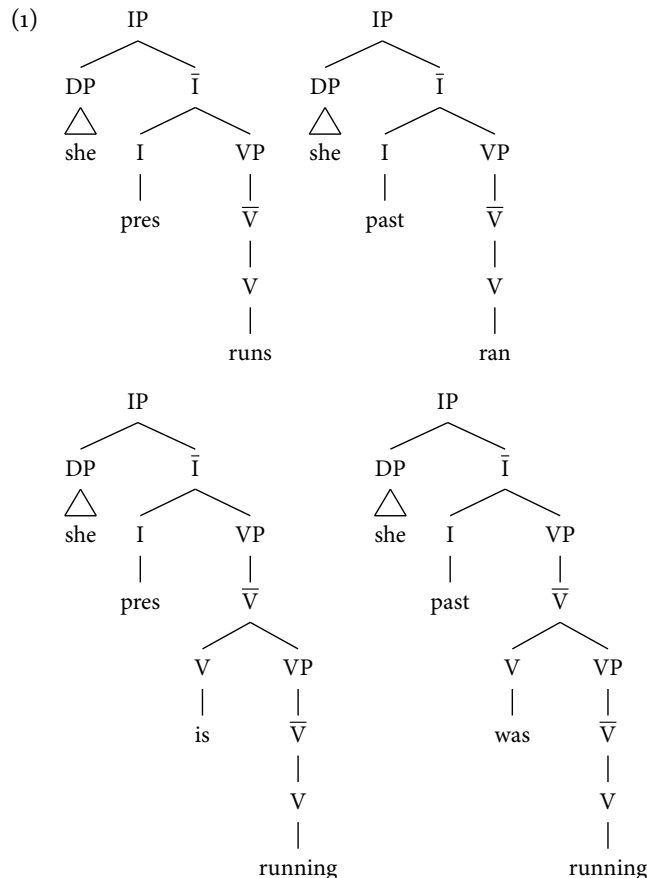# Head Movement

Introduction to Syntax
Kyle Johnson

Our present parse for simple tensed sentences has a strange property. It says that the head of the sentence is where the tense information is encoded, but, in fact, tense shows up as part of the morphology of the verb. We can see that problem in, for instance, the following parses.

(1)

In each case, I^0 holds the information about tense, but that information is expressed on the verb that heads the following VP.

Of course, the normal arrangement is quite different than this. Our phrase structure trees put the material in the very place that we speak that material. That's the whole point of them. Nouns, for instance, are pronounced in just those positions that the syntactic system of English allows the N symbol to be put, for instance. What we're seeing with the tense morpheme in I^0, however, is that it controls the morphological form of the verb that follows it. Perhaps what makes these cases different from the normal ones is that I^0 contains a bound morpheme — a suffix. Every other example we've dealt with is one in which the head of a phrase is occupied by a full word. This is the one kind of

Sometimes terminals, or heads, are indicated by putting a superscript "o" on them. This can be a helpful typographical method of distinguishing, for instance, the upper case "I" that is the English orthographic symbol for the first person singular pronoun and the upper case "I" that is an abbreviation for the word class "inflection." I will use this typographical device sometimes.
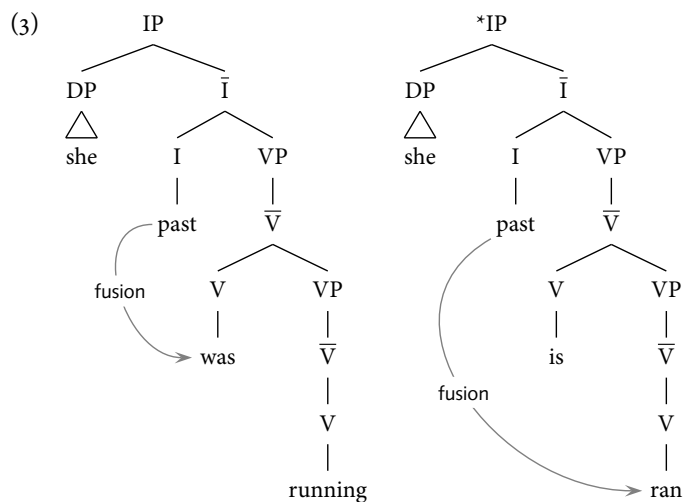
case where a head is occupied by something that isn't a word. If that is what makes this scenario different, then what we are looking for here is a way of letting the syntax and the morphology interact. We are looking for a rule that assembles two heads into one word. That rule will put together the tense suffix in I^0 with the verb that follows it.

One popular way of expressing this rule is with (2).

(2)   Two heads can be combined into one word with <u>fusion</u>. α fuses with β just in case β and α are adjacent.

This is a proposal that Bobaljik (1994, 1995) makes.

This rule allows two heads to be combined into a word if the phrase structure rules have positioned them so that they are right next to each other. This will explain why, for instance, the tense morphology in I^0 is expressed on the verb that immediately follows it and not a verb farther away, as indicated below.

(3)

```
        IP                              *IP
       /  \                            /   \
     DP     Ī                        DP      Ī
     /\    / \                       /\     / \
    she   I   VP                    she    I   VP
          |    |                          |    |
         past  V̄                         past  V̄
        fusion / \                             / \
              V   VP                          V   VP
              |    |                          |    |
             was   V̄                          is   V̄
                    |                fusion         |
                    V                               V
                    |                               |
                 running                           ran
```

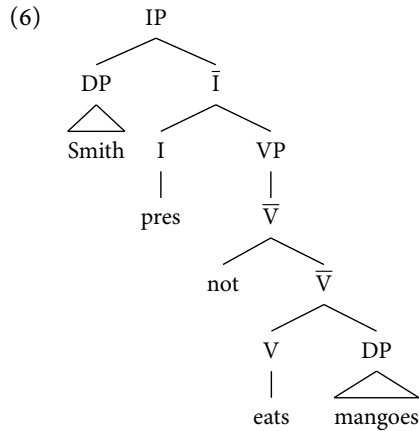It might also explain the ungrammaticality of (4).

(4)   * Smith not eats mangoes.

We know from the contrast in examples like (5), that the adverb *not* is positioned between I^0 and VP.

(5)   a.   * Smith not should eat mangoes.

      b.   Smith should not eat mangoes.

Thus, in (4) we can deduce that *not* intervenes between I^0 and *likes*, as indicated in (6), violating the condition on fusion.

(6)
```
                    IP
          ┌─────────┴─────────┐
         DP                   Ī
          △          ┌────────┴────────┐
        Smith        I                VP
                     │                 │
                    pres               V̄
                          ┌────────────┴────────────┐
                         not                        V̄
                                          ┌──────────┴──────────┐
                                          V                    DP
                                          │                     △
                                        eats                 mangoes
```

To complete this picture, we need to make explicit what is wrong with representations like (1) that is repaired by getting the tense suffix to combine with the following verb. I'll do that with (7).

(7)   The morpheme a head holds must either be a word or form a word through fusion.

This will force fusion to apply in examples like (1), and when it is prevented from doing so, as in (5a), the result will be ungrammatical.

This works fine with most verbs. But there are a small class of verbs that do not work this way. These are called "auxiliary verbs," and they include *have*, *do* and *be*. These verbs, when they are not inflected for tense, sit just where verbs should sit: immediately after whatever it is that stands within I^0.

Remember that *should* and *to* belong to the word class I^0. The analysis of auxiliary verbs that I ^{0} present here has its roots in Chomsky (1957).
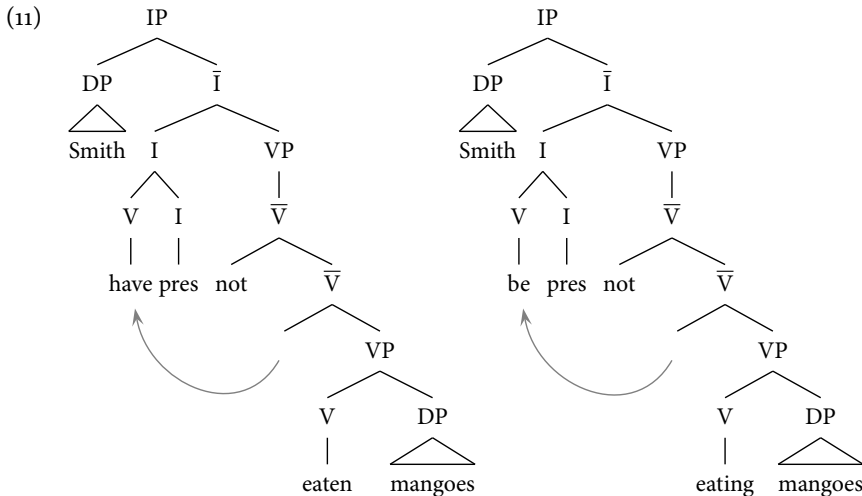
(8)   a. Smith should not have eaten mangoes.

       b. Smith should not be eating mangoes.

(9)   a. Smith wanted [$_{IP}$ her to have eaten mangoes].

       b. Smith wanted [$_{IP}$ her to be eating mangoes].

But when these verbs bear the inflection that tense invokes, they are suddenly <u>not</u> in the positions that verbs should be. They are instead in the position that the tense is, as we can see by looking at (10).

(10)   a. Smith has not eaten mangoes.

       b. Smith is not eating mangoes.

One way of capturing this is to imagine that auxiliary verbs move to I^0, as (11) indicates.

(11)

IP tree diagrams (two parallel structures):

Left tree: IP → DP (Smith), Ī → I [V have, I pres], VP → V̄ → not, V̄ → VP → V (eaten), DP (mangoes)

Right tree: IP → DP (Smith), Ī → I [V be, I pres], VP → V̄ → not, V̄ → VP → V (eating), DP (mangoes)

The result of putting *have* together with present tense is *has*, and, similarly, the result of putting *be* together with present tense is *is*. In short, there seems to be a rule which brings the auxiliary verb together with the tense morpheme in I^0 to form a larger word — a larger I^0, in particular — that is pronounced whatever way the English vocabulary chooses to express the particular auxiliary verb in that tense.
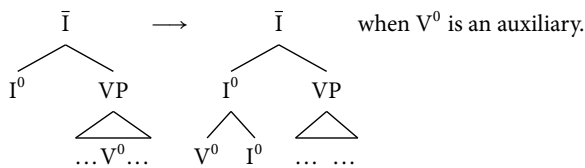
We call this rule "Verb Movement."

(12)   Verb Movement

Move an auxiliary verb to I^0.

Another, more explicit way, of writing out Verb Movement is:

(13)   Verb Movement

$\bar{I}$ → $\bar{I}$ when V^0 is an auxiliary.

I^0 VP I^0 VP
…V^0… V^0 I^0 … …

This gives us a rather different image of what the representation for a sentence can be. Up to now, we've associated each sentence with a battery of phrase structure rules that show how the words in those sentences are organized into phrases. What we see in these examples is that the form a sentence can have is also able to involve the action of a rule that changes the position of a term. In some sense, then, a sentence can involve more than one parse. One of those parses corresponds to what the phrase structure rules are designed to produce. The other is a structure that results from a rule applying to that first parse. These sentences with tensed auxiliary verbs, then, are a pair of parses: in fact, the very ones that are shown in (11).

We will learn that there are other rules like Verb Movement that can have this kind of effect. There are a set of rules that can give to a sentence more

than one, or even two, parses. So in anticipation of learning these other rules, I'll define now a system for representing sentences that involves not just phrase structure rules, but also rules of these sorts. Here is our new system.
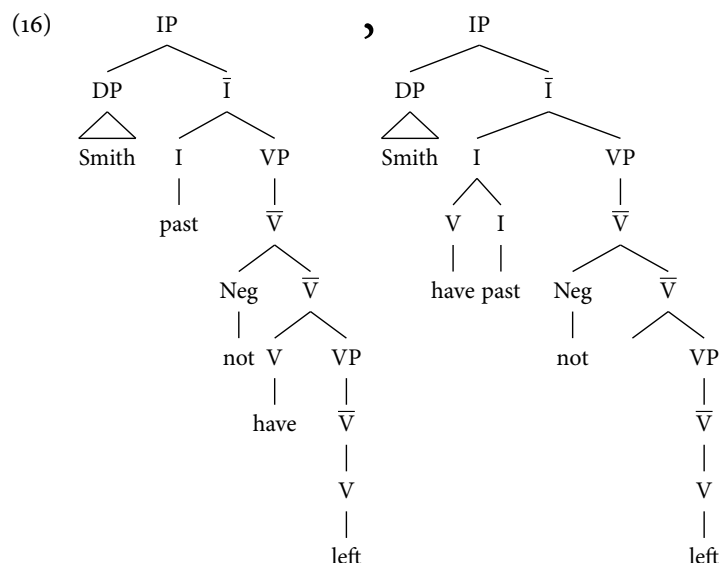
(14)   Every grammatical sentence must have a well-formed <u>derivation</u>, δ, where δ is:

   a.   a series of parses: $\delta = (P_1, P_2, \ldots, P_n)$, where
   b. P_1 is formed by the phrase structure rules, and
   c. P_n corresponds to what is spoken, and
   d.   Each $P_{i>1}$ is formed by some rule applying to P_{i-1}.

There are special names for certain parses in the derivation. P_1 is called a "d-structure," and P_n is called an "s-structure." It is s-structure that must satisfy those conditions that bear on how a sentence is pronounced. One of these conditions is the one we saw that forces the tense morpheme to be part of a verb. I'll restate this requirement now explicitly as a condition on s-structure, and I'll give it a name.

(15)   Head Condition

   The morpheme a head holds at s-structure must either be a word or form a word through fusion.

Notice that Verb Movement creates a parse that also satisfies the Head Condition. There are two ways, then, to satisfy the Head Condition in a sentence that has tense morphology in I^0. Either fusion can cause that tense morpheme to become part of the verb that immediately follows it, or Verb Movement can put the verb that tense morphology gloms onto into an I^0 that contains it. The first process is the "normal" one. It applies to nearly every verb in English. The second process applies when there is an auxiliary verb. For sentences with a tensed auxiliary verb, then, there is a derivation with at least two parses in it. For instance, the sentence *Smith had not left* has the derivation shown in (16).

(16)

```
        IP                    ,              IP
      /    \                              /     \
    DP      Ī                           DP       Ī
    /\     /  \                         /\      /   \
  Smith  I    VP                      Smith    I     VP
         |     |                            /  \      |
        past   V̄                           V    I     V̄
              / \                          |    |    / \
            Neg  V̄                       have past  Neg  V̄
             |    \                                  |     \
            not  V  VP                              not    VP
                 |   |                                      |
               have  V̄                                      V̄
                      |                                      |
                      V                                      V
                      |                                      |
                     left                                  left
```

Note that the I^0 which has been formed by moving *have* into I^0 is pronounced as *had*.

It's important to keep in mind that the technical execution of the idea here is that a sentence is a series of distinct parses, and so the action of Verb Movement creates the series of parses in (16). I^0 will sometimes use the abbreviation of representing a series of phrase markers with the movement arrows that I've used in the pictures in (11). But this is just a space-saving method of representing derivations. It would be wise for you to be cautious in using this abbreviation, especially when there is more than one thing that moves (as we will now see is possible).

I^0 Movement

Up to this point, our grammar has concentrated on simple declarative sentences — the sort of sentence that makes up the majority of our conversations. But there are kinds of sentences that do not make assertions, like declarative sentences do. One of these kinds of sentences seeks information: they are interrogatives, or questions. Interestingly, the word order of constituents in questions is different than what we've seen so far. This can be illustrated by the so-called "Yes/No Questions" in (17).

(17)   a. Should ducks quack?

       b. Can Jones boil some milk?

What we see in these examples is that the modals residing in I^0 are at the beginning of the sentence, rather than between the subject and the VP, where we otherwise see them. And yet, there still seems to be a phrase in these sentences that is made up of that modal and the VP that follows it. At least, from a semantic point of view, that is the case. You can see that by comparing

the meanings of the sentences in (17) with the meanings of the sentences in (18).

(18)   a.   Ducks should quack.

   b.   Jones can boil some milk.

Part of the meaning of the sentences in (18) is derived from the meaning of the phrase *should eat the mangoes* and *can boil some milk*. These phrases have a meaning that is compositional; that is, they have a meaning that is more than just a list of the meanings of the words they contain. They have a meaning that is derived by combining, somehow, those meanings into something else. Informally, the meaning of *should quack* is something that conveys what the speaker of (18a) wishes to say holds of ducks. And, similarly, the meaning of *can boil the milk* has a meaning that expresses what the speaker of (18b) wishes to convey holds of Jones. Those meanings are also part of what is found in (17). The speaker of (17a) is seeking confirmation that *should eat the mangoes* is something that holds of Smith, and the speaker of (17b) is seeking confirmation that *can boil the milk* holds of Jones. Even though it's not apparent from the order of the words, there is still within (17), the phrases *should eat the mangoes* and *can boil the milk*. We need to find a way of capturing that.

One way is with a rule that moves I^0 to the front of the sentence in cases like (17). So what we're looking at is something like (19).

(19) I^0 Movement (preliminary)

   Move I^0 to the front of the IP that it heads.

If I^0 Movement is responsible for forming the sentences in (17), then the d-structure of these sentences has the phrase whose meaning we are perceiving in them. Before the modal is moved by I^0 Movement, it will form a phrase with the VP that follows it, and give the meanings that these sentences have. Now what we need to do is find a way of making sure this rule only happens when the sentence involved is a question. We need to find a way of linking the question part of the meaning of a sentence with the action of this rule. Let's turn to that question next.

There's an interesting thing about this rule: it only applies to root IPs. Questions can also be found inside larger sentences, as in (20).

A "root IP," or "root sentence," is an IP that is not embedded in a larger sentence.

(20)   a.   She asked [$_{CP}$ whether Smith has eaten the mangoes].

   b.   He wondered [$_{CP}$ whether Smith is eating the mangoes].

The questions in (20) are CPs whose head is the complementizer *whether*. It's this particular complementizer, in fact, that indicates that these embedded clauses are questions and not something else, like a declarative sentence. If the embedded sentences were to be understood as declaratives, they would use a different complementizer, perhaps *that*, for instance.

(21)   a. She asked [$_{CP}$ that Smith eat the mangoes].

    b. He said [$_{CP}$ that Jones boiled the milk].

This way of signaling that a sentence is a question is very widespread across languages. Many languages have a specialized complementizer which signals that the clause it heads is a question. Japanese is like this, for instance. In (22), the complementizer *kadooka*, indicates that the embedded clause is a question.

(22)   John-wa [$_{CP}$ Sally-ga   biiru-o   non-da-kadooka]   ask-ta
    John-top [$_{CP}$ Sally-nom beer-acc drink-past-whether] ask-past
    'John asked whether Sally drank beer.'

Like all heads in Japanese, the Complementizer is the last thing in the phrase it heads, so that is why *kadooka* appears at the end of the embedded sentence. Moreover, the complementizer (and tense) is pronounced as a suffix on the verb. Interestingly, Japanese can also deploy a question complementizer in root clauses too, as in (23). The complementizer changes in this context, however: it's *no*.

(23)   John-wa biiru-o   non-da-no?
    John-top beer-acc drink-past-Q
    'Did John drink a beer?'

One very common way of making a sentence a question, then, is to use a complementizer of a special sort. That is found in many, many languages, and it's also what happens in English in embedded questions. But I^0 Movement is something else English employs to signal that a clause is a question, but never when the question is embedded. Things like (24) are not grammatical.

(24)   a.   * She asked (that) has Smith eaten the mangoes.

    b.   * He wondered is Smith eating the mangoes.

In embedded questions, only a complementizer can be used.

Conversely, a root question can only use I^0 Movement to signal that a question is being made. Using a complementizer in this context is ungrammatical in English.

(25)   * Whether Smith has eaten the mangoes?

What we need, then, is a system that divvies up the work of expressing questions and specifies where those different expressions occur. In root clauses, we don't find the question complementizer, but we do find I^0 Movement; in embedded clauses, we don't find I^0 movement but we do find the question complementizer.

Here's a way of doing that which is popular. First, in order to account for the fact that root clauses cannot begin with the question complementizer, like *whether*, we simply define *whether* as the question complementizer for embedded clauses.

(26)   If C^0 contains *whether*, then its CP is embedded.

We might imagine that English has a question complementizer that is found just in the C^0 position of root clauses, however. This would be a complementizer that is only found in the head of root CPs. That question complementizer is silent; or perhaps we could imagine that the way it is pronounced is by moving the contents of I^0 into it. So we should change the formulation of I^0 Movement to (27).

(27) I^0 Movement

    Move I^0 to C^0.

If we represent this complementizer with Q, then (17a) becomes (28).

(28)

```
            CP
            |
            C̄
          /    \
       C⁰       IP
       |       /  \
       Q     DP     Ī
            /\     /  \
        Ducks    I⁰    VP
                 |     |
              should   V̄
                       |
                       V⁰
                       |
                     quack
```
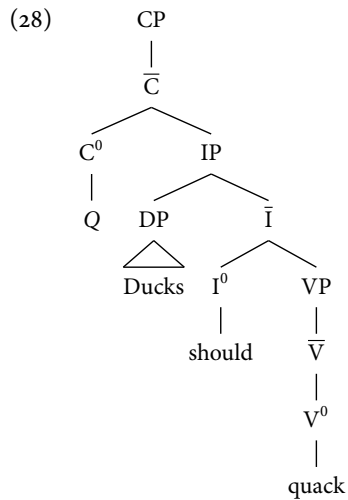
Suppose that Q is a suffix on I^0. That is, suppose that Q has the same kind of relationship to I^0 that the tense morpheme has to a verb. The Head Condition will require it to get expressed as part of the word that contains I^0. There are two ways for that to happen: either fusion can combine them, or a movement rule can bring I^0 together with the C^0 that contains Q. Fusion cannot happen in (28), however, since fusion can only happen if the two heads that are being brought together are adjacent. In (28), there is a DP between them (i.e., *ducks*) and this prevents fusion from happening. The only thing left is I^0 Movement. So, the derivation for questions of this sort are illustrated by (29).

(29)

```
        CP                              CP
        |                               |
        C̄                               C̄
       / \                             / \
      C⁰   IP                         C⁰   IP
      |   / \                        / \   / \
      Q  DP  Ī                      I⁰  C⁰ DP  Ī
         /\  / \                     |   |  /\   |
        Ducks I⁰  VP              should Q Ducks  VP
              |   |                              |
           should V̄                             V̄
                  |                              |
                  V⁰                             V⁰
                  |                              |
                quack                          quack
```
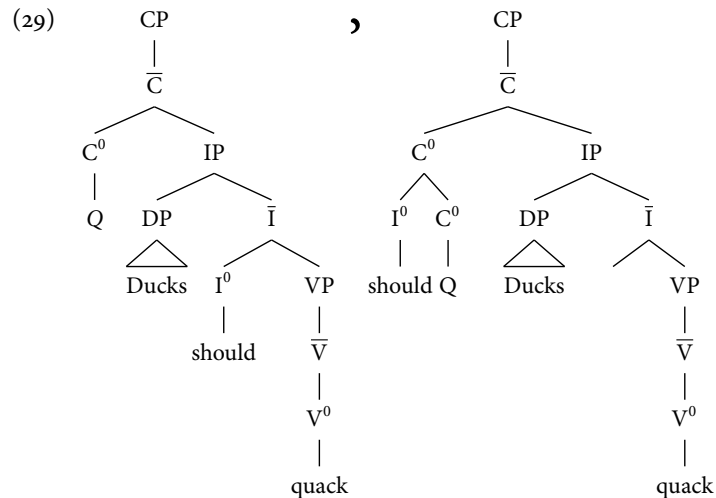
It's not just modals that move in Yes/No Questions, however. So also do the auxiliary verbs which have moved into I^0, as (30) indicates.

(30)   a.   Has Smith   eaten the mangoes?

b.   Is Smith   eating the mangoes?

The derivations for these sentences have three parses in them. For instance, the derivation for (30a) is (31).

(31)

```
        CP                        CP                           CP
        |                         |                            |
        C̄                         C̄                            C̄
       / \                       / \                          / \
      C⁰   IP                   C⁰   IP                      C⁰       IP
      |   / \                   |   / \                     / \       / \
      Q  DP  Ī                  Q  DP  Ī                   I⁰  C      DP  Ī
        /\   / \                  /\   / \                / \  |     /\   / \
      Smith I⁰  VP             Smith I⁰  VP             V⁰  I⁰  Q   Smith  VP
            |   |                  / \   |               |   |              |
           pres V̄               V   I⁰  V̄             have pres           V̄
                |                |   |   |                                  |
                V⁰  VP          have pres VP                               VP
                |   |                     |                                 |
              have  V̄                     V̄                                 V̄
                    |                     |                                 |
                    V⁰  DP                V   DP                           V   DP
                    |   |                 |   |                            |   |
                  eaten D̄               eaten D̄                         eaten  D̄
                        |                     |                                |
                        D  NP                 D  NP                            D  NP
                        |  |                  |  |                             |  |
                       the N̄                 the N̄                           the  N̄
                           |                     |                                |
                           N                     N                                N
                           |                     |                                |
                        mangoes               mangoes                          mangoes
```
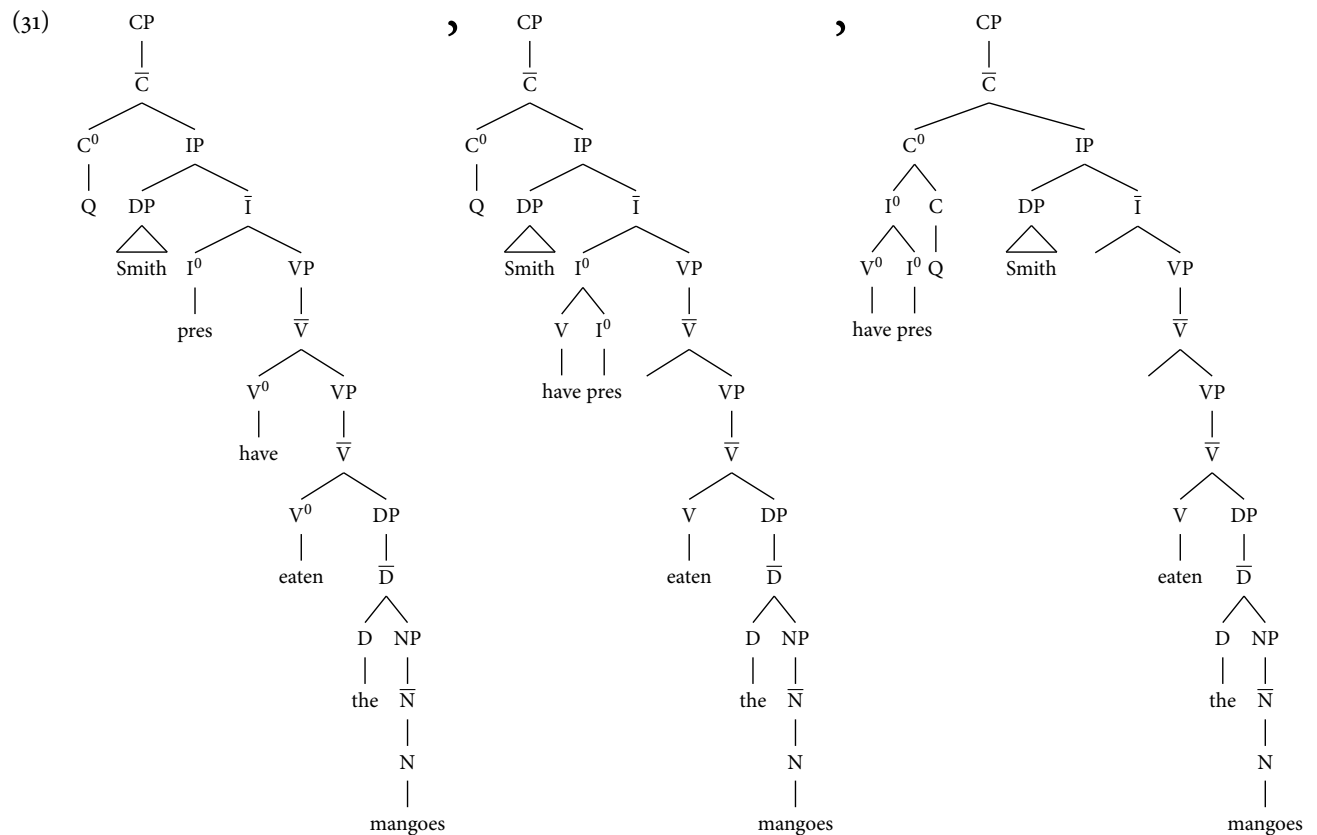
German

Embedded Clauses

English is not the only language that has a rule that moves verbs and I^0 in the ways that we've just seen. Indeed, these rules are found in many languages, although there are some interesting differences in how the rules work. In this section, we'll look at how these rules behave in German.

We'll start by looking at how German CPs work when they are in embedded contexts. We start there because, as we'll discover, German does a weird thing in independent CPs, that is CPs that stand alone. Simple German sentences in embedded contexts are illustrated in (32).

(32) Ich sagte …
      I   said …

   a. dass Hans Bücher kauft.
       that John books buys
       'that John buys books'

   b. dass Hans Bücher kaufen soll.
       that John books buy   should
       'that John should buy books'

   c. dass Hans Bücher gekauft hat.
       that John books bought has
       'that John has bought books'

   d. dass Hans Bücher gekauft haben soll.
       that John books bought have   should
       'that John should have bought books'

Just as in English, there is evidence that the strings that contain a verb and its argument(s) make a phrase. For instance, in German, as in English, these strings can be coördinated.
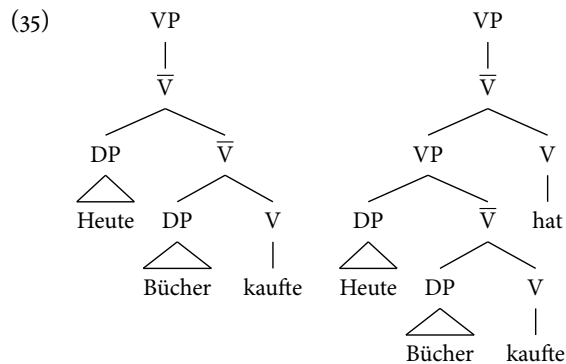
(33) Ich sagte dass Hans Bücher kauft und Autos verkauft.
      I   said that John books buys and cars   sells
      'I said that John buys books and sells cars'

Moreover, just as in English, there is evidence that the argument in a VP wants to be closer to the verb than a non-argument does. The effect isn't as strong in German, but it still exists. (We'll see that the effect is weakened in English too, in certain contexts.) There is a contrast between the word-orders in (34), when these sentences don't have something that is being foregrounded or focused.

(34) Ich sagte …
    I   said …

    a.   dass Hans Heute Bücher kaufen wird.
           that John today books buy   will.
           'that John will buy books today.'

    b. ?? dass Hans Bücher Heute kaufen wird.
           that John books today buy   will
   'That John will buy books today.'

It looks like German VPs are very much like English ones then. We could let German be subject to the Case Filter and all the stuff about θ-roles and modifiers, and we'd get the right facts about what can be in a German VP.

The Case Filter is discussed in the Argument Movement domain.

The one thing that differs is just how the terms are ordered in $\overline{\overline{V}}$s. We want the German phrase structure rules to make these phrases so that the heads come final. They will get the parses in (35).

(35)

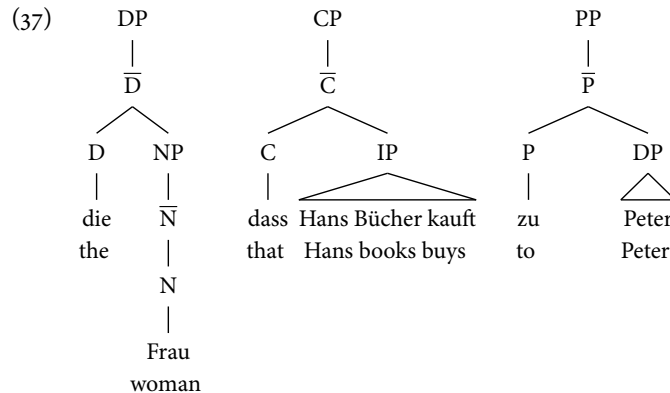Moreover, if German modals are in I^0 position, like they are in English, then we can also see that the phrase structure rules of $\overline{I}$s should do something different in German. We want the German rules to produce a parse like (36).

(36)
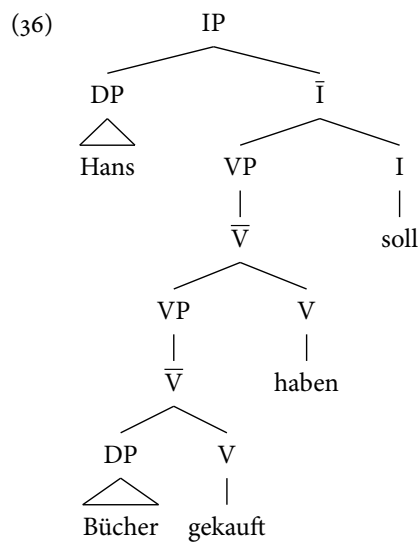
Other phrases in German put the heads in the same order that they get in English. DPs, CPs and PPs are like English: the heads come first.

(37)

```
        DP                  CP                    PP
        |                   |                     |
        D̄                   C̄                     P̄
       /\                  /  \                  /  \
      D   NP              C    IP               P    DP
      |   |               |   /‾‾\              |    /\
     die  N̄              dass Hans Bücher kauft  zu   Peter
     the  |              that Hans books  buys   to   Peter
          N
          |
         Frau
        woman
```

root clauses

What we have seen is that German phrases look like they fit the grammar of English, except for the way order that IPs and VPs have. In German, the phrase structure rules put the head I^0 and V^0 last in a $\bar{I}$ or $\bar{V}$, whereas in English they come first. But that falls apart when we consider what German sentences look like when they are not embedded. (38) gives an impression of the word order found in these contexts.

(38)   a. Hans kauft Bücher.
           John buys books
           'John buys books.'

       b. Hans hat Bücher gekauft.
           John has books   bought
           'John has bought books.'

       c. Hans wird Heute Bücher kaufen.
           Hans will today books   buy
           'Hans will buy books today.'

       d. Hans wird Heute Bücher gekauft haben.
           Hans will today bought have
           'Hans will have bought books today'

What we see here is that whatever should be the last verb, shows up instead right after the subject.

   In fact, the term that comes right before the verb doesn't have to be the subject. It can be any phrase whatsoever. So alongside (38c), for instance, the word orders in (39) are grammatical too.

(39)   a. Bücher wird Hans Heute gekauft haben.
           books   will John today bought have

       b. Heute wird Hans Bücher gekauft haben.
           today will John books   bought have

Any phrase can come right before this verb, but only one phrase is allowed. Word orders like (40) are ungrammatical.

(40)   a.   * Hans Bücher wird Heute gekauft haben.
              John books   will today bought have

       b.   * Heute Hans wird Bücher gekauft haben.
              today John will books   bought have

This word order pattern is called "Verb Second."

One ingredient in Verb Second is reminiscent of something we saw in English. Recall that in English questions, there is I^0 , forming sentences like (41).

(27) I^0 Movement

       Move I^0 to C^0.

(41)   Will John   have bought books today?

This movement only occurs in independent clauses, and we accounted for that by speculating that the position I^0 moves to is C^0. In embedded clauses, the C^0 position is occupied by the complementizer, and this doesn't leave enough room in C^0 for another word, like I^0, to be there. Suppose that the final verb shows up in a different place in German root clauses for the same reason. Suppose, that is, that German verbs move into C^0 when that C^0 is not occupied by a complementizer.

Let's see how this idea plays out. Consider how the derivation for (38c) will go. The D-structure representation will be (42).

(42)

CP
|
$\overline{C}$

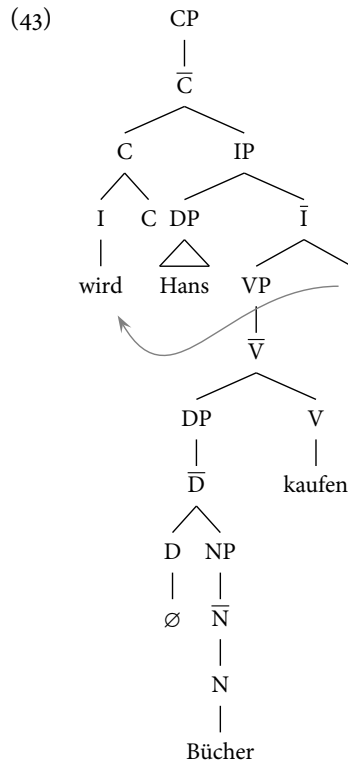C   IP

DP $\overline{I}$

Hans   VP   I

$\overline{V}$ wird

DP   V

$\overline{D}$ kaufen

D   NP

ø $\overline{N}$

N

Bücher

The analysis of Verb Second word order that I will present here is due to Koster (1975) and den Besten (1983).

If German has the same rule English does that moves I^0 to C^0, that rule could create the representation in (43) from (42).

(43)

```
                    CP
                    |
                    C̄
                   ╱  ╲
                  C    IP
                 ╱╲   ╱  ╲
                I  C DP   Ī
                |    △   ╱ ╲
              wird  Hans VP
                          |
                          V̄
                         ╱  ╲
                        DP   V
                        |    |
                        D̄  kaufen
                       ╱╲
                      D  NP
                      |   |
                      ∅   N̄
                          |
                          N
                          |
                       Bücher
```

As in English, this is the right word order for a Yes/No question in German. But it's not the sentence that we are aiming for. To get that sentence, we need a rule that English doesn't have. I'll call in Topicalization, because the phrase that it moves is understood to be the "topic" of the sentence.

(44)   Topicalization
       Move XP into the Specifier of a root CP.

This will produce from (43) representations like those in (45).

Note that Topicalization only moves XPs, not $\bar{\text{X}}$s or heads. We call a phrase the "root phrase" when it is the largest phrase in a sentence. A "root CP," then, is the phrase that the entire sentence is inside.

(45)

```
        CP                                    CP
       /  \                                  /  \
     DP    C̄                              DP    C̄
     /\   /  \                            /\    /  \
   Hans  C    IP                    die Bücher  C    IP
        / \   / \                          / \   /  \
       I   C     Ī                        I   C DP    Ī
       |      / \                         |     /\   / \
     wird   VP                          wird  Hans VP
            |                                      |
            V̄                                      V̄
           / \                                    /
         DP   V                                  V
         /\   |                                  |
      Bücher kaufen                            kaufen
```
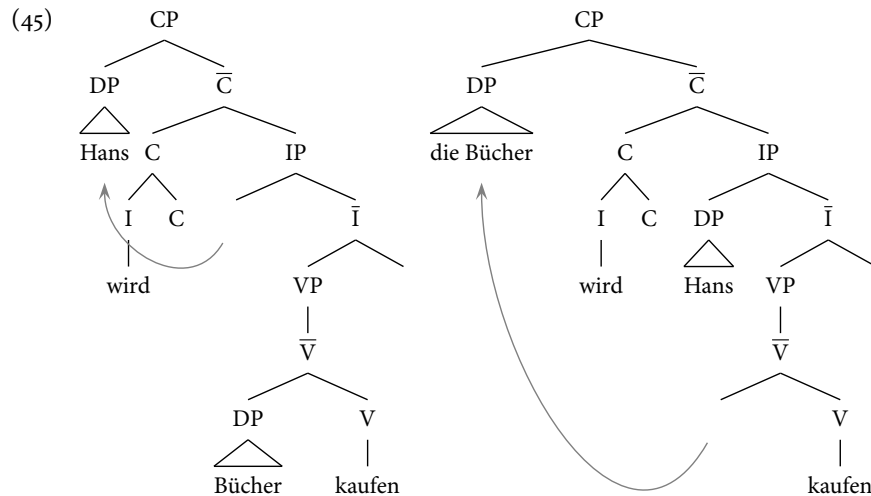
We need to make Topicalization and I⁰ movement obligatory, which we can
do with (46).

<div style="float:right">
Note, then, that German sentences are
always CPs, whereas in English only ques-
tion sentences must be CPs. Declarative
sentences can be IPs.
</div>

(46)   An independent sentence in German must be a CP that has some-
       thing spoken in its Specifier position and something spoken in its C^0
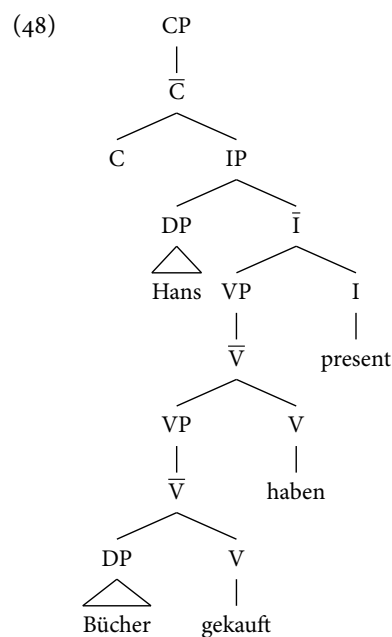   position.

For German and English alike, we also need to make sure that root CPs don't
come with a complementizer:

(47)   A root C^0 cannot have a complementizer in it.

<div style="float:right">A "root" head is the head of a root phrase.</div>

Let's consider next how (38b) is derived. This is an example with an auxil-
iary verb inflected for tense morphology. If we take the head of a sentence in
German to be able to be tense inflection, just as we did for English, then the
D-structure parse for (38b) is (48).

(48)

```
              CP
              |
              C̄
             /  \
           C     IP
                / \
              DP   Ī
              /\   / \
            Hans VP   I
                 |    |
                 V̄  present
                / \
              VP   V
              |    |
              V̄  haben
             / \
           DP   V
           /\   |
        Bücher gekauft
```

If the movement rule that brings modals into the second position is the I^0 to C^0 rule, then we want to get *hat* into I^0 so that it will be carried forward into C^0 position. Perhaps German has a rule, like that we saw in English, that moves auxiliary verbs into I^0 position. That rule, Verb Movement, recall, is responsible for moving the auxiliary verb in (50) past *not* into the I^0 position.
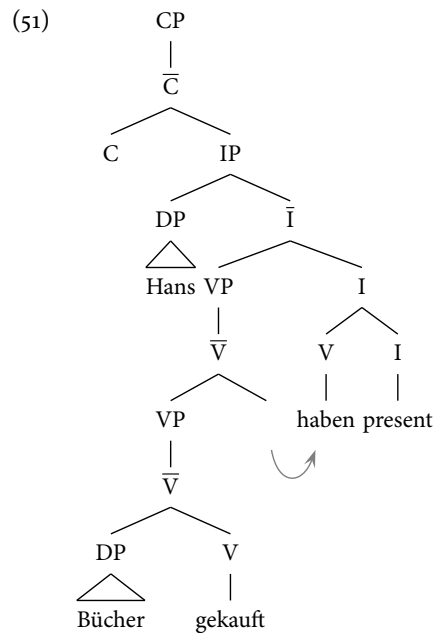
(49)   Verb Movement
       Move an auxiliary verb to I^0.

(50)   John has not   bought books.
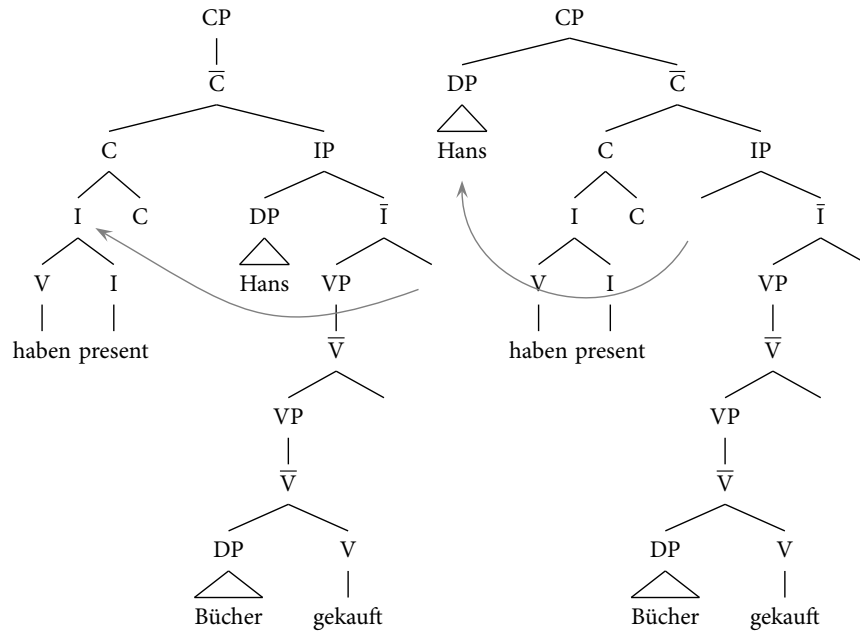
If German also has Verb Movement, then it could apply to (48) to form (51).

(51)

To this structure, I^0 to C^0 can apply to form the first parse in (52), and then Topicalization applies to form the second parse in (52).

(52)

This achieves the correct word order.

Finally, let's consider (38a). This is a sentence that has neither auxiliary verb nor modal. Its D-structure representation is (53).

(53)
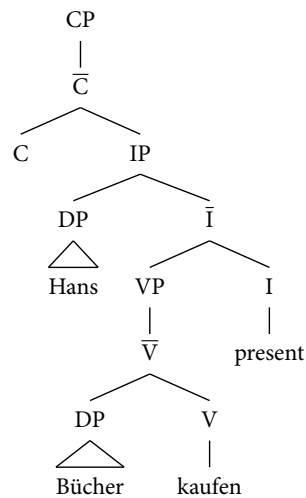
As with the auxiliary verb *hat*, we want the I^0 movement rule to bring *kauft* into C^0 position. For this to happen, however, *kauft* must be in I^0. If this were English, the rule that moves verbs would not do that because the English version of the rule only moves the auxiliary verbs *have*, *be* and *do*. That's why Verb Movement does not produce sentences like those in (54).

(54)   * John buys not books.

Perhaps, however, the German version of this rule is able to move main verbs. So we have the two Verb Movement rules in (55).

(55) a. Verb Movement: English
       Move an auxiliary verb into I^0.

   b. Verb Movement: German
       Move a verb into I^0.

If that is correct, then Verb Movement could apply to (53) to form (56).

(56)
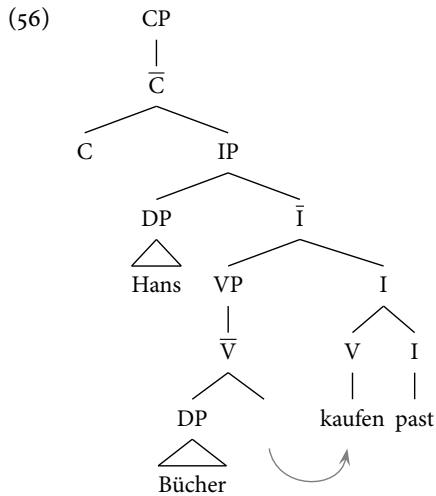
I^0 Movement and Topicalization can now apply to form the word order in (38a).

(57)
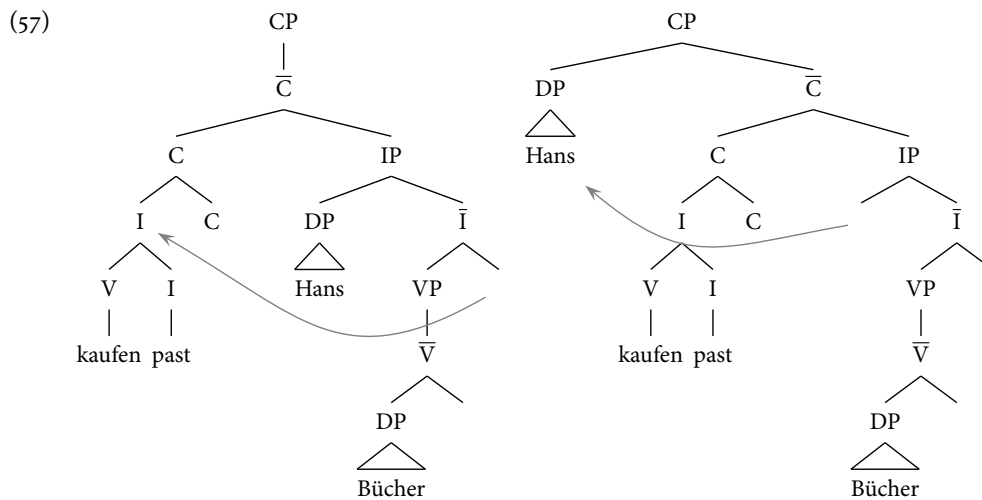
Constraints

We've seen that the Verb Movement and I^0 Movement rules exist in a similar form in English and German. Many other languages have these rules as well. We've also seen that the rule of Verb Movement is not exactly the same in English and German. The range of things it applies to is larger in German than it is in English. Indeed, the English version of the rule is very limited – it only

applies to auxiliary verbs. One thing that is interesting to study is how these rules vary across languages and how they don't. Knowing how these rules can and can't vary could give us clues about the learning process. When we discover ways in which these rules cannot vary, we will have discovered what sorts of guesses a child learning a language apparently <u>never</u> makes. And, by contrast, when we discover a way in which these rules can vary, we have discovered what sorts of guesses a child learning these rules seems able to make. In this section we will examine some properties of these rules that, so far as we presently know, do not vary across languages. These, then, are aspects of these rules that reflect something, we surmise, about what is possible to learn.

We begin by observing that the rules we have are not presently written accurately enough. Consider the rule of Verb Movement, for instance.

(58)   Verb Movement

Move V^0 to I^0.

The rule finds a V^0 and an I^0 and it puts them together in the position that I^0 occupies. If this were really all there were to the rule, it would allow the derivation in (59).

(59)
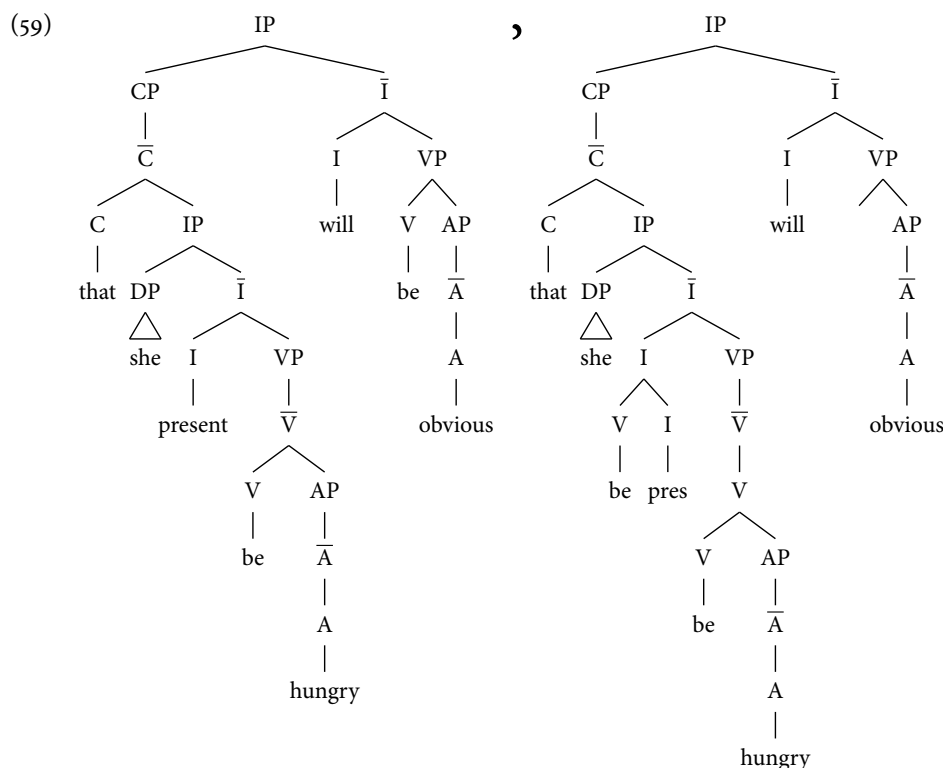
This derivation would produce the ungrammatical sentence in (60).

(60)   * That she is be hungry will obvious.

The grammatical derivation, of course, is (61).

(61)

```
                    IP                  ,                    IP
          ┌──────────┴──────────┐                 ┌──────────┴──────────┐
         CP                     Ī                 CP                     Ī
          │              ┌──────┴──────┐           │              ┌──────┴──────┐
          C̄              I            VP           C̄              I            VP
    ┌─────┴─────┐        │         ┌───┴───┐ ┌─────┴─────┐        │         ┌───┴───┐
    C          IP      will        V   AP   C          IP      will        V   AP
    │      ┌───┴───┐              │   │     │      ┌───┴───┐              │   │
  that    DP      Ī              be   Ā   that    DP      Ī              be   Ā
          △   ┌───┴───┐               │           △   ┌───┴───┐               │
         she  I      VP               A          she  I      VP               A
              │      │                │          ┌─┴─┐  │                      │
           present  V̄              obvious       V   I  V̄                  obvious
                    │                            │   │  │
              ┌─────┴─────┐                     be  pres ┌─────┴─────┐
              V          AP                               AP
              │          │                                │
             be          Ā                                Ā
                         │                                │
                         A                                A
                         │                                │
                      hungry                           hungry
```
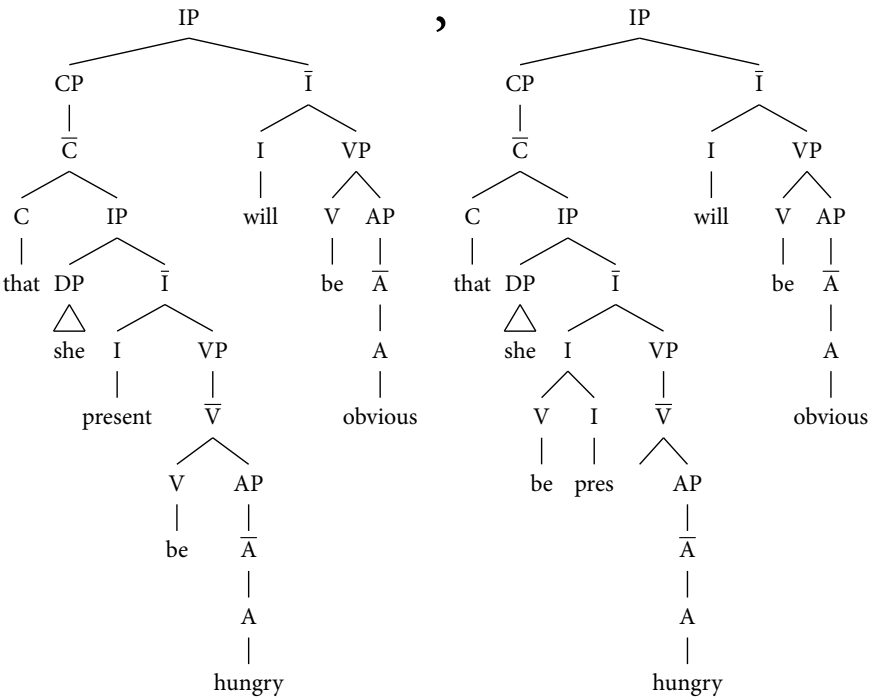
This corresponds to the sentence in (62).

(62)   That she is hungry will be obvious.

We can see a similar problem in the derivation in (63).

(63)
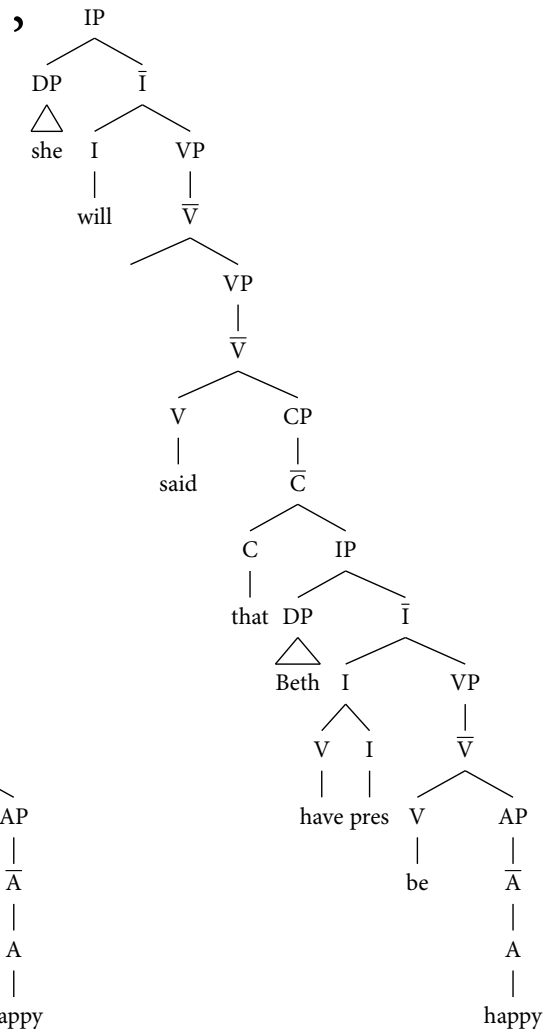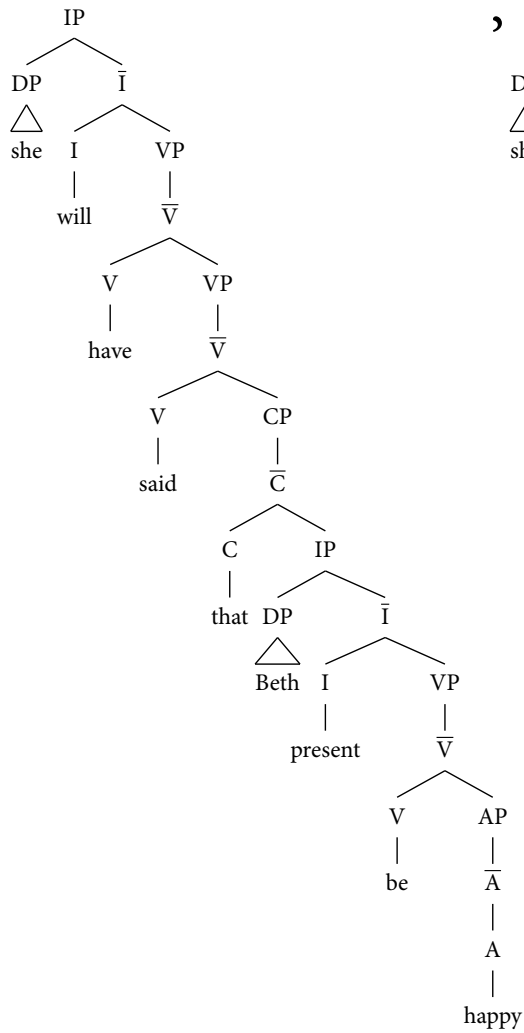
If this derivation were possible, we'd expect (64) to be grammatical.

(64)   * She will said that Beth has be happy.

Instead, of course, the grammatical outcome from the d-structure in (63) is (65), which is achieved through the derivation in (66).

(65)   She will have said that Beth is happy.

(66)

```
        IP                              ,            IP
       /  \                                         /  \
     DP    Ī                                      DP    Ī
     /\   / \                                     /\   / \
    she  I   VP                                  she  I   VP
         |   |                                        |   |
        will  V̄                                      will  V̄
            / \                                          / \
           V   VP                                       V   VP
           |   |                                        |   |
         have  V̄                                      have  V̄
             / \                                          / \
            V   CP                                       V   CP
            |   |                                        |   |
          said  C̄                                      said  C̄
              / \                                          / \
             C   IP                                       C   IP
             |   / \                                      |   / \
          that DP  Ī                                   that DP  Ī
              /\  / \                                      /\  / \
           Beth I   VP                                  Beth I   VP
                |   |                                        /\   |
            present V̄                                      V   I  V̄
                  / \                                       |   |  / \
                 V   AP                                    be  pres  AP
                 |   |                                                |
                be   Ā                                                Ā
                     |                                                |
                     A                                                A
                     |                                                |
                   happy                                            happy
```
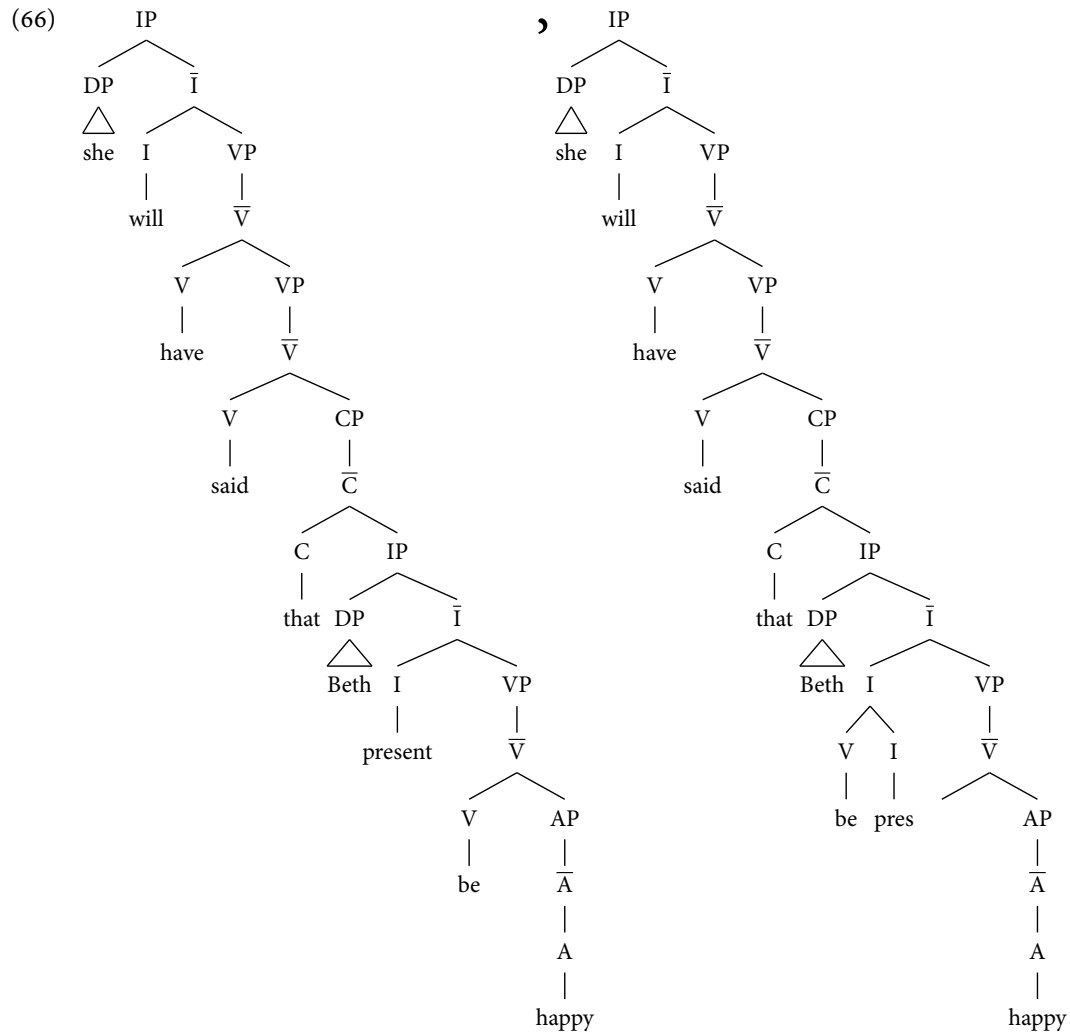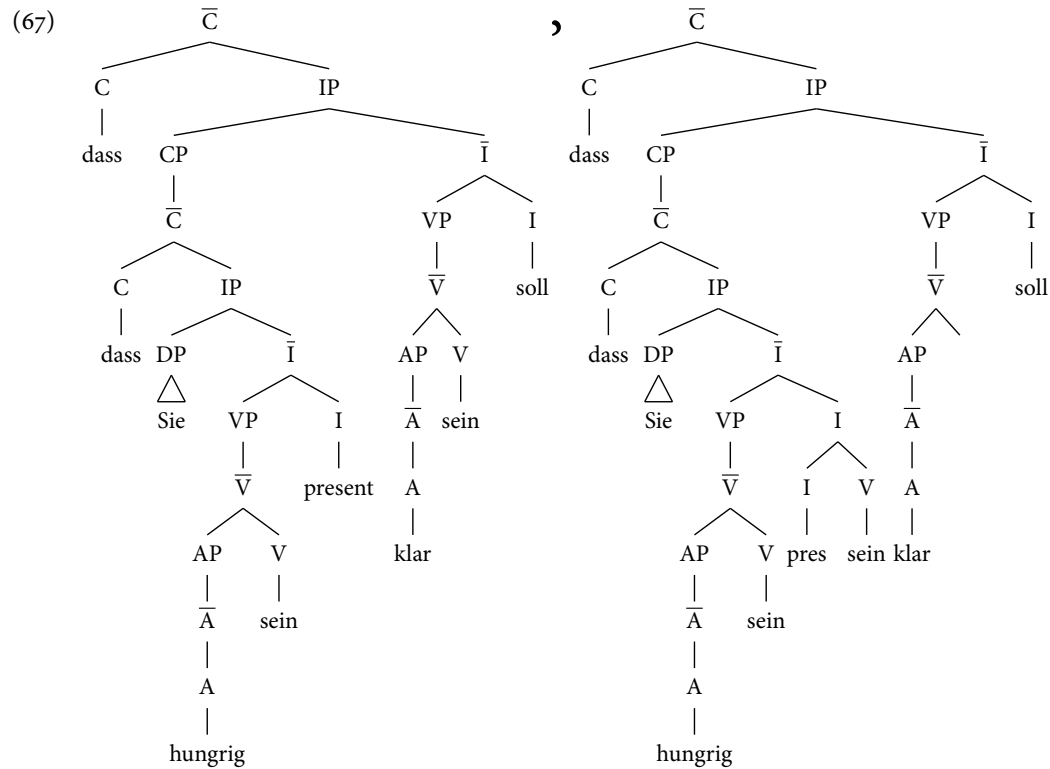
These sorts of derivations are also ungrammatical in German. For instance, the derivation in (67), which is parallel to (59), also leads to an ungrammatical sentence, namely (68). (The sentence we look at here is embedded, so that I^0 can avoid the action of Topicalization. I've parsed, then, an IP that's within a CP headed by *dass*.)
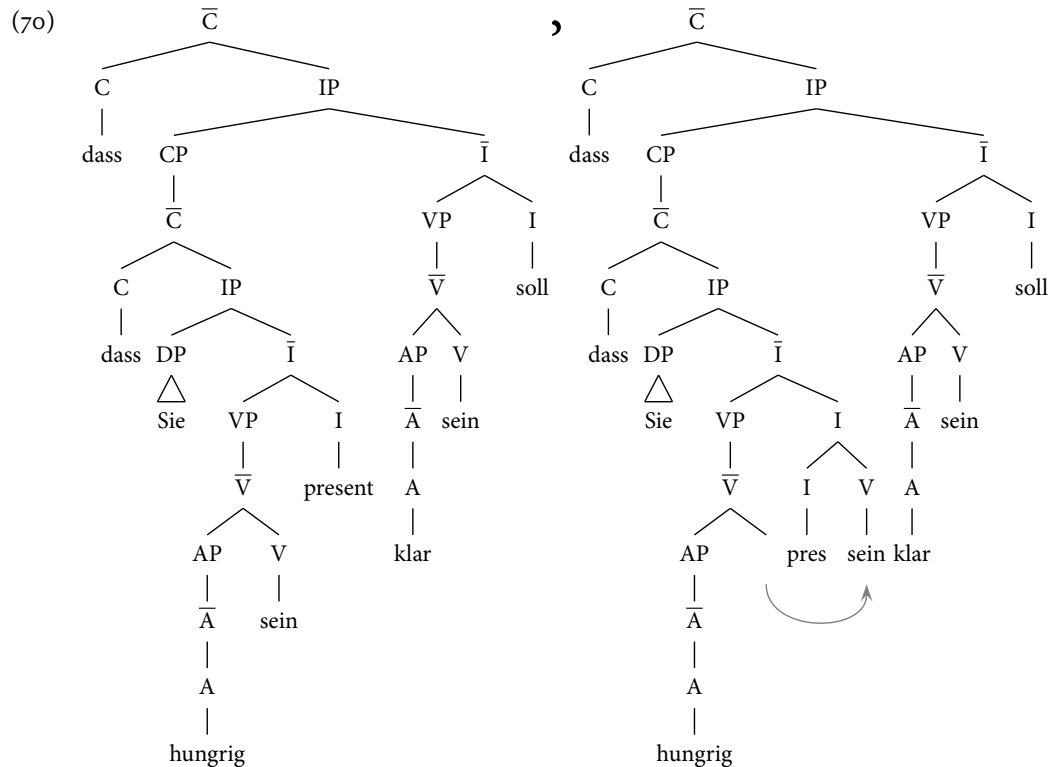
(67)

Tree 1:
$\overline{\text{C}}$ → C (dass), IP
IP → CP, $\overline{\text{I}}$
CP → $\overline{\text{C}}$
$\overline{\text{C}}$ → C (dass), IP
IP → DP (Sie), $\overline{\text{I}}$
$\overline{\text{I}}$ → VP, I (present)
VP → $\overline{\text{V}}$
$\overline{\text{V}}$ → AP, V (sein)
AP → $\overline{\text{A}}$ → A (hungrig)
$\overline{\text{I}}$ → VP, I (soll)
VP → $\overline{\text{V}}$
$\overline{\text{V}}$ → AP, V (sein)
AP → $\overline{\text{A}}$ → A (klar)

Tree 2:
$\overline{\text{C}}$ → C (dass), IP
IP → CP, $\overline{\text{I}}$
CP → $\overline{\text{C}}$
$\overline{\text{C}}$ → C (dass), IP
IP → DP (Sie), $\overline{\text{I}}$
$\overline{\text{I}}$ → VP, I
VP → $\overline{\text{V}}$
$\overline{\text{V}}$ → AP, V (sein)
AP → $\overline{\text{A}}$ → A (hungrig)
I → I (pres), V (sein)
$\overline{\text{I}}$ → VP, I (soll)
VP → $\overline{\text{V}}$
VP → AP
AP → $\overline{\text{A}}$ → A (klar)

(68)   * Ich sagte dass dass Sie hungrig sein ist klar soll.
         I   said that that she hungry be   is clear should.
         'I said that that she is be hungry should clear.'

Instead, the grammatical outcome is (69), whose derivation is (70).

(69)   Ich sagte dass dass Sie hungrig is klar   sein soll
         I   said   that that she hungry is clear be   should
         'I said that that she is hungry should be clear.'

(70)

Left tree:

```
                        C̄
              ┌─────────┴─────────┐
              C                   IP
              │          ┌────────┴────────┐
             dass        CP                Ī
                         │           ┌─────┴─────┐
                         C̄           VP          I
                   ┌─────┴─────┐     │           │
                   C           IP    V̄          soll
                   │      ┌────┴────┐ │
                  dass    DP        Ī  ┌──┴──┐
                          △      ┌──┴──┐ AP   V
                         Sie     VP    I  │   │
                                 │  present Ā  sein
                                 V̄         │
                              ┌──┴──┐       A
                              AP    V       │
                              │     │      klar
                              Ā    sein
                              │
                              A
                              │
                           hungrig
```

Right tree:

```
                        C̄
              ┌─────────┴─────────┐
              C                   IP
              │          ┌────────┴────────┐
             dass        CP                Ī
                         │           ┌─────┴─────┐
                         C̄           VP          I
                   ┌─────┴─────┐     │           │
                   C           IP    V̄          soll
                   │      ┌────┴────┐ │
                  dass    DP        Ī  ┌──┴──┐
                          △      ┌──┴──┐ AP   V
                         Sie     VP    I  │   │
                                 │  ┌─┬─┐Ā  sein
                                 V̄  I V A │
                              ┌──┴──┐│ │ │ A
                              AP    │pres sein klar
                              │     │      │
                              Ā           A
                              │           │
                              A        hungrig
```

Similarly, derivations like (63) are ungrammatical in German.

We need a way of specifying which I^0 that V^0 moves to. The generalization seems to be that for a V^0 to move to I^0, the I^0 must be "above" V^0 in the phrase marker. We need to define "above." There is a definition of "above" that plays a role in a variety of other domains too, and it is usual to adopt that definition. That will give us one notion of above. The definition makes use of a relation called "constituent command," or, more compactly, "c-command." The definition we will use is (71).

(71)   X c-commands Y if and only if:

    a. every phrase that dominates X also dominates Y, and

    b. X doesn't dominate Y.

We can use this to narrow our formulation of Verb Movement so that the ungrammatical derivations we've looked at are blocked. That's done in (72).

(72)   Move V^0 to a c-commanding I^0.

If you look back at the bad derivations, and compare them to the good ones, you'll see that the good ones obey (72) and the bad ones don't.

There is some evidence that the I^0 Movement rule is constrained in a similar way, but it's much harder to determine this because of the already limited domain that the I^0 Movement rule applies. In both German and English, we've seen that I^0 only moves to a C^0 that is in a root CP, and this all by itself will rule out examples where an I^0 has moved to some C^0 that

doesn't c-command it. For instance, the derivation in (73) would be blocked if I⁰ could only move to a C⁰ that c-commands it. But this same derivation is already prevented by the restriction that I⁰ cannot move to a C⁰ that is embedded.

(73)
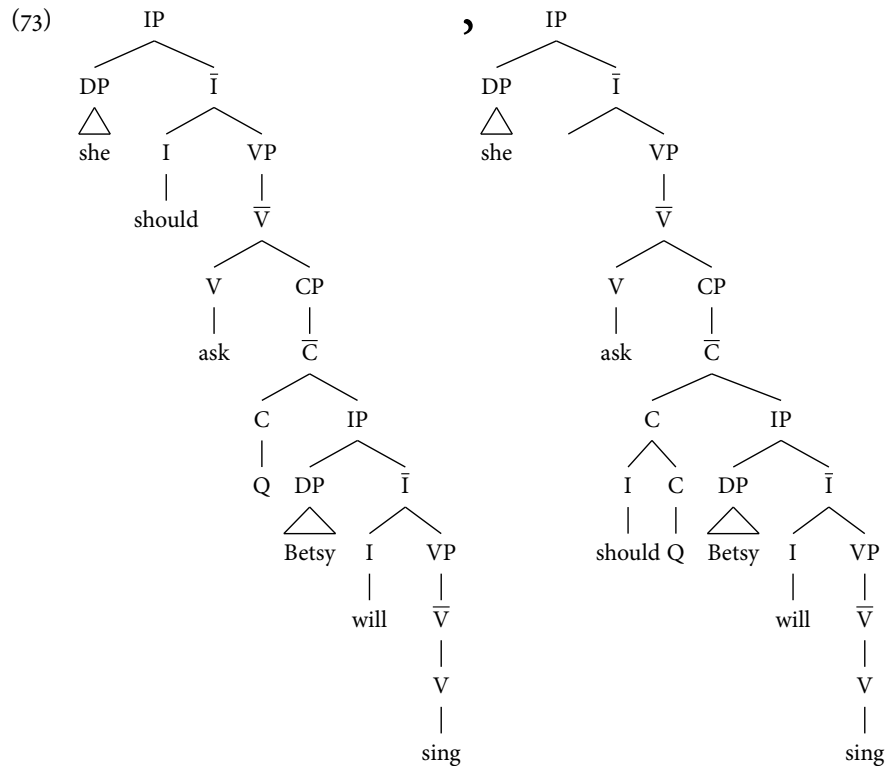
There are, it turns out, some limited cases in German in which it appears that an embedded C⁰ <u>can</u> be a position to which I⁰ moves. (74) is one of those examples.

(74)   Ich sagte Betsy kann Wasser trinken.
     I   said Betsy can   water   drink
     "I said Betsy can drink water."

Note that *kann* is in "second position" of the embedded sentence, and *Betsy* is in Topicalized position. The derivation for the embedded CP – that is the CP that follows *sagte* – is indicated in (75).

(75)
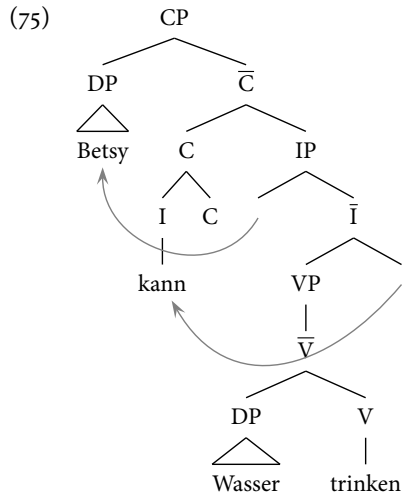
In these cases, then, it seems that it <u>is</u> possible for I^0 to move to an embedded C^0. And yet an I^0 that these embedded C^0's don't c-command cannot. So derivations like (76) are blocked, just as the parallel examples in English are. (Again, we look at an embedded IP so that we can avoid the effects of Topicalization. The IP we have here, then, is embedded and includes inside it the IP with verb second word order in (74)).

(76)
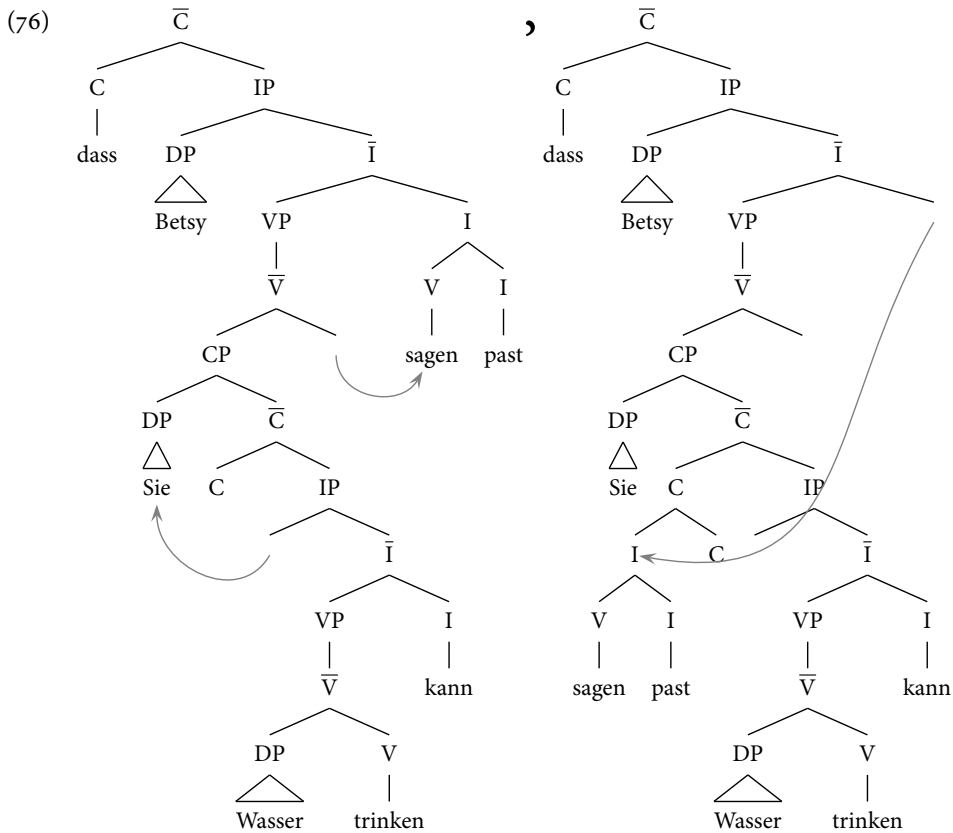
What makes this derivation ungrammatical is the step in which I^0 has moved to the embedded C^0. This could be blocked if we added the same c-command restriction to I^0 movement that we've added to Verb Movement.

Although the evidence for adding this constraint to I^0-to-C^0 Movement is somewhat scant, the usual guess is that it applies to I^0 Movement in the same way that it does to Verb Movement. We should change our rule of I^0 Movement, then, to (77).

(77) I^0 Movement

   Move I^0 to a c-commanding C^0.

The derivation in (78) indicates that the rule of Verb Movement still requires some sharpening up. In (78), Verb Movement has moved the verb to a c-commanding I^0, as now required, but that I^0 isn't the nearest one.

(78)
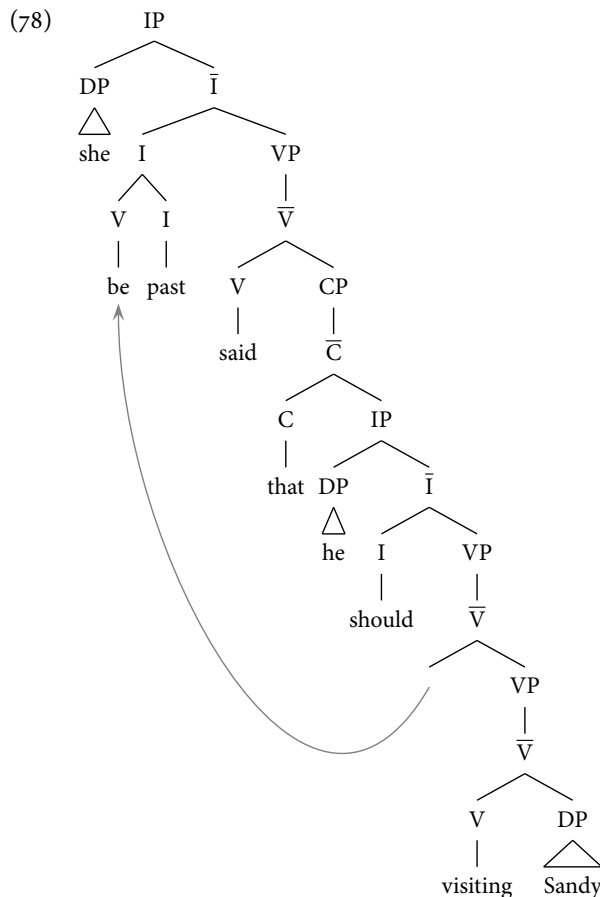
This derivation would produce the ungrammatical (79).

(79)   * She was said that he should visiting Sandy.

The grammatical outcome is (80), in which no Verb Movement has applied.

(80)   She said that he should be visiting Sandy.

We should formulate Verb Movement so that it cannot move a verb as far as it has in (78). This very same limitation to Verb Movement is also found in German. I won't show the examples here, but the German translation of the sentence in (79) is similarly ungrammatical.

If we were to look at more examples, we'd see that the pattern seems to be that Verb Movement can move a verb only to the "closest" I^0. To be able to formulate this precisely, we need to find a way of defining "closest." One definition, which again has been found to be useful in other contexts, is based on c-command; it's (81).

(81)   X is the closest α to Y if there is no other α such that:

    a. α c-commands Y, and

    b.   X c-commands α.

We can now formulate Verb Movement with this notion included.

(82)   Verb Movement

    Move a V^0 to the closest c-commanding I^0.

A parallel modification needs to be made to the I^0 Movement rule, as can be seen by considering the derivation in (83).

(83)
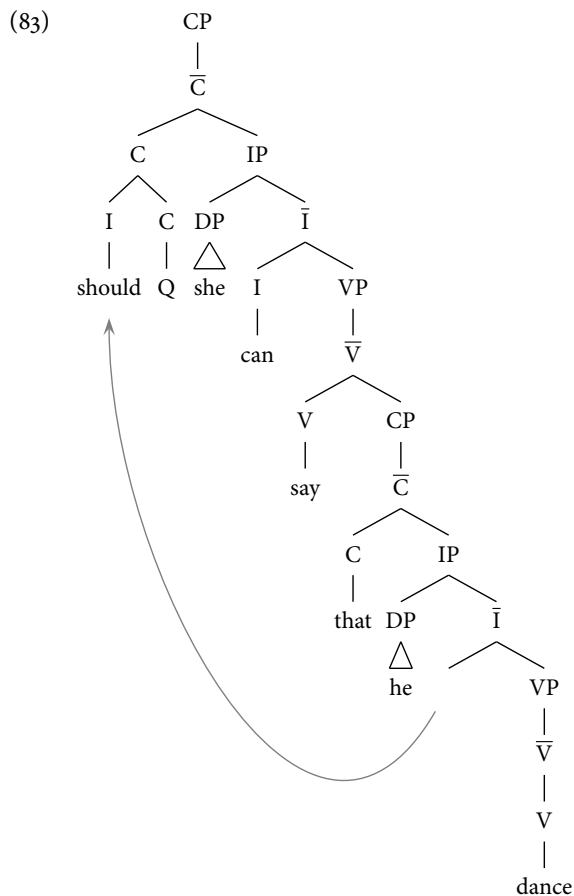
This derivation produces the ungrammatical (84), when what I^0 Movement should produce is (85).

(84)   * Should she can say that he dance?

(85)   Can she say that he should dance?

Again, the very same kind of limitation needs to be imposed on German. The German versions of (84) and (85) have precisely the same grammaticality status. We can block these derivations if we change the I^0-to-C rule so that it builds in the "closest" condition. This would give us (86).

(86) I^0 Movement

Move I^0 to the closest c-commanding C^0.

One thing we can notice once we've put in these refinements is that the Verb Movement and I^0 Movement rules look very similar. They both are moving one head to another, and the head they are moving to is the closest c-commanding one. These similarities might be a clue that what we're looking at here are not two separate rules, but one and the same rule applying to different items. Indeed, when we look at German and English together, we can see that the basic format of the rules stays the same. The thing that varies is just what kind of term is moved. These observations suggest that the proper formulation of these processes is as something like (87).

(87)   Head Movement

Move the head α to the closest c-commanding head.

   a.   German: α = V^0 and I^0

   b.   English: α = Auxiliary V^0 and I^0

What this suggests is that the details about where a head can move to remain constant across languages, and that the only thing that varies is what kind of head is moveable. Put into the framework of the acquisition question, what this suggests is that as children are guessing about the syntax of the language they are acquiring, their guesses don't involve where a moving head can go, but rather what kind of head can move.

References

den Besten, Hans. 1983. On the interaction of root transformations and lexical deletive rules. In *On the formal syntax of the Westgermania*, ed. W. Abraham. Amsterdam, The Netherlands: John Benjamins Publishing Company.

Bobaljik, Jonathan. 1994. What does adjacency do? In *The morphology-syntax connection*, ed. Heidi Harley and Colin Phillips, 1–32. MIT.

Bobaljik, Jonathan. 1995. Morphosyntax: The syntax of verbal inflection. Doctoral Dissertation, Massachusetts Institute of Technology, Cambridge.

Chomsky, Noam. 1957. *Syntactic structures.* Mouton.

Koster, Jan. 1975. Dutch as an SOV language. *Linguistic Analysis* 1:111–136.