Syntax
John Goldsmith
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Syntax

It has long been recognized by linguists that the construction of a sentence is more than stringing a set of words together: there is a structure to it, one which is not usually indicated in the written form of the language but which is there for us to analyze. Starting in the 1940s, American linguists used ambiguous sentences — strings of words with two obviously different analyses—to drive this point home. Here are some examples of that; headlines are particularly good sources of funny ambiguous sentences:

1 Thanks to Jason Merchant for comments on an earlier version.

2 Thanks to the morphology book by Mark Aronoff and Kirsten Fudeman.

| British Left Waffles on Falkland Islands. |
| Miners Refuse to Work after Death. |
| Eye Drops Off Shelf. |
| Local High School Dropouts Cut In Half. |
| Reagan Wins on Budget, But More Lies Ahead. |
| Squad Helps Dog Bite Victim. |
| Juvenile Court to Try Shooting Defendant. |
| Kids Make Nutrious Snacks. |

We will develop a method that will generate two analyses for these sentences, like the two below for the first example above:

\[(1)(a)\]

```
S
  NP
    adj
    British
    noun
    Waffles
    verb
    Left
    PP
    on
    Falkland Islands

(2)(b)```

```
S
  NP
    noun
    British
    Left
    N
    Waffles
    verb
    NP
    on
    noun
    Falkland Islands
```
Phrase structure rules (PSR)

The goal of syntax is to understand how we put words together to create well-formed, and meaningful, sentences. It is clear right from the start that we are looking at sequences of words: words occur one after another, in sequence. What are the principles governing the relative order of words in sentences? Until the middle of the 20th century, thinking about this problem divided into two methods: in the first, individual words would be identified in the sentence by the role they played in a sentence. For example, in the sentence: Lee sent a birthday present to Kim, Lee is the subject, present is the direct object, and sent is the verb. In the second approach, the sentence would be broken up into smaller and smaller pieces.

In the mid 1950s, this second analytic approach was stood on its head, and linguists began to write synthetic rules that generated pieces of sentences. These pieces could be as simple as a word, or it could be very complex. These rules were formulated—first by Noam Chomsky—in a way that was inspired by mathematical logic. For example,

\[
(3) \quad S \rightarrow NP \ VP
\]

is a rule that says that an S[entence] can be expanded as an NP (a Noun Phrase) followed by a Verb Phrase. And we will have to immediately write some other rules to provide an answer to what those things are. We will expand VP in this way:

\[
(4) \quad VP \rightarrow \text{verb NP}
\]

and we will expand NP in this way:

\[
(5) \quad NP \rightarrow \text{det adj noun}
\]

We will distinguish between lexical categories, such as noun, adjective, and det[erminer], and phrasal categories, such as S, NP, or VP (sentence, noun phrase, and verb phrase). Lexical categories are the most specific things that our syntax will delve into, at least at the beginning; and our phrase structure rules.

We begin with an initial symbol (for now, S), which is expanded by means of phrase-structure rules, until the bottom categories of the tree that is created consists entirely of lexical categories; these lexical categories then are filled out with lexical items of the appropriate category (nouns, adjectives, and so on).

We will use lower case letters to specify lexical categories: this is not standard notation, but it is convenient.

We could write successive expansions in this way:

<table>
<thead>
<tr>
<th>expansion</th>
<th>the operative rule</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>(S \rightarrow NP \ VP)</td>
</tr>
<tr>
<td>NP VP</td>
<td>(NP \rightarrow \text{det adj noun})</td>
</tr>
<tr>
<td>det adj noun VP</td>
<td>(VP \rightarrow \text{verb NP})</td>
</tr>
<tr>
<td>det adj noun verb NP</td>
<td>(NP \rightarrow \text{det adj noun})</td>
</tr>
</tbody>
</table>
but it is much more common to draw this as a tree:

```
S
  |   |
 NP VP
  |   |
 det adj noun verb
  |   |
 NP
  |   |
 det adj noun
```

And this tree represents many millions of sentences, two of which are drawn here:

```
S
  |   |
 NP VP
  |   |
 det adj noun verb NP
  |   |
 the last delivery brought det adj noun
  |   |
 a wonderful package
```

```
S
  |   |
 NP VP
  |   |
 det adj noun verb NP
  |   |
 my favorite recipe includes det adj noun
  |   |
 a strange ingredient
```

Big Idea: the motivation for positing the rule \( NP \rightarrow \text{det adj noun} \) is that this sequence appears several times in the description of the English sentence, and we can make the overall description more compact if we posit this entity, the ‘NP’.

The more times we are able to simplify our overall description by re-using a phrasal (non-lexical) category like \( NP \), the better we believe our analysis is motivated. So, for example, there is another VP-expansion that is motivated by examples like *send a big present to the new teacher*. Instead of accounting for this with a new VP-expansion rules

(7) \( \text{VP} \rightarrow \text{NP prep det adj noun} \),

we write instead:
(8) $VP \rightarrow NP\ PP$

(9) $PP \rightarrow \text{prep\ NP}$,

where $\text{prep}$ is a lexical category of prepositions that includes such words as $to$, $for$ and $with$, and ‘PP’ marks a prepositional phrase. Thus the tree structure is not:

\[
S \quad \rightarrow \quad NP \quad \rightarrow \quad VP
\]

\[
NP \quad \rightarrow \quad \text{det\ adj\ noun\ verb\ NP\ prep\ det\ adj\ noun}
\]

but rather:

\[
S \quad \rightarrow \quad NP \quad \rightarrow \quad VP
\]

\[
NP \quad \rightarrow \quad \text{det\ adj\ noun\ verb\ NP\ prep\ det\ adj\ noun}
\]

**Alternative expansions of phrasal categories**

We have just noted that there are two possible expansions for $VP$: (i) verb + NP and (ii) verb + NP + PP. In general, phrasal categories do have a lot of different, but related, ways of being expanded, and this fact is a central part of the motivation for talking about phrasal categories in the first place. Let us explore this.

Now, there is an implicit *independence assumption* made when we posit a category such as NP or VP: no matter where that node is generated by phrase-structure rules, any of its expansions may appear in that position. There is a lot that is right about that assumption; but it is by no means the whole story, and to be perfectly blunt about it, it is far from true: it is, indeed, false. False but helpful.

For example, let us consider several possible expansions for NP in English:

Perhaps the first reference to this is in Pittman 1948: if we do not view a sentence as being hierarchically broken into parts, "one is almost compelled to regard every morpheme in an utterance as pertinent to the description of every other morpheme. But a good analysis in terms of immediate constituents usually reduces the total possible environmental factors of a given morpheme or sequence of morphemes to one: in other words, it states that the only pertinent environment of a given immediate constituent is its concomitant (the other immediate constituent)." (p. 287)
By positing these five different, but related, rules that expand NP, we are saying that any NP, any place in a sentence, can have any of those five structures. To repeat: that is not entirely true, but it is a good first step to take in approximating the way words are ‘distributed’ in English and in other languages.

It is often the case that we can simplify our analysis of a phrasal category by saying that a part of its expansion is optional. Instead of saying that we have both rules (i) and (ii) above, we say that det is optional, and the notation for that is a set of parentheses around the optional category:

13) NP → (det) noun.

Looking at all of the expansions given in (12xx), we would naturally be led to the conclusion that a better form of the NP rule would be this:

14) NP → (det) (adj) noun (PP)

(Discuss the consequences: more expansions predicted now.)

Ambiguous sentences

In analyzing ambiguous sentences, most of the time we assign two different syntactic structures, one with each of the intended interpretations, as we did with sentences (1a) and (1b), and in most of these cases, there are two or more words which are assigned different lexical categories in the two cases. In the sentence we considered, “Left” was a noun in the intended sense—perhaps a noun derived from a verb, but in any event, it referred to a political party, or a coalition of parties. In the unintended sense, “Left” was the main verb of the sentence, the past tense of the verb leave. Our analysis, then, predicts that if we change the word “Left” into some other word, some word that is not both a verb and a noun, the sentence should become unambiguous and not funny at all. That is true: there is no humor in British Right Waffles on Falkland Islands, or in British Leave Waffles on Falkland Islands. The humor of the ambiguity arises out of the totally unexpected collision between two different syntactic structures, themselves the result of simple phrase-structure rules motivated by an enormous number of simple rules.

By the way: not all ambiguities are like that; one of the most over-used ambiguous sentences, I saw the man with the telescope, is ambiguous in a strictly structural way. Is it the man with the
telescope that I claim to have seen, or am I just talking about some man and the fact that I looked at him through the telescope? These two senses correspond to two different syntactic structures:

We do not always know when an ambiguous sentence is syntactically ambiguous. Is they are married ambiguous? If not, where does the humor come from in They're married, but not to each other? How about Kids make nutritious snacks? That is ambiguous, but it may not be syntactically ambiguous. And what about My father always beat me ... at chess, at least?

Let's consider another ambiguous sentence:
The second structure arises unambiguously if we put in some words that allow no other analysis — for example, if the sentence had been *squad helps dog find master*.

**Constituents**

Any string of words that is generated by a single phrasal node in a given sentence is called a *constituent*. To analyze a sentence is to assign a tree structure to it, and by doing so, to analyze a set of constituents in the sentence. A good part of syntactic analysis is finding the right constituency structure for a sentence (we sometimes say, the right tree structure).

The most direct way to apply tests for constituency is to use the independence assumption that I mentioned earlier: if a string of words is a constituent – an NP, let’s say – then it ought to be possible to use that string of words in other sentences that seems
structurally rather different. If a string of words if a direct object NP (the price of tea in Japan in the sentence we compute the price of tea in Japan), then it ought to be possible to put the same string of words in places where we are already pretty sure that NPs can appear, such as in subject position of a simple sentence, or as the object of a preposition:

(16) The price of tea in Japan drives economic conditions there.

(17) I don't know much about the price of tea in Japan.

or other constuctions, such as the pseudo-cleft:

(18) What they study is the price of tea in Japan.

or the cleft (formed with it):

(19) It was the price of tea in Japan that was the most important factor, not the temperature in Seattle.

What does this test suggest about the constituency of The congregation sent the family flowers? Is the family flowers a constituent? The fact that the following strings of words are not good sentences suggests strongly that it is not a constituent.

(20)(a) *What they sent was the family flowers.

(b) *It was the family flowers that they sent.

More examples

A simple example illustrating constituent structure ambiguity: Fireproof clothing factory burns to ground.

(21) (i) fireproof clothing factory

We will look shortly at the difference between John turned over the book and John jumped over the puddle. Can you tell if over the book or over the puddle is a constituent?
This headline is funny because there are two interpretations of fireproof clothing factory, and the more natural one (more natural if we only consider that phrase) is contradicted by the larger context, the sentence. The more natural interpretation is that it concerns a clothing factory that is fireproof: fireproof then modifies (adds additional information to) clothing factory; clothing factory is a constituent in which clothing modifies factory, and together, clothing factory refers to the same kind of thing that the word factory does.

In short, when we analyze a noun phrase (roughly, a referring expression), one of the words within it expresses the type of thing that is referred to (here, factory). Typically, if any or all of the modifying material is be removed, the larger sense is vaguer but still roughly the same: factory burns to ground. Factory is said to be the head of the phrase Fireproof clothing factory: it is the element whose removal would most change the meaning of the phrase. The non-head element of a constituent is often called the modifier, or satellite. We know which structure is which in fireproof clothing factory because a non-head (or satellite) of a constituent C is not semantically modified by an element outside of that constituent. Structure (i) can be used to indicate a fireproof factory because factory is the head; that structure cannot be used to express a situation in which fireproof semantically modifies clothing.

English is relatively unusual in how poorly it marks nouns and verbs as distinct from a morphological point of view, and this can lead to multiple syntactic analyses. Time flies is famously ambiguous.
The interest of the headline: **GRANDMOTHER OF EIGHT MAKES HOLE IN ONE** relies on a structural difference: is [hole in one] a single item, or does it form two “sister constituents” in the verb phrase, as in *she put it in the bag* (or “…puts beans in nose”)?

(22) teacher strikes idle kids

(23) grandmother of eight makes hole in one

grandmother of eight puts beans in nose
Another nice way to sensitize oneself to syntactic structure is to look at garden-path sentences, like

1. Fat people eat accumulates.
2. The cotton clothing is usually made of grows in Mississippi.
3. The girl told the story cried.
4. The horse raced past the barn fell.
5. I know the words to that song about the queen don't rhyme.
Infinitives and embedded clauses

We generally use the term clause a bit more generally than the term sentence. We often find that what could be a free-standing sentence is part of—or, as we say, is embedded in—a larger clause. Consider:

(26)

\[
\begin{array}{c}
S \\
| \\
NP \quad VP \\
| \\
\text{the point of the story} \quad \text{verb} \\
| \\
\text{was} \quad S \\
| \\
\text{that no good deed goes unpunished}
\end{array}
\]

No good deed goes unpunished can appear as a free-standing sentence, and it appears in (x) as an embedded clause. Sometimes an embedded clause has largely the structure of a free-standing clause, though some parts of it are affected by the sentence in which it is embedded, as in this example:

(27)

\[
\begin{array}{c}
S \\
| \\
NP \quad VP \\
| \\
\text{the commission} \quad \text{adverb} \quad \text{verb} \\
| \\
\text{strenuously} \quad \text{denied} \quad S \\
| \\
\text{that any wrongdoing had been found}
\end{array}
\]

Any wrongdoing had been found cannot form a free-standing sentence: the possibility of the any in the embedded clause is the result of the negative sense that is implicit in the verb denied.

Thus embedded clauses may look different from main clauses. Sometimes the verb takes on a special form, as in the next sentence, or in a French sentence where the embedded clause has a verb in the subjunctive.

(28)

\[
\begin{array}{c}
S \\
| \\
NP \quad VP \\
| \\
\text{it} \quad \text{verb} \quad \text{AP} \\
| \\
\text{is} \quad \text{adj} \quad S \\
| \\
\text{that they be brought up on charges}
\end{array}
\]

\text{(28) crucial}
In many languages, the form of the embedded clause is considerably reduced when the subject of the embedded clause refers to the same person or thing as the subject of the higher clause—we say, when the subject of the upper and the lower clauses co-refer, as in:

(30) She never wanted her baby to become a vampire, for example — has the structure in (a) or in (b):
So: although there is controversy regarding the precise details of the analysis, let’s agree to represent verb phrases with an infinitive as VP (verb phrases) immediately dominated by S:

(32)

Auxiliary verbs

One of the most impressive and influential of the early generative analyses of English was Chomsky’s analysis of the English auxiliary. Let’s consider a range of possible auxiliary verb combinations. There is one thing that separates this data from the kind of data we have considered up to now. In the earlier examples, the choice of words that we made was essentially irrelevant; we included words by selecting nouns where the phrase structure rules generated “noun”, and likewise for the other categories. But here – each word or morpheme acts differently and uniquely. Why would we expect phrase-structure rules to work here? Either we will have actual words in our phrase-structure rules, or we will have to create categories that contain only a single item. The two pretty much boil down to the same thing.
You walk.
John walk-s.
John walk-ed.
John may walk.
John may have walk-ed.
John has walk-ed.
John is walk-ing.
John may be walk-ing.
John may have be-en walk-ing.

Sentences with -ed:
John may have walk-ed.
John has walk-ed.
John walk-ed.

Sentences with -ing:
John may is walk-ing.
John may be walk-ing.
John may have be-en walk-ing.

Sentences with 3rd p. sg -s:
John walk-s.
John is walk-ing.
John has walk-ed.

Sentences with -do:
You do walk.
John does walk.
*John does walk-s.
*John does may have walk-ed.
*John does has/have walk-ed.
*John does is/be walk-ing.
*John does may be walk-ing.
*John does may walk.
*John do may have be-en walk-ing.

Do you walk?
Does John walk?
May John walk?
May John have walk-ed?
Has John walk-ed?
Is John walk-ing?
May John be walk-ing?
May John have be-en walk-ing?

*You not walk.
*John do not walk.
*John does not walk.
John may not walk.
John may not have walk-ed.
John has not walk-ed.
John is not walk-ing.
John may not be walk-ing.
John may not have be-en walk-ing.
You were amaze-d.
John was amaze-d.
John may be amaze-d.
John may have be-en amaze-d.
John has be-en amaze-d.
John is be-ing amaze-d.
John may be be-ing amaze-d.
John may have be-en be-ing amaze-d.

<table>
<thead>
<tr>
<th>You</th>
<th>were</th>
<th>amaze-d.</th>
</tr>
</thead>
<tbody>
<tr>
<td>John</td>
<td>was</td>
<td>amaze-d.</td>
</tr>
<tr>
<td>John</td>
<td>may</td>
<td>be</td>
</tr>
<tr>
<td>John</td>
<td>have</td>
<td>be-en</td>
</tr>
<tr>
<td>John</td>
<td>has</td>
<td>be-en</td>
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<tr>
<td>John</td>
<td>is</td>
<td>be-ing</td>
</tr>
<tr>
<td>John</td>
<td>may</td>
<td>be</td>
</tr>
<tr>
<td>John</td>
<td>have</td>
<td>be-en</td>
</tr>
</tbody>
</table>

Table 1: English auxiliary

Let’s try to extract some basic generalizations concerning this data:

- No sentence with two words from the group called **modal verbs**: may, can, will, would, may, should, shall is grammatical; but one word from this group can co-occur with the other auxiliary verbs, such as have, be.\(^3\)

- When auxiliaries appear, their left to right order is summarized by a table:

| Modal verb | have (perfective) | be (progressive) | be (passive) | verb |
|------------|------------------|------------------|-------------|

- The auxiliary verb *do* does not appear when there is any other auxiliary present: any of the auxiliaries we are exploring. It only appears when there are no others.

- However, the auxiliary *do* can appear along with the possessive have and the real (not dummy) verb do: We do not have enough money to do that. Anyway, we do not do things like that.

- If the negative *not* is present, it appears after the left-most (i.e., the first) of all of these auxiliaries. And if we count the auxiliary *do* as belonging to this group (and we do!), then when there is a *not*, there **must** be an auxiliary.

**Chomsky and Syntactic Structure: the basics**

Chomsky’s account in *Syntactic Structures* (1957) was along the lines of what I have put in Figures 1 and 2 (I have made some changes that I think no one would disagree with, with hindsight).

Chomsky’s example was more like the Figure 4. He alluded to morphophonemic rules that would include *will* + *S* → *will*, *will* + *past* → *would.*
S → NP Aux VP
Aux → Tense(Modal)(have + en)(be + ing)(be + en)
verb → hit, take, walk, read, etc.
modal → will, can, may, shall, must
Tense → S / NP_{sing} —
Tense → ∅ / NP_{p}
Tense → past

Affix hopping:

\[
\begin{align*}
\{ & \text{past} \\
\{ & \text{S} \\
\{ & \text{∅} \\
\{ & \text{-en} \\
\{ & \text{-ing} \\
\} & \text{Modal} \\
\} & \text{verb} \\
\} & \text{have} \\
\} & \text{be} \\
\} & : 1 \rightarrow 2 \rightarrow 2 \rightarrow 1# \\
\end{align*}
\]

Chomsky suggests an abbreviation of Af for the disjunction

\[
\begin{align*}
\{ & \text{past} \\
\{ & \text{S} \\
\{ & \text{∅} \\
\{ & \text{-en} \\
\{ & \text{-ing} \\
\} & \text{Modal} \\
\} & \text{verb} \\
\} & \text{have} \\
\} & \text{be} \\
\} & : 1 \rightarrow 2 \rightarrow 2 \rightarrow 1# \\
\end{align*}
\]

Replace + by # except in the context v−Af.
Insert # initially and finally.
Chomsky’s negation transformation

NP - Tense - X → NP - Tense + not + X

Affix hopping applies after the negation-insertion transformation, and cannot apply, because the not, like a grain of sand in the gears, prevents the rule from finding the context it is looking for.

Chomsky adds a later rule (known to all later on as do-Support), which applies after all of the rules mentioned above:

(34) Do-support: # Af → #do + Af

Shortly after this (p. 65), Chomsky proposes a transformational rule that introduces a morpheme called A whose realization is as emphasis on the word that precedes it. In this case, the appearance of a form of do when there is emphasis (“John does arrive”) is accounted for by the linear placement of A that is (i) in the same spot as the not, and (ii) equally able to block the hopping of the S-affix; which failure to hopping leads to an S which triggers Do-support. Imagine a derivation containing the step: John # S+A # arrive, and you have it.

See Figure 4 for a slightly different constituency structure.

Constituents -2

NP Verb PP; NP Verb NP PP

Our first look at some of the details of English syntax involved the auxiliary verbs. A very different kind of syntactic distribution is found when we look at what follows the verb in English. There are, to be sure, many intransitive verbs in English, as in (xx), where nothing follows the verb. There are also many in which a noun phrase follows the verb – we call these transitive sentences, as in (xx) – as well as many which are followed simply by a prepositional phrase (xx).
(35) 1.(a) The baby is sleeping.
   (b) Whenever it rains, it pours.
   (c) Man plans, and God laughs.
2. (a) I love salmon, but Jessie can’t eat it.
   (b) The contractor has finished the kitchen.
   (c) The House finally passed the president’s legislation.
3. (a) All rivers run to the sea.
   (b) She spoke to every expert she could find.
   (c) Dr. King dreamt of a world in which all men are brothers.
   (d) Do not speak to the driver while the vehicle is in motion.

And finally, there are many sentences in which the verb is followed by a noun phrase and a prepositional phrase (see (37)).

(36) She put her name on the door.

(37) I translated the text into French.

In class we discussed some of the basic heuristics for getting information about constituency, such as:

1. We can look at constructions which select a single constituent in a given position (subject of a sentence; focus of (it)-cleft, focus of pseudo-cleft), and see what string of words can show up in those positions;

2. if we can replace a string of words by it and retain the syntactic construction, this suggests the string is an NP;
3. if we can coordinate two strings with and, this suggests that each
is a constituent, and that together they form a constituent.

The syntactic patterns NP Verb PP and NP Verb NP PP are very
common patterns in English and other languages. Let’s take a look
at several patterns of this general sort:

He climbed over the wall

(a) What did he climb over?
(b) Over what did he climb?
(maybe)
(c) Over the wall climbed the monkeys.
(d) Over the wall the monkeys climbed. (maybe)
(e) The wall was climbed over.
(maybe)
(f) This wall has never been climbed over.
(g) He climbed over it.
(h) He climbed over the wall and the hedges.
(i) He climbed over the wall and through the thick brush on the ground.

The (b) example—if it is grammatical—is evidence that over and
its following object VP forms a constituent; in the metaphor of
syntactic movement, a preposition would only move with its object.
(c) (which is, I think, unquestionably grammatical) makes the same
point, but in the context of a different construction. (e) is a passive,
in which the object of over has been passivized; this suggests a tight
syntactic relationship between over and the preceding verb climb,
and if (e) is not great, (f) is, and it makes the same point regarding
grammar. 4

She put her name on the door

(a) What did she put on the door?
(b) Where did she put her name?
(c) What did she put her name on?
(d) On the door, she put her name.
(e) On the door, she put her name; on her desk, she put her new title.

4 The point is often made in relation to the contrast between This bed has been slept in and This bed has been slept under,
where the first is much better than the second.
They turned out/off the light

Now, let’s consider the sentence *They turned out the light*, which is also of the form $NP\ V\ P\ NP$. Does this have the same structure? – that is, is it:

The first sign that this is *not* the same structure is that this structure is unavailable when we have *it* rather than the *light* (remember, this was fine with *he climbed over it*):

(40) 1. *They turned out/off it.*
2. They turned it out/off.

   It is odd that the light cannot be simply replaced by it in They turned out the light, especially since apparently similar sentences are fine. Is this phenomenon general, fairly general, or just marginal? How can we check? Are there words other than out that participate in this oddity?

   This is known as a verb particle construction, or as a phrasal verb.

   to turn on something

(41) The lion turned on his trainer, and it was several minutes before he could be removed from the cage.

(42) (Not: …turned his trainer on…)

(43) The detective turn on her radio, and it was several minutes before she could tear herself away from what she was hearing.

(44) (just as fine…The detective turned her radio on… )

   Questions: Do we wish to assign different structures to these sentences, and if so, how? What do you notice about the stress or prominence of the word on in the two sentences?

   They turned over the blanket.

   Is this right?

(45)

   We can still say:

(46) What did they turn over?

   but not:

(47) *Over what did they turn?

   or

(48) *It was over the blanket that they turned.
So there is no evidence of *pied-piping*, of the preposition ‘moving’ along with the following NP. So *Over the blanket* does not behave like a constituent. And we can say:

(49) They turned the blanket over.

What is the right structure for that sentence?

![Diagram of sentence structure]

What do we find if the object is a pronoun?

5

(50) • They turned it/him over.
    • *They turned over it.

They rolled it over/they rolled over it.

(51)(a) They jumped over the box.

![Diagram of sentence structure]

(b) They jumped over the box, not the blanket.
(c) They jumped over the box, not over the blanket.

(d) They turned over the box.

(e) They turned over the box, not the blanket.

(f) **They turned over the box, not over the blanket.

They threw the garbage out the window.
(52) (a) They jumped over the box.
(b) They turned over the box.
(c) They jumped over the box, not over the shoes.
(d) **They turned over the box, not over the shoes.
(e) They turned over the box, not the shoes.
<table>
<thead>
<tr>
<th>Verb</th>
<th>Direct Object</th>
<th>Particle</th>
<th>Generalization</th>
</tr>
</thead>
<tbody>
<tr>
<td>put</td>
<td>the book</td>
<td>on</td>
<td>The direct object and the particle can permute—appear in either order—only if the particle is not part of a larger Prepositional Phrase. It cannot have a preceding determiner, and it certainly cannot have a complement (like the monkey).</td>
</tr>
<tr>
<td>put</td>
<td>it</td>
<td>under the tree</td>
<td></td>
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<tr>
<td>put</td>
<td>it</td>
<td>over the sink</td>
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<tr>
<td>put</td>
<td>the coat</td>
<td>on</td>
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<tr>
<td>put</td>
<td>the coat</td>
<td>on the monkey</td>
<td></td>
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<td>put</td>
<td>it</td>
<td>on</td>
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<tr>
<td>put</td>
<td>the coat</td>
<td>on the coat.</td>
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<td>put</td>
<td>it</td>
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<td>put</td>
<td>on</td>
<td>*it.</td>
<td></td>
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<tr>
<td>put</td>
<td>on</td>
<td>shorts.</td>
<td></td>
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<tr>
<td>put</td>
<td>*on the monkey the coat.</td>
<td></td>
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<tr>
<td>put</td>
<td>the decision</td>
<td>off.</td>
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<tr>
<td>put</td>
<td>it</td>
<td>off.</td>
<td></td>
</tr>
<tr>
<td>put</td>
<td>off</td>
<td>the decision.</td>
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<tr>
<td>take</td>
<td>the coat</td>
<td>off.</td>
<td></td>
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<tr>
<td>take</td>
<td>the coat</td>
<td>off the monkey.</td>
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<td>take</td>
<td>it</td>
<td>off.</td>
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<td>off the monkey.</td>
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<tr>
<td>take</td>
<td>off</td>
<td>the coat.</td>
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<tr>
<td>take</td>
<td>*off the monkey the coat.</td>
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</tr>
<tr>
<td>drink</td>
<td>the water.</td>
<td>out of the bottle</td>
<td></td>
</tr>
<tr>
<td>drink</td>
<td>the water</td>
<td>(all) up</td>
<td></td>
</tr>
<tr>
<td>drink</td>
<td>up</td>
<td>the water</td>
<td></td>
</tr>
<tr>
<td>drink</td>
<td>*all up</td>
<td>the water</td>
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<td>drink</td>
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<td>up</td>
<td>out of the bottle</td>
<td></td>
</tr>
</tbody>
</table>

What’s the generalization? The direct object and the particle can permute—appear in either order—only if the particle is not part of a larger Prepositional Phrase. It cannot have a preceding determiner, and it certainly cannot have a complement (like the monkey).

Let’s find some examples with off, up, out. Can we find any with after? to? from?

Some analyses


(53) **A-verbs** I switched the light off. (The lights are now off.)

(54) **B-verbs** I looked the information up. (The information is not now up, whatever that might mean.)

(55) A-verbs:

1. He propped the hood of the car up; with the hood up he then drove off.
2. Sally pushed the lever on the amplifier down; with the lever down her CD-player was pre-programmed.

3. Jim turned the radio off; with the radio off he could finally relax.

(56) B-verbs:

1. *He brought the kids up by himself; with the kids up he could go on holiday.
2. *My teacher always puts his pupils down; with his pupils down he feels superior.
3. *Jim sold the car off to a friend (now a former friend); with the car off he could buy the boat he had dreamed of.

(57) In comparatives, A-verbs are pretty good:

(58) A-verbs:

1. The oven off is less dangerous than the oven on.
2. The oven off is as dangerous as the oven on.
3. The ovens off is at least as dangerous as the ovens on. (What does this show?)

(59) B-verbs:

1. *He brought his kids up more than he brought them down.
2. *The kids up is very desirable.
3. *His pupils down is terrible (a terrible sight to behold).

(60) Conjunction: what does this show?

1. He switched the lights on and the TV off.

(61) Stowell 1981:

```
S
  \---\n  NP VP
    \---\n      I V'
        \---\n          V v off
            \---\n              switched-the light
```
What do these show?

That off is a phrase, not a single word – in the case where it is to the right of the direct object NP?

---

(64) Kayne 1984:

from which is derived:

(65) Aarts’s analysis of A-verbs, B-verbs:
Some of the basic phenomena of interest to syntacticians

Word-order interacts with logical scope of operators

For example, in English:

• i. *With no job, John would be happy*. If he had no job (= if he were unemployed), John would be happy.

• ii. *With no job would John be happy*. There is no job such that it would make John happy (if it were given to him).

Basic word order: SVO and its permutations

Joseph Greenberg in 1966 drew attention to the fact that the order of constituents in sentences was not uniformly distributed among all the logical possibilities. Focusing on subject (S), object (O), and verb (V), studies (such as Ruhlen 1975) have found distributions along these lines:

<table>
<thead>
<tr>
<th>Word Order</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOV</td>
<td>52%</td>
</tr>
<tr>
<td>SVO</td>
<td>36%</td>
</tr>
<tr>
<td>VSO</td>
<td>10%</td>
</tr>
<tr>
<td>VOS</td>
<td>2%</td>
</tr>
<tr>
<td>OVS</td>
<td>0%</td>
</tr>
<tr>
<td>OSV</td>
<td>0.2%</td>
</tr>
</tbody>
</table>

VOS: Malagasy, Seediq (Austronesian)
OSV: Kabardian (Northwest Caucasian)
OVS: Apalai, Hixkaryana (Carib)

English: SVO

Subject-Verb-Object

*The police arrested E. Howard Hunt.*
Japanese: SOV

Japanese is a strictly verb-final language, with massive pro-drop and topic-marking (-wa). This combination is of great interest to many linguists.

Tanaka-san wa ringo -o tabemasu
Mr. Tanaka TOPIC apple DO eat
Mr. Tanaka eats the apple.

The preceding sentence would be a reasonable answer to the question: What does Tanaka-san eat? To answer, Who eats the apple?, you might say:

ringo -wa Tanaka-san ga tabemasu
apple TOPIC Mr. Tanaka SUBJ eat
Mr. Tanaka eats the apple.

Consider.6

Tanaka-san ga kono ie ni sunde imasu.
Mr. Tanaka SUBJ this house in living is.
Mr. Tanaka is staying in this house.

Tanaka-san wa sensei desu.
Tanaka TOPIC teacher is.
Tanaka is a teacher.

sunde ← sum+te.

German: mixed SVO, SOV

First approximation: In main clauses, the finite verb appears in second position, and a major syntactic constituent precedes it. A separable prefix does not appear in second position, even it is lexically associated with the verb that is in second position. When a series of verbs occurs in a single clause, the logically highest one is that which appears in second position. None of this occurs in embedded clauses – or rather, in sentences with overt complementizers.
Wir singen Lieder.
Er zieht seinen Mantel an.
Er hat seinen Mantel an-ge-zogen.
Er muss seinen Mantel an-ziehen.

... weil wir Lieder singen.
... weil er seinen Mantel an-zieht.
... weil er seinen Mantel an-ge-zogen hat.
... weil er seinen Mantel an-ziehen muss.

Sie gibt seinem Freund einen Apfel.
Sie hat seinem Freund einen Apfel gegeben.
Sie hat ihm einen Apfel gegeben.
Sie hat es ihm gegeben.

... weil sie es ihm gegeben hat.
... weil sie es ihm gegeben haben muss.

... weil sie es ihm gegeben haben muss.
Er tut es.
Er hat es ge-tan.
Er muss es tun.
Er hat es tun müssen.

... weil er es hat tun müssen.
Ich habe Casablanca (nicht) gesehen.
Casablanca habe ich (nicht) gesehen.
Nie hat er Casablanca ge-sehen!
Er hat mit dem Karl ge-sprochen.
Mit dem Karl hat er ge-sprochen.
Was singen sie?
Wer singt Lieder?
Was hat sie ge-gessen?
Wen hat sie ge-sehen?
Mit wem hat sie ge-sprochen?

[ex from www.dartmouth.edu/german]
Roughly: The old man *comes* today home.

There are a large number of phenomena that have been analyzed in terms of *syntactic movement*. *Movement* is, of course, a metaphor, but we use it to suggest a phenomenon whereby we have a good linguistic reason to analyze a word (or a constituent) as appearing in a position different from where it is on the surface.  

Connection between constituent structure and movement: When we discover two closely related sentence patterns, we usually find that the difference can be expressed as a difference in the location of a small number (ideally, just one) constituent. For example:
With no job would John be happy.
The clearest examples of this are the cases of question formation and, in many languages, relative clause formation.

**Question formation**

In English, a *question word* (or *wh-word*, or *whord*) appears sentence-initially in direction questions, even if it corresponds (in terms of the predicate of which it is an argument) to a NP in a different position. We will call the position in which wh-words are found the *complementizer* (or *Comp*) of a sentence. COMP' is read "COMP-bar", and is a shorthand for speaking of a larger constituent for which COMP is an obligatory member (even if it does not seem that the COMP really is obligatory here!).

In formal English, a preposition may metaphorically move along with a wh-word, even if the preposition is part of an idiom along with the verb; while this is restricted to formal English, it is the normal and everyday case for many languages, include Romance languages; see the French example immediately below.

This is called Pied-Piping

To which country should I travel?
Which country should I travel to?

With which researchers do you work?
This wh-movement involved in question-formation can apply over several clauses, in many languages (including English).

Avec quels chercheurs travaillez-vous?

His parole officer told him he should talk to Custer
In French, we see the verb of the main clause impose the subjunctive mood on the verb of the embedded clause, and the object of the lower clause appears sentence initially.

Relative clauses

In English, a relative clause follows the head noun, and has a gap in the sentence corresponding to the position in which the head would have appeared in the relative clause:

the fruit \( \{\text{which} \} \) she had picked.
In relativizing from subject position, an empty COMP is not allowed:

We purchased some fruit $\{ \begin{align*}
\text{which} \\
\text{who} \\
\text{that} \\
\emptyset
\end{align*} \}$ was not ripe, unfortunately.

The words which and who are wh-words (who is for people, which for non-humans), and are analyzed as involving movement: pied-piping is permitted in this cases, but that is a complementizer, and there is no overt movement when it is present:

the people $\{ \begin{align*}
\text{with whom} \\
\text{with which} \\
\text{with that} \\
\text{with} \emptyset
\end{align*} \}$ she had consulted were enthusiastic.

Relativization over a long syntactic distance is possible, just as with wh-questions:

The so-called magic bullet was the bullet $\{ \begin{align*}
\text{that} \\
\text{the Warren Commission argued} \\
\text{Oswald had used} \\
\text{to shoot both Kennedy and Connally.}
\end{align*} \}$

Question formation brings a wh-word to sentence-initial (COMP) position, but it can be a position at the beginning of a subordinate clause:

It was never determined what the former CIA employees were actually looking for $\{ \text{at the Watergate.} \}$

*What was it never determined the former CIA employees were actually looking for $\{ \text{at the Watergate?} \}$

Whose is both a relative pronoun and a wh-word, but it is specifically for humans as a wh-word, but not as a relative pronoun:

The car, whose, door was smashed in the accident had to be junked afterwards.

Whose, door, was smashed in the accident? OK: Mary/mine; *Mary’s car’s/that car’s.