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Introduction to the Theory of Language

The hitchhikers guide to drawing trees
vs.2.1

I. The basics

Take an utterance:

1.   The man from Kentucky will like coffee in the early afternoon.

First step: identify the word categories in the sentence:

2. Word categories

the= determiner

man = noun

from = preposition

Kentucky = noun

will = modal/tense

like = verb

coffee = noun

in = preposition

the = determiner

early = adjective

afternoon = noun

Once that is established using morphological, semantic and function in the sentence criteria, proceed to establish what strings of words form constituents. Remember that X-bar says every XP has a head, so we can extrapolate to assume that means every word in (2) has its own XP.

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3. X-bar expansion

DP	NP	PP	NP	TP	VP	NP	PP	DP	AP	NP
|	|	|	|	|	|	|	|	|	|	|
Det'	N'	P'	N'	T'	V'	N'	P'	Det'	Adj'	N'
|	|	|	|	|	|	|	|	|	|	|
Det	N	P	N	T	V	N	P	Det	Adj	N
|	|	|	|	|	|	|	|	|	|	|
The	man	from	Kentucky	will	like	coffee	in	the	early	afternoon

This is the first step of X-bar expansion. Note that the textbook is very inconsistent and does not expand Det, and sometimes other categories like A. I recommend that you follow a system where every word has its X-bar structure.

The trick is to figure out which phrase goes with which and how they attach. X bar allows us to expand its intermediate X' nodes indefinitely:

4.
XP
 |
X'
 :
 :
X'
|
X

thus creating additional attachment sites if necessary. These are used primarily by optional, and easily discarded, elements called adjuncts.

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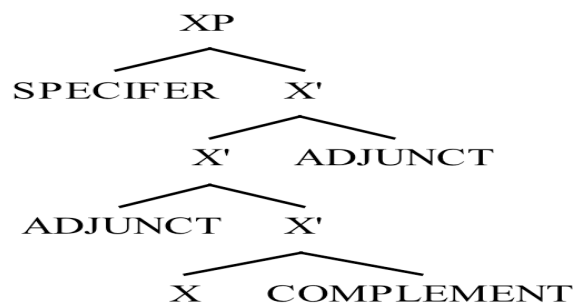
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Adjuncts/complements

X' expansion means that we can attach an infinite amount of phrases to a given phrase. We will not do that, but we will call positions that trigger X-bar expansion as adjuncts/ modifiers, that is optional elements. By definition, these adjuncts are optional and attach to an X' and their sister is an X'. Sisters of X are considered complements, there are C-selected by X. Complements are obligatory with some minor exceptions (Nouns).

Specifiers

Another position to attach to is the Specifier position, sister of X' and daughter of XP. These positions will be unique and reserved mostly for Determiner phrases in side Noun Phrases, and subject positions in specifier of Tense.

5.   Specifiers, adjuncts, complements

```
                        XP
                      /    \
              SPECIFER      X'
                          /    \
                        X'      ADJUNCT
                      /    \
               ADJUNCT      X'
                          /    \
                        X       COMPLEMENT
```

Specifier: sister of X' and daughter of XP
Adjunct: sister of X' and daughter of X'
Complement: sister of X

The above tells us that certain positions in the tree are reserved for different functions. In essence, it tells us that once we know what phrase to attach to which phrase, then these are the possible positions of attachment. OK, so we know the possible attachment sites, but we still need to know what to put with what. For this we need phrase structure (PS) rules. These encode our intuitions about constituency, C-selection. The list differs from what is in the book. I have highlighted the differences. Some modifications are needed to make what the textbook says consistent (TP, CP). One change, introduction of DP is mine.

6. PS rules for English (red indicates my additions to what is listed in some parts of the book. I used decimal point numbers for most of my additional rules, so as to be consistent with the numbering of the rules that overlap with the book)

1.1 CP → C̄ (needed later for questions where we have a CP not S)

1.2 C̄ →C TP (needed later for questions where we have a CP not S)

1.3 TP→NP T̄ (needed since in the book it is argued that every sentence has Tense)

1.4 T̄ → T VP (needed since in the book it is argued that every sentence has Tense)

1.5 DetP → D̄ (Introduced by me to make determiners consistent with X-bar)

1.6 D̄→D   (needed since I introduced DP)

1.7 NP → N̄ (needed for nouns without determiners, like *Kentucky*)

2. NP → DetP N̄ (needed since I introduced DP)

3. N̄ → N

4. VP → V̄

5. V̄ → V NP

6. V̄→ V PP

7. V̄ → V AP

8. N̄ → N PP

9. PP → P̄

10. P̄ → P NP

11. AP → Ā

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12. $\bar{A} \rightarrow A$

13. $\bar{A} \rightarrow A$ PP

14. $\bar{N} \rightarrow$ AP $\bar{N}$ (needed since X-bar requires A to head an AP)

15. $\bar{A} \rightarrow$ IntP $\bar{A}$ (Intensifiers are also phrases)

16. $\bar{V} \rightarrow \bar{V}$ PP

17. $\bar{N} \rightarrow \bar{N}$ PP

18. $\bar{V} \rightarrow$ AdvP $\bar{V}$

19. $\bar{V} \rightarrow \bar{V}$ AdvP (consistency of AP rule)

P20. $\bar{V} \rightarrow V$ VP

P21. IntP $\rightarrow \overline{\text{Int}}$ (consistency of Intensifier rule)

P21. $\overline{\text{Int}} \rightarrow$ Int (consistency of Intensifier rule)

What these rules tell us is how a given node is composed. PS rules tell us how a structure will look top-down. PS rules tell us what are the possible components of every node. In contrast, X-bar tells us how to build structure bottom-up starting with a word and ending with a phrase. X-bar informs about possible outcomes based on the input. X-bar and PS rules combined provide a powerful algorithm to establish syntactic structure.
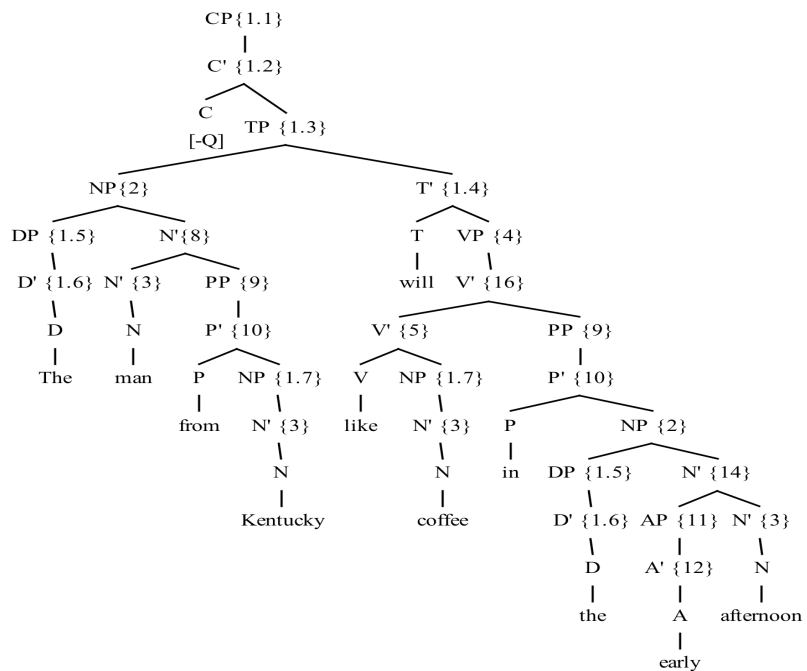
Now we can draw the sentence in accordance with PS and X-bar.

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7. The man from Kentucky will like coffee in the early afternoon.
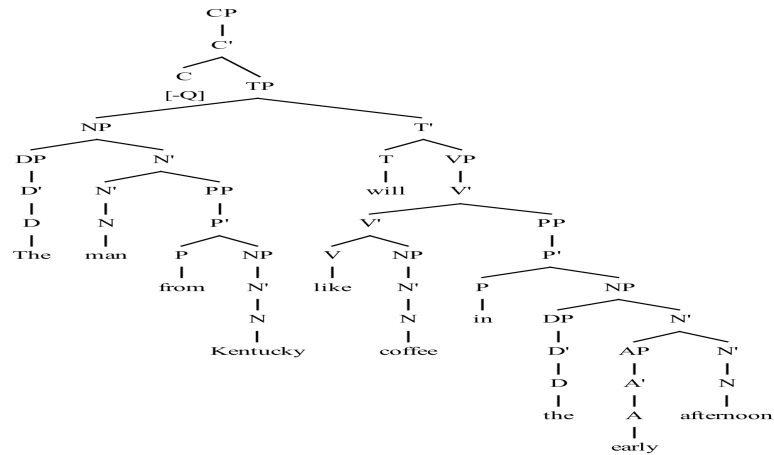
8. Phrase structure rules used:

1.1 CP → C̄

1.2 C̄ →C TP

1.3 TP→NP T̄

1.4 T̄ → T VP

1.5 DetP → D̄

1.6 D̄→D

1.7 NP → N̄

2. NP → DetP N̄

3. N̄ → N

4. VP → V̄

5. V̄ → V NP

8. N̄ → N PP

9. PP → P̄

10. P̄ → P NP

11. AP → Ā

12. Ā → A

14. N̄ → AP N̄

16. V̄ → V̄ PP

17. N̄ → N̄ PP

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Note that we have not used *all* the PS rules, just a subset. In fact, the full list is still incomplete as far as English, but it will do for our purposes. It has to be stressed that PS rules do not determine what is a complement, adjunct or specifier. These are structural relationships that are not only a function of phrase structure, but also of individual lexical properties of words used. Verbs and Nouns will be very idiosyncratic as far as what they select as complements. Note that functional categories like C, T and P are not so picky. C always selects TP, T always selects VP, and P seems to almost always select NP.

II. Movement

Yes/No question movement

9. Q. Will the man from Kentucky like coffee in the early afternoon?
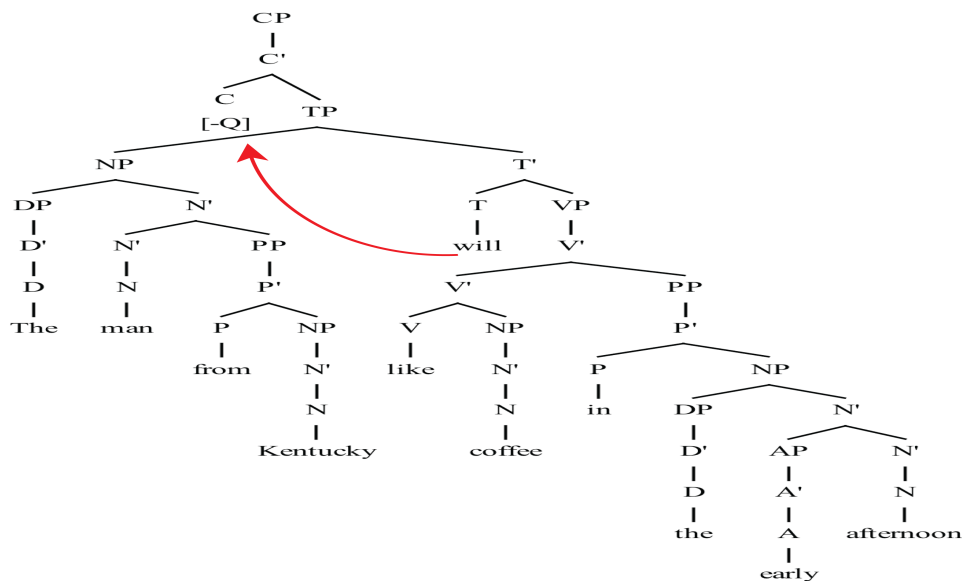
10. A. Yes, ~~the man from Kentucky like coffee in the early afternoon~~

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The structure of a question is related to the structure of its answer. The structure of (9) shown in the tree above is related to the omitted part of the question in (10). How? Via movement, an operation that allows single words or constituents to behave as if they occupied more than one position and, at the same time, be pronounced in only one position. In the example above in (10), the word *will* functions as the head of Tense and as the Yes/No question marker in C. The arrow depicts this relationship. Note that the structure in (9) minus movement is the structure of the answer in (10). We say that both share the same deep structure, and (9) is derived from (10).

Things are more tricky with Wh-question formation. Here we have two movements. One responsible for Yes/No questions and another which moves the wh-NP constituent to the specifier of C.

11. Q. What will the man from Kentucky like in the early afternoon?

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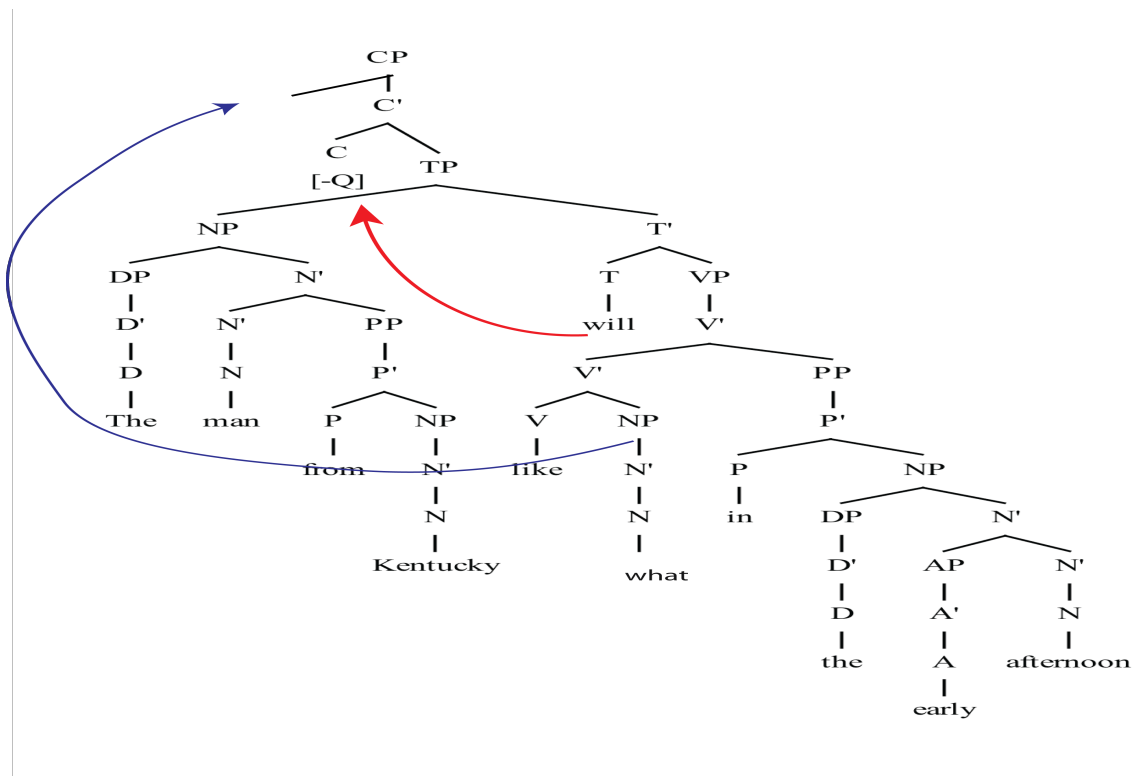
Wh-words have special semantics, they behave like variables for the things they can replace in the sentence. *What* can replace anything that is inanimate in the clause in (11): coffee, tea, walks on the beach, etc. This means that one possible answer is:

12. The man from Kentucky will like what=coffee in the early afternoon.

Again, (11) and (12) are related. Example (11) is derived from (12) and retains the core properties of Tense being future, as well as the notion that an inanimate objects is being liked, encoded via a theta role discharged onto the complement of *like*.

There is evidence for movement. For one, in moved structures we cannot fill the 'gaps' with otherwise compatible phrases. Take our example, first with just yes/no movement and then with wh-movement:

13.   *a.   Will the man from Kentucky can like coffee in the early afternoon
       b.   The man from Kentucky can like coffee in the early afternoon
14.   *a.   What will the man from Kentucky can like tea in the early afternoon
       *b.   What will the man from Kentucky like tea in the early afternoon
       b.   The man from Kentucky can like tea in the early afternoon

As we can see above, in (13a) we cannot have a word like *can* occupy the position vacated by the movement of *will* although, as (13b) shows, with no movement the structure is fine. The same logic applies to (14a). Here *tea* cannot occupy the slot vacated by movement of *what* and *can* cannot occupy the slot vacated by movement of *will*. Note in (14b) *tea* cannot occupy the slot vacated by movement of *what*, even if the slot vacated by movement of *will* is left empty. Example (14c) is again a control showing there is nothing wrong in using *can* and *tea* provided they do not occupy positions vacated by movement.

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One final note, movement does not impact PS rules. It is a different component of the grammar relating different structures generated by PS rules and X-bar. Movement is a solution to the tension between, for example, operations like question formation requiring a NP to be in Spec-C, and requirements for complements to be sisters of the verb so that they get a theta role. These two requirements place the NP = what in a difficult position: it needs to be a complement (sister) of the verb and at the same time be in the Specifier of C. Movement solves this tension. As mentioned in class, not every variation of word order is movement. Across languages we see variation between the relative order of the verb and its complement. Take Turkish:

15.   Yusuf   elmayı yedi.

        Yusuf   apple ate

        'Yusuf ate the apple'

In the example above the first line is the actual example, line two is a gloss - a word for word translation, and finally line three is the translation into English. We see that Turkish has a mirror image word order of the verb and its object when compared to English.

16.   John ate the apple.

Is this movement? This is subject to debate. However, if you examine the diagram in (5) you will notice that the definition of a complement is: *sister of X*, but that can be drawn as in (17) below:

        17.Turkish
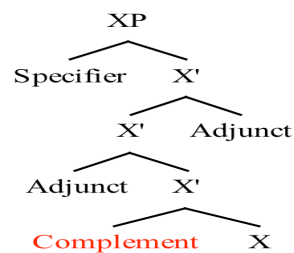
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In (17), the complement is still the sister of X. In fact, Specifiers can be 'flipped' too. The ability to 'flip' sisters of a phrase might be the source of some language variation as far as word order. This would mean that word order is parametrized. The definition of a complement is universal, but has to be further specified at the level of each language as far as the relative order of the head and its sister. This is called the head parameter. The assumption is it is set by every child during language acquisition.

III. Appendix Constituency tests:

Constituency Tests

Below is a summary of some tell-tale signs that a string of words behaves as a unit. These 'tests' should never be used in isolation. Use caution in using them. If a given string X fails any of these tests that does not mean it is **not** a constituent. Like in any empirical science, a negative result does not prove much. Only positive outcomes tell us that X is a constituent.

A. Modification

If you see an Adjectival Phrase modifying a string, that string of words is usually an NP.
If you see an Adverbial Phrase modifying a string of words, it is usually a VP.

B. Cleft constructions (usually NP)
Take a sentence:

18. He photographed the store on Fifth Avenue.

You can use a cleft construction
It was X that did Y

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To make A into B

19. It was <u>the store on Fifth Avenue</u> that he photographed.

C. Ellipsis (usually a VP)

Take a sentence:

20. John photographed the store on Fifth Avenue and

Mary photographed the store on Fifth Avenue.

You can elide certain strings if they are similar enough to a preceding antecedent after factoring out something that has contrast. X=John and Y=Mary are that contrast, the similar part is <u>photographed the store on Fifth Avenue.</u>

21. X <u>photographed the store on Fifth Avenue</u> and

so did Y [~~photograph the store on Fifth Avenue~~].

So our example is:

22. John photographed the store on Fifth Avenue and

Mary ~~photographed the store on Fifth Avenue~~ did so too.

D. Coordination (Phrases of the same kind NP, VP, PP etc.)

Take a clause with NP coordination:

23. John photographed <u>the store on Fifth Avenue</u> and <u>a town in the Rocky Mountains.</u>

or one with VP coordination:

24. John <u>photographed the store on Fifth Avenue</u> and <u>painted a town in the Rocky Mountains.</u>

If a string X can be coordinated with a string Y, then X and Y are constituents of the same type. Coordination can be tricky, you need to know what the length of the string is before 'and'. How do we know <u>the store on Fifth Avenue</u> is that string in the above clause? We need to use other constituency tests. For example, clefting:

25.   It was <u>the store on Fifth Avenue</u> that John photographed.

E. Pronoun replacement (Noun Phrases)

Take our sentence:

26. John photographed <u>the store on Fifth Avenue</u> and I painted it.

The pronoun 'it' refers to <u>the store on Fifth Avenue</u>. In general, a string X is a constituent if it can be a referent to a pronominal, or more generally a pro-form (replacing other things that just nominals).

F. Fragments (usually PP, NP, VP)

Take our clause:

27. John photographed the store on Fifth Avenue.

Turn it into a wh-question (ones using words like who, what, which, where, how)

28. Q What did John photograph?
Answer it:
        - The store on Fifth Avenue = NP

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29. Q What was John doing?

    -Photographing the store on Fifth Avenue = VP

G. PP preposing

A PP can usually be preposed to the front of a sentence:

30. John saw Jupiter <u>with a telescope</u>

31. <u>With a telescope</u> John saw Jupiter