

Constraining the identification of epistemic judges across different syntactic categories

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Overview

Lyons' original motivation

Alternative Analysis

Topics and Goals of this talk

- ▶ Why are epistemic adjectives in Germanic (Greenbaum 1969, pp. 111, 153, Jackendoff 1972, pp. 84–85, Bellert 1977, pp. 344–345, Lyons 1977, pp. 799 Nuyts 2001, pp. 58–59) at least such as *possible*, *probable*, *certain* or *möglich* ‘possible’ so much more acceptable in non-canonical environments such as questions than epistemic adverbs like *possibly*, *probably*, *certainly* or *möglicherweise*?
- ▶ What is the precise interpretation of epistemic modal operators in non-canonical environments?

Goals of this talk

- ▶ **Standard solution:** all epistemic operators in non-canonical environments belong to the class of objective epistemic modals which take a narrower scope
 - ▶ **Problem 1:** no agreement what is subjective epistemic and objective, so far no consistent definition
 - ▶ **Problem 2:** many of the items that are considered as subjective only occur in environments where only objective epistemic operators should occur
- ▶ **Solution presented here:**
 - ▶ Epistemic operators always have same meaning, even in non-canonical environments
 - ▶ epistemic operators introduce a variable for deictic centres and can be embedded more easily if the variable is locally bound
 - ▶ epistemic adjectives are more easily interpretable in non-canonical environments than epistemic adverbs and verbs because they differ in argument structure

Topic of this talk: contrasts I

Contrast between acceptability of epistemic modal adjectives and adverbs in questions, as observed since Greenbaum (1969, pp. 111, 153), Jackendoff (1972, pp. 344–345) (cf. 1), Bellert (1977, pp. 344–345) (cf. 2), Lyons (1977, pp. 799), Hengeveld (1988, pp. 236–240) and Nuyts (2001, pp. 58–59) (3):¹

- (1) a. Is it probable that Frank beat all his opponents?
b. * Did Frank probably beat all his opponents?
- (2) a. Is it possible/probable that John will come?
b. * Will John possibly/probably come?
- (3) a. Is it probable that they run out of fuel?
b. * Did/Have they probably run out of fuel?
c. * Probably they have run out of fuel?

¹Lyons is not explicit about this contrasts but they follow from his claims (cf. 805–806.)

Topic of this talk: contrasts II

Similar contrasts are discussed for negation, (cf. Greenbaum 1969, pp. 152, Bellert 1977, pp. 343, 346 ex. 4, Lyons (1977, pp. 802, 806), Hengeveld 1988, pp. 236–240 ex ??, Nuyts 2001, pp. 59–60 ex. 5):²

- (4) a. It is improbable/impossible that John has come.
b. * Improbably/Impossibly/Not probably John has come.
- (5) a. It is improbable that they have run out of fuel.
b. * Improbably they have run out of fuel.
c. * They have improbably run out of fuel.

²Again, Lyons is not very explicit of such a contrast but he notes that negation may take scope over epistemic adjectives and that they are objective epistemic

Topic of this talk: contrasts III

Likewise such a contrast is discussed for the occurrence within the antecedents of conditionals (cf. Lyons 1977, pp. 805–806 ex. 6, Hengeveld 1988, pp. 236–240 ex. 7).³

- (6) a. If it may be raining, you should take your umbrella.
- b. If it is possible that it will rain, you should take your umbrella.
- c. If there is a possibility of rain you should take your umbrella.
- (7) a. If it is possible that John will come, I am going home.
- b. * If possibly John will come, I am going home.

³Once again Lyons is not very explicit. He does not provide any ungrammatical example for epistemic adverbs.

Summary: contrasts

Not all the authors make the same claims for all the environments. Contrasts in acceptability between adjectives and adverbs are suggested for the following environments:⁴

	questions	negation	conditionals	tense	challenge
Greenbaum (1969, pp. 111–113, 132–141, 148–153)	✓✓	✓✓			
Jackendoff (1972, pp. 344–345)	✓✓				
Bellert (1977, pp. 343–346)	✓✓	✓✓			
Lyons (1977, pp. 797–809)	(✓)		✓✓	✓	
Hengeveld (1988, pp. 236–240)	✓✓	✓✓	✓✓	✓	✓✓
Dutch: Nuyts (2001, pp. 59–60)	✓✓	✓✓			
German: Öhlschläger (1989, pp. 207–210)	✓	✓	✓		
German: Diewald (1999, pp. 82–84, 274)	✓✓				

⁴✓✓ means that the author provides examples, ✓ means that the author explicitly claims that there is a contrast, (✓) means that the author doesn't explicitly mention such a contrast but it follows from other claims made, empty fields mean no claims were made.

Epistemic modal verbs in information seeking questions

- (8) a. „Wer kann Ihnen etwas ins Glas
who can you something into.the glass
geworfen haben?“, fragte der Richter.
throw-POP have-INF asked the judge
- b. „Ich denke, es war dieser Bekannte“, erwiderte
I think it was that friend answered
die Frau.⁵
the woman
‘ “Who could have thrown something in your glass?” ,
the judge asked.
“I think it was this friend”, the woman answered.’

⁵DeReKo: BVZ07/FEB.00540 Burgenländische Volkszeitung, 07/02/2007.

Standard explanation

- ▶ Lyons, Hengeveld argue that these contrasts are result of two different types of meanings and different ranges of scopes/scopal positions:
 - ▶ **epistemic adverbs**: express subjective epistemic modality, speaker weakens truth commitment
 - ▶ **epistemic adjectives**: express objective epistemic modality, statement of a (logical) possibility or necessity
 - ▶ **epistemic modal verbs**: depending on lexical item express both or only one epistemic modality
- ▶ Many of the authors here are no native speakers (Bellert, Hengeveld, Nuyts)
- ▶ A consulted native speaker questions most of these results
- ▶ Greenbaum (1969, pp. 111–113, 132–141, 148–153) conducted an experiment and collected corpus data which suggest the existence of a contrast for the adverbs *possible/possibly*,

- ▶ Lyons (1977, pp. 787–809): very sketchy, enigmatic, no systematic classification of which lexical expression belongs to which class
- ▶ Hengeveld (1988, pp. 236–240): tests adjectives and adverbs in a much more systematic
- ▶ Nuyts (2001): criticism of Lyon's original work, introduces new dimension *subjective* vs. *inter-subjective*

Inspired on work by the philosopher R.M Hare, Lyons (1977, pp. 749, 802) assumes that each utterance consists of three components:

1. **phrastic component**: propositional content of the utterance
2. **tropic component**: specifies the kind of speech act
3. **neustic component**: speaker commitment to that speech act.

According to the three components, three types of negation:

1. **phrastic negation**: context free assertion of a negative proposition

(9) I say that it is the case that **not**- p .

2. **tropic negation**: denial

(10) I say that it is **not** the case that p .

3. **neustic component**: non-commitment

(11) I **don't** say that it is the case that p .

Lyons' analyses of different illocution types

Lyons (1977, pp. 802): **phrastic component** represented by p , the **tropic** and the **neustic** component each by a full-stop.

assertion	.	.	p
tropic negation	.	~	p
question	?	.	p
command	.	!	p
prohibition	.	~!	p
deliberative question	?	!	p

Basic assumption about epistemic modality

Lyons (1977, pp. 804)

objective epistemic modality is a qualifier for the tropic *It-is-so* component:

(12) I say that it is possibly the case that p .

≈ asserting a possibility/necessity

Lyons (1977, pp. 804)

subjective epistemic modality is a qualifier for the neustic *I-say-so* component:

(13) Possibly/Perhaps it is the case that p .

≈ no assertion but entirely independent illocutionary force with reduced speaker commitment to the truth

Lyons (1977, pp. 806)

[subjective epistemic modality] is more basic than [objective epistemic modality], as far as the everyday use of language is concerned; and that OEM can be thought of as being derived from SEM by a process of objectification.

1. How does one account for the contrast of acceptability between embedded epistemic ADV and ADJ?
2. How does one account for different possibilities to identify deictic center?
3. How does one account for the fact that EMV are never attested under other modal operators?

(14) It might be raining in Lagos right now.

- ▶ Speaker makes a claim about possible worlds/possibilities about their knowledge
- ▶ epistemic operators are always evaluated with respect to the knowledge of some judge
- ▶ controversy
 - ▶ common knowledge of everyone?
 - ▶ knowledge of an individual attitude holder?

Three different ways of building epistemically modified VPs

Epistemic adverb (15a), epistemic modal verb (15b), predicative epistemic adjective (15c) build propositions with similar meanings:

- (15) a. ... dass **wahrscheinlich** der Joseph die Maria
that probably the Joseph the Mary
kennt.
knows
'... that Joseph probably knows Mary.'
- b. ... dass der Joseph die Maria kennen **dürfte**.
that the Joseph the Mary knows-INF may
'... that Joseph might know Mary.'
- c. ... dass es **wahrscheinlich** ist, dass der Joseph
that it probable is that the Joseph
die Maria kennt.
the Mary knows
'... that it is probable that the Joseph
knows the Mary.'

- (16) ... dass der Joseph die Maria kennen will.
that the Joseph the Mary know-INF wants
'... that Joseph wants it to be accepted as a truth that he
knows Mary.'

In corpus data evaluated by Maché (2013), four different possibilities can be found how epistemic operators are interpreted

1. Unembedded EMVs/EMADVS: DC=SPEAKER
2. EMVs/EMADV embedded under a non-factive attitude predicate: DC=EXP of matrix predicate
3. reportative MVs: DC=EXP of MV
4. EMADJ DC=EXP of epistemic predicate
5. EMV/EMADV in information seeking questions/conditionals: DC=ADDRESSEE

Context dependence of epistemic operators: assertions

Epistemic operators are always evaluated with respect to the knowledge and beliefs of some DEICTIC CENTRE. In matrix declarative clauses it is identified with the speaker (17):

- (17) der Joseph **dürfte** die Maria kennen.
the Joseph 'be.probable' the Mary knows-INF
'Joseph probably knows Mary.'
DEICTIC CENTRE=*spkr*

Context dependence of epistemic operators: embedded non-factives

As show by Stephenson (2007), the DC is identified with an appropriate attitude holder in the matrix clause in embedded non-factive clauses. (17):

- (18) Der Gabriel vermutet, dass der Joseph die Maria
the Gabriel assumes that the Joseph the Mary
kennen **dürfte**.

knows-INF may

'Gabriel assumes that Joseph might know Mary.'

DEICTIC CENTRE=matrix EXP = *Gabriel*

Context dependence of epistemic operators: interrogatives

As shown by Lasersohn (2005), Maché (2013), the DC is identified with the addressee in information seeking interrogatives and event related conditionals (19):

- (19) Wen dürfte der Joseph hier aller kennen?
who.ACC be.probable the Joseph here of.all know-INF
'Whom do you believe does Joseph know here?'
- DEICTIC CENTRE=*addr*

- ▶ Epistemic operators in information seeking interrogatives impose strict conditions of use
- ▶ Only used in situations in which the speaker assumes that the addressee is not in the position to commit to any answer and only able to provide assumptions that reflect the modal strength of the modal operator suggested by the speaker

Context dependence of epistemic operators: reportatives

In reportatives, the DC is identified the argument of the modal verb which refers to the attitude holder (20–21):

(20) der Joseph **will** die Maria kennen.

the Joseph wants the Mary knows-INF

‘Joseph wants everybody to add the proposition to the common ground that Joseph knows Maria.’

DEICTIC CENTRE=SUBJ

(21) der Joseph **soll** die Maria kennen.

the Joseph shall the Mary knows-INF

‘someone wants everybody to add the proposition to the common ground that Joseph knows Maria.’

DEICTIC CENTRE=EXP

Condition on Deictic Centres (CoDeC)

The use of an epistemic operator indicates that the embedded proposition is not part of the DEICTIC CENTRE's knowledge. (cf. Maché 2013, pp. 415)

Hierarchy of Salience

The variable of the DEICTIC CENTRE is bound by...

1. ... the experiencer arguments of the predicate which introduce the epistemic modal operator
2. ... the experiencer argument of an attitude predicate in the superordinate clause
3. ... the most salient referent of the speech act

(cf. Maché 2013, pp. 422)

Intuition behind the analysis

Slight contrast between *für*-PPs binding the argument position for the attitude holder of the adverb/adjectives in question:

(22) a. ? ... aber für IHN ist es
but for him it is

sicher/wahrscheinlich/möglich, dass der HSV
certain/probable/possible, that the HSV
gewinnt.

wins

'...but to him it is certain/probable/possible that HSV is going to win.'

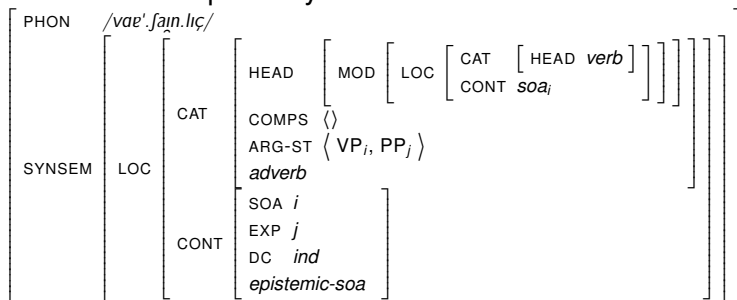
b. ?? ... aber für ihn gewinnt der HSV morgen
but for him wins the HSV tomorrow

sicher/wahrscheinlich/möglicherweise.
certainly/probably/possibly

'...but for him HSV is going to win
certainly/probably/possibly.'

- ▶ argument position within sentential adverbs less accessible for syntactic operations than argument positions of the predicate

(23) *wahrscheinlich* 'probably'



- ▶ based on entries for sentence adverbs as suggested by Müller (2020, pp. 223) or Kim (2021, pp. vii)
- ▶ include a **DEICTIC CENTRE** (DC) which determines the attitude holder with respect to whose knowledge the epistemic modal operator is evaluated

(24) *wahrscheinlich* 'probable'

PHON	/vae'.faj̃n.liç/		
SS LOC	CAT	HEAD	PRD + <i>adjective-prd</i>
		SUBJ	{ [1] <i>dass-S_i</i> }
		COMPS	{ ([2] <i>PP_{für-j}</i>) }
		ARG-ST	{ [1] <i>dass-S_i</i> , [2] <i>PP_{für-j}</i> }
		MOD	{ }
	CONT	SOA	<i>i</i>
	EXP	<i>j</i>	
	DC	<i>ind</i>	
		<i>epistemic-soa</i>	

- ▶ has an argument for an attitude holder which can optionally realises as *PP_{für}*
- ▶ if unrealised, usually interpreted as generic pronoun like *PRO_{arb}*
- ▶ DC not yet instantiated

(25) *dürfte* 'be.probable'

CAT	HEAD	<i>verb</i>
	ARG-ST	$\boxed{1} \oplus \boxed{2} \oplus \langle V[bse, LEX +, SUBJ\boxed{1}, COMPS\boxed{2}]_i \rangle$
CONT	SOA	<i>i</i>
	DC	<i>ind</i>
		<i>epistemic-soa</i>

- ▶ Raising analysis cf. Müller (2013, pp. 243, 277)
- ▶ no restriction on IC: they can be embedded under non-factives
- ▶ no restriction on VFORM: they can be nonfinite when embedded under non-factives

(26) *wollen* 'want' here: 'claim'

CAT	HEAD	<i>verb</i>
	ARG-ST	$\langle \text{NP}[\textit{str}]_i \rangle \oplus \textcircled{2} \oplus \langle \text{V}[\textit{bse}, \textit{LEX} +, \textit{SUBJ} \langle \text{NP}[\textit{str}]_i \rangle, \textit{COMPS} \textcircled{2}]_j \rangle$
CONT	EXP	<i>i</i>
	SOA	<i>j</i>
	DC	<i>i</i>
	CLOSED	+
		<i>epistemic-soa</i>

- ▶ Based on the analysis of control predicate by Müller (2013, pp. 280)
- ▶ By virtue of *HoS1* DC is bound by the attitude holder argument introduced by the verb *wollen* (or *sollen*)
 - ▶ a structure with a verbal head which has a EXP on its ARG-ST and an *epistemic-soa* in its CONT.
- ▶ no restriction on VFORM because also attested as infinitive

Clause 1

the variable of the DEICTIC CENTRE is identified by the EXPERIENCER argument of the predicate which introduce the epistemic modal operator:

$$\left[\begin{array}{l} \text{CAT} \\ \text{CONT} \end{array} \left[\begin{array}{l} \text{HEAD } \textit{verb} \\ \text{ARG } \textit{list} \oplus \langle \text{NP/PP}_i \rangle \oplus \textit{list} \\ \text{EXP } \textit{i} \\ \textit{epistemic-soa} \end{array} \right] \right] \rightarrow \left[\text{CONT} \left[\begin{array}{l} \text{EXP } \textit{i} \\ \text{DC } \textit{i} \\ \text{CLOSED } + \end{array} \right] \right]$$

- ▶ When ever a predicate of the type *verb* introduces an epistemic operator with DEICTIC CENTRE and has an EXPERIENCER on its COMP-list: the DEICTIC CENTRE is locally bound by the EXPERIENCER argument
- ▶ applies to reportative modal verbs and copulas with predicative epistemic adjectives

- ▶ *HoS1* does apply to VPs modified by epistemic adverbs
- ▶ mother node does not have appropriate attitude holder on ARG-ST list
- ▶ *HoS1* does not apply to epistemic adverb as it is not of the category *verb*

Clause 2

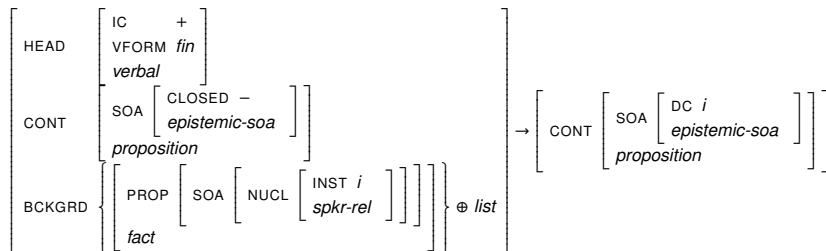
the variable of the DEICTIC CENTRE is bound by the EXPERIENCER argument of an attitude predicate in the superordinate clause

$$\left[\begin{array}{l} \text{CAT} \\ \text{CONT} \end{array} \left[\begin{array}{l} \text{ARG-ST } list \oplus \langle NP_i \rangle \oplus list \oplus \left\langle S \left[\begin{array}{l} \text{H-DTR|SYNSEM|LOC} \\ \text{CONT} \end{array} \left[\begin{array}{l} \text{CAT|HEAD|IC} \\ \text{CONT} \end{array} \left[\begin{array}{l} - \\ \textit{epistemic-soa} \end{array} \right] \right] \right] \right] \right] \rightarrow \\ \text{EXP } i \end{array} \right]$$
$$\left[\begin{array}{l} \text{CAT} \\ \text{CONT} \end{array} \left[\begin{array}{l} \text{ARG-ST } list \oplus \left\langle S \left[\begin{array}{l} \text{H-DTR|SYNSEM} \\ \text{CONT} \end{array} \left[\begin{array}{l} \text{DC} \\ \text{CLOSED} \end{array} \left[\begin{array}{l} i \\ - \end{array} \right] \right] \right] \right] \right] \right]$$

- ▶ IC– signals that clause is embedded (cf. Ginzburg and Sag 2000, pp. 45)
- ▶ the feature VFORM of the embedded verb remains unspecified, because embedded clause can be non-finite too in German
- ▶ CLOSED– signals that deictic centre in the clause is not bound yet

Clause 3a

the most salient referent of the speech act (declaratives)

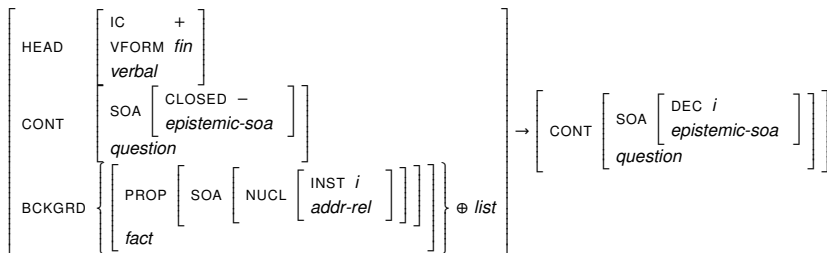


- ▶ CLOSED– indicates that there is no potential binder which is more local than speaker
- ▶ root clause constraint according to Ginzburg and Sag (2000, pp. 26, 42–46)
- ▶ representation of the speaker inspired by Ginzburg and Sag (2000, pp. 120–124)

- ▶ only declarative clause have `CONT` value specified for message-type *proposition*
- ▶ the feature `CLOSED-` signals that there is no more local binder between the root-level node and the DC-variable contributed by the epistemic operator
- ▶ in such environments the DC is identified with the speaker

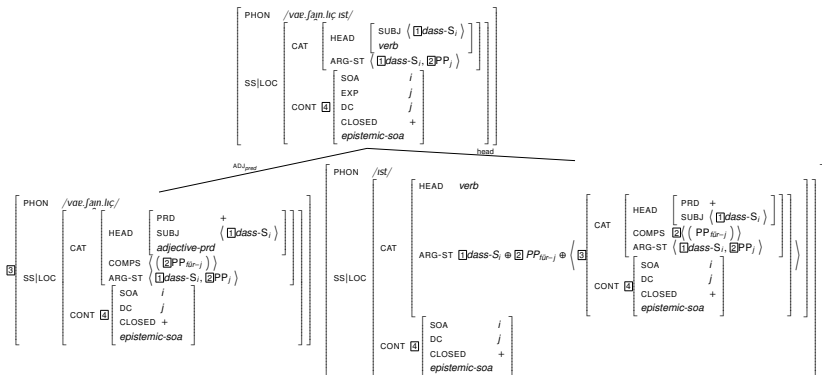
Clause 3b

the most salient referent of the speech act (information seeking interrogatives)



- ▶ only interrogative clause have CONT value specified for message-type *question*
- ▶ the feature CLOSED– signals that there is no more local binder between the root-level node and the DC-variable contributed by the epistemic operator
- ▶ in such environments the DC is identified with the addressee

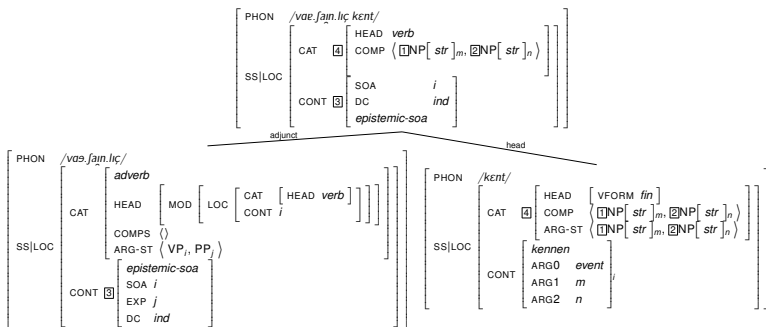
Copula with predicative epistemic adjective



- ▶ The arguments [1], [2] of the ADJ will end up in the predicate's ARG-ST-list
- ▶ By virtue of argument attraction in cluster formation the copula attracts the arguments of the embedded predicative adjective

- ▶ There is constituent with a head of the category *verb*
 - ▶ that has an EXP on its ARG-st
 - ▶ and that a DC in its content:
- ▶ Controversial? ARG-ST at a phrasal-level (contra Sag and Wasow 1999, pp. 152–154) But: predicate complex formation

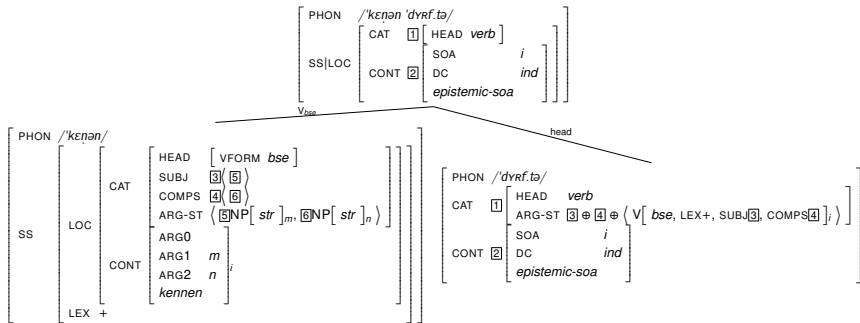
Epistemic adverbs with VP



- ▶ Arguments of the ADV will not end up in the predicates ARG-ST-list
- ▶ Clause 1 of *HoS* cannot apply:


- ▶ There is no AVM with a head of the category *verb*
 - ▶ that has an EXP on its ARG-st
 - ▶ and that a DC in its content:
- ▶ consequence: clause 1 cannot apply
- ▶ consequence: DC-variable left be unbound.
- ▶ consequence: DC-variable can only be bound by the top most binder

Epistemic modal verbs




- ▶ CONTENT of epistemic modal verb is *epistemic-soa*
- ▶ If in matrix clauses *HoS3* applies
- ▶ If embedded in clause *HoS2* applies

- ▶ The different behaviour of epistemic adverbs and epistemic adjectives in Westgermanic languages is caused by a difference in argument structure and binding behaviour
 - ▶ epistemic operators introduce a variable for a DEICTIC CENTRE
 - ▶ depending on the context different binding behaviour
 - ▶ if DC-variable is not bound locally subject to strict conditions on context
 - ▶ argument position in predicates can be locally bound by EXPERIENCER arguments
 - ▶ epistemic adverbs do not participate in predicate complex formation, DC cannot be bound locally
 - ▶ predicative epistemic adjectives are part of the predicate complex, DC is bound locally


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