Syntactic Theory

Tree-Adjoining Grammar (TAG)

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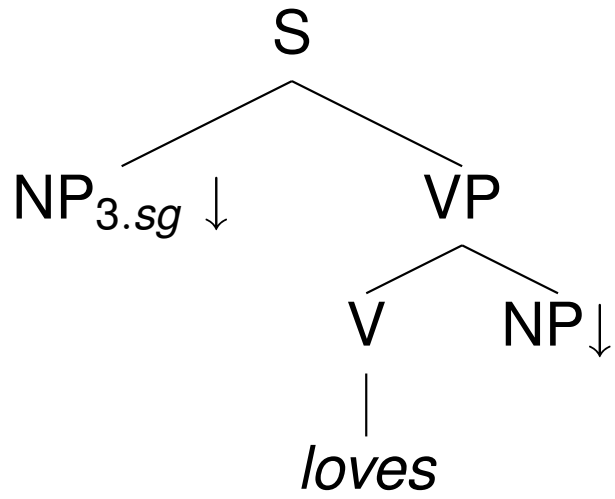
Outline

Two Important Properties of TAG

- Elementary trees can be of arbitrary size, so the domain of locality is increased
  - $\rightarrow$ **Extended domain of locality (EDL)**
- Small initial trees can have multiple adjunctions inserted within them, so what are normally considered non-local phenomena are treated locally
  - $\rightarrow$ **Factoring recursion from the domain of dependency (FRD)**

Extended Domain of Locality: Agreement

The lexical entry for a verb like *"loves"* will contain a tree like the following:



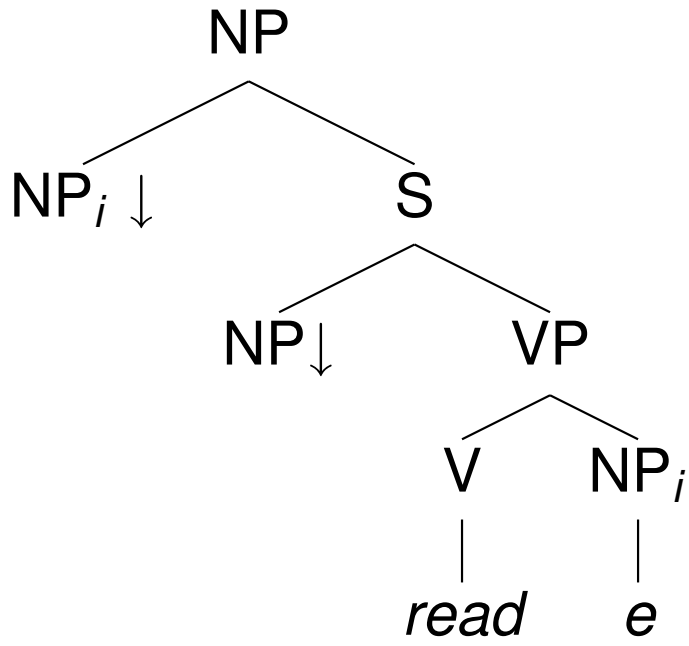
With **EDL**, we can easily state ageement between the subject and the verb in a lexical entry

CFG Notion of Agreement

Compare the corresponding CFG rules: agreement has to be transferred between at least three different rules:

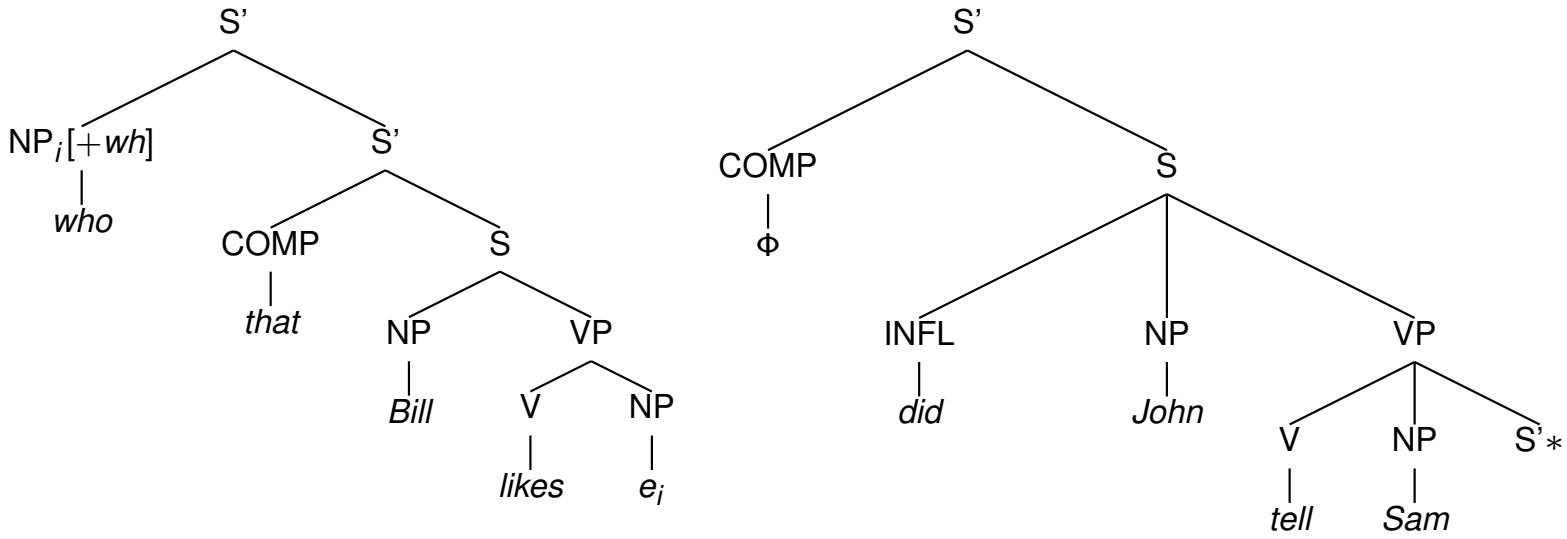
- $S \rightarrow NP_{3.sg}\ VP_{3.sg}$
- $VP_{3.sg} \rightarrow V_{3.sg}\ NP$
- $V_{3.sg} \rightarrow \mathit{loves}$

Extended Domain of Locality: Extraction



This lexical entry of *"read"* will license strings like *"the book I read"*

FRD: Extraction



The above trees allow the insertion of the auxiliary tree in between the WH-phrase and its extraction site, resulting a long distance dependency; yet this is factored out from the domain of locality in TAG

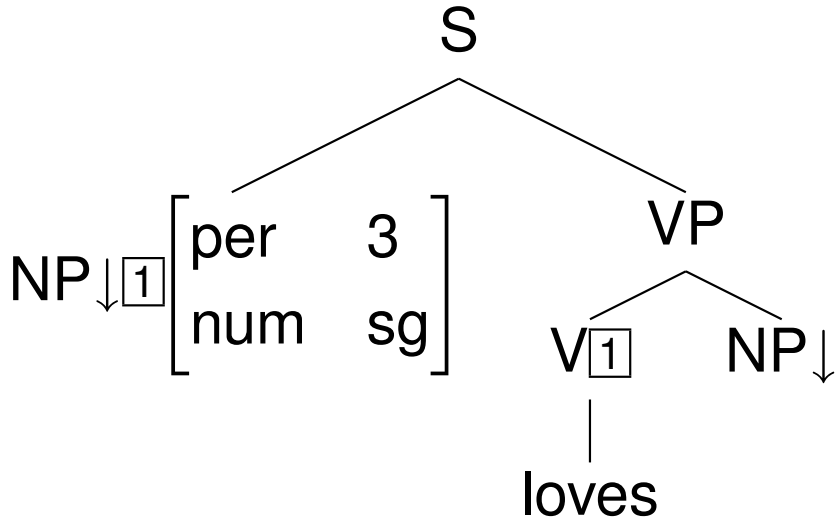
An Extended Example

(On the whiteboard)

Outline

Feature Structure Based TAG (FTAG)

A simple way is to associate feature structures with the nodes of the elementary trees. The operations of substitution and adjoining are defined in terms of unifications of appropriate feature structures

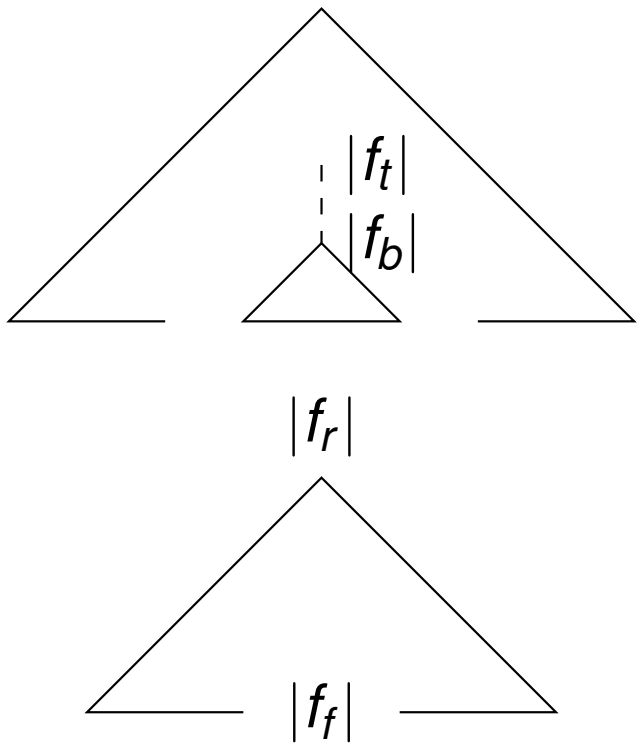


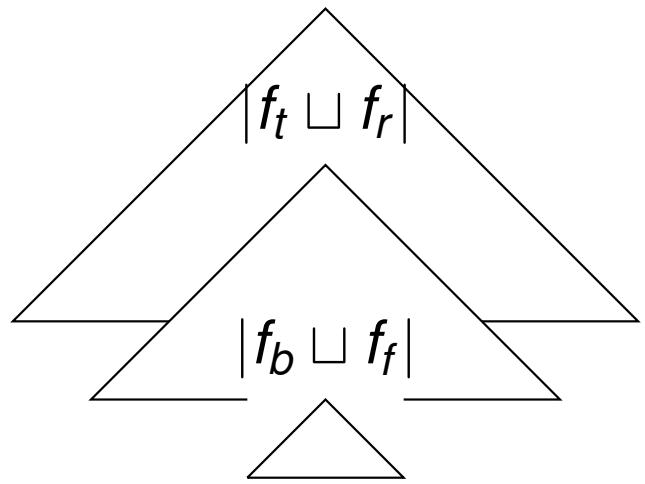
All the feature structures are fully specified. Adjoining operation creates a new structure that does not maintain all of the properties in the original structures

Using Description Trees in TAG

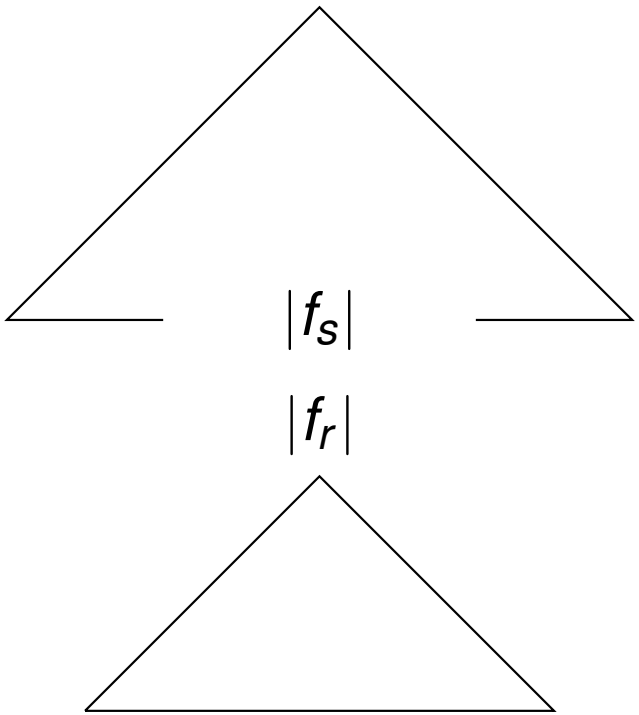
- Each internal node is viewed as a pair of *quasi nodes*, called *top* and *bottom*
- Feature structures are associated with quasi nodes
- Substitution and adjoining operations are defined to unify these feature structures into the new tree

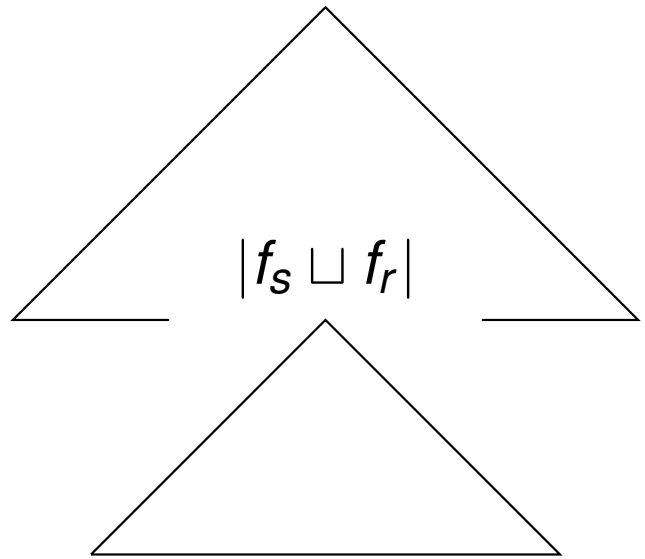
Adjoining Operation in FTAG





Substitution Operation in FTAG

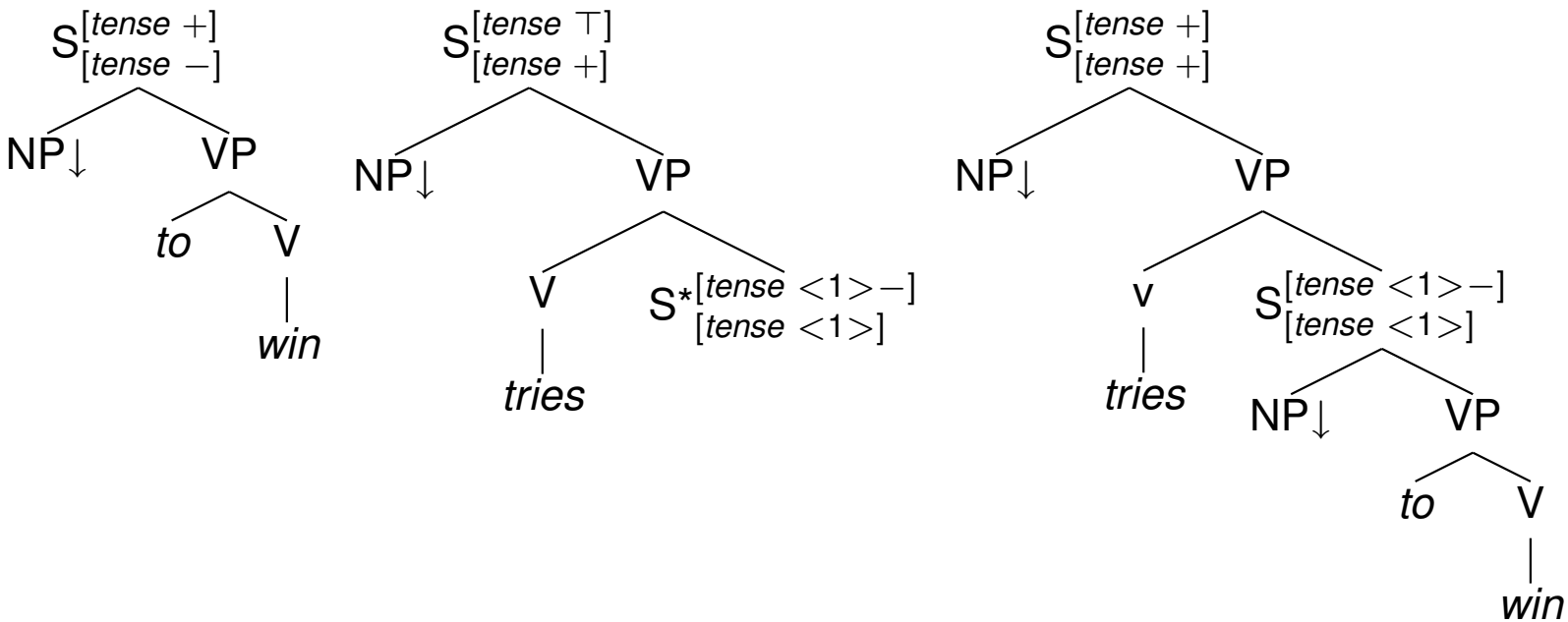




FTAG Examples

Simulating Obligatory Adjunction (OA)

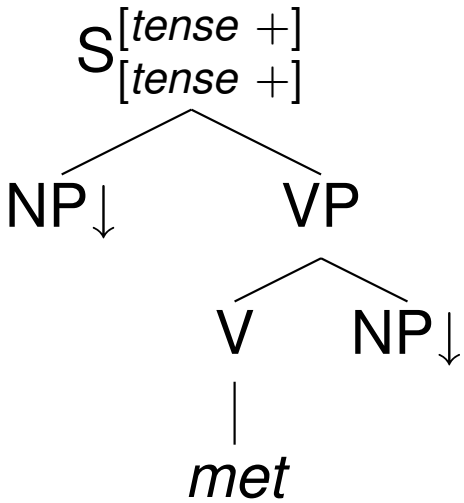
Obligatory Adjunction (OA) can be specified by a pair of quasi nodes with incompatible feature structures

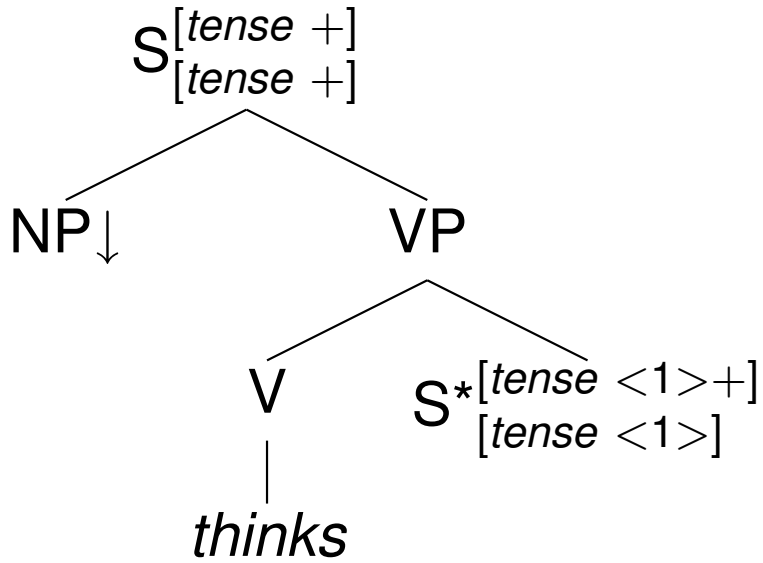


FTAG Examples

Simulating Selective Adjunction (SA)

Adjunction is not possible if any of the two feature structure unifications fails





References I


Joshi, A. and Schabes, Y. (1997).
Tree-adjoining grammars.