
1) Tree adjoining grammar is related to Catagorial Grammar, in that the category specified in the lexicon determines how it will combine with other elements. The difference is that the categories here are specified as chunks of trees:

Some sample lexical entries:

- **NP**
  - **N**
  - John

- **S**
  - **NP**
  - laughed
  - **VP**
  - **V**
  - thinks

- **NP**
  - **D**
  - woman

- **S**
  - **NP**
  - loves
  - **VP**
  - **V**
  - **NP**
the ↓ arrow means “Substitute”, the * means “adjoin” to an identical category.

The * is known as the foot. The foot must be identical in category to the root of that subtree.

Derivation of the sentence:

*John has loved Steven*

```
S  VP  S*
   |   |
---|--|---
That V Adv S*
    |   |
has yesterday
```

```
S
 NP↓ VP + VP
  | |   |
---|--|--|---
V NP↓ V VP*
   |   |
loved has
```

```
S
 NP↓ VP
  |   |
---|--|---
V V NP↓
   |   |
has loved
```

```
S
 NP↓ VP
  |   |
---|--|---
V NP↓
   |   |
has N
    |   |
loved Steven
```

```
S
 NP↓ VP
  |   |
---|--|---
V VP N
   |   |
has John
    |   |
loved
```

```
S
 NP↓ VP
  |   |
---|--|---
V NP↓
   |   |
loved Steven
```