Tree Adjoining Grammars
Syntax: Complementation in LTAG

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Outline

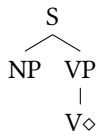# Complementation with NPs and PPs: The base cases

Complementation with NPs:

αnx0V:

```
      S
     / \
   NP   VP
         |
        V◇
```

αnx0Vnx1:

```
      S
     / \
   NP   VP
       /  \
     V◇    NP
```

αnx0Vnx2nx1:

```
      S
     / \
   NP   VP
       /  |  \
     V◇  NP   NP
```
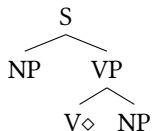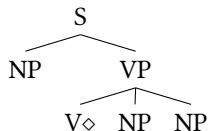
Complementation with PPs: substitution or co-anchor

αnx0Vnx1pnx2:

```
        S
      /   \
    NP     VP
         / | \
       V◇  NP  VP
              /  \
             V    PP
             |   /  \
             ε  P    NP
```

αnx0Vnx1Pnx2:

```
        S
      /   \
    NP     VP
         / | \
       V◇  NP  VP
              /  \
             V    PP
             |   /  \
             ε  P◇   NP
```
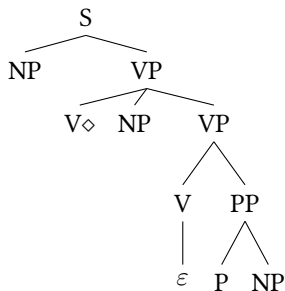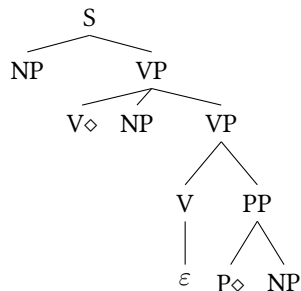
Case assignment and subject-verb agreement
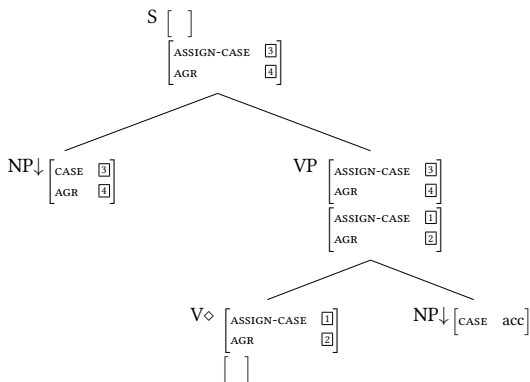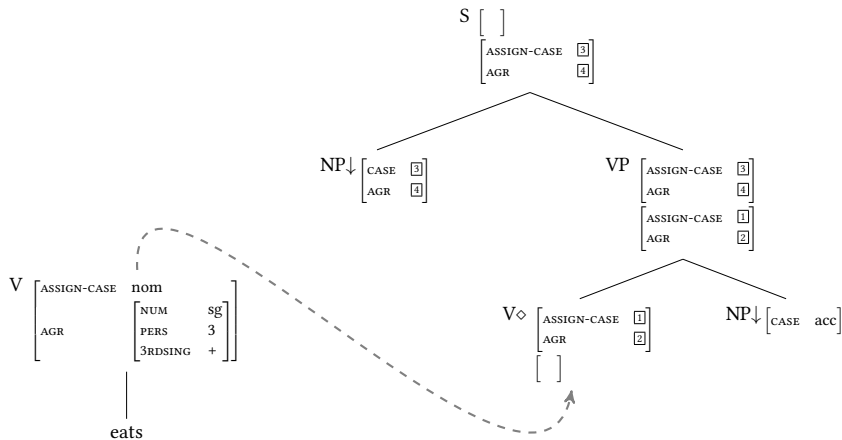
Two modes of case assignment in tree templates:

- Direct case assignment with case
- Indirect case assignment with assign-case
 ⇒ by the lexical anchor (during lexical insertion) or by adjoining trees

αnx0Vnx1:

S $\begin{bmatrix} \ \end{bmatrix}$
$\begin{bmatrix} \text{ASSIGN-CASE} & \boxed{3} \\ \text{AGR} & \boxed{4} \end{bmatrix}$

NP↓ $\begin{bmatrix} \text{CASE} & \boxed{3} \\ \text{AGR} & \boxed{4} \end{bmatrix}$

VP $\begin{bmatrix} \text{ASSIGN-CASE} & \boxed{3} \\ \text{AGR} & \boxed{4} \end{bmatrix}$
$\begin{bmatrix} \text{ASSIGN-CASE} & \boxed{1} \\ \text{AGR} & \boxed{2} \end{bmatrix}$

V◇ $\begin{bmatrix} \text{ASSIGN-CASE} & \boxed{1} \\ \text{AGR} & \boxed{2} \end{bmatrix}$
$\begin{bmatrix} \ \end{bmatrix}$

NP↓ $\begin{bmatrix} \text{CASE} & \text{acc} \end{bmatrix}$

Case assignment and subject-verb agreement

Case assignment and subject-verb agreement
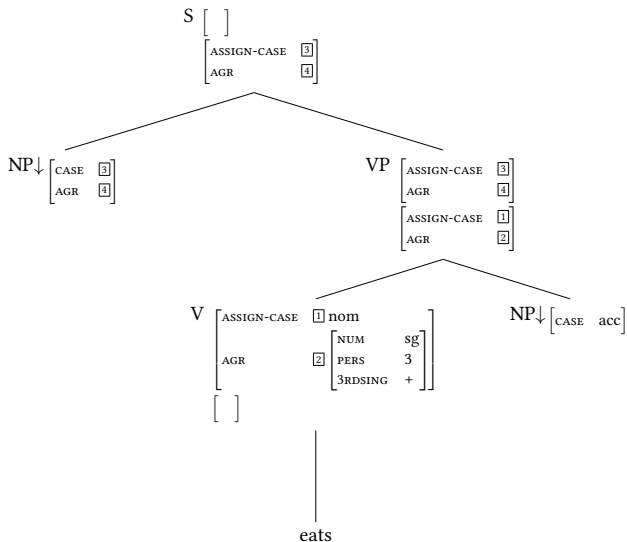
Sentential complement structures

In XTAG, a distinction is drawn between sentential complements with **(i) finite verbs**, sentential complements with **(ii) to-infinitives**, and **(iii) small clauses**.

(1) a. Kim said [that Sandy left].   (finitive)
    b. Dana preferred [for Pat to get the job].   (to-infinitive)
    c. Leslie wanted [Chris to go].
    d. René tried [PRO to win].
    e. [Kim] seems [to be happy].
    f. Tracy proved [the theorem false].   (small clauses)
    g. Bo considered [Lou a friend].
    h. Gerry expects [those children off the ship]
    (from Pollard and Sag (1994))

To-infinitives: Controlling and Raising its subject

XTAG assumes different syntactic structures/derivations for superficially very similar sentences:

(2) a. John tries [PRO to leave].
    b. [John] seems [to leave].

Why is that?

XTAG adopts the **projection principle** from GB Chomsky (1981), according to which "meaning maps transparently into syntactic structure" (Culicover and Jackendoff, 2005, 47), such that the following equivalence relation holds:

Complement of the verb $\Longleftrightarrow$ Argument of the predicate

$\Rightarrow$ θ-criterion for TAG from Frank (2002)

To-infinitives: Controlling and Raising its subject

> Complement of the verb $\iff$ Argument of the predicate

(3) a. John tries to leave
    b. try(John, leave(John))

$\Rightarrow$ *John* is the complement of both *tries* and *to leave*.
$\Rightarrow$ Empty element (PRO) is used to avoid complement sharing.
$\Rightarrow$ PRO needs to be "controlled".
$\Rightarrow$ **Control**
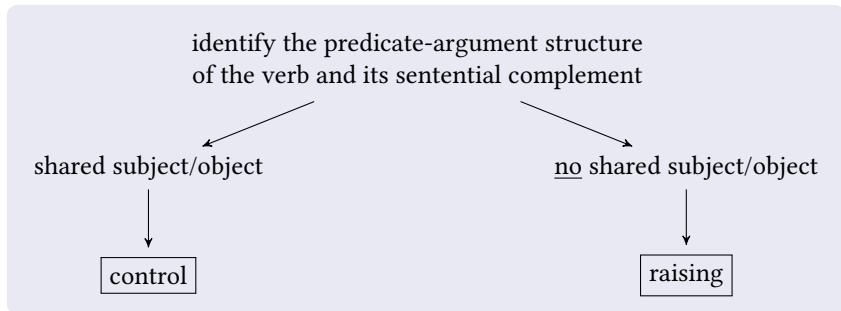
(4) a. John seems to leave
    b. seem(leave(John))

$\Rightarrow$ *John* is not the complement of *seems*.
$\Rightarrow$ Argumenthood is the primary syntactic factor, not agreement!
$\Rightarrow$ An alien complement looks like a regular complement.
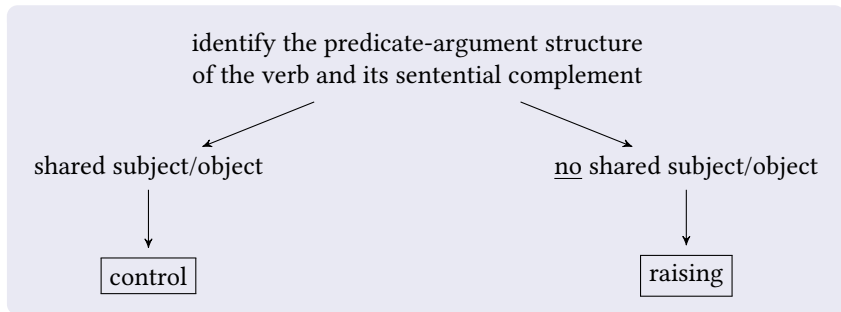$\Rightarrow$ **Raising**

Raising or Control?

identify the predicate-argument structure
of the verb and its sentential complement

shared subject/object

control

<u>no</u> shared subject/object

raising

- Classfication game:

(5) a. They asked Jan to leave. (object control)
   b. Bo turns out to be obnoxious. (subject raising)
   c. Sandy is willing to go to the movies. (subject control)
   d. Terry was expected to win the prize. (subject raising)
   e. Kim believed a unicorn to be approaching. (object raising)

Raising or Control?

identify the predicate-argument structure
of the verb and its sentential complement

shared subject/object   <u>no</u> shared subject/object

control   raising

- Pitfalls and special cases:

(6) a. It is important for Bill to dance.   (PP-raising?)
     b. Christy left the party early to go to the airport.   (modifier?)
     c. Peter kept standing in the doorway.   (no to-infinitive)

Control verbs

> Control verbs establish the coreference between their subject/object (= the controller) and the unexpressed subject (PRO) of their sentential complement.
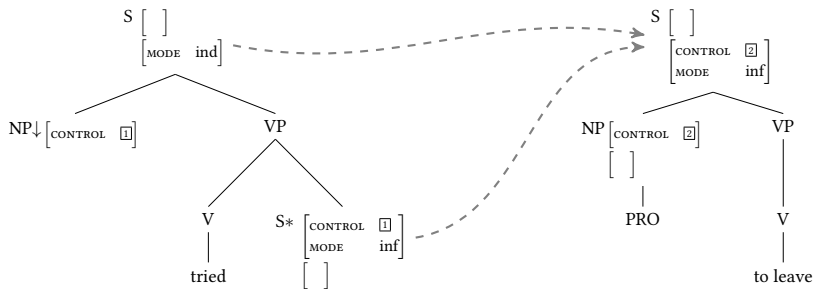
(7) a. $John_i$ tried [PRO_i to leave]. (subject control)

    b. John persuaded him_i [PRO_i to leave]. (object control)

    c. *$There_i$ tries [PRO_i to be disorder after a revolution].

$\Rightarrow$ **Control verbs assign a semantic role to the controller!**

Control verbs - XTAG-Analysis

- CONTROL feature for coindexation
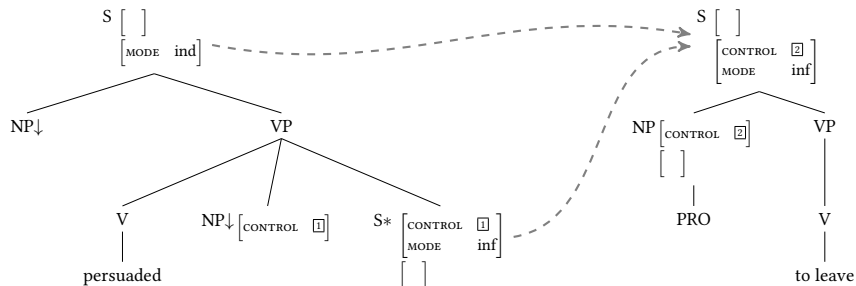- PRO tree or PRO as coanchor of the verb

Example for subject control:

Control verbs - XTAG-Analysis

- CONTROL feature for coindexation
- PRO tree or PRO as coanchor of the verb

Example for object control:

Raising verbs

Raising verbs determine case and agreement properties of the subject complement of the (non-finite) sentential complement. Since the "raised" constituent is no immediate part of the argument structure of the raising verb, this is called **Exceptional Case Marking (ECM)**.

(8) a. [John] seems [to leave].   (subject raising)
    b. Sue expects [him to leave].   (object raising)
    c. [There] seems [to be disorder after a revolution].
    d. John expected [it to rain].

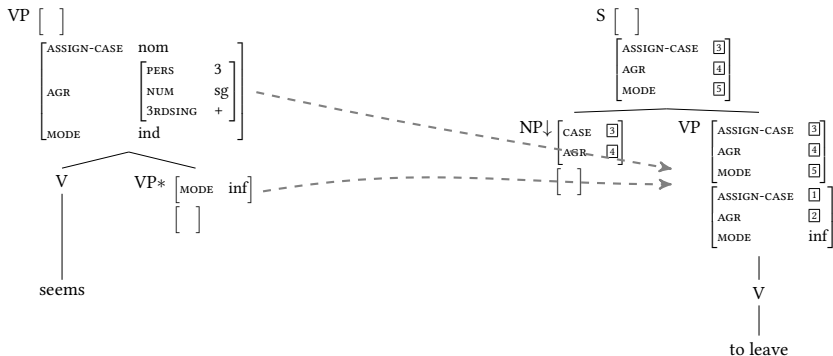⇒ **allow for expletive pronouns (***it/there***)**

(9) John seems unhappy.
    *John tries unhappy.

⇒ **allow for small clauses**

Raising verbs - XTAG-Analysis (1)

- no PRO
- The "raised" constituent is still part of the to-infinitive!
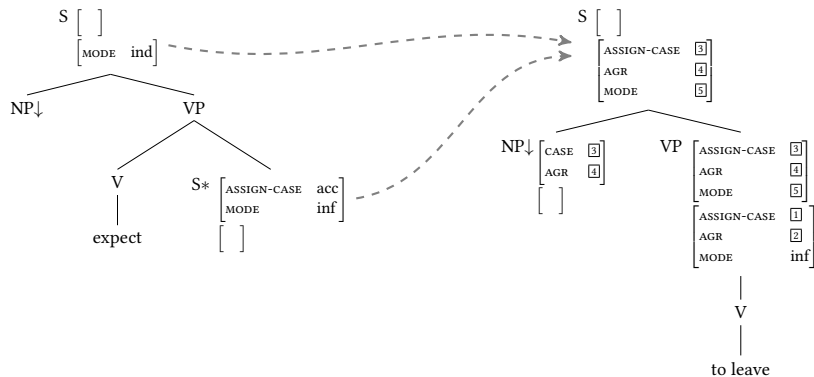- ECM via ASSIGN-CASE feature

Example for subject raising:

Raising verbs - XTAG-Analysis (2)

Example for object raising:

(10) We expect him to leave.

"Ist's eins? Sind's zwei?" (Goethe, 1819)

Question:

What complements does the verb *consider* take?

(11) a. We consider [Kim to be an acceptable candidate].
    b. We consider [Kim an acceptable candidate].
    c. We consider [Kim quite acceptable].
    d. We consider [Kim among the most acceptable candidates].
    e. *We consider [Kim as an acceptable candidate].

Similar verbs: *prove, expect, rate, count, want*

1. **One sentential complement (small clause)**, where *to be* can be omitted
2. **A noun and a predicative phrase**

Small clauses - Pro and contra (1)

Pro:

- Homomorphism between argument structure and complement structure (in GB: Projection Principle, UTAH; in TAG: θ-Criterion)

- Uniformity of the subcategorized constituents:

  Instead of NP, AP, PP, IP/S, ... as possible categories of the complements, there is only one complement category.

Small clauses - Pro and contra (2)

Contra:

- Passivization (object-to-subject shift)

  (12) We considered [Kim quite acceptable].
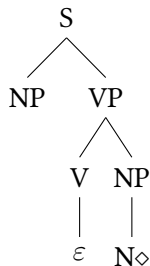   Kim was considered [__ quite acceptable].

- Idiosyncratic restrictions on the predicative phrase

  (13) a. I consider/*expect [this Island a good vacation spot].
       b. I consider/*expect [this man stupid].
          I expect [that man to be stupid].
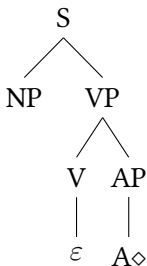   c. We rate/*consider [Kim as quite acceptable]

⇒ The verb should be indifferent to the categorial status of the
   small clause predicate!
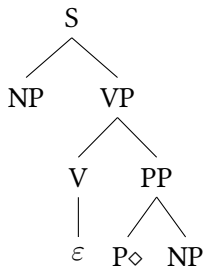
Small clauses - XTAG-Analysis (1)

αnx0N1:

```
        S
       / \
     NP   VP
         /  \
        V    NP
        |    |
        ε    N◇
```

αnx0Ax1:

```
        S
       / \
     NP   VP
         /  \
        V    AP
        |    |
        ε    A◇
```

αnx0Pnx1:

```
        S
       / \
     NP   VP
         /   \
        V     PP
        |    /  \
        ε   P◇   NP
```
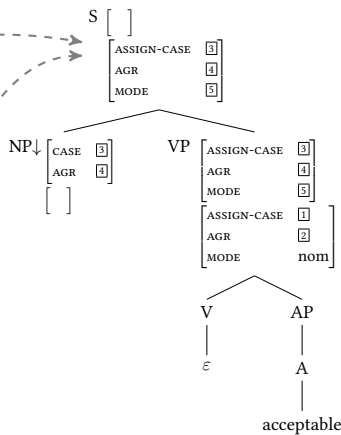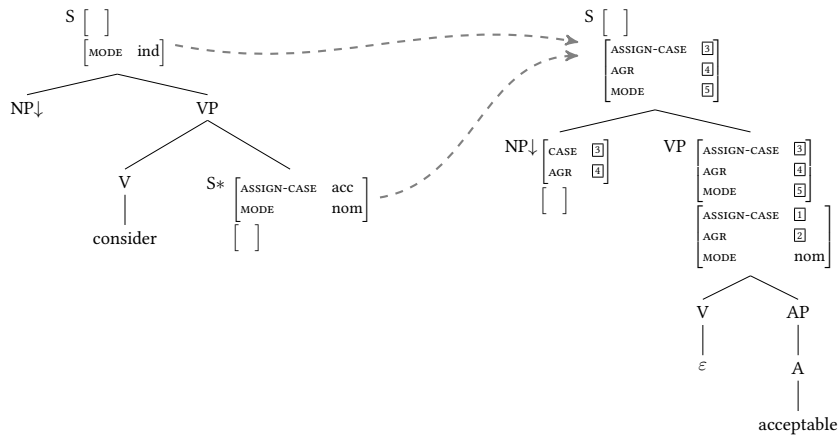
Small clauses have the structure of regular sentences , except that
the verb is missing.

⇒ The superordinate verb is represented as auxiliary tree that
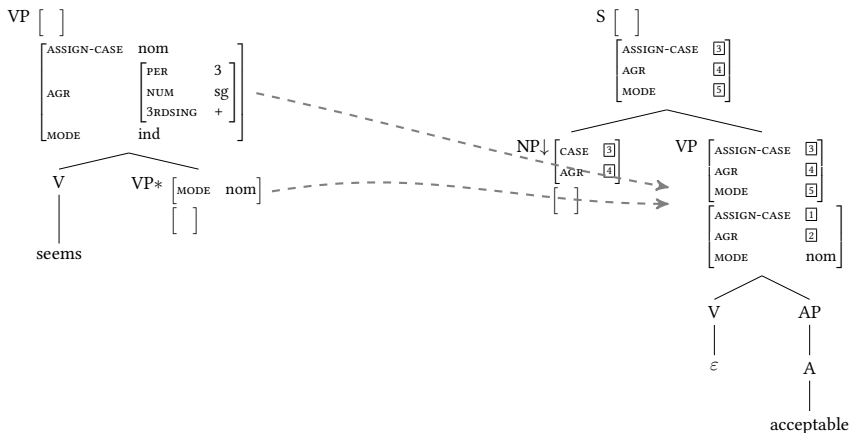   adjoins at VP or S.

Small clauses - XTAG-Analysis (2)

(14) We consider Kim acceptable.

Small clauses - XTAG-Analysis (3)

(15) Kim seems acceptable.

Raising and Control - Summary

control verbs	raising verbs
assign semantic role	assign <u>no</u> semantic role
(to the controlled subject)	(to the raised subject)
PRO	no PRO
(incomplete sent. complement)	(complete sent. complement)
assign <u>no</u> case	assign case via ECM
(to the controlled subject)	(to the raised subject)
no small clauses	small clauses
XTAG: adjoin to S	XTAG: adjoin to S or VP

Chomsky, N. (1981). <u>Lectures on Government and Binding</u>. Foris, Dordrecht.

Culicover, P. W. and Jackendoff, R. (2005). <u>Simpler Syntax</u>. Oxford University Press, Oxford.

Frank, R. (2002). <u>Phrase Structure Composition and Syntactic Dependencies</u>. MIT Press, Cambridge,MA.

Pollard, C. and Sag, I. A. (1994). <u>Head-Driven Phrase Structure Grammar</u>. University of Chicago Press, Chicago and London.