

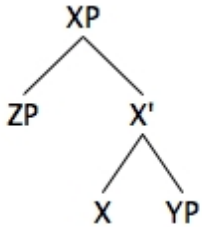
The Phrase Structure Component of our Grammar of English
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September 29, 2011

Our goal with this assignment is to clearly and concisely lay out our current view of X-bar theory. In doing so we have decided, first, to introduce our current grammar without much in the way of explanation, second, to justify our theory's inclusion of each of its structures with the use of salient examples, and lastly, to discuss the pieces of our theory that are either problematic or unsatisfying.

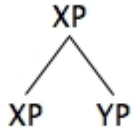
Section 1: Our Current Grammar

X-bar Theory maintains that there are certain structures that are universal across languages. Our current rendition of this theory holds that there are five of these structures, which are as follows:

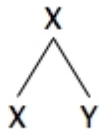
1. Heads, Maximal Projections, Complements, and Specifiers.



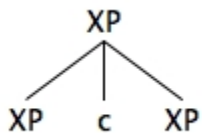
2. Phrase Adjunction.



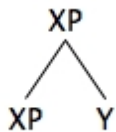
3. Head Adjunction.



4. Coordination.



5. Adverbs.



Assumptions:

1. The structure is unordered.
2. Languages can impose orders.
3. Adjuncts are always optional.
4. There can be no more than one specifier.
5. Adjunction is possible to maximal projections or heads, but not to intermediate projections.
6. Every phrase must have exactly one head, regardless of whether or not it is overt.
- (7. The features of a head are shared by its projections. And assumption that isn't truly part of X-bar Theory as features are irrelevant in X-bar Theory, but an assumption that must be stated all the same.)

These structures and assumptions are integral to our theory, but in order to have an English grammar, we must add language specific elements, specifically phrase structure rules, form rules, and a lexicon.

The language specific elements of our grammar begin with the rules that provide information about the possible hierarchical ordering of a structure. These rules are as follows:

$CP \rightarrow C'$
 $C' \rightarrow C TP$
 $TP \rightarrow T'$
 $T' \rightarrow T VP$
 $T' \rightarrow T NegP$
 $NegP \rightarrow Neg'$
 $Neg' \rightarrow Neg VP$
 $VP \rightarrow V'$
 $VP \rightarrow DP V'$
 $V' \rightarrow V$
 $V' \rightarrow V (DP) (AP) (PP) (CP)$
 $DP \rightarrow (DP) D'$
 $D' \rightarrow D \{NP\}$
 $\quad \quad \quad \{VP\}$
 $NP \rightarrow N'$
 $N' \rightarrow N$
 $NP \rightarrow AP NP$
 $NP \rightarrow NP PP$
 $NP \rightarrow N (PP) (CP)$
 $AP \rightarrow (Deg) A'$
 $A' \rightarrow A$
 $PP \rightarrow P'$
 $P' \rightarrow P DP$
 $RP \rightarrow R'$
 $R' \rightarrow R PP$

Although this bridges on the realm of morphology, our grammar must also contain rules that contain information concerning the form that a certain word, specifically a pronoun or a verb, must appear in based on their local environment. These form rules are as follows:

$Pn \rightarrow \text{Nom/subject position}$
 $Pn \rightarrow \text{Acc/elsewhere}$
 $V \rightarrow \text{singular form/DP T _}$

[3sg][pres]

V→past/T_

[past]

V→past participle/have I _

V→present participle/be I _

V→base/elsewhere

While the information contained in both the phrase structure rules and form rules is extremely important, they are impossible to put into use without information about where words fit into these rules. This information is stored in the lexicon.

Section 1.1: The Lexicon

Within the phrase structure, there are end nodes called heads. Heads are really the only substantial units of the structure, as they are the words of the sentence. Everything else is a framework that describes the relationships among these words. All words are heads. Not all heads are words, however. Heads can be functional things like tense markings or bound morphemes like the possessive “s.” Without getting too far into that, however, there is the lexicon. The lexicon is where all heads are listed. The lexicon is much more than just a vast list of heads, however. Heads all belong to categories that describe where they can appear in the phrase structure grammar. For instance, “on” is a preposition. It is predicted that “on” will only appear as the head P in a prepositional phrase, such as “on the table” in “I put the book on the table.” This distinction is a very basic notion, but is important in that by assigning words to lexical categories, it can be predicted where a type of word can and cannot occur. For instance, and adjective such as “hungry” cannot occur where a noun is predicted to occur, such as in “*Harvey chased the hungry into the barn.”

This simple distinction is not quite enough, however. The framework describes where heads can occur and what relationships they can have with other heads and phrases, but the phrase structure grammar does not specify when certain heads/phrases are needed. Take verbs, for instance. Consider “give” in particular. A grammatical sentence containing “give” looks like this:

I gave the book to the pig.

Think about what is going on in this sentence. What entities are participants in the event described by this sentence? Well, there is “I,” the giver of the book. There is “the book,” which is the object being given. And there is “the pig,” the recipient of the book that was given by me. This sentence is no good if it doesn’t contain all three of these parts.

- *I gave the book.
- *I gave to the pig.
- *Gave the book to the pig.

Now, think about a verb like eat. Eat needs an eater and that’s it (“The pig ate”). It can also have a thing being eaten (“The pig ate the food”). It doesn’t need a recipient the way “give” does,

however. In fact it cannot take a recipient. So how do we account for the fact that these two verbs occur as V's in the phrase structure, but mandate different things? Well, the parts they select for are called arguments, and each verb has its own argument structure. "Give" selects for a giver, called an agent; a thing given, called a theme; and a recipient of the thing given, called a recipient. "Eat" selects for an eater (agent) and if it is transitive, a thing eaten, (theme). Knowing what arguments of what thematic categories a verb takes is often instrumental in recovering the deep structure of a sentence that has undergone many transformations. This is because if we know that "give" assigns 3 thematic roles, then we know that in the sentence are 3 arguments that belong to "give," regardless of their position after transformations.

Now, while verbs assign thematic roles which helps them select for their arguments, this does nothing in the way of phrase structure grammar. Thematic categories are not phrases nor lexical categories. Verbs also need subcategorizations--restrictions on what phrases can occur in their complement and specifier positions. Take "on" and "to" for instance. Both are prepositions. They can both occur as the head of a PP as in "I walked to the beach" and "I walked on the beach." Now, consider "I gave the book to Robert" and "*I gave the book on Robert." The two sentences seem identical except for the preposition, yet the latter is ungrammatical, meaning that the distinction of preposition as a lexical category is not sufficient. This is why we have subcategorizations. It is clear that "give" requires a PP, because sentences like "*I gave the book" are no good. "Give" must select for its complements. In particular, it needs a DP and a PP. More specifically, it needs a PP headed by "to." The subcategorization for give would be notated as:

$$\text{Give, V } \langle \text{DP } [_ \text{ DP PP}] \rangle$$

on

Verbs are not the only heads that can subcategorize. All heads have a subcategorization listed in the lexicon. Subcategorizations are essential for limiting what types phrases can occur where. There are CP's, DP's, etc., but there are also different kinds of each phrase type, and it is based upon their head. A head can subcategorize for its complement and specifier, and by extension the head of its complement.

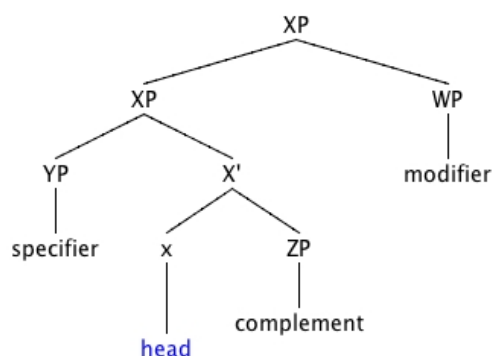
Section 2: Justification of X-bar Theory Structures

Section 2.1: Specifier and Complement Structures

Our current phrase structure is set up in a hierarchical system, called the X-bar Theory, which establishes that the head of a sentence is the core of a phrase and is thus ranked below an intermediate bar level in order to indicate the hierarchical relationships between a head and the maximal projections within a phrase. Another way to put it is that a head is one entity of the X-bar theory, and specifiers, complements and modifiers are fixated around the head as maximal projections that add more information to the phrase as a whole.

While the X-bar theory is our theoretical model, the lexicon is what holds the true semantic information, where we can assess whether the head of XP selects for a specifier and/or complement. The hierarchy of the X-bar structure sets up the projections in a logical way, where

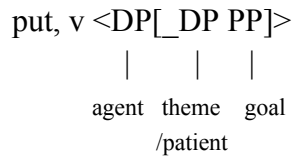
the heads are at the core of the structure and are in close proximity to their potential arguments, the specifier and the complement(s). The potential modifier(s) or adjunct(s) are attached at the third level, the farthest point from the head, which makes sense because adjuncts and heads behave independently from one another, since an adjunct can never be subcategorized for by a head.



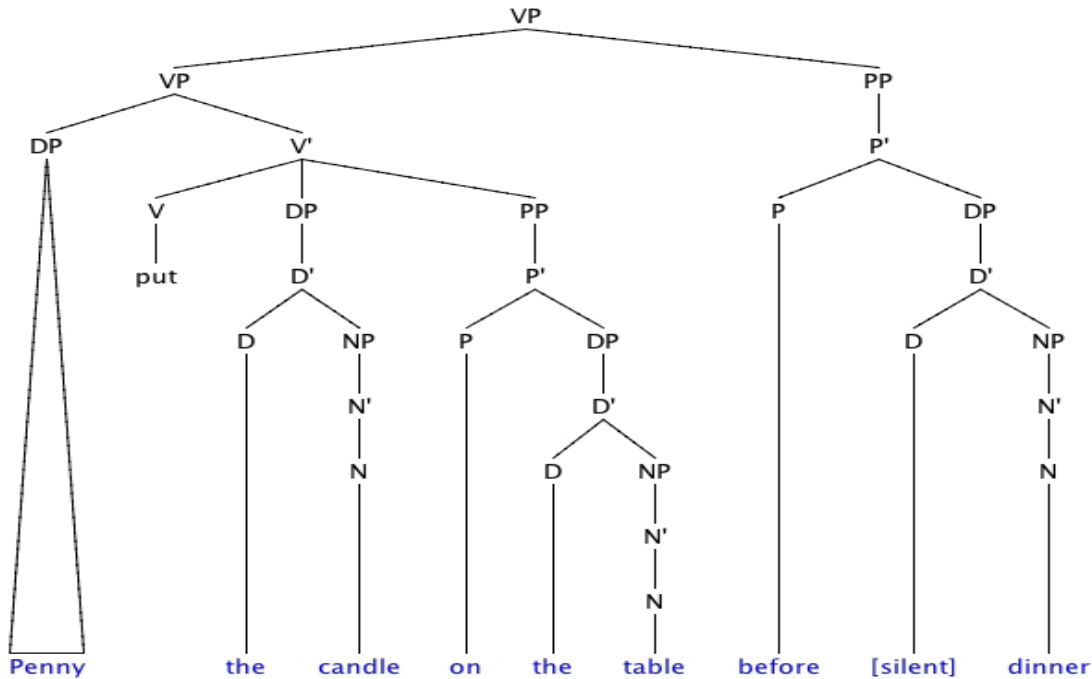
Any phrase is able to conform to this structure, but it is not mandatory that each projection be filled. For example, there are many phrases that are composed of just a bar level, a head, and a complement if the head selects for one. Modifiers are optional and never selected for, and we typically only see specifiers at the deep structure in VPs, possessive DPs, and sometimes APs. Even when a head does not select for a specifier, like the verb ‘seems’, for example, the phrase structure rule $VP \rightarrow V'$ is still considered to fall into the standard structure of X-bar theory; the VP in ‘seems’ wouldn’t have a specifier projection at DS, but the TP would acquire the subject from a downstairs clause after the transformation *subject-to-subject raising*. Thus our theory of transformations have to conform to X-bar theory as well. As long as any part added to the structure has one of the five X-bar structures, and the structure is in the correct hierarchical order, then our derivation will comply to our theory. Thus when projections are missing from a phrase, it can still be assumed that X-bar theory still holds. A good example of a minimal projection appearing to be ‘absent’ from a phrase is a CP with a silent C. The structure of a C’ is still maintained, yet the C is marked with a [silent] feature, that takes a TP complement. Of course, our structure doesn’t allow there to be a phrasal complement without a head, which makes this example a little different from a head existing without a specifier or complement. However, it’s important that the structure remain constant even if a projection appears to be empty. Our standard bar structure needs to allow the possibility of a head projection, and the maximal projections of a specifier, complement, and modifier, throughout a derivation at all times.

In the case of a VP with a specifier at deep structure, a verb and its arguments are stored in the lexicon where an extended subcategorization is theoretically held. As we have already established, a verb will only ever select for one specifier, and its subcat will determine whether it has a complement, and whether it has more than one. For instance, in the sentence, *Penny put the candle on the table before dinner*, the verb ‘put’ selects for three arguments: (1) the putter (the agent), (2) the thing that is ‘put’ (the theme/patient), and (3) the location of where the thing is put

(theme or goal):



The PP ‘before dinner’ is an adjunct and is not considered to be any argument to the head verb.



This is the deep structure of the VP in accordance with X-bar theory. The left DP to the intermediate bar level of the verb head expresses the specifier relation that the head selects for, as well as the head's two complements to its right. I suppose we should mention here that although the X-bar theory displays binary branching, there is no real evidence to support a theory that a head can only have one complement, which will be discussed in 3.2. One of our rules that directly contradicts such a claim is the VP, which has four complements.

Section 2.2: Adjunction Structures

There are two adjunction structures present in our current X-bar Theory, phrase adjunction and head adjunction. For each of these adjunction structures we will illustrate why their presence in our theory is necessary by using a characteristic example.

Phrase adjunction creates a structure that allows one phrase to modify another, a structure that is an integral part of our theory due to the presence of sentences like the following:

1. The cat in the sun slept.

Initially, this sentence appears to have two main components that each function as units, specifically a determiner phrase (the cat in the sun) and a verb phrase (slept).

[The cat in the sun]DP [slept]VP

If we further consider the DP, we can see that it contains a determiner (the), a noun (cat), a preposition (in), another determiner (the), and another noun (sun). Although we initially created a theory in which all of these components were sisters in a single phrase, we quickly replaced this theory for one that utilized a hierarchical structure. This decision came from the evidence that certain elements within the determiner phrase act as phrases themselves.

Within the hierarchical structure, the lowest phrase in *the cat in the sun* is likely *the sun*, which appears to be a DP, as it looks identical to all of the other DPs we have seen. The next phrase seems to be *in the sun*, as it can be coordinated or altogether ignored:

The cat *in the sun on the porch* slept. (Coordination)

The cat slept. (Entire phrase optional)

*The cat slept *in*. (A partial phrase is not grammatical, which further suggests that ‘in the sun’ functions as one phrase. It is only okay to have a partial phrase when *in* is a particle, like in the sentence, *the cat slept in*, but *the cat slept on* is undoubtedly ungrammatical)

If we take it to be true that *in the sun* functions as a phrase, it should be a prepositional phrase as the preposition is a single word that would obligatorily take a DP complement. The next phrase would be *cat in the sun*, since it functions as a single unit that can be coordinated or substituted, as seen below:

The *cat in the sun* and *dog on the porch* slept. (Coordination)

The lazy *one* slept. (Substitution, from *The lazy cat in the sun slept*.)

If we take this to be a phrase, then it ought to be a NP as it occurs in exactly the same position that a noun phrase is expected to occur. Since this NP consists of a noun and a PP, we could make this PP a complement to a head, N, but this is problematic as we have assumed in our X-bar theory that complements (and specifiers) are selected for. It is unreasonable to suggest that a noun like *cat* selects for a prepositional phrase, as the noun is just as grammatical with or without the presence of the PP.

The cat *in the sun* slept.

The cat slept. (If *cat* selected for a PP, we would expect this to be ungrammatical.)

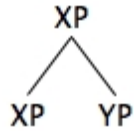
Since the PP cannot be a complement, specifier, or head (as it is a maximal, not minimal, projection), we must create a new structural position for it to fill. This position should be entirely optional, as a PP is never an integral piece of a NP, and it should also allow for the possibility of recursion, as seen in the sentences below:

The cat *in the sun* slept.

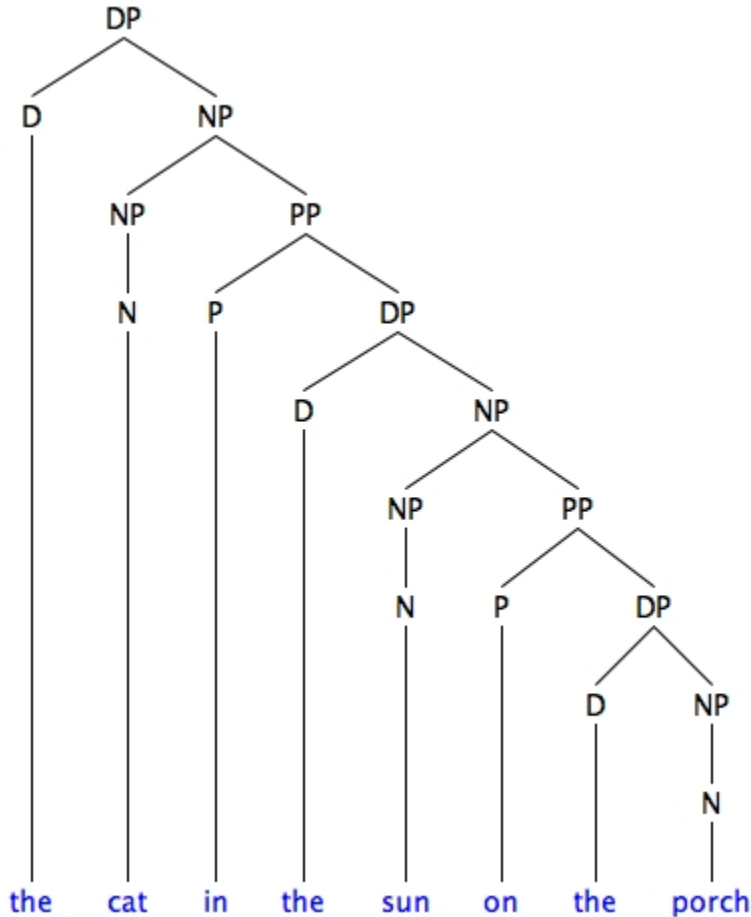
The cat *in the sun on the chair* slept.

The cat *in the sun on the chair on the porch* slept.

If we intend to capture these generalizations about the PP that modifies the NP *cat*, and we know that the entire phrase *cat in the sun* also functions as a NP, it seems logical to assume that a PP can adjoin to the NP it modifies to create a larger NP, in order to do this we would need to utilize the following structure:



If we apply our example above to this structure, it would result in the following:



We decided to include this in our X-bar Theory as it is structurally satisfying, in that it is an optional structure that allows for recursion, such as the structure above.

Head adjunction creates a structure in which one head modifies another. This structure must be an integral part of our theory in order to account for the structure of complex noun phrases (and $V \rightarrow T$ and $T \rightarrow C$ movement, as our theory works with the assumption that the output of transformations must conform to X-bar Theory at surface level). In order to demonstrate why this structure is a necessary addition to our theory, we will investigate complex noun phrases, for instance, the following:

state income tax law

We know that this must, in its entirety, be a noun phrase, as it can take a determiner and it occurs in all of the places that we would expect a NP to be.

The *state income tax law* was bad.

The bad *state income tax law* was disliked.

He hated the *state income tax law*.

He read the first clause in the *state income tax law*.

The fact that *state income tax law* can be found as a complement to a D, in subject position, in object position, in object position of a preposition, and be modified by an adjective, is all strong evidence that it is truly a NP. If this is the case then there should, in theory, be one head noun that takes other nouns as complements. However, this idea is problematic as it would predict that the head noun is ungrammatical without the presence of the other nouns and, as seen below, this is not the case.

The *state* was bad.

The *income* was bad.

The *tax* was bad.

The *law* was bad.

Since all of these sentences in which the nouns stand alone in their NP are still grammatical, it stands to reason that none of them take complements. If we look at more sentences, it also seems as though the nouns are functioning as modifiers, as they are optional and there is no limit on the number of nouns that can be strung together to form a complex NP.

The *tax* was bad.

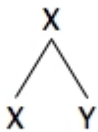
The *income tax* was bad.

The *state income tax* was bad

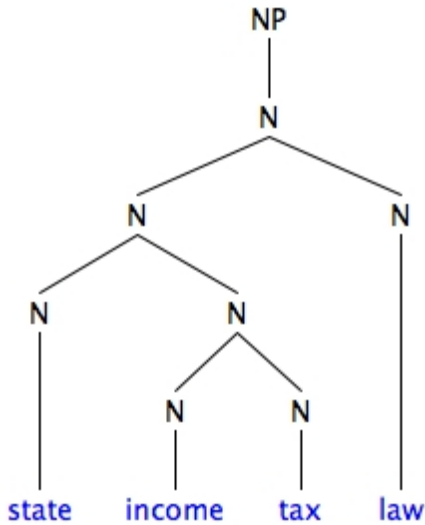
The *state income tax rebate* was bad.

The *state income tax rebate law* was bad.

Since these nouns appear to modify other nouns, it is within good reason that nouns should be able to adjoin to other nouns in order to create a larger (or complex) NP, utilizing the following structure:



When this structure is applied to the example we have been working with, the result is as follows:



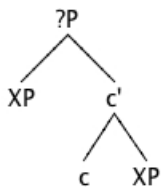
This new structure is satisfying as it, along with our assumptions about X-bar Theory, explains why these nouns are both optional and potentially unlimited. Consequently, we decided that it was an advantageous structure to include in our theory.

Section 2.3: Coordinate Structures

Another type of construction we see that requires special consideration is coordinate structures. In linear terms, coordinate structures consist of two or more phrases (XP) of the same kind strung together by a coordinator (c) such as *and*, *or* or *but*. In terms of the coordinate structure's place in the larger sentence, all the phrases and the coordinator(s) form a singular unit all descendants in some way or another of a larger XP. The reason the encompassing phrase is also an XP is because these coordinate structures will appear in exactly the same places as an individual inner XP would. For example the coordinate structure *Mateo, Danny and Delphina* consists of 3 DPs conjoined by the c *and* and can appear anywhere a DP can appear, namely in Spec V, as a complement to V or as a complement to a P.

When it comes to the internal structure of a coordinated structure, there are contrasting views. One hypothesis adheres to X Bar Theory and also has only binary branching. The other would have 3 or more branches stemming from the larger XP mother and this would be a new structure that we would have to add to our grammar.

Let's begin by examining the binary branching hypothesis because it adheres to our existing X Bar Theory. This theory would require the c to be the head of the coordinate structure because it is a zero level projection whose relatives are all maximal projections. One of the XPs would appear as the complement to c and one as its specifier as shown below:



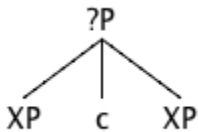
The first problem with this analysis is that according to X Bar Theory, the topmost phrase should be called a cP but as mentioned before, the coordinate structure acts like an XP

and appears where XP appears. If we kept it as cP, we would have to add cP into our Phrase Structure Rules any time a coordinate structure can appear. As pretty much any kind of phrase can be coordinated, we would have to add a whole slew of cPs everywhere. If we instead stipulate that the topmost node above just becomes XP in some way, we avoid all that trouble.

The second problem with this analysis is that heads should select for their specifiers and complements. There is nothing about any of the c's which restricts or selects for any specific complement or specifier. Any phrase can be coordinated with any other so long as they are of the same phrasal category. Also, the different c's can all appear with the exact same combinations of phrases.

The third problem with this analysis is that it makes it so that the XP on the left and the XP on the right have different relationships to the c. The XP complement on the right is more closely grouped with c. The XP specifier also c-commands the XP complement the possible ramifications of which we need to explore further. C-command aside, this asymmetric positioning of the coordinated XPs is flawed because the XPs can appear on either side of the c without a change in meaning. For example, *Mary and John* and *John and Mary* have the exact same meaning as each other. All throughout the rest of X Bar Theory, the specifier and complement positions hold real and special meaning whereas here, the placement of each XP into one or the other position seems arbitrary.

The alternative way to form coordinate structures is with tertiary or more branching. Rather than one XP being a complement to c while others are in Specifier position, all coordinated phrases would be on the same level, branching from one node, along with the c.



This analysis still presents the same problem that the c should be the head because it's a zero level projection sister to maximal projections. Once again, within a sentence, this ?P acts like and appears in the same places as an XP. If we make the same stipulation above that the ?P steals information from one of the XPs, we avoid this problem. That both analyses have this same issue though is problematic and requires further attention.

The fact that there are 3 branches coming from one node here should not be problematic. We have seen before that V' can have 3 daughters: V and 2 complements. It would only be if you wanted to subscribe to binary branching theory that this would be a problem.

This analysis also avoids the problem of asymmetry that the above analysis has. No one XP has a closer relationship to the c and neither XP c-commands the other.

This structure is not currently in our X Bar Theory so we have to add it. This may seem like brazenly stipulating a new structure when there is already a possible way to treat it with our existing X Bar Theory. But this structure is so productive in that almost every type of phrase can be coordinated. There is also head to head coordination which provides further numerical support that our grammar might need this new structure.

Section 2.4: Adverbial Structures

Adverbs were one of the initial reasons why it was decided that it must be possible for heads alone to modify an entire phrase, i.e. XP => XP Y. The reasoning for this has to do with the nature of adverbs.

Adverbs move very readily, so it is not entirely clear where they attach in the deep structure. You can see adverbs at either the beginning or the end of sentences.

Yesterday, John went to the store

John went to the store yesterday

However, this does not take away from their importance. This is because it is still clear that adverbs don't have a specifier, or any complements. The closest facsimile to such would be things such as "just" and "only." We see these being used in the following sentences:

John baked cookies just yesterday.

Only yesterday Steve ate 100 cookies.

There can also be multiple of these before an adverb, such as in "Steve baked 100 cookies only just yesterday" or "Steve baked 100 cookies just only yesterday."

It is extremely important that there can be multiple of these before an adverb, and that they can be in any order, as this means that they cannot be the specifier of the adverb, and that the adverb cannot be a complement of "just" or "only." This is because we have never seen something that has the possibility of having two specifiers, and the only time we've seen something that can have either its own type of phrase as a complement or something else is with VPs. Assuming that this is correct, that adverbs are not the complement of "just" and that "just" isn't the specifier of an adverb, then the fact that some adverbs don't seem to work with "just" or "only" seems to be more of a semantics issue than a syntactic one. In the following ungrammatical sentences, making this assumption, we can presume the strangeness of the following sentences isn't syntactic ungrammaticality but semantic weirdness.

*John ate his cookies just quickly

*Only quickly I baked cookies

Beyond the relationship between words such as "just" and "only" and adverbs themselves, there is another important fact about adverbs that need to be taken into account. There can be an infinite number of adverbs in any given sentence.

I was baking cookies constantly yesterday

I was selling pies nonstop all day yesterday

So, adverbs must be in a modifier structure. Since adverbs must be in a modifier structure and they seem to have neither complements nor specifiers, it would be weird if they were simply a typical modifier structure, i.e. $XP \Rightarrow XP YP$. If there is no proof of a specifier or complements, there is no purpose for including them. For this reason, our current x-bar theory contains the structure type $XP \Rightarrow XP Y$. The following is an example of an XP being modified by just a head Y.



As for the specific phrase structure rules of adverbs in English, there are many, many unanswered questions. These questions will be dealt with in section 3, "Unresolved Questions and Issues."

Section 3: Unresolved Questions and Issues

Section 3.1A: Specifiers

As we discussed in class, there are still some pressing issues about our X-bar theory leaving out the fact that there could be potentially more than one specifier in other languages. This causes some what of a problem, since we want this theory to provide a structure that can be used across languages. The lingering question is where would an additional specifier fit in to our current x-bar structure?

Section 3.1B: 'Silent' heads

It remains unclear as to whether a silent head should be accounted for in the lexicon, or just be a feature of our phrase structure rules. Because of its silent feature, its unclear how it would select for a complement, yet it always does in the case of a silent C selecting for a TP complement.

Section 3.2: Binary Branching

Another issue some have about our X-bar theory is that it seems to support a notion of binary branching. This is based off the assumption that nearly every phrase has at most one head and complement, with an exception to NPs and VPs. In class considered revising our theory to include more than two branches, but the majority of our PSR conform to binary branching thus it may be detrimental to our current theory to complicate matters by adding multiple branches.

Section 3.3: DegP or AP

Another unresolved question that we have is how Degree words are incorporated into our grammar. Some of us have been working with a grammar that has DegPs in it and the maximal projection of a Deg P would look like this:



DegPs would be incorporated into our grammar with the following Phrase Structure Rules:

NP -> DegP NP

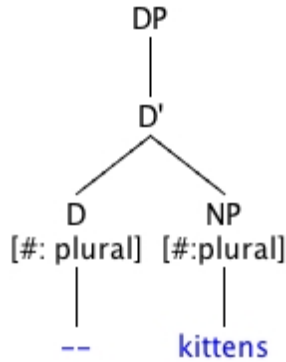
V' -> V (NP) (DegP) (PP) (CP)

This analysis of Degree words and Adjective phrases would look very similar to how Determiners and Noun Phrases look which would give consistency to our grammar. However, the motivation for the above structure of DegPs is problematic.

Let us first consider some sample DPs and the reasons why we give DPs the structure that we do.

- (1) The kitten ran away.
- (2) *Kitten ran away.
- (3) *These kitten ran away.
- (4) These kittens ran away.

As seen from (1)-(4) above, Ds and the nouns that follow them must agree in number. Our analysis of Ds and Ns is that NP is a complement to D and that the D subcategorizes for an N that agrees in number.



However, thinking about every language that we know enough about, we don't see any instances of Degs agreeing with their APs. If there were such a language, then that would give evidence in support of the above analysis of DegPs. If it is universally true that Degs do not agree with the APs that follow them, then we need to readjust our analysis.

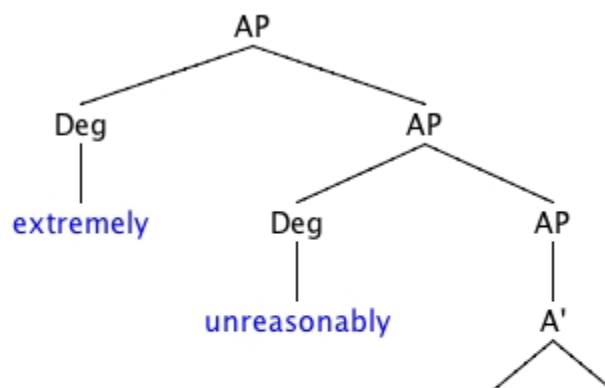
If APs are not complements of Degs then we need to decide what the relationship is. We know that Degs are not Specifiers of APs because a) heads select for their Specifiers and as we mentioned, there is no agreement between APs and Degs; and b) because there can be more than one Degree word for an AP.

Consider:

- (5) I am so very tired.
- (6) It is extremely painfully early in the morning.

We know that in our grammar, things that can occur in infinite number are modifiers. They are attached in the tree in adjunction structures. Degs can appear in infinite numbers, therefore they should be somehow adjoined to APs.

Furthermore, we believe that Degs never have Specifiers or Complements. Therefore just as with adverbs above, we can consider any zero projection of a Deg head to be both a maximal and minimal projection. Also from our investigation of adverbs, we know that zero projection heads can adjoin to entire phrases. Therefore we propose the following hypothesis:



Therefore our PS Rules would have to include:

NP -> AP NP

AP -> Deg AP

Of course, we would still need more investigation to either prove or disprove either of these analyses. As mentioned before, if there were evidence from other languages that Deg words and As agreed, we would go with the DegP analysis.

Section 3.4: Adverbial Phrases

Currently, there is no consensus on where adverbs are attached in deep structure. With surface structures, we see adverbs in at least three different positions when considering just sentences that don't contain embedded CPs.

I was baking cookies constantly yesterday

I was constantly baking cookies yesterday

Yesterday, I was constantly baking cookies

*I constantly was baking cookies yesterday

*I was baking constantly cookies yesterday

There are three word places where adverbs are seen, ignoring the actual syntactic trees and focusing on just word order - at the start of a sentence, at the end of a sentence, and between two verbs. However, it seems that not all adverbs can appear in all positions.

*I was yesterday baking cookies constantly

*Constantly, I was baking cookies yesterday

One interesting point that argues against adverbs being the leftmost thing in deep structure is that that constructions requires a specific prosody. When saying the sentence "Yesterday, I was baking cookies" you need to have a slight pause following "yesterday" or else the sentence sounds very odd.

Things become even stranger still when we consider adverb movement as well as WH questions, yes-no questions, and embedded CPs.

?Yesterday, who ate the cookies

*I know yesterday, who was baking cookies

I know that John was constantly baking cookies

I know that yesterday, John was baking cookies

*I know yesterday that John was baking cookies

This patterning is very similar to topicalization in that it moves to the right of the C when in an embedded CP, but moves to the left of the C in the root CP. The interesting point is that some adverbs can still appear between two V even in an embedded CP. However, since there are some adverbs that cannot appear between two V in this manner it would make more sense that in deep structure adverbs would be attached in such a way that they are the rightmost thing, such as VP => VP Adv. Overall, though, this is still very uncertain and could due with more investigation.