Explaining Generative Grammar: An Introductory Course.

by

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1 Introduction: Before Generative Grammar.

In 1963, Joseph H. Greenberg announced that human languages had universal common features. Greenberg meant that all human languages followed some common rules. To find out these common rules, Greenberg selected 30 languages almost at random and carefully examined these sample languages. Greenberg identified subjects (S), objects (O) and verbs (V) as fundamental elements of sentences. A simple calculation tells you that you can arrange these 3 elements (viz. S, V and O) in 6 different orders. However, he only found languages with SVO, SOV and VSO word orders in his sample languages. This finding led Greenberg to conclude that languages in which objects precede subjects are extremely rare or do not exist. Then, he classified attested languages into two categories, namely, languages with VO type word orders and those with OV type word orders. According to Greenberg, although VO type languages tended to have preposition constructions, OV type languages tended to have postpositions. Greenberg also found out that only in VO type languages, a question particle was placed at the initial position of a clause. In contrast to that, in OV languages, a question particle was placed at the final position of a clause if a sentence had a question particle at all.

Here we check examples of OV type and VO type languages. Japanese has OV type word orders and English has VO type word orders. We examine yes-no question clause in both Japanese and English.

1) (a) I do not know [**whether** he is guilty]
   (b) I do not know [**if** he is guilty]
   (c) Is he guilty?

What Greenberg called ‘particles’ remains a mystery. Usually, particles do not change their word forms for agreement or case marking. Typically, particles lack rich semantic meanings but have grammatical functions. In (1ab), *whether* and *if* can be said to be yes-no question particles. Bracketed clauses in (1ab) are called embedded clauses. English, which has VO word orders, places question particles at the initial position of embedded clauses. (1c) indicates that present-day English seems to lack yes-no question particles for main clauses.

In contrast to the English language, Japanese has OV word orders. Yes-no question clauses in

Japanese are as follows:

2) Japanese

(a) kare-wa kashikoi-no **ka**

he-TOP clever **Question**

'Is he clever?'

(b) [kare-ga kashikoi-no **ka**] wakara nai

he-NOM clever **Question** know not

'I do not know whether he is clever.'

Each *ka* in (2ab) can be said to be a yes-no question particle. In both embedded clauses and main clauses, yes-no question particles are placed at the ends of the clauses.

Thus far, we have seen some of the Greenberg's universals of human languages. We have also checked the validities of these universals. You may wonder why human languages have such universals. Unfortunately, Greenberg did not explain why human language have such common rules. He claimed that VO languages went well with preposition constructions and clause initial question particles. His claim does not explain anything. The task of explaining mechanisms behind these universals of human languages has been left to other linguists.

2 Generative grammar's approach to sentences.

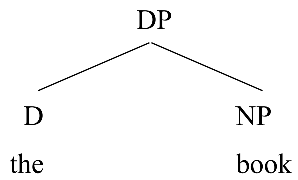
Linguistics have several branches. One of these branches is generative grammar. Noam Chomsky started generative grammar by writing a thesis titled *The Logical Structure of Linguistic Theory* in 1955. Ever since generative grammarians have studied how we generate phrases and sentences out of lexicon (i.e. words). Generative grammarians believe in an innate hypothesis. In the innate hypothesis, generative grammarians claim that we have the source of language inside our brains. Chomsky (1995) calls this source of language Universal Grammar (UG). When we set parameters of Universal Grammar, the UG grows into a full language. This means that all naturally developed human language follow some common rules because they have all developed from UG. Generative grammarians have studied many languages to shed light on the true nature of UG. By doing so, generative grammarians have explained some of Greenberg's universals as a by-product. In the following section, we see how generative grammarians analyze sentences.

According to Chomsky (1995) we need a process called **merge** to create phrases and sentences. Merge combines one constituent (such as a word and a phrase) with another to give us a larger constituent. For example, when we merge the determiner *the* and the NP (Noun Phrase) *book*, we get a larger constituent (i.e. a phrase) *the book*. A question arises here: what is the overall grammatical feature of the resulting phrase *[the book]*? Semantically, the phrase seems to have the grammatical feature of a noun. However, we concern here the syntactic feature of the phrase. We cannot put the phrase *[the book]* in positions where NPs usually can be placed.

3) (a) I want a [ ].
   (b) This [ ] is interesting.

Bracketed places in (3) are places where NPs can be placed. Both follows determiners. We cannot put the phrase *the book* in the bracketed spaces. This means that once a determiner is merged with a NP, the resulting phrase loses the grammatical feature of the NP and gains that of the determiner (D). Thus, the resulting phrase is categorized as a DP (determiner phrase).

4) The internal structure of the DP *the book*



The tree diagram in (4) shows the result of our first merge. This tree diagram shows that the resulting phrase *[the book]* is a DP and the D *the* determines the grammatical feature of the overall phrase. The constituent that determines the overall grammatical feature of the resulting phrase is called the **head** of the phrase. Thus, the D (determiner) *the* is the head of the DP. The NP *book* does not determine the grammatical feature of the DP. Linguists call such a constituent the **complement** of the head (or the complement of the phrase). Thus, the NP *book* is the complement of the head D *the.* A head and a complement are merged to form a phrase.

Another important point is that a head selects its complement (Donati and Cecchetto 2011). For example, the head D *the* requires a NP as its complement. For example, if you try to merge the head D *the* with a V (verb) *do* as the D's complement*,* the resulting phrase *[*the do]* is ungrammatical. (* indicates that the phrase or the sentence is ungrammatical.) Hence, the validity of the tests in (3).

The DP *the book* is merged with a V *read* to form a larger phrase *read the book*. This time, the DP is treated as a single constituent. The resulting phrase *read the book* seems to have the behavior of a larger verb. For example, the phrase *read the book* can be placed in bracketed positions in (5a-c).

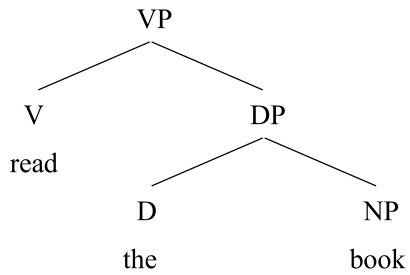
5) (a) He will [ ].

(b) He can [ ].

(c) He wants to [ ].

We can place verbs such as *swim* and *jump* in bracketed space in(5a-c). We can also place the resulting phrase *read the book* in the same places. Thus, the bracketed position in (5 a-c) are places where VPs (Verb Phrases) can be placed. The fact that the resulting phrase *read the book* can be placed in (5a-c) means that the phrase has the grammatical features of a verb phrase. We can draw a tree diagram (6) to show the internal structure of the VP *read the book*.

6) The internal structure of the VP *read the book*



The V *read* determines the grammatical feature of the VP *read the book*. Thus, the V *read* is the head of the VP. The DP *the book* is the complement of the VP.

Careful readers might have noticed that the head precedes its complement in every merge operation. In the first merge operation, the head D precedes its complement NP. In the second merge operation, the head V precedes its complement DP. These word orders are not by chance. Only two kinds of word order are possible for a head and its complement. We place the head and its complement so that the head precedes its complement or we place them so that the head follows its complement. This word order is governed by the value of the head-initial parameter (Chomsky 1995, Radford 2004, 2009, 2016, Roberts 2021 among many others). Generative grammarians believe that human languages have parameters. No linguists know the exact number of parameters a human language has. Roberts (2007) counted the number of parameters linguists had already discovered and concluded that a human language had at least 30 parameters. However, recent study reveals that a human language has far more parameters (Roberts 2021). Roberts (2007, 2021) claims that the head-initial parameter, which governs the word order of a head and its complement, is one of the most fundamental parameters (a big parameter in his terminology). Parameters are like switches in your brains. Radford (2004, 2009, 2016) claims that if your brain has set the value of the head-initial parameter as positive, heads precede their complements in all the phrases you produce. If you have set the value of the head-initial parameter as negative, the head follows its complement in every phrase you utter. The parameters are first thought up to explain children's first language acquisitions. Radford (2016) claims that when a child realizes the language people around her speak has the positive value for the head-initial parameter, she sets the head-initial parameter in her brain as positive. Once this head-first parameter has been set as positive in her brain, in all the phrase she produces, heads precede their complements. Thus, acquisition of the grammar of the first language is just setting parameter (Chomsky 1995). Biologically, human beings have Universal Grammar. Small children are just setting the values of the parameters of Universal Grammar. Linguists call this hypothesis of first language acquisition the innate hypothesis. The innate hypothesis has been severely attached by cognitive grammarians such as Joan Bybee. I would like to prove the validity of the innate hypothesis in the section 13 (the language creation case in Nicaragua).

Human languages seem to have other parameters. For example, the value of the wh-initial parameter tells us whether a language moves all the question phrases (such as *who, when* and *what*) to the initial position of clauses. The value of the null subject-parameter governs whether a language allows null subjects (like Spanish and Italian) or not (like English).

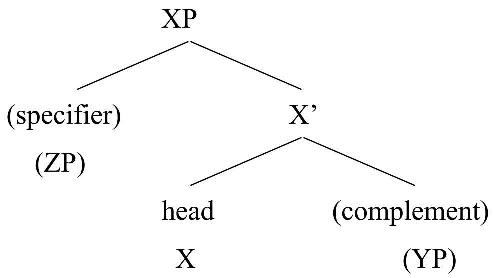
Thus far, we have made the VP *read the book*. We need to add tense to this VP. Thus, the VP *read the book* is merged with a T (tense) *will* to form a larger phrase *will read the book*. We would like to call the resulting phrase a TP. However, we cannot do so. The phrase *will read the book* is somehow incomplete.

7) (a) *will read the book.
(b) I will read the book.

For example, the attained phrase **will read the book* is ungrammatical when used as an independent phrase. (In a diary style, 7a may be acceptable.) We need a subject. A problem is that a subject is neither a head nor a complement. A subject is merged as a third category, namely, a specifier. Ray Jackendoff (1977) put forward the idea of specifiers.

Ray Jackendoff wrote a book titled $\bar{X}$ *syntax—A Study of Phrase Structure* in 1977. In this book, Jackendoff claims that the internal structure of a phrase can be diagramed as the following tree diagram show. Here, I slightly modify Jackendoff's (1977) original analysis so that it will be compatible with Chomsky's (1995) minimalist approach.

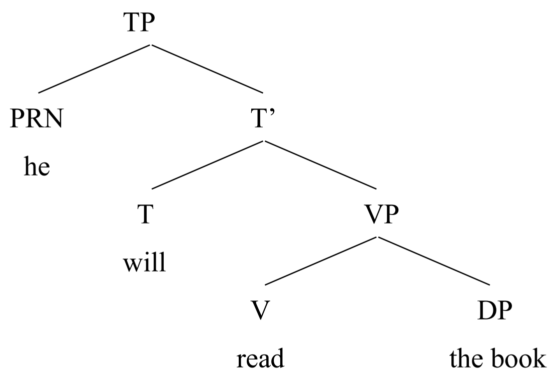
8) The internal structure of a phrase



The tree diagram (8) shows that the head X and its complement YP merges to form the X-bar. (X-bar is sometimes written as X' or $\overline{X}$. Both X' and $\overline{X}$ mean the same thing, namely, X-bar. Originally, X-bar was written as $\overline{X}$ but upper bar is difficult to write on Microsoft word software. Thus, most linguists use X' instead.) This X-bar merges with the specifier (YP) to form the full phrase XP. Linguists call Jackendoff's analysis the X-bar theory. Jackendff (1977) thought that the grammatical feature of the head X is projected upward through the X-bar to the XP. Thus, he called the X-bar an intermediate projection and the XP an maximal projection. According to Jackendoff, the head X itself is a minimal projection. The X-bar is called the intermediate projection because the X-bar is larger than the head X but smaller that the maximal projection XP. The bar notation ($\overline{X}$) was thought up to indicate the X-bar is larger than the head X. Keep in mind that the specifier and complement are optional. When the phrase lacks the specifier, the head X and its complement YP merge to form a maximal projection, namely, XP. Thus, in this case, there is no intermediate projection (X-bar). When the phrase lacks both specifier and complement, the head is the maximal projection.

Adopting Jackendoff's X-bar theory, we analyze the incomplete phrase *will read the book* as a T-bar. We merge this T-bar with the pronoun *he* to form a complete TP. This pronoun *he* is merged as the specifier of the TP. The tree diagram in (9) shows the internal structure of the TP.

9) The internal structure of the TP *he will read the book*



Thus far, we have made the TP *he will read the book*. Although this TP seems to be a complete clause (sentence), it is not. According to Chomsky (1981. 1986, 2021), Radford (1988, 2004, 2009, 2016), Roberts (2007, 2021) and many other researchers, a clause needs a complementizer phrase (CP). A complementizer is difficult to define. To make the explanation simple, I define a complementizer as the head which takes a TP as its complement. In English, overt complementizers such as *that* in (10a) and whether in (10e) appear in embedded clauses. In (10a-e) examples, the embedded clauses are indicated by outer brackets. The heads of CPs are bold faced. The specifiers of CPs are underlined. The tree diagrams in (11) show internal structures of the embedded clauses of (10a-c).

10) (a) I know [CP [C **that**] he will read the book]

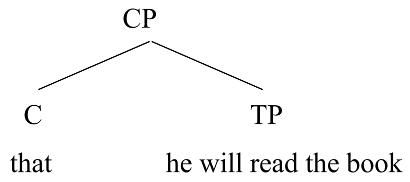
(b) I know [CP [C **ø**] he will read the book]

(c) I do not know [CP what [C **ø**] he has got in his pocket]

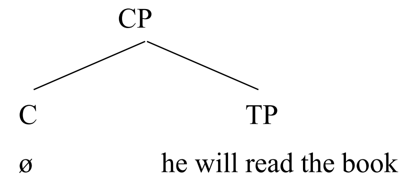
(d) I cannot forget [CP what a great time [C **ø**] I had]

(e) I do not know [CP [C **whether**] he is guilty or not]]

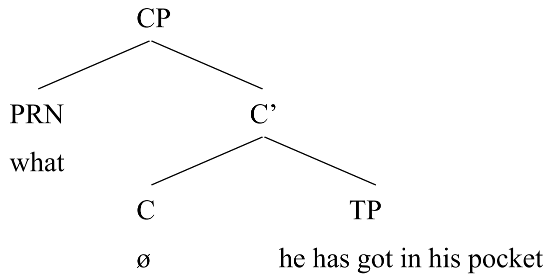
11) (a)



(b)



(c)



We interpret the embedded clause in (10a) *[CP [C **that**] he will read the book]* as a declarative clause because the embedded clause has the declarative complementizer *that* in the head of the CP position. We interpret the embedded clause in (10c) *[CP what [C **ø**] he has got in his pocket]* as a wh-question clause because the embedded clause has a wh-question word *what* in the specifier of the CP position. This wh-question word acts as a wh-question operator. An operator has a function to change the meaning of a clause. Human languages are said to have wh-question operators, yes-no question operators such as *whether* in (10e), conditional operators like *if*, relative clause operators, negative operators and so on (Radford 2016). Keep in mind that the embedded clause in (10c) has a null complementizer as the head of the CP. A null constituent has no phonological forms, which means the null constituent is not pronounced but has a syntactic function. This null complementizer in (10c) seems to not affect the interpretation of the embedded clause. The embedded clause in (10d) *[CP what a great time [C **ø**] I had]* has an exclamatory phrase *what a great time* in the specifier of the CP position. Since the embedded clause in (10d) has this exclamatory phrase in the specifier of CP position, the embedded clause is interpreted as an exclamatory clause. The null complementizer in (10d) also does not affect the interpretation of the clause. In contrast to (10cd), the embedded clause in (10b) *[CP [C **ø**]* *he will read the book]* has no specifier in the CP layer. The CP in (10b) has only the null complementize ***ø*** as its head. In this case, the embedded clause (10b) is interpreted as a declarative clause. According to Radford (2016), a clause is interpreted as declarative by default when the CP of the clause lacks a specifier but has a null complementizer as the head of the CP. Since the embedded clause in (10e) *[CP [C **whether**] he is guilty or not]]* has the yes-no question operator *whether* as the head of the CP, the embedded clause is interpreted as a yes-no interrogative clause.

As the above (10) examples show, we seem to judge the type of a clause by checking the head and the specifier of the clause's CP. Linguists call the head and the specifier of a phrase the edge of the phrase. Thus, as Radford (2016) claims, human language seem to have the following condition for judging the type of a clause. (Noam Chomsky 1995 put forward the idea of the clause typing condition. Andrew Radford 2016 modified the idea.)

12) Clause Typing Condition

We judge the type of a clause (i.e. whether it is declarative, wh-question, yes-no question, conditional or exclamatory etc.) by checking the edge of the clause's CP.

The clause typing condition means that every clause is a CP. Even root clauses are CPs. Thus, the TP in (9) *he will read the book* is incomplete as a clause. We interpret the example in (9) as a declarative clause. Thus, the example in (9) must be a CP, not a TP. We merge the declarative null complementizer *ø* with the TP to form a CP *ø he will read the book.* Since the CP has the null C as its head, we interpret the clause as declarative by default (Radford 2016).

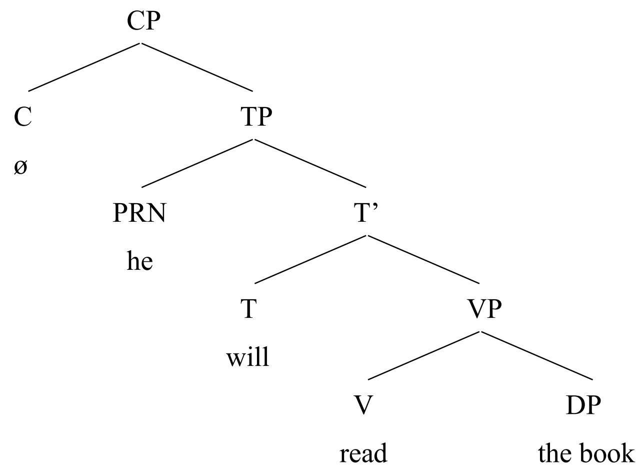
3 How did generative grammarians explain Greenberg's universals?

In the preceding section, we saw how generative grammarians analyze sentences. In this section, we see how they have explained some of Greenberg's universals. One of the most fundamental parameters of human languages is the head-initial parameter (Roberts 2007, 2021). VO type languages has the positive value for this head-initial parameter. In head-first type languages, a head precedes its complement in every phrase. Thus, the head D precedes its complement, NP. The head V precedes its complement, DP. Thus, we have VO word orders in a head-initial type language. The head T precedes its complement, VP. The head C precedes its complement, TP. English has the positive value for the head-first parameter. English sentences have internal structures shown in the following tree diagrams.

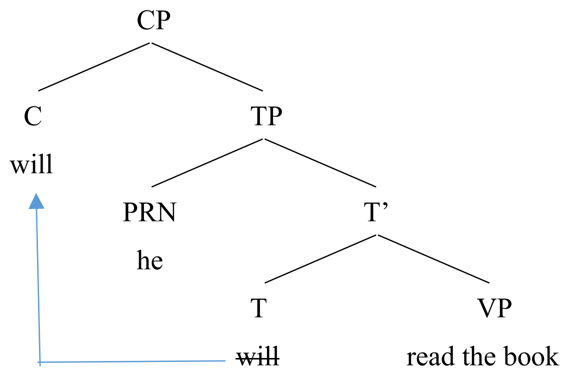
13) (a) He will read the book.
(b) Will he read the book?
(c) he will go to Japan.

14)

(a) The internal structure of *he will read the book* (=13a)

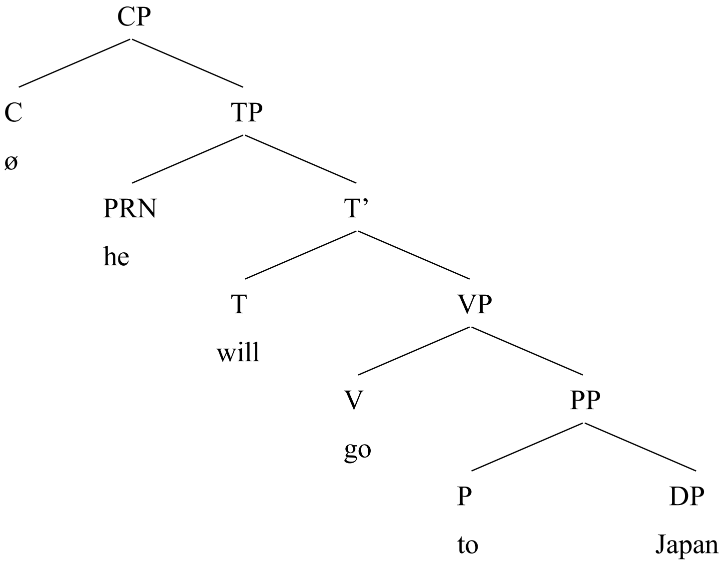


(b) The internal structure of *will he read the book* (=13b)



We will see T-to-C movement in section 5

(c) The internal structure of *he will go to Japan* (=13c)



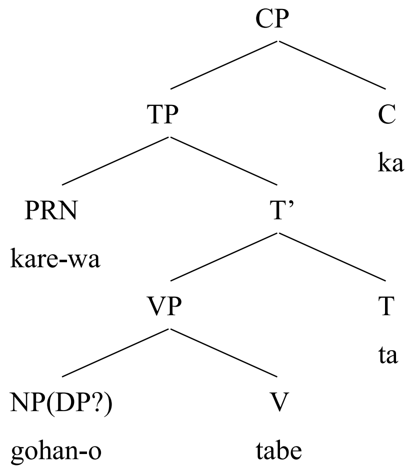
(PP stands for preposition phrase. Prepositions are heads of PPs. Prepositions and postpositions belong to adpositions. In a postposition construction, postposition is the head of the postposition phrase. The DP is the complement of the postposition.)

Since English has the positive value for the head initial parameter, in every phrase (i.e. CP, TP, VP, DP, PP), the head precedes its complement. V precedes its object. A preposition is the grammatical head and the DP governed by the preposition is its complement. A question particle tends to be in the C position. Thus, the question particle in in clause initial position as Greenberg (1963) observed. Summarizing, we can explain some of Greenberg's universals by introducing the head-initial parameter.

In a language which has the negative value for head initial parameter, a head follows its complement in every phrase. Japanese is such a language. Japanese has OV word orders and postposition constructions. A postposition is the grammatical head of the postposition phrase. The DP governed by the postposition is the complement. In a postposition phrase, the head follows its complement. The following tree diagram shows the internal structure of a Japanese sentence.

15) kare-wa gohan-o tabe-ta ka
he-NOM. rice-ACC. eat-PAST. Question
'did he eat rice?'

16) The internal structure of (15)



I have no background knowledge about Japanese grammar. I followed Inoue's (2006) analysis here and placed *ta* in the head T position. I am not sure where the question particle *ka* is placed. I placed it in the head C position following my intuition. Keep in mind that in a head-final type language, verbs follow objects and Cs follow TPs. Summarizing, the value of the head-initial parameter explains Greenberg's universal about basic word orders. It is unclear from the above tree diagram (16) whether the specifier of the TP, namely, the pronoun *kare-wa*, is pronounced before the complement of the V, namely, NP gohan-o, or not. In the following section, I give a purely theoretic answer to this question. However, the following section is difficult. You do not need to worry. You can skip the following section and move on to the section 5.

4. Why do We Need Parameters?

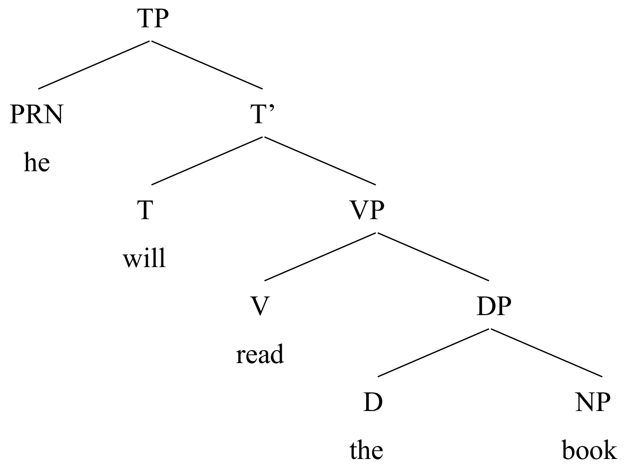
You may wonder why human languages have the head-initial parameter and other parameters. Chomsky (2021) claims that spoken languages need to have word orders because you cannot pronounce two or more words at the same time. Chomsky (1995) and Sheehan, Biberauer, Roberts, and Holmberg, (2017) claim that syntax has only a hierarchic structure shown in (A) and recognizes categories of words but does not have a linear order.

(A)

TP
he
will
VP
read
DP
the
book

The hierarchic structure (which has no linear order) is sent to the phonological component (PF). In the PF, the hierarchic structure gets the linear order purely for pronunciation reasons I mentioned earlier. The word order of a head and its complement is one of the most fundamental of all word orders (Roberts 2021). Chomsky (1995) also claims that we need to decide on the linear order between a X-bar (an intermediate projection) and its specifier. However, Sheehan, Biberauer, Roberts, and Holmberg (2017) argue that in almost all languages, a specifier precedes the intermediate projection (X-bar). SBRH point out that a subject is associated with the specifier of TP (or VP). Since Greenberg (1963) found out that subjects preceded objects in almost all languages, SBRH concludes that specifiers precede the intermediate projections they merge with. Chomsky (1995) and Sheehan, Biberauer, Roberts, and Holmberg (2017) argue that in the English language, the words sent to the PF are spelled out in the order of specifier-head-complement. When you pronounce the words in (A) in this linear order, you get the below tree diagram (B).

(B)



First, we check the top of the hierarchic structure, namely, the TP. The TP has the specifier, namely, the pronoun *he*. Following the spell out order in English mentioned earlier, we pronounce the specifier before spelling out the T-bar. Since the value of the head initial parameter is positive in English, we spell out the head of the TP, namely, T*will* before we pronounce the complement of the T, namely, the VP. The VP is a phrase. Thus, we pronounce the words in the VP following the spell out order mentioned above, namely, the order of specifier-head-complement. The VP has no specifier. Thus, we spell out the head of the VP, namely, V *read*. After that, we move on to the DP.

Japanese has the opposite value for the head-initial parameter. We will see how we get the word order of (15) from the hierarchic syntax structure in (C).

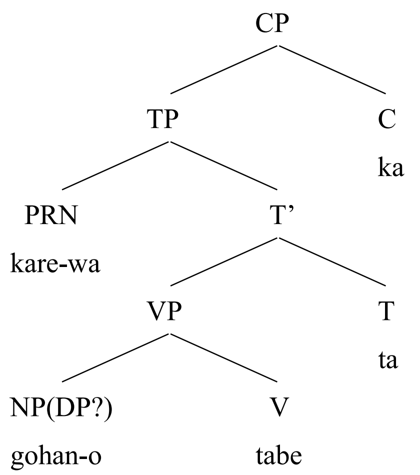
(C)

CP
ka
TP
kare-wa
ta
VP
tabe
NP (or DP?)
gohan-o

Since Japanese has the negative value for the head initial parameter, we spell out a head and its complement in the order of complement-head in the PF. The linear order between a specifier and the intermediate projection (X-bar) is the order in which the specifier precedes the intermediate projection which the specifier merges with. Thus, in Japanese, we spell out words sent to the PF in the linear order of specifier-complement-head. Following this spell out rule, we assign the linear order to the hierarchic syntactic structure in (C). The top of the hierarchic structure is the CP. Since the CP has no specifier, we concentrate on the linear order of the C and its complement. Following the spell out rule I mentioned earlier, we must pronounce the complement of the C before we spell out the C head *ka.* Since the complement of the C is the TP, we concentrate on the linear order of the words in the TP. Following the spell out order of specifier-complemet-head, we spell out the specifier of the TP, namely, *kare-wa*, before we pronounce the T-bar. In the T-bar, the complement of the T, namely, the VP, is pronounced before we spell out the head T *ta*. In the VP, we pronounce the complement of the V, namely the NP, before we spell out the head V *tabe*. In this fashion, we get the following word order (D, E), which is the same as (15, 16).

(D) kare-wa gohan-o tabe-ta ka (=15)
he-NOM. rice-ACC. eat-PAST. Question
'did he eat rice?"

(E)



Summarizing, syntax has only a hierarchic structure and recognizes the category each word belongs to but does not have linear word orders. When this hierarchic structure in the syntax is sent to the phonological component (PF), we assign a linear word order to this hierarchical structure following the spell out order. This spell out order follows the values of parameters such as the head-initial parameter. The reason the PF must assign linear order to the words is that in spoken languages, we cannot pronounce two or more words at the same time.

The idea that the syntax has no linear word order but recognizes hierarchic structure and categories of the words is supported by naturally developed sign languages. Idioma de Signos Nicaragüense is one of these naturally developed sign languages. Deaf children in Nicaragua made this new sign language spontaneously (Kegl, Senghas, and Coppola 1999, Roberts 2021). In sign languages, sometimes you can sign two items at the same time. For example, in ISN, *what* is signed by raised eye braws and backward tilt of your head. You mainly sign with your hands and arms. Thus, two items can appear when *what* is signed. The signers sometimes sign two items. This fact supports Chomsky's claim that the syntax has no word order.

In the next section, we look at argument structures and theta-roles.

5 Theta-roles and the VP Internal Subject Hypothesis

5.1 arguments and theta-roles

Almost all sentences have predicates. A predicate expresses an activity or event. The activity and event expressed by predicates have participants. Linguist call these participants of activities or event **arguments** (Ando 2005, Radford 2004, 2009). Generative grammarians believe that every argument in a sentence has its theta-role. Theta-roles are semantic roles assigned to arguments. (I do not know the difference between theta-roles and semantic roles.)

17) Tom killed Mary.
[AGENT] [THEME]

For example, the action of killing somebody needs two participants, namely the killer and the person (or a living thing) who is killed. These two participants are arguments of the activity of killing somebody. Thus, in (17), both *Tom* and *Mary* are arguments of the predicate. Linguists believe that every argument must have a theta-role. *Tom* is understood as the killer and *Mary* is interpreted as the person who is killed. Thus, *Mary* has the theta-role of THEME (i.e. a victim in this case). *Tom* has the theta-role of AGENT (i.e. the one who started the action). Different linguists accept slightly different theta-roles. Here, I adopt those of Andrew Radford's (2009).

18) A list of theta-roles and their meanings.

Role	Gloss	Examples
THEME	Entity undergoing the effect of some action.	*Mary* fell over.
AGENT	Entity instigating some action.	*Debbie* killed Harry.
EXPERIENCER	Entity experiencing some psychological state.	*I* like syntax
LOCATIVE	Place in which something is situated or takes place.	He hid it *under the table*.
GOAL	Entity representing the destination of some other entity.	John went *home*.
SOURSE	Entity from which something moves.	He returned *from Paris*.
INSTRUMENT	Means used to perform some action.	He hit it *with a hammer.*

(Adapted from Radford 2009: 245-246)

We analyze proper nouns in argument positions such as *Mary* and *Tom* as DPs. NPs cannot refer to concrete entities but DPs can do so. Thus, *Mary* and *Tom* in (17) has null D *ø* as their heads. The internal structure of Mary in (17) is *[$_{DP}$ ø [$_{NP}$ Mary]]*. This analysis is supported by the fact that proper nouns in Greek has determiners such as *o* and *tia* in the following example:

19) Greek
O Gianis thavmazi **tin** Maria.
The John admires the Mary. (= 'John admires Mary') (Radford 2016: 222)

A question arises how a DP receives its theta-role. If you rewrite (17) as *Tom killed the elephant*, the DP *elephant* following the verb *kill* still receives the theta-role of THEME. This means that theta-role assignments do not depend on DPs but depend on verbs. In the following section, we see mechanisms of theta-role assignments.

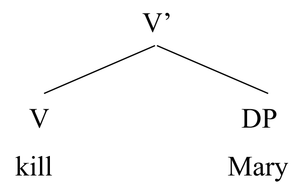
5.2 VP internal subject hypothesis

In order to understand mechanisms behind theta-role assignments, we need to get familiar with the concept of c-command. C-command stands for constituent command. C-command is the most important relationship between constituents (Chomsky 1995, Radford 2004, 2009, 2016).

20) c-command
If a constituent A and B are sisters, A c-commands B and every constituent contained in B.

We check how c-command words in a real situation. We build the sentence (17). First, we merge a V *kill* with a DP *Mary*. The resulting phrase *kill Mary* is V-bar. Here, we depart from the analysis we adopted in section 5.

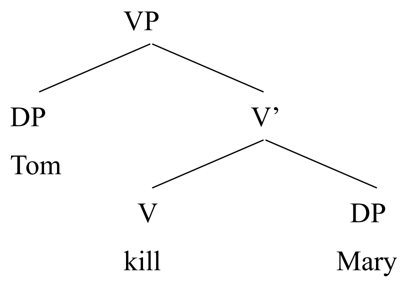
21) The internal structure of V-bar *kill Mary.*



The tree diagram (21) shows that the V *kill* and the DP *Mary* are sisters. By the definition of c-command (20), sisters c-command each other. Thus, the V *kill* c-commands the DP *Mary*. The DP *Mary* receives its theta-role of THEME from the c-commanding V *kill*. This means that the relation c-command plays a crucial role in theta-role assignment. In this case, the V *kill* assigns a theta-role THEME to the c-commanded constituent, the DP *Mary*. So-called objects are internal arguments of predicates. Thus, we can say that internal arguments receive its theta-roles from the c-commanding verbs.

So-called subjects are external arguments of predicates. Things seem to be more complicated when you consider theta-role assignments of external arguments (i.e. subjects). Thus far, we have made the V-bar *kill Mary*. We merge this V-bar *kill Mary* with the DP *Tom*. DP *Tom* is the subject of the verb and it is merged as the specifier of the V. The resulting phrase is VP *Tom kill Mary* and the internal structure of the VP is shown in the tree diagram (22).

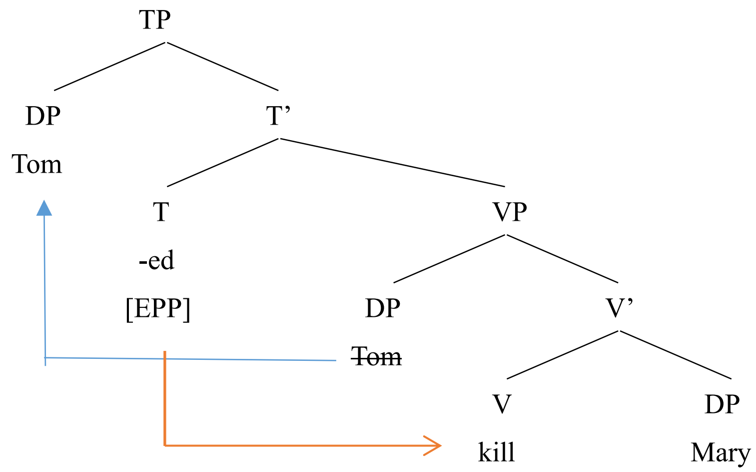
22) The internal structure of the VP *Tom kill Mary*.



At first sight, the V *kill* seems to assign the theta-role of AGENT to the subject DP *Tom*. However, the V *kill* does not c-commands the subjects DP *Tom* but the V-bar *kill Mary* c-commands the subject DP *Tom*. V-bar *kill Mary* and the specifier of VP *Tom* are sisters. By definition of c-command (20), sisters c-command each other. We have already seen that c-command plays an important role in theta-role assignments. This means the V-bar as a whole assigns the theta-role of AGENT to the external argument *Tom*. Summarizing, an internal argument (i.e. an objects) receives its theta-role from the c-commanding V. On the other hand, external argument (i.e. a subject) receives its theta-role from the c-commanding V-bar as a whole.

We merge a T suffix *–ed* with the VP *Tom kill Mary* to form the T-bar *–ed Tom kill Mary*. In English, all Ts have EPP features (Radford 2004, 2009). EPP stands for Extended Projection Principle. A head with the EPP feature must have a specifier. Thus, the T-*ed* search its domain for a suitable candidate. The domain of a head H is the complement of the head H. Thus, the T's domain is its complement VP. (Every head c-commands its complement. C-commanding relation also plays an important role here.) The EPP feature of T acts like a probe. The EPP feature of the T search the VP for a suitable goal and when the EPP finds the goal, which is the DP *Tom* in the specifier of VP position, the EPP feature attracts the DP *Tom* to the edge of the TP. (Recall that the edge of a phrase is the specifier and the head of the phrase.) Chomsky (1981, 1995) put forward several constrains on movements. For example, a head can only move to another head position. There are no movements to complement positions. A constituent in a specifier position can move to another specifier position. Thus, the DP *Tom* in the specifier of the VP moves to the specifier of the TP position. In this fashion, we have made the whole TP *Tom –ed Tom kill Mary*. Chomsky (1995) claims that when a constituent moves, it leaves a copy of itself in its original position. In this case, the DP *Tom* in the specifier of the VP is the copy. The internal structure of the TP is shown in the tree diagram (23). When you pronounce the TP *Tom –ed Tom kill Mary,* two things happen. First, the copy is phonologically deleted. Second, the suffix -*ed* is lowered to the V position because the verbal suffix -*ed* must be pronounced with verbs. This lowering operation is called affix hopping (Chomsky 1957). Keep in mind that affix hopping is a phonological operation and that syntactically the tense affix -*ed* remains in the head T position (Radford 2009. 2016).

23) The internal structure of the TP *Tom -ed kill Mary*.



An important thing about the TP in (23) is that the theta-role of the DP *Tom* does not change even after the DP *Tom* has been moved from inside the VP to the specifier of the TP. Once the DP *Tom* in the VP receives the theta-role of AGENT form the V-bar *kill Mary*, the DP *Tom* retains that theta-role and moves to the specifier of the TP position. According to Radford (1988), Ray Jackendoff put forward the idea of theta-role criteria. Radford (1988) explain about the theta-criteria. Once a constituent receives a theta-role, any operation including movements cannot change the theta-role of that constituent. Thus, the DP *Tom* in the specifier of TP has the same theta-role as its original VP internal position.

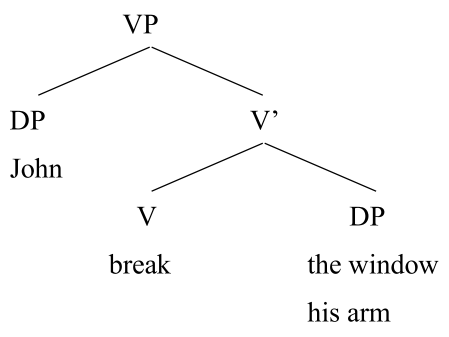
We have seen above how **all the arguments** of a verb are generated inside the VP. The internal argument (i.e. the object) of a verb receives its theta-role from the c-commanding verb. The external argument (i.e. the subject) receives its theta-role from the c-commanding V-bar, and moves to some higher position such as the specifier of TP. Linguists call this idea **VP Internal Subject Hypothesis** and most generative grammarians accept this hypothesis.

Evidence which seems to support the VP internal subject hypothesis comes from several phenomena. First of these phenomena is as follows:

24) (a) John broke the window. (Radford 2009: 253)
(b) John broke his arm. (ibid.)

In (24), both *the window* and *his arm* have the same theta-role of THEME. Both *the window* and *his arm* are understood as things which are broken (i.e. victims). Both *the window* and *his arm* are c-commanded by the same V *break*. Thus, we can say that the V *break* assigns the theta role of THEME to the c-commanded DP. However, the DP *John* in (24a) and the DP *John* in (24b) seem to have different theta-roles despite the fact that both sentences have the same verb *break*. *John* in (24a) has the theta role of AGENT. An AGENT can start an action intentionally. On the other hand, *John* in (24b) has the theta-role of EXPERIENCER. An EXPERIENCER experience pain or some other psychological state. This phenomenon can be explained by adopting VP internal subject hypothesis. In (24a) the V *break* and the DP *the window* merge to form a unitary constituent V-bar *break the window*. The V-bat *break the window* as a whole assigns the theta-role of AGENT to the c-commanded DP *John*. In (24b) the V *break* and the DP *his arm* merge to form a unitary constituent V-bar *break his arm*. This V-bar *break his arm* as a whole assigns the theta-role of EXPERIENCER to the c-commanded DP *John*.

25) The internal structures of (24ab)



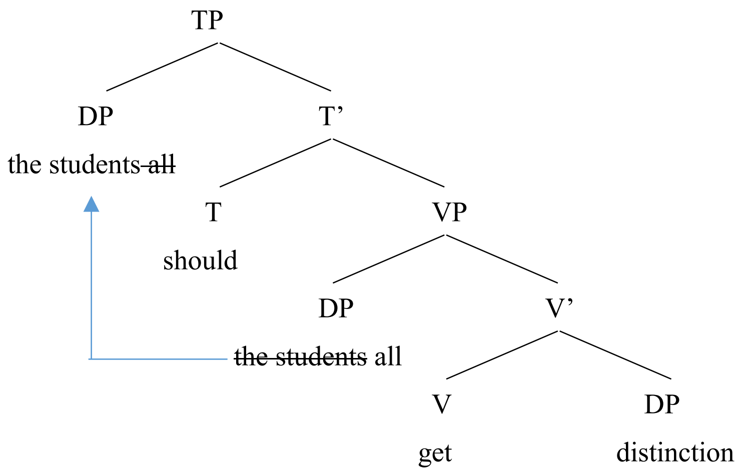
Another fact which supports the VP internal subject hypothesis comes from **floating quantifiers.** The examples of floating quantifiers are as follows:

26) **The students** should *all/both/each* get distinctions. (Radford 2009: 245)

27) **The students** *all/both/each* should get distinctions. (ibid.)

all/ both/ each used like (26) are called floating quantifiers. They modify the DP *the students*. These quantifiers are separated from the DP *the students* but these quantifiers are understood to be modifying the DP. Why is this? The answer to this question is that the DP *the students* and the quantifiers *all/ both/ eac*h are originally generated together as a larger DP *the students all/ both/ each* and this larger DP is originally generated inside the VP. This larger DP is moved to the specifier of TP position as the tree diagram below shows.

28) The internal structures of (26) and (27).



According to Chomsky (1995), when a constituent moves, the moved constituent leaves a copy of itself in the original position. Usually, copies are phonetically deleted when pronounced like the case of (27). However, copies are sometimes partially spelled out. In the case of (28), we phonetically silence the quantifier *all* in the spec-TP position. On the other hand, we silence *the student* in the spec-VP position but overtly spell out the quantifier *all* in that position. In this way, we get an example in (26). Langacker (1991) argues that other that wh-question phrases, subjects are the sole elements which allow floating quantifiers. This means that objects do not usually accept floating quantifiers. Lagnecker's claim supports the VP Internal Subject Hypothesis because under the hypothesis, objects do not move but subjects move from inside VPs to the spec-TPs. (See unaccusative section in Radford 2009 for cases where complements of Vs move to the spec-VPs.)

6 Passive

In this section, we see how passive sentences are made.

29) Tom killed Mary.
[AGENT] [THEME]

30) Mary was killed.
[THEME]

(30) is the passive of (29). (29) has two arguments but (30) has only one argument. According to Brinton and Arnovick (2017), passivization reduces the number of arguments a verb has. When you change a verb in the active voice to the passive voice, the number of arguments the verb has decreases by one. Thus, theoretically speaking you can passivize a verb which has two or three arguments in the active voice. On the other hand, you cannot passivize a verb which has only one argument in its active voice.

31) He runs very fast.
32) ??He is run. (Intended as the passive of 31)

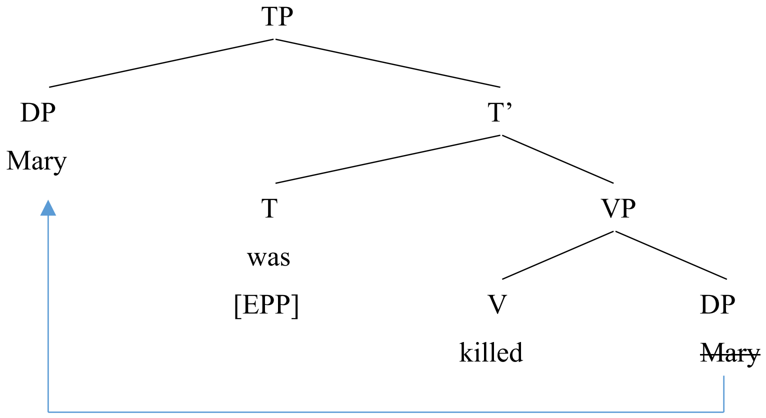
(31) and (32) endorse our prediction.

We will see how to make a passive sentence. We make (30) *Mary was killed* repeated here as (33).

33) Mary was killed.

First, we merge a V *killed* and a DP *Mar*y to form the VP *killed Mary*. The V *killed* assigns the theta-role of THEME to the c-commanded DP *Mary*. Then, we merge a T *was* with this VP *killed Mar*y to form the T-bar *was killed Mary*. As we have already seen, all Ts in English have EPP features. A head with the EPP feature must have a specifier. Thus, the EPP feature of the T attracts the DP *Mary* inside the VP to the specifier of the TP position. Thus, we have got the whole TP *Mary was killed Mary*. The internal structure of the TP is shown in the tree diagram below. Keep in mind that the DP *Mary* in the spec-TP has the same theta-role as the DP *Mary* inside the VP. This means that once the DP *Mary* receives its theta-role inside the VP, the DP holds this theta-role and moves to the spec-TP position. This follows theta-role criterion Jackendoff proposed.

34) The internal structure of the TP *Mary was killed ~~Mary~~*.

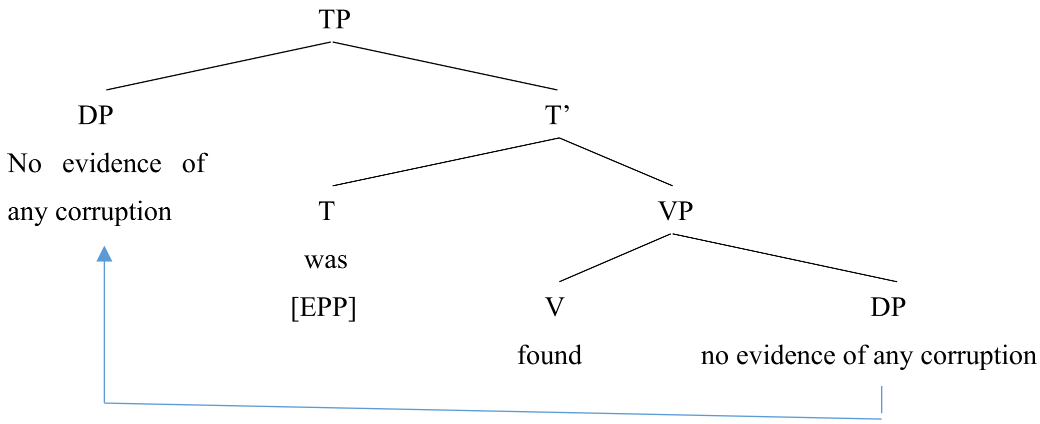


The idea that the DP originally merged as the complement of the V moves to the spec-TP position is supported by the following examples reported by Radford (2009)

35) *No evidence of any corruption* was found. (Radford 2009: 256)
36) There was found *no evidence of any corruption*. (ibid.)

The meanings of (35) and (36) are virtually the same. We make (35) by the following way. We merge the V *found* and the DP *no evidence of any corruption* to form the VP just like the following tree diagram.

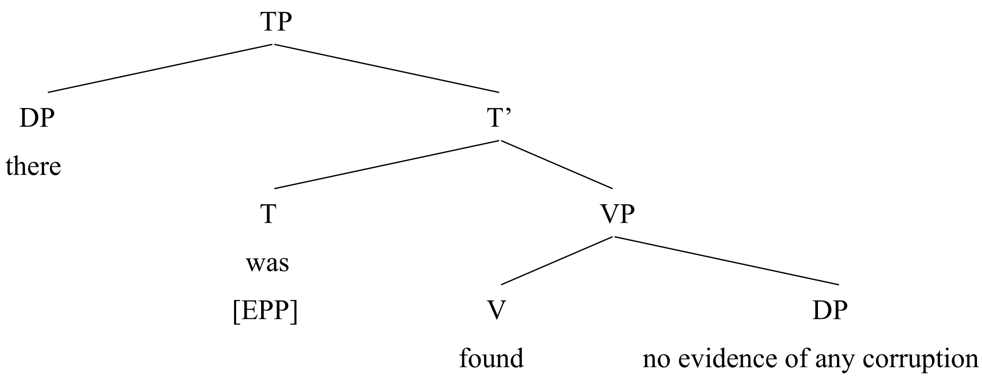
37) The internal structure of (35)



The DP *no evidence of any corruption* receives its theta-role of THEME from the c-commanding V *found.* The VP was then merged with the T *was* to form the T-bar. According to Radford (2009), all Ts in English have EPP features. Thus, the T *was* must have a specifier. In the cases of (35) and (37), the

EPP feature of the T is satisfied by the movement of the DP. However, the requirement of the EPP feature of the T can be satisfied by another way. We merge an expletive *there* in the specifier of the TP position. In this way, the T has a specifier *there*. Thus, the EPP feature of the T is satisfied. In this fashion, we get the example (36). The tree diagram in (38) shows the internal structure of (36).

38) The internal structure of (36).



Chomsky (1995) and Rizzi (2009) claim that movement is a kind of merge. For example, in (37), when we have made the T-bar *was found no evidence of any corruption*, we take the DP *no evidence of any corruption* from that T-bar and merge this DP with the T-bar we have already made. Thus, Chomsky (1995) and Rizzi (2009) call movement an **internal merge**. Generalized concept of movement is as follows: we take a constituent B from the phrase [A B] we have already built and merge this B with the phrase [A B] to form a larger phrase [B [A B]]. B in the original position is the copy of B. On the other hand, in (38), the expletive *ther*e comes from the lexicon (i.e. word stocks) in our brains. The lexicon is outside of the phrase already built (i.e. T-bar). Thus, Chomsky (1995) and Rizzi (2009) call such an operation an **external merge**. If their claim is correct, we build phrases and sentences only by merger. (Strictly speaking, we also need agreements. However, to simplify things I ignore Agree here.)

7 WH-Movement

7.1 Yes-No Questions

Before we see how wh-questions sentences are made, we should check the mechanisms of English yes-no question sentences.

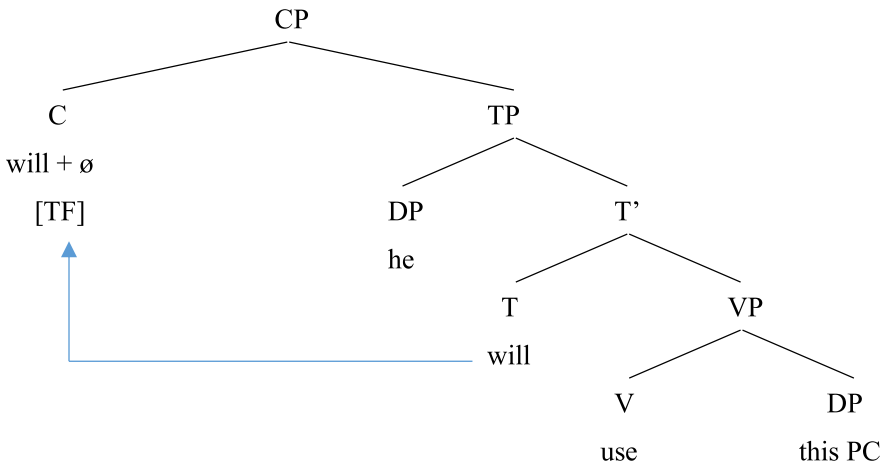
39) He will use this PC.

40) Will he use this PC?

Traditional grammarians claim that we make yes-no question sentences by inverting the subject and the auxiliary verb. However, generative grammarians see the things differently.

When we have generated the TP *he will use this PC*, we merge this TP with a yes-no question null C. The yes-no question null C is different form the declarative null C in that the yes-no question null C has the T feature. The T feature of the null C attracts the constituent in T to the edge of the CP. (The edge of the CP means the head and specifier of the CP.) Thus, the T feature of the null C attracts *will* in the head T position to the head C position as shown below:

41) The internal structure of (40) *will he use this PC?*

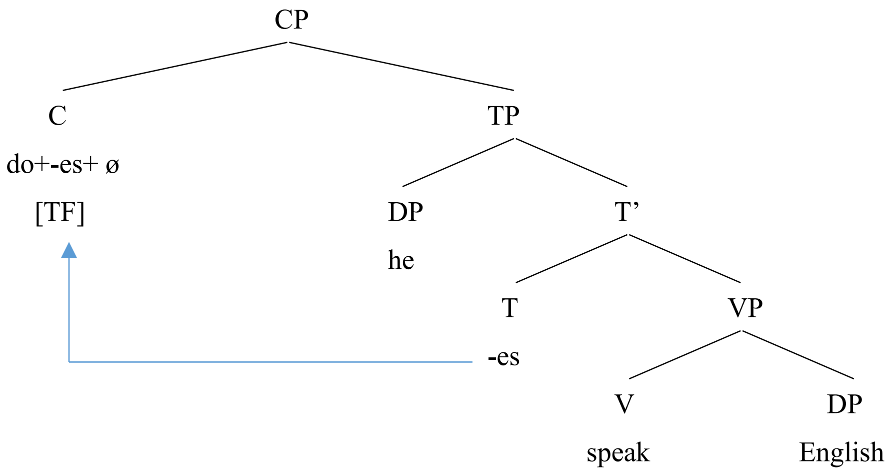


In (41), we have made a yes-no question sentence by moving an auxiliary verb, which is positioned in T, to the head C position. However, how do you make a yes-no question sentence from a sentence without any auxiliary verbs like (42) below?

42) He speaks English.

The sentence in (42) lacks an auxiliary verb. However, as the tree diagram in (43) shows, (42) has suffix *–es* in the T position. To make a question sentence, we move the constituent in the T position to the C position as shown in the tree diagram (43).

43) The internal structure of the yes-no question sentence of (42) *he speaks English*.



The suffix *–es* left behind in the original T position is the copy of the moved suffix. Since a copy is phonologically deleted when the sentence is pronounced, the copy in the T position is silenced when pronounced. Real concern here is how to pronounce the moved suffix in the C position. The verbal suffix *–es* must be pronounced with verbal host. In present-day English, we insert an semantically null auxiliary *do* to the C position to save the verbal suffix *–es*. Thus, we get the sentence in (44). Linguists call this phenomenon of do-insertion **do-support** (Radford 2016).

44) Does he speak English?

Note that regardless of the existence of the auxiliary verbs such as *will* and *can*, we have made the yes-no question sentences by moving the constituents in Ts to Cs. This T-to-C movement operations support the validity of affix hopping. Affix hopping is a phonological operation (see section 7.3 for phase theory and phonological operations). Syntactically, the verbal suffixes remain in their original positions (i.e. in Ts). If the verbal suffix has already gone to the V position, the result of T-to-C movement operation in (43) must have been different. (We see the different result in section 9 *Negatives and V-to-T movements*.)

You may have already noticed that a head can only move to the head immediately above it. This means that a head cannot jump over another head. Thus, only constituents in Ts can move to Cs. Constituents in Vs cannot move to Cs in one-go.

7.2 Wh-Questions

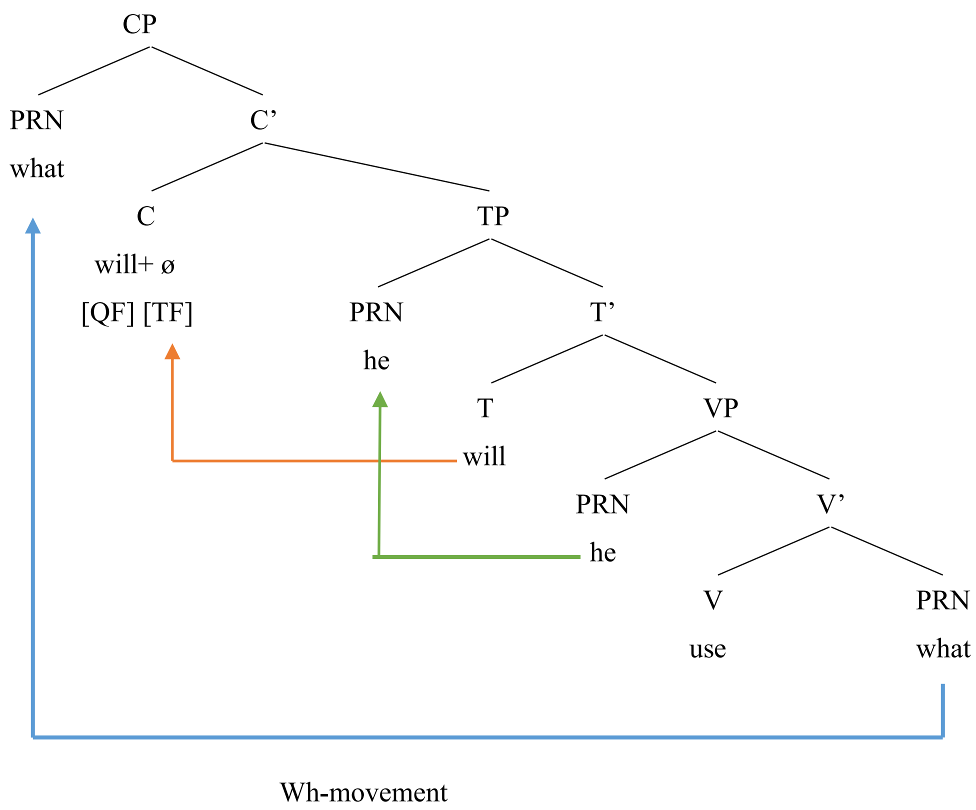
The derivations of wh-movement question partially follow those of yes-no questions.

45) He will use this PC.

46) Will he use this PC?

47) What will he use?

48) The internal structure of (47).



As the above tree diagram shows, we merge the V *use* and wh pronoun *what* to form the V-bar *use what*. The pronoun *what* receives its theta-role of THEME from the c-commanding verb *use*. The pronoun *he* merges with this V-bar as the specifier of the VP. The pronoun *he* receives its theta-role of AGENT form the V-bar *use what*. We merge this VP with the T *will* to form the T-bar *will use what*. At the moment the T merges with its complement, the EPP feature of the T attracts the pronoun *he* in the specifier of the VP to the specifier of the TP. In this way, we get the whole TP. Then, we merge the resulting TP with the null wh-question C *ø*. This wh-question null C is different from the yes-no question null C in that the null C for wh-questions has both the T feature and Q feature. At the same time the wh-question null C merges with the TP, the T feature of the C attracts the constituent in T to the edge of the CP. Thus, *will* in the T position moves to the C position. The Q feature of the C attracts smallest maximal projection which contains a wh-phrase. In this case, question pronoun *what* itself is a maximal projection because it is a complement[1]. Thus, the Q feature of C attracts *what* to the edge of the CP. The landing site of *what* is the specifier of CP because *what* is not a head.

7.3 Successive Wh-Movements and Phase Theory

We have seen how a wh-phrase moves from its original position to the spec-CP. In this section, we see how we make a wh-question sentence like (49).

49) What do you think (that) he stole?

(49) is different from (48) in that the wh-question word *what* is moved from inside the embedded clause to the initial position of the main clause. You may wonder one long distance movement suffices.

50) [CP what [C do] you think [CP [C (that)] he stole ~~what~~]]

One long distance wh-movement

However, the long distance movement like (50) is banned because there is a following condition:

51) Impenetrability Condition

A constituent c-commanded by a complementiser C is impenetrable to (so cannot agree with, or case-marked by, or be attracted by etc.) any constituent c-commanding the CP headed by C. (Radford 2016: 356)

In (50), the lower TP *he stole what* is c-commanded by the lower C *(that)*. The impenetrability condition (51) tells us that a constituent in the lower TP can move as far as the specifier of the lower CP. This means that the wh-question pronoun *what* cannot move to the specifier of the higher CP in one long distance movement.

You may wonder why the impenetrability condition (51) exists. The answer comes from

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[1] Only maximal projections (i.e. full phrase) can be used as complements (Radford 1988). Also see (9) above.

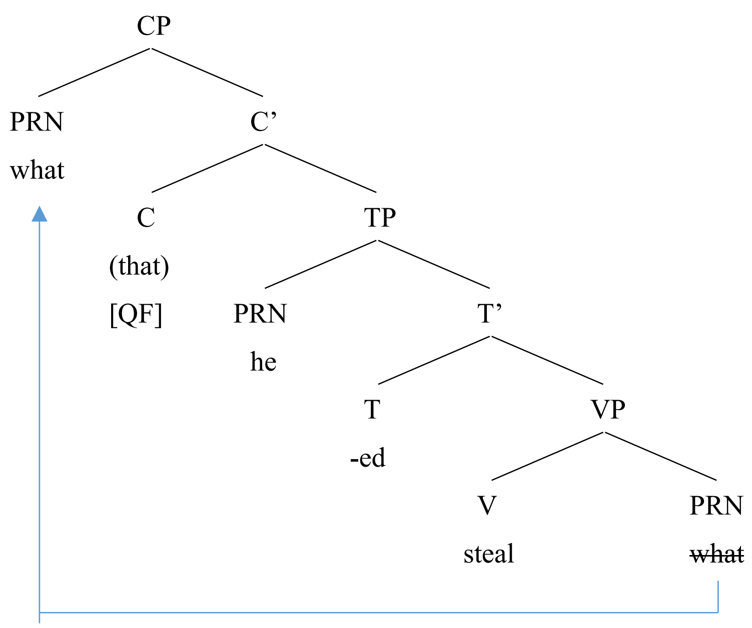
Chomsky's phase theory. Chomsky (1998, 2001, 2004, 2008) put forward an insightful idea. According to Chomsky, our working memory is so small that we do not retain a full sentence in our memory when we are making it. First, we make a part of a sentence and when that part is complete, we send it to the phonological component (PF component) 'to be assigned appropriate phonetic representation' (Radford 2009: 380). This small part of a sentence is called 'a phase.' Once the first phase is complete, we move on to the next phase. When we are building the second phase, the first phase is already in the PF. Thus, the first phase is no longer accessible to further syntactic operations.

Chomsky (2001, 2004, 2008) claims that CP and v*P are phases. We do not use v*P analysis here, so we can forget about v*Ps. Following Chomsky's phase theory, we make the sentence in (49) repeated here as (52)

52) What do you think (that) he stole?

First, we make a TP *he –ed steal what* by successive mergers as the following tree diagram (53) shows. (Merger is a noun for merge.) Then, we merge this TP with a C *that*. According to Chomsky, C is a phase head. Thus, when we merge the C *that* with the TP, two things happen: first, all the syntactic operations concerning C are executed; second, the domain of the C (i.e. the complement of the C, namely, the TP) is sent to the phonological component (PF component).

53) The internal structure of the first phase.



The C *that* has a question feature (QF). This Q-feature attracts the wh-question phrase *what* to the specifier of the CP. After all the syntactic operations are completed, the domain of the C (i.e. the TP) is sent to the phonological and semantic component. When the TP has been sent to phonological component, the TP is inaccessible to further syntactic operations. This means that we cannot extract any constituents out of the TP or constituents inside the TP cannot agree with constituents outside the relevant TP. This leads to the Impenetrability Condition (51). Chomsky (2001) put forward the following Phase Impenetrability Condition:

54) The Phase-Impenetrability Condition (PIC)

The domain of H is not accessible to operations outside HP; only H and its edge are accessible to such operations. (Chomsky 2001: 13)

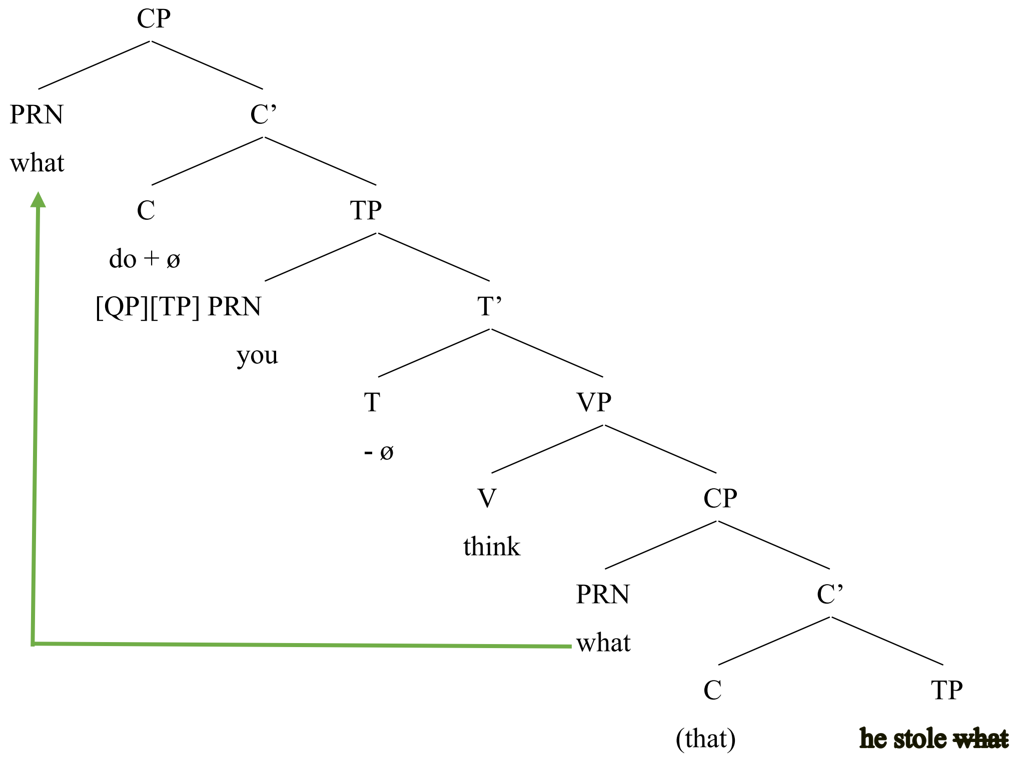
(H stands for a phase Head.)

This condition summarizes what has happened here. This phase impenetrability condition is similar to the Impenetrability Condition (51). When you replace H in (53) with C, you have a very similar condition to impenetrability condition (51). In fact, impenetrability condition (51) derives from the phase impenetrability condition (53).

When the TP *he –ed steal what* is sent to the phonological component, the copy of *what* at the extraction site is phonologically deleted. Also, the verbal suffix *-ed* is lowered to the V by affix hopping in the phonological component. Thus, affix hopping is phonological operation, not a syntactic one. In other words, syntactically, the verbal suffix *-ed* remains in the T. Section 7.1 (yes-no question) supports this idea. If syntactic operations have lowered verbal suffixes such as -es and -ed, the Cs cannot attract verbal suffixes.

After we made the CP *what he stole ~~what~~* in (54), we move on to the next phase. We merge this CP with a V *think*. By successive mergers, we get a whole TP as the below tree diagram (55) shows.

55) The internal structure of the second phase.



We merge the resulting TP with a null wh-question C. This wh-question C has both the T feature and the Q-feature. The T-feature of the C search its domain (i.e. the TP) for a suitable candidate. Keep in mind that the lower TP c-commanded by the lower C *that* is already sent to the phonological component (PF component). Thus, we cannot extract anything from the lower TP. In other words, the lower TP is ‘frozen.’ I use the **bold font** to indicate that the TP is already gone to the PF. To borrow the words from Chomsky (2005, 2008), we ‘forget’ the lower TP. Thus, the T feature of the higher C only finds the verbal suffix - *ø* in the higher T position. The T feature of the higher C attracts this null verbal suffix to the higher C position. The Q-feature of the C attracts the smallest maximal projection containing a wh-question phrase. the lower TP is already sent to the PF component. We cannot extract anything from the lower TP, so we move *what* in the specifier of the lower CP to the specifier of the higher CP.

After all the syntactic operations concerning the higher C have finished, the domain of the higher C (i.e. the higher TP) is sent to the phonological component. This is the second phase. You may wonder how we pronounce the specifier and the head of the highest CP—namely, *what* and *do*. We have two options. First option is as follows: we suppose that the specifier and the head of the highest CP are always sent to the phonological component regardless of phase theory. Second option is that we adopt Luigi Rizzi’s split C hypothesis and suppose that there is a higher C which takes the CP *what do you* *think (that) he stole* as its complement. This highest C is never pronounced in a root clause. (This explains why English does not have overt declarative null C that in a root clause.)

Summarizing, a wh-phrase generated in a lower TP is moved successively to the specifier of the highest CP. A sentence with n clauses moves a wh-phrase n times. In each movement, the wh-phrase in a TP moves to the specifier of the CP which takes that TP as its complement. This means that wh-phrases moves thorough specifiers of lower CPs.

A piece of evidence which supports this argument comes from floating quantifiers.

56) *What all* do you think that he'll say that we should buy?[2] (Radford 2009: 211)
57) *What* do you think *all* that he'll say that we should buy? (ibid.)
58) *What* do you think that he'll say *all* that we should buy? (ibid.)
59) *What* do you think that he'll say that we should buy *all*? (ibid.)

All in (57-59) are called floating quantifiers. Originally, *what* and *all* are generated like *what all* in (56). As the question phrase *what all* moves each time, the phrase leaves a copy of itself in its extraction site. The internal structure of (56-59) is as follows.

60) [CP *what all* [C do] you think [CP *what all* [C that] he'll say [CP *what all* [C that]
we should buy *what all*]]]

When you partially spell out italicized constituents, you get floating quantifier like (57-59).

Radford (2009) also reports the following examples.

61) You think they went *how far inside the tunnel*?[3] (Radford 2009: 210)
62) *How far inside the tunnel* do you think they went? (ibid.)
63) % *How far* do you think *inside the tunnel* they went? (ibid.)

The mechanisms behind (61-63) are almost the same as the floating quantifiers. How far inside the tunnel is a preposition phrase (PP) which has a preposition *inside* as its head.

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[2] An English native speaker informant comments that (56)-(59) are anacceptable.

[3] An English native speaker informant comments that he do not use (61).

64) [PP how far [P inside] the tunnel]

The internal structure of (61-63) are as follows:

65) [CP *how far inside the tunnel* [C do] you think [CP *how far inside the tunnel* [C ø] they went *how far inside the tunnel*]]]

(65) has two movement operation, the first operation moves the PP in the lower TP to the specifier of the lower CP. The second movement operation moves the PP in the specifier of the lower CP to the specifier of the higher CP. Each time the PP is moved, the PP leaves a copy of itself in its excavation site. By partially spelling out the copies, we get (63).

7.4 Relative Clauses.

We can make relative clauses by wh-movements (Chomsky 1981).

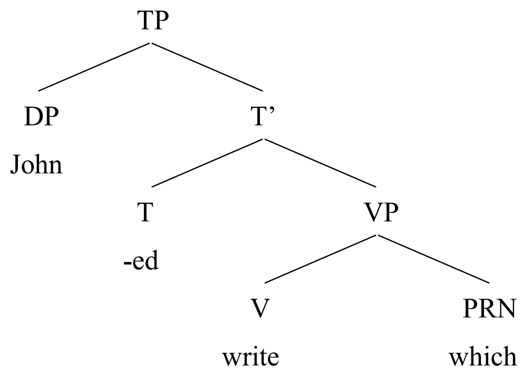
(66) a. The book [**which** John wrote] sells well.

b. The book [**that** John wrote] sells well.

c. The book [**ø** John wrote] sells well.

I make the sentence(s) in (66) to show how relative clause constructions are made by wh-movement approaches.

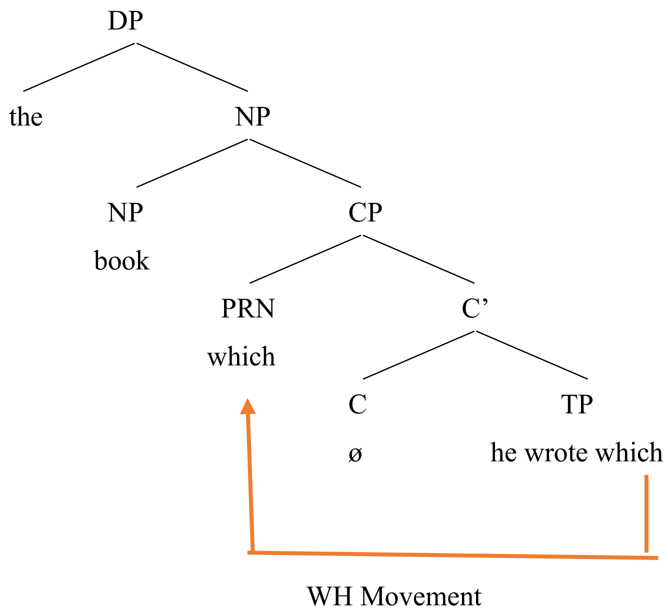
(67)



We merge the V *write* and a relative pronoun *which* to form the VP *write which*. The relative pronoun *which* receives the theta-role of THEME from the c-commanding V *write*. (In other words, the V *write* assigns the theta-role of THEME to its sister, namely, the relative pronoun *which*.) To simplify things, I ignore the VP Internal Subject Hypothesis here. We make the whole TP by successive mergers.

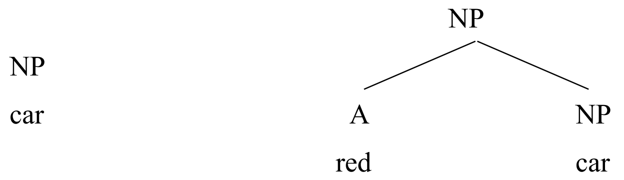
We merge the resulting TP with a null C *ø*. This null C is for a relative clause. This null C has a wh-feature but does not have a T-feature. Thus, this null C attracts the smallest maximal projection which contains a wh-word to the edge of the CP. (Recall that the edge of a phrase is the head and the specifier of the phrase.)

(68)



In this example, the null C attracts the relative pronoun *which* to the edge of the CP. The landing site of the relative pronoun *which* is the specifier of the CP because only head can be moved to another head position. The relative pronoun *which* is not a head because it is merged as the complement of the V. Usually, complements are not heads. Thus, the relative pronoun keeps its original theta-role and moves to the specifier of the CP position. Thus far, we have made a CP *which ø he wrote which*. We merge this CP with a NP *book*. This time, the whole CP is treated as an adjunct. An adjunct is the fourth category generative grammarians use. (We have already seen heads, complements and specifiers.) An adjunct merges with a constituent and makes that constituent even larger. Adjuncts do not change the grammatical categories of the constituents they merge with. For example, NP *car* do not change its grammatical category even after we have merged an adjunct *red* with the NP car.

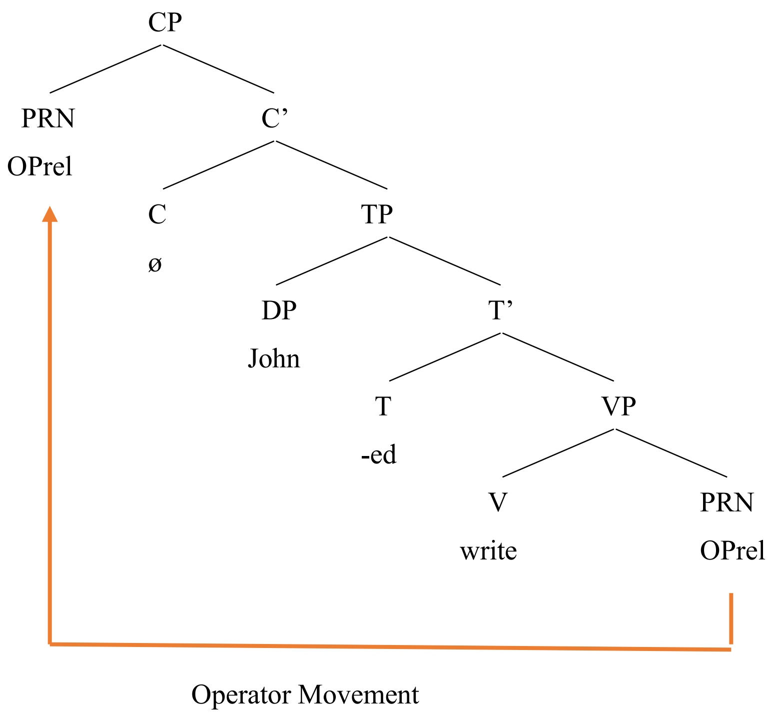
(69)



Merging an adjective (A) *red* with NP *car* gives us an even larger NP *red car*. Similar thing happens in (68). In (68), the CP merges with a NP *book* as an adjunct and makes this NP even larger. We merge this large NP *book which ø he wrote which* with the determiner *the* to form the DP *the book which ø he wrote which.* In PF component, the copy of the relative pronoun *which* in the original position is phonologically delete. The verbal suffix *-ed* is lowered to the V by affix hopping.

We can make (66c) in the following fashion. We merge the V *write* and a null relative operator *OPrel* to form the VP *write OPrel*. This null operator for a relative clause receives its theta-role THEME from the c-commanding V *write*. After we have made the C-bar *ø John -ed write OPrel*, we move the null operator to the specifier of the CP position. Keep in mind that the relative operator holds its theta-role THEME. By this operator movement, we get the full CP as the below tree diagram shows.

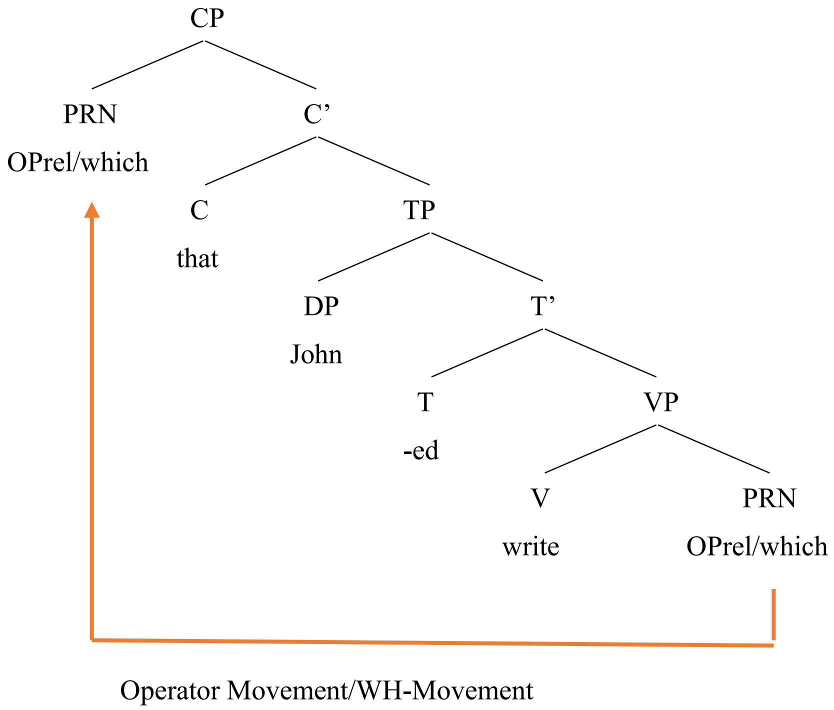
(70)



After all the syntactic operation concerning the null C has finished, the domain of the phase head C (i.e. the TP) is sent to the PF component to be assigned phonological representation. In the PF, the verbal suffix *-ed* is lowered to the V by the operation affix hopping. We merge this CP with a NP *book* to form an even larger NP *book OPrel John -ed write OPrel*. We merge this larger NP with the determiner *the* to form the example in (66c) *the book [ø John wrote] sells well*.

Thus far, we have used null complementizers (Cs) for the head of the CPs. When we use an overt complementizer *that* instead of the null complementizer, we get the below constructions.

(71)



(72) a. The book [CP which [C that] John wrote] sells well.

b. The book [CP [C that] John wrote] sells well.

When we use the relative pronoun *which*, we get (72a). When we use the null relative operator *OPrel* instead of the overt relative pronoun *which*, we get (72b). (72a) is ungrammatical in present-day English. However, similar construction was grammatical in older English such as Middle English (which was spoken from 1100 to 1500).

(73) Only the sight of hire, **whom that** I serve,… (Chaucer, *Knight's Tale* 1231: line 373; from Cinque 2020: 53)

The question arises here: why the constructions such as (72a) and (73) are ungrammatical in present-day English. Chomsky and Lasnik (1977) tried to answer this question. They thought up of the concept of the Doubly Filled Comp Filter (DFCF). They supposed that present-day English has the DFCF, which works in PF component (where phonological representation is assigned to the phrase already made). Simply put, this DFCF phonologically filters out structures such as (73) as ill formed.

(73) * [CP wh- [C that]]

(73) shows a construction in which a CP has overt head and specifier. Chomsky and Lasnik claim that when a CP has overt head and specifier, we phonologically delete at least either the specifier or the head of the CP. This DFCF has descriptive power but it does not have an explanatory power. In other words, Chomsky and Lasnik (1977) did not explain why (72a) is ungrammatical in present-day English. They just described the facts.

8 Negation and V-to-T movement

8.1 introduction

When you make a negative sentence, you use a negative word *not*.

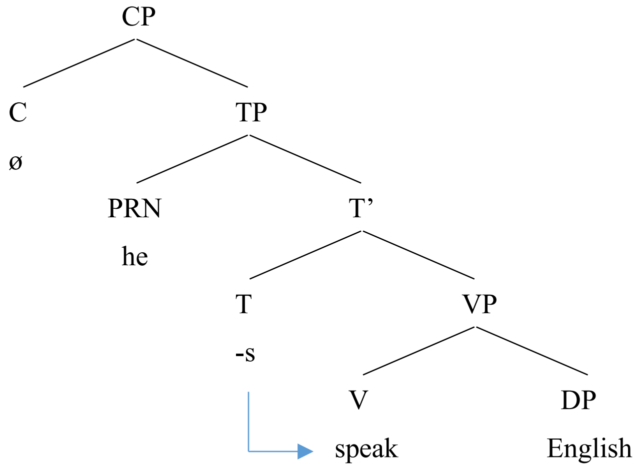
(74) (a) He will *not* use this PC.
(b) He should *not* eat this cake.

Modal auxiliary verbs such as *will* and *should* are merged in T positions. Main verbs such as *use* and *eat* are merged in V positions. (74) reveals that the negative word *not* precedes the VP and follows the T head. In other words, *not* is sandwiched between the T and VP.

We have analyzed verbal suffixes such as *-s* and *-ed* as merged in T positions. In declarative sentence, the verbal affix *-es* is lowered to the V position by affix hopping.

(75) He speaks Japanese.

(76) The internal structure of (75)



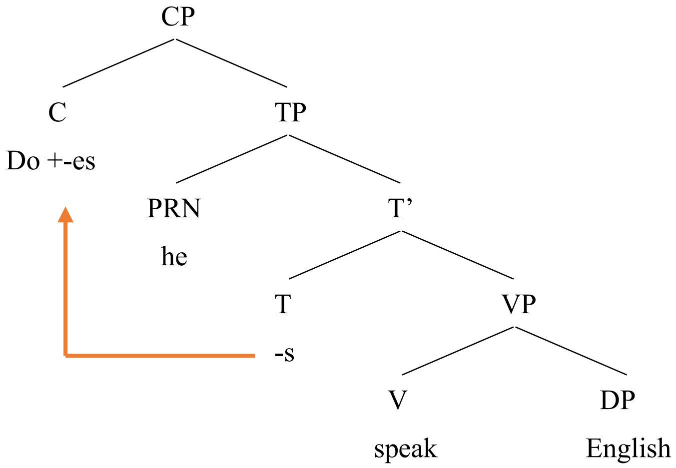
Keep in mind that affix hopping is a phonological operation. The affix hopping works after the TP has merged with the phase head C and has been sent to the PF component to be assigned phonological representations. In other words, the affix hopping works in the PF component. Thus, syntactically, the verbal suffix remains in the T position. Supporting evidence comes from the yea-no question (or wh-question) and the negation of (75).

As I mentioned earlier, you make a yes-no question sentence by moving the constituent in the T to the C position. The head can only move to the adjacent head immediately c-commanding it. C is the next higher head above T. Thus, the constituent in T can move to C position. However, the constituent in V cannot pass over T in one movement.

(77) Does he speak English?

(77) shows that the verb remains in the V position and the verbal suffix in the T moves to the C position. The internal structure is as follows:

(78)



If the affix hopping were the syntactic operation, the result might be different. However, the verbal suffix remains in T, which is available to T-to-C movement. The moved verbal suffix needs a verbal host to be appropriately pronounced. The main verb in the V position is not able to move to the C position because the constituent in the V cannot jump over another head, namely, the T in this case. Thus, we insert a semantically null auxiliary verb *do* to support the verbal suffix. Linguists call this operation do support.

In a negative sentence, it seems that affix hopping cannot lower the verbal suffix in the T to the V position.

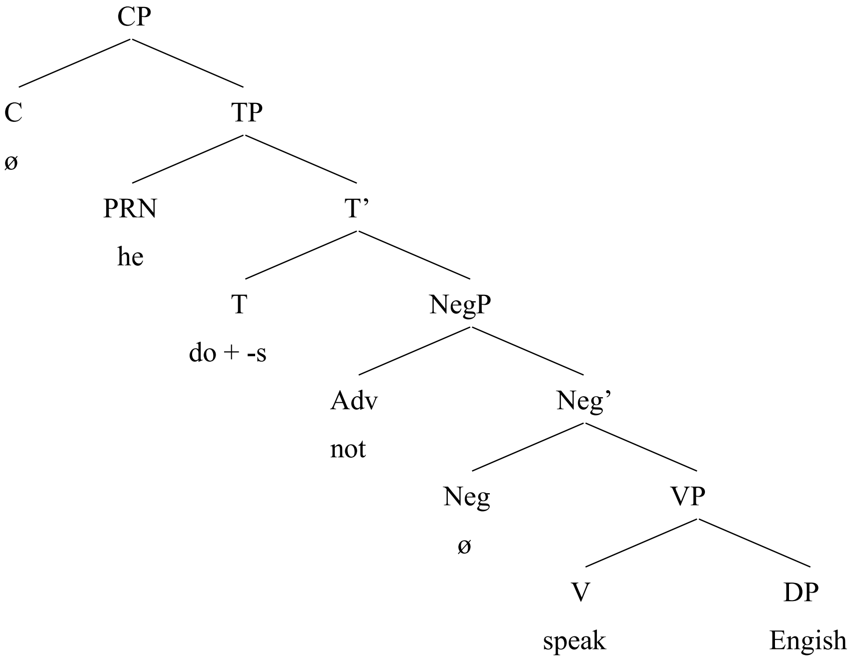
(79) He does *not* speak English.

As we have seen above, *not* is sandwiched between the T and the VP. In a negative sentence, the verbal suffix remains in its original position, the T. The reasonable question is why the verbal suffixes originated in Ts cannot lower to the Vs in negations. Radford (2016) introduces negative phrases and solves this problem.

8.2 Negative Phrases (NegPs)

Radford (2016) proposes that a negative sentence in English has a negative phrase. He supposes that in present-day English, a negative phrase has a null constituent *ø* as its head and the negative word *not* as is specifier. Since a negative phrase is sandwiched between the T and VP, the internal structure of (79) is analyzed as (80).

(80)



Since a head can only move to the immediately higher or lower head, the verbal tense suffix in the T head cannot pass over the head of the negative phrase. Thus, affix hopping cannot move the verbal suffix in the T to the host verb in the V position. In this case, we insert a semantically null auxiliary verb *do* to rescue the verbal suffix stranded in the T position. Linguist call this operation do-support.

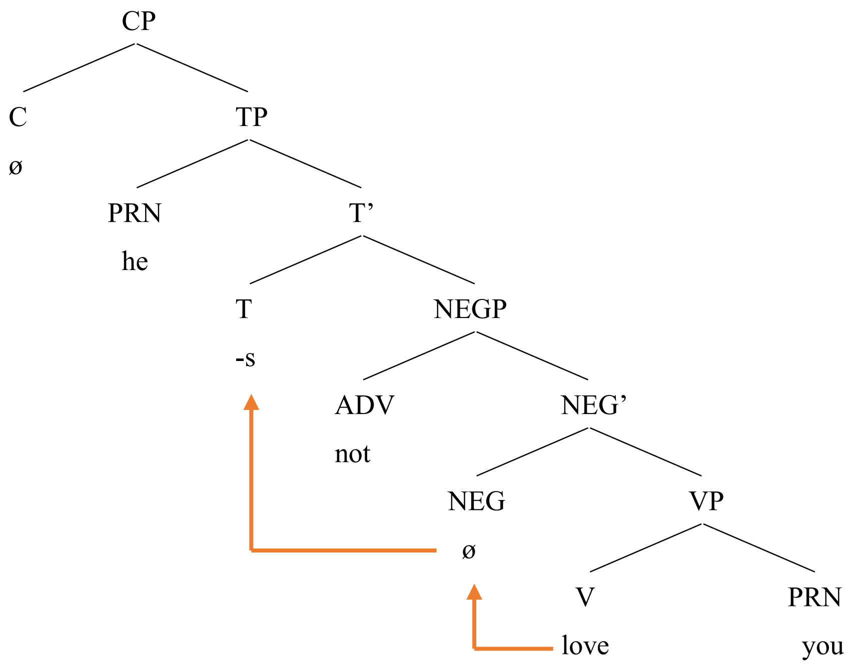
Negative phrase analysis reveals interesting points. Older English such as Early Modern English (which was spoken from 1500 to 1700) did not use affix hopping.

(81) (a) He loves not you (Shakespeare, Lysander, *Midsummer Night's Dream*, III. ii [Quoted by Radford (2016: 314)])

(b) Speakest thou in sober meaning? (Shakespeare, Orlando*, As You Like I*t, V. ii [Quoted by Radfrod (2016: 271)]) ‘Do you speak in sober meaning?’

In (81a), the main verb precedes *not*. The main verb *love* generated in the V position moves through the head of the negative phrase to the T position. The tree diagram in (82) shows the internal structure of (81).

(82)



Second important thing about examples in (81) is that in (81b), the main verb precedes the subject *thou* in the specifier of the TP to make a yes-no question. This means that the verb generated in the V position moved upward to the T position and then moved to the C position with the verbal suffix. Thus, in Early Modern English, a verbal suffix in the T position attracted the movement of a verb generated in the V position (Roberts 2021). Thus, affix hopping did not happen at that time. The affix remained in its original position and the verb moved to the T position. Roberts (2007, 2021) calls this movement V-to-T movement. The constituents in a T position can move to the C position to form a question sentence. Thus, the verb in the T position moved to the C position with the suffix. Head movement cannot strand any constituents (Radford 2016).

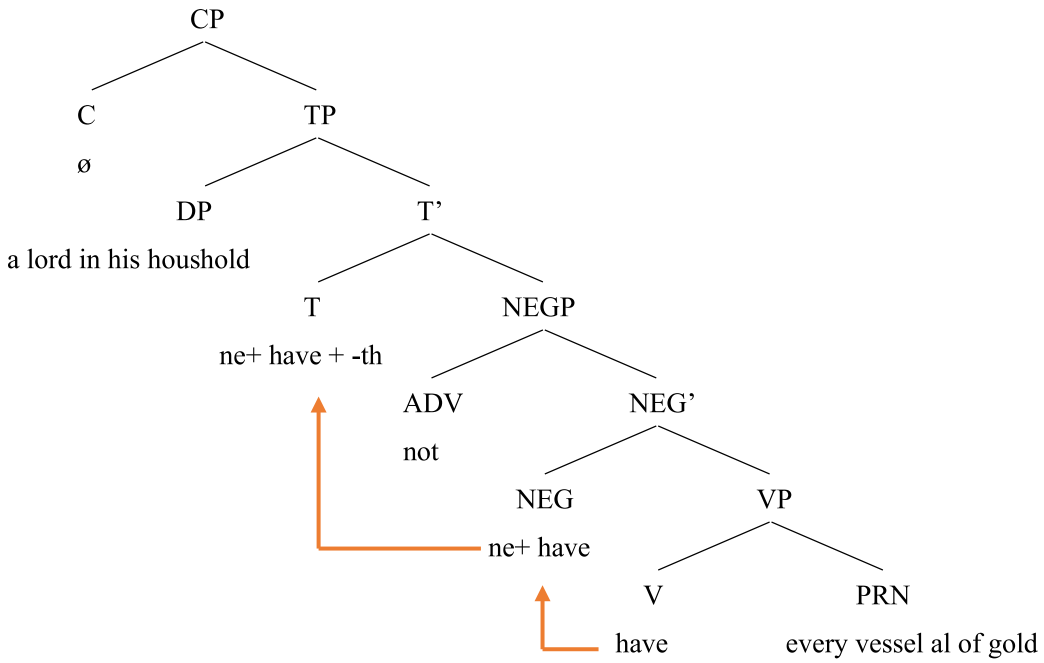
According to Roberts (2021) whether a language adopts V-to-T movement (like in Early Modern English) or affix hopping (like in present-day English) depends on a parameter. The name of the parameter is unclear. I call this parameter the strong T parameter. A language with the positive value for the strong T parameter has morphologically rich verbal suffix. Early Modern English had four different verbal suffixes to distinguish subjects with different person-number features. These strong verbal suffixes in T attracted the movements of verbs. Present-day Italy and French have the positive values for the strong T parameter. Thus, in these languages, verbs move to the T positions. In contrast to Early Modern English, present day English has only two verbal suffixes in present tense, namely, -*s* and zero. These weak suffixes are lowered to the V positions when pronounced.

Negative phrase analysis shed light on another phenomenon. Middle English (which was spoken from around 1100 to 1500) had a negative concord. In the negative concord, one negative sentence has two negative words. As an example of Middle English, I cite a sentence from Chancer's *Wife of Bath's Tale*.

(83) A lord in his houshold *ne* hath *nat* every vessel al of gold
‘A lord in his household does not have all his vessels made entirely of gold’
(Chaucer, *Wife of Bath's Tale*. [Quoted by Radford (2016: 285) emphasis original])

Radford (2016) analyzes the sentence in (83) as follows.

(84) The internal structure of (83)



Every vessel al of gold is a quantifier phrase (QP). *Every* and *all* are categorized as quantifiers. In this case, a quantifier *every* merges with a NP *vessel al of gold* to form the QP. We merge this QP with a V *have* to form a VP *have every vessel of al of gold*. We merge the resulting VP with the head of a negative phrase, *ne*. Note that the negative phrase in Middle English had *ne* as its head and *not* as its specifier. Middle English had the positive value for the V-to-T movement parameter (the strong T parameter). Thus, the constituent in the V need to move through the negative head to the T. When the negative head and the VP merges, *have* in the V moves out of the VP to the negative head. We merge the specifier of the negative phrase and get the full negative phrase. Then, we merge this negative phrase with the T *-th* to form the T-bar. This verbal suffix *-th* is strong and attracts the constituents in the negative head (or the constituent in V in a declarative clause). Thus, the constituents in the negative head moves to the T position. In head movements, we cannot strand anything. *Ne* and *have* in the head of the negative phrase move together to the T position. In this fashion, we get a string *ne+ have+ -th* in the T position. We merge DP *a lord in his household* as the specifier of the TP. When we pronounce this sentence, we spell out the string *ne+ have+ -th* in the T as *ne has*. In this way, we get a negative concord.

This is the end of the material. At first, I planed to explain split CPs, language changes and a language creation case in Nicaragua. However, time is up. Thank you for reading.

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