

Lecture 5

X-bar Theory and the Structure of the Sentence

Organization of the Grammar

Grammar interprets sound and meaning and mediates between them. This mediation is translated in "Aspects of the Theory of Syntax", Chomsky (1965) in the following way:

Syntactic Component: *Deep Structure* which is the input to the Semantic Component (i.e. it is closer to the semantic information).

Transformations: relates D-str to S-str.

Surface Structure which is the input to Phonological Component (i.e. it assigns reading to a sentence in terms of how we pronounce a sentence).

- (1) S-str: I rely on him and he on me (ellipsis) \Rightarrow transformation
D-str: I rely on him and he relies on me.
- (2) S-str: What did he say he bought? (wh-movement) \Rightarrow transformation
D-str: Did he say he bought what?

It follows we need D-str. The major constraint on transformations is that they should not change the meaning of the sentence since S-str. is not visible to the Semantic Component; transformations should be *meaning preserving*

In "Aspects" D-str. contained a set of Phrase Structure Rules (PSRs) which showed the inner constituency of phrases. Constituents are any concatenation of two elements in a string. Moreover, constituents are strings which are coherent i.e. they share formal and semantic properties.

(3) Bill was slowly writing the letter. (*Bill* = constituent; *was writing a letter* = constituent)

*Bill was slowly (i.e. is only a string)

*Bill was slowly writing a... (i.e. is only a string)

It follows that "was writing a letter" is a constituent as it can be replaced by another constituent (e.g. *was building a house*); "Bill" is another constituent as it can be replaced by "he". We retain the important fact that transformations operate on constituents.

We saw above that PSRs give the structure of phrases. To make this thing more conspicuous consider the following examples:

(4) John hops

(5) John likes girls

(6) John puts the money in the bank

(7) John says he has never been happier

In the above examples, it is clear that we can not switch around the verbs: we can not use 'like' instead of 'hop' because 'like' is a transitive verb that requires a direct object while 'hop' is an intransitive verb. The same goes for 'put' which requires both a DO and a locative complement (in the form of a prepositional phrase) while 'say' is a verb that requires a sentential complement.

Consider another example:

(8) John is fond of girls

It is again clear that 'fond' requires the preposition 'of', otherwise a sentence like 'John is fond girls' is ill-formed. We see that the verbs and the adjective mentioned above specify the syntactic categories with which they co-occur.

Each lexical item is assigned to a lexical category (i.e. verb, adjective, noun, preposition) in a given language according to its general distribution and morphological properties. That is what we have called subcategorization frame of a lexical item:

- (9) fond: A, + [__PP]
 hop: V, + [__#]
 like: V, + [__NP]
 put: V, + [__NP PP]
 say: V, + [__S]

The subcategorization frame/features of lexical items is lexical knowledge, that is, we take this information about lexical items from our mental Lexicon. We do not know the meaning of a lexical item unless we know the structure of a minimal phrase containing that lexical item. Thus, each lexical item is associated with a feature that specifies the structure of a minimal phrase containing it. These features [__] are called *subcategorization features*. They provide categorial information about the minimal context of an item. We have all the information about these features from the Lexicon store.

In early 80's, Chomsky set up another model of grammar in order to make grammar more explanatory: "Government and Binding" (GB) (1981).

With GB, grammar has been lexicalized to a large extent; that is, phrases and sentences develop out of the lexical properties of words. Each word may project a phrase, i.e. may grow into a phrase.

PSRs are no longer necessary because they are predictable from the lexical properties of words and they only duplicate the information contained in the mental Lexicon.

Furthermore, Chomsky (1981) identified cross-categorial similarities in the structure of phrases. We shall illustrate some of these cross-categorial similarities.

Cross-categorial similarities: the case of prepositions and particles:

- (10) He walked in
(11) He walked into the room
(12) *He walked into

The sentence in (12) is ill formed because 'into' needs completion different from 'in' which needs no completion. So, in a way 'in' behaves like an intransitive verb (it may be followed by nothing) while 'into' behaves like a transitive verb (it must be followed by a NP).

X' Theory

The idea of cross-categorical similarities was developed in a theory that describes the generic form of any phrase: this theory is called *X' Theory* (read X bar Theory, so called because it implies a number of projections of a certain level/bar).

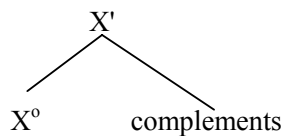
The X' Theory says that in a phrase of the form XP, where X is N, V, A, P, all Xs have the same properties. Any XP has a head. The head is the obligatory constituent of the phrase, the one whose properties determine the structure of the phrase. Each head projects a phrase.

(13) He is fond of Mary

*He is fond

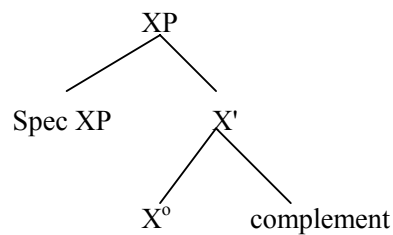
He is very fond of Mary (where *very* is not obligatory)

We see that we can distinguish between obligatory and optional elements in a sentence. To formalize this intuition we assume that there are *two levels of structure*: XP and X⁰. In between them there is an intermediate projection X'. The head and the subcategorized constituents make up the *first projection* of the head:



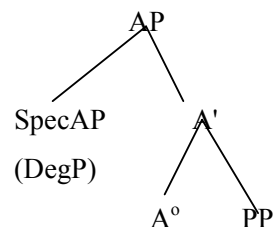
X⁰ projects at least one complement from the Lexicon. Information regarding complements is taken from the Lexicon where it is represented as the feature of subcategorization (of course, if the verb is intransitive it will not project a complement).

In the *second projection*, on the other hand, the second level of structure is represented by a Specifier (Spec) of the head:



Spec is an optional constituent and is normally involved in spelling out the reference of the head (i.e. in the sense that it makes it more explicit).

(14) very fond of Mary (where the head is 'fond'):



The reference of an Adjective is the class of objects that have the property expressed by the adjective: in our case, 'very' the optional Spec of A makes the reference of the head (i.e. *fond*) more precise.

To conclude, the trees above give us the Phrase Structure template of phrases as cognitive units.

Thus, a phrase in GB has the following structure:

$$XP \rightarrow (\text{SpecXP}) \cap X'$$

$$X' \rightarrow X^{\circ} \cap \text{Complement}$$

This structure of the phrase belongs to universal grammar. It specifies the general properties of the phrase of any human language. For each of the basic elements of the lexicon (Noun, Verb, Adjective, Preposition), universal grammar provides a *projection*. The elements of the lexicon will be the *head* of the projection, which is a maximal projection: NP, VP, AP, PP (as seen above). The head in each case is a lexical category

of the appropriate type and the complement in each case is a YP (NP, VP, AP, PP). In English and Romanian, the head precedes its complements. However, this is not always the case: in Japanese and Miskito the head follows the complement. Here, we have to do with the *head parameter*, variable in different languages (i.e. "head first" - each lexical head precedes its complement or "head final" - each lexical head follows its complement).

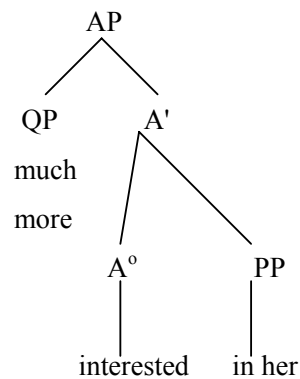
Let us show that Spec also evinces cross-categorical similarities.

$$XP \rightarrow QP \wedge X'$$

A QP is a quantifier phrase embodied by lexical quantifiers such as: *much, many, few, little, more* etc. The template of a phrase such as:

(15) (He is) much more interested in her

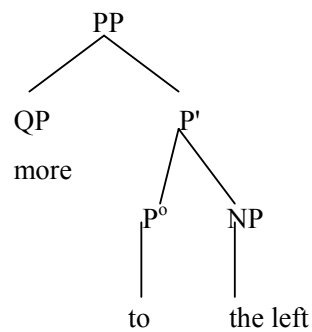
will be the following (where, naturally, the adjective 'interested' is the head):



Another example will be:

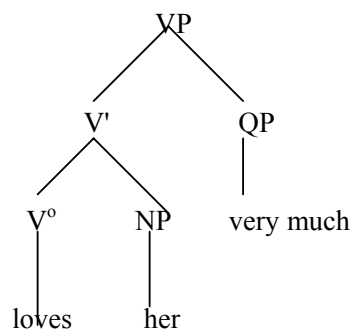
(16) (move) more to the left

where the head is 'to' as it is subcategorized by the verb 'move':



Let us now take a verb as a head and see what position Spec can occupy:

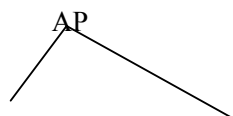
(17) (He) loves her very much

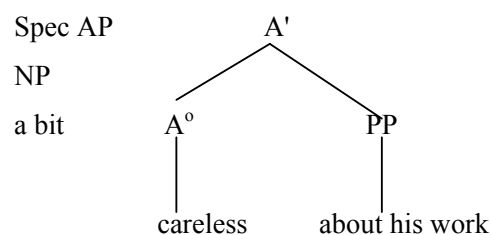


We see that Spec is placed to the right of the verb. Conventionally, if a Spec is to the right of the head it is called *Modifier*. Spec is a cover - term distinguishing anything which is not a complement, that is, it is not in the first projection of a head.

Let us see now an example where a NP can be the Spec of an AP where, obviously, the head of the phrase is an A:

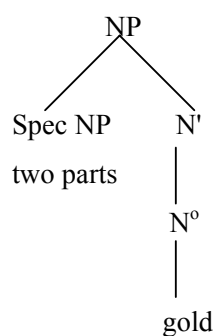
(18) a bit careless about his work





Let us take one more example in which a NP can function as Spec of a NP:

(19) (The alloy) is two parts gold



All in all, we see that heads (i.e. lexical constituents) do not appear as sentence constituents; only *phrases* are sentence constituents.

Syntactic Categories

In GB grammar we speak of *lexical categories* (i.e. parts of speech: noun, verb, adjective, preposition) and *syntactic categories* (i.e. NP, VP, etc.).

In 1951, Martin Joos conjectured that parts of speech vary without assignable limits. In fact, he studied Indian dialects in the USA, which were dying as languages and, indeed, this impression to a structuralist like Joos appears plausible.

In contrast, generative grammarians claimed that parts of speech systems of natural languages are partly similar because they express the same fundamental distinctions. They maintain the view that there is a core of features that generate parts of speech and whose nucleus is +/- N and +/- V.

Another idea put forth by generativists is that parts of speech are not unanalysable, atomic entities but they may be viewed as bundles of syntactic features (such as N, V). The advantage of this view is that parts of speech may share common features or properties such as +N, +V.

Grammar should not be based on meaning; justification in syntax is essentially formal, distributional. For example, in a sentence such as *It is raining*, although *it* is devoid of meaning it appears in the position of subject and it is analysed as subject. The fact that justification in syntax is formal does not mean that grammar is not interested in semantics; on the contrary, a good grammar is one that secures an optimal match/correspondence between syntax and semantics. We mentioned above the lexicalization of grammar. We should add now a second general trend in modern grammar: the semanticization of grammar. That is, the attempt to interpret, to attach a significance to formal units of grammar. At this point, we may ask the reasonable question with respect to what significance we can attach to the features N and V.

A part of speech is nominal if it can be the obligatory constituent, that is the argument (i.e. a participant in an event) of a predicate. A nominal part of speech can be marked for gender, number and case. For example, NP is a nominal category in English as it is marked at least for case: e.g. *see him* (i.e. NP/accusative case).

A part of speech is verbal if it signifies ability to license an argument. Licensing an argument means assigning it a semantic interpretation. For example, *kill* is a verbal category because it licenses two arguments: an Agent (who does the killing) and a Patient (who is the sufferer of killing); *give* is a verbal category because it licenses three arguments (an Agent, a Theme (=the thing given) and a Goal (=the entity that receives the thing given)); *fond* is a verbal category because it licenses two arguments (an Experiencer and the object somebody is fond of (=Theme)). We see that the feature +V designates events or states.

Let us see now what are the features that lexical categories share in terms of the core features +N, +V:

Noun: +N	Verb: -N	A/Adv	: +N	Prep/Part : -N
-V	+V		+V	-V

The nominal features of Nouns and the verbal features of Verbs are pretty clear. Adjectives and Adverbs are grouped together as both have degrees of comparison; besides, an adjective is nominal to the extent at which it forms NPs such as *the rich*, *the wounded* etc. Adverbs are verb modifiers and they subcategorize for verbs. We have seen that particles are to some extent like prepositions; the only difference is that particles occur without completion (e.g. *They walked in*) while prepositions do ask for completion (e.g. *They walked into the room*). However, they are neither nominal nor verbal.

A further feature essential in defining parts of speech is the feature +/-f (i.e. functional). From this point of view syntactic categories split into lexical categories (e.g. N, V etc) which are -f and functional categories which are +f (to be defined below). This division captures the difference between open classes (i.e. lexical categories, as their number is very large and can be made even larger by borrowings, word-formation etc.) and closed classes (i.e. functional categories whose number is limited).

Another difference between lexical categories and functional categories is that the former has descriptive meaning while the latter lack descriptive meaning. For each lexical category, there is a functional category. For example, the lexical category N has Det as a functional category. The lexical category V has Aux as functional category. The lexical category A has Deg(ree) Phrase as functional category. Preposition has nothing as functional category. Functional categories have abstract meaning (i.e. they lack descriptive meaning). They are operators on lexical categories specifying the reference of lexical categories.

Let us illustrate this with some examples. The N 'horse' designates the class of objects having the property of being a horse. The functional category Det (e.g. *the* + horse) fixes the object we speak about in the class of objects 'horse'.

The V designates a class of events. For example a sentence such as: *Swimming in the pool is fun* says that every event of swimming in the pool is fun. The functional category for verbs is Aux, which includes Tense. When we utter a sentence such as: *I swam in the pool last night*, we refer to one particular event of swimming which took place last night.

Functional categories lack descriptive characteristics and are extremely idiosyncratic. For example the definite article *the* and the indefinite article *a* are distributionally very different; the same holds for *modal verbs* which are part of the auxiliary constituent.

Functional categories close off lexical phrases making it possible for lexical phrases to function in discourse. Functional categories always 'produce' *maximal* (as opposed to intermediate) projections (XPs). For example, the following sentences which contain lexical categories that lack functional categories (to articulate them in discourse) are ill-formed: e.g. *He break the glass; *Child is hungry.

The big similarity between lexical and functional categories is that they project alike, according to X' schema. That is, Det will project as DetP, Aux will project as AuxP.