Lexical Functional Grammar (LFG)

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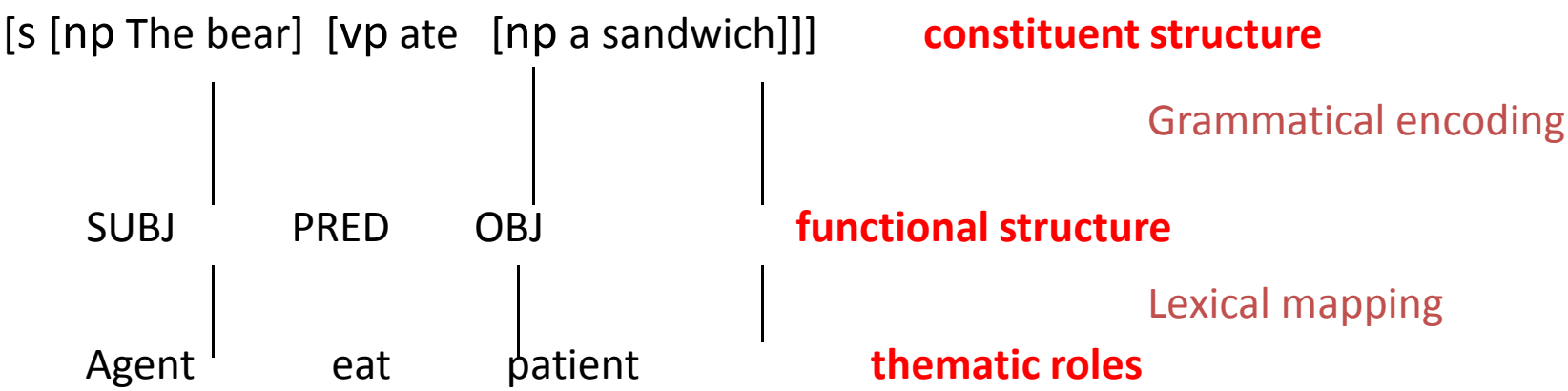
Lexical Functional Grammar (LFG) Model

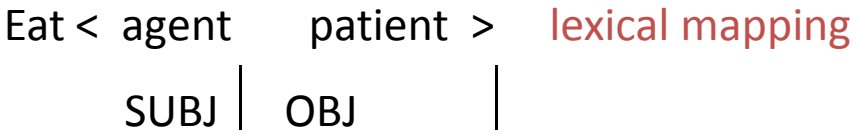
- LFG is a theory of generative grammar
- The goal is to explain the native speaker's knowledge of language by specifying a grammar that models the speaker's knowledge explicitly
- The grammatical architecture of LFG postulates a number of simple data structures with mappings defining the relationships between structures

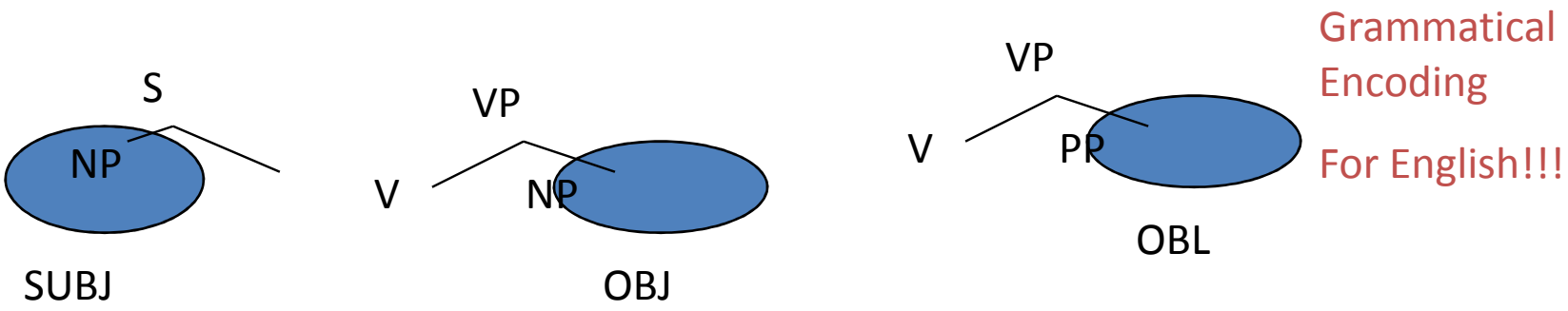
LFG structures

- LFG represents two syntactic structures
- constituent structure (c-structure or categorical structure) : phrase structure, syntactic structure or grammatical encoding
- functional structure (f-structure) : feature structures, lexical mapping or attribute-value matrices

Levels of Representation in LFG







Functional Structure

SUBJ	PRED	‘bear’
	NUM	sg
	PERS	3
PRED	‘eat< agent patient >	
	SUBJ OBJ	
TENSE	past	
OBJ	PRED	‘sandwich’
	NUM	sg
	PERS	3

F-structure constraints

- An f-structure is restricted by the principles of
  - Completeness : particular attribute may have at the most one value.
    - E.g Num : either singular or plural
  - Coherence : f-structure contains all the functions that their predicates govern.
    - E.g see<sub, obj>, `He saw' will be incomplete (no object)
  - Uniqueness or Consistency : completeness in reverse. All the function functions must be governed by the predicates
    - E.g laugh<sub>, `I laughed a book' is ill-formed sentence

Grammatical functions

- Grammatical functions are universal primitives within this framework,
- they are associated both with lexical items and with syntactic positions—by means of annotated phrase structure rules
- they mediate between lexical and constituent structure representations.
- Each lexical entry consists of a pairing of arguments and grammatical functions.

Grammatical functions - Examples

hit, Verb

(↑ PRED) = '{meaning of hit} < SUB, OBJ >'

Mary, Noun

(↑ PRED) = '{meaning of 'Mary'}'

(↑ NUM) = –PL

(↑ GEND) = +FEM

constituting equations

speaks, Verb

(↑ PRED) = '{meaning of 'speak'} <SUB>'

(↑ SUB NUM) $=_c$ -PL

constraint equations

A sentence like 'They speaks' would be ill-formed since the constraint equation is not satisfied.

- A sentence like ‘They speaks’ would be ill-formed since the constraint equation is not satisfied.

She saw stars in the sky.

CFG rules to handle this sentence are:

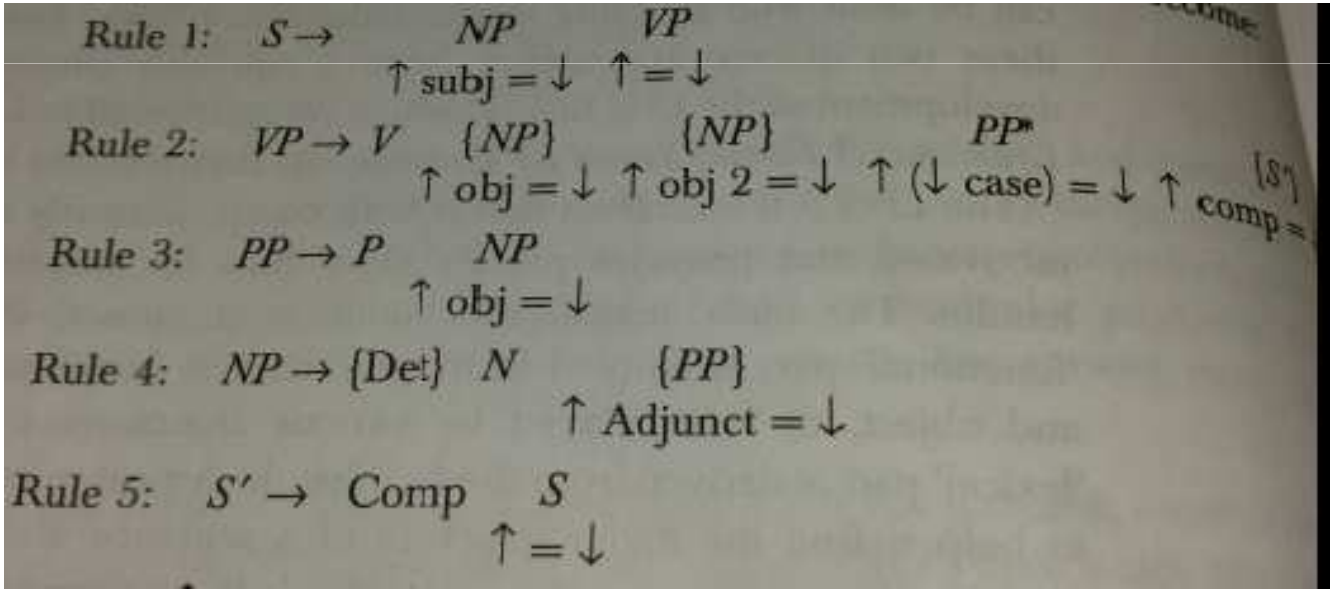
$S \rightarrow NP\ VP$

$VP \rightarrow V\ \{NP\}\ \{NP\}\ PP^{*}\ \{S'\}$

$PP \rightarrow P\ NP$

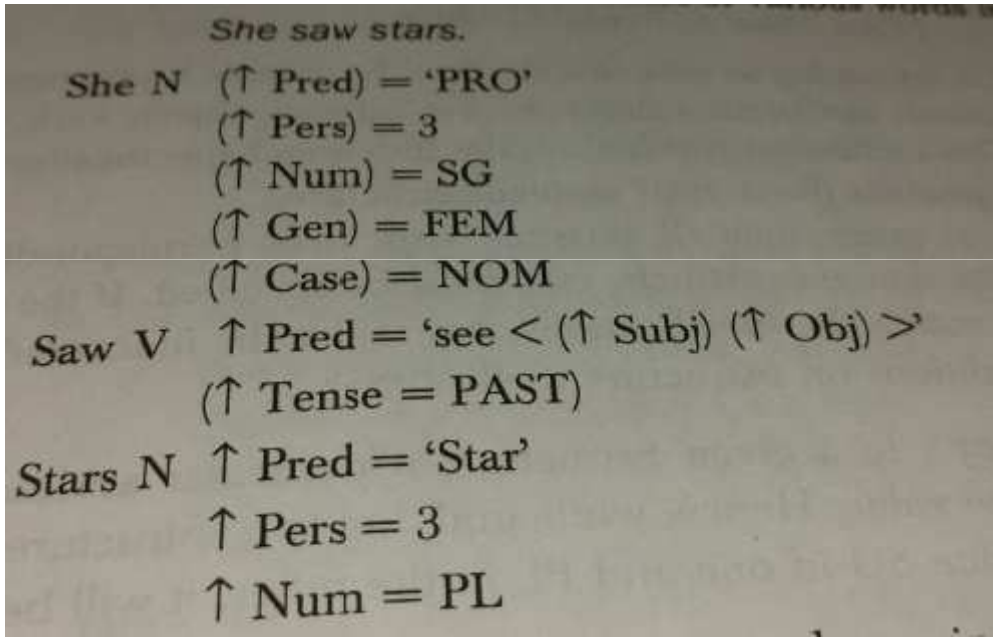
$NP \rightarrow Det\ N\ \{PP\}$

$S' \rightarrow Comp\ S$



Functional Specifications

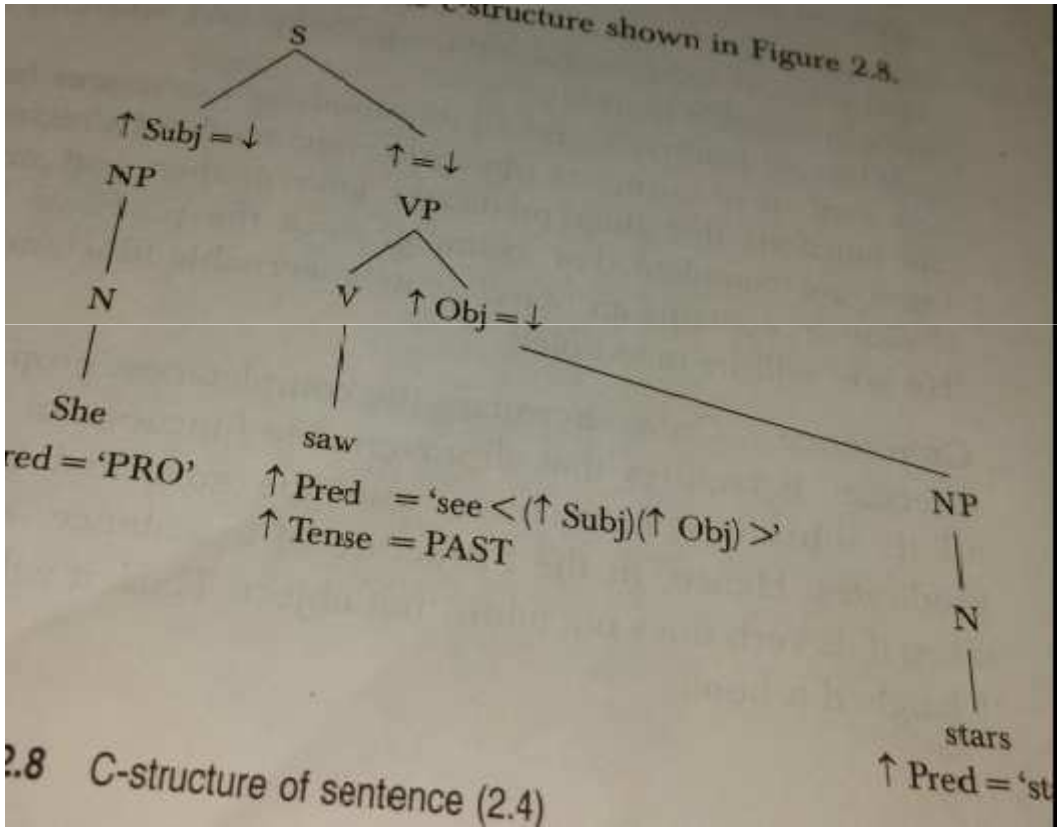
Grammatical functions



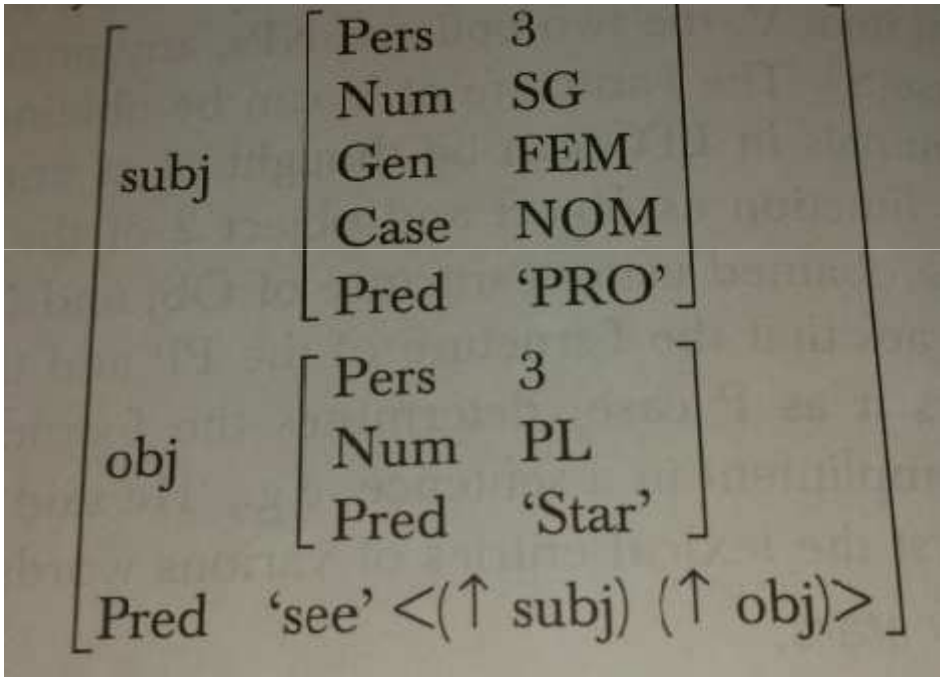
She saw stars.

She N	(↑ Pred) = 'PRO'
	(↑ Pers) = 3
	(↑ Num) = SG
	(↑ Gen) = FEM
	(↑ Case) = NOM
Saw V	↑ Pred = 'see < (↑ Subj) (↑ Obj) >'
	(↑ Tense = PAST)
Stars N	↑ Pred = 'Star'
	↑ Pers = 3
	↑ Num = PL

C-Structure


structure shown in Figure 2.8.
S
↑ Subj = ↓
↑ = ↓
NP
VP
N
V
↑ Obj = ↓
She
saw
red = 'PRO'
↑ Pred = 'see < (↑ Subj)(↑ Obj) >'
↑ Tense = PAST
NP
N
stars
↑ Pred = 'st
2.8 C-structure of sentence (2.4)

F- structure


subj
Pers 3
Num SG
Gen FEM
Case NOM
Pred 'PRO'
obj
Pers 3
Num PL
Pred 'Star'
Pred 'see' <(↑ subj) (↑ obj)>

Summary

- Lexical functional grammar
- C-structure
- F-structure
- Grammatical functions

Questions

- What is the significance of LFG model?
- What are LFG structures?
- List the constraints for f-structure?