

# Raising and Control in LFG

## Syntactic Theory

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# Outline

1 Introduction

2 Raising

3 Equi-verbs

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# Raising and Equi-verbs, examples

Raising verbs:

- (1) David seemed to smile.
- (2) David believed Chris to know the answer.

Equi verbs:

- (3) David tried to smile.
  - (4) David convinced Chris to leave.
- Even though the structures above look similar, there are semantic and syntactic differences between the two.

# Outline

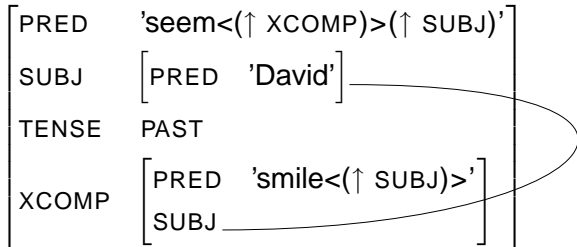
1 Introduction

**2 Raising**

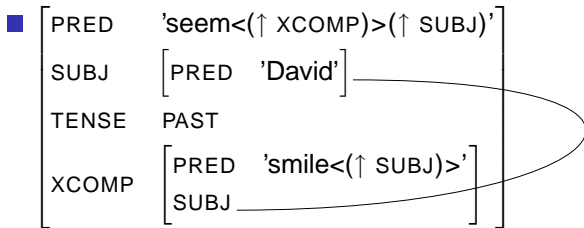
3 Equi-verbs

# Raising

■ f-structure of 'David seemed to smile'

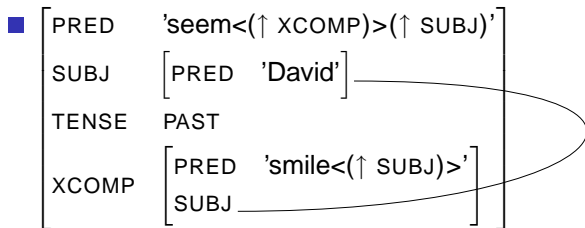


# Analysis of raising



- Observations for the f-structure:

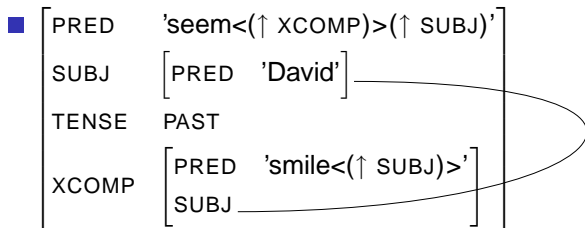
# Analysis of raising



- Observations for the f-structure:
- The subject of *seem* is identical to the subject of *smile*



# Analysis of raising



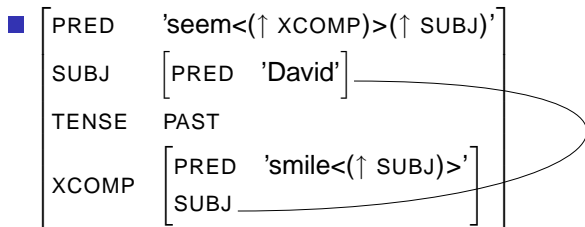
- Observations for the f-structure:
- The subject of *seem* is identical to the subject of *smile*
- The subject of *seem* is placed outside of the < >

# Semantic arguments

- In *David seemed to smile*, *David* is not a semantic argument of *seem* (i.e. 'David' is not 'seeming'), the verb does not place semantic restrictions on its subject
- *seem* functions as a semantic modifier of David's smiling: its XCOMP is a semantic argument of *seem*
- Arguments inside the angled brackets are semantic arguments of the predicate
- Arguments that are syntactically required, but are not semantic arguments of the verb are placed outside of the angled brackets, hence:

'seem<(↑ XCOMP)> (↑ SUBJ)'

# Functional control



- In the example above, the SUBJ of raising verb *seem* **functionally controls** the SUBJ of the subordinate XCOMP.
- This means that the f-structure that is the value of the SUBJ of *seem* must be the same as the SUBJ of the subordinate XCOMP.

# Evidence for functional control

- In functional control the SUBJ of the matrix verb is identical to the SUBJ of the subordinate verb
- This means that syntactic restrictions imposed by the subordinate verb must be maintained when the subject is raised
- We will see two cases that demonstrate that this holds for raising verbs:
  - semantically empty arguments
  - Icelandic case marking

# Semantically empty arguments

- Some English predicates select for a specific semantically empty argument:

(5) <u>It</u> is raining	$\left[ \begin{array}{l} \text{PRED} \quad \text{'rain} \langle \rangle (\uparrow \text{SUBJ}) \\ \text{SUBJ} \quad \left[ \begin{array}{l} \text{FORM} \quad \text{IT} \end{array} \right] \end{array} \right]$
(6) <u>There</u> is a problem	

- The same arguments are used when these sentences become part of raising structures:

- (7) It seems to be raining
  - (8) There seems to be a problem
  - (9) David believed it to be raining
  - (10) David believed there to be a problem
- This also shows that the arguments that exhibit functional control are not semantic arguments

## F-structures of raised semantically empty subjects

PRED	'seem<(↑ XCOMP)>(↑ SUBJ)'
SUBJ	[FORM IT]
TENSE	PRESENT
XCOMP	[PRED 'rain<>(↑ SUBJ)' SUBJ

PRED	'believe<(↑ XCOMP) (↑ SUBJ)>(↑ OBJ)'
OBJ	[FORM IT]
SUBJ	[PRED 'David']
TENSE	PRESENT
XCOMP	[PRED 'rain<>(↑ SUBJ)' SUBJ

## Icelandic quirky cases

- Subjects of Icelandic 'quirky case verbs' can bear one of several cases:

(11) Drengina        vantar mat.  
      boys.DEF.ACC lacks food.ACC  
      "The boys lack food."

(12) Barninu        batnaði        veikin.  
      child.DEF.DAT recovered from disease.DEF.NOM  
      "The child recovered from the disease."

(13) Verkjanna        gætir        ekki  
      pains.DEF.GEN is noticeable not  
      "The pains are not noticeable."

# Raised Icelandic quirky cases I

- Quirky cases maintain their original value when raised:

- (14) Hann telur mig (í barnaskap sínum)  
 he believes me.ACC (in his foolishness)  
 vanta peninga.  
 to lack money.ACC  
 "He believes me (in his foolishness) to lack money."
- (15) Hann telur barninu (í barnaskap sínum)  
 he believes child.DEF.DAT (in his foolishness)  
 hafa batnað veikin.  
 to have recovered from disease.DEF.NOM  
 "He believes the child (in his foolishness) to have recovered from the disease."



## Raised Icelandic quirky cases II

- (16) Hann telur verkjanna (í barnaskap  
he believes pains.DEF.GEN (in his  
sínnum) ekki gæta  
foolishness) not noticeable  
"He believes the pains (in his foolishness) not to be  
noticeable."

## Icelandic Data: comments

- The fact that the adverbial phrase “in his foolishness” can follow the “raised” arguments shows that this argument is indeed realised as the object of “believe”.
- The OBJ of *telur* (believe) bears the case that the subordinate XCOMP assigns to its SUBJ
- By supposing that the OBJ of 'believe' functionally controls the SUBJ of the subordinate verb, this behavior is expected

# Analysis of raising (or 'functional control') structures

- PS-rules (relevant parts only):

$$V \rightarrow \left( \begin{array}{c} V \\ \uparrow = \downarrow \end{array} \right) \left( \begin{array}{c} NP \\ (\uparrow \text{ OBJ}) = \downarrow \end{array} \right) \left( \begin{array}{c} VP \\ (\uparrow \text{ XCOMP}) = \downarrow \end{array} \right)$$

- (Partial) lexical entries of *seemed* and *believed*:

*seemed*    V    (↑ PRED) = 'seem<(↑ XCOMP) >(↑ SUBJ)'  
                   (↑ SUBJ) = (↑ XCOMP SUBJ)

*believe*    V    (↑ PRED) = 'believe<(↑ SUBJ)(↑ XCOMP) >(↑ OBJ)'  
                   (↑ OBJ) = (↑ XCOMP SUBJ)

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# Equi-verbs

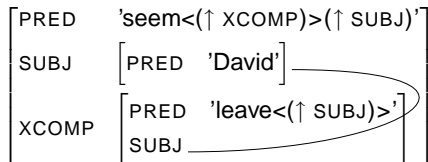
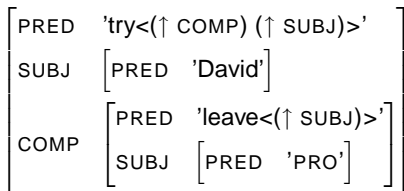
- Verbs such as *try* and *convince* are so-called equi-verbs
  - (17) David tried to leave
  - (18) David convinced Chris to leave
- There are several differences between equi-verbs and raising-verbs, in their semantics, and on a syntactic level

## F-structures of equi-verb sentences

$$\left[ \begin{array}{l} \text{PRED} \quad \text{'try}<(\uparrow \text{COMP}) (\uparrow \text{SUBJ})>' \\ \text{SUBJ} \quad \left[ \text{PRED} \quad \text{'David'} \right] \\ \text{COMP} \quad \left[ \begin{array}{l} \text{PRED} \quad \text{'leave}<(\uparrow \text{SUBJ})>' \\ \text{SUBJ} \quad \left[ \text{PRED} \quad \text{'PRO'} \right] \end{array} \right] \end{array} \right]$$

$$\left[ \begin{array}{l} \text{PRED} \quad \text{'convince}<(\uparrow \text{COMP}) (\uparrow \text{SUBJ})(\uparrow \text{OBJ})>' \\ \text{OBJ} \quad \left[ \text{FORM} \quad \text{'CHRIS'} \right] \\ \text{SUBJ} \quad \left[ \text{PRED} \quad \text{'David'} \right] \\ \text{TENSE} \quad \text{PRESENT} \\ \text{COMP} \quad \left[ \begin{array}{l} \text{PRED} \quad \text{'leave}<(\uparrow \text{SUBJ})>' \\ \text{SUBJ} \quad \left[ \text{PRED} \quad \text{'PRO'} \right] \end{array} \right] \end{array} \right]$$

## Differences between raising and equi-verbs



- All arguments of the equi-verb are semantic arguments
- There is no functional control between (one of) the equi-verb's arguments and the subject of the subordinate verb

## Semantic arguments of equi-verbs

- Intuitively, David is also trying and Chris is also being convinced in the sentences below:

(19) Chris tried to leave

(20) Chris convinced David to leave

- Trying to combine equi-verbs with predicates that have semantically empty arguments clearly demonstrates this:

(21) # It tried to rain/David tried to rain

(22) # David convinced there to be dancing/David convinced it to rain



## Absence of functional control in equi-verbs

- In case of functional control, the restrictions posed on arguments by the subordinate verb must be respected when these arguments are raised
- Consider the following Icelandic examples:

(23) Drengina vantar mat.  
boys.DEF.ACC lacks food.ACC  
"The boys lack food."

(24) Ég vomast til að vanta ekki efni í  
I.NOM hope to to lack not materials for  
ritgerðina  
thesis.DEF  
"I hope to not lack material for the thesis."

## Control for equi-verbs

- In an equi-structure, the arguments receive their case value from the equi-verb: they can thus not be identical to (or functionally control) the SUBJ of the subordinate clause
- There is, however, a connection between a controlling argument and the subject of the subordinate verb:
  - David convinced Chris to leave  
means that David convinced Chris and that Chris should leave
- We say that the OBJ of *convince* **anaphorically controls** the SUBJ of the subordinate verb

## Raising and equi: additional examples

- (25) a. The students seem clearly to be intelligent.  
(XCOMP)  
b. The students tried hard to be on time. (COMP)
- (26) a. The students believed David to have left. (XCOMP)  
b. The students convinced David to leave. (COMP)

## Equi-verbs analysis: recall their f-structures:

$$\left[ \begin{array}{l} \text{PRED} \quad \text{'try}<(\uparrow \text{COMP}) (\uparrow \text{SUBJ})>' \\ \text{SUBJ} \quad \left[ \begin{array}{l} \text{PRED} \quad \text{'David'} \end{array} \right] \\ \text{COMP} \quad \left[ \begin{array}{l} \text{PRED} \quad \text{'leave}<(\uparrow \text{SUBJ})>' \\ \text{SUBJ} \quad \left[ \begin{array}{l} \text{PRED} \quad \text{'PRO'} \end{array} \right] \end{array} \right] \end{array} \right]$$

$$\left[ \begin{array}{l} \text{PRED} \quad \text{'convince}<(\uparrow \text{COMP}) (\uparrow \text{SUBJ})(\uparrow \text{OBJ})>' \\ \text{OBJ} \quad \left[ \begin{array}{l} \text{FORM} \quad \text{'CHRIS'} \end{array} \right] \\ \text{SUBJ} \quad \left[ \begin{array}{l} \text{PRED} \quad \text{'David'} \end{array} \right] \\ \text{TENSE} \quad \text{PRESENT} \\ \text{COMP} \quad \left[ \begin{array}{l} \text{PRED} \quad \text{'leave}<(\uparrow \text{SUBJ})>' \\ \text{SUBJ} \quad \left[ \begin{array}{l} \text{PRED} \quad \text{'PRO'} \end{array} \right] \end{array} \right] \end{array} \right]$$

# Equi-verb analyses

- PS-rules (relevant part for raising and equi):

$$V \rightarrow \left( \begin{array}{c} V \\ \uparrow = \downarrow \end{array} \right) \left( \begin{array}{c} NP \\ (\uparrow \text{ OBJ}) = \downarrow \end{array} \right) \left( \begin{array}{c} VP \\ (\uparrow \{ \text{XCOMP} | \text{COMP} \}) = \downarrow \end{array} \right)$$

- (Partial) lexical entries of *tried* and *convinced*:

*tried*      V    (↑ PRED) = 'try<(↑ SUBJ)(↑ COMP) >'  
                  (↑ COMP SUBJ PRED) = 'PRO'

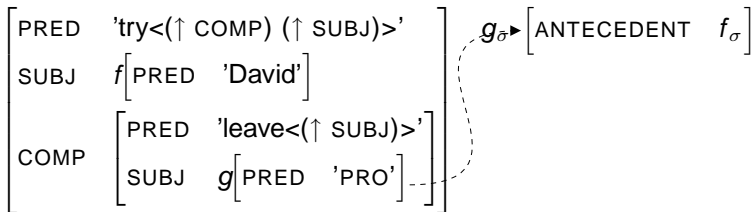
*convinced* V    (↑ PRED) = 'convince<(↑ SUBJ)(↑ COMP)(↑ OBJ)>  
                  (↑ COMP SUBJ PRED) = 'PRO'

# Anaphoric control

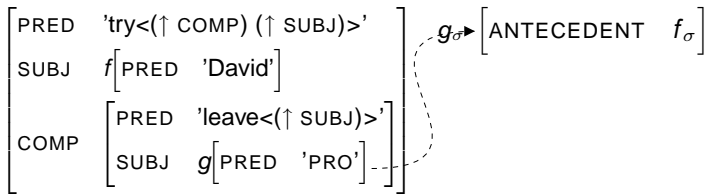
- The SUBJ of *try* and the OBJ of *convince* anaphorically control the SUBJ of their COMP.
- These instances of obligatory anaphoric control imply that the controlling argument of the matrix verb must be coreferent with the controlled argument of the subordinate verb
- i.e.
  - The SUBJ of *try* must be coreferent with its COMP's SUBJ
  - The OBJ of *convince* must be coreferent with its COMP's SUBJ

# Anaphoric control: equi-verbs

- Function  $\sigma$  maps the f-structure to its corresponding semantic structure
- E.g. *Chris tried to walk*:



## Anaphoric control: equi-verbs (cont)



- $i_\sigma$  is the semantics of f-structure  $i$
- We can state that the referent of  $i$  has referent of  $g$  as its antecedent in the following way:  

$$(i_\sigma \text{ ANTECEDENT}) = g_\sigma$$
- The verb *try* requires its SUBJ's referent to be antecedent of the referent of its COMP's SUBJ:
- If  $g$  is the value of SUBJ, and  $i$  the value of COMP SUBJ we get:  

$$((\uparrow \text{COMP SUBJ})_\sigma \text{ ANTECEDENT}) = (\uparrow \text{SUBJ})_\sigma$$



## Lexical items of equi-verbs

*tried*      V    ( $\uparrow$  PRED) = 'try<( $\uparrow$  SUBJ)( $\uparrow$  COMP) >'  
                  ( $\uparrow$  COMP SUBJ PRED) = 'PRO'  
                  (( $\uparrow$  COMP SUBJ) $_{\sigma}$  ANTECEDENT) = ( $\uparrow$  SUBJ) $_{\sigma}$

*convinced* V    ( $\uparrow$  PRED) = 'convince<( $\uparrow$  SUBJ)( $\uparrow$  COMP)( $\uparrow$  OBJ)>'  
                  ( $\uparrow$  COMP SUBJ PRED) = 'PRO'  
                  (( $\uparrow$  COMP SUBJ) $_{\sigma}$  ANTECEDENT) = ( $\uparrow$  OBJ) $_{\sigma}$

# Example analysis for equi-verbs

(white board)

# Summary Raising

## Raising-verbs:

- subcategorize for a non-semantic argument
- this argument *functional controls* the subject of the subordinate verb
- the controlling argument and controlled argument must have identical syntactic properties:  
e.g. ( $\uparrow$  SUBJ) = ( $\uparrow$  COMP SUBJ)
- raising of semantically empty arguments in English, and quirky case noun phrases in Icelandic demonstrate this property

# Summary Equi-verbs

## Equi-verbs:

- only have arguments that are syntactic and semantic arguments
- one of their arguments *anaphorically controls* the subject of the subordinate
- they assign the PRED value 'PRO' to the SUBJ of their COMP
- they also assign the obligatory anaphoric control between their controlling argument and the controlled argument  
e.g.  $((\uparrow \text{COMP SUBJ})_{\sigma} \text{ ANTECEDENT} = (\uparrow \text{SUBJ})_{\sigma})$
- Anaphoric control means that the referent of the controller and the controlled element are the same
- Syntactic properties may be different (as they are in Icelandic)

# What you need to know from this lecture

- The difference between raising and control verbs, as well as the difference between functional and anaphoric control
- The difference between semantic arguments and non-semantic arguments (and how this is represented)
- How English raising and equi-structures are analyzed in LFG
- Why Icelandic case marking provides evidence for functional control in raising (and anaphoric control in equi-verbs)

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