

Constraining the identification of epistemic judges across different syntactic categories

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Overview

Epistemic modality

Lyons' original motivation

Objections to objective epistemic modality

- EVM un information seeking questions

- EMV under Negation

- EMV in the antecedent of event related conditionals

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 2001a, 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 (2001a, 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 2001a, 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 (2001a, 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

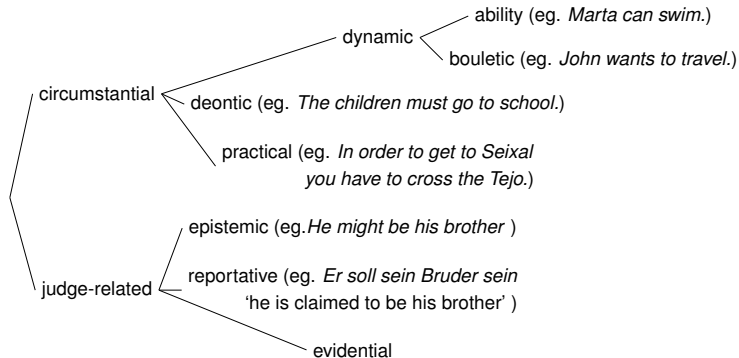
- ▶ Lyons, Hengeveld argue that these contrasts are result of two different types of meanings and different ranges of scopes/scopal positions:
 - ▶ **epistemic adverbs**: express subjective epistemic modality, speaker weakens truth commitment
 - ▶ **epistemic adjectives**: express objective epistemic 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*,

Modality

Expressions that allow the speaker to talk about situations which are not part the set of facts he knows. (Inspired by Portner 2009, pp. 1)

1. Situations including unrealised wishes of the subject referent.
(9) Maria wants to become famous.
2. Situations which include rules that are not obeyed.
(10) You should go to bed now.
3. Situations which are not part of the speaker's knowledge
(11) He might be Pedro's brother.
4. Situations expected to occur after utterance time
(12) Tomorrow, there is going to be rain.

Types of modality



Flavours of modality in a nutshell

- ▶ **ability**
- ▶ **bouletic** in line with situations which provide a higher degree of happiness to the subject referent
- ▶ **deontic** in line with situations which provide a higher degree of happiness to some other referent, potentially a collective abstract body
- ▶ **practical** necessities and possibilities that arise from the nature of things
- ▶ **epistemic** assumptions and inferences based on the speaker's knowledge

What is epistemic modality

Epistemic modality has two basic characteristics:

- ▶ modified proposition cannot be part of speaker knowledge
- ▶ epistemic modal verbs allow to embed predicates referring to states that cannot be changed (individual level predicates), whereas circumstantial modals do not

(13) This lake could be deep.

- ▶ Speaker can utter (13) without knowing anything
- ▶ Speaker cannot utter (13) when he knows that the lake is deep (cf. Westmoreland 1998, pp. 12, Diewald 1999, pp. 209, 225 Ziegeler 2006, pp. 90, Fintel and Gillies 2010, pp. 353, Kratzer (2011, 2012, pp. 99), Martin 2011 and Zimmermann 2004, pp. 256)

Three ways to characterise epistemic modality

(14) Three ways to formulate the CoDeC:

- a. p is not part of the deictic centre's knowledge
- b. $\neg p$ is not part of the deictic centre's knowledge
- c. neither p nor $\neg p$ part of the deictic centre's knowledge

- ▶ Krämer (2005, pp. 60, 133), Ziegeler (2006, pp. 90), Erb (2001, pp. 161), Fintel and Gillies (2010, pp. 353), Kratzer (2011, 2012, pp. 99) in favour of option (14a)
- ▶ Martin (2011, Sect. 3.1.) in favour of option (14b)
- ▶ Westmoreland (1998, pp. 12) in favour of option (14c)

- ▶ Option (14a) is the most plausible
- ▶ Speaker can be aware that epistemically modified proposition is false
- ▶ Speaker in example (15) that Kidman does not have 30 babies

- (15) Wenn alle Meldungen über Schwangerschaften
if all reports about pregnancies
der Oscar-Preisträgerin gestimmt
the-GEN oscar-winner attune-PPP
hätten, müsste sie mittlerweile 30
have-SBJV.PST must-SBJV.PST she meanwhile 30
Babys bekommen haben. Kidman ist Mutter
babies get-PPP have-INF. Kidman is mother
zweier adoptierter Kinder.⁶
two-GEN adopted-GEN children
'If all of those reports about the Oscar winner's pregnancies
had been true, then she would have had 30 babies by now.
Kidman is the mother of two adopted children.'

⁶DeReKo: BRZ07/DEZ.11819 Braunschweiger Zeitung, 31/12/2007.

The second basic property

- ▶ Circumstantial modal verbs fail to embed predicates that refer to states that cannot be changed
- ▶ epistemic/evidential modal verbs allow if not prefer such predicates
- ▶ A similar observation by Abraham (1991), Abraham (2001), Abraham (2005), and Leiss (2002) for German and by Barbiers (2002, pp. 59, 61) for Dutch.

Circumstantial only: *can*

Hofmann (1976, pp. 94), Coates (1983, pp. 85), Sweetser (1990, pp. 62), Brennan (1993, pp. 14), Drubig (2001, pp. 43), Auwera, Ammann, and Klindt (2005, pp. 258), Portner (2009, pp. 30) and Hacquard and Wellwood (2012, pp. 4): *can* only circumstantial interpretations, no epistemic interpretations:

- (16) a. * Smerdyakov can be the murderer. (only CIRC)
b. Smerdyakov could be the murderer. (EPIST)
- (17) a. * Smerdyakov can have killed Fyodor Pavlovich.
(only CIRC)
b. Smerdyakov could have killed Fyodor Pavlovich.
(EPIST)

- ▶ Only epistemic, reportative and evidential modality modify predicates that refer to states which (cf. Maché 2013)
- ▶ The use of epistemic modal operators are much more limited in many environments (cf. Maché 2013), such as:
 - ▶ excluded embedded under other modal operators
 - ▶ limited in questions
 - ▶ limited in antecedents of conditionals

- ▶ 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 (2001a): 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

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

2. **tropic negation**: denial

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

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

(20) 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:

(21) 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:

(22) 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.

Objective epistemic modality: an example I

Assume the following premisses are part of the speakers knowledge:

1. Alfred is part of a community of 90 people
2. 30 of these people are unmarried
3. It is not known whether Alfred is among the unmarried people

(23) Alfred may be unmarried.

Lyons does not discuss the consequences explicitly:

- ▶ **claim 1**: ADJ are more appropriate for OEM than for SEM
- ▶ **claim 1**: ADV are more appropriate for SEM than for OEM
- ▶ An ADJ should be significantly better to express the state of affairs described above

- (24) a. It is possible that Alfred is unmarried.
b. Possibly, Alfred is unmarried.

Clear contrast expected between (25) and (26)⁷

- (25) a. Es ist möglich, dass Alfred unverheiratet ist.
b. Ich halte es für möglich, dass Alfred unverheiratet ist.
c. Es besteht die Möglichkeit, dass Alfred unverheiratet ist.
d. Alfred kann unverheiratet sein.
e. Es kann sein, dass Alfred unverheiratet ist.
- (26) a. Alfred ist möglicherweise/vielleicht/womöglich unverheiratet.
b. Alfred könnte unverheiratet sein.
c. Es könnte sein, dass Alfred unverheiratet ist.

⁷According to Öhlschläger (1989, pp. 207, 210) and Diewald (1999, pp. 82–84, 274) *kann* can be OEM, but *könnte* is always SEM

Objective epistemic modality: another example I

Assume the following premisses are part of the speakers knowledge:

1. Alfred is part of a community of 90 people
2. 30 of these people are unmarried
3. It is not known whether Alfred is among the unmarried people
4. 70 married people are already known by name
5. Alfred is not among them

(27) Alfred must be unmarried.

Again Lyons does not discuss the consequences explicitly, but following his claims above an ADJ should be significantly appropriate here than a ADV

- (28) a. It is necessary/certain that Alfred is unmarried.
b. Certainly/Necessarily, Alfred is unmarried.

Clear contrast expected between (29) and (30)

- (29)
- a. Es ist sicher, dass Alfred unverheiratet ist.
 - b. Ich halte es für sicher, dass Alfred unverheiratet ist.
 - c. Es besteht Sicherheit, dass Alfred unverheiratet ist.
 - d. Alfred muss_{L*/L+H*} unverheiratet sein.
 - e. Es muss_{L*/L+H*} (so) sein, dass Alfred unverheiratet ist.
- (30)
- a. Alfred ist sicher/sicherlich/mit Sicherheit unverheiratet.
 - b. Alfred muss_{L*/L+H*} unverheiratet sein.
 - c. Es muss_{L*/L+H*} (so) sein, dass Alfred unverheiratet ist.

- ▶ I do not observe any contrast between ADV and ADJ
- ▶ nor between typical SEM verbs like *könnte* and typical OEM verbs such as *kann*
- ▶ Doubtful whether there is a 1:1 relation
 - ▶ modal operators that are embedded under the discussed operators
 - ▶ an epistemic judgement which is accessible to other referents aside the speaker

Accounting for epistemic modal operators in non-canonical environments:

1. Lyons (1977, pp. 805–6), Nuyts (2001b, pp. 392–393) assumption that SEM is more basic than OEM in conflict with grammatical development: ‘objective epistemic’ instances occur before ‘subjective epistemic ones’ (cf. Fritz 1997, pp. 140 and Diewald 1999, pp. 273, 366)
2. clear SEM in non-canonical environments
3. there are no diagnostics that apply to all alleged OEM
4. there are no allegeded OEM which pass all the suggested diagnostics

EMV in information seeking questions

- ▶ ‘Subjective’ epistemic modal operators DO occur in information seeking questions
- ▶ Canonical interrogations: speaker asks addressee to return assertion among the possible assertions which answer the questions
- ▶ Interrogations that include epistemic operators: speaker asks addressee to return assertion among the possible assertions which answer the questions
- ▶ Involve context shift: deictic center/judge is not the speaker but the addressee
- ▶ They are used when speaker assumes that addressee is not in the position to commit to a single answer as an assertion

Epistemic modal verbs in information seeking questions II

Clearly based on evidence accessible only to addressee.

(31) 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.⁸
the woman

‘ “Who could have thrown something in your glass?” ,
the judge asked.

“I think it was this friend”, the woman answered.’

⁸DeReKo: BVZ07/FEB.00540 Burgenländische Volkszeitung, 07/02/2007.

EMV in information seeking questions III

- (32) a. Was dürfte bei diesem Unglück passiert
what.NOM might at that disaster happen-PPP
sein?
be-INF
- b. Z.O.: Ein Triebwerk hat zu brennen begonnen.
a engine has to burn begun
Der Brand kann viele Ursachen haben, ein
the fire can many causes have-INF a
Leck in der Kerosinzufuhr, alles Mögliche.⁹
leak in the kerosine.supply everything possible
‘[journalist:] “What do you think had happened at this
disaster?”
Zhuber-Okrog: “An engine caught fire. The fire can
have several causes, a leak in the kerosin supply; a lot
of things.” ’

⁹DeReKo: K00/JUL.55992 Kleine Zeitung, 27/07/2000.

- (33) a. „Kann das Glas schon länger, also
Can the glass already longer thus
beispielsweise zwei Monate, gestanden haben?“
for.example two month stand have
- b. „Die Wohnung sah so aus, als
the flat looked so out as.if
würde sie benutzt“, erwiderte der
PASS.AUX-SBJV.PST she used responded the
Zeuge.¹⁰
witness
‘ [lawyer:] “Could the glass have already stood there
for two months?”
witness: “The flat looked liked it was used.” ’

¹⁰DeReKo: RHZ08/JUN.01066 Rhein-Zeitung, 02/06/2008.

- ▶ EMV in the scope of negation well documented: English *can't*, *needn't*, German *können* 'can', *brauchen* 'need', Dutch *hoeven* 'need', Mainland Scandinavian *beøve*
- ▶ Objective interpretation not applicable
- ▶ Evidence accessible only to main character.
- ▶ Even Lyons (1977, pp. 801) acknowledges that *can't* has an 'subjective' epistemic interpretation despite being in the scope of a negation:

(34) It can't be raining.

EMV under Negation: example I

- (35) Zwei Pferde trabten durch den Wald. Sie kamen
two horses trotted through the forest they came
aus Northgate, dessen war sich Sonaja sicher.
from Northgate REL.GEN was REFL Sonaja certain
Sie brauchten nicht unbedingt hinter ihr her zu
they need NEG necessarily after her after to
sein, aber es war besser, Vorsicht walten zu
be-INF but it was better care rule-INF to
lassen.¹¹
let-INF

'Two horses were trotting through the forest. They came from Northgate. She was certain about that, but they needn't necessarily be after her. However, it would be better to act with caution.'

¹¹DECOW14: 689178779,

<http://darktales.gamers.de/00000095a9128f216/00000099b41331801/00000099b41331806.html>.

- (36) Die beiden Reiter suchten nach einer Spur. Es
the both horsemen looked after a trace it
brauchte nicht ihre gewesen sein, aber wer
need NEG hers be-PST.PTCP be-INF but who
war denn sonst noch in ihrer Richtung unterwegs
was PRT else again in their direction on.the.way
gewesen?¹²

be-PST.PTCP

‘The two horse men were looking for a trace. It needn’t
have been hers. But who else could have been moving
along with her in that direction.’

¹²DECOW14: 689179104,

<http://darktales.gamers.de/00000095a9128f216/00000099b41331801/00000099b41331806.html>.

- ▶ Pose an additional complication.
- ▶ Sweetser (1990, pp. 123), Kratzer (1995, pp. 130) and Haegeman (2002, pp. 117) three different types of conditionals:
 - ▶ **content/event-related conditionals** if e_1 happens, e_2 is going to happen too.
 - ▶ **epistemic conditionals**: if q is true, then p must be true to, 'mostly echoic'
 - ▶ **Speech act conditionals** if antecedent q is fulfilled, then utterance is relevant
- ▶ Excluding conditionals with 'echoic' antecedents

If event e_1 happens, event e_2 is going to happen too:

- (37) a. If you click this button, you are going to format your hard drive
- b. When Mary speaks French, she speaks it well.

- I
- (38) a. If Mary knows French, she knows it well.
b. If they have to leave a message, he has gone already. (epistemic)
- ▶ If q is true, then p must be true to, 'mostly echoic'.
 - ▶ Event of main clause can precede event of antecedent (38b).
 - ▶ 3
 - ▶ 4
 - ▶ 5

(39)

(40) If you are hungry, just serve you selve.

- ▶ Speech act conditionals may modify other illocutions such as imperatives or questions
- ▶ They often involve echoic antecedents

Speech act conditionals I

- (41) a. Wenn das stimmt, warum sollen wir uns dann
if this holds why shall we us then
überhaupt mit den utopischen
at.all with the utopian
Steuerträumereien von Schwarz-Gelb
tax.dreams of Black-Yellow
beschäftigen?¹³
occupy
'If this is true, why should we then be concerned with
the utopian dreams of the black yellow coalition about
taxes?'
- b. Wenn Bush behauptet, dass die Welt seit dem
if Bush claims that the world after the
Einmarsch der Koalitionstruppen sicherer
invasion the-GEN coalition.troops safer
geworden sei, dann lügt er.¹⁴
became he-SB IV PRS then lies he

Conditionals summary

- ▶ As well known: epistemic and speech act conditionals operate on a higher level/conjoin bigger types of clauses
- ▶ It is not surprising, even expected to find epistemic operators in antecedents of these.
- ▶ Any conditional that involves an 'echoic' antecedent is either epistemic or speech act
- ▶ In order to target event-related ones, exclude all examples with echoic antecedents
- ▶

There are. Interestingly only with *könnte*, which is claimed to be only SEM by objective-epistemic modality believers.

- (42) Wenn der Täter bewaffnet sein könnte, würde
if the offender armed be-INF could would
ich jedoch dringend abraten.¹⁵
I but strongly advise-INF
'If the offender could be armed, I would strongly advise
against it.'

¹⁵DeReKo: RHZ96/OKT.04492 Rhein-Zeitung, 08/10/1996.

- (43) Es besagt, dass eine in die Schweiz geflüchtete
it says that a in the Switzerland fled
Person nicht in ihr Ursprungsland zurückgeschafft
person NEG in his origin.country back.delivered
werden darf, wenn sie dort an Leib und
PASS.AUX-INF may if she there at body and
Leben bedroht sein könnte.¹⁶
life threaten-PPP be-INF could
'It says that a person who has fled to Switzerland must not
be returned to his original country if he could be physically
threatened there.'

¹⁶DeReKo: A09/FEB.06666 St. Galler Tagblatt, 24/02/2009.

- ▶ Under very specific conditions EMV with subjective interpretation even in antecedents of event related conditionals
- ▶ Only with *könnte*
- ▶ Involve context shift: deictic center is addressee
- ▶ If addressee alone has the evidence, rather than the evidence is publicly accessible
- ▶ 5

Summary: different views on OEM

Different views on objective epistemic modality.¹⁷

environment	<i>kann</i> (very rare)	<i>muss</i>	<i>dürfte</i>	<i>könnte</i>	<i>mögen</i> (rare)	epist. adj.	epist. adverbs	part. <i>wohl</i>
factive complement		yes	yes	yes	yes		yes	
causal		yes	yes	yes	yes			yes
temporal		(yes)	yes	yes				yes
conditional	no	no		??yes	no			no
negation	yes	yes	no	no	no		no	no
questions	yes	no	yes	yes	no			yes
quantifiers	yes	no	no	yes	no		no	
infinitive	yes	yes	no					
GERMAN								
Öhlschläger (1989, pp. 207, 210)	obj./subj.	obj./subj.	obj./subj.		subj.		subj.	
Diewald (1999, pp. 82–84, 274)	obj./subj.	obj./subj.					subj.	
DUTCH								
Nuyts (2001a), Nuyts (2001b, pp. 392–393)	obj./subj.						obj./subj.	
Huitink (2008)	obj./subj.	obj./subj.						
ENGLISH								
Lyons (1977, pp.)	obj./subj	obj./subj			obj./subj (<i>may/might</i>)	obj.	subj.	
Watts (1984, pp. 133)	yes				no (<i>may</i>)			

¹⁷ Lyons is not very explicit. Below are enlisted examples he uses for *may* as OEM (14) 797–798, (20) p.799, (24–25) p. 801, (45) p.804; *might* (19) p. 799; *can't* as OEM (26–27), *must* (15) 797–798, hardly natural with *needn't* (31) p. 801; Examples of *may* as SEM (14) p. 797, (20) p.799, (24–25) p. 801, *might* (22–23) p. 799; *must* as SEM (15) p. 797 and *can't* as SEM despite the fact it is occurring in the scope of a negation (26) p. 801.

- ▶ 'subjective' epistemic modals are attested in information seeking questions
- ▶ 'subjective' epistemic modals are attested under negation
- ▶ 'subjective' epistemic modals even are attested in antecedents of event related conditionals
- ▶ assumption of objective epistemic modality served to account for epistemic modal operators that occur in 'forbidden environments
- ▶ division becomes obsolete

- (44) Und er erzählt, dass dieses Rätsel bald gelöst
And he tells that this riddle soon solv-PPP
sein könnte.¹⁸
be-INF could
'And he said that this riddle could be solved soon.'

¹⁸DeReKo: NUN03/AUG.02519 Nürnberger Nachrichten, 28/08/2003.



Reportative modal verbs in German

Occur much more readily in non-canonic environments than epistemic modal verbs (cf. Doherty 1985, pp. 118–119 and Reis 2001, pp. 296):

- (45) Will Uderzo mit dieser Abrundung seines (und
wants Uderzo with this completion his-GEN and
Goscinnys) Lebenswerks vielleicht wirklich
Goscinnys-GEN lifework maybe indeed
endgültig den letzten Band herausgebracht
definitely the last volume edit-PPP
haben?¹⁹

have-INF

‘Does Uderzo really want to say that this is definitely the last volume which he has edited of his and Goscinnys’s lifework?’

¹⁹DeReKo: RHZ96/OKT.06061 Rhein-Zeitung, 10.10.1996.

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?

(46) 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 (47a), epistemic modal verb (47b), predicative epistemic adjective (47c) build propositions with similar meanings:

- (47) 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

- (48) ... 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 (49):

- (49) 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. (49):

- (50) 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 (51):

- (51) 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 (52–53):

(52) 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

(53) 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:

(54) 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

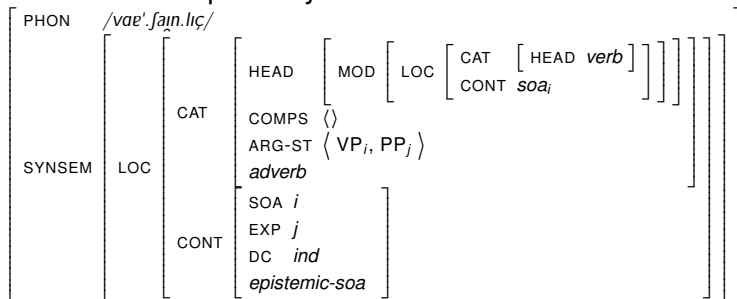
sicher/wahrscheinlich/möglicherweise.
certainly/probably/possibly

'...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

Lexicon entry for epistemic adverbs

(55) *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

(56) *wahrscheinlich* 'probable'

PHON	/vae'.fajn.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

(57) *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

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

CAT	HEAD	<i>verb</i>
	ARG-ST	$\langle \text{NP}[\textit{str}]_i \rangle \oplus \boxed{2} \oplus \langle \text{V}[\textit{bse}, \textit{LEX} +, \textit{SUBJ} \langle \text{NP}[\textit{str}]_i \rangle, \textit{COMPS}\boxed{2}]_j \rangle$
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

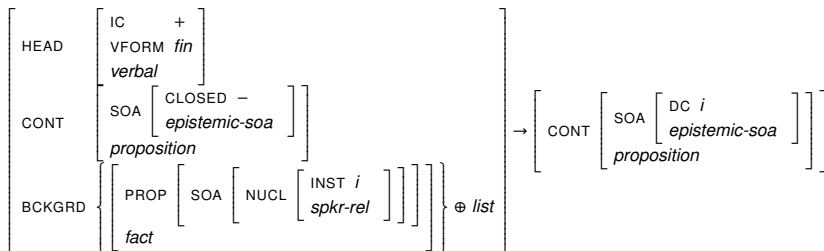
the variable of the DEICTIC CENTRE is bound by the EXPERIENCER argument of an attitude predicate in the superordinate clause

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

- ▶ 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)

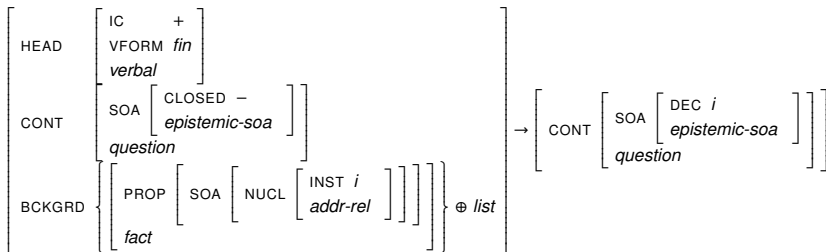


- ▶ CLOSED– indicates that there is no potential binder which is more local than speaker
- ▶ root clause constraint according to Ginzburg and Sag (2000, pp. 26, 42–46)
- ▶ representation of the speaker inspired by Ginzburg and Sag (2000, pp. 120–124)

- ▶ 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

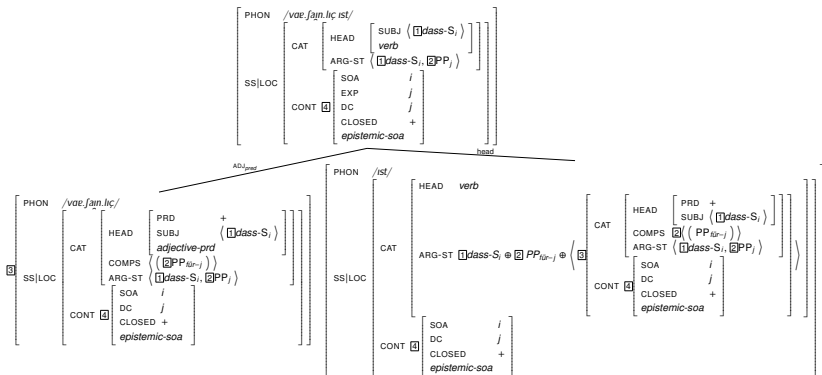
Clause 3b

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

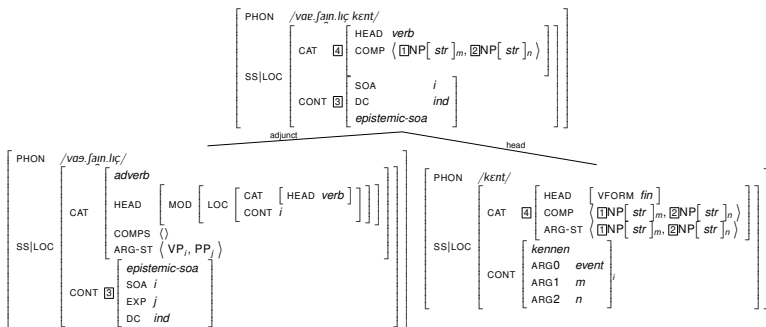
Copula with predicative epistemic adjective



- ▶ 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

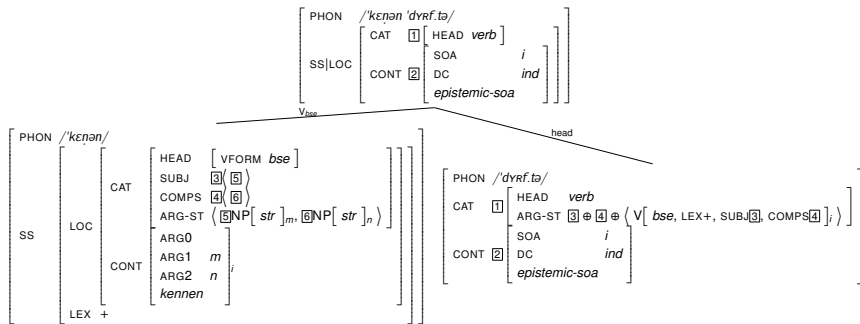
Epistemic adverbs with VP



- ▶ 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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