Our syntax is made up of a set of phrase structure rules, each of which fit into the X Skeleton. Our working hypothesis is that the X Skeleton, in combination with the statements that link how they are linearized, express what is a possible syntax.

(1) X Skeleton

Every phrase structure rule must be of the following kinds

a. XP $\rightarrow$ $\overline{X}$
b. XP $\rightarrow$ YP $\overline{X}$
c. $\overline{X}$ $\rightarrow$ YP $\overline{X}$
d. $\overline{X}$ $\rightarrow$ $\overline{X}$ YP
e. $\overline{X}$ $\rightarrow$ YP $\overline{X}$
f. $\overline{X}$ $\rightarrow$ $\overline{X}$ YP

Languages vary as according to which subset of these rules are used, but so far as we can see, it’s possible to use just these six rules to describe the phrase structure system of every language. Well, that’s too strong. We don’t understand why the rule that builds coördinations doesn't fit into these forms. And there are many constructions in many languages that we don’t yet understand well enough to be sure what their phrase structure is. A more accurate way of putting it is that, with the mystery of coördination set aside, what we are sure of about the phrase structure of sentences, it looks like the patterns in (1) is universally true. Let’s adopt this as our working hypothesis. English doesn’t seem to have any rules of the sort that (1e) describes, but all the other types are found.

An important step we took at the beginning was to concentrate not on the arrangements of particular words that make a grammatical sentence, but instead on the arrangements of word-types that make grammatical sentences. We did this because we saw that we have the ability to make grammaticality judgments even when we know nothing more about a particular word than where it can stand. For instance, if we are told that (2) is grammatical, we know automatically that (2a) also is and that (2b) isn’t.

(2) Many bloresnicks are on my ear.
   a. My bloresnicks are many.
   b. I am happy bloresnicks.

Our syntactic knowledge is not too dependent on the particulars of the meanings of the words involved, then.

On the other hand, our definition of syntax depends on the meaning of sentences. Our definition, recall, is (3), which makes reference to the semantic notion of “compositionality:”

(3) Syntax is the set of laws that determine which arrangement of morphemes are compositional.

To know when we have a compositional string – a phrase – we need to see that the particular meanings of the words in that string go together to make a larger meaning. We should expect, therefore, that the meanings of the particular words in a sentence will matter. Their meanings must fit together to make a larger meaning, after all, and this fitting together could easily involve more than just the kind of word it is.

Indeed, unsurprisingly our rules as they stand will make sentences whose meaning is decidedly odd. Consider, for instance, the examples in (4).

(4) a. Jerry danced with pickles.
   b. Jerry danced at noon at midnight.
   c. Jerry stood slowly still.
   d. a green idea

Some of these have weird, nonsensical, meanings because of what we know about the meanings of the words. We know, for instance, that pickles don't dance and that ideas have no color (for most of us). Some of these sentences have contradictory meanings – how can something happen at both noon and midnight?

As odd as the meanings of the sentences in (4) are, they are at least compositional. The phrases that make up these sentences obey our phrase structure rules,
and the words which have been put into the positions reserved for them bring meanings that do, as expected, compose into larger meanings. There are situations, however, where we seem to lose compositionality even though the phrase structure rules are obeyed. Consider, for example, the sentences in (5).

(5)  
   a. * Jerry laughed Mary.  
   b. * Sam gave it at Jill. 
   c. * Sally died whether you should eat better.  
   d. * Jim wondered to Kris.  
   e. * Jerry slapped.

Semantically, the particular verbs in these sentences have meanings that prevent them from semantically composing with the material that is in their phrase. Here are cases, then, in which the rules of semantic combination are responsible for preventing phrases from being formed. The particular meanings of the particular words involved in these cases do matter. If we match up the material in each of these VPs with different verbs, as in (6), the results are grammatical.

(6)  
   a. Jerry laughed.  
   b. Sam gave it to Kris.  
   c. Sally died.  
   d. Jim wondered whether you should eat better.  
   e. Jerry slapped his thigh.

What we are seeing, then, is that whether any particular string of words is compositional depends on both the form of those words (do they make a phrase) and the particular meanings brought into the picture by the word (can they compose semantically).

The study of the rules that allow the meanings of words to compose belongs to semantics, and we won't engage in that study here – it's a different class. But it will be useful to know a little bit about how semantics works in outline form. I will concentrate on describing how the meanings of VPs are composed, though what I describe carries over, more or less, to APs, NPs and PPs.

There are two broad ways in which material in VPs can be semantically combined. Sometimes the meanings of the verbs heading the VPs completely specifies how that verb will combine with a particular phrase. In that case, we say the phrase is the verb's argument. When a phrase is a verb's argument, its meaning refers to something that is involved in the event or state of affairs that the verb describes. Consider, for instance, the different semantic roles that the word Tuesday has in (7).

(7)  
   a. I [VP danced Tuesday].  
   b. I [VP remember Tuesday].

In (7b), Tuesday is an argument of remember. The thing Tuesday refers to, i.e. a particular time interval, is what is being remembered. When Tuesday and remember semantically compose, the meaning of Tuesday becomes part of the meaning of remember. That is, it becomes part of the event or state of affairs that a remembering is. By contrast, Tuesday is not an argument of danced in (7a). The thing that Tuesday refers to in this case is not part of the dancing event, but instead is used to locate that dancing event in time. We say in such cases that Tuesday is modifying the verb, and that Tuesday is a modifier.

A very similar thing can be seen by comparing the sentences in (8).

(8)  
   a. I met her on the bus.  
   b. I put her on the bus.

In (8b), the PP on the bus is an argument of the verb put. We can think of the meaning of put as involving two things and a location: a thing that does the putting, a thing that gets put and a location that the put thing gets put at. In (8), on the bus is the location that is part of put's meaning. By contrast, the PP on the bus in (8b) is not an argument of the verb met. Unlike put, the meaning of met does not intrinsically involve a location. Instead, on the bus in (8) is a modifier. The location it names is understood to be where the meeting took place.

Arguments can be phrases of any category. (9) has some examples.

(9)  
   a. She remains happy with Pickles.  
   b. She said that durian kills.  
   c. She seemed to like durian.  
   d. She has avoided durian.

In (9a), the AP happy with Pickles is an argument of remains, and in (9b), the CP that durian kills is an argument of said. In (9c), the verb seem has an argument that is the phrase to like Durian. That phrase, as it turns out, is a kind of IP, headed by the I to. There are some peculiarities of this IP that we will have to look at later, but it provides an illustration of an argument made from an IP. And finally, in (9c) is an example of a VP as argument. In this case, the VP avoided durian is an argument of has.

One way of talking about the relationship between a verb and its arguments is to say that the verb assigns a “θ-role” to that argument. When the argument is a DP or a PP, these θ-roles are sometimes given names to describe the kind of
semantic relation that is involved. So, for instance, the verb *send* takes three arguments, two DPs and a PP, and so we would say of *send* that it assigns three \( \theta \)-roles. Those \( \theta \)-roles are sometimes called “Agent,” “Theme” and “Goal.”

(10)  Sandy sent his book to Sean.

\[ \begin{array}{lll}
\text{Agent} & \text{Theme} & \text{Goal} \\
\end{array} \]

Another way of talking about the relation between a verb and its arguments is to say that the verb selects its arguments. So for *send* we would say that it selects three arguments. Usually this word “selects” is used to refer more particularly to the fact that the verb requires its arguments to be of a particular kind. So, for instance, *send* doesn’t just assign three \( \theta \)-roles, or have three arguments, it more specifically requires that two of those arguments be DPs and the other be a PP. This kind of information is built into the argument taking relationship. So, for instance, the verb *please* selects two DPs, and not a DP and a PP, as we can see from the contrast in (11). Whereas, by contrast, the verb *talk* selects a DP and PP, rather than two DPs, as we can see from the contrast in (12).

(11)  a. Jerry pleases Mary.
      b. * Jerry pleases to Mary.

(12)  a. * Jerry talks Mary.
      b. Jerry talks to Mary.

Whether a phrase semantically composes with another as a modifier or an argument turns principally on what the meaning of that phrase is. Some phrases only have a meaning that allows them to compose when they are arguments. So, for instance, most names and pronouns cannot modify. (An exception are names of time intervals, like *Tuesday.* ) For them to be able to semantically compose, they must be selected by something: a verb, preposition or adjective, for instance. Certain prepositional phrases are also only able to be arguments, not modifiers. PPs headed by *of, to and about* for instance, are almost always arguments. Other phrases, by contrast, have a meaning that allows them to either be an argument or a modifier. PPs headed by *on, under, beside* and other prepositions that describe locations can be either arguments or modifiers. We can describe this situation with (13).

(13)  If a phrase only has a meaning appropriate for an argument, it must be assigned a \( \theta \)-role.

This is why (5a), for instance, is ungrammatical.

(5a)  * Jerry laughed Mary.

Mary is an argument, but *laugh* does not assign it a \( \theta \)-role.

Another key ingredient in whether a phrase can form a compositional meaning turns on what the head of that phrase requires. A verb’s meaning can require that the phrase it projects contain arguments of the kind it selects. So, for instance, the ungrammaticality of (5e) traces back to the fact that *slap* requires an argument.

(5e)  * Jerry slapped.

Some verbs have obligatory \( \theta \)-roles to assign, and when they do, there must be an argument to which that \( \theta \)-role goes.

(14)  If a head has an obligatory \( \theta \)-role to assign, there must be a phrase with the appropriate meaning to receive it.

Some verbs seem to have optional arguments, and that is why (14) makes reference to obligatory \( \theta \)-roles. For instance, *talk* is grammatical with or without an argument PP headed by *to* in its projection.

(15)  a. Jerry talked.
      b. Jerry talked to Mary.

We can also see the action of (14) in how (16) gets interpreted.

(16)  Smith put it on the table.

We know that *on the table* has a meaning that allows it to be a modifier. We can see that in sentences like (17).

(17)  Smith ate it on the table.

But in (16), *on the table* cannot have that meaning. It cannot say where the “putting of it” event took place. Instead, *on the table* can only name the location that it ends up after Smith does the putting. That is, it is an argument of *put*, not a modifier of it. And this too follows from (14), for if *on the table* were to be a modifier in this example, *put* would not have a phrase to which its “location” \( \theta \)-role is assigned.

Sometimes (13) and (14) are put together and referred to by the name “the Theta Criterion.”

(18)  The Theta Criterion

  a. Every phrase that only has the meaning appropriate for an argument in a sentence must be assigned a \( \theta \)-role.
  b. Every obligatory \( \theta \)-role must be assigned to a phrase with the meaning appropriate for an argument.
The reason for the ungrammaticality of all the examples in (5) is that they violate, in way one or another, the Theta Criterion.

We need to say a little bit more than just that the two ways that a phrase’s meaning can be composed is through modification or \( \theta \)-role assignment. For both modification and \( \theta \)-role assignment, there are conditions that determine where the relevant semantic compositions are possible. I’ll concentrate here on the part of this that involves \( \theta \)-role assignment.

It’s easy to see that we need to say more than just that a verb must assign all of its obligatory \( \theta \)-roles to appropriate phrases for a sentence to be grammatical. We also need to say something about where those phrases must be. Where the arguments are depends on the \( \theta \)-role, it seems. To see this, consider the verb kiss, which assigns two \( \theta \)-roles, we can call them “Agent” and “Patient.” The Agent \( \theta \)-role is borne by the DP that refers to the individual who is kissing and the Patient \( \theta \)-role is borne by the DP which refers to the individual that is kissed. Those two \( \theta \)-roles are successfully assigned to arguments in (19).

We’d like to make sure, however, that the Agent \( \theta \)-role is assigned to the DP Smith, and not to Jones, which should instead get the Patient \( \theta \)-role. In addition to the Theta Criterion, then, we’ll need rules that determine which \( \theta \)-roles go to which arguments.

As the example in (19) illustrates, verbs assign some \( \theta \)-role to whatever is in Specifier of IP and others are assigned to phrases within the VP. Let’s assume that the \( \theta \)-roles that come with a verb are marked as to whether they are assigned to the thing in Specifier of IP or not. The \( \theta \)-role that gets assigned to Specifier of IP is sometimes called the “external \( \theta \)-role.” So, let’s imagine that when you learn a verb, you also learn the \( \theta \)-roles it assigns along with which of them (if any) are external. If we designate the external \( \theta \)-role with an underline, then some examples of this set-up are in (20).

\[[20] \begin{align*}
\text{a. kiss: } & \text{Agent, Patient} \\
\text{b. put: } & \text{Agent, Theme, Location} \\
\text{c. fear: } & \text{Experiencer, Cause} \\
\text{d. annoy: } & \text{Agent, Experiencer} \\
\text{e. donate: } & \text{Agent, Theme, Goal}
\end{align*}\]

We see in (20) some other examples of \( \theta \)-roles. “Theme” is a \( \theta \)-role that is assigned to an argument that undergoes motion as a result of the verb’s action. “Experiencer” is a \( \theta \)-role assigned to an argument that refers to an individual that has a mental experience as the result of the verb’s action. “Goal” is a \( \theta \)-role assigned to an argument that refers to something to which the verb’s action is directed. “Cause” is assigned to an argument that refers to something that causes the verb’s action. None of these terms should be thought of as precise semantic definitions of the meanings involved; they are merely handy ways of distinguishing them.

We can describe how \( \theta \)-roles are assigned with (21).

\[[21] \text{A head’s external } \theta \text{-role is assigned to the Specifier of the smallest IP containing that head. All other } \theta \text{-roles are assigned to phrases within a projection of that head.}\]

The “smallest IP” part of the rule is designed to allow kiss to assign its external \( \theta \)-role to Smith in the first, but not the second, of (22).
We might need to be more specific about where the non-external \( \theta \)-roles, or “internal \( \theta \)-roles,” as they are sometimes called, can be assigned. There seems to be a preference for the internal arguments of a verb to be closer to that verb than modifiers. Consider, for example, (23).

(23)  
   a. She put it after dinner in there.  
   b. She put it in there after dinner.

The verb *put* assigns a Location \( \theta \)-role to a PP. In (23b), that \( \theta \)-role is assigned to *in there*; the other PP, *after dinner*, is a modifier. In (23a), by contrast, it's harder to understand *in there* as getting the Location \( \theta \)-role. English speakers prefer the order in (21b), if *in there* gets the Location \( \theta \)-role, or, alternatively, they understand *after dinner* to be the Location argument of *put*, and find a way of making *in there* be a modifier. In response to facts like these, let's formulate our rules for \( \theta \)-role assignment with (24).

(24)  
   Theta Role Assignment Rules  
   
   a. The external \( \theta \)-role for a head, \( \alpha \), is assigned to the Specifier of the smallest IP containing \( \alpha \).  
   b. The internal \( \theta \)-roles for a head, \( \alpha \), are assigned to phrases within a projection of \( \alpha \) that contains no modifiers.

We've seen verbs that assign one external \( \theta \)-role, and no internal \( \theta \)-roles, verbs that assign one external \( \theta \)-role and one internal \( \theta \)-role, and verbs that assign one external \( \theta \)-role and two internal \( \theta \)-roles. Some examples of these kinds of verbs are in (25).

(25)  
   a. no internal \( \theta \)-role:  
      i. Smith ran.  
      ii. Jones sang.  
   b. one internal \( \theta \)-role:  
      i. Smith met Jones.  
      ii. Smith talked to Jones  
      iii. Smith said that things happen.  
   c. two internal \( \theta \)-roles:  
      i. Smith put Jones on the bus.  
      ii. Smith donated Jones to the charity.  
      iii. Smith explained to Jones that things happen.

There are also verbs with no external \( \theta \)-roles, though they are rarer. The verbs *appear* and *seem*, for instance, have no external \( \theta \)-role, but do have two internal \( \theta \)-roles. This is exemplified in (26).

(26)  
   a. It seems to Smith that things happen.  
   b. It appears to Jones that things happen.

One of these two internal \( \theta \)-roles is optional for both *appear* and *seem*, and so they can also be found in sentences like (27).

(27)  
   a. It seems that things happen.  
   b. It appears that things happen.

Note that the *it* in these examples isn't an argument of *seem* or *appear*. The phrase that describes what it is that seems or appears is the CP that follows these verbs. The *it* in these sentences, then, is different than the *it* in (28).

(28)  
   a. It ran.  
   b. It sang.
These versions of *it* are arguments. They refer to something, and that something is what these sentences say ran or sang. The versions of *it* in (27) are also not the versions we see in (29).

(29)  
a. She said *it*.  
b. He thought *it*.
These versions of *it* are also arguments. They refer to the things that these sentences say were said or thought. Unlike the *its* in (28), they don't refer to “animate” things – things that can run or sing. Instead, the *its* in (29) refer to the kinds of things that can be said or thought – things that are expressions of ideas, I guess. It might appear that the versions of *it* in (27) could be these *its*. But if the *its* in (27) refer to the ideas that seem or appear, and therefore are the arguments that get a θ-role from *seem* and *appear*, then what are the CPs that follow these verbs doing? It’s these CPs that refer to the idea that *seem* and *appear* are describing, and that means that the *its* can’t be.

The *its* in (27) are also not modifiers, however. Indeed, it’s difficult to discern any meaning that the *it* has in these sentences. The present hypothesis is that these *its* have no meaning. Expressions which have no meaning are called “expletives,” and one expletive in English is *it*.

Another place we see the expletive *it* is with verbs that assign neither an external nor an internal θ-role. Some examples of these verbs are in (30).

(30)  
a. It rains.  
b. It snowed!

The *it* in these sentences clearly doesn’t refer to an idea, like the *its* in (29), and it probably doesn’t refer to a thing, like the *its* in (28) (what would that thing be?), so our present guess is that these are expletive *its* as well.

Now interestingly, none of these sentences with expletives are grammatical if we leave them out.

(31)  
a. * Seems that things happen.  
b. * Appears that things happen.  
c. * Rains.  
d. * Snows again!

This follows from our phrase structure rules, which require that there be something in the Specifier of every IP. This particular fact about the phrase structure rules is sometimes given a name. It’s called the “EPP” (\([?l^i? ?l^i ?l^i]\)), which is an acronym for “Extension (to the) Projection Principle.”

(32)  
EPP  
Every IP must have something in its Specifier position.

The Projection Principle is the name for a hypothesis about the law that determines where θ-roles are assigned. It’s a law that we won’t look at in this class. It would explain why external and internal θ-roles go to the particular positions in a phrase marker that they do. That is, the Projection Principle would replace (24).