

LFG

Syntactic Theory

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Outline

- 1 Syntactic Correspondences
- 2 Grammatical functions
- 3 Analyses and constraints

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1 Syntactic Correspondences

2 Grammatical functions

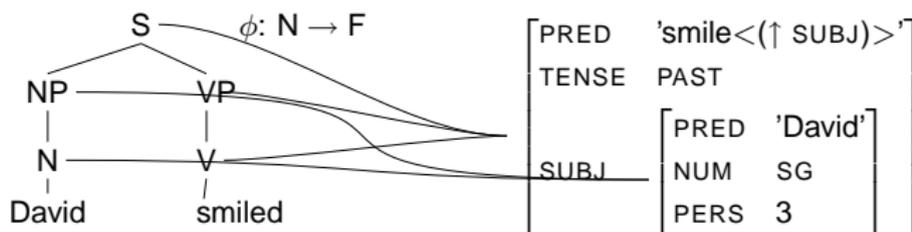
3 Analyses and constraints

Function ϕ

- ϕ maps nodes to their associated f-structure, i.e. $\phi: N \rightarrow F$
- $\phi(n)$ leads to the f-structure associated with n
- $\phi(M(n))$ leads to the f-structure associated with the mother node of n
- $\downarrow \equiv \phi(n)$
- $\uparrow \equiv \phi(M(n))$

Mapping from c- to f-structure: The head convention

- Consider the following example:



- The **head convention** states that a phrase inherits its functional properties and requirements from its head: a constituent structure phrase and its head map to the same f-structure
- S, VP and V thus map to the same f-structure

Annotating PS-rules: heads

- Consider the following rule to expand VP to V

$$VP \rightarrow V$$

- We express the fact that VP and V have the same f-structure by annotating the V-node:

$$VP \rightarrow V$$

$$\phi(M(n)) = \phi(n)$$

- This equation indicates that the f-structure of the mothernode of V ($\phi(M(n))$) is equal to the node of V ($\phi(n)$)

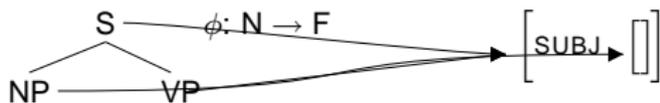
- An alternative notation:

$$VP \rightarrow V$$

$$\uparrow = \downarrow$$

Annotating PS-rules: grammatical functions

- Consider the following example:



- Here the NP bears the SUBJ function
- The following phrase structure rule carries the additional information to derive the correct f-structure:

$$S \rightarrow \quad \quad \quad NP \quad \quad \quad VP$$

$$(\phi(M(n)) \text{ SUBJ}) = \phi(n) \quad \phi(M(n)) = \phi(n)$$

- An alternative notation:

$$S \rightarrow \quad \quad \quad NP \quad \quad \quad VP$$

$$(\uparrow \text{ SUBJ}) = \downarrow \quad \uparrow = \downarrow$$

Lexical Entries

In lexical entries, information about the item's f-structure is represented in the same way as in c-structures:

smiled V (↑ PRED) = 'smile<(↑ SUBJ)>'
 (↑ TENSE) = PAST

- The equivalent phrase structure rule:

$V \rightarrow$ *smiled*
 (↑ PRED) = 'smile<(↑ SUBJ)>'
 (↑ TENSE) = PAST

An example analysis: *David smiled*

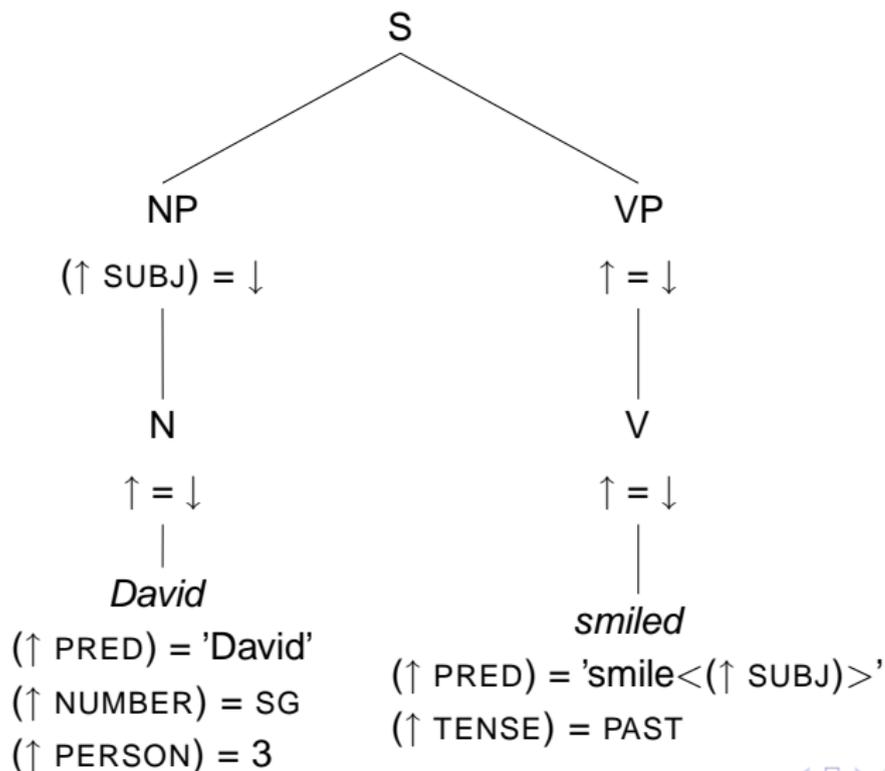
- We assume the following annotated PS-rules:

- $S \rightarrow NP \quad VP$
 $(\uparrow \text{SUBJ}) = \downarrow \quad \uparrow = \downarrow$
- $VP \rightarrow V$
 $\uparrow = \downarrow$
- $NP \rightarrow N$
 $\uparrow = \downarrow$

- and the following lexical entries

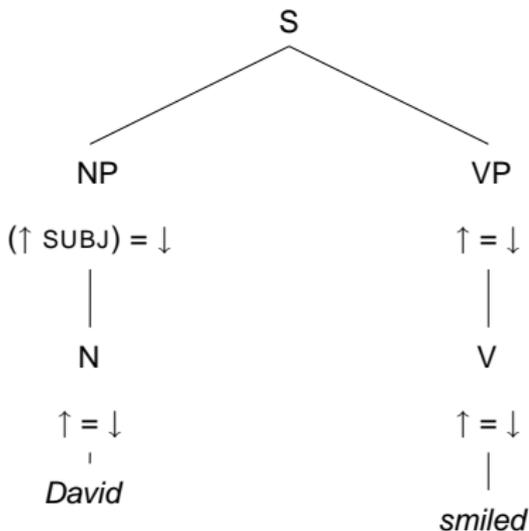
- *smiled* V $(\uparrow \text{PRED}) = \text{'smile} < (\uparrow \text{SUBJ}) > \text{'}$
 $(\uparrow \text{TENSE}) = \text{PAST}$
- David* N $(\uparrow \text{PRED}) = \text{'David'}$
 $(\uparrow \text{NUMBER}) = \text{SG}$
 $(\uparrow \text{PERSON}) = 3$

Analysis of *David smiled*



Instantiating the f-description of the sentence

- In order to get the functional description of the sentence, we associate each node with an f-structure:



f_s corresponds to node S

f_{np} corresponds to node NP

f_n corresponds to node N

f_{vp} corresponds to node VP

f_v corresponds to node V

(↑ PRED) = 'David'

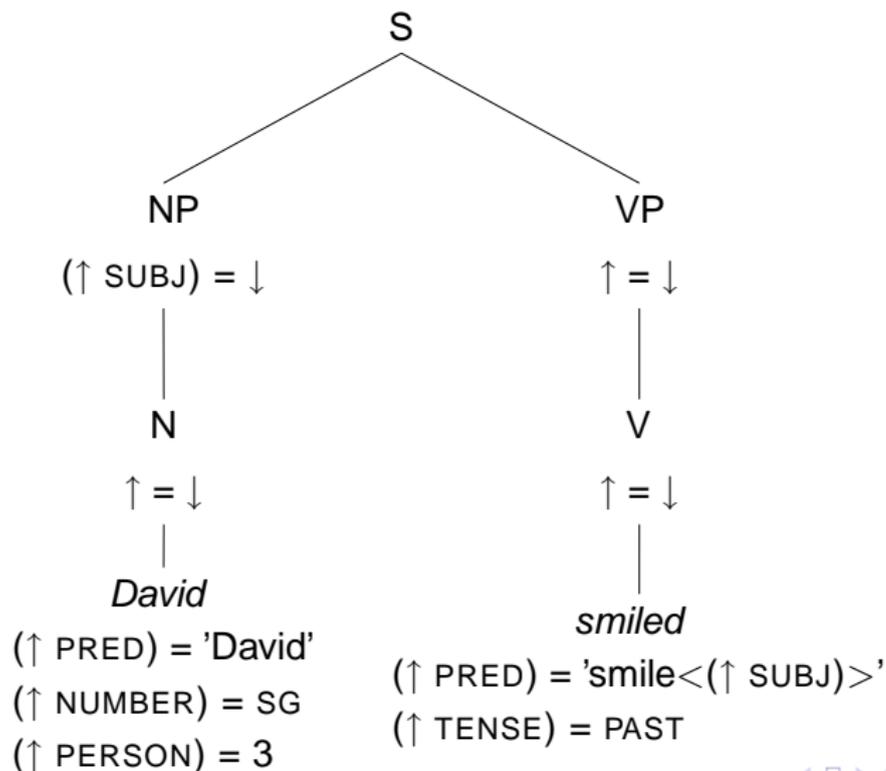
(↑ NUMBER) = SG

(↑ PERSON) = 3

(↑ PRED) = 'smile<(↑ SUBJ)>'

(↑ TENSE) = PAST

References of \uparrow and \downarrow



The functional description

- The tree on the previous slide provides the following functional description:

$(f_s \text{ SUBJ}) = f_{np}$

$f_{np} = f_n$

$(f_n \text{ PRED}) = \text{'David'}$

$(f_n \text{ NUMBER}) = \text{SG}$

$(f_n \text{ PERSON}) = 3$

$f_s = f_{vp}$

$f_{vp} = f_v$

$(f_v \text{ PRED}) = \text{'smile<(\uparrow \text{SUBJ})>'}$

$(f_v \text{ TENSE}) = \text{PAST}$

The functional description

- The tree on the previous slide provides the following functional description:

$(f_s \text{ SUBJ}) = f_{np}$

$f_{np} = f_n$

$(f_n \text{ PRED}) = \text{'David'}$

$(f_n \text{ NUMBER}) = \text{SG}$

$(f_n \text{ PERSON}) = 3$

$f_s = f_{vp}$

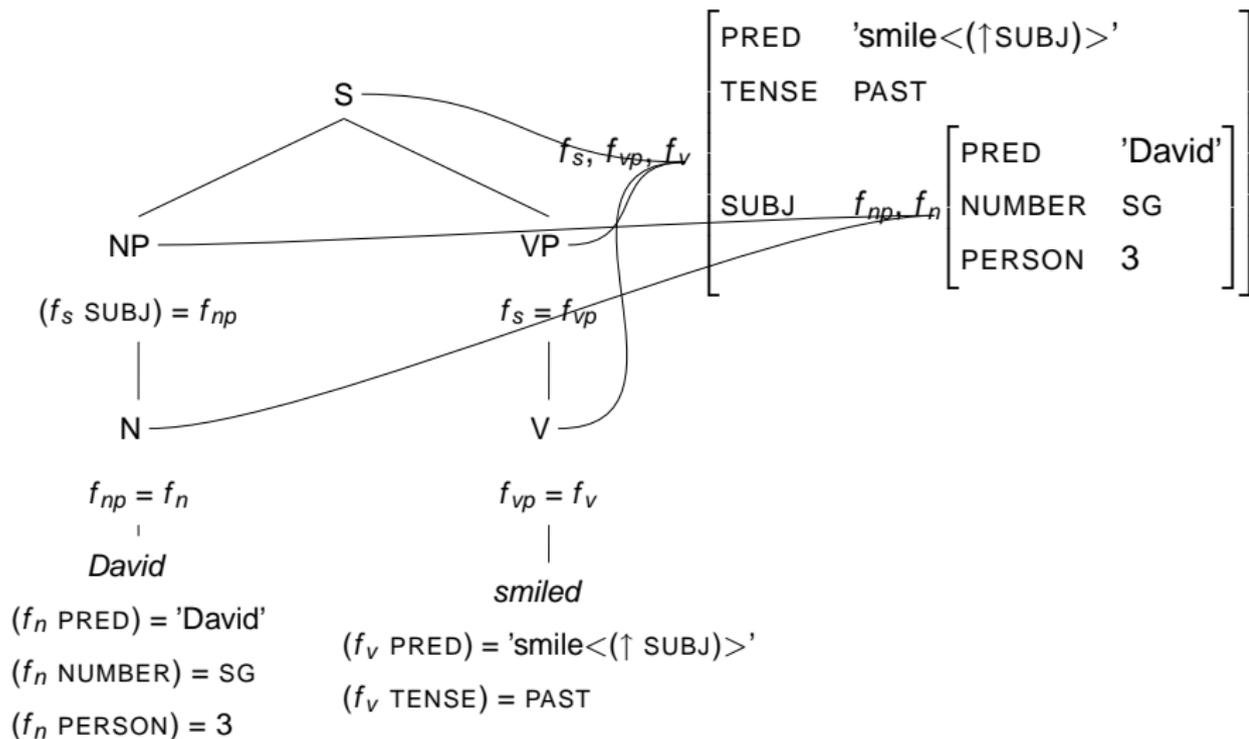
$f_{vp} = f_v$

$(f_v \text{ PRED}) = \text{'smile}<(\uparrow\text{SUBJ})>'$

$(f_v \text{ TENSE}) = \text{PAST}$

$$f_s, f_{vp}, f_v \left[\begin{array}{ll} \text{PRED} & \text{'smile}<(\uparrow\text{SUBJ})>' \\ \text{TENSE} & \text{PAST} \\ \text{SUBJ} & f_{np}, f_n \left[\begin{array}{ll} \text{PRED} & \text{'David'} \\ \text{NUMBER} & \text{SG} \\ \text{PERSON} & 3 \end{array} \right] \end{array} \right]$$

David smiled: f- and annotated c-structure

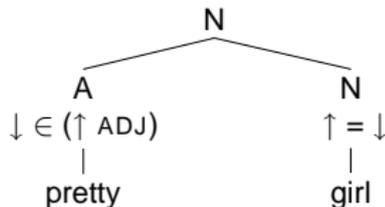


Adjuncts

- The attribute ADJ takes a set as its value
- The c-structure/f-structure correspondance rule expresses membership to a set as follows:

$$N \rightarrow \text{AdjP} \quad N$$

$$\downarrow \in (\uparrow \text{ADJ}) \quad \uparrow = \downarrow$$



PRED	'girl'
NUMBER	SG
PERSON	3
ADJ	{ [PRED 'pretty'] }

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Grammatical functions in LFG

Recall: LFG has a universal inventory of arguments, which can be cross-classified in several ways:

- Governable functions: SUBJ, OBJ, XCOMP, COMP, OBJ_θ, OBL_θ
Modifiers: ADJ, XADJ
 - Core arguments/terms: SUBJ, OBJ, OBJ_θ
Non-term/oblique functions: OBL_θ
 - Semantically unrestricted functions: SUBJ, OBJ
Semantically restricted functions: OBJ_θ, OBL_θ
- Open functions: XCOMP, XADJ
Closed functions: SUBJ, OBJ, COMP, OBJ_θ, OBL_θ, ADJ

We have seen governable functions and modifiers, in this lecture we'll look at other divisions and grammatical functions

Terms and non-terms

- Among governable functions, we distinguish *terms* 'direct functions' and *nonterms* 'oblique functions'
 - Terms: SUBJ, OBJ, OBJ_θ
 - NON-TERMS: OBL_θ, XCOMP, COMP
- The phenomena may distinguish terms from nonterms:
 - Agreement: in some language all and only term nominals trigger verb agreement (Ojibwa) (Southern Tiwa)
 - Anaphoric binding patterns: in some languages terms behave differently with respect to anaphoric binding:
 - Albanian: terms may be antecedent of any governable grammatical function, obliques may only be antecedent of obliques
 - Word order requirements:
 - In English, terms precede nonterms

Based on Dalrymple (2001)

Semantically restricted and unrestricted functions

- Subjects and objects are semantically unrestricted. In other words, they can be associated with any thematic role (Fillmore 1968), subject examples:

AGENT *he hit the ball*

EXPERIENCER *he felt cold*

THEME *he lives in Saarbrücken*

PATIENT *the window broke*

INSTRUMENT *the stone broke the window*

- OBJ_{θ} and OBL_{θ} are bound to a specific thematic role, e.g. OBJ_{THEME} must always be a theme
 - I gave her a *book*
 - I asked him a *question*

Based on Dalrymple (2001)

Subject I

- The subject is the highest argument in the Keenan-Comrie hierarchy
- If a phenomenon is only applicable to one grammatical function, this is often the subject
- There are many tests to identify the subject, which tests apply differs from language to language (as for all functions)
 - Agreement: the subject is often the argument that agrees with the verb
 - Moravcsik's universal: there is no language in which the verbs agrees with an element distinct from the intransitive subject, which does not also include sentences where the verb agrees with the intransitive subject
 - Honorification: in Japanese honorific verb forms are used to honor the subject (Matsumoto (1996))

Subject II

- (1) sensei wa hon o-yomi ni
teacher TOPIC book ACC honorific-READ
narimashi-ta
COPULA become.POLITE-PAST
'the teacher read a book'
- (2) * Jon wa sensei ni o-tasuke-rare
John TOPIC teacher by HONORIFIC-help-PASSIVE
ni nat-ta
COPULA become-PAST
'John was saved by the teacher'

- Subject noncoreference: in Hindi the antecedent of a pronoun cannot be a subject of the same clause (Mohanani (1994))

Subject III

- (3) Vijay ne Ravi ko uski saikil par
Vijay ERG Ravi ACC his bicycle LOC
bithaayaa
sit.CAUSATIVE.PERFECT
“Vijay_i seated Ravi_j on his_{*i,j} bike”

- The subject condition:

- The subject condition states that:

Every verbal predicate must have a subject

→ no consensus to whether this is universal, or only holds for most languages

Based on Dalrymple (2001)

Objects

- In some languages, there is a clear distinction between subjects and objects on the one hand, and other functions on the other hand
 - Languages may reveal subject and object agreement on the verb (e.g. Palauan, Abkhaz, Jingulu, Malayam)
 - Languages may allow only subjects and objects to be relativized (e.g. Kinyarwanda)
- Case marking can also indicate whether an element is an object, but note that this is seldom a one-to-one mapping

Based on Dalrymple (2001)

Multiple objects

- In many languages, there may be more than one phrase bearing the object function
e.g. He gave her a book
- Originally, these second objects were called 'indirect objects' IOBJ or OBJ2 (after traditional grammar approaches)
- It has been observed though, that languages only have one unrestricted object, the secondary object is usually *thematically restricted*
e.g. English: OBJ_{THEME}
He made her a cake
* He made a cake her

Oblique

- Oblique arguments are
 - associated with a particular semantic role
 - marked to indicate their function overtly
- English marks oblique arguments with prepositions, in other languages, cases may be used
- Oblique arguments may
 - 1 bear a mark that reflects their semantic role ('semantic case'),
e.g. OBL_{GOAL} in *He gave the book to Chris*
 - 2 bear an idiosyncratic marker ('quirky case') (Butt and King (1999))
e.g. *David relied on/*to/*about Chris*

Clausal functions

- COMP, XCOMP and XADJ are clausal functions
- the X in XCOMP and XADJ indicates that these functions are open functions: they have an external subject
- COMP is a closed function: its subject is internal
- XADJ differs from COMP and XCOMP in that it is a modifier

Clausal functions, examples I

- COMP clauses containing an overt subject internal to their phrase
 - (4) David complained that Chris smiled
 - (5) David wondered who smiled
 - (6) David couldn't believe how big the house was
- XCOMP clauses that do not contain an internal subject, whose subject must be realized externally
 - (7) David seemed to smile
 - (8) Chris expected David to smile
- XADJ a modifier that has a subject that must be specified externally

Clausal functions, examples II

- (9) Stretching his arms, David smiled
- (10) David announced the news dancing

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A more elaborate example of PS-rules

S	→	NP (↑ SUBJ) = ↓	VP ↑ = ↓	
VP	→	VP ↑ = ↓	$\left(\begin{array}{c} \text{PP}^+ \\ \downarrow \in (\uparrow \text{ADJ}) \end{array} \right)$	
VP	→	V ↑ = ↓	$\left(\begin{array}{c} \text{NP} \\ (\uparrow \text{OBJ}) = \downarrow \end{array} \right)$	$\left\{ \left(\begin{array}{c} \text{NP} \\ (\uparrow \text{OBJ}_\theta) = \downarrow \end{array} \right) \mid \left(\begin{array}{c} \text{PP} \\ (\uparrow \text{OBJ}_\theta) = \downarrow \end{array} \right) \right\}$
NP	→	Det ↑ = ↓	$\left(\begin{array}{c} \text{AP}^+ \\ \downarrow \in (\uparrow \text{ADJ}) \end{array} \right)$	N ↑ = ↓

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