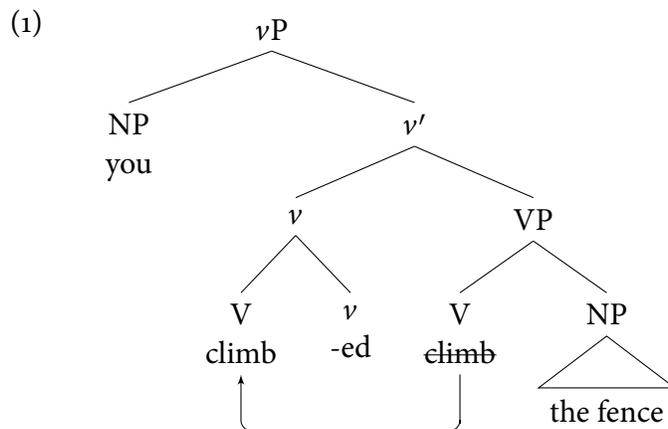# Lecture notes: Week 5
Subject position

1   The position of the subject

- So far, our tree for a sentence like *You climbed the fence* looks as follows:

(1)

- Sentences can be more complex than this, however

(2)   a.   You DID climb the fence
       b.   You could climb the fence
       c.   You can climb the fence
       d.   You will climb the fence
       e.   You would climb the fence

- How can we accommodate these additional verbs (auxiliary verbs) into our structures?

- One thing to notice is that, whenever an auxiliary verb is present in the sentence, past tense can no longer be marked on the main verb (*climb*):

(3)   a.   *You DID climbed the fence
       b.   *You could climbed the fence
       c.   *You do climbed the fence
   d.   *You can climbed the fence

- Furthermore, the *-ed* suffix seems to be combining with the auxiliary if we want to treat *did* as *do+-ed*, for example.

- Since we are assuming that *-ed* is loacted in *v*, we could say that auxiliaries merge with *v*. On this assumption, the verb will not move *v* and simply stay put in its original position:

(4)
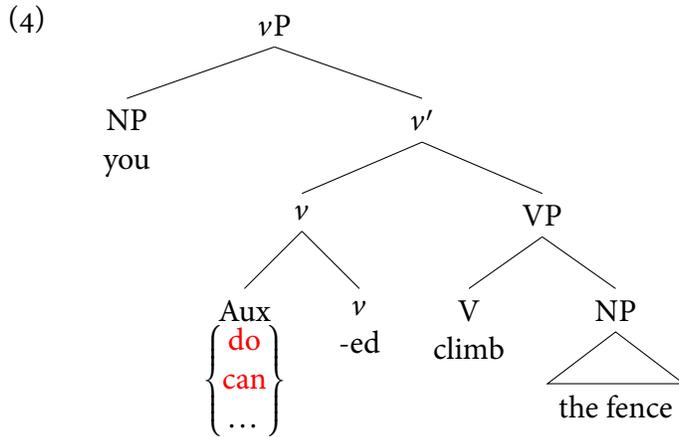
- For this analysis, we can assume these morphological realization rules:

(5)   a.

$\rightarrow$ *did*   b.
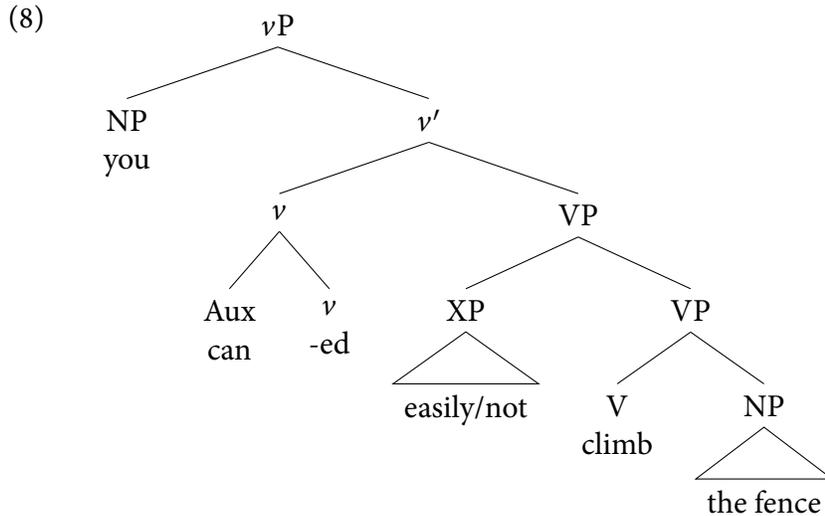

$\rightarrow$ *could*

- This analysis seems to work well enough in getting us the right word order. We have space in v to incorporate the auxiliaries into our current analysis and it seems to correctly predict that we get the *-ed* inflection associated with v on the auxiliary and not on the main verb.

- There are some problems with this analysis, though. First, think about the prediction that the lack of movement from V and v makes for ditransitives. If we have both an auxiliary verb and a ditransitive main verb, we predict that the verb should surface in its original position between the two objects:

(6)
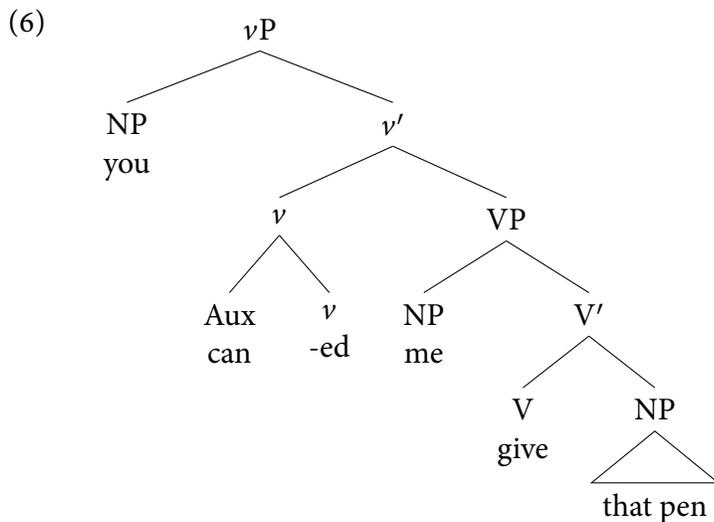
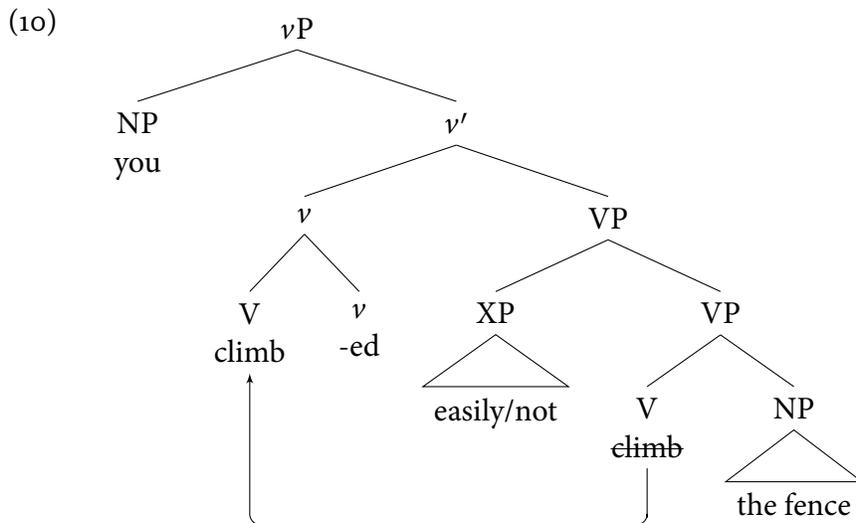- In other words, we incorrectly predict the word order **You could me give that pen*.

- Another problem regards the position of adjuncts. Let's consider adverbs like *easily* and also *not* which will treat as an adjunct for now:

(7)   a.   You could easily climb the fence
      b.   You could not climb the fence

(8)

```
                         vP
              ┌───────────┴───────────┐
             NP                        v′
             you            ┌──────────┴──────────┐
                            v                      VP
                     ┌──────┴──────┐      ┌─────────┴─────────┐
                    Aux            v      XP                   VP
                    can           -ed    ╱──╲           ┌──────┴──────┐
                                     easily/not         V             NP
                                                       climb         ╱──╲
                                                                  the fence
```

- This has a problem, however. The problem is that we now require left-adjunction to VP. As we saw last time, this is a problematic assumption since, if we remove the auxiliary from the sentences in (7), we predict the following sentences to be grammatical:
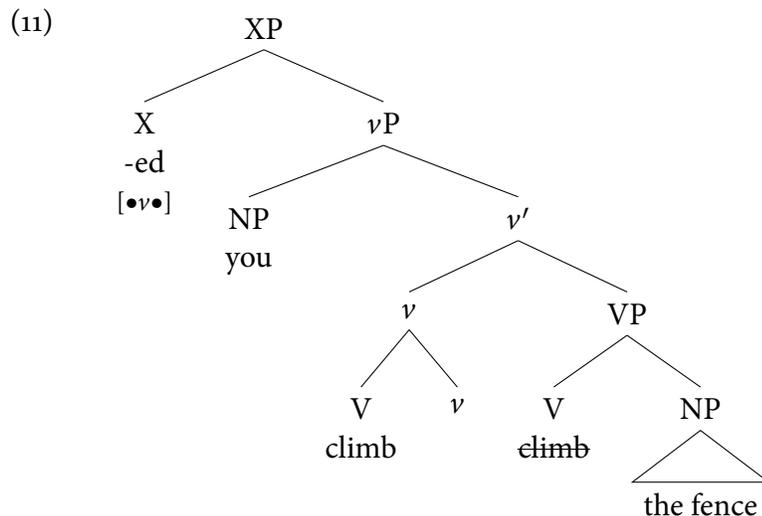
(9)   a.   *You climbed easily the fence
      b.   *You climbed not the fence

(10)

```
                         vP
              ┌───────────┴───────────┐
             NP                        v′
             you            ┌──────────┴──────────┐
                            v                      VP
                     ┌──────┴──────┐      ┌─────────┴─────────┐
                    V              v      XP                   VP
                  climb           -ed    ╱──╲           ┌──────┴──────┐
                    ↑                 easily/not        V             NP
                    │                                  climb          ╱──╲
                    └──────────────────────────────┘             the fence
```

- So this analysis isn't one that we want to stick with. The problem seems to be that we don't have enough space in the tree. We need to have a position for the verb to move to *in addition* to a place to host the
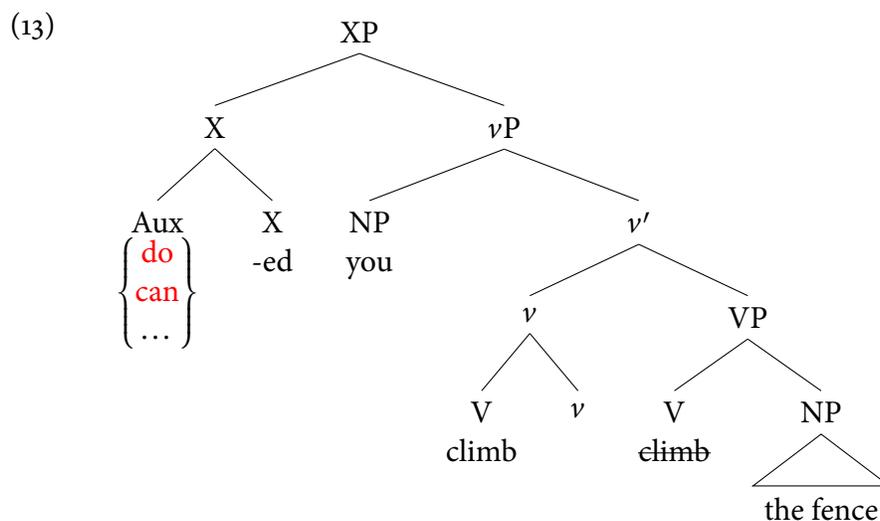
auxiliary verb. Right now, they are competing for the same spot in the tree. Furthermore, we need an adjunction site for *easily/not* that is between *climbed* and *the fence*, but is not VP.

- In order to make steps toward this, let's change our assumptions somewhat. Let's entertain the idea that the inflection on the verb does originate in *v*, but instead in a higher head that we will call X for now.

- X will have a feature that selects its sister which is of category *v*.

(11)

XP
- X
  - -ed
  - [•*v*•]
- *v*P
  - NP
    - you
  - *v*′
    - *v*
      - V
        - climb
      - *v*
    - VP
      - V
        - ~~climb~~
      - NP
        - the fence

- What do we get if we merge an auxiliary with X in this structure? We predict sentences like the following, which are indeed grammatical ways of asking a question.

(12) a. Could you climb the fence?
      b. Did you climb the fence?

(13)

XP
- X
  - Aux
    - { do
      can
      … }
  - X
    - -ed
- *v*P
  - NP
    - you
  - *v*′
    - *v*
      - V
        - climb
      - *v*
    - VP
      - V
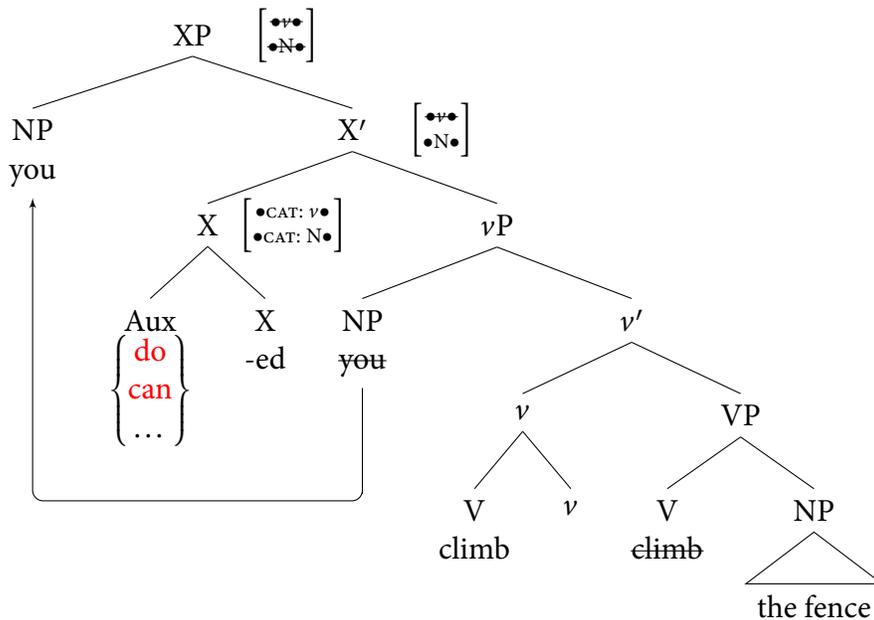   - ~~climb~~
      - NP
        - the fence

- This looks like a plausible approach for those sentences in (13), but what about our original sentence where the subject is the first phrase in the sentence. On this expanded model of the sentence, we need to allow
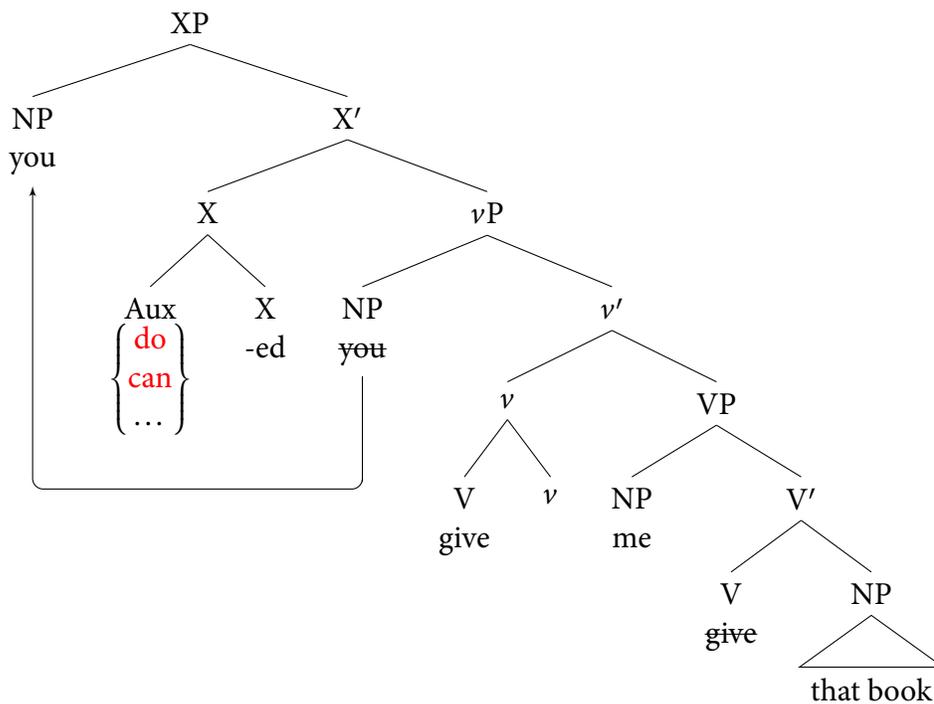
the subject to precede an auxiliary in X.

- A simple way to do this, as we have seen, is to move the subject from its position in the specifier of *v* to the specifier of X. We can do this by adding a feature [•N•] to the X head:

(14)

[tree diagram: XP with feature bundle [•v•, •N•]; NP "you" and X′; X′ has feature bundle [•v•, •N•]; X with feature bundle [•CAT: v•, •CAT: N•] and vP; X branches to Aux {do, can, …} and X "-ed"; vP branches to NP "you" (struck through) and v′; v′ branches to v and VP; v branches to V "climb" and v; VP branches to V "climb" (struck through) and NP "the fence"]

- This solves our problem about word order in ditransitives:

(15)

[tree diagram: XP; NP "you" and X′; X′ branches to X and vP; X branches to Aux {do, can, …} and X "-ed"; vP branches to NP "you" (struck through) and v′; v′ branches to v and VP; v branches to V "give" and v; VP branches to NP "me" and V′; V′ branches to V "give" (struck through) and NP "that book"]

- It is also solves our problem with regard to adjunction to VP. We can adjoin adverbs/negation to *v*P and have it appear between the auxiliary and the main verb.

- What kind of head is X? We have already seen that its job, like we assumed for *v*, is to host the morphological endings associated with tense (*-ed/-s*).

- So let's call this head T(ense).

- We can see more evidence for this based on this example:

(16)   I want
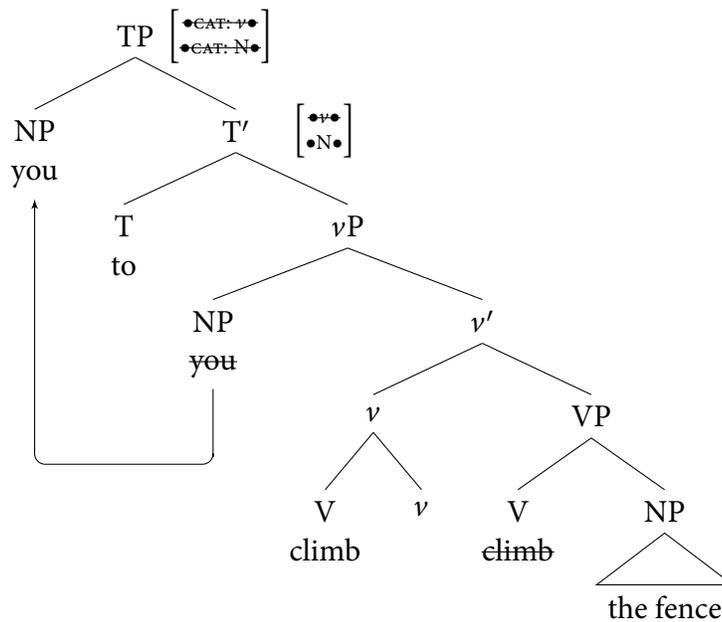
- In *I want you to climb the fence*, the head T is not expressing present or past tense, but actually no tense at all. The sentence embedded under *want* is non-finite (i.e. the absence of tense). Here we see that the subject still moves the specifier of T in order so that it precedes *to*.

- A this point, we might ask ourselves why we need to assume that the subject starts off selected by *v* and then moves to the specifier of T. Why couldn't we just have the subject of the clause merged initially in the specifier of T instead of moving there from a lower position in the tree?

- Well, it turns out that there is actually evidence for this. First consider the sentences in (17) and (18).

(17)   a.   All the dragons will burn the city.
        b.   The dragons will all burn the city.

(18)   a.   Both the girls can play the guitar.
        b.   The girls can both play the guitar.

- The important question becomes what *all* and *both* are in the (b) examples. We would assume that this is some kind of adjunct, but notice that they are only possible when the subject is plural (19b), (20b). This is also true when *all* and *both* show up together with the subject too (19a), (20b).

(19) a. *All the dragon will burn the city.
      b. *The dragon will all burn the city.

(20) a. *Both the girl can play the guitar.
   b. *The girl can both play the guitar.

- It seems reasonable to assume that these are actually part of the subject itself. So why are they realized in a different position to the rest of the subject? Assuming that the subjects moves to its surface position helps us to understand this.

(21)

(22)
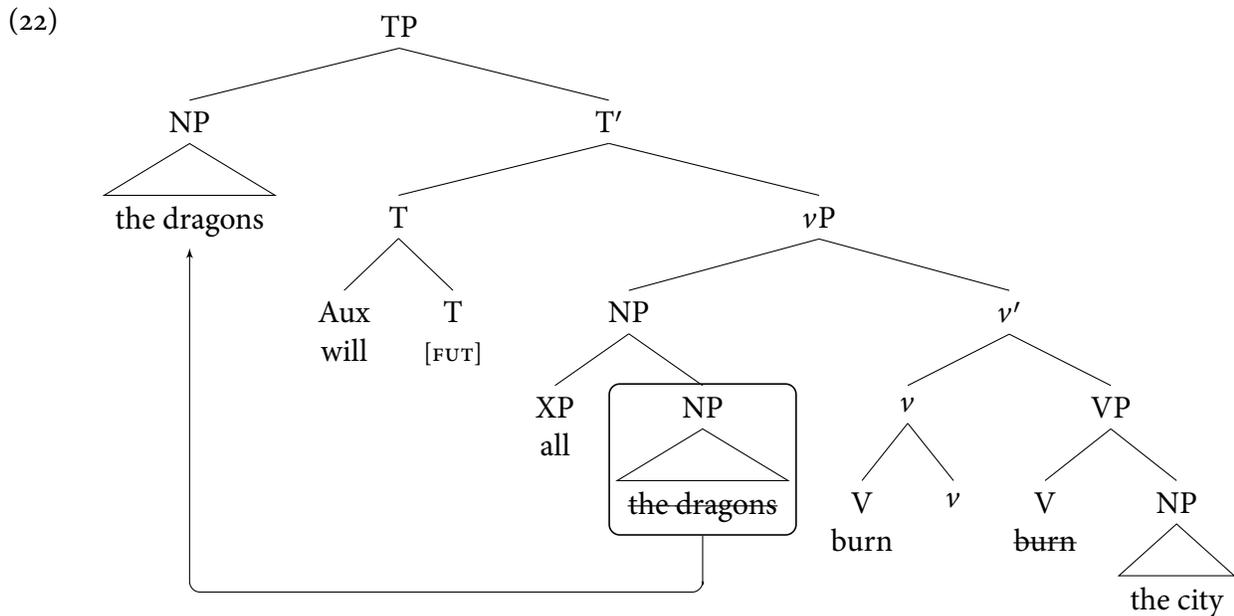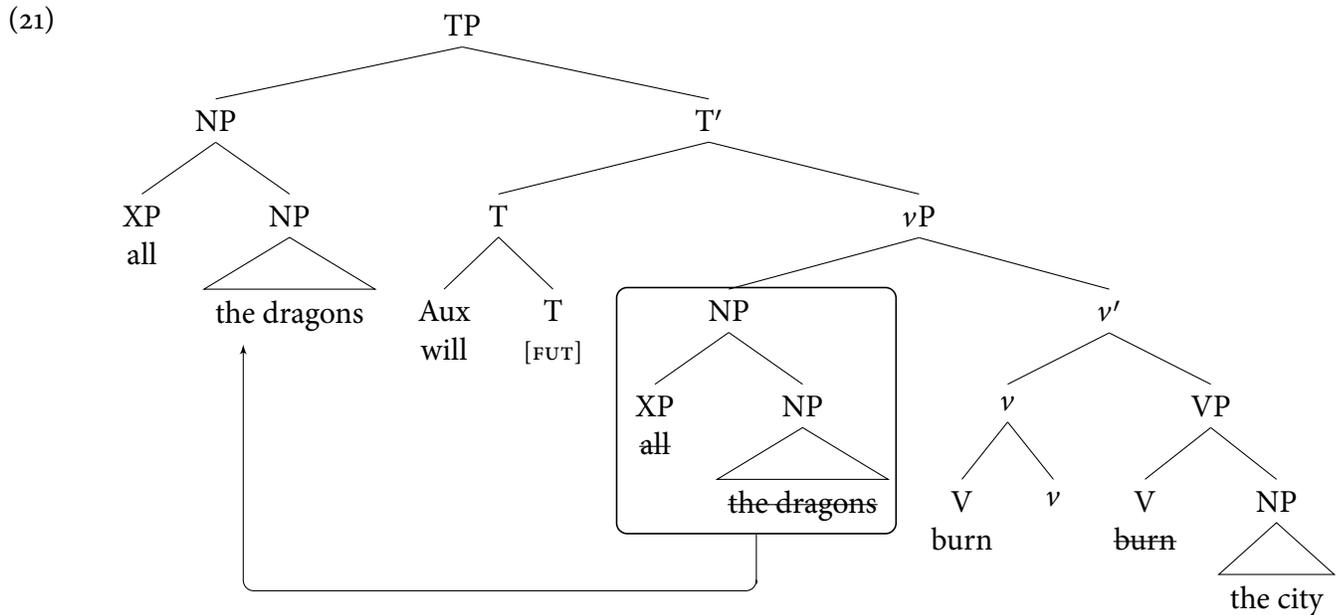
- As the trees above show, if assume that *all* is an adjunct to the NP *the dragons*, it is plausible that we have the choice of which NP node to target for displacement. In (21), the entire NP is moved, while in (22) the lower NP node is moved leaving *all* 'stranded'.

- The possibility of leaving part of a subject behind in this way reveals that its original position is not that the one it started in.

- Another piece of evidence for the fact that subjects move comes from the fact sometimes they seem to surface in a lower position than usual, i.e. below the auxiliary verb. Consider the following sentences:
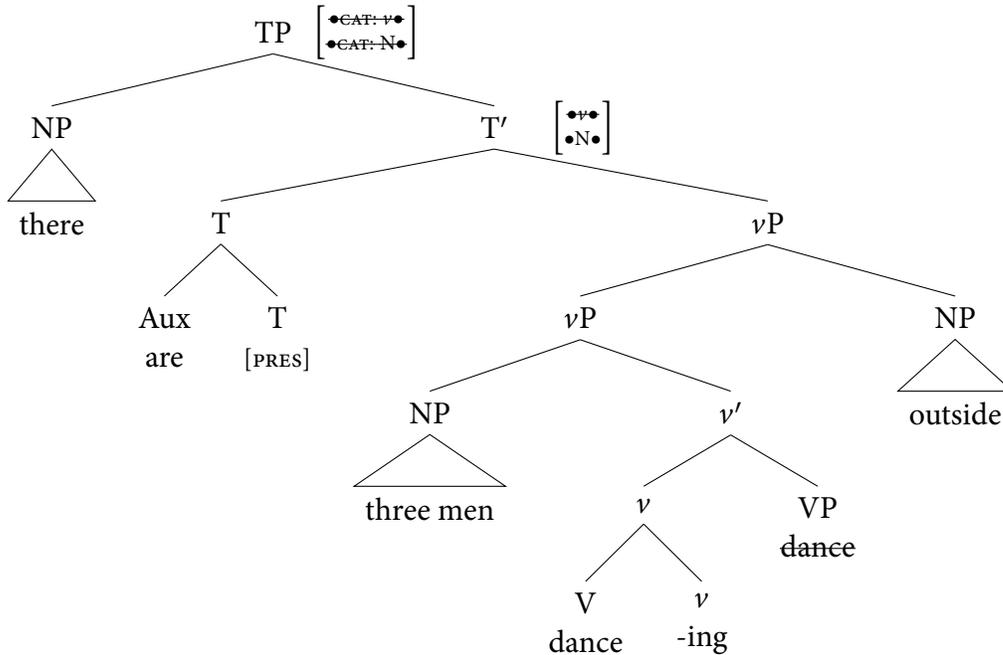
(23) a. Three men are dancing outside
     b. There are three men dancing outside

- The derivation of (23a) is reasonably straightforward.

(24)
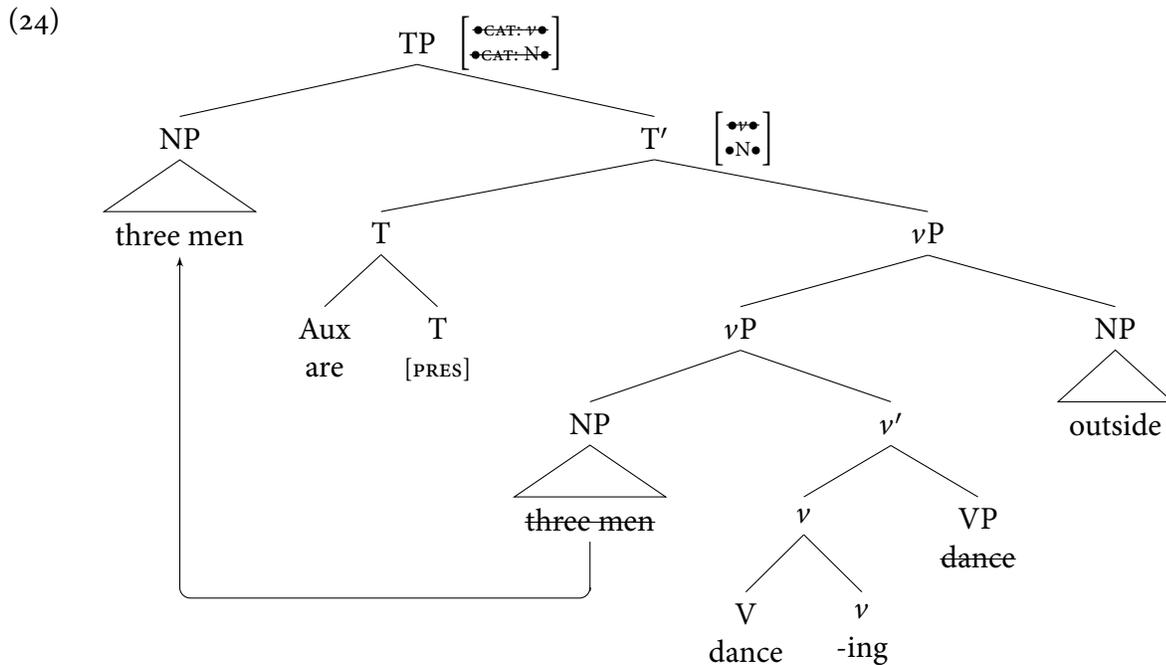
- For (23b), however, it seems that the specifier of T is not filled by the moved subject, but in fact by *there*.

- If we assume that *there* is of category N, then it is also able to check the [•N•] feature that we assumed that T has.

- In this case, it is not necessary for the subject to move so it remains in its original position. Indeed, the position is clearly lower in the structure than the auxiliary in T.

- (We assume that the *-ing* suffix is hosted in *v*. We will talk more about how it gets there next week.)
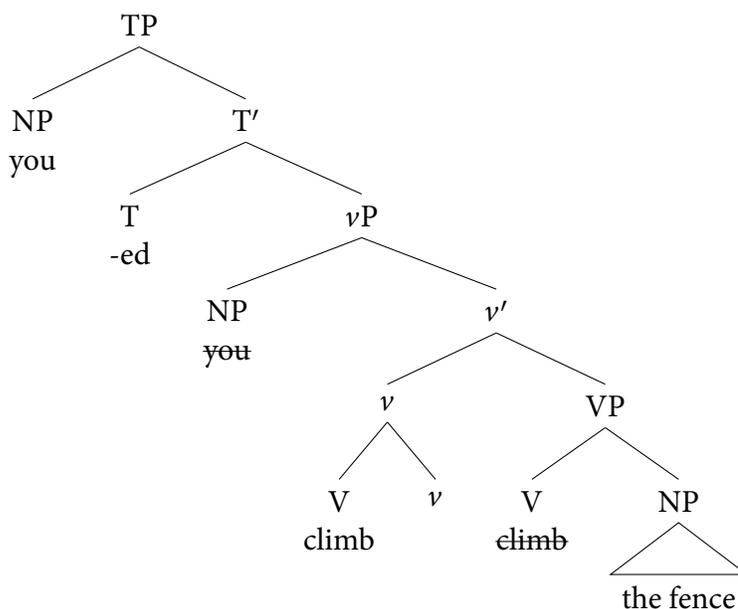
(25)

TP $\begin{bmatrix} \bullet\text{CAT: } v\bullet \\ \bullet\text{CAT: N}\bullet \end{bmatrix}$

- NP
  - there
- T′ $\begin{bmatrix} \bullet v\bullet \\ \bullet\text{N}\bullet \end{bmatrix}$
  - T
    - Aux
      - are
    - T
      - [PRES]
  - vP
    - vP
      - NP
        - three men
      - v′
        - v
          - V
            - dance
          - v
            - -ing
        - VP
          - ~~dance~~
    - NP
      - outside

- With this in place, it seems that our analysis in which the subject moves to a higher position is needed to explain the cases we saw above.

2   Morphology on the verb

- So far, we have seen that a theory in which the morphological ending on the verb starts out in T rather than *v* is more successful. But in a sentence without an auxiliary, such as *You climbed the fence*, how does the verb combine with its suffix?

(26)

TP

- NP
  - you
- T′
  - T
    - -ed
  - vP
    - NP
      - ~~you~~
    - v′
      - v
        - V
          - climb
        - v
      - VP
        - V
          - ~~climb~~
   - NP
          - the fence

- One possibility is to assume, as we did when we still had *-ed* down in v, that the verb moves there. In this case, it would be something more complicated moving to T since

- This was built into our working definition of the head movement operation:

> **Head movement (version 1)**
>
> Create a new node Z with daughters X and Y, where X is a minimal projection ($\approx$head) and Y is the closest c-commanding head to X. Do not pronounce the lower occurrence of X. Also, Z = Y.

- So the movement would like roughly as follows:
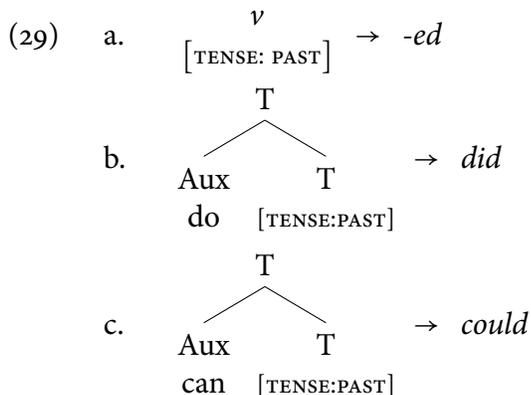
(27)
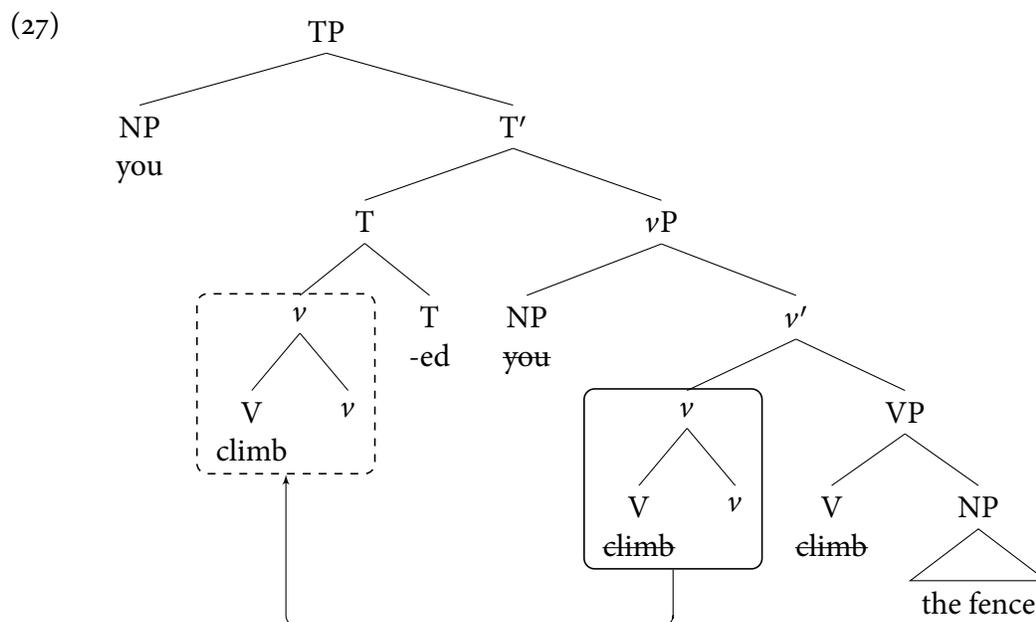
- Is this what we want? Well, it seems to make wrong predictions about the position of the verb relative to adverbs and negation:

(28)   *You climbed {easily, not} the fence
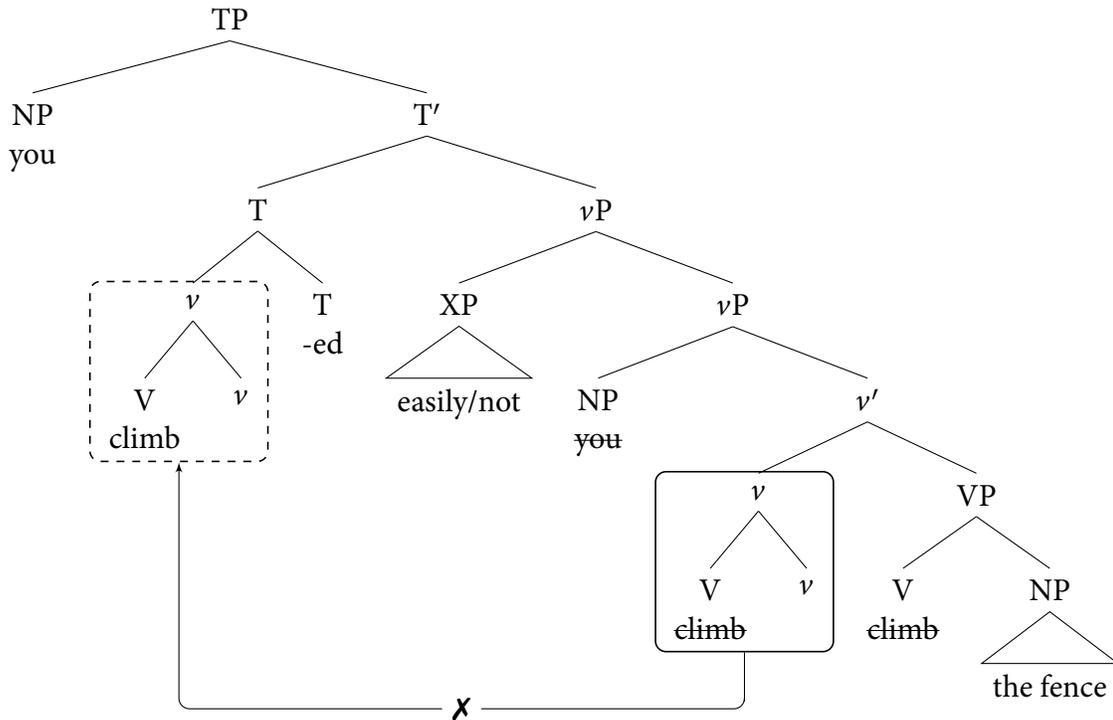
- (We could try to say that adverbs adjoin to T′ instead of *v*P maybe, but this won't help us. When there is an overt auxiliary again we won't be able to get *You could probably climb the fence*, *v*P-adjunction has to be an option.)

- So what can we do? Everything else seems to be working well. Well, what if we said that the tense suffix originates in T but is actually pronounced on the verb when there is no auxiliary around? How would this work?

- Well, there is a way we can do it. Remember the morphological rule we originally had for *-ed* on *v* and the two rules for the auxiliaries from before (modified for T now):

(29)   a. $\begin{array}{c} v \\ \left[\text{TENSE: PAST}\right] \end{array} \rightarrow$ *-ed*

      b. $\rightarrow$ *did*

      c. $\rightarrow$ *could*

- This seems to suggest that we need to be able to have a past feature both on T and *v* (in principle):

(30)

```
                    TP
           ┌─────────┴─────────┐
          NP                   T′
          you          ┌───────┴───────┐
                       T              vP
                 [TENSE: PAST]   ┌─────┴─────┐
                                NP           v′
                                you    ┌─────┴─────┐
                                       v           VP
                                  ┌────┴────┐   ┌───┴───┐
                                  V         v   V       NP
                                climb  [TENSE: PAST] climb   △
                                                         the fence
```
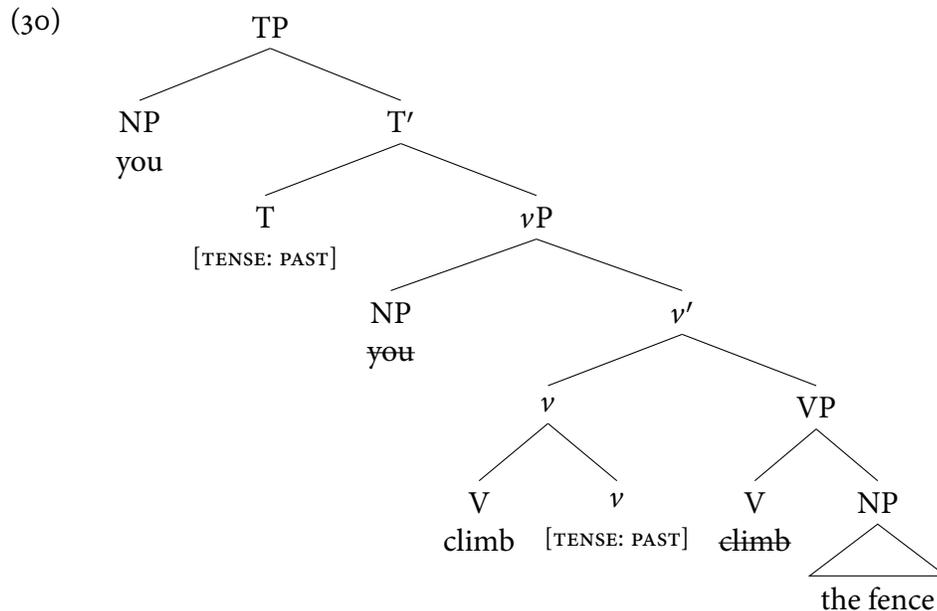
- But let's assume that the 'true' information about tense is encoded on the head T (we called named it T for 'Tense' after all). The tense information on *v* is somehow 'copied' there just in case there is not an auxiliary in the sentence.

- On this assumption, *v* starts off without a specification for tense. The tense feature of *v* is **unvalued**.

(31)

```
                    TP
           ┌─────────┴─────────┐
          NP                   T′
          you          ┌───────┴───────┐
                       T              vP
                 [TENSE: PAST]   ┌─────┴─────┐
                                NP           v′
                                you    ┌─────┴─────┐
                                       v           VP
                                  ┌────┴────┐   ┌───┴───┐
                                  V         v   V       NP
                                climb  [TENSE: __] climb   △
                                                         the fence
```
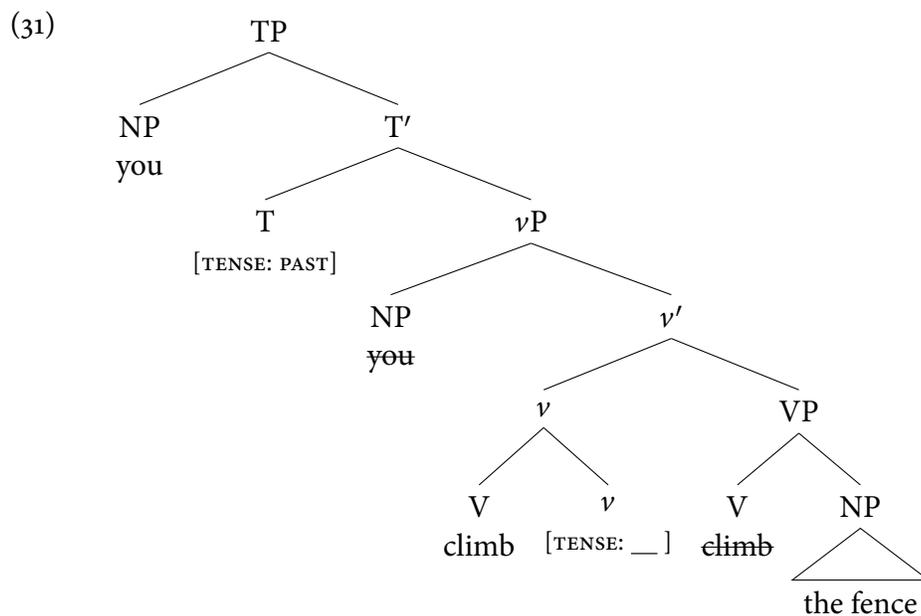
- So, how do we get the features onto tense? This is not something we can do with Merge. Merge only applies under sisterhood. We need an operation that is slightly less local and identify matching features. This operation is called **Agree**. We will define it as follows:
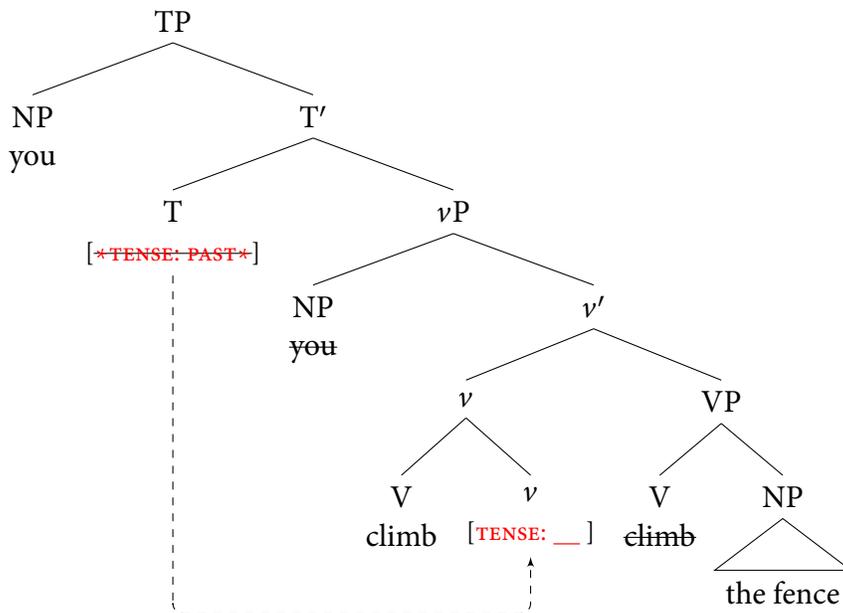
> **Agree**
>
> A feature [∗F: G∗] on a node X can be checked (and deleted) against a matching feature [F: G] on a c-commanded node Y (where Y is the closest c-commanded node bearing [F: G]).
>
> (G may be a null value on X if it is valued on Y (and vice versa).)

- Matching here is defined over the attribute (F:) not the value (these may be null in either one of the features, but not both).

- This involves the introduction of a new kind of feature diacritic [∗F: G∗]. These 'star'-features are features that must be checked by Agree. Similar to the •-features [•F: G•] checked by Merge, they result in an ungrammatical structure if not checked.

- If we make the tense feature on T ∗-feature, then it can be checked by the matching c-commanded feature on *v*: After checking, it is deleted. I will mark features involved in an Agree relation as red.
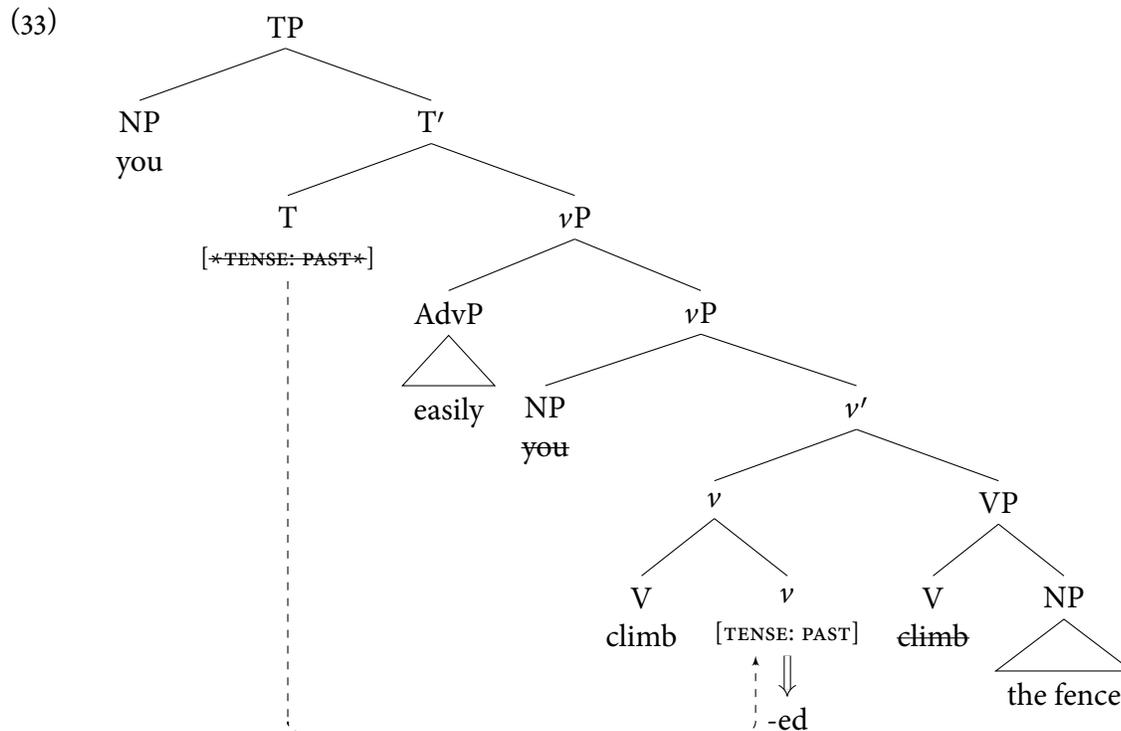
(32)

- Aside from checking the ∗-feature on T, we will assume there is another side effect of Agree that takes place whenever one of the two heads involved has an unvalued feature that is matched by a valued feature on the other. We will call this **Valuation**.

> **Valuation**
>
> If X and Y are heads in an Agree relation and X or Y has some valued feature [F′: __] and the other head has a feature [F′: V], then copy V to [F′: __]. If either feature on X or Y is a ∗-feature, then check this feature on X or Y.
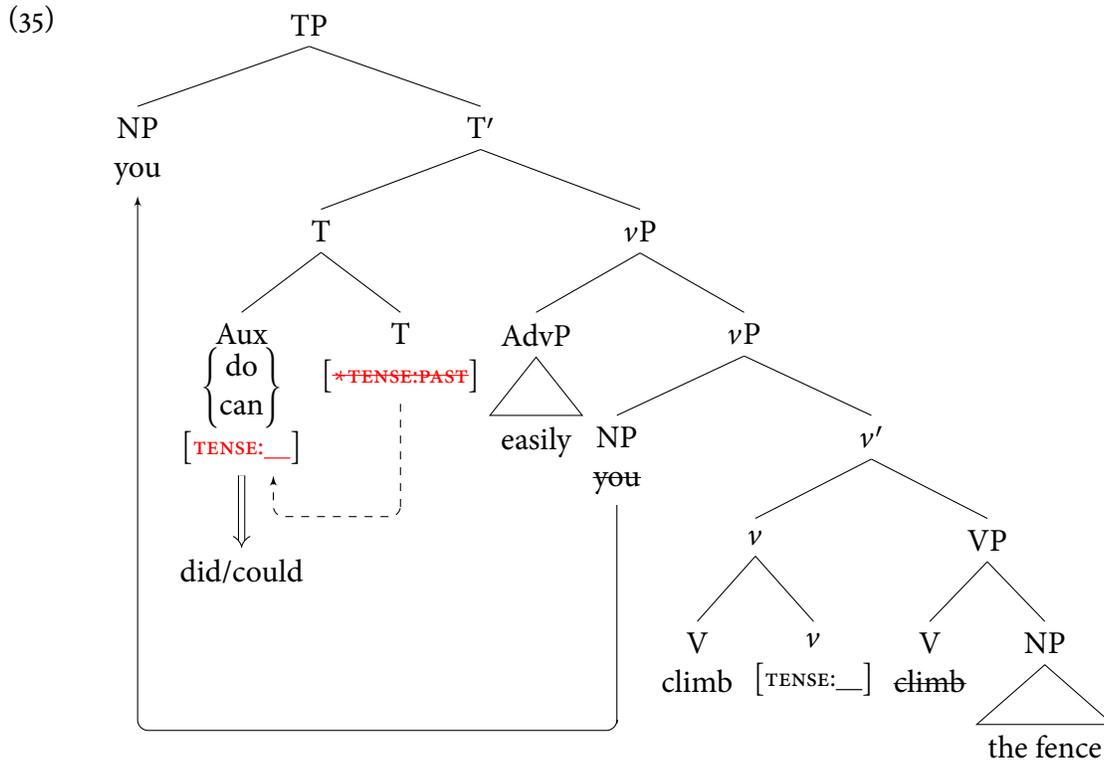
- As a result of valuation, the *v* head receives the value 'PAST' for its feature [TENSE: __] under Agree with T:

(33)

```
                    TP
            ┌───────┴───────┐
           NP               T′
           you        ┌─────┴─────────┐
                      T               vP
               [*TENSE: PAST*]  ┌──────┴──────┐
                              AdvP            vP
                               △       ┌──────┴──────┐
                             easily    NP            v′
                                       y̶o̶u̶    ┌───────┴────────┐
                                              v               VP
                                         ┌────┴────┐     ┌─────┴─────┐
                                         V    v    V     NP
                                       climb [TENSE: PAST] c̶l̶i̶m̶b̶  △
                                                 ⇓          the fence
                                                -ed
```

- Since the feature on T is deleted, it cannot be realized as *-ed* (or anything for that matter) by a morphological realization rule. The realization rule in (29a) can apply to realize *v* as *-ed*, as in the tree above.

- We now have a way of having of account for the fact that the *-ed* attaches to the verb (following *easily/not*) when there is no auxiliary around, but does not when there is.

- So, what happens when we have an auxiliary in our sentence like in (34a)? Here, we don't want to *v* to be realized as *-ed* as in (34b).

(34)   a.   You DID/could (easily) climb the fence
        b.   *You DID/could (easily) climbed the fence

- Let's assume that auxiliary verbs are of category Aux and that they are adjoin directly as the sister of T (we will revise this assumption later):

(35)

```
                        TP
              ┌──────────┴──────────┐
             NP                     T′
             you          ┌─────────┴─────────┐
                          T                   vP
                    ┌─────┴─────┐      ┌───────┴───────┐
                   Aux          T     AdvP             vP
                  ⎧ do ⎫  [*TENSE:PAST]  △        ┌─────┴─────┐
                  ⎩ can ⎭              easily     NP          v′
                  [TENSE:__]                      you    ┌────┴────┐
                      ⇓                                  v         VP
                 did/could                          ┌───┴───┐  ┌───┴───┐
                                                    V       v  V       NP
                                                  climb [TENSE:__] climb  △
                                                                       the fence
```

- Since Aux is a closer c-commanded head with an unvalued tense feature to T than *v*, T will pass its value to Aux rather than *v*.

- Since the tense feature of Aux *do/can* is valued as a past, it can be realized as its past tense form. We can adapt our realization rules accordingly:

(36) a. $\begin{matrix} v \\ [\text{TENSE: PAST}] \end{matrix}$ → *-ed*

  b. $\begin{matrix} \text{Aux} \\ \text{do} \\ [\text{TENSE: PAST}] \end{matrix}$ → *did*

  c. $\begin{matrix} \text{Aux} \\ \text{can} \\ [\text{TENSE: PAST}] \end{matrix}$ → *could*

- Since the *v* head in (35) does not have a valued tense feature, it is correctly predicted by (36a) that it cannot surface as *-ed* in this structure. We therefore rule out the sentence **We did/could easily climbed the fence*.

- (However, our theory still predicts **You not climbed the fence* to be possible. I will come back to this shortly.)

3   Head movement

- Our new theory of Agree also gives us a way of implementing head movement. Recall our definition included this idea of head movement involving movement of 'closest c-commanding head to X' to X:

> **Head movement (version 1)**
>
> Create a new node Z with daughters X and Y, where X is a minimal projection ($\approx$head) and Y is the closest c-commanding head to X. Do not pronounce the lower occurrence of X. Also, Z = Y.

- We don't need to include this in our definition if we use Agree to trigger head movement:

> **Agree**
>
> A feature [∗F: G∗] on a node X can be checked (and deleted) against a matching feature [F: G] on a c-commanded node Y (where Y is the closest c-commanded node bearing [F: G]).
>
> (G may be a null value on X if it is valued on Y (and vice versa).)

- To do this, let's make the following crucial assumption:

> **Parallelism of Selection and Agree**
>
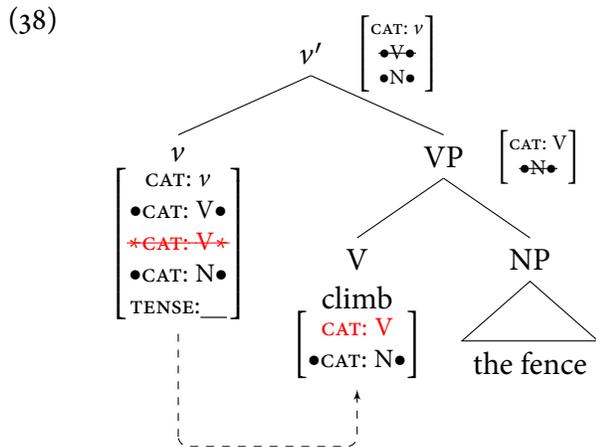> If a head has a selectional feature [●F: G●] it also has [∗F: G∗].
>
> (Restricted to 'verbal' categories: V, *v*, T, …)

- So, *v* selects V so it also now has the feature [∗CAT: V∗] or [∗V∗] for short.

(37)   *v*
$$\begin{bmatrix} \text{CAT: } v \\ \bullet\text{CAT: V}\bullet \\ \ast\text{CAT: V}\ast \\ \bullet\text{CAT: N}\bullet \\ \text{TENSE:}\underline{\quad} \end{bmatrix}$$

- This means that *v* will enter Agree with the head of VP (I'm including the full sets of features here for clarity):

(38)

- What is the result of this Agree relation? The feature [∗V∗] on *v* is checked, but that does change anything. Here, I would like to propose that head movement is triggered by this kind of Agree relation:
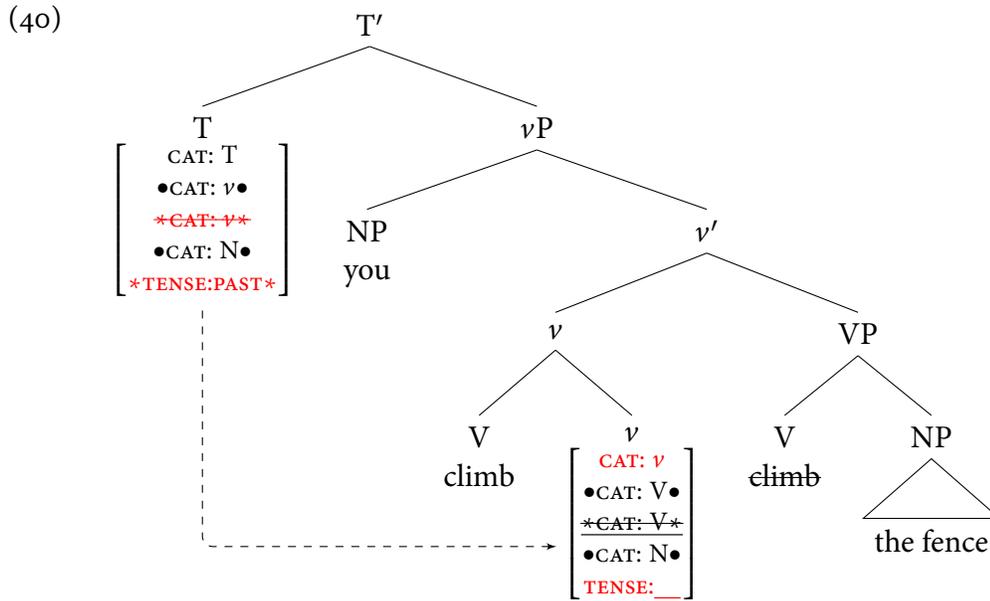
> **Head movement (version 2)**
>
> If a head X agrees with another head Y and X a 'strong' feature [(∗)F: G(∗)], then adjoin Y to X.
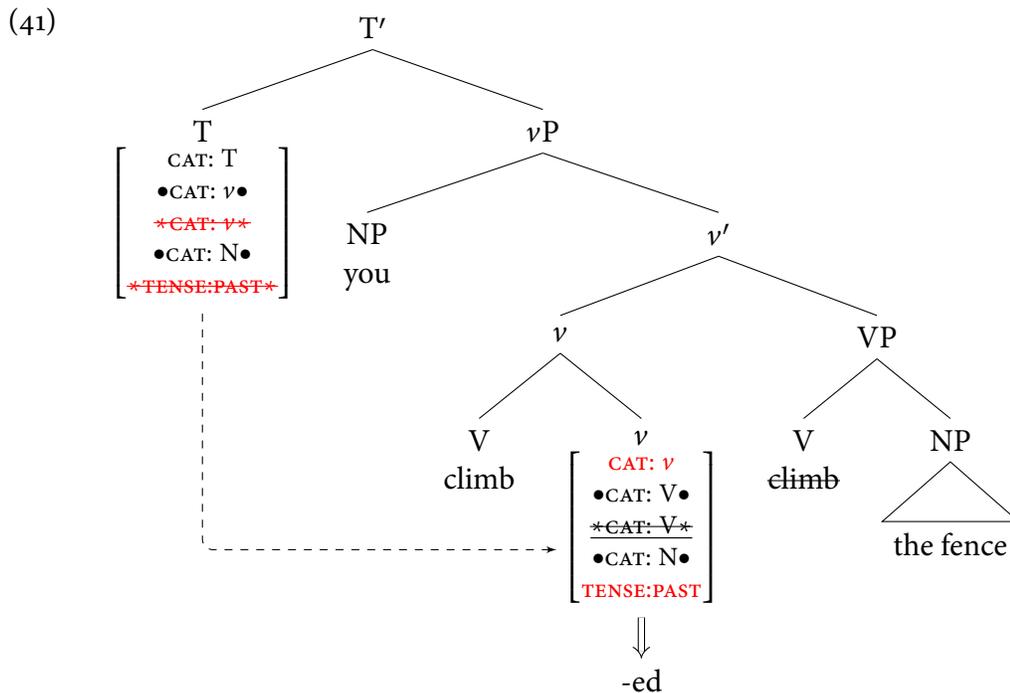
- So, if we make sure that the [∗CAT: V∗] is a <u>strong</u> feature as in (39), then it will force V to move to *v* as a result of Agree.

(39)
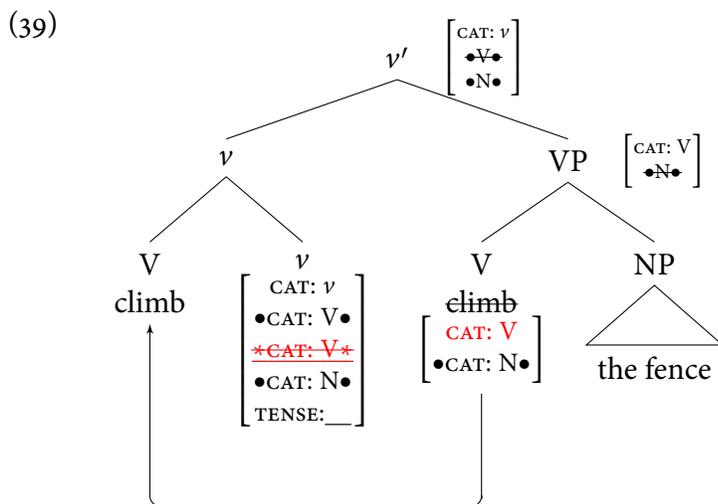
- Now let's imagine that we continue the derivation. We add in the subject in the specifier of *v* and we merge in T. We have talked about the kind of features T has, e.g. it moves something to its specifier and encodes the tense information of the clause. Now in addition to selecting *v*, it will also have an Agree feature [∗*v*∗]. This feature is checked under Agree with the *v* head:

(40)

T′
— T
[CAT: T / •CAT: *v*• / *CAT: V* / •CAT: N• / *TENSE:PAST*]
— *v*P
—— NP
you
—— *v*′
——— *v*
———— V
climb
———— *v*
[CAT: *v* / •CAT: V• / *CAT: V* / •CAT: N• / TENSE:___]
——— VP
———— V
~~climb~~
———— NP
the fence

- Furthermore, given our definition of Valuation above, the TENSE-feature on *v* receives a value from T and the corresponding ∗-feature on T is checked and deleted:
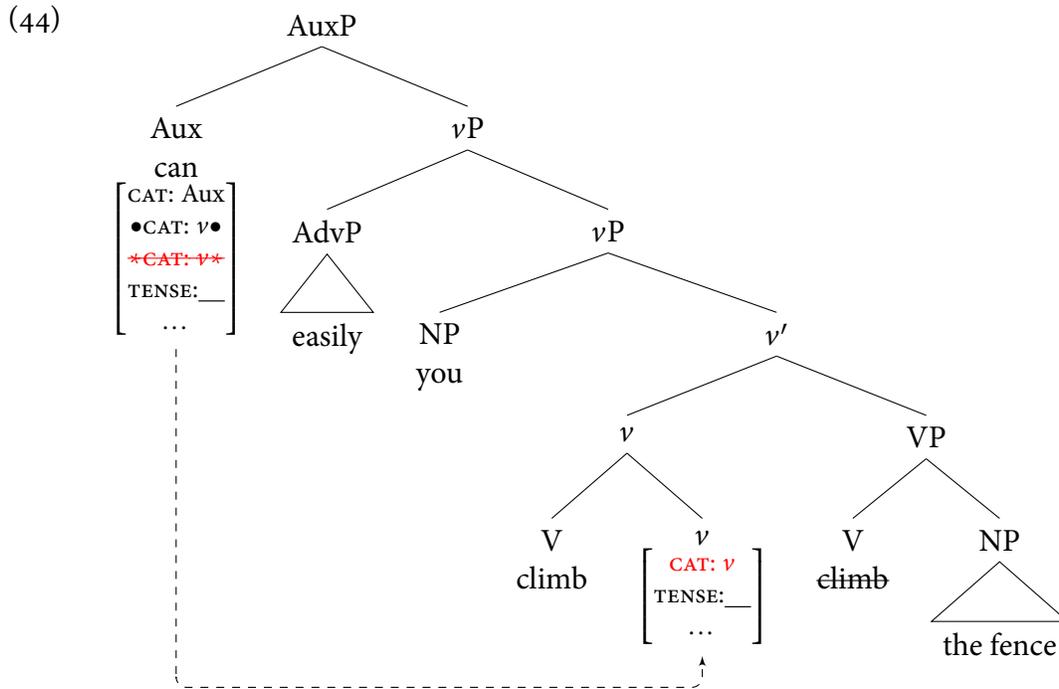
(41)

T′
— T
[CAT: T / •CAT: *v*• / *CAT: V* / •CAT: N• / *TENSE:PAST*]
— *v*P
—— NP
you
—— *v*′
——— *v*
———— V
climb
———— *v*
[CAT: *v* / •CAT: V• / *CAT: V* / •CAT: N• / TENSE:PAST]
⟹
-ed
——— VP
———— V
~~climb~~
———— NP
the fence

- Importantly, the [∗*v*∗] feature on T is not strong. So for this reason, it does not trigger movement of *v* to T.

- Recall the morphological realization rule in (29a), repeated below. This means that *v* can now be realized as *-ed*, as shown in (41)

(42) $\overset{v}{\left[\text{\scriptsize TENSE: PAST}\right]} \rightarrow$ *-ed*
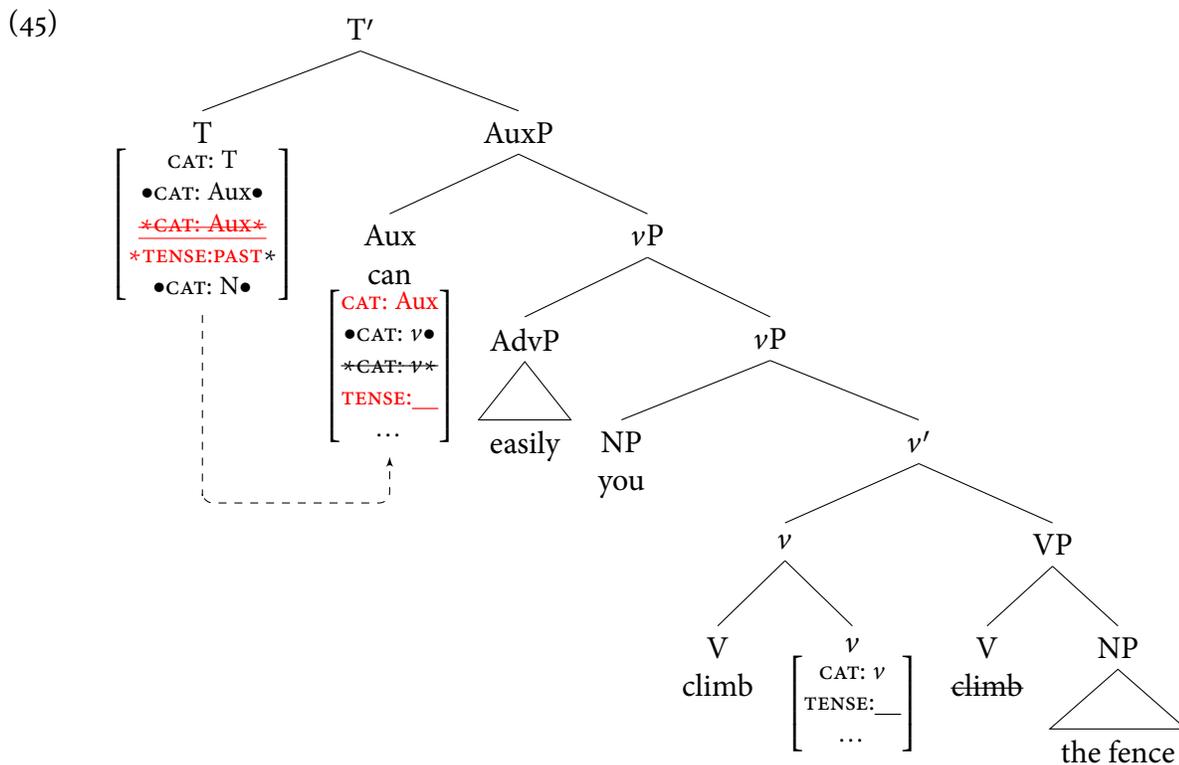
- Just to complete the derivation of *You (easily) climbed the fence*, we move the subject to the specifier of T as in (43).

- We now have the correct word order for this sentence, including the right position for the adjunct. (We can keep the ban on left-adjunction to VP to still rule out **You climbed easily the fence*.)

(43)
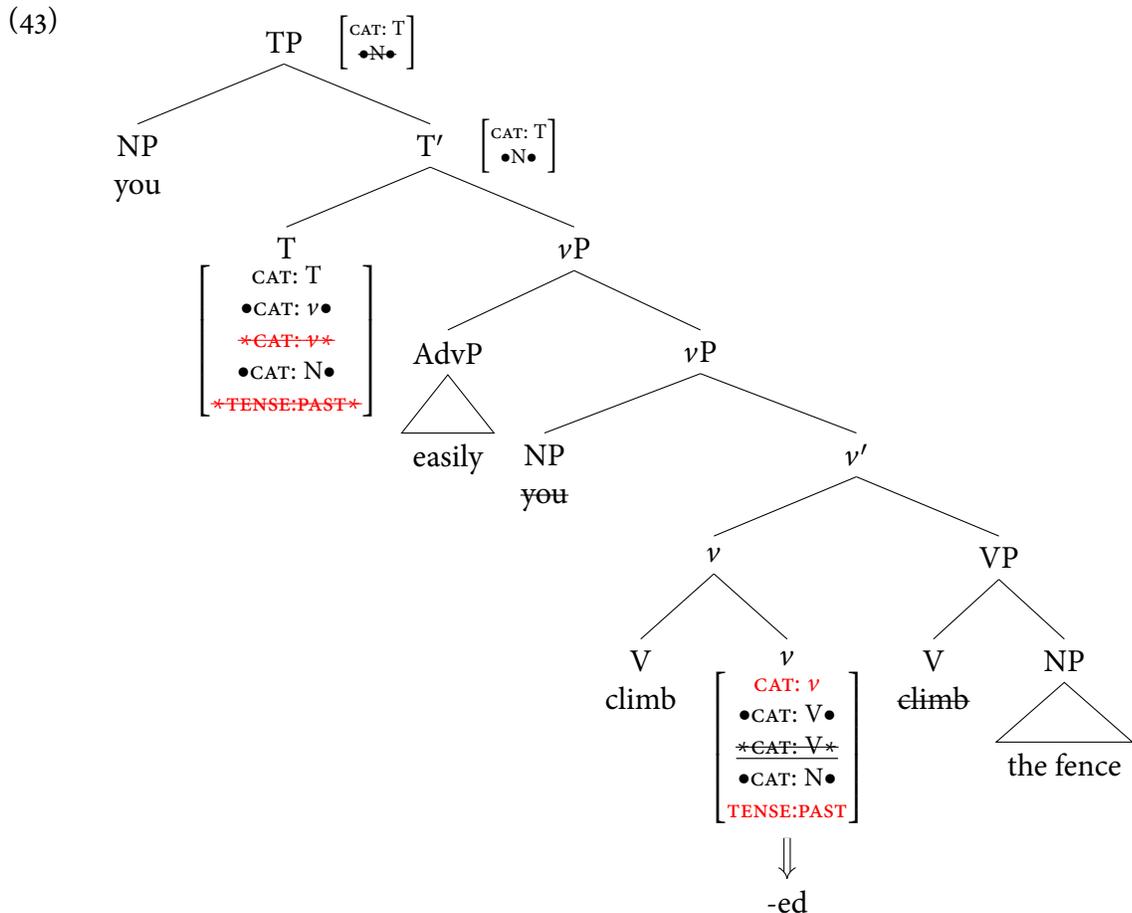
- What about auxiliaries? Well, for modal verbs like *can/could* and the emphatic version of *do* (*You DID climb the fence! (Don't lie!)*), we will assume that they originate in a projection AuxP below T:

- Let's look at how to derive *You could (easily) climb the fence*:

(44)

```
                          AuxP
                     ┌──────┴──────┐
                    Aux            vP
                    can        ┌────┴────┐
              ┌──────────┐   AdvP       vP
              │CAT: Aux  │    △      ┌───┴────┐
              │●CAT: v●  │  easily  NP       v′
              │*CAT: v*  │          you  ┌────┴────┐
              │TENSE:___ │               v         VP
              │   …      │           ┌───┴───┐  ┌───┴───┐
              └──────────┘           V    ┌──────┐ V    NP
                                   climb  │CAT: v│ climb △
                                          │TENSE:│    the fence
                                          │___   │
                                          │  …   │
                                          └──────┘
```

- Next, T is merged with AuxP. In this case, T must select Aux rather than *v*. For this reason, it also has a [*Aux*] feature to match its selection feature [●Aux●]. This feature allows T to enter an Agree relation with Aux. As a result, the TENSE feature is also checked, with Aux receiving a value:

(45)

```
                        T′
                ┌───────┴────────┐
               T               AuxP
          ┌─────────┐      ┌─────┴─────┐
          │CAT: T   │     Aux          vP
          │●CAT: Aux●│    can      ┌────┴────┐
          │*CAT: Aux*│ ┌────────┐AdvP       vP
          │*TENSE:PAST*│CAT: Aux│  △    ┌────┴────┐
          │●CAT: N●  │ │●CAT: v●│easily NP        v′
          └─────────┘ │*CAT: v*│       you   ┌────┴────┐
                      │TENSE:__│             v         VP
                      │   …    │         ┌───┴───┐  ┌───┴───┐
                      └────────┘         V   ┌──────┐V    NP
                                       climb │CAT: v│climb △
                                             │TENSE:│  the fence
                                             │__    │
                                             │  …   │
                                             └──────┘
```

- Since the [∗Aux∗] feature on T is strong, it triggers head movement to Aux to T:

(46)
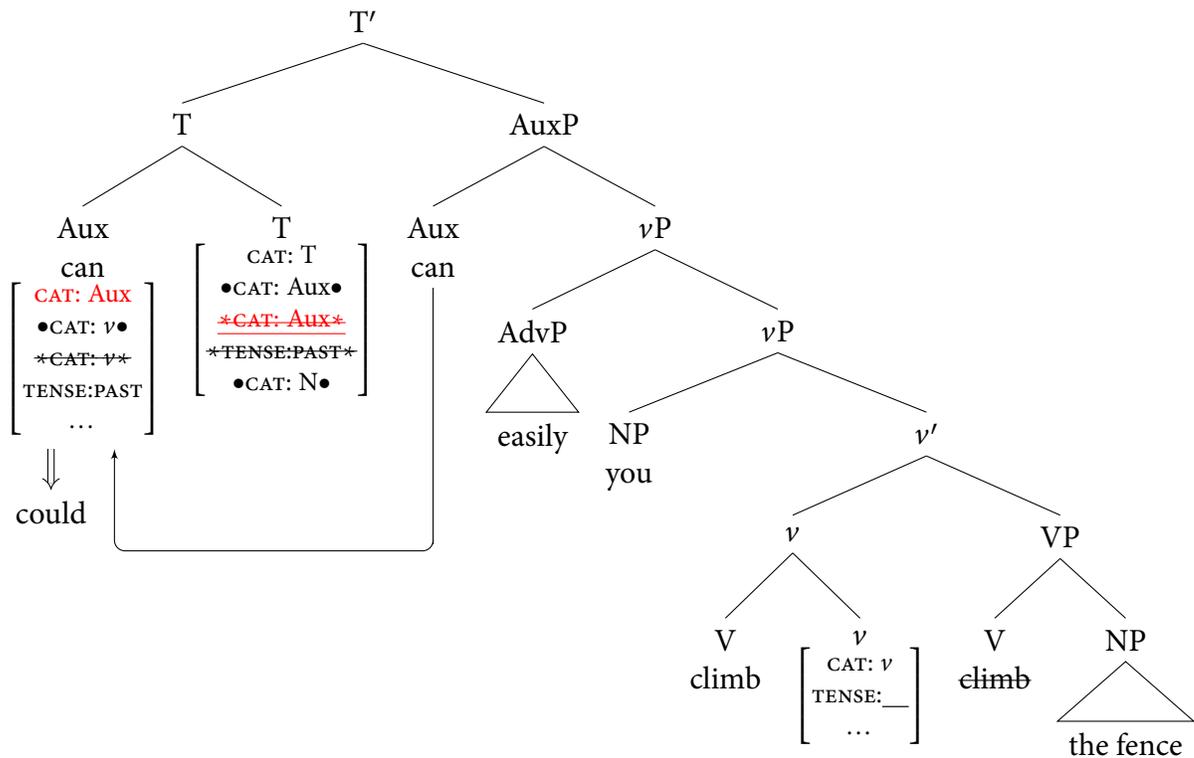
- Why assume that the [∗Aux∗] feature on T is strong? For now, it doesnt seem to make a difference. We will see why later.

- Finally, the subject will move to the specifier of T to check the remaining [•N•] feature of T:

(47)
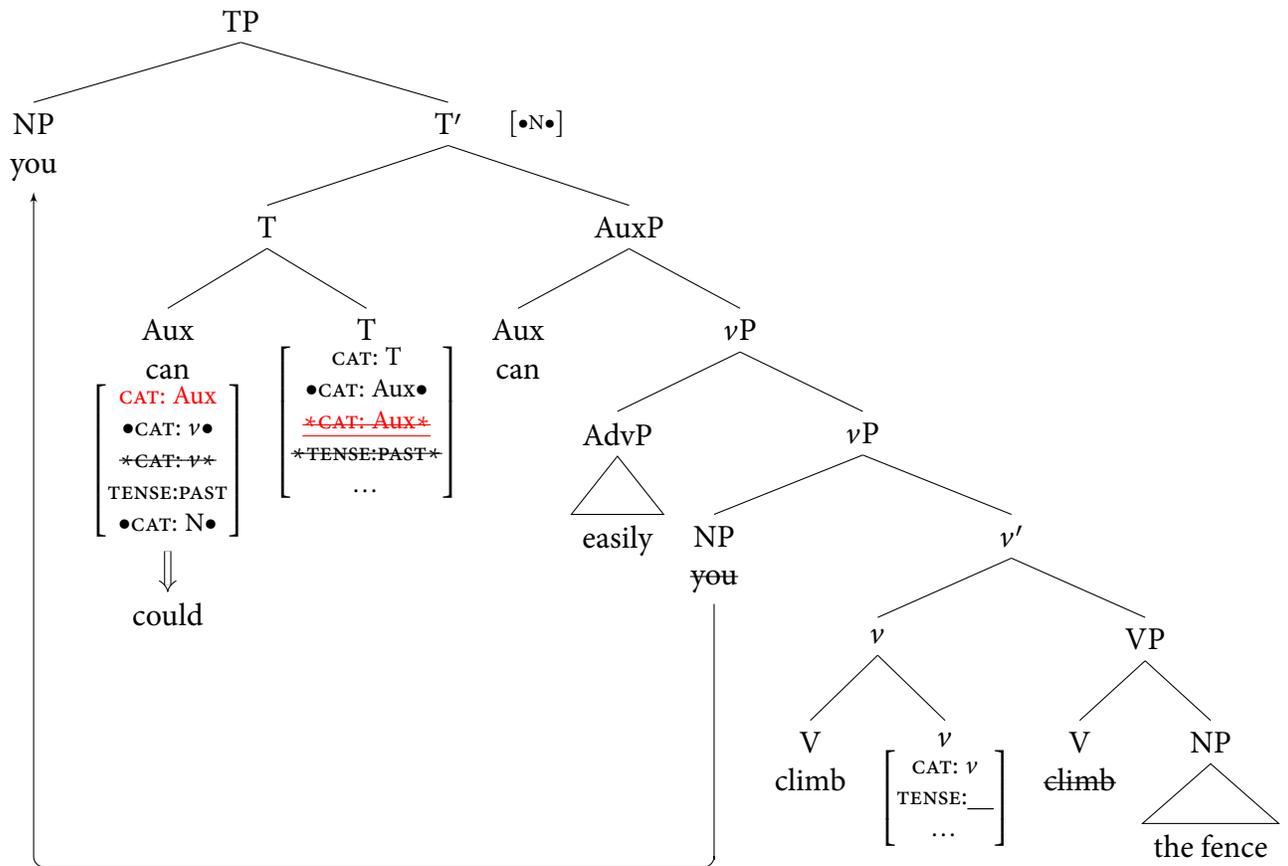
- (Note that going forward, I will start to abbreviate the features more and more in the tree, e.g. those we will use for head movement. I have written them out here in full detail since is the first time we are talking about them. In future I will just write [∗V∗] on the *v* head, for example.)

- This is the derivation that we will assume for all types of auxiliaries, including emphatic *do*.

- What about unstressed *do*? We will turn to that now.

4   Negation and *do*

- Now, we are left with one final problem. Why can't we say **You not climbed the fence*?

- Instead, we have to use the unstressed variant of *do* (48). This is the only way to express past tense when we have *not*.

(48)   You did not climb the fence

- What is the status of *not*. Perhaps it is an adjunct to *v*P like *easily*?

(49)
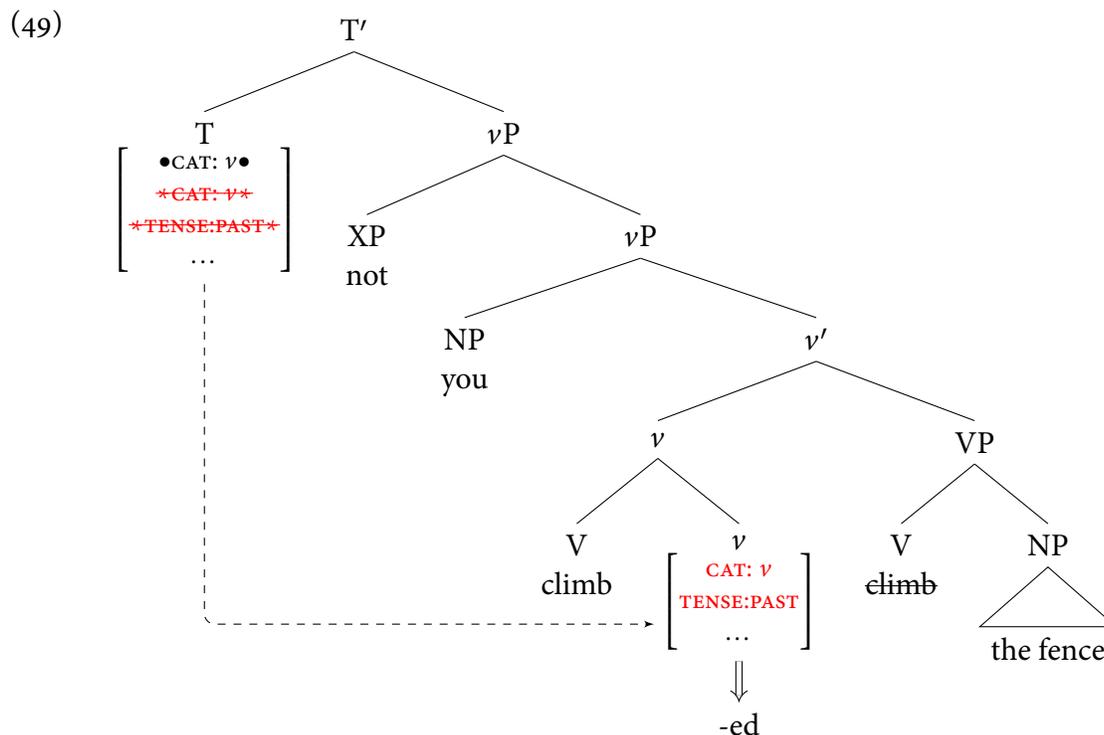
- But here we predict **You not climbed the fence*. While *climbed* may follow *easily*, it may not follow *not*. Maybe this is telling us something: *not* isn't an adjunct.

- Let's try making it the head of its own phrase, NegP, by assigning it the category Neg.

- This means that T will select NegP rather than *v*P in the presence of negation. This also means that it will have a [∗Neg∗] feature rather than a [∗*v*∗] feature.

- As shown in (50), we can check the [∗Neg∗] feature on T, but Neg does not have a tense feature.

- Also, since none of the features involved in Agree is a <u>strong</u> feature, no head movement is triggered.

(50)
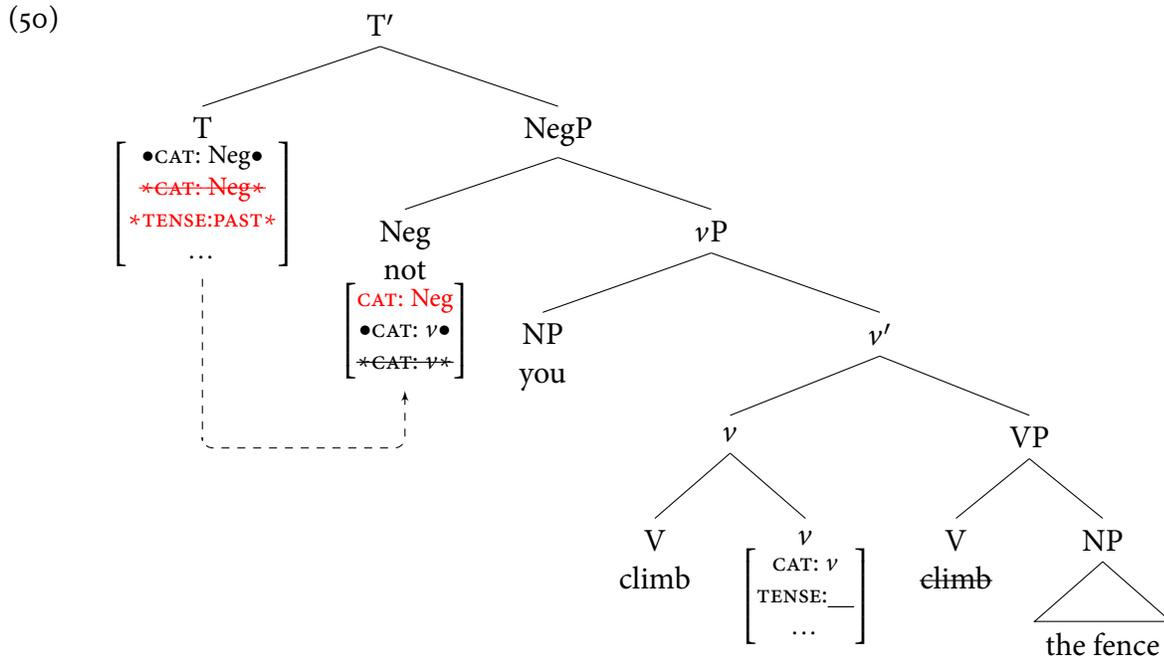
- Here, the problem is that the [∗TENSE:PAST∗] feature on T remains unchecked. If it is not checked during the syntactic derivation, then it will lead to an ungrammatical structure.

- Assuming that Agree with *v* is not possible at this point (due to the lack of [∗*v*∗] on T), then the only way to 'save' this structure is to merge an auxiliary directly with T:

(51)
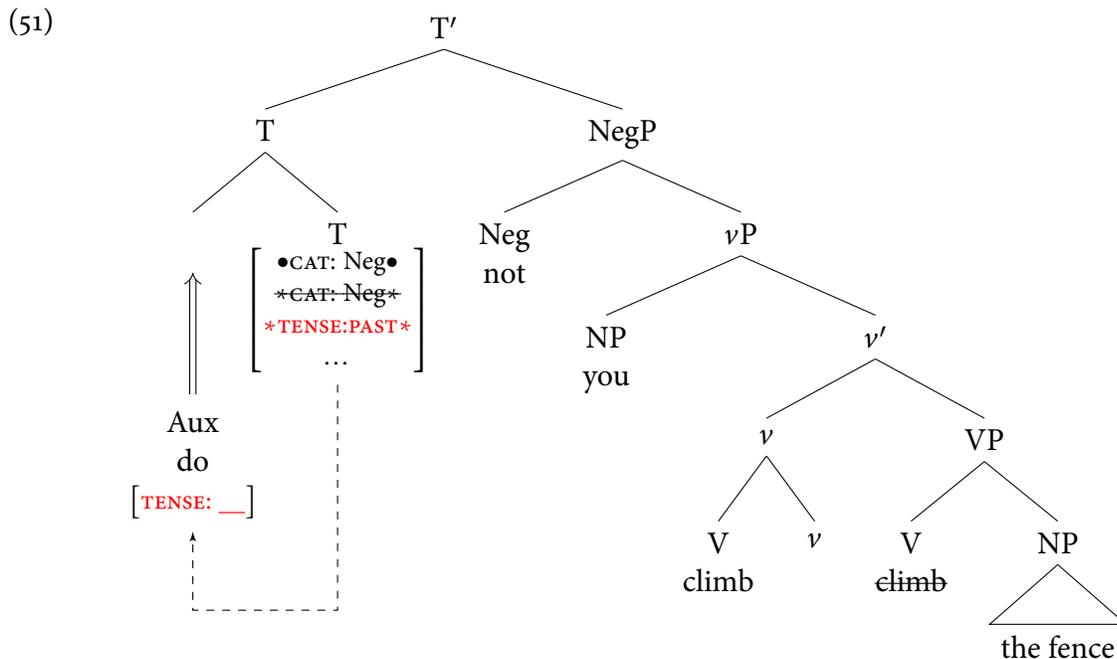
- Since Aux is a sister of T (and c-commanded by it) it can value its tense feature under Agree. *Do* will therefore be realized as *did*.

- On this view, non-emphatic use of *do* is a way of rescuing a structure that would otherwise fail due to an unchecked [∗TENSE∗] feature.

- This 'rescuing' operation is known as *do*-support. It is a quirk of English that past tense has to be realized by *do* (and not on the main verb) in the presence of negation.

- (Why is *do* that is inserted and not some other auxiliary? Perhaps it is because *do* is more general in its meaning than *can* or *would*? It is hard to say.)

- Since it is impossible for T to agree with *v* in the presence of Neg, we account for why **You not climbed the fence* is ungrammatical.

- (When we look at sentences with multiple auxiliaries, however, we will have to revise these assumptions somewhat.)