Long Distance Dependencies

Syntactic Theory
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Outline

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Long Distance Dependencies, examples

- Topicalization
  - (1) Chris, I like.
  - (2) Happy, Sandy will never be.
- Wh-questions
  - (3) What did you find?
  - (4) Tell me who you talked to.
- Tough-constructions
  - (5) This question is tough to answer.
  - (6) Kim is easy to talk to.
- Relative clauses
  - (7) The idea that you had
  - (8) The guy who(m) Peter talked to

Long Distance Dependencies, examples

- Topicalization
  - (9) Chris, I like __.
  - (10) Happy, Sandy will never be __.
- Wh-questions
  - (11) What did you find __?
  - (12) Tell me who you talked to __.
- Tough-constructions
  - (13) This question is tough to answer __.
  - (14) Kim is easy to talk to __.
- Relative clauses
  - (15) The idea that you had __
  - (16) The guy who(m) Peter talked to __

Long Distance Dependencies, common features

- In all long distance dependency examples, there is a gap: an empty position that normally is filled by (for instance) an NP or PP
- The entity that fills the role of the missing element is found elsewhere in the sentence (here: at the beginning of the sentence or clause)

(17) To Chris, I gave a book __

(18) Who did you say Pauline likes __?

- Why "long distance"?

  (19) Who did you think Chris said David believed Mary liked __?

Outline

What are topics?

- *topic* is a *discourse function*
- *Discourse information* or *information structure* captures properties such as prominence and new-ness of information in an expression.
- **topic**: old or known information that is prominent: the rest of the sentence elaborates on (says something about) the topic
- In English topicalization the **topic** is 'fronted', i.e. placed at the initial position of the sentence, stressing its prominent character.

Topicalization, examples

- English allows topicalization by 'fronting' or 'extracting' of several phrasal categories:

(20) NP: Chris, I like.

(21) PP: To Chris, I gave a book.

(22) AP: Happy, Chris will never be.

(23) CP: That Chris was a movie star, I never would have guessed.

(24) VP: ?To leave, we convinced Chris

Examples taken from Dalrymple (2001), p. 391

Properties of topics

- Topics present prominent known information
- Topics have a grammatical role in the sentence
- Depending on the language, they may be restricted to certain phrasal categories
- Other restrictions than phrasal category may apply

Outline

Main ideas

We want to capture...

- that the topic must have a grammatical function in the sentence
- that the topic has the discourse function of TOPIC
- the specific restrictions on topicalization imposed by the language (in our case English)

Extended Coherence Condition

Extended Coherence Condition (simplified version)

FOCUS and TOPIC must be linked to the semantic predicate argument structure of the sentence in which they occur.

Topics in LFG

- When an expression contains a topicalized entity, we want to capture somehow that this entity is TOPIC, i.e. we want to represent *discourse information*
  - When discourse functions such as TOPIC and FOCUS play a syntactic role, they are (typically) part of the f-structure (Bresnan and Mchombo (1987))
  - Butt and King (2000) propose (for Hindi and Urdu) to represent discourse information in a separate *information structure*, linked to the c-structure by a function ι
- In this class, the feature TOPIC will be part of the f-structure.

Topics in f-structure

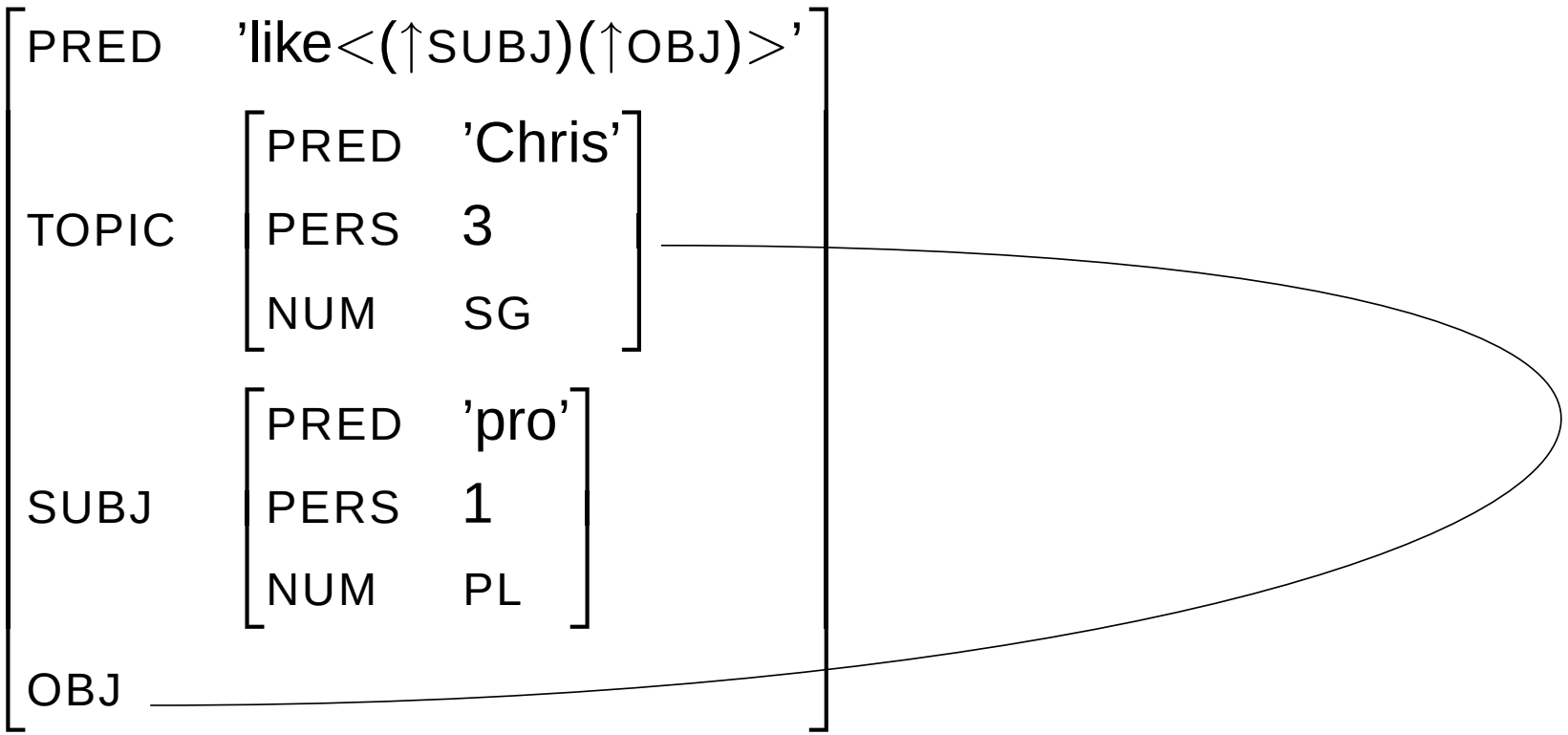
- What does the f-structure look like for (25)?

(25) Chris, we like

Topics in f-structure

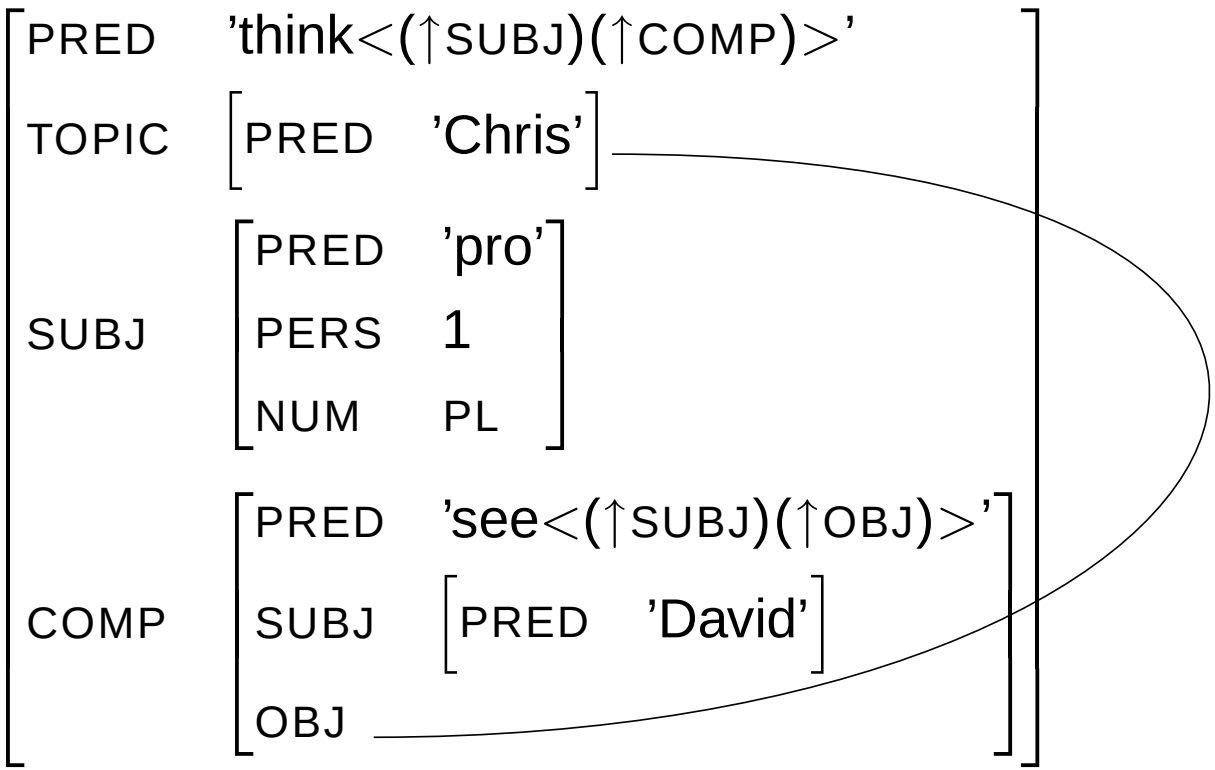
- What does the f-structure look like for (25)?

(26) Chris, we like



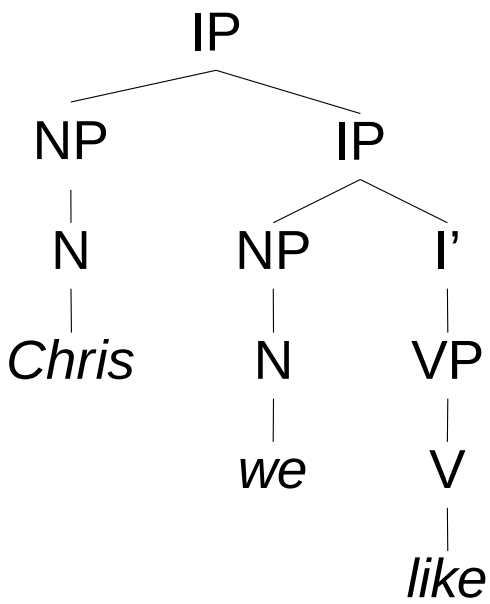
Topics in f-structure

(27) Chris, we think that David saw



Topics in c-structure

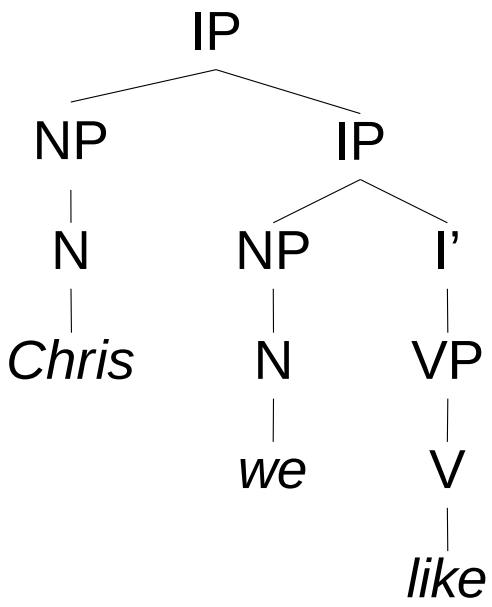
Consider the phrase structure tree of *Chris, we like* below:



- How should the c-structure be annotated?

Topics in c-structure

Consider the phrase structure tree of *Chris, we like* below:

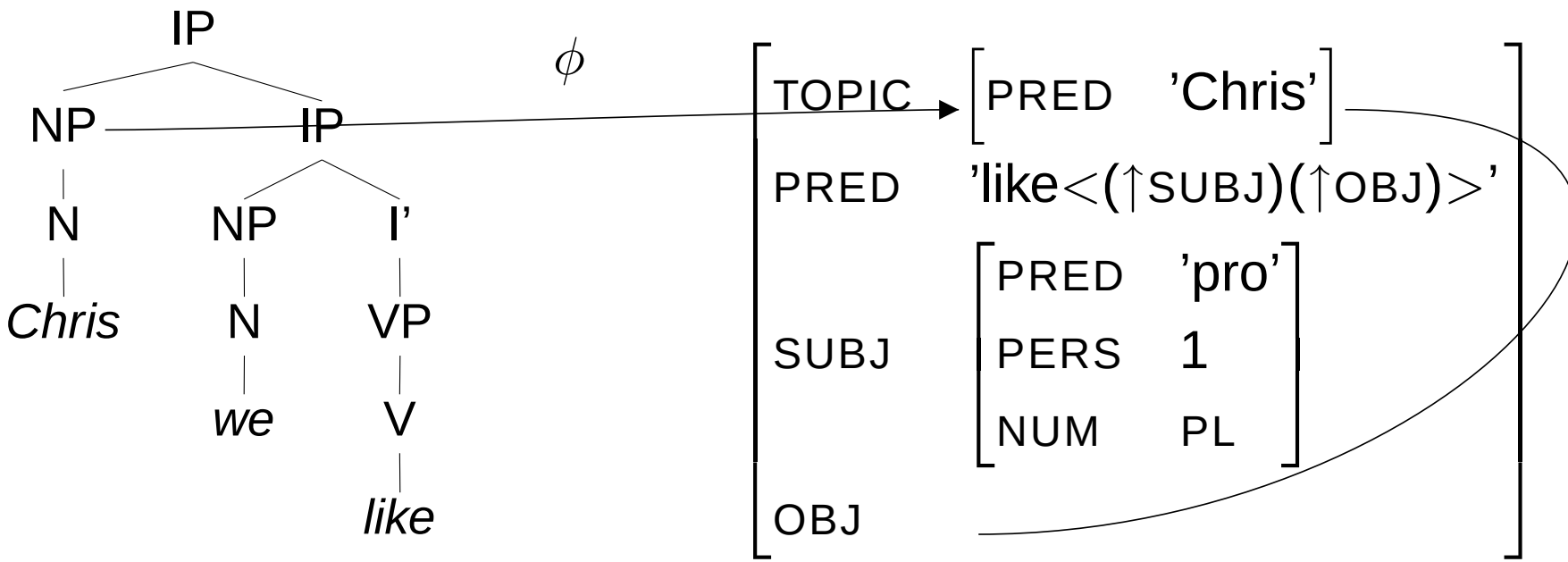


$$\begin{bmatrix} \text{TOPIC} & \begin{bmatrix} \text{PRED} & \text{'Chris'} \end{bmatrix} \\ \text{PRED} & \text{'like}\langle(\uparrow\text{SUBJ})(\uparrow\text{OBJ})\rangle\text{'} \\ \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{'pro'} \\ \text{PERS} & 1 \\ \text{NUM} & \text{PL} \end{bmatrix} \\ \text{OBJ} & \end{bmatrix}$$

- How should the c-structure be annotated?

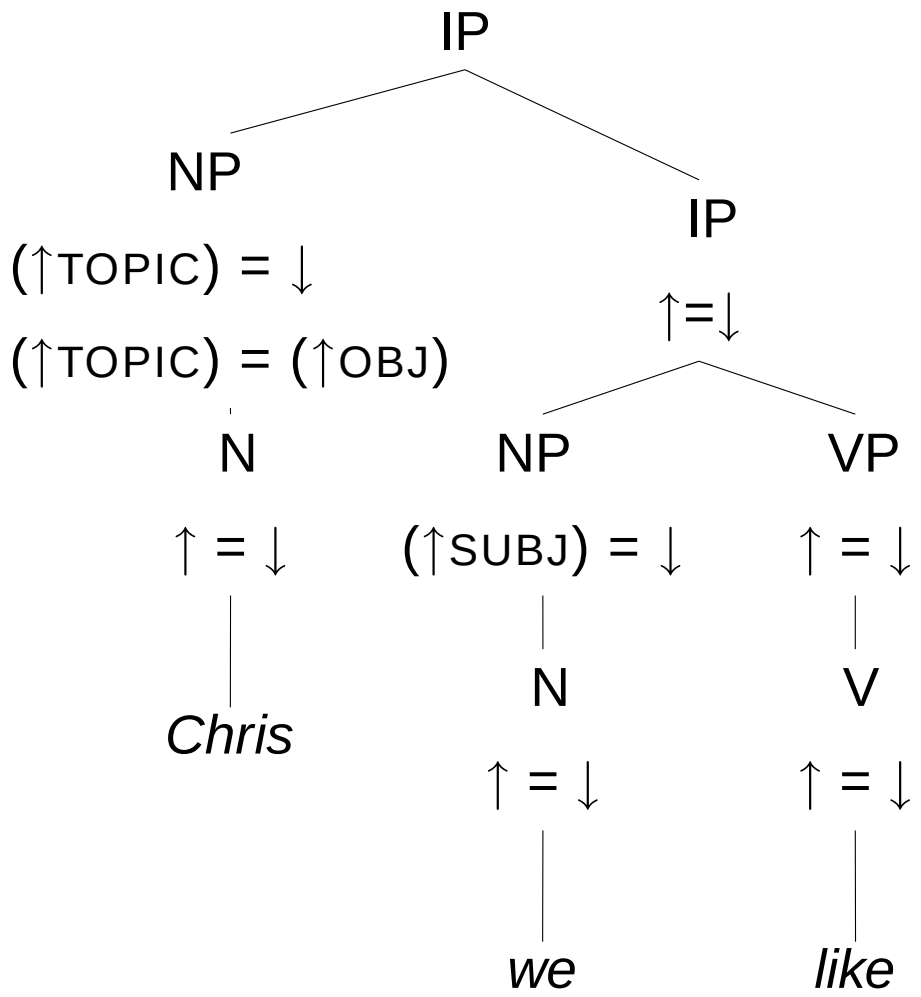
Topics in c-structure

Consider the phrase structure tree of *Chris, we like* below:



- How should the c-structure be annotated?

((simplified) C-structure of *Chris, we like*



Phrase-structure rules licensing topicalization

We need to make sure that

1. The right categories may appear in topic position
2. The phrase in the topic contributes the value of TOPIC
3. The value of TOPIC is bound to the right function (recall the extended coherence condition)

Categories used as topics

Recall that NPs, PPs, APs, CPs and VPs may be topicalized

(28) NP: Chris, I like.

(29) PP: To Chris, I gave a book.

(30) AP: Happy, Chris will never be.

(31) CP: That Chris was a movie star, I never would have guessed.

(32) VP: ?To leave, we convinced Chris

TopicP

- We can define TopicP as a meta-category:
  - TopicP $\equiv$ {NP|PP|VP|AP|CP}
- We introduce the following phrase-structure rule:
  - IP $\rightarrow$ $\begin{pmatrix} \text{TopicP} \\ (\uparrow \text{TOPIC}) = \downarrow \end{pmatrix}$ $\begin{pmatrix} \text{IP} \\ \uparrow = \downarrow \end{pmatrix}$

Functional Uncertainty

- Recall from the 'extended coherence condition' that the TOPIC must be linked to a grammatical function in the sentence
- The question is which function the TOPIC plays in the sentence
- This depends on the language, but in many cases more than one function may be candidate
- If there is more than one grammatical function that may appear as a topic, we speak of *functional uncertainty*

Functional uncertainty for English topics

- Some English examples:

  (33) OBJ: Chris, I like.

  (34) OBL: To Chris, I gave a book.

  (35) COMP: That Chris was a movie star, I never would have guessed.

  (36) XCOMP: ?To leave, we convinced Chris

- We can define a functional abbreviation to represent the possible grammatical functions to capture the examples above:
  - TOPICPATH $\equiv$ {OBJ|OBL|COMP|XCOMP}

English topicalization, preliminary version

- $\text{IP} \rightarrow \begin{pmatrix} \text{TopicP} \\ (\uparrow \textsc{topic}) = \downarrow \\ (\uparrow \textsc{Topic}) = (\uparrow \textsc{TopicPath}) \end{pmatrix} \quad \begin{pmatrix} \text{IP} \\ \uparrow = \downarrow \end{pmatrix}$
- $\text{TopicP} \equiv \{\text{NP}|\text{PP}|\text{VP}|\text{AP}|\text{CP}\}$
- $\textsc{TopicPath} \equiv \{\textsc{obj}|\textsc{obl}|\textsc{comp}|\textsc{xcomp}\}$

This analysis is based on a hand full examples: there are possibilities and constraints it does not capture!

Grammatical functions of topics

- In most examples we have seen so far, the TOPIC was governed by the main predicate of the sentence (i.e. TOPICPATH was of length 1)
- Longer paths are possible as well:

  (37) Chris, we think that David saw. (TOPICPATH = COMP OBJ)

  (38) Chris, we think that David wants to like. (TOPICPATH = COMP XCOMP OBJ)

- We extend TOPICPATH:
  - TOPICPATH $\equiv$ {GF}* { GF }
  - GF $\equiv$ {SUBJ|OBJ|OBJ$_\theta$|OBL|COMP|XCOMP|ADJ|XADJ}

Restrictions on extraction/topicalization

- Our current analysis allows topicalization of practically anything of the right category:
  - TopicPath $\equiv \{GF_1\}^*$ { GF_2 }
  - For convenience we'll refer to GF_1 as the path (to GF_2), and GF_2 as the attribute (of the topicalized item)
- Ross (1967) (and others after him) observed several restrictions on long distance dependencies
- We will see:
  - Restrictions set by the matrix-verb
  - Sentential Subject Constraint
  - Restrictions on extraction from adjuncts
- All of these constraints apply to the path (i.e. (GF_1) in TopicPath)

Restrictions on extracting from embedded clauses

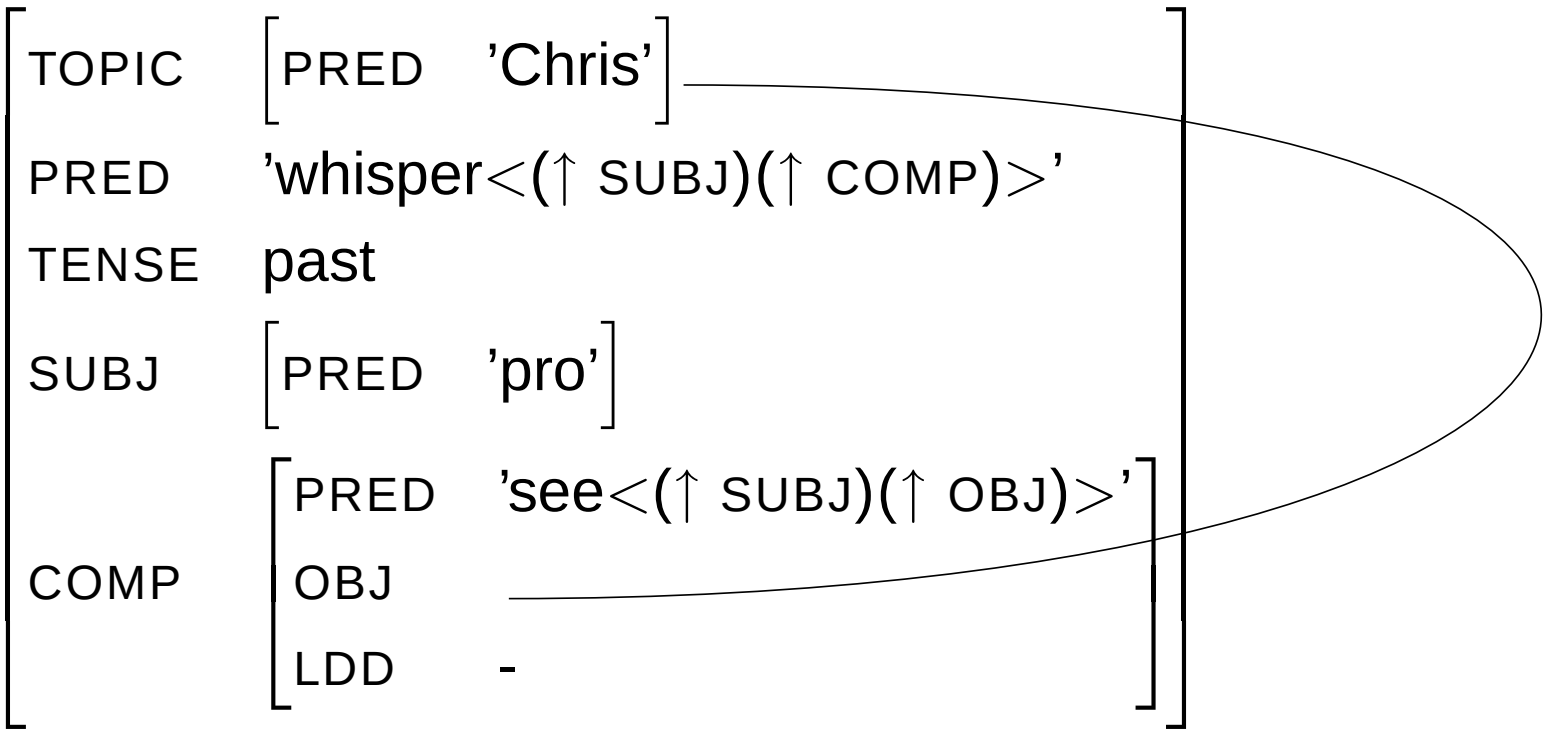
- It is not always possible to extract an argument from an embedded clause:

  (39) * Chris, we whispered that David saw

  (40) Chris, we think that David saw

- TOPIC may be related to a position within the COMP of a so-called "bridge verb" like *think*
- Since this is a property of the verb (*whisper* vs *think*), we specify this on the verb subcategorizing the COMP
- A non-bridge verb such as *whisper* specifies that its COMP contains the attribute-value pair <LDD,->

f-structure of **Chris, we whispered that David saw*



Off-Path Constraints $\rightarrow$

- We want to make sure that no COMP part of our path contains [LDD -]
- This can be done by an **off-path constraint**, i.e. an additional constraint on f-structures along the path (Dalrymple 2001, p.149)

e.g. $(\uparrow \text{TOPIC}) = (\uparrow \quad \text{COMP} \quad \text{OBJ})$
$(\rightarrow \text{LDD}) \neq \text{-}$

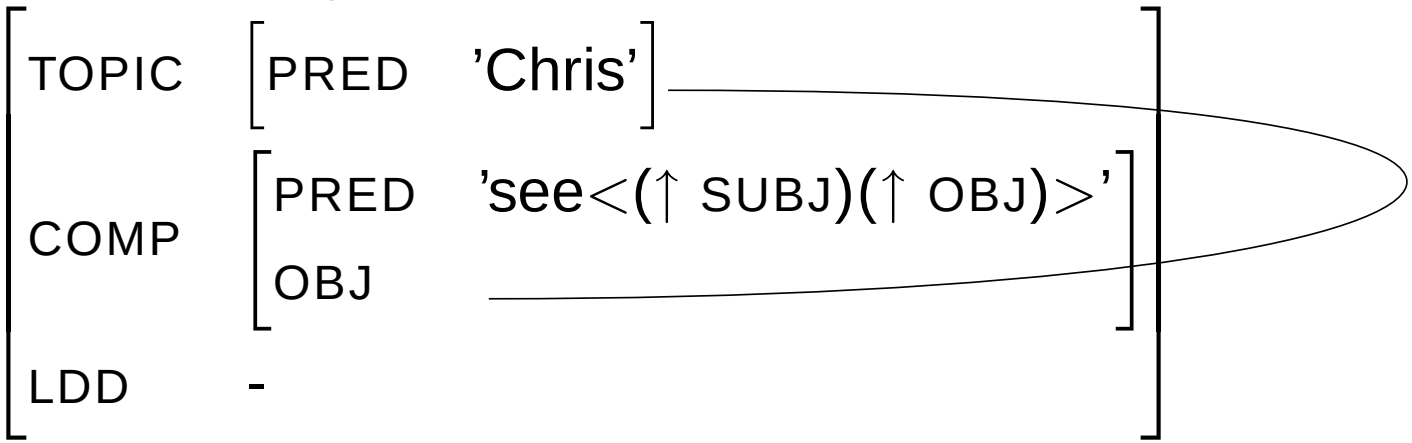
- The $\rightarrow$ stands for the value of the attribute COMP
- If the value of COMP contains an attribute LDD with value -, the negative constraint $(\rightarrow \text{LDD}) \neq \text{-}$ is violated

Off-path Constraints ←

- The off-path constraint ← refers to the f-structure that contains a attribute

e.g. (↑ TOPIC) = (↑ COMP OBJ)
(← LDD) ≠ -

- The following f-structure would violate this constraint:



Off-path Constraints, definitions

In an expression like $(\leftarrow a)$, $\leftarrow$ refers to the f-structure of which a is an attribute.

In an expression like $(\rightarrow a)$, $\rightarrow$ refers to the value of attribute a.

e.g. $\begin{bmatrix} A & - \\ B & \begin{bmatrix} C & + \end{bmatrix} \end{bmatrix}$ can be excluded by $(\uparrow B) \neq -$ or $(\uparrow B) \neq +$ $(\leftarrow A)$ $(\rightarrow C)$

Dalrymple (2001), p.151

Sentential Subject Constraint

- Ross (1967) observed that it is not possible to extract arguments from sentential subject

  (41) * Chris, that David saw __ surprised me.

  (42) Chris, it surprised me David saw __.

- It is easy to implement this constraint: the path to the extracted attribute may not include SUBJ, but it may be a sentential OBJ.

Constraints on adjuncts

- Not all constraints on extraction from adjuncts are well-defined yet
- For our current purposes, we'll limit ourselves to capturing the examples below (following Dalrymple (2001))

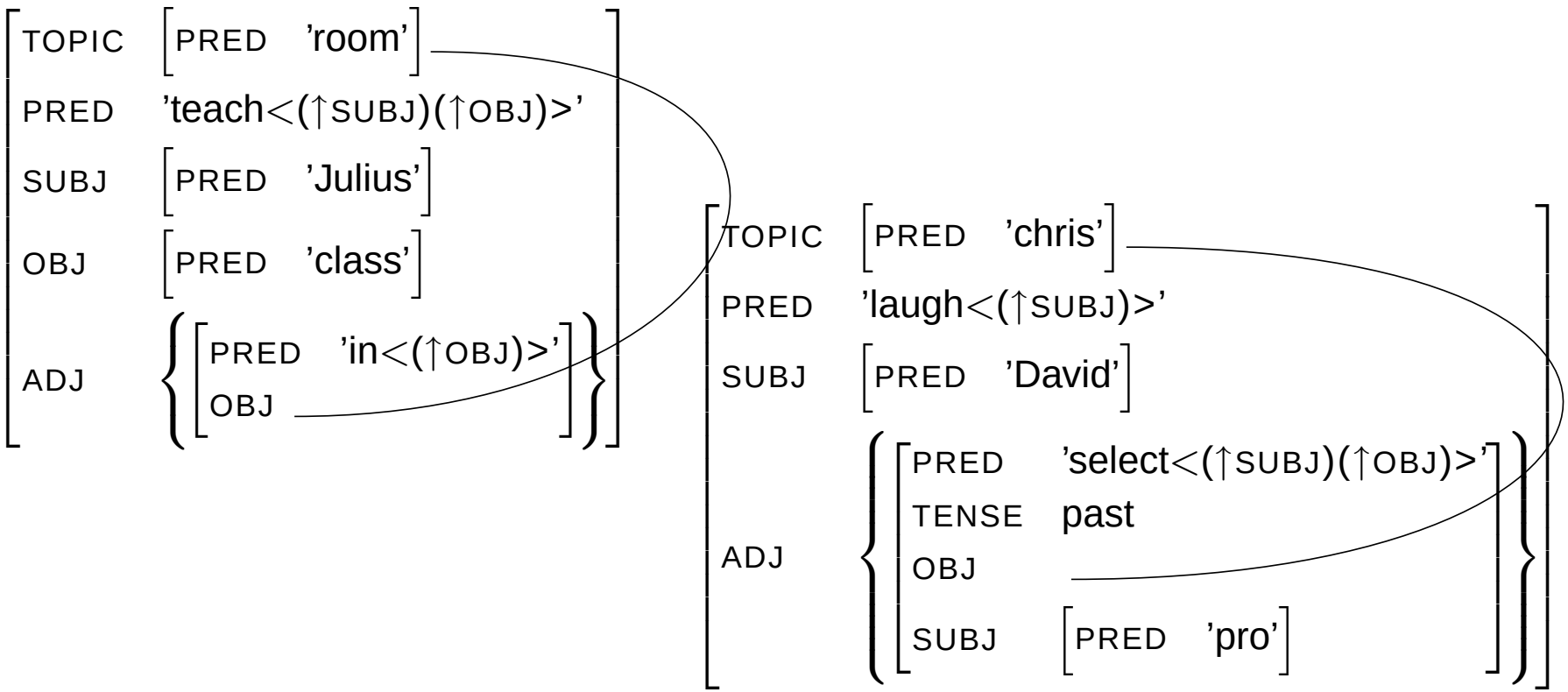
(43) This room, Julius teaches his class in.

(44) * Chris, we think that David laughed when we selected.

(45) This room, we think that Julius teaches his class in.

(46) * Chris, David laughed when we selected.

Example AVMs (simplified)



Extraction Assumptions

- We assume that extraction is possible from adjuncts:

  This room, (we think) Julius teaches his class in.

- But **not** when the adjunct is a tensed sentence:

  * Chris, David laughed when we selected.

- We can capture this by using the following off-path negative constraint: $\neg(\rightarrow \text{TENSE})$
- The following notation is required to restrict the ADJ:

$$(\text{ADJ} \quad \in \quad)$$
$$\neg(\rightarrow \text{TENSE})$$

Recapitulation of constraints on extraction

- The matrix verb must be a bridge verb (no *whisper*):
  COMP is annotated as $(\rightarrow \text{LDD}) \neq$ -
- It is not possible to extract from sentential subjects:
  in $\{\text{GF}\}^*$ GF, the first GF must be replaced by a set of grammatical functions that does not contain SUBJ
- Extraction from adjuncts is not possible if the adjunct is a tensed sentence:
  we must restrict adjuncts in the path to: $(\text{ADJ} \in \quad) \quad \neg(\rightarrow \text{TENSE})$
- There are some more constraints that will be integrated directly in our definition of TopicPath

TopicPath

- English TopicPath:

$$\{\text{XCOMP} \mid \underset{(\rightarrow \text{LDD}) \neq \text{-}}{\text{COMP}} \mid \underset{(\rightarrow \text{TENSE})}{\text{OBJ}}\}^* \{(\text{ADJ} \in) (\text{GF}) \mid \underset{\neg(\rightarrow \text{TENSE})}{\text{GF}}\}$$

- In the following slides, we will look at the specific parts of the TopicPath to see what they mean.

Taken from Dalrymple (2001)

TopicPath

- English TopicPath:

$$\{\text{XCOMP} \mid \underset{(\rightarrow \text{LDD}) \neq \text{-}}{\text{COMP}} \mid \underset{(\rightarrow \text{TENSE})}{\text{OBJ}}\}^* \{(\text{ADJ} \in)(\text{GF}) \mid \underset{\neg(\rightarrow \text{TENSE})}{\text{GF}}\}$$

- This part of the equation states that the within-clause grammatical function of TOPIC:

GF: may be any grammatical function

(ADJ ∈) (GF): can optionally appear as a member of an ADJ set, or an argument thereof

¬(→ TENSE): but only if this adjunct does **not** have TENSE (i.e. is not sentential)

TopicPath

- English TopicPath:

$$\{\text{XCOMP}\mid \underset{(\rightarrow \text{LDD}) \neq \text{-}}{\text{COMP}} \mid \underset{(\rightarrow \text{TENSE})}{\text{OBJ}}\}^* \{(\text{ADJ} \in)(\text{GF}) \mid \underset{\neg(\rightarrow \text{TENSE})}{\text{GF}}\}$$

- This part of the equation states that:

$\{...\}^*$: The (path +) attribute (ADJ) GF may be embedded inside any number of XCOMP, COMP, OBJ functions, as long as they are properly constrained:

$(\rightarrow \text{LDD}) \neq \text{-}$: COMP may not contain attribute-value pair <LDD, ->

$(\rightarrow \text{TENSE})$: the object must be tensed, i.e. sentential (note that we have not seen data for this constraint)

Functional Uncertainty (repeated)

- Equations as given for TOPICPATH which involve abbreviatory symbols referring to a set of grammatical functions and/or regular expressions exemplify *functional uncertainty*

Definition of functional uncertainty

(f α) = v holds if and only if f is an f-structure, α is a set of strings, and for some s in the set of strings α, (f, α) = v

- Note that s can be of a length greater than one
- This definition basically states that value v may be the value of a range of possible grammatical functions (defined by α). The value in question can validly be assigned to any grammatical function defined by α.

English Topicalization Analysis

- IP $\rightarrow$ $\begin{pmatrix} \text{TopicP} \\ (\uparrow \text{TOPIC}) = \downarrow \\ (\uparrow \text{TOPIC}) = (\uparrow \text{TOPICPATH}) \end{pmatrix}$ $\begin{pmatrix} \text{IP} \\ \uparrow = \downarrow \end{pmatrix}$
- TopicP $\equiv$ {NP|PP|VP|AP|CP}
- English TOPICPATH:

$$\{\text{XCOMP} \mid \underset{(\rightarrow \text{LDD}) \neq \text{-}}{\text{COMP}} \mid \underset{(\rightarrow \text{TENSE})}{\text{OBJ}}\}^* \{(\text{ADJ} \in \underset{\neg(\rightarrow \text{TENSE})}{\ }) (\text{GF}) \mid \text{GF}\}$$

Summary of this lecture and what you need to know I

In this lecture we have seen:

- What Long Distance Dependencies are and what topicalization is (as an introduction)
  - → read-through and reference
- What functional uncertainty is
  - → should be understood
- What off-path constraints are
  - → should be known (you should be able to use ← and → and know what they refer to)
- An example analysis of topicalization in English
  - → You should understand how the topicalization analysis works:
    1. What do individual parts of the analysis mean (e.g. GF, {COMP|XCOMP}*, individual constraints)?

Summary of this lecture and what you need to know II

2. Which expressions are licensed/excluded by the analysis? I.e. given an analysis of topicalization, or a similar one: can you say of a set of examples whether they are accepted or (and why) not?
3. How data motivates decisions for a particular analysis

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