

Syntax

The word “syntax” comes originally from Greek and literally means “a **putting together or arrangement**. Syntax **concentrates on the structure and ordering of components** within a sentence. It is the study of the organization of words into larger units (phrases and sentences).

Generative Grammar

Inspired by the original work of Noam Chomsky, linguists have attempted to produce a **particular type** or **grammar** that has a very explicit system of **rules specifying** what **combinations** of basic elements would result in grammatical sentences. This model could be used to describe all human language and to predict the grammaticality of any given utterance (that is, to predict whether the utterance would sound correct to native speakers of the language).

Generative grammar **defines the syntactic structures of a language**. The grammar will generate all **well-formed syntactic structures** (e.g. sentences) of the language and **will not generate** any ill-formed structures. This has been called the “**all and only**” **criterion**, that is, all the grammatical sentences and only the grammatical sentences will be produced.

The goal of GG is to build a grammar that generates **all of the possible** sentences and **none** of the **impossible** sentences.

Before we begin, we need to recognize that the individual words in a sentence are organized into naturally **coherent groups** called **constituents**.

A **constituent** is any word or **combination of words** that is dominated by a **single node**. A word or a **group of words** that function as a **unit** and make up larger **grammatical units**.

e.g. the young linguist will about syntax.

The string “the young linguist” is a constituent, but the string “the young” is not.

A **phrase** is a **string** of (one or more) **words** that functions as **syntactic unit** (or **constituent**). A phrase is a **syntactic unit** headed by a **lexical** category such as Noun, Adjective, Adverb, Verb, or Preposition. Phrases are named for their heads.

Lexical categories have particular kinds of meanings associated with them. For example, verbs usually refer to actions, events, and states (kick, marry, love). The V in a VP is called the head of the VP, (usually the head is the only obligatory part of a phrase).

A term that is used to indicate that words belong to different classes with different morphological and syntactic properties. The major lexical categories are noun (N), verb (V), adjective (Adj), and preposition (P). Other terms are lexical class and syntactic category or class.

Functional categories are called so because their members have a **grammatical** function rather than a descriptive meaning, for example, the category **determiner** (Det), which includes articles (the, a, an) as well as demonstratives (this, that, these, and those) and “counting words” (each and every). Another category is **Auxiliary** (Aux) which include **be** and **have** and modals.

Phrasal constituents

There are **five** categories of **phrasal** constituents corresponding closely to the **lexical** categories which head them:

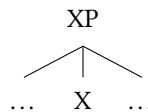
1. An NP is a constituent headed by N.
An NP is a projection of N.
2. A VP is a constituent headed by V.
A VP is a projection of V.
3. A PP is a constituent headed by P.
A PP is a projection of P.
4. An AdjP is a constituent headed by Adj.
An AdjP is a projection of Adj.
5. An AdvP is a constituent headed by Adv.
an AdvP is a projection of Adv.

A more **general** principal can be formulated:

An XP is a constituent headed by X.

an XP is a projection of X.

The same information can be represented in tree diagram format:



Each **lexical head** heads a **corresponding phrase**.

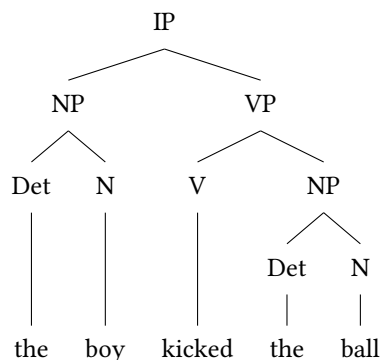
Phrase structure trees and phrase structure rules

Phrase structure **trees** and **brackets** are notational **equivalents**.

A **tree** diagram with **syntactic category information** is called a **phrase structure tree**. This tree shows that a sentence is both a **linear string** of words and a **hierarchical structure** with phrases nested in phrases. Words appear in trees under labels that correspond to their syntactic category. Nouns are under N, determiners under Det, verbs under V, and so on.

In discussing trees, every **higher node** is said to **dominate** all the **categories beneath** it. VP dominates V, NP, and also dominates Det and N. A node is said to immediately dominate the categories one level below it. VP immediately dominates V and NP. Categories that are immediately dominated by the same node are sisters. V and NP are sisters in the PS tree of the boy kicked the ball.

Consider the following example:



Or by using **brackets**:

$[_{IP} [_{NP} [_{Det} the[_N boy[_{VP} [_{V} kicked[_{NP} [_{Det} the[_N ball]]]]]]]$

These **labeled brackets** correspond to **labeled nodes** on a **phrase** structure tree.

IP or **InflP**: Inflectional phrase is a **functional** head containing (in English) auxiliary verbs and/or tense and/or agreement features. Also written as I (I^0). More recently, Infl has been reinterpreted as a conflation of **two** separate **heads** **AGR** (agreement) and **T** (tense).

The information represented in a PS tree can also be represented by another formal device: **phrase structure rules**. The general schema is: **XP** → (YP) X (ZP)

We can read it as: XP consists of YP followed by X followed by ZP. The elements in **parenthesis** are **optional**, and the elements **without parenthesis** are **obligatory**. X, Y and Z are **variables** representing any **category**. e.g. (N, V, P, Adj, etc). The example (1) can be represented as the following:

IP → NP VP

NP → Det N

VP → V NP

To the left of the arrow is the dominating category, for example VP, and the categories that it immediately dominates – that comprise it – appear on the right, V and NP.

VP → V NP (write a book)

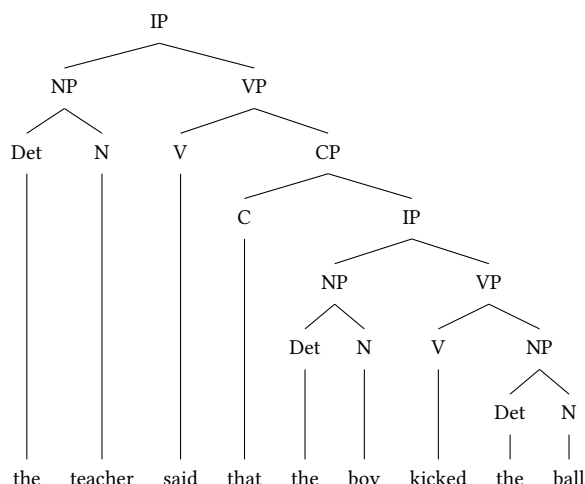
VP → V Adv (arrive late)

VP → V PP (go to school)

VP → V PP Adv (drive at night carefully)

VP → V CompP (said that...)

Another option open to the VP is to contain or embed a clause. For example, the sentence “The teacher said that the boy kicked the ball” contains the clause “the boy kicked the ball”. Preceding the embedded clause is the word *that*, which is a Complementizer (Comp). Comp is a functional category, like Aux and Det. Here is the structure of such sentences:



These phrase structure rules fulfill at least three roles:

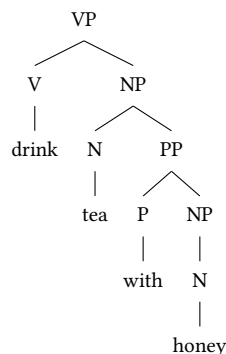
1. They show how sentences can be broken down to illustrate their structure.
2. They show a general manner of creating sentences.
3. They provide a way for us to compare languages.

Thus phrase structure rules were formulated in order to **construct unlimited sentences** with a **small** number of rules.

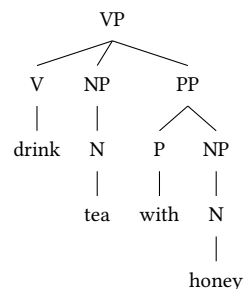
Syntactic ambiguity

It results from the **syntactic structure of the phrase or sentence**. Consider the following example:

(1) drink [tea with honey]



(2) drink [tea] [with honey]



“The PP is a constituent of the NP in 1 vs. ... of the VP in 2.”

Draw a PS tree for the following sentence: I hit the man with the hammer.

Constituents and Constituency tests

Sentences, or clauses, are not simply a string of words; they are **hierarchically organized** in units of different levels. Clauses have a structure.

Consider the following example:

- (3) [The young linguist] will meet [his friend] [in the local gallery] [after lunch].

This example contains 13 words, but some of these words are more closely connected to each other than others. Square brackets [...] demarcate a unit of structure or a constituent.

Various linguistic **tests** reveal the **constituents** of a sentence. They are called **constituency tests**: they are used to determine which elements in a sentence form a **syntactic unit** or a **constituent**.

1. The semantic criterion

A set of words that can stand alone form a constituent.

The demarcation in (1) is based on the interpretation of the units. There is a tighter semantic connection between the words that compose the strings *the young linguist* or *his friend* than there is between the words *friend in the*.

2. Substitution

The second test is “**replacement by a pronoun**”.

His friend can be replaced by the pronoun *him*. [The young linguist] will meet [him] [in the local gallery] [after lunch].

Similarly, we can replace *in the local gallery* by *there*, *the young linguist* by *he* and *after lunch* by *afterward*.

[He] will meet [him] [there] [afterwards].

3. Movement

The strings which we have identified as constituents can sometimes be moved around in the sentence.

[**After lunch**] The young linguist will meet his friend [**in the local gallery**].

[After lunch] can be moved to the beginning of the sentence and [in the local gallery] to the end of the sentence.

4. Questions: substitution and movement

In some cases, substitution and movement combine.

- Whom will the young linguist meet _____ in the local gallery after lunch?
- Where will the young linguist meet his friend _____ after lunch?
- When will the young linguist meet his friend in the local gallery _____?

In (a), the pronominal question word **whom** refers to his friend and it is also moved to the beginning of the sentence.

In (b), **where** replaces **in the local gallery** and is also moved leftward.

In (c), **when** replaces **after lunch** and is also moved leftward.

5. Deletion

Another property of constituents is that they can **sometimes** be **omitted**, but only **adjuncts of time** and **place**. Constituents which realize the argument structure of the verb cannot be omitted because of **the theta-criterion**.

The young linguist will meet his friend _____ after lunch.

The young linguist will meet his friend in the local gallery _____.

The young linguist will meet _____ in the local gallery after lunch.

6. Focalizing a constituent

The cleft sentence

The constituents identified so far can also become the **focal** element of a sentence.

It is **the young linguist** who will meet his friend in the local gallery after lunch.

It is **in the local gallery** that the young linguist will meet his friend after lunch.

It is **after lunch** that the young linguist will meet his friend in the local gallery after lunch.

In these examples, one constituent XP is inserted in a string of the type:

It is [XP] who / that ...

Structures like those are called **cleft sentences**. In a cleft sentence, we **cut (cleave) one constituent** represented as XP out of the sentence and **place it in a position** in which it will receive **contrastive stress** and in which it will function as a **contrastive focus**.

The cleft sentence test offers another means for identifying which groups of words form a constituent.

7. The pseudo-cleft sentences

The pseudo-cleft sentence allows us to isolate the constituent containing the verb.

What the young linguist will do is [meet his friend in the local gallery after lunch].

[Meet his friend in the local gallery after lunch] is **what the young linguist will do**.

In these examples, we cleave the sentence into **two** parts: the bracketed string [] gets contrastive stress. This paraphrase separates **will** from the string [meet ... after lunch.].

Further evidence for separating the verb and the auxiliary Will and **meet** do **not** form **one** independent constituent; they are **not** part of the **same** constituent.

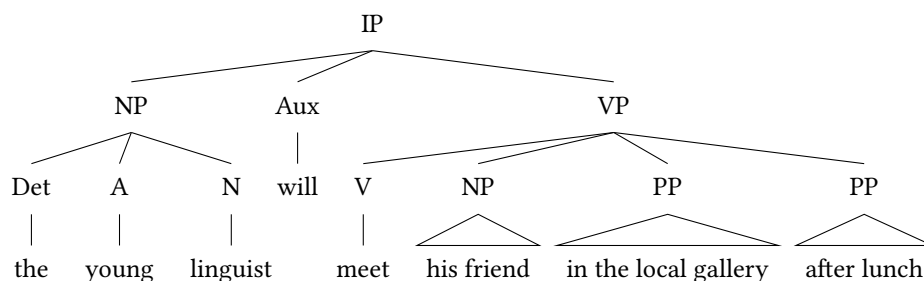
This conclusion is confirmed by another substitution test, illustrated in the following:

The young linguist will meet his friend in the local gallery after lunch and his brother will **do so too**.

Do so too replaces [meet his friend in the local gallery after lunch].

To conclude, this sentence must be decomposed at least into the following units:

[**The young linguist**] **will** [meet [his friend] [in the local gallery] [after lunch]].



Complements and adjuncts The elements which are **required by the verb** are called **complements**.

The elements which do **not** require **license** from the verb to occur in the predicate are called **adjuncts** and are typically **optional** elements. They can be **omitted** without affecting the grammaticality and central meaning of the sentence. They provide additional meaning connected to the when, where, how or why of the situation (i.e. time, place, manner, etc.) but not what or who.

The young linguist will meet his friend **in the local gallery after lunch**.

The complements are: his friend and the young linguist.

The adjuncts are: in the local gallery and after lunch.

Because it was too heavy, John put the parcel on the desk.

John gave Bill the money **in the living room**. **Because it was too heavy**, John **probably** put the parcel on the desk **last night**.

So adjuncts provide information about time, manner, reason, place, modality, and so on. **Adjuncts** are **not** arguments of a verb.

Consider the following examples

John abandoned the project.

*John abandoned.

*John abandoned after the project.

From these examples, we can say that the verb abandon must be associated with a noun phrase. The absence of the NP renders the sentence ungrammatical.

So abandon is a **transitive** verb that requires a complement of the category NP, which is its **direct** object.

*John smiled his friend.

Unlike abandon, smile doesn't require the presence of NP. Traditionally, smile is an intransitive verb. This means that it cannot be followed by an NP like his friend.

John lives in an apartment.

*John lives an apartment.

Live selects a PP and not an NP. We will say that a **verb selects a complement of a specific kind**. Other verbs select **a sentence** as their complement:

John wondered [whether Bill would leave].

The verb wonder selects the complement [whether Bill would leave], which is itself a clause.

The list of verbs is so long, e.g. put, hand, give...

The specific realization of the **complements** selected by a verb may **differ** from one language to another. While English ditransitive verbs may be followed by two NPs, or by an NP and a PP, only the latter option is obtained in French.

(1) John gave Bill the manuscript.

* John a donné Bill le manuscrit.

To conclude, verbs such as: abandon has two arguments, smile one argument, and give three arguments.

Recursion

It is described as the ability to place one component inside another component of the same kind.

When a category appears on both the left and right side of a rule (or a pair of rules, transitively) in the same grammar, the set of structures generated by this grammar is non-finite.

NP → Det N PP

PP → P NP

Recursion is defined as a property of language that allows for the embedding of categories (which can yield infinitely long phrases).

The cat on the mat in the house on the street.

John believed that Cathy knew that Mary helped George.

X' bar syntax

Proponents of X' bar voice two types of objection to phrase structure:

1. It is too **restricted in the number** of types of **categories** it permits.
2. It is too **unconstrained** in the sets of possible phrase structure it permits.

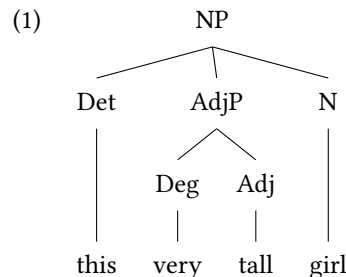
Within phrase structure, only two types of categories are recognized: **Lexical** categories like N, V, P, A, Adv, Aux, Det...

Phrasal categories like NP, VP, PP, AdvP...

There are no intermediate categories larger than the word but smaller than the phrase: e.g. there is no intermediate category larger than the Noun but smaller than the Noun Phrase. Within the system of phrase structure, any nominal constituent must either be an N, or an NP. But there seems to be a considerable amount of empirical evidence that such intermediate categories exist.

Consider the following example: this very tall girl.

Within the traditional system of phrase structure, this example has the following structure:

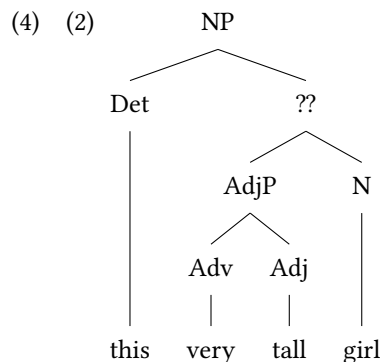


According to this structure, the string [very tall girl] does **not** form a constituent. But this is **wrong**. The string can be replaced by [one].

I like this very tall girl more than that **one**.

One can stand for the word [girl]. I like this very tall girl more than that girl.

or **one** can either stand for the string [very tall girl]. I like this very tall girl more than I like that very tall girl. Therefore, the string [very tall girl] must be a **constituent**. So the structure must be like this:



What could be the category ?? which dominates the AP – N sequence? A reasonable guess might be that ?? is actually NP. But this **cannot** be right since phrases like [very tall girl] do not have the same distribution as a typical NP like [this very tall girl], as we see from:

- a. This very tall girl is my friend.
John can't stand *very tall girl.
- b. John can't stand this very tall girl.
John can't stand *very tall girl.
- c. I spoke to this very little girl.
I spoke to *very tall girl.

Equally, it seems implausible to treat a phrase like [very tall girl] as representing an N. It seems that we reach the conclusion that a phrase like very tall girl represents some kind of **intermediate** category, larger than N, but smaller than NP. But within the system of phrase structure, there are no intermediate categories between lexical and phrasal categories.

It is precisely this type of deficiency that X-bar theory is designed to remedy. Within the X-bar framework, there may be more

than one phrasal expansion of any given lexical category X: i.e. in an X-bar framework we find the following range of categories –types:

a- X (or X^0 , X with no bars = the lexical category X)

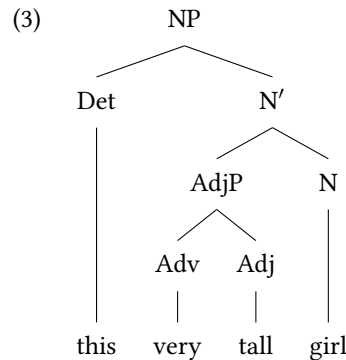
b- X' (or X^1 , X-bar or X-single-bar)

c- X'' (or X^2 , X-double-bar)

Etc.

One way of looking at the difference between phrase structure syntax and X-bar is that phrase structure is a **restricted** version of X-bar which imposes the condition that the maximum number of bar projections of any category is **I** (because in phrase structure there is one and one phrasal projection of any given category).

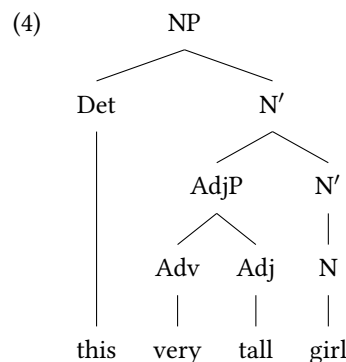
So the structure (2) can be represented as follows:



Recall that we observed that one could stand for either the phrase very tall girl, or the world girl on its own.

Under the structure (3), the phrase very tall girl would be an N' , whereas girl would be simply an N. This means that **one** can function either as a **pro- N'** , or as a **pro-N**. This in turn would imply that **one** has **two** distinct roles to play. To avoid such undesirable conclusion, let us say that one functions uniquely as a **pro- N'** , so that whatever sequence serves as the antecedent of **one** must likewise be an N' . This would mean that the interpretation where one stands for girl, then girl too must be **an N'** .

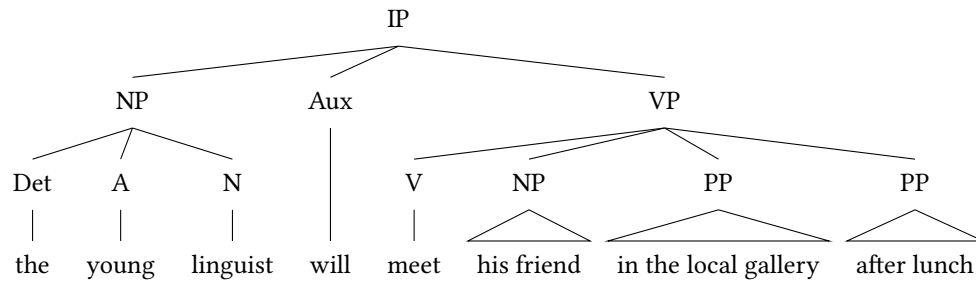
The structure (3) must be corrected like this:



Layering

VP Layers

So far, we have arrived at the following structure for the sentence: the young linguist will meet his friend in the local gallery after lunch.



In this representation, the VP consists of a V (meet), an NP (his friend), and the analysis above is not adequate and that we need a **more articulated structure** for VP.

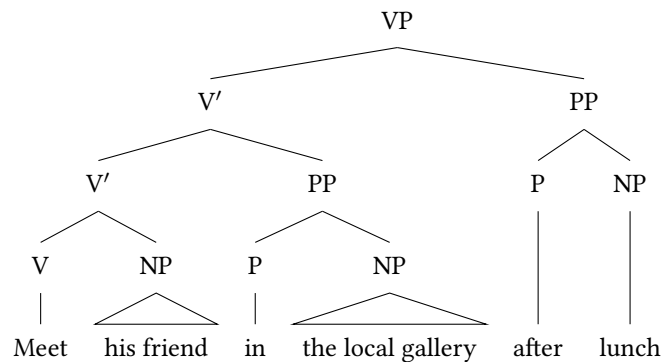
The young linguist will meet his friend in the local gallery after lunch.

- a- He will **do so** indeed.
- b- He will **do so** after lunch.
- c- He will **do so** at the university before class.

We use substitution by **do so** to replace the following strings:

- a- meet his friend in the local gallery after lunch.
- b- meet his friend in the local gallery.
- c- meet his friend.

This means that each of the strings must be a constituent. But this conclusion is incompatible with the representation above since it only represents (a) (meet his friend in the local gallery after lunch). We conclude that the VP structure represented above must be decomposed into separate constituents:



The VP is decomposed into distinct **layers**. This structure represents a hierarchical organization in which the V and the NP form a constituent labeled V'. This constituent combines in turn with the PP to form another V', which finally combines after lunch.

VP is called the **maximal** projection of **V**; **V** is the **head** of the projection. The **V'** constituents are also called projections of **V** since their head is **V**, but they are not maximal projections; they are **intermediate** projections.

The intermediate projections display a semantic hierarchy; the lowest V' is composed of V and one of its arguments; a higher V' is composed of V' and an optional element.

Draw a tree for the following sentences:

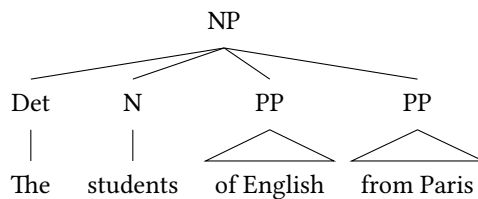
- a- abandon her husband.
- b- dance after lunch.
- c- dance.

NP-layers

Consider the following example:

The students of English from Paris

Adopting the first analysis of the NP, we might propose the following structure:



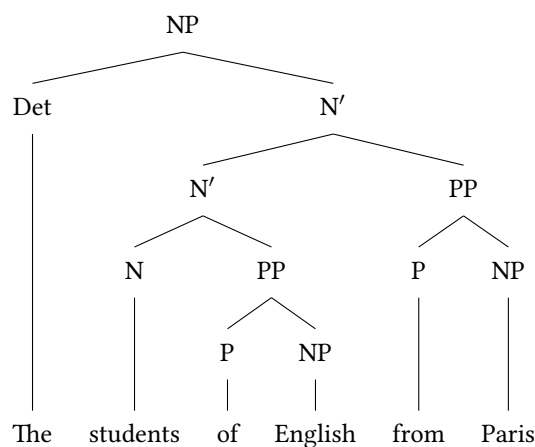
But the following substitutions suggest that this structure is inadequate:

a- I had met [_{NP} the ones from Paris] before.

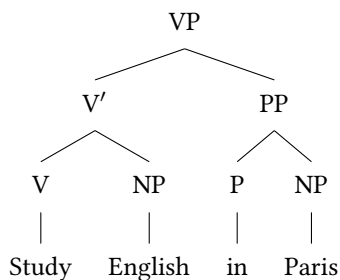
b- I had met [_{NP} the new ones] at a party.

In (a) **ones** replaces **students of English**, and in (b) **ones** substitutes for **students of English from Paris**.

This means that the string **students of English** is a constituent. So, the structure above is not adequate. The NP must be decomposed into a more articulate structure:



This structure shows that the N **students** has a closer relation with the PP **of English** than with the PP **from Paris**. The relation between **students** and **of English** resembles that between the V **study** and the direct object **English** in: **study English in Paris**.



The same type of layering can be imposed on the structure of AP, AdvP and PP.

Draw a tree for the following:

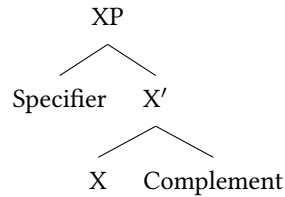
Quite independent of any other considerations

Quite independently of any other considerations

Right on the spot.

The X-bar format of phrase structure

The result of adopting such layered structure is that we obtain a more elegant and economic way of dealing with phrasal projections. All projections can be represented in terms of a single binary branching system. The following structure summarizes the format for **lexical projection**.



The letter **X** is used to signify an arbitrary **lexical** category. Thus, the X may become an N for noun, a V for Verb, an A for adjective, or a P for preposition.

The term X-bar is derived from the notation representing this structure. Certain structures are represented by \bar{X} (an X with a bar over it = \bar{X}). Because this is difficult to typeset, this is often written as X' , using the prime symbol. In English, however, this is still read as “X bar”. The notation XP stands for X Phrase, and is equivalent to X-bar-bar (X with a double overbar = $\bar{\bar{X}}$), written X'' , usually read aloud as X double bar.

X is the **head** of the projection. **XP** is the **maximal** projection of X. X' is an intermediate projection. X' dominates the head X and the complement; the maximal projection XP dominates an intermediate projection X' and the specifier. The **sister(s) of X** is/are called the **complements** of the head, and the **sister(s) of X'** is/are the **specifier(s)** (of the phrase).

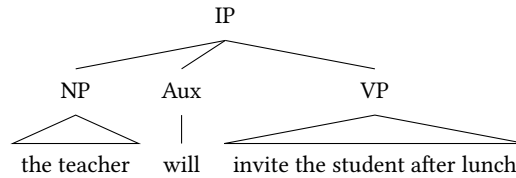
Functional projections

Consider the following examples:

a- The teacher **will** invite the student after lunch.

b- The student **invited** the student after lunch.

The structure of (a) is:



But, this structure cannot apply to sentence (b), which doesn't contain any auxiliaries. However, there are arguments for isolating an AUX node in this example too.

1- What the teacher will do is **invite the student after lunch**.

2- **Invite the student after lunch** is what he will do.

3- Invite the student after lunch, he **will**.

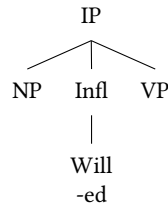
4- What the teacher did was **invite the student after lunch**.

5- **Invite the student after lunch** is what he did.

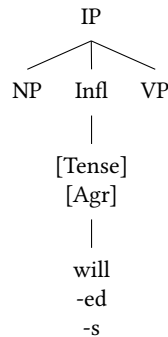
6- Invite the student after lunch, he **did**.

The VP **invite the student after lunch** is separated from the auxiliary will (1-3). Similarly, the VP in (b) is isolated and the past tense inflection associated with the verb is now associated with the auxiliary do (4-6).

These sentences provide a first motivation assuming that the tense inflection of the verb has an auxiliary -like status. Recall that **will** itself is also inflected for tense: it is the present tense form, would being the past tense form. From this point of view, what is common to will and the -ed past tense morphology is that both realize tense inflection.



Infl not only encodes tense properties of the verb, it also dominates person morphology.



Infl dominates the tense and agreement inflection of the verb.

The **Infl** node **dominates** either **free** morphemes such as will or **bound** morphemes such as -ed. Bound morphemes cannot remain independent in the structure. They must be associated with another morpheme.

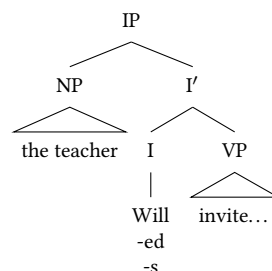
*The teacher -ed invite the student after lunch

*The teacher -s invite the student after lunch.

The ban on unattached affixes is not just confined to English, as shown by the following examples:

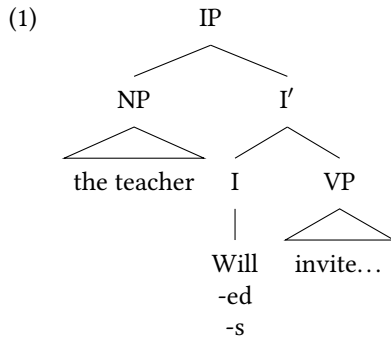
French: (5) *Jean **-ait** rencontre l'étudiant à Paris.
Jean PST meet the student in Paris.

Dutch: (6) *Jan **-te** ontmoet de student in Paris.
Jean PST meet the student in Paris.



Lexical verbs and auxiliaries

1- Sentence medial adverbs and verb positions



*The teacher -ed invite the student after lunch.

*The teacher -s invite the student after lunch.

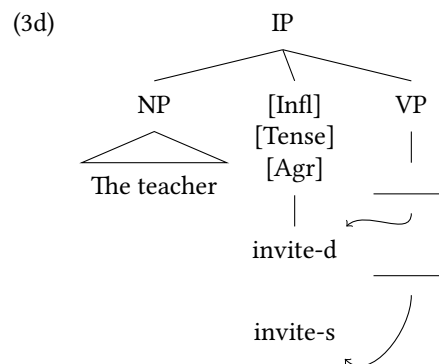
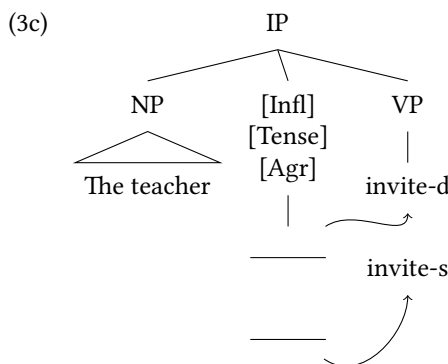
We have already pointed out that the above representation **cannot** correspond to the **surface** string of the sentence: the stray **affixes** in the above examples lead to **ungrammaticality**. (1) is an **abstract** representation which gives us the **underlying** or the **base** structure of the sentence. The **original** position which an element occupies in the structure will be its **underlying** position or its **base** - position. **The set of all the base- positions of the elements in the sentence is the underlying structure of the sentence, the deep or the D-structure.**

The structure obtained after **various movements** have rearranged is the **derived** or **surface** structure, S-structure.

3a- The teacher **invited** the student after lunch.

3b- The teacher **invites** the student after lunch.

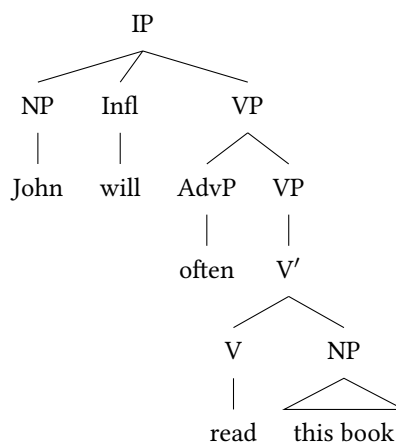
In order to **derive** the surface string for (3), we have to **unite** V with its tense and agreement morpheme. This could be achieved either by **lowering the affix** onto the V as in 3c, or by **raising the V** towards the affix as in 3d.



One **type** of elements that intervenes between I and V are sentence-medial **adverbs** such as often, always, already. These adverbs are **VP-adjoined**, or they are **adjoined to the VP**.

Consider (4):

4a- John will often read this book.



Modal auxiliaries always precede sentence –media adverbs. Such auxiliaries are always **tensed**: for example, **can** is **present** tense, **could** is **past** tense. So, they must be inserted under Infl.

In what follows, we will use the **position** of sentence- medial adverbs such as often as **signpost** to **determine the position of the verb with respect to Infl**.

Consider the sentence in (4b):

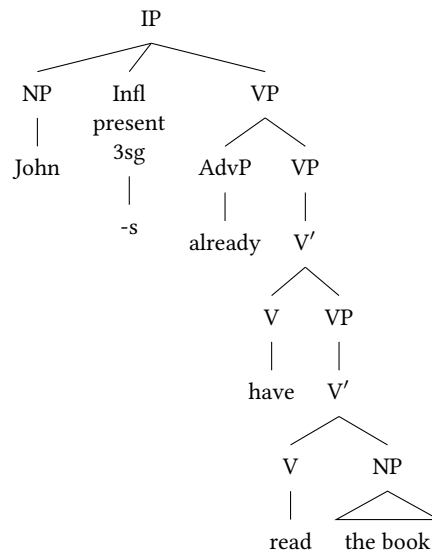
4b- John will already have read the book.

We assume, as before, that **will** is located **under Infl**. The VP contains two verbs, have and read. The sentence medial- **adverb precedes** have. In (4b) have is **not a finite verb**, it doesn't carry agreement or tense inflection. It is a verbal root. Given X'-theory, the presence of the two verbs heads leads to the creation of two VPs, one headed by the auxiliary have, the second one headed by the participle of the lexical verb read.

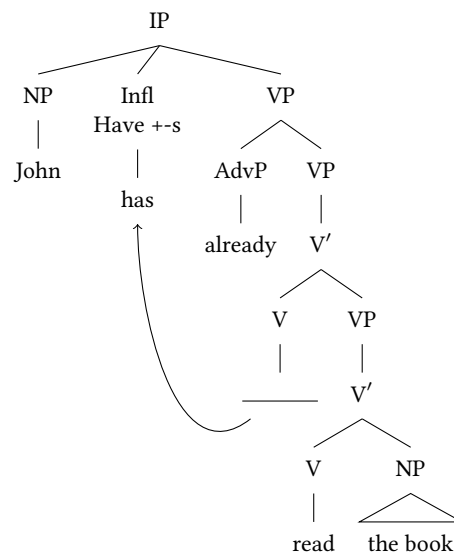
Consider the following example:

5- John has already read the book.

There are two verbs, has and read. So there are two VPs in the structure: that headed by **have** and that headed by **read**. The **underlying structure** of 5 is the following:



But we know that the bound morpheme –s cannot remain under Infl: it **must associate** with the verb have. In (1), **has** precedes **already**. This means that in this example **have** has united with Infl by **moving up** and **incorporating** into Infl. The affix and the verb thus form one word:



With respect to the adverb already, we conclude that the auxiliary “**have**” **moves up into Infl** to **unite** with the inflection. The same reasoning applies to the auxiliary **be** in the following examples:

6a- John is already reading the novel.

6b- John is often invited to parties.

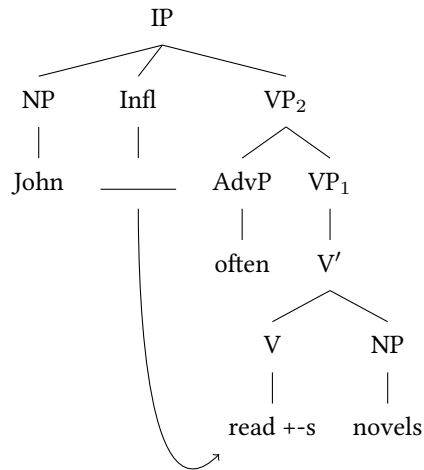
Now consider the following example:

7- John often **reads** novels.

How does the verb read unite with the inflectional affix -s? If the verb were to move to Infl, we predict that we would end up with a sentence in which the verb precedes the adverb:

*John **reads often** novels.

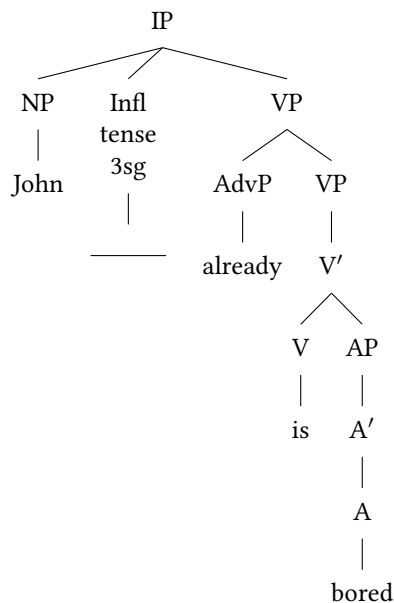
The resulting string is ungrammatical. Apparently, a **lexical** verb like read **cannot escape from the VP** to move to its inflection. Rather, the **verb remains inside VP-internal**, i.e. to the right of the adverb. In order to avoid being unattached, **Infl lowers onto the lexical verb**.



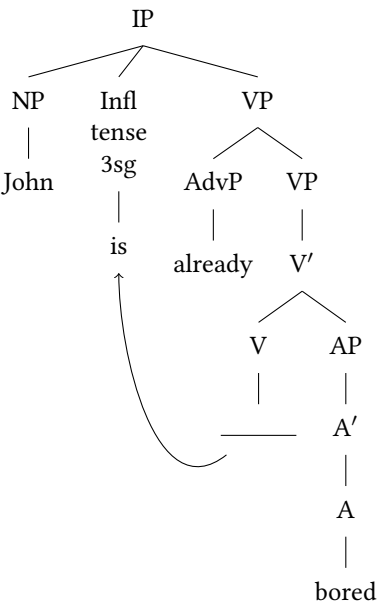
Consider another example:

John is already bored.

The verb in this sentence is not followed by another verb. It is the only verb of the sentence. Nevertheless, since it precedes the sentence medial adverb, we conclude that, like auxiliaries, it must be able to leave the VP. Be functions as a copula: it relates a predicate, an AP, to the subject NP. The following structure shows **the base- position** of be.



Be moves out of its base position and raises to Infl producing the following:



Let us summarize our findings:

- 1- Modal auxiliaries such as will, may, can **precede** VP adjoined sentence medial adverbs. They are dominated by Infl. (4a)
- 2- Auxiliaries such **have** and **be** follow VP-adjoined sentence medial verbs when they are **non finite (4b)**, but they **precede** them when **finite**. (5&6)
- 3- **Lexical** verbs such as read **always follow VP-adjoined** sentence-medial adverbs. They are not able to move out of the VP; Infl lowers onto them. (7)
- 4- Copular be behaves like an auxiliary.

2-Negation

The **difference** between **auxiliaries** and **lexical** verbs is also clear when we consider their **distribution** with respect to the **negative** marker **not**:

- (8) a- John **will** not write any books.
b- John **may** not write any books.
c- John **could** not write any books.
d- John **has** not written any books.
e- John **is** not writing any books.
f- John **is** not bored.

In these examples, the boldfaced verbs are classified as auxiliaries on the basis of the fact that they precede a VP-joined sentence –medial adverb, also precede the marker of negation not. In contrast lexical verbs cannot precede negation.

- g- *John **writes** not any books.

In order for the bound morpheme of the inflection to survive, the verb do is inserted:

- i- John **does not** write any books.

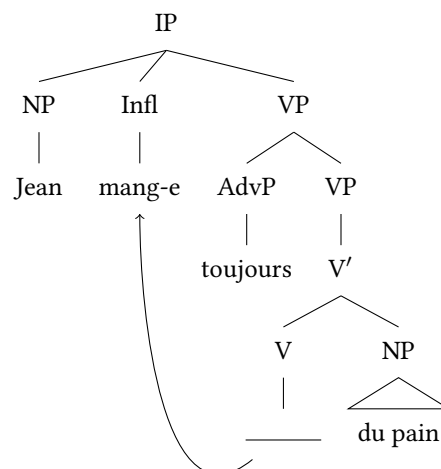
Do is inserted as a **last resort** operation to enable the sentence to survive. The inflectional morpheme must not remain isolated; the lexical verb **cannot** move **up** to it, **nor** can the **inflection** lower onto the verb. So, **do**, which functions as an auxiliary here, is inserted to **support** the **bound** morpheme.

The question arises why is it that the **finite** forms of have and be **move** to **Infl** to pick up the finite inflection, while **lexical** verbs must remain **VP-internal**.

To answer this question, let's consider the distribution of the verb in French.

In French, lexical verbs systemically **leave** the **VP** and **unite** with the **inflection** in Infl since they **precede** sentence medial – **adverbs** such as toujours (always) and the **negation** marker pas.

(9a) has the following structure



What **property** distinguishes the grammar of **French** from that of **English**? The answer to this question might be related to **the nature of the verb** or else to that of the **inflectional morpheme**. One important contrast between English and French is that **English verb** morphology is relatively **impoverished** compared to its French counterpart.

Take the example of the verb finish in English and finir (finish) in French:

	English	French
1sg	I finish	je finis
2sg	you finish	tu finis
3sg	he/she finishes	il/elle finit
1pl	we finish	nous finissons
2pl	you finish	vous finissez
3pl	they finish	ils/elles finissent

The present tense paradigm for French finir has **four** different forms (the forms finis and finit are not distinct phonetically), while that for English finish has **two forms**. These distinct forms reflect agreement (Agr) properties of the verb. An inflectional paradigm with a **substantive number of distinct** forms of **agreement** is characterized as **'strong'** and that **strong** inflection can **attract the verb**. A paradigm with **few** distinct **forms** to mark **agreement** is **'weak'** and weak inflection **cannot attract** the **lexical verb**.

Transformations

We have assumed that there is only **one** level of structure in syntax; that is the level of **Surface Structure** which represents the **superficial syntactic** structure of sentences. And we have assumed that the task of any adequate syntax of a language is to **generate** all the **well-formed** surface structures of the language which can be done by a set of categorical rules (i.e. phrase structure, or constituent structure).

In this section, we are going to argue that our existing types of rules are **not** adequate to hand **certain characteristic** constructions in natural languages, and that to handle them we need to **posit both** a **new** level of structure (variously known as Deep structure, D-structure, underlying structure, base structure... and a new type called **Transformations** (=movement rule). We shall consider the syntax of **WH-questions** in English, and argue to handle this we need to posit a transformation rule generally known as **wh-movement**.

Consider this example:

10- Which car will your father put in the garage?

We might propose a set of phrase structure rules:

IP → NP AUX NP VP

VP → V PP

PP → P PP

NP → Det N

So under VP, we have [put in the garage]. But surprisingly, this is not the case at all. Recall that put is a verb which is subcategorized as requiring both a following NP complement and a following PP complement, as we see from:

John put the car in the garage.

*John put the car.

*John put in the garage.

In the above PS rules, [put] is followed by a PP, not by an NP. What does this mean? It means the way our grammar is presently constituted, it wrongly predicts that we **cannot** insert [put] under the V-node. Or, it **wrongly** predicts that sentences like (10) are **ungrammatical**.

So, what is exactly the problem posed by wh-questions? And how can we modify grammar to handle them?

Although the wh-phrase [which car] occurs at the beginning of the sentence, for subcategorization purposes it behaves as if it were actually positioned after the verb. Now if instead of looking at **non-echo questions** we had been looking at **echo questions**, it would indeed have been the case that an object phrase like which car would have occurred in typical object position after its verb, as we see from Speaker B's echo questions:

A: my father will put the Mercedes in the garage.

B: your father will put which car in the garage?

A: will my father put the Mercedes in the garage.

B: will your father put which car in the garage?

And, interestingly, echo questions like those asked by B would not have posed any problems for our existing grammar.

Suppose that we postulate that the wh-phrase does actually originate after the verb, and only subsequently gets moved into initial position by a rule which is called wh-movement.

(11) a. Your father will put which car in the garage?

|
WH-movement
|

b. Which car will your father put _____ in the garage?

(_____ serves to indicate that which car occupied before it was moved).

An analysis like this presupposes that we recognize **two** levels of structure in syntax; firstly, the familiar Surface Structure (11b), but secondly an additional level of **abstract** structure (11a) which underlies it, and which Chomsky and other variously refer to as a Deep Structure, D-structure, Base structure, or Underlying Structure.

The underlying structure in this case is related to the surface by a transformation (i.e. movement rule) called wh-movement.

So it seems that a grammar containing movement rules like wh-movement can cope with wh-questions, whereas our earlier grammar lacking movement rule could not.

To derive (11a) from (11b), we need two movement operations, **one** involving the **preposing** of the wh-phrase, and **another** inverting the subject NP your father and AUX will.

So, two distinct movement rules are involved for the following reasons. Firstly, inversion may take place in sentences not containing a wh-phrase.

Will your father put the car in the garage?

Secondly, **embedded wh-questions** show **preposed** wh-phrase without inversion:

I don't know which car your father will put _____ in the garage.

For these reasons, it seems clear that there are two distinct rules:

1- a rule of wh-movement which moves wh-phrases into clause initial position in certain clauses.

2- a rule of NP-Aux inversion which interchanges an NP and an immediately following Aux in particular type of clauses.

One question we can ask about wh-movement is: what exactly is a wh-phrase, and what kind of wh-phrases can be moved to the front of a clause by wh-movement?

By wh-phrase, we mean a phrase which contains a wh-word like who, what, when, where, etc.

a- A noun phrase containing a wh-word can be moved:

What has he given _____ to Mary?

b- A prepositional phrase has undergone wh-movement:

About what are they quarreling _____?

c- An adjectival phrase has undergone wh-movement:

How anxious will Mary be _____ about her exam results?

d- An adverbial phrase has undergone wh-movement:

How carefully did he plan his campaign _____?

e- A VP can undergo a wh-movement:

*Read which book upside down cannot he _____?

So it seems that only non verbal phrasal categories can undergo wh-movement in English.

S as a projection of I

After having established more clearly the relation between the node **Infl** and the **verb**, let us ask a question: can the structure of clauses be integrated into the X-bar format? We outlined an analysis of sentences in which every S **has** an **Infl** dominating tense and agreement inflection. We discussed the difference in the distribution of lexical verbs and auxiliaries. The main point of the latter discussion was that lexical **verbs cannot leave the VP**; hence they cannot precede adverbs such as often (1a) or the negative marker **not** (1b), and they cannot precede the subjects in questions (1c).

1a- *John reads often novels.

John often reads novels.

1b- *John writes not any books.

John doesn't write any books.

1c- *Writes John anything?

Does he write anything?

Lexical projections such as NP and VP are **endocentric**: they are projections of the head. It is the head which determines the properties of the projection. NPs are headed by N: the category of the head determines the category of the phrase. The same observation applies to VP, AP, PP. In this section, we are going to show that S is also endocentric. Consider the following examples:

2a- I hope that [Jane **will** dance after lunch].

b I hope for [Jane **to** dance after lunch].

In (2a), the bracketed string is a sentence. It consists of a sequence NP (Jane), Infl (will), VP (dance after lunch).

The bracketed string in (2b) is quite similar to that in (2a). We have already seen that will is inflected for tense; we say that will is **finite**. **To** has the same distribution as the auxiliaries but it is invariant for tense: **to is non-finite inflection** which is associated with the infinitival form of the verb. The difference between the finite sentences and the non-finite sentence is determined by the Infl node: **will** is finite, while **to** is **non-finite**. The finite / non-finite contrast had an impact on the realization of the subject. First, when we replace Jane by a pronoun we see that the choice of finite versus non finite inflection determines the form of the subject pronoun: **she** as the **nominative** case and **her** is the **accusative** case of the third person singular feminine pronoun. Regardless of their **difference** morphology **both** pronouns, she and her, function as **subjects** of the bracketed clauses:

3a- I hope that [**she** will dance after lunch].

b- I hope for [**her** to dance after lunch].

Second, recall that **external arguments** (i.e. the arguments realized as subjects) may sometimes be **non-overt** (represented by ec for **empty category**).

4a- *I hope that **ec** will dance after lunch.

b- I hope **ec** to dance after lunch.

c- I told him that he should dance.

d- I told him **ec** to dance.

In (4a), hope takes a **finite** clausal complement and the **subject** of the complement clause must be **expressed overtly**.

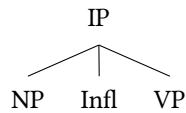
In (4b), hope takes a **non-finite** clausal complement whose subject is non-overt (ec); the non-overt external argument of dance is controlled by I, the subject of hope.

In (4c), tell takes **three** arguments realized by the **subject** (I), the indirect object **NP** (him), and the **clausal** complement (that he should dance).

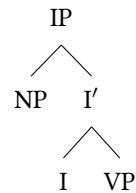
In (4d), the clausal complement is **non** finite and its non-overt subject is controlled by him, the indirect object.

Because the properties of a sentence (finite/non-finite) are a function of the features of its Infl, we propose that Infl **heads** the sentence. **The sentence is a projection of I[nfl], IP.** So, the structure of a sentence can be **represented** in terms of (binary branching) **X-bar** format developed for lexical projections. The structure with **ternary** branching in (5a) is replaced by the structure with **binary** branching in (5b).

(5) a- Ternary branching



(5) b- Binary branching



We will say that I selects VP with which it forms an intermediate projection, I'. I' combines with the subject NP to form IP, the sentence.

IP and CP

Consider the following examples:

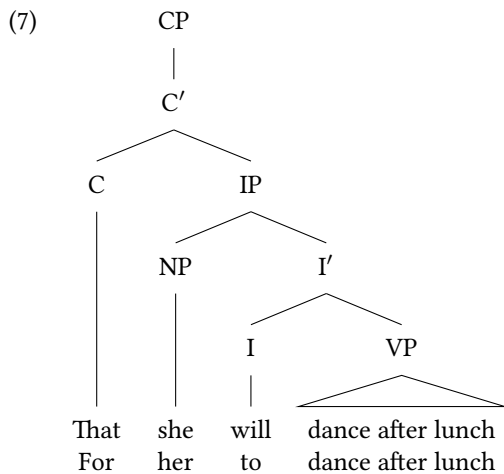
6a- I expect [**that**] [she will dance after lunch].

b- [For [her to dance after lunch]] would be surprising.

The bracketed sentences in (6) are constituents of a larger clause: they are **subordinate** clauses or **embedded** clauses.

In (6a), the finite subordinate clause [she will dance after lunch] is introduced by **that**, a word of the category **complementizer**.

In (6b), the infinitival subordinate clause [her to dance after launch] is introduced by **for**, a preposition which here functions as the complementizer associated with the non-finite clauses. In order to represent the structure of the sentence we must include the complementizer, which we abbreviate as C. A complementizer selects a clause, an IP, as its complement. The structure of (6) is the following:



(8) a. I hope [_{CP} **that** [Jane will dance after launch]]

b. I hope [_{CP} **for** [Jane to dance after launch]]

c. I wonder [_{CP} **whether** [Jane will dance after launch]]

d. I wonder [_{CP} **whether** [ec to dance after launch]]

e. I wonder [_{CP} **if** [Jane will dance after launch]]

The bracketed CP is an embedded clause. That means that it is a clause which is a constituent of another sentence. The embedded clauses in (8) are complements of the verbs of the higher clauses. The **choice** of **complementizer** is related to the **type** of embedded clause. There are **two dimensions**

along which complementizers vary: 1- **finiteness** and 2- **illocutionary force** or **mood**. With respect to the **first** dimension, the complementizer **that** and **if** introduce **finite clauses**, while **for** introduces **non-finite** (infinitival) clauses. **Whether** introduces **both finite** and **non-finite** (infinitival) clauses. With respect to **illocutionary force**, **that** and **for** introduce **declarative** clauses, while **whether** and **if** introduce **interrogative** clauses.

Consider (9):

- (9) a- I believe [_{CP} **that** [_{IP} Jane is honest]].
 b- *I believe [_{CP} **for** [_{IP} Jane to be honest]].
 c- I believe [_{IP} Mary to be honest].

The verb believe selects a **finite** declarative clause (9a). When believes selects a non finite clause, then this clause lacks the cP level: (9b), in which the CP is projected, is ungrammatical. So, believe **selects** either a **finite CP** or a **non-finite IP** complement.

Small clauses

Consider the following examples:

- (10) a- [_{IP1} I consider [_{CP} **that** [_{IP2} Jane is very smart]]].
 b- [_{IP1} I consider [_{IP2} Jane to be very smart]].

In (10a), the verb consider takes as its complement a finite CP, introduced by **that**. In (10b), consider is followed by the string [Jane to be very smart]. This string is a non-finite clause: **Jane** is the **subject**, **to** realizes as **Infl** and **be very smart** is the **VP**. The insertion of the complementizer **for** leads to ungrammaticality.

- (10) c- * [_{IP1} I consider [_{CP} **for** [_{IP2} Jane to be very smart]]].

Now consider (10d):

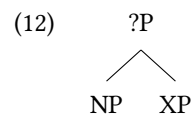
- (10) -d I consider [Jane very smart].

The clause seems to contain only the NP Jane and the predicate AP very smart. Constituents such as Jane very smart are called small clauses.

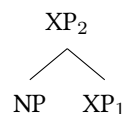
- (11) a- I consider [Jane [_{NP} the best candidate]].
 b- I consider [this proposal [_{PP} out of the question]].

In (11a), the NP Jane combines with NP the best candidate to form a small clause; in (11b), the NP this proposal combines with the PP out of the question. In all three examples, the small clause contains a subject, an NP, and a predicate.

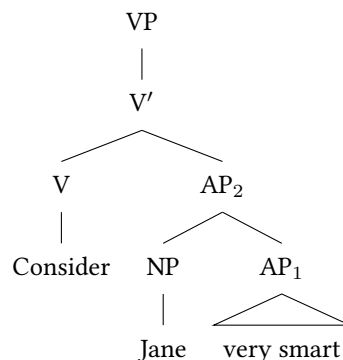
As a first approximation, a small clause can be represented as follows:



In a small clause, there is a subject-predicate relation between the NP and a phrasal projection. What distinguishes the small clause from the clauses in (10) is the absence of the verb, i.e. the copula **be**. The question arises what syntactic label to assign small clauses? What is ?P in (12)? The answer is:



Then, (10d) would have the partial structure:

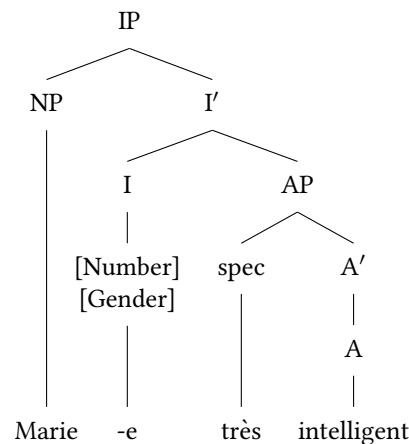


There are some indications that **small clauses do contain functional** projections and that they are **headed** by a functional element. The first evidence comes from French:

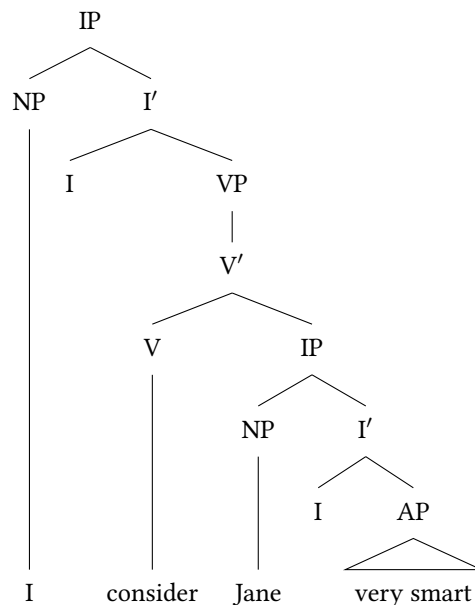
- (1) Je considère [Jean [_{AP} très intelligent]].
I consider Jean very intelligent.
- (2) Je considère [Marie [_{AP} très intelligente]].
I consider Marie very intelligent.
- (3) Je considère [les enfants [_{AP} très intelligents]].
I consider the children very intelligent.

In the above examples, *considère* 'consider' selects a small clause complement whose predicate is an adjective phrase (AP) headed by the adjective *intelligent* (intelligent). The form of the adjective **varies** depending on the choice of subject: with a masculine singular subject, *Jean*, the adjective is realized as *intelligent*; with a feminine singular subject, *Marie*, the adjective is realized as *intelligente*. The adjective agrees with the subject in terms of the features number and gender.

If we assume that the agreement morphemes (-e, -s, -es) are bound morphemes, then, by analogy with our analysis of the bound morphemes which encode verb inflection (tense and agreement), we may wish to propose that adjectival agreement morphemes also head inflectional properties. This would mean that small clauses contain a category **INFL**, which dominates number and gender features. The subject of the small clause is the specifier of IP and enters into an agreement relation with the head of IP.



(10d) has the following structure:



Binding

It is useful -following Chomsky- to distinguish between three distinct types of NPs: anaphors, pronominals and lexical NPs.

An anaphor is an NP which can have no independent reference, but rather which takes its reference from some other expression in the sentence, its antecedent. For example, each other is a **reciprocal** anaphor in English sentences like:

1- John and Mary like **each other**.

Since it takes its reference from its antecedent John and Mary. Since anaphors cannot have independent reference, but must take their reference from some antecedent, If an anaphor is used in a sentence where it has no antecedent, the sentence is ungrammatical.

2- *Each other have left.

A second class of anaphors in English are **reflexives** anaphors: these are self-forms (myself...). They must take their reference from some antecedent, hence the contrast between:

3-a. John cut himself.

b. *Himself resigned.

In (3a) himself can be interpreted as having John as its antecedent and hence takes the reference of John; whereas in (3b), himself cannot be assigned any antecedent, and hence has no reference, and thus is ungrammatical.

A second of NPs are **pronominals**. This class comprises simply what are traditionally called **personal pronouns** (I, me; you; he, him; she, her; it; we, us; they, them).

Semantically, pronominals can fulfill either of two functions in English; they can either take their reference from some other NP or they can refer independently. For example:

4- John thinks he is clever.

The pronominal **he** could either refer back to **John** (4a) or **someone other** than John (4b).

4a- John₁ thinks he₁ is clever.

4b- John₁ thinks he₂ is clever.

A traditional way of representing this type of relation is by using what are called **referential indices**: there are (usually numerical) subscripts appended to nodes. NPs with the same subscript are interpreted as co-referential, whereas NPs with different subscripts are interpreted as non-co-referential.

The third class of NPs distinguished by Chomsky are **lexical NPs**.

Consider the examples in (5):

5a John hurt himself.

b- *Himself arrived on time.

c- *Mary hurt himself.

Each of the sentences above contains the reflexive, himself. A reflexive element is referentially **dependent on another NP**, which is referred to as the **antecedent**. In (5a), the NP John is the antecedent of himself. The antecedent matches the reflexive in terms of its grammatical features person, number and gender. From the data (5b and c), we infer that the distribution of reflexives is **not** completely **free**, it is subject to constraints. (5b) is ungrammatical because the reflexive lacks an antecedent. (5c) is also ungrammatical; the feminine singular NP Mary cannot serve as the antecedent for himself since himself is masculine.

We will say that the antecedent **binds** the reflexive. By their nature, reflexives have to be **bound**. The antecedent of the reflexive is the **binder** of the reflexive. We encode the binding relation by means of co-indexation as in (4a and 4b).

6a John_i hurt himself_i.

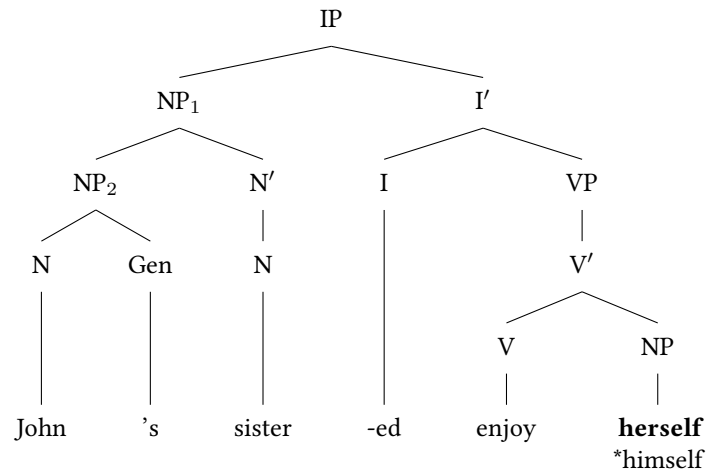
b- *John hurt himself.

The data in (6) suggest that the **antecedent** has to **precede** the **reflexive** it binds. But **precedence** is not sufficient to establish a binding relationship.

7a **John's** sister enjoyed herself at the party.

b- **John's** sister enjoyed himself at the party.

In (7a), the reflexive **herself** is bound by the subject NP₁ John's sister, which precedes it. In (7), the reflexive cannot be bound by NP₂ John, although NP₂ also precedes the reflexive. The structure of (7) is the following:



Why is it that NP₁ **John's sister** can function as the **antecedent** for the **reflexive** himself?

In the tree diagram, NP₁ John's sister **c-commands** the reflexive: the first branching node dominating John's sister is IP and IP also dominates herself. NP₂ John doesn't c-command himself: the first branching node dominating NP₂ John is NP₁, which doesn't dominate himself. We conclude that in order to function as an antecedent, an NP must c-command the reflexive.

A c-command relation (an abbreviation of constituent-command) can be defined as follows:

C-Command

Node X c-commands node Y if the first branching node dominating X also dominates Y.

Illustration:



B c-commands C, E and F.

C c-commands B and D.

D c-commands C, E and F.

E c-commands F only.

F c-commands E only.

Consider the following examples:

8a- *John considers [_{CP} that [_{IP} Mary should not contradict **himself**]].

b- *John considers [_{CP} that [_{IP} Mary should not contradict **herself**]].

As a first **hypothesis**, a reflexive must be bound within **the first clause that dominates it**. In (8a) himself cannot be bound by John because the NP is outside the dominating clause, while in (8b) herself can successfully be bound by Mary because Mary is the subject of the first clause dominating the reflexive. **The antecedent of the reflexive must be contained in the first clause dominating the reflexive; the antecedent and the reflexive must be clause-mates.** The binding relation between a reflexive and its antecedent is thus subject to **locality condition**.

9a- *John asked **Mary** [_{CP} whether [_{IP} Bill could give some information about **herself**]].

b- *John wondered [_{CP} whether [_{IP} Bill had asked **Mary** for some information about herself]].

10a- John considers [**Mary**_i to be proud of **herself**_i].

c- ***John**_i considers [Mary to be proud of **himself**_i].

The domain in which the reflexive has to be bound is **more restricted** than the first finite clause containing the reflexive; the binding domain is restricted to the non-finite clause.

Consider the case of small clauses:

11a- John considers [**Mary** too proud of **herself**].

b- *John considers [Mary too proud of **himself**].

In (11b) the reflexive himself, which is contained in the small clause cannot be bound by an antecedent outside it: John cannot serve as an antecedent because it is not contained in the small clause. From these examples, the clause-mate condition on binding is redefined as follows: **the binding domain of a reflexive is delimited by the first c-commanding subject.**