noun phrase of English may consist of a determiner, an optional AP, a noun and an optional PP (in that order)

If we differentiated between single adjectives on the one hand and adjective phrases on the other, this would entail an unwarranted loss of generality, because we would have to state another rule, too:

Rule 2: a well formed noun phrase of English may consist of a determiner, an optional adjective, a noun and an optional PP (in that order)

This shows (hopefully) that it is not economical to differentiate between AP consisting of just one adjective and complex AP.

What we have talked about so far are phrases that are either headed by a noun, or an adjective, or a preposition, but we have not yet discussed phrases headed by a verb. There is a reason for this, namely the fact that in the case of **VERB PHRASES (VP)**, the match between dependency trees and (traditional!) phrase markers is not as straight forward as it was with NP, AP and PP.

To get this, let us recapitulate the dependency tree for *Mary gave the book to him*:

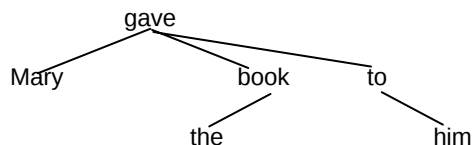


Fig. 16: Dependency tree for *Mary gave the book to him*

Here, all the arguments of GIVE, namely the NP *Mary*, the NP *the book* and the PP *to him* appear on the same level. From a 'dependency point of view', this makes sense: GIVE is a trivalent verb, the head of the sentence and all its arguments are equal.

In terms of 'traditional' constituency, though, one of the arguments of GIVE (or actually, one argument of any verb) is treated differently. The argument in question is always the **SUBJECT** argument, in the case of *Mary gave the book to him* it is thus the NP *Mary* that receives a special status in the phrase marker. We will elaborate constructs such as *subject* and *object* in section 3.5.1, where you will find out how this 'specialness' can be motivated, and then refer back to these paragraphs. To cut a long story short: in traditional phrase-structure-grammar, the sentence was not seen to be headed by the verb, but instead dissected into the subject noun phrase and the verb phrase, the latter therefore consisting of the main verb and all its dependents EXCLUDING the subject:

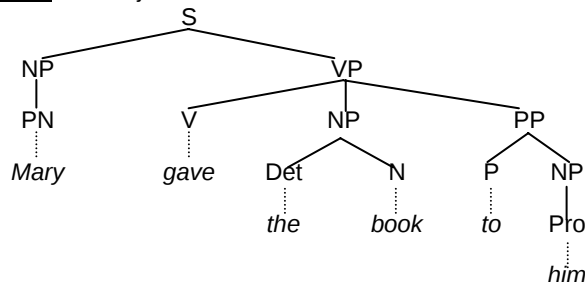


Fig. 17: Phrase marker for *Mary gave the book to him*

Another example, in this case with a bivalent verb:

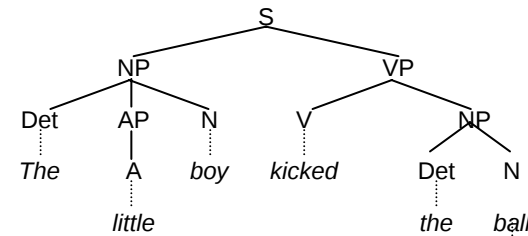


Fig. 18: Phrase marker for *The little boy kicked the ball*

Let us do the same here as we did with Fig. 8, i.e. use this tree diagram as a template for generalization. Fig. 13 can be used to derive the following rules about English sentences:

Rule 1: a well-formed English sentence consists of a NP and a VP (in that order):
 $S \rightarrow NP VP$

Rule 2: a well-formed English NP may consist of a Det, an optional AP and a common noun (in that order)
 $NP \rightarrow Det (AP) N$

Rule 3: a well-formed English AP may consist of an adjective
 $AP \rightarrow A$

Rule 4: a well-formed English VP may consist of a verb and a NP (in that order)
 $VP \rightarrow V NP$

If we combine these four rules with a **LEXICON** such as

Noun: {boy, girl, husband, teacher}

Det: {the, this, some, my}

A: {ugly, stupid, lovable, sick}

V: {kicked, loved, hated, annoyed}

we get a staggering amount of well-formed sentences (*the boy loves the ugly girl*, *some girl annoyed the teacher*, *my lovable husband hated my teacher*, *my sick husband kicked some boy*, *this girl loved the boy and so on and so on*). What this shows is the 'generalizing' capacity of constructs such as NP, VP or PP in the description of sentences. For more phrase-markers, please see the appendix.

Let us end the section on constituency with two interesting topics, namely the question 'phrase – or no phrase?' and some brief remarks on structural ambiguity.

Phrase – or no phrase?

If you compare the following two sentences, they are virtually identical:

(78) Mary danced with the mayor in London

(79) Mary danced with the mayor of London.

On a superficial level, we have two sequences of

(80) Proper Noun–Verb–Preposition–Determiner–Noun–Preposition–Proper Noun.

Interestingly, though, the syntactic behaviour of these sequences is quite different, cf.

(81) In London, Mary danced with the mayor.

(82) *Of London, Mary danced with the mayor.

(83) Whom Mary danced with in London was the mayor.

(84) *Whom Mary danced with of London was the mayor.

How can we account for this difference? Well, it has to do with the fact that the structures of (78) and (79) are quite different. In sentence (78), the sequence *with the mayor in London* can be broken up into two PP [*with the mayor*] and [*in London*].

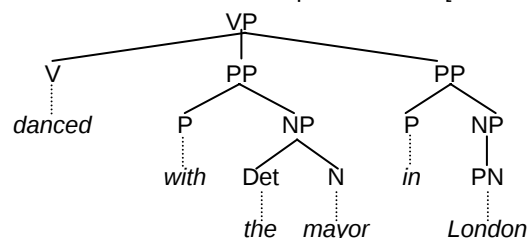


Fig. 19: Phrase marker for *danced with the mayor in London*

In sentence (79), on the other hand, the sequence *of London* is part of the NP *the mayor of London*. In this case, the sequence *the mayor* itself is not a noun phrase:

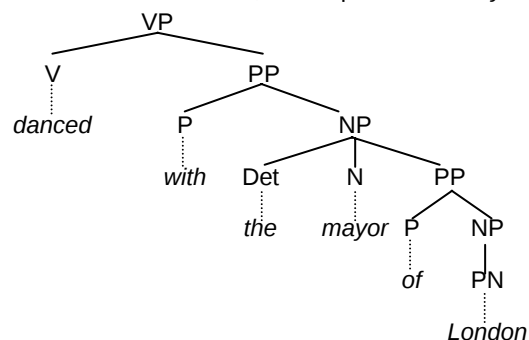


Fig. 20: Phrase marker for *danced with the mayor of London*

Semantically, this of course also makes sense: *in London* can be seen as information about the location where the dancing took place in sentence (78), while *of London* in (79), it tells us more about the reference of the noun *mayor* (Which mayor? The mayor of London).

You may wonder if there are formal ways of substantiating the claim that *the mayor* is not an NP in sentence (79) – and yes, there are. One way (the best one, in my opinion) of establishing whether a sequence of words is a phrase or not is by applying the so-called 'pronominalization-test'. This means that as soon as we are able to replace a sequence with a pro-form (such as a pronoun like *he/she/it* for nominal expressions or *there* for certain prepositional expressions), the sequence replaced is established as a constituent.

Let us try this test on examples (78) and (79):

(85) Mary danced with him in London (*him = the mayor*: ok)

(86) *Mary danced with him of London (*him = the mayor*: not ok)

As we cannot replace *the mayor* in (79) with a pronoun, we have established that this sequence is not, in fact, a constituent.

Structural ambiguity

Structural ambiguity is frequent in syntax and is always present if a string of words can be allocated more than one structure (and thus carries more than one meaning). To illustrate this phenomenon, a warm welcome for the mother of all structurally ambiguous sentences:

(87) John observed the girl with the telescope

None of the words in this sentence is ambiguous, there is neither homonymy nor polysemy involved. This means that the ambiguity is not lexical in nature. Nevertheless, this sentence has two readings, one in which the PP *with the telescope* is interpreted as the instrument of the observation; the other in which it is a specification of *girl* ("Which girl? The one with the telescope"). This is a classic case of structural ambiguity: without context, we do not know where the PP 'belongs'. Accordingly, we get two different structures for this sentence, in the second of which the sequence *the girl* is again not a constituent:

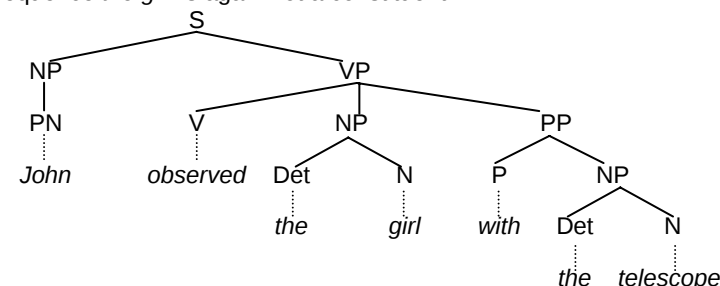


Fig. 21: 'with the telescope' as an instrument

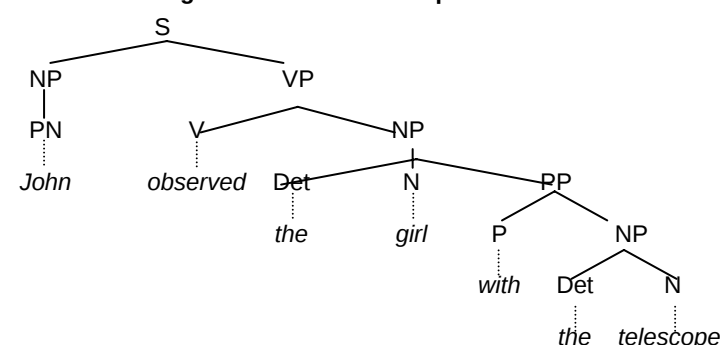


Fig. 22: 'with the telescope' as a specification of *girl*

3.5.1 Types of dependent: grammatical functions

The concept of dependency was introduced in connection with the concept of valency: elements required by a lexical head are the dependents of this head. However, in footnote 3 we already mentioned that there are also other kinds of dependents. The task of this section is to introduce and classify these various types.

Many of the terms presented here will be familiar to you from school, my advice is to clear your brains of any crusty remnants of knowledge concerning constructs such as *subject* or *object* or *indirect object* – just read on as if you had never encountered these terms before.

One quick comment before we start: do not confuse function (such as argument, adjunct, subject etc.) with category (such as noun, verb, noun phrase, adjective phrase). These are different kinds of constructs, as the following example shows: if I asked you about the sequence *the boy*:

a) is this a noun phrase or a verb phrase?

b) is this a subject or an object?

you could only answer the first question (it is of course a noun phrase). The second question, however, cannot be answered – it depends on the sentence in which *the boy* appears:

(88) The boy is sad (*the boy*: subject)

(89) I saw the boy (*the boy*: object).

While we can recognize the category of a word or a phrase in isolation, something like 'subject' or 'object' is inherently relational - it is always a subject or an object of something else. For this reason, *subject*, *object* and the others are called 'functions' or 'relations', not 'categories'.

Arguments vs Adjuncts

Let us begin with two sample sentences:

(90) John lived in London.

(91) John died in London.

(92) [[John] [$\left\{ \begin{array}{l} \text{lived} \\ \text{died} \end{array} \right\}$ [in London]]]

Although structurally similar, the PP *in London*, has a different **STATUS** in (90) and (91), as the following examples show:

(93) *John lived.

(94) John died.

How can we account for this? Well, if we have a closer look at the respective verbs of the sample sentences, we note that LIVE⁵ is bivalent, it has two arguments (someone always lives *somewhere*), DIE, however, is of course monovalent. Whereas *in London* realizes one of the arguments of LIVE in sentence (90), it merely provides additional information about the situation depicted by DIE in sentence (91).

⁵ live as in *wohnen*.

We already learned that dependents whose appearance is conditioned by the valency of the head are called arguments. To differentiate terminologically between arguments on the one hand and dependents that are 'free' (in the sense of not being required by the head) on the other, let us introduce the term **ADJUNCT**. A traditional German term that you may be familiar with and which denotes adjuncts within verb phrases is *adverbiale Bestimmung*. We saw examples for adjuncts in connection with noun phrases, too: the AP *rather gullible*, for example, is an adjunct of the head noun in *the rather gullible heiress*.

But how can we tell whether a certain phrase is an argument or an adjunct? As a rule of thumb, we can say that all adjuncts are necessarily optional, whereas arguments are often (but not always) obligatory. Compare

(95) John kissed her on her mouth.

(96) *John kissed on her mouth.

(97) John kissed her.

Obviously, the NP *her* is an argument, whereas the PP *on her mouth* is an adjunct. What about the following pair, though?

(98) John was eating a pizza.

(99) John was eating.

The NP *a pizza* is obviously not obligatory – omitting it does not render the sentence ungrammatical. Does this mean it is an adjunct? No, it does not, because we need not express whatever it is that is being eaten, yet we still know that when someone eats, he or she will necessarily eat something. Here, then, we have a case of an optional argument. Examples for this are also found within noun phrases. Compare

(100) John is [a teacher of physics].

(101) John is [a teacher with little experience].

(102) John is [a teacher].

The PP *of physics* and *with little experience* can both be omitted – they are optional. Still, we will consider *of physics* an argument and *with little experience* an adjunct. Why?

Because TEACHER is a relational noun (for relational terms, see the section on converses in the chapter on semantics): we know that if someone is a teacher, he or she will always teach something to someone. Here, we of course have an analogy to the trivalent verb TEACH (X teaches Y to Z), from which TEACHER is derived. Accordingly, we can say:

(103) John teaches physics.

where the NP *physics* is clearly an argument – and it stays an argument within the NP, too.

The PP *with little experience*, though, is completely different - imagine something like

(104) ?John teaches little experience

Obviously, *with little experience* does no more than provide additional information (in this case concerning manner) about the head, i.e. *teach* in (104) and *teacher* in (101), and is accordingly an adjunct.

To round off this section, a little Denksportaufgabe:

(105) John is a teacher of physics with little experience

(106) *John is a teacher with little experience of physics

(107) John kissed her on the mouth

(108) *John kissed on the mouth her.

How would you account for this by applying the terms head, argument and adjunct?

Different types of arguments I: subject vs object(s) (in English and German)

Both NPs in the following sentence are arguments of the verb:

(109) He kicks them.

If asked which one was **SUBJECT**, which one **OBJECT** you will probably answer: "The NP *he* is the subject, the NP *them* the object" – and this is perfectly true.

The interesting question here is of course: what makes you say so? How come you recognize *he* as subject and *them* as object? Well, during my experience in introductory classes, I found that when asked to answer this question, students tended to come up with two reasons:

1. The NP *he* is the subject because it appears in the initial position of the sentence.
2. The NP *he* is the subject because it stands for the entity that carries out the action denoted by the verb.

Now while it is of course true that *he* appears in initial position and carries out the action denoted by the verb, it is not true that this makes *he* the subject. If we took explanations 1 and 2 as a basis for defining 'subject', we would end up in deep trouble. You see, if the subject is defined by occurring in initial position, the PP *on Monday* would be the subject in

(110) On Monday, John left for Paris.

This is of course nonsense: the subject in this sentence is not *on monday*, but the NP *John*. Although 'position' is not that far off the mark when it comes to English subjects, (this will become clear in a minute) 'sentence initial position' just does not work.

If we defined 'subject' semantically, i.e. 'carries out the action denoted by the verb', this would mean that in

(111) John was kicked by Bill

the subject is (by) *Bill* - again, this is not the case, since the subject is *John*. In the chapter on semantics, we introduced terms that are better suited to capture what students mean with explanations like 2 above, i.e. terms such as *agent* or *patient*.

The point of this discussion is for you to realize that although subjects are very often agents, and also often appear in sentence initial position, agenthood and 'initial position' can not be used as defining criteria for subjects. How, then, can we identify subjects and differentiate them from other arguments, such as objects?

To clarify this point, let us return to example (109) and concentrate on the more formal differences between the two noun phrases. We note that

- *He* carries the case feature 'subjective case', *them* carries the case feature 'objective case'
- *He* agrees with the verb concerning the features person (3) and number (singular), *them* does not agree with the verb
- *He* immediately precedes the verb, *them* follows the verb.

Categorially, subjects and objects are either noun phrases or clauses. If we generalize the findings above, we can make out a number of formal differences:

1. If pronominal, English subjects appear in the subjective case
2. English subjects agree with the verb with respect to person and number
3. English subjects have to immediately precede the verb.⁶

As you can see, the third point does refer to the position of the subject, but it does not say that this is sentence-initial. Instead, it is that 'slot' that is directly in front of the verb. As concerns this point, English and German subjects are very different, since word-order is not of importance when it comes to identifying subjects in German.

If you think back to section 3.5 where we introduced phrase-markers for sentences, you may remember that we talked about the 'specialness' of the subject – well, by now you ought to have an idea of what it is that is special about the subject.

Different types of arguments II: direct vs indirect object (in English and German)

The differentiation between **DIRECT** and **INDIRECT OBJECTS** is not as a clear-cut as that between subjects and objects – at least not in English. Let us therefore start with a brief discussion of 'indirect object' in German:

(112) Sie gaben ihm den Brief.

In school, you will have been taught that *ihm* is the indirect object, and *den Brief* the direct object. Most likely, though, you will not have been told why that is so. At best, you may have received semantic statements such as "Die NP, die den Rezipienten ausdrückt, ist das indirekte Objekt". This is only half the truth, though, because in German, there are many solid formal criteria that we can use to distinguish direct and indirect objects:

Case form:

In German, direct objects have accusative case, indirect objects have dative case:

- *den Brief* (accusative) vs *ihm* (dative).

Passive:

In German, direct objects can appear as a subject in passives, indirect objects can not:

- *Der Brief wurde ihm gegeben*. Not **Den Brief wurde ihm gegeben*
- **Er wurde den Brief gegeben*. Instead: *Ihm wurde der Brief gegeben* (unless you are Verona Feld- sorry, Pooth, or an employee of 'Neun Live').

Interestingly, none of these criteria hold in English – there is no case difference like in German, and all the arguments of a trivalent verb can be passivized:

- They gave him the letter
- He was given the letter
- The letter was given to him

Accordingly, many modern grammars refrain from using the term 'indirect object' when it comes to English, and instead call it 'object 2' or some such.

Still, there is a slight difference between 'object 1' and 'object 2' even in English, and this again has to do with word-order. If a verb has two NP-object-arguments, one of

⁶ Adjuncts like adverbs are an exception here and may intervene: *John often smokes*

these will appear closer to the head than the other, and this object is called 'indirect object' in many traditional grammars:

(113) They gave him the letter vs. *They gave the letter him

Different types of arguments III: objects vs complements

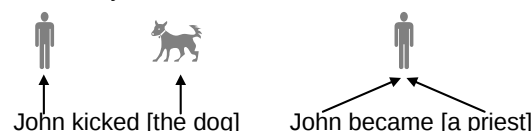
To get the difference between objects and complements, let us compare

(114) John kicked [the dog]

(115) John became [a priest]

Neither of the bracketed NPs can be omitted.

There is a major difference, however, with respect to what they refer to. Whereas *John* and *the dog* in (114) refer to something different, *a priest* in (115) actually describes a property of the subject *John*:



In a way, then, we can say that the NP *a priest* provides us with certain information about the subject of the sentence, which is of course not the case with *the dog*.

Syntactically, *the dog* and *a priest* are also different: we can, for example, form a passive of (114), but not of (115):

(116) The dog was kicked by John

(117) *A priest ??was became/become?? by John

The situation is similar in the following sentences:

(118) John is [in the garden].

(119) John turned [protestant].

(120) John grew [extremely angry].

The PP *in the garden* serves to locate the subject, the NP *protestants* tells us about the subject's religious beliefs, the AP *extremely angry* provides information about a process that the subject underwent. These expressions are not objects. Instead, they are termed **COMPLEMENTS** in traditional grammar.

The cases discussed so far showed so-called **SUBJECT-COMPLEMENTS**, but there are certain constructions in which complements designate information about an object, too:

(121) They elected him [president of the senate].

(122) We consider her [completely boring].

The NP *president of the senate* and the AP *completely boring* are called **OBJECT-COMPLEMENTS**. Actually, the whole area of complements and the question of how to treat them is one heatedly discussed topic in modern linguistics but we will postpone a closer look at the phenomena in question.

Different types of arguments IV: a little left-over

Let us finally turn to something that - with good reason - has been put last, namely the question: what kind of function does the PP in the following sentence fulfil:

(123) John put the book [on the table]

This PP obviously represents one argument of the trivalent PUT – we cannot, for example, just delete it:

(124) *John put the book.

We know that *on the table* is not the subject of the sentence, and we also know that it is not an object, since it is neither a noun phrase nor a clause.

It is also not a complement, since it does not provide any information about either subject nor object. So what is it? Well, answers to this question are as plentiful as authors dealing with it (unless - like the UCL-Grammar that is linked on our webpage – they conveniently neglect to discuss sentences such as (123) at all).

Some authors (QUIRK *ET AL.*, and accordingly P.G. MEYER) gloss *on the table* as in sentence (123) an 'obligatory adverbial'. LEECH and SVARTVIK call it a 'necessary adverbial'. WAGNER calls it a 'prepositional object'. Other authors, for example HUDDLESTON *et al.* say that the PP is a 'none-core argument' (as opposed to core-arguments, ie. subjects and objects) and call the NP within (*the table* in our example) an 'oblique object' – oblique because the relation between head-verb and NP is not direct but mediated via the preposition.

'Prepositional object' is tricky not only because there is another term 'object of the preposition', which means something quite different. I don't find 'obligatory adverbial' at all useful since it muddies the waters considerably. Adverbials are usually introduced as optional dependents, serving to give 'additional information' (a quote from P.G. Meyer), thus to call them obligatory in some cases and optional in others may only lead to confusion. 'Non-core' argument for the PP is fine with me, or simply PP-argument, but since these are not generally accepted terms, we will leave out trivalent verbs such as PUT or GIVE and pray for some better terminology in the future.

3.6 English sentence patterns

With these insights in mind, we can now describe the internal structure of some simple, English kernel sentences in terms of grammatical functions, too. You will see that these patterns always hinge around the main verb:

- | | |
|--|---|
| 1. <u>Paul</u> slept | Subject-V |
| 2. <u>Paul</u> slept <u>for an hour</u> | Subject-V-Adjunct |
| 3. <u>The boy</u> kicked <u>the dog</u> | Subject-V-Direct Object |
| 4. <u>The boy</u> kicked <u>the dog</u> <u>yesterday</u> | Subject-V-Direct Object-Adjunct |
| 5. <u>Fred</u> gave <u>Mary</u> <u>the keys</u> | Subject-V-Indirect Object-Direct Object |
| 6. <u>John</u> was <u>sad</u> | Subject-V-Subject Complement |
| 7. <u>Fred</u> called <u>Bill</u> <u>an idiot</u> | Subject-V- Direct Object- Object Complement |

3.7 Different types of sentence: a brief classification

At the very beginning of this chapter, we noted that there is a systematic relation between

(125) He fooled her

(126) She was fooled by him

(127) Did he fool her?

The task of the next section is to discuss these various types of sentence and introduce the relevant terminology.

3.7.1 Indicative, Interrogative, Imperative

From your days in school, you will probably be familiar with the terms **INDICATIVE**, **IMPERATIVE** and **INTERROGATIVE**, and if asked about the difference between these various types of sentence most likely come up with statements such as

- imperative sentences are used to give orders or make demands,
- interrogative sentences are used to ask questions,
- indicative sentences are used to make statements.

This kind of definition refers to the function that these sentences may have, which is fair enough, but unfortunately, there is a snag to it. As you will see in more detail when we talk about pragmatics, it may be true that a prototypical imperative is used to give orders - but surely something like

(128) Have a nice day!

is not about giving an order (you can hardly order someone to have a nice day), yet it is clearly an imperative. Obviously then, there is more to 'imperative' than just 'giving an order'. Let us look at a similar example:

(129) Can you tell me the time?

If you say this to someone, you would hardly expect that person to say 'yes' (or 'no'), ie. to answer the question; instead, you want him or her to react somehow, look at their watch and tell you the time, in other words, you make a demand. Does this mean that (129) is an imperative? No, of course not, it is an interrogative, and again we see that it is not sufficient to describe these concepts solely on the basis of their function. The next few paragraphs serve to discuss those parameters that can be used to describe and differentiate indicative, imperatives and interrogatives without referring to their function.

Indicatives (Indikative, Aussagesätze)

As has been mentioned above, simple indicatives are seen by many grammarians as a 'base' form which can be used as a foundation and point of reference for describing imperatives and interrogatives, too. From a formal point, we note that indicative sentences are centered around a finite verb, ie. a verb that is inflected with respect to person, number and tense. Depending on this verb and the type and number of arguments, simple indicative sentences can be described by using the sentence patterns as presented in section 3.6: the subject appears in sentence-initial position, followed by the finite verb (or verbal complex) and other dependents of the verb.

Do note, though, that the sentence patterns from above only represent the 'basic', namely active form of indicatives - as we shall see in a little while, there are other, more complex forms of indicatives, too.

Imperatives (Imperative, Befehlssätze)

(130) Kick the wall!

(131) Open the door!

(132) Have a nice day.

One of the main formal differences between indicatives and imperatives is the fact that the latter have no overt subject. Still, we always understand imperatives to have a subject, namely a subject in the second person; an assumption that is proved true when imperatives combine with so-called tag-questions, which only work with a second person pronoun:

(133) *Open the door, will* $\begin{cases} \text{you} \\ *he \\ *she \end{cases}$

Note that the imperative 'behaves' as if it did have a subject, namely the subject 'you'.

Another formal difference to indicatives is the form of the verb, which always carries the features 2nd person, present tense (thus being identical with the *base-form*).

Interrogatives (Interrogative, Fragesätze)

The class of interrogatives is somewhat more complex than that of imperatives and can itself be dissected into a number of subclasses, two of which we will have a closer look at.

Closed interrogatives (Entscheidungsfragen)

(134) Has Fred sold the recipe?

(135) May I come in?

(136) Does the pope live in the woods?

From a formal point of view, we note that interrogatives exhibit the so-called **SUBJECT-AUXILIARY-INVERSION**; which means that subject and auxiliary change places. To see this, compare (134) and (135) to the corresponding indicative:

(137) Fred has sold the recipe

(138) I may come in.

In cases with no auxiliary verb, the so-called *dummy-do* is used, cf. the indicative for (136):

(139) The pope lives in the woods

In other words, the salient feature of closed interrogatives is the auxiliary in sentence-initial position, directly followed by the subject. Note that 'auxiliary' comprises the class of modals, ie. *will*, *can*, *may*, *must* etc. The only possible answer to a closed interrogative is either 'yes' or 'no'.

Open interrogatives

Open interrogatives are formed by using a so-called interrogative-phrase containing a WH-word such as *who*, *whose*, *which*, *where*, *how*, *when*, *what* etc:

(140) Who has sold John the recipe?

(141) What has Fred sold John?

(142) Who(m) has Fred sold the recipe?

(143) When will I see you again?

(144) How much wood would a woodchuck chuck if a woodchuck could chuck wood?

The interrogative-phrases *who*, *what* und *whom* 'ask' about the subject in (140) und the objects in (141) und (142), cf. the corresponding indicative for all three: *Fred has sold John the recipe*.

The interrogative-phrase *when* in (143) 'asks' about an adjunct (cf. *I will see you again when*) and in (144) (*how much wood*) for a more specified account (in this case the quantity) of the object, cf. *A woodchuck would chuck how much wood*.

The interrogative-phrase usually appears in sentence-initial position. This entails no change in word-order in sentence (140), ie. the interrogative that asks about the subject (which usually appears in this position, anyway).

Things are a bit more complicated in sentences (141) - (144). Here, we do not only have to move the interrogative-phrase into sentence-initial position, but we also have to invert subject and auxiliary:

Fred has sold John what → *What Fred has sold John* → *What has Fred sold John?*

Note, though, that subject-auxiliary-inversion does not take place if the interrogative is an **EMBEDDED INTERROGATIVE**:

(145) I know [what Fred has sold John].

The bracketed interrogative in (145) again shows that we have to differentiate between form and function: formally, this sentence is an interrogative (as can be seen by the interrogative-phrase *what* in sentence-initial position), but from a functional point of view, we know that it is not used to ask a question. It is therefore not surprising that open interrogatives are nowadays often called 'WH-sentences'; a term which refers to formal features and is therefore more or less neutral when it comes to function.

3.7.2 Different types of indicatives

To round off this chapter, let us have a final look back at indicatives. Sentence (146) is a typical active indicative:

(146) Rosa kicked the bettwurst repeatedly.

This sentence complies with sentence pattern No. 4 on page 18. Interestingly, the information that this sentence conveys can be structured in quite a number of different ways, for example

(147) The bettwurst was kicked repeatedly

(148) The bettwurst, Rosa kicked repeatedly

(149) Repeatedly, Rosa kicked the bettwurst

(150) It was Rosa who kicked the bettwurst repeatedly

(151) It was the bettwurst that Rosa kicked repeatedly

(152) What Rosa kicked repeatedly was the bettwurst

(153) What Rosa did was kick the bettwurst repeatedly

You will note that all these sentences deviate from pattern 4 on page 18, yet they all have the same core-meaning, they all describe one and the same extralinguistic event. The difference between them is that each one uses a special 'technique', if you like, to emphasize one of the constituents specifically (which has been underlined in the examples). Read more about this in the addendum on information structure.

All the above sentences belong to a specific type of indicative; the following table presents a brief overview of these types, gives you the technical term and an additional example each:

Sentence	Type	Another example
(146)	<i>active</i> (kernel)	Fred sold the recipe
(147)	<i>passive</i>	The recipe was sold (by Fred)
(148) und (149)	<i>topicalization</i>	The recipe, Fred sold
(150) und (151)	<i>cleft</i> (Spaltsatz)	It was Fred who sold the recipe
(152) und (153)	<i>pseudo-cleft</i> (Sperrsatz)	What Fred sold was the recipe

Fig. 23: Different Types of Indicative

3.8 Appendix: Examples

Dependency generalizations: an (incomplete) overview

Verbs govern nominal expressions

John kicked the dog

Verbs govern prepositions

John went to London

Verbs govern adverbs

John slept fitfully

Nouns govern determiners (with reservations)

A boy

Nouns govern adjectives

An ugly boy

Nouns govern prepositions

A boy in a car

Adjectives govern degree adverbs

A very ugly boy

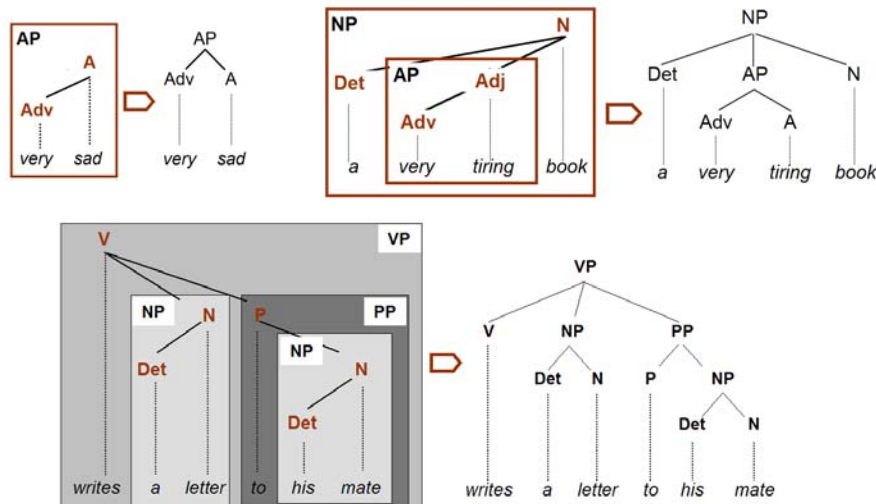
Adjectives govern prepositions

John is sad about the result

Prepositions govern nouns

John is sad about the result

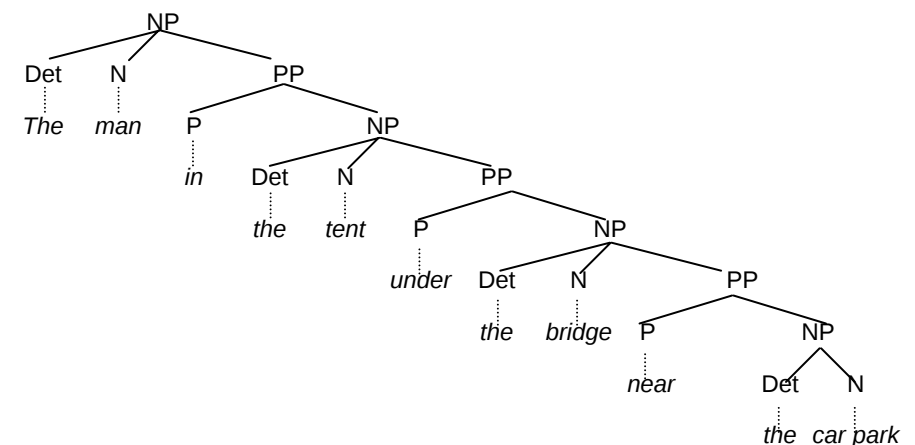
Dependency trees and phrase markers: some examples



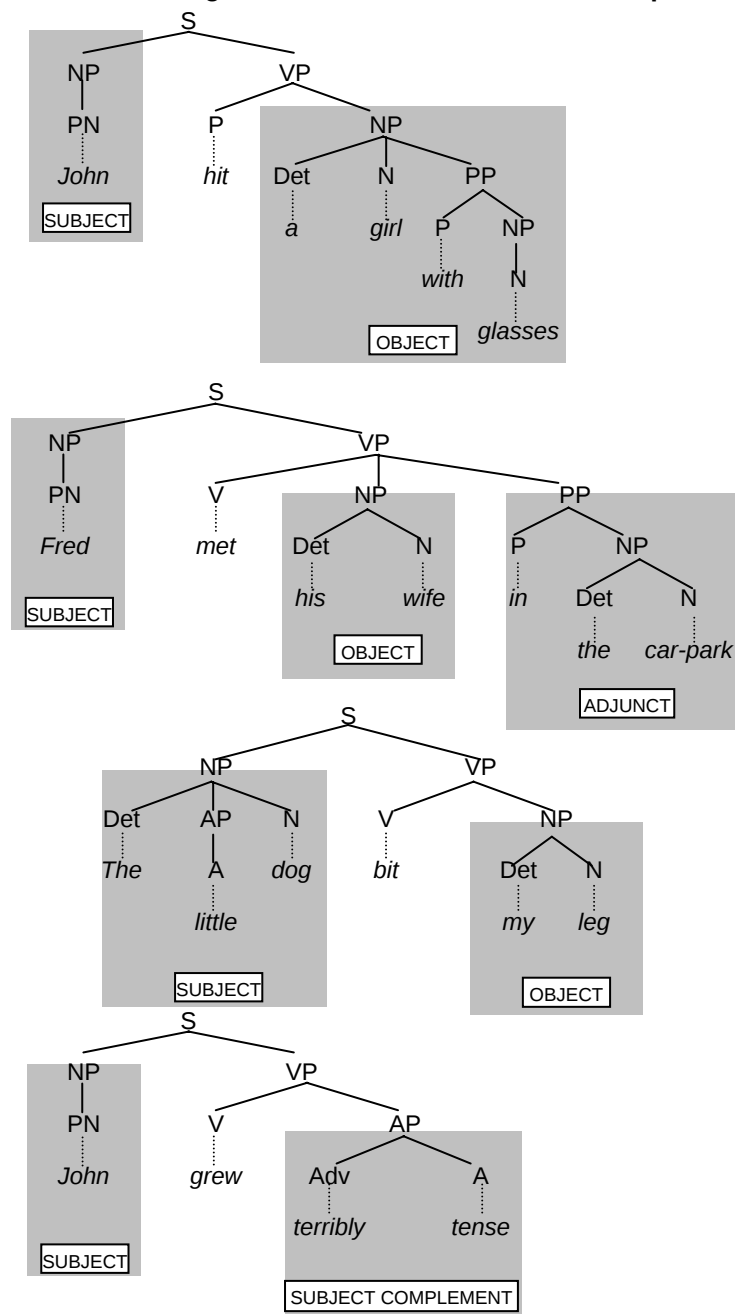
Phrases: some examples

Phrase	Category
the sleazy con artist	NP
sleazy	AP
She left	S
She	NP
left	VP
a girl with a rather horrible smile	NP
with a rather horrible smile	PP
a rather horrible smile	NP
rather horrible	AP
left the car with his mother	VP
the car	NP
with his mother	PP
his mother	NP
The police followed the woman in the porsche	S
The police	NP
followed the woman in the porsche	VP: AMBIGUOUS
Analysis 1: (police in the porsche)	
the woman	NP
in the porsche	PP
the porsche	NP
Analysis 2: (woman in the porsche)	
the woman in the porsche	NP
in the porsche	PP
the porsche	NP

Recursive structures: an example



Phrase markers & grammatical functions: some examples



Function vs category: two examples

on the roof: Category: always PP. Functions:

John is on the roof: SUBJECT COMPLEMENT

John watched the sunset on the roof: ADJUNCT

an honest lawyer: Category: always NP. Functions:

An honest lawyer is hard to find: SUBJECT

I actually found an honest lawyer: OBJECT

John is an honest lawyer: SUBJECT COMPLEMENT

She considers him an honest lawyer: OBJECT COMPLEMENT

Grammatical functions & sentence patterns: some examples

Abbreviations: S: subject, V: verb, DO: direct object, IO: indirect object, Cs: subject complement, Co: object complement, AD: Adjunct, V: Verb

<u>The little cat</u> <u>ate</u> <u>the mouse</u>	S—V—DO
<u>John</u> <u>thinks</u> <u>that Mary is stupid</u>	S—V—DO
<u>Sue</u> <u>heard</u> <u>the news</u> <u>on the radio</u>	S—V—DO—AD
<u>My father</u> <u>sold</u> <u>John</u> <u>the car</u>	S—V—IO—DO
<u>Mary</u> <u>gave</u> <u>him</u> <u>the book</u> <u>yesterday</u>	S—V—IO—DO—AD
<u>Philomena</u> <u>felt</u> <u>sick</u>	S—V—Cs
<u>She</u> <u>was</u> <u>in the garden</u> <u>for hours</u>	S—V—Cs—AD
<u>Bill</u> <u>considers</u> <u>this idea</u> <u>foolish</u>	S—V—DO—Co

Deriving sentences from other sentences: a step-by-step example

Active $\Rightarrow$ Passive

Change the function of the subject so that it becomes an argument of the preposition *by* [...]. Change the function of the object so that it becomes the subject. Add the [...] verb *be* as superordinate to the original verb, put the latter into the past participle form and transfer its original inflectional properties to *be* (HUDDLESTON '88 p 176-7, slightly modified as Huddleston uses *complement* instead of *argument*).

My little dog bit the cat (active)

Change the function of the subject so that it becomes an argument of the preposition *by*:

$\Rightarrow$ bit the cat by my little dog

Change the function of the object so that it becomes the subject:

$\Rightarrow$ the cat bit by my little dog

Add the verb *be* as superordinate to the original verb:

$\Rightarrow$ the cat be bit by my little dog

put the latter into the past participle form:

$\Rightarrow$ the cat be bitten by my little dog

and transfer its original inflectional properties to *be*: et voilà -

The cat was bitten by my little dog (passive)

4 Addendum 1: Verb semantics and semantic roles

You will note that so far we have adopted a primarily formal stance: we have for the most part refrained from referring to the meaning or semantics of the linguistic phenomena we discussed. In this section, we will transcend this formal approach and have a closer look at the question of how to categorize and generalise certain aspects of meaning in connection with verbs. This is necessary as concepts such as 'verbal argument' and 'semantic role' play an important part in virtually any modern grammar and thus in computational linguistics.

Let us begin with an informal example:

(154) kick

(155) own

How can we describe the meanings of these verbs? If you tried to give a casual explanation, you would most certainly come up with something like

(156) *kick* means some kind of action in which someone hits someone or something else forcefully with his foot

(157) *own* means some kind of state in which something belongs to someone

These descriptions (which, in some form or other, you will of course find in many dictionaries) are a splendid basis for what is to come, because they contain exactly those components that we want to investigate in more detail in the next sections.

Firstly, we note that (156) and (157) distinguish *kick* and *own* by allocating these two verbs to two different classes: ACTIONS VS STATES.

Secondly, we see that both descriptions refer to those entities that are somehow involved in the occurrence in question: we describe *KICK* by referring to someone hitting something with his foot, or *OWN* by saying that something belongs to someone.

Both these aspects are a reflex of the fact that our knowledge of verb meaning comprises knowledge about

1. the type of **SITUATION**⁷ described (in the above examples: actions vs states)
2. the participants of this situation, ie. the **ARGUMENTS** of the verb and the way they are involved in the situation (in the above examples: *someone* / *something*)

As we shall see, these two facets of verb meaning are intimately related. Before exploring them more thoroughly, a few words about participants.

The term 'participant' ($\approx$ *Mitspieler*) is to be understood as a very general term referring to those entities – may they be persons, things or abstract units – that are directly involved in a given situation. We know, for example, that the verb *KISS* involves two participants (the one that kisses and the one that is being kissed), that the verb *THINKS*

⁷ Terms such as SITUATION or - see below - EVENT, CAUSATIVE, PROCESS, AGENT, ARGUMENT etc. are anything but univocally defined within modern linguistics. If you encounter these terms in other work, be prepared that they are introduced and used in a wide variety of ways. Many authors, especially within formal semantics, have far more precise notions of concepts like 'situation', but we can not elaborate this here and instead take a somewhat more informal stance in trying to relate some of the basic tenets of this approach.

also involves two participants (someone that thinks and whatever it actually is that he or she thinks), that the verb *GIVE* involves three participants (the person that gives something, the thing that is being given and the person that receives this thing) and so on.

A very useful term employed to describe this situation is **VALENCY** (German *Valenz*, *Wertigkeit*). Linguistics has borrowed this term from chemistry, where it is used to describe the potential of atoms to combine with other atoms. The valency of a word refers to its inherent capacity to combine with other words or groups of words; we can thus argue that *KICK* or *OWN* have a valency of two – both have two participants, both open up two 'slots', if you like, each of which needs to be filled for a well-formed sentence to result. Let us call the elements that fill these slots the **ARGUMENTS** of the lexeme. The following sentences are examples for verbs that have one argument (*SLEEP*), two arguments (*SEDUCE*) and three arguments (*SEND*):

(158) John slept (argument of *slept*: *John*)

(159) John seduced Mary (arguments of *seduced*: *John* and *Mary*)

(160) John sent Bill the book (arguments of *sent*: *John*, *Bill* and *the book*).

Some of you may be familiar with the grammatical distinction between intransitive, transitive and ditransitive verbs – you see here how this distinction is motivated: intransitive verbs have one argument, transitive verbs have two and ditransitive verbs three. In many cases, the semantic arguments of a verb are obligatory, that means we cannot leave them out without rendering the construction incomplete. Take sentence (159) from above – omitting either of *SEDUCE*'s two arguments results in an ungrammatical sentence (which is accordingly marked with an asterisk):

(161) *John seduced

(162) *seduced Mary

In some cases, though, not all arguments need be overtly expressed. Let us take the following sentences as an example:

(163) John ate.

(164) John slept.

Here, both *EAT* and *SLEEP* have but one argument (overtly expressed by *John*). Still, our semantic knowledge of *EAT* tells us that there necessarily has to be something that is being eaten, in other words, we know that semantically, *EAT* has not one but two arguments. This of course is not the case with *SLEEP* – we cannot "sleep someone or something":

(165) John ate a pizza.

(166) *John slept a pizza

We will come back to the concepts of 'valency' and 'argument' in more detail in the section on syntax. For now, keep in mind that the arguments of a verb are those elements that are required by the valency of the verb, they express those entities that are immediately involved in the situation denoted and our semantic competence concerning verb meaning comprises knowledge about the number and type of its arguments. This was evident in our sample definitions in (154) and (155), where we saw that each mentions the arguments of the respective verbs.

4.1 Semantic classes of verbs

To get a rough idea about the logic behind this system, let us begin with the following sentences:

(167) John liked Mary.

(168) John kicked Mary.

From a very superficial point of view, we could argue that (167) and (168) are rather alike – both sentences describe a certain situation which involves the same two participants, namely John and Mary. In other words, both *LIKE* and *KICK* are bivalent (they have two arguments). Interestingly, though, these two sentences do not 'behave' the same. One difference is that they do not answer equally well to the following question:

(169) What happened? (in the sense of *Was ist passiert?*)

Sentence (168) seems a likely candidate for an answer, (167), though, sounds somehow odd (*What happened? — ?John liked Mary*). How can we account for this? Well, quite intuitively we feel that sentence (167) describes some kind of situation in which nothing actually 'happens', thus we cannot ask 'what happened', whereas (168) describes a situation where, to put it informally, something was 'going on'.

Both sentences describe a certain situation, but the individual type of situation differs and it goes without saying that this difference lies in the semantics of the respective verbs (all the other elements in our sample sentences are identical): *KICK* refers to an event, *LIKE* does not.

Let us sum up our findings as follows: generally speaking, verbs are used to describe situations. On the basis of our observation, we can make out two big subclasses of situation, namely **STATES** and **EVENTS**, to which our sample verbs and some others can be allocated as follows:

(170) state verbs: {*LIKE*, *OWN*, *BE*, *STAY*}

(171) event verbs: {*KICK*, *SMASH*, *BREAK*, *DIE*, *MELT*, *RUN*, *JUMP*}

The class of event verbs can be further dissected into a number of different subclasses. Compare

(172) John jumped.

(173) John died.

Very informally, we can say that in sentence (172), John actually does something, he is the source for some kind of **ACTION**, while in sentence (173) something happens to him, ie. he undergoes some kind of **PROCESS**. You see here how the difference of semantic class is connected with a different type of involvement of the verbal argument: a verb such as *JUMP* is considered to be an action verb because its argument refers to someone or something is initiating or carrying out some kind of action, whereas with *DIE*, the argument refers to someone that is affected by a process but does not, as a matter of fact, act itself in any way. Some more examples for action and process verbs would be

(174) action verbs: {*JUMP*, *SNEEZE*, *LAUGH*, *SING*, *RUN*}

(175) process verbs: {*DIE*, *SUFFER*, *STUMBLE*, *MELT*}

Sentence (168) from above, renumbered as (176), contains the verb *KICK*:

(176) John kicked Mary.

Here we find a combination of action and process: one argument (represented by *John*) carries out the action; the other (*Mary*) is affected by it. This kind of verb is called **ACTION-PROCESS**. These verbs have to have two arguments; examples are

(177) action-process verbs: {*KICK*, *SMASH*, *CARESS*, *CHASE*, *MELT*}

Hold on, you may think – why is the verb *MELT* categorized as a process verb in (175), but an action-process verb in (177)? Well, because *MELT* – and quite a number of other verbs, too – can appear as either process or action-process:

(178) a: The ice-cream melted: process

b: John melted the ice-cream: action-process

(179) a: The boat sank: process

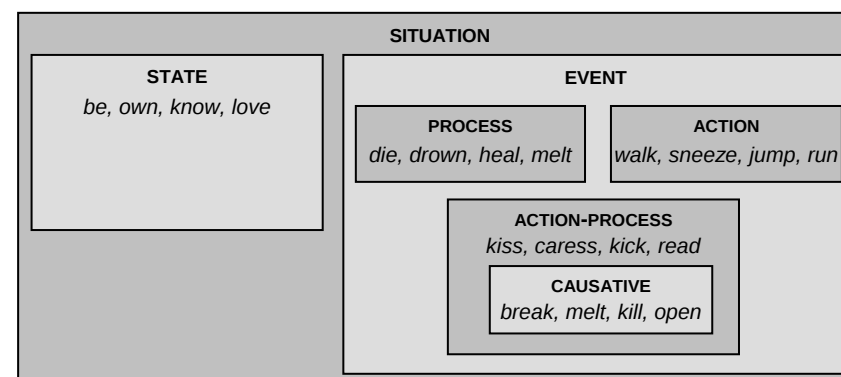
b: The army sank the boat: action-process

What makes examples (178) and (179) interesting, too, is the fact that *MELT* and *KICK*, taken as action-process verbs, represent an important subclass of this semantic category, namely the so-called **CAUSATIVES**. Paraphrasing the (b)-sentences of these two examples gives us something like

(180) John did something that caused the ice to melt.

(181) The army did something that caused the boat to sink.

Causative verbs are verbs whose meaning will necessarily entail a certain result of the action expressed. Our semantic knowledge of both *MELT* and *SINK* - if used bivalently - tells us that the completed action automatically leads to a specific state, namely that something is either melted or sunk. This is an intrinsic part of the meaning of these two verbs, something we will have a closer look at in a little while. First, the following diagram gives a brief overview of the semantic classes discussed so far:



Hierarchy of verbal semantic classes

This is of course only a very coarse classification - there are many classes that we have not talked about. We could establish numerous subclasses for those presented in the diagram - we could, for example, dissect the class of action verbs into motion and non-motion verbs (*WALK*, *JUMP* and *RUN* being motion verbs, *SNEEZE* a non-motion verb). We will not do so here, though, since the aim of this section is not to establish a

thorough taxonomy of verb meaning, but instead to provide you with an idea about the general mechanism that underlies such systems.

What, though, is the use of these semantic classes for verbs? To arrive at a satisfactory answer, do keep in mind that one of the aims of any linguistic subdiscipline is to arrive at generalized statements, and the semantic classes of verbs discussed in this section allow for just that when it comes to the 'behaviour' of verbs and certain linguistic phenomena that would otherwise be very hard to describe, as the following examples show:

(182) John kicked Bill – John was kicking Bill

(183) John knew Bill – *John was knowing Bill.

How can we account for the fact that *kick* can appear in the progressive form while *know* can not? Well, one way of going about this is by referring to the semantic classes the respective verbs belong to: *kick* is an action verb; *know* is a state verb and the latter usually do not appear in the progressive form:

(184) *John is owning the house.

(185) *Mary is loving her children.

(186) *Fred is wanting the book.

(187) *Bill is being dead

Another feature of state verbs is the fact that they cannot (really) occur in imperative clauses:

(188) ?Own the house!

(189) ?Love the dog!

(190) ?Want the book!

Without constructs such as 'state verb' or 'event verb' at one's disposal, a general account of these kind of phenomena would be very difficult.

4.1.1 Interlude: lexical decomposition of verbs

The selection of semantic classes that was introduced in the section above proves useful when it comes to the lexical decomposition of verbs, too. We will restrict our survey to the following examples:

(191) John is dead.

(192) John died.

(193) Bill killed John.

Here, we have a state verb BE (DEAD) in (191), a process verb DIE in (192) and a causative verb, ie. an action-process KILL in (193). The interesting point to note about these sentences is the fact that the 'net result' described is always exactly the same, namely that John is dead. In sentence (191), this state is expressed directly via the combination of *be* + *dead*. In (192) and (193), though, it is not overtly expressed, yet our semantic competence tells us that if someone has died or been killed he or she will necessarily be dead.

Let us begin by looking a bit more closely at the semantics of DIE. One part of its meaning is the fact that it denotes a process that ends in the state of being dead. Informally, we may represent this as follows:



Semantics of DIE

As a matter of fact, there are quite a number of process verbs whose meaning comprises the transition from one state to another. Take the following example:

(194) State: John knows that 2 x 2 equals 4.

(195) Process: John learned that 2 x 2 equals 4.

Here, too, we can argue that the state expressed in (194) 'reappears' – although implicitly – as part of the meaning of (195): if someone has learned that 2 x 2 equals four, we can necessarily expect that he or she will afterwards know this fact.

Incidentally, there is a whole class of English verbs in which this state of affairs is at work, namely verbs that are derived from adjectives such as *red* or *widen*:

(196) State: The road is wide

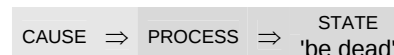
(197) Process: The road widened

(198) State: Her face is red

(199) Process: Her face reddened

What these examples show is the close relation between verbal expressions that are stative such as *(be)-dead*, *own*, *know* etc. and verbal expressions that denote processes such as *learn*, *die* or *widen*: we can describe the meaning of these process verbs by postulating that they can be decomposed into two meaning-components: a process and an accomplished or resulting state.

With these insights in mind we can now return to example (193) from above and the verb KILL. If we wanted to paraphrase the meaning of *kill* very generally, we could say that if something or someone kills something else, it causes it to change into another state, namely that of being dead:



Semantics of KILL

This diagram shows how the semantics of DIE is part of the semantics of KILL, so again we have the case where the meaning of a single lexeme is made up of smaller, more general parts of meaning. The description for KILL can actually function as a general template for causative verbs:

(200) Mary opened the window.

(201) The council widened the road.

(202) The sun melted the ice.

(203) The army destroyed the bridge.

Although these sentences denote completely different events, their verbs can all be described in a similar way as KILL: the 'net result' is always different, yet the individual semantics all entail something or someone causing a process and a resulting state.

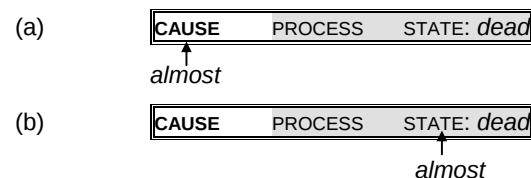
The following example, with which we close this section, will demonstrate the usefulness of verbal decomposition:

(204) Bill almost killed John.

This sentence is thought-provoking from a semantic point of view, because we can allocate more than one meaning to it. The scientific term for this is **AMBIGUITY**, and sentence (204) is ambiguous because we do not know what the adverb *almost* actually refers to. It could mean either

- (a) Bill almost caused John to die: he almost did something that would end John's life
- (b) Bill caused John to almost die: he did something, for example shoot John, but only wounded him.

This ambiguity can be accounted for nicely if we decompose the verb *kill*, because by doing so, we can isolate the very meaning components that *almost* modifies:



It goes without saying that the very same situation is reflected in other sentences with causative verbs (*The army almost destroyed the bridge*, *The sun almost melted the ice-cream* and so on) which – via lexical decomposition – can be described in exactly the same way as sentence (204).

4.2 Semantic classes and semantic roles

Let us end our little study of verb semantics with some brief remarks on semantic roles. On page 23, we noted the fact that our knowledge of verb meaning comprises knowledge about the various participants that are involved in the situation expressed by the verb, i.e. the arguments that it takes, and, more specifically, differences in the type of their involvement in this situation.

The term **SEMANTIC ROLE** is based on the assumption that the various arguments of a verb take on different roles in the situation expressed by the verb. To grasp this concept, think of a stage play in which the various protagonists take on different roles, too.

Take the following example as a starting point:

- (205) a. John kicked Bill.
b. John kissed Bill.

Both *KICK* and *KISS* take two arguments each, in our example *John* and *Bill*. What can we say about the involvement of the arguments in the situation expressed by the verb? Which roles do they take? Well, in (205) (a), John is the one that does the kicking and Bill is being kicked; in (205) (b), John is the one that kisses and Bill is being kissed.

We could thus say that *KICK* takes two arguments, one representing the kicker and the other the entity that is being kicked, and that *KISS* also takes two arguments, one being the kisser and the other the one being kissed. This statement is of course not very satisfactory, because it is extremely specific: it applies only to the verbs *KICK* and *KISS*. What we want, though, is to describe semantic roles on a much more abstract level in order to arrive at a more generalized account. What is it that the 'John-arguments' in both sentences have in common? Or the 'Bill-arguments'?

Well, the answer is not too difficult, because we can say that the 'John-argument' in both sentences represents the entity (here: person) that is the source for the action described by the verb (whatever that action may be), and the 'Bill-argument' represents the one that is affected by this action. Actually, we see this kind of 'distribution' of involvement in an endless number of situations:

- (206) John smashed the car (*John*: source of the action; *the car*: affected by the action)
Mary caressed her cat (*Mary*: source of the action; *her cat*: affected by the action)
The janitor opened the door (*The janitor*: source of the action, *the door*: affected by the action).

The technical terms for these two different types of involvement are **AGENT** and **PATIENT**: generally speaking, then, *agent* refers to the entity that can be seen as the source of an action. *Patient* refers to an entity that is affected by a process or in a certain state.

Although prototypical agents are likely to carry the feature [+HUMAN], do keep in mind that 'agent' and 'patient' are rather abstract notions: do not equate agent- or patienthood with, say, 'real' people or 'real' things. The following examples show a non-prototypical agent in (a) and a patient that is not any real entity in (b):

- (207) a. A fire destroyed London (*A fire*: agent, *London*: patient)
b. John told a story (*John*: agent; *a story*: patient).

What we see here, then, is the systematic relationship between different semantic classes of verb and the semantic roles that accompany these verbs: all the verbs in (205) and (206) are action-process verbs, accordingly, each takes an agent and a patient. Process verbs such as *DIE*, *DROWN* or *MELT* take a patient only; action verbs such as *RUN*, *JUMP* and *SNEEZE* an agent. To get a feeling for agent and patient accompanying various verbs, have a look at the following examples:

- (208) John became sick: *become*: process verb, *John*: patient
The door opened: *open*: process verb, *the door*: patient
Frank opened the door: *open*: causative verb, *Frank*: agent, *the door*: patient
The dog barked: *bark*: action verb, *the dog*: agent
The wind shook the tree: *shake*: action-process, *The wind*: agent; *the tree*: patient

In the relevant literature, you will of course find many more semantic roles than just agent and patient. Be prepared for roles such as **LOCATION**, **SOURCE** or **GOAL** in sentences like *The book is in the car* (*the book*: patient, *the car*: location); *John went to Paris* (*John*: agent, *Paris*: goal), *He took the book from the shelf* (*He*: agent, *the book*: patient, *the shelf*: source)

Semantic roles like these can be regarded as a central notion not only to verb semantics but to grammar as a whole, and many facts of grammar can be explained with reference to these roles. But since mainstream linguistic has as yet failed to present a proper theory of semantic roles, we will not pursue this topic beyond the very basic notion as presented in this section.

5 Addendum 2: Information structure

5.1 Preamble

In the chapter on syntax we have become acquainted with some central notions of modern linguistics: 'distribution' and 'class' are of the utmost importance when it comes to account for a large number of data in a generalized way.

Instances of this can be found on all levels of description: in phonetics and phonology, we talk about classes of sounds and ways how to establish them, in semantics we identify different semantic classes of lexemes, in syntax we come across word- and constituent classes (i.e. phrases).

We have seen, too, that concepts such as 'structure' and 'hierarchy' are key elements of linguistic description. Within semantics, we can describe meaning relations in terms of hierarchical structures, in morphology and syntax we use tree diagrams to represent the internal structure of complex signs.

In connection with the classes mentioned above, we have seen that if we 'embellish' structures with classes, we get a basis for generalisation, namely templates for (a potentially) infinite number of concrete linguistic expressions.

As a result of these investigations, we are now in a position to describe and account for a large number of different syntactic phenomena and to identify differences and analogies between various sets of data by applying the appropriate terminology and methodology.

We have at least a basic notion about linguistic reasoning and therefore might also be able to come up with educated guesses about ways of dealing with phenomena that we have not dealt with explicitly in this text.

Unfortunately, though, there are many phenomena that elude us; there are linguistic data that we just cannot capture if we go about it the way we have done so far. In other words: there are problems that we cannot work out because the overall approach we have taken so far would not allow for a satisfactory solution.

We already hinted at this at the very end of the first chapter:

The approach that we follow is for the most part formal in nature: we will look at language data more or less in isolation of questions that concern the communicative function they fulfil.

These questions will be dealt with in the final section of this text, where we will expand our investigation of language with respect to the people that utilize it and the potential contexts in which they do so

In order to get a conceptual basis for the next section on information structure, let us start off with a non-linguistic example that serves to illustrate the difference between formal and functional descriptions.

The distinction between so-called 'formal' and 'functional' linguistics is by no means easy to convey, and you will find that there is no clear-cut definition for either. What follows is a first introduction to some functional terminology that no thorough description of sentences can do without.

5.2 Form vs function

Compare the following, incomplete descriptions for the object 'hammer':

Description **A**:

Hand hammers consist of a handle and striking head, with the head often made of metal with a hole in the centre to receive a wooden handle. Surfaces of hammerheads vary in size, in angle of orientation to the handle (parallel or inclined), and in type of face (flat or convex). Carpenters' hammers often have a claw on the head. Weights range from a few ounces or grams up to 15 pounds...



Description **B**:

Tool designed for pounding or delivering repeated blows. The handle is designed to increase the blow. As a tool for nailing, riveting, and smithing hammers originated in the Metal Age with the inventions of nails, rivets, and jewelry. For beating lumps of metal into strips and sheet, compact hammers with flat faces were needed. These, in lighter form, were suited to riveting and driving nails and wooden pegs...

Description **A** is **FORMAL** in the sense that it lists a certain number of prototypical features that hammers usually exhibit, mentioning the material they are made up of or their size and weight. These features can be described without any reference to the potential use or function that the object in question may be applied to.

Description **B**, on the other hand, is **FUNCTIONAL**: it describes the very same object almost solely in terms of the function or purpose it fulfils.

How does this relate to language, you may ask. Well, the example above provides us with an analogy to one of modern linguistics' most heatedly discussed topics, namely the question about the complex relationship between formal and functional descriptions of language.

Up to now, our approach has been rigidly formal: we have almost entirely neglected questions that concern the function of sentences. What we have been working with so far were isolated strings of word-forms (*John talked to the mayor in London*) that were picked out more or less at random or because they were well suited to exemplify certain technical constructs. We have tried to describe and classify them without ever once asking any of the key questions that a strictly functional analysis would put first, namely "Who says what to whom, where and when do they say it and of course - why?"

This means that questions concerning

- a) the speaker and the listener(s), i.e. the sign users
- b) the time and place of the utterance,
- c) the reason for producing the utterance in the first place,
- d) the things that were said before or follow the utterance in question

have not been treated so far.

It is these very questions that describe the communicative 'setting' for anything that we produce verbally, and each of these questions has to do with a certain type of context in which an utterance is produced.

The notions **CONTEXT** or **ENVIRONMENT** have repeatedly cropped up in this text. So far, we have interpreted 'context' in a more or less formal fashion: when we talk about

the syntactic context of linguistic elements we mean those sounds, morphs or words preceding and following. The largest unit of description we encountered in this text was the sentence, whose boundaries we never crossed. The questions presented in a) - d) do just that, though.

'The things that were said before or follow the utterance in question' refer to the **TEXTUAL CONTEXT** or **CO-TEXT** of linguistic signs such as sentences, which we will briefly with next in the section on **INFORMATION STRUCTURE**.

Questions concerning speaker and listener, time and place of the utterance and their communicative function form a set of parameters that describe the **EXTRALINGUISTIC CONTEXT** for a linguistic sign. The scientific term for this set of parameters is **COMMUNICATIVE SITUATION**; this we will not deal with in this text. Terms that you may have encountered in this context are **DEIXIS**, **SPEECH ACTS** and **IMPLICATURES & CONVERSATIONAL MAXIMS**. Taken together, their study is often subsumed under the term **PRAGMATICS**.

The term 'pragmatics' is derived from the Greek word *pragma* ("act"); and accordingly, you will find definitions of pragmatics that go like this:

Linguistische Pragmatik ist die Lehre vom sprachlichen Handeln.

Linguistic pragmatics is the study of communicative acts.

Within pragmatics, the general field of study, the aims of the scientists, the linguistic data under consideration and so forth are unfortunately not nearly as clear cut as in the core areas of linguistics such as morphology, phonology or syntax

Accordingly, some people gloss pragmatics the 'waste-paper basket'⁸ of linguistics into which is thrown everything that a strictly formal analysis of language fails to account for. But this is a very negative viewpoint which we do not want to adopt here.

Instead, we will consider pragmatics to be an area of very diverse scientific research which is nonetheless united by one underlying assumption, namely that a thorough description of language will only come about if the linguistic and extralinguistic contexts in which language is produced are paid proper and thorough attention to.

5.3 Information Structure

Let us begin with a set of sentences familiar from the last section of our chapter on syntax.

- (209)
- a) John kicked a dog.
 - b) A dog, John kicked
 - c) A dog was kicked by John.
 - d) It was John who kicked a dog.
 - e) What John did was to kick a dog.

All sentences example (209) have the same core meaning, they describe one and the same extralinguistic situation. The main verb in all cases is *KICK*, an action-process verb that takes an *AGENT* (represented by the NP *John*) and a *PATIENT* (represented by the NP *a dog*). The situation described is always localized in the past. In the chapter on syntax we introduced the scientific terms for the various types of sentence in (209), i.e.

⁸ Yule '96 discusses this problem

- (210)
- a) active
 - b) topicalisation
 - c) passive
 - d) cleft
 - e) pseudo-cleft

We also learned that there is an 'orderly' relation between these types of sentence, and that we can use an active sentence such as *John kicked a dog* as a base form from which we can systematically derive all other types. So far, so good.

What we cannot account for, though, is **WHY** there are (at least) five different forms to represent identical content. In other words, why does the English language (and other languages, too, of course), offer this array of sentence types? Does this not seem somewhat uneconomical? If we want to express one meaning, why should we do so in five different ways?

Well, the answer to this question can only be found if we do, in fact, take into consideration the textual context of a sentence. To get this point, compare the following sentences:

- (211) John is Mary's husband. / Mary's husband is John.

Again, these two sentences have the same core-meaning and could thus be regarded as synonymous. The copula *be* represents a symmetrical relation, namely mutual entailment between the two noun phrases *Mary's husband* and *John*:

- (212) Mary's husband = John

Can we assume, then, that (211) and (211) are interchangeable, that we can say *Mary's husband is John* whenever we can say *John is Mary's husband*? From a strictly semantic point of view, the answer would have to be 'yes', but the following example shows that there are factors that do in fact restrict the choice.

- (213)
- a) Let me introduce my friend John to you.
John is Mary's husband.
 - b) Let me introduce my friend John to you.
??Mary's husband is John.

You see that sequence a) seems much more natural than sequence b), which clearly shows that the question whether we say *Mary's husband is John* or *John is Mary's husband* may depend on what has been said before.

To put it informally, we can say that in *Mary's husband is John*, we somehow talk about *Mary's husband*, whereas in *John is Mary's husband* we talk about *John*. The information conveyed in these two sentences is the same, yet the way that we present the information is different, and this difference has to do with textual context.

Coming back to the sentences in example (209), we now get an idea about what it is that they differ in. Try it out yourselves: let us say you had to answer the following question by using one of the forms in (209):

- (214) Who kicked a dog?

You will note that not all the forms presented lend themselves equally well for an answer. While the active (*John kicked a dog*) and the cleft (*It was John who kicked a dog*) are ok as an answer, all the others sound decidedly odd. A different context, though, may of course produce different results:

(215) What happened?

This question could be answered with the active, the topicalization and the passive sentence (*John kicked a dog*, *A dog*, *John kicked* and *A dog was kicked by John*), but cleft and pseudo-cleft do not fit equally well. As a matter of fact, you will see that active sentences can usually appear in all the textual contexts that the other sentences can also appear in, but not vice versa. The active has the largest range of application, its distribution is least restricted and we can therefore identify it as the **UNMARKED** form.

Let us sum up what we have worked out so far: different types of sentence enable the speaker to focus different constituents. The motivation for this choice can only be accounted for if we include the textual context of a sentence in our analysis.

The examples also show that pragmatically, sentence-initial position plays a very important part. The contrast between the active *John kicked a dog* and the topicalization *A dog*, *John kicked*, for example, relies solely on which element comes first in the sentence: in the active sentence, the subject appears in sentence initial position, in the topicalized form, it is the object.

Let us introduce a technical term for the constituent that appears first in a sentence which we will call **THEME**. The rest following the theme is called **RHEME**. We adopt this terminology from one of the most influential linguists of British functionalism, namely M.A.K. Halliday. Taken together, theme and rheme are often termed **PRAGMATIC FUNCTIONS**. The following table lists some sample sentences that have been analysed in terms of theme and rheme:

Theme	Rheme
John	kicked a dog.
A dog,	John kicked.
A dog	was kicked by John.
Mary's husband	is John
On Monday,	Bill went to NY.
To be or not to be	that is the question.

Do note, though, that there is considerable confusion around the exact definition of pragmatic functions. What they have in common is that they all serve to describe variance in information structure.

M.A.K. Halliday describes the theme as follows:

The theme is what is being talked about, the point of departure for the clause as a message; and the speaker has within certain limits the option of selecting any element of the clause as thematic. (Halliday 1967, 212).

A slightly different (and very influential) approach concerning information structure was developed within the *Prague School*, which has been mentioned in the section on environment and distribution. Here, the theme of a sentence is defined as the element that carries the lowest degree of communicative dynamism (CD). This in turn has to do with the distinction between **GIVEN** and **NEW** information.

The following sentence introduces the concepts 'cat', 'running', '(along) road'.

(216) A cat was running along a road.

In the following set of examples, these concepts occur again and can thus be considered as 'given':

(217) The cat was panting like mad. (given, low CD: *cat*, new: *was panting like mad*)

(218) The road was wet. (given, low CD: *the road*, new: *was wet*).

In (217) and (218), the NP in sentence-initial position 'pick up' information that has been given before in (216), they have the lowest CD. But in the following case, the NP *some dog* is in this position, yet it does not have a low CD as it would be considered new information:

(219) Some dog was chasing this cat. (given, low CD: *cat*, but this is not in sentence-initial position).

In modern linguistics, there is actually a multitude of terms employed to account for word-order variation (**THEME, RHEME, GIVEN, NEW, TOPIC, FOCUS** etc.). Do not let this or different readings of theme confuse you - when you encounter terms like the ones mentioned, just keep in mind that they are always part of a specific theoretical approach and can therefore exhibit different readings.

For our purposes, it is sufficient to correlate theme with sentence-initial position.

To wrap this section up, let us look at an informal example where the concept of 'theme' comes in very useful. This example is in German because it relies on your native-speaker-competence. What you have to do is simple: just compare the two little stories accompanying the picture with respect to how 'geschmeidig', i.e. fluent the information is structured within:

Text A:

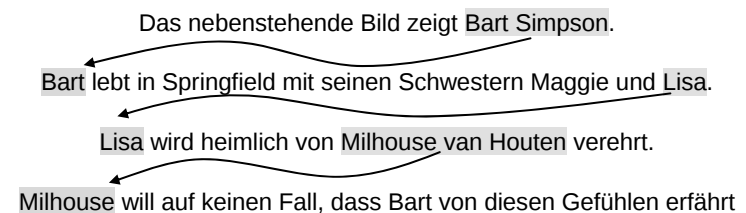
Das nebenstehende Bild zeigt Bart Simpson.
In Springfield leben seine Schwestern Maggie und Lisa mit Bart.
Milhouse van Houten verehrt Lisa heimlich.
Dass Bart von diesen Gefühlen erfährt, will Milhouse auf keinen Fall.



Text B:

Das nebenstehende Bild zeigt Bart Simpson.
Bart lebt in Springfield mit seinen Schwestern Maggie und Lisa.
Lisa wird heimlich von Milhouse van Houten verehrt.
Milhouse will auf keinen Fall, dass Bart von diesen Gefühlen erfährt.

You will probably find that text B is structured somewhat more smoothly and as a matter of fact, this can be explained quite easily. In B, the theme of each sentence picks up the constituent that came last in the rheme of the sentence before:



Note that in order to get this simple, linear thematic progression, the third sentence has to appear not in the unmarked active form, but instead in the passive.

6 Exercises

- I** Allocate each word in the following, perfectly grammatical sentences to its respective lexical category ('word-class'). What interesting phenomenon do you note here?
The old man the boat.
The boy who whistles tunes the piano.
- II** In traditional grammars, you might find the following allocation of word and lexical category:
 article: *the, a*
 possessive pronoun: *my, your, our, his*
 demonstrative pronoun: *this, these*
 interrogative pronoun: *which*
 quantifier: *some, any*
 How could you justify the assumption of modern linguistics that all the words above can be subsumed in one class of words, namely determiner?
- III** In many grammars, you will find pronouns defined as 'words such as *he, she, us, they* that take the place of a noun in a sentence'. Illustrate the inappropriateness of this 'definition' by using the following sample sentence:
Her little sister wanted to marry the boy from next door
- IV** Given the following string of words:
the older sister of some very unruly boys
 a) Identify the dependency relations in this sequence and represent them in a table
 b) Draw a dependency tree for this string and mark all phrases in this tree
 c) 'Translate' the annotated dependency tree into a phrase marker
- V** Account for the ambiguity of the following sentence by diagramming its different structures:
John wrote a book on Trafalgar Square
- VI** Identify both the syntactic category (NP, VP, AP etc) and the grammatical function of the bracketed sequences in the following sentences:
1. Her sister meets [me] [in the pub] [every night].
 2. [She] was not taken seriously.
 3. [On Mondays], Fred is [in London].
 4. I just can't stand [his stupid excuses].
 5. They declared [the meeting] [open].
 6. [Bill] sold [her] [the car].
 7. [She] was sold [the car].
 8. [The car] was sold.

- VII** Identify the type of mood (imperative, interrogative, indicative) of each of the following sentences:
1. I must go to the dentist tomorrow
 2. watch out where the huskies go
 3. would you please remind me to call the vet
 4. has the paper arrived yet
 5. have a nice day
 6. let me ask you a question
 7. I told you not to answer the door
 8. no woman no cry
- VIII** Identify the type of indicative (active, topicalisation, cleft etc.) of each of the following sentences:
1. The cat was chased by the dog.
 2. What John kicked was the door.
 3. In 1974, President Nixon resigns.
 4. John threw the ball to Bill.
 5. She was given a bunch of flowers.
- IX** Can 'subject' be equated with either 'agent' or 'theme' in the following sentence?
These flowers, my aunt was given by my uncle.
- X** Which strategies can you come up with to move the object of the following sentence into theme position:
John wrote the letter on Monday.