Constraining the identification of epistemic judges across different syntactic categories

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This paper addresses the question under which conditions epistemic modal operators can be embedded in information seeking questions and complement clauses. These contrast were observed in English (cf. Greenbaum 1969: 111, 153, Jackendoff 1972: 344–345 and Lyons 1977: 797–801), German (cf. Öhlschläger 1989: 207, 210 and Diewald 1999: 82–84, 274), Dutch (cf. Nuyts 1992, Nuyts 2001, Huitink 2008), and Ibero-Romance languages (cf. Hengeveld 1988, Olbertz and Hattnher 2018).

Starting with Greenbaum (1969: 111, 153) and Jackendoff (1972: 344–345), it was observed that epistemic adjectives like *probable* with finite clausal complements can be more readily embedded in question than their morphological cognate adverbs like *probably*.

(1) a. Is it probable that Frank beat all his opponents?
b. * Did Frank probably beat all his opponents?

These data suggest that the syntactic category of the epistemic operator has an impact on whether or not it can be properly interpreted, in other words, this contrast is caused by differences in syntactic structure.

In later research, Lyons (1977: 799) and Hengeveld (1988: 236–240) suggested that the diverging behaviour is due to a difference in semantics: Epistemic adverbs are always interpreted in a subjective epistemic manner by means of which the speaker weakens their commitment to the truth. These authors suggest that in their models epistemic adverbs occupy the same scope position in the utterance as assertive or interrogative operators. Competing for the same scope position as interrogative operators, it becomes clear why epistemic adverbs are not acceptable in questions, in the scope of a negation or in antecedents of event-related conditional clauses. In their analysis, subjective epistemic modal operators encode typically judgements which are based on evidence accessible to the speaker alone.

In contrast, epistemic adjectives are interpreted in an objective epistemic way, expressing a mere statement of a (logical) possibility or necessity. According to Lyon's view, they do not compete for the same scope position as interrogative operators but they reside in the scope of illocutionary operators. Thus epistemic adjectives can be embedded in canonical information seeking questions and other "non-canonical" environments. As a consequence, Lyons (1977: 799) and Hengeveld (1988: 236–240) conclude that objective epistemic modal operators also encode judgements which involve evidence that is publicly accessible to anyone.

As observed by Lyons (1977: 797–801), there are some modal auxiliaries in English which can occur under negation, in antecedents of event-related conditionals and in information seeking questions. Accordingly, he concludes that a restricted group of modal auxiliaries can be used in an objective way, where as the majority only is acceptable with a subjective epistemic interpretation. Despite the fact Lyons explicitly mentions that *can*, *must* and *may* have an objective epistemic interpretation in English, he does not systematically specify the precise extension of the class of objective epistemic modal auxiliaries.[1]

Following Lyons, Öhlschläger (1989: 207, 210) and Diewald (1999: 82–84, 274) assume that there are objective epistemic modal auxiliaries in German too. In contrast to Lyons, they discuss much more systematically extensive data for German, which leads them to the conclusion that the forms *kann* and *muss* allow for objective interpretations whereas the forms *mag* and *könnte* clearly do not. As they argue the former can be embedded in questions and in the scope of a negations, but the latter fail to do so.

Based on comprehensive corpus data from the German Reference Corpus *DeReKo*, it will be shown here that the whole idea of distingishing subjective from objective modality is misleading for a couple of reasons:[2]

[1] Lyons is not very explicit. Below are enlisted examples he uses for *may* as OEM (14) pp. 797–798, (24–25) p. 801, (45) p.804; *can't* as OEM (26–27), *must* (15) pp. 797–798, hardly natural with *needn't* (31) p. 801; Examples of *may* as SEM (14) p. 797, (24–25) p. 801, *must* as SEM (15) p. 797.

[2] The German Reference Corpus (*Deutsches Referenzkorpus DeReKo*) contained $2 * 10^9$ word form tokens at the time of investigation 2010–2012. It is predominantly composed from newspaper articles:

https://cosmas2.ids-mannheim.de/cosmas2-web/

The search strategy aimed at finding epistemic uses of modal verbs that co-occur with question pronouns, question marks. In order to filter epistemic modal verbs, the query focused on modal verbs that co-occur with the stative predicates *sein* and *haben*, as it was shown in previous corpus studies that German modal verbs pre-dominantly select these two stative

Firstly, there are element which are generally considered to be subjective epistemic but which are attested in non-canonical environments such as information seeking questions, in the scope of a negation and in antecedents of event-related conditional clauses. There are cases with *kann* and *dürfte* in information seeking questions, which clearly involve evidence accessible to the epistemic judge alone, thus subjectively interpreted. In interrogatives, these modal operators involve a context shift, they are interpreted with respect to the addressee's knowledge rather than with respect to the speaker's, as illustrated in example (2).

(2) a. „Wer **kann** Ihnen etwas ins
who can you something into.the
Glas geworfen haben?", fragte der
glass throw-POP have-INF asked the
Richter.
judge

b. „Ich denke, es war dieser Bekannte",
I think it was that friend
erwiderte die Frau.[3]
answered the woman

' "Who could have thrown something in your glass?" , the judge asked.

"I think it was this friend", the woman answered.'

Secondly, there are corpus examples that contain adverbs or epistemic particles such as *wohl* which are embedded in information seeking interrogatives (cf. Zimmermann 2004: 263). According to to the analysis defended by Lyons (1977: 799) and Hengeveld (1988: 236–240) such cases should not exist: Epistemic adverbs and particles should be incompatible with an objective epistemic manner and as a consequence, being always 'subjective' epistemic they are not expected to occur in information seeking interrogatives. This clearly demonstrates that Lyon's proposal, which was not systematically spelled out for each modal operator and each non-canonical environment, has some flaws.

Thirdly, none of the alleged objective epistemic operators is acceptable with all the environments in which they were predicted to occur, for instance only *kann* is attested in information seeking questions, whereas *muss* is not. Likewise, only *kann* was found in the scope of a subject quantifier but not *muss*. These observation suggest that the contrasts of acceptability between epistemic adjectives in predicative use and adverbs on the one side and the occurrence of epistemic modal verbs in questions on the other side have to be explained in a different manner.

In order to provide an analysis to account for the behaviour of epistemic operators in non-canonical environments, there are two major questions that need to be answered. Firstly, how does one account for the fact that there are two classes of propositions that contain epistemic operators: (i) epistemically modified propositions that can more easily be embedded under certain operators (= propositions modified by reportative modal verbs or predicative adjectives) and (ii) those that cannot be embedded under certain operators (=propositions modified by modal verbs and adverbs). Secondly, it needs to be explained why epistemic operators are sensitive to context shift in certain syntactic environments: epistemic auxiliares and adverbs in root declaratives are always interpreted with respect to the speaker's knowledge (cf.3), they are interpreted with respect to the addressee's knowledge in information seeking interrogatives (cf. 2), they are interpreted with respect to (potentially unrealised) arguments of the modal expression itself, such as the subject referent of reportative *wollen* to which the truth commitment is attributed (cf. 4), and finally they are interpreted with respect to arguments of a non-factive matrix predicates whenever they are embedded under such (cf. 5): The referent who is evaluating the proposition is the matrix subject *Thomas Figge*.

(3) Der Mann **dürfte** im Schlaf gestorben
the man might in.the sleep die-PPP
sein, da die Beamten ihn im Bett
be-INF as the officers him in.the bed
gefunden hatten.[4]
found had

'The man must have died while beeing asleep, as the officers found him in his bed.'

(4) Sieben Packerl Rotwein **will** er vor dem
seven packets red.wine wants he before the
Prozess konsumiert haben.[5]
process consume-PPP have-INF

'He claims to have consumed seven packets of red wine prior to the process.'

(5) Polizeisprecher Thomas Figge erklärte
police.spokesman Thomas Figge declared
gestern auf Anfrage, dass der 33-Jährige
yesterday on demand that the 33.year.old
mindestens Tempo 100 gefahren sein
at.least tempo 100 drive-PPP be-INF
muss.[6]
must

'The police spokesman Thomas Figge declared yesterday, on demand, that the 33-year-old must have driven at least 100 km/h.'

The second issue can be tackled following Stephenson's

predicates as their complements Raynaud 1977: 22.

[3] DeReKo: BVZ07/FEB.00540 Burgenländische Volkszeitung, 07/02/2007.

[4] DeReKo: BVZ09/OKT.01155 Burgenländische Volkszeitung, 14/10/2009.

[5] DeReKo: NON09/JUL.08001 Niederösterreichische Nachrichten, 15/07/2009.

[6] DeReKo: BRZ09/MAI.05146 Braunschweiger Zeitung, 12/05/2009.

(2007: 497) observation that epistemic modal operators are always evaluated with respect to a deictic centre (judge). In case of assertions, epistemic modal auxiliaries and epistemic adverbs are always interpreted with respect to the speaker. As demonstrated by the corpus data presented in Maché (2013: 313–319), there are certain syntactic environments which force a context shift on epistemic operators: With non-factive embedded clauses the deictic centre of an epistemic modal verb or adverb is always identified with the attitude holder argument of the embedding predicate. If the attitude holder argument is introduced by the epistemic modal operator, as it is the case with reportative modals or epistemic adjectives, it is always identified with the variable for the deictic centre, as discussed in Maché (2013: 407). In other words, the variable for the deictic centre is always bound to the most local syntactic representation of a suitable attitude holder: (i) in case of reporative modal verbs and predicative epistemic adjectives, the variable for the deictic centre is bound by a clause-mate attitude holder argument; (ii) in case of epistemic modal verbs and epistemic adverbs which are embedded under a non-factive predicate, the deictic centre is bound by the attitude holder argument of the embedding non-factive predicate; (iii) and in case of epistemic modal verbs that are matrix predicates in assertions and with epistemic adverbs in matrix clauses, the variable for the deictic centre is bound by the assertive operator, in which the speaker is the most salient attitude holder.

Epistemic modal operators in interrogatives behave slightly differently. As suggested by the corpus data presented in Maché (2013: 297–304, 308–309), epistemic adverbs and epistemic modal verbs which are matrix predicates embedded in information seeking questions are always interpreted with respect to the addressee's knowledge rather than the speaker's. In other words, their variable for the deictic centre is bound by the interrogative operator, in which the most salient attitude holder is the addressee.

The different types of context shift imposed on the deictic centre by these four syntactic scenarios can be summarised in a Hierarchy of Salience:

(6) Hierarchy of Salience

1. if the epistemic predicate has an EXPERIENCER argument, the deictic centre is coreferential with that EXPERIENCER argument
2. if the epistemic predicate is embedded by an attitude predicate, the deictic centre is coreferential with the EXPERIENCER of that attitude predicate
3. if the epistemic predicate is the finite matrix predicate of a declarative clause, the deictic centre is coreferential with the speaker
4. if the epistemic predicate is the finite matrix predicate of a interrogative clause, the deictic centre is coreferential with the addressee

Condition 1 applies to reportative modal verbs in German and Dutch such as *wollen* (cf. 4). Whenever an epistemic operator occurs in one of the configurations outlined in the Hierarchy of Salience, its variable for the deictic centre is bound. The basic assumption here is that epistemic operators can be more easily embedded under other operators such as interrogative operators or antecedents of event related conditionals just in case if their variable for the deictic centre is locally bound by a appropriate referent which can function as attitude holder, like EXP-arguments, the formalisation of this clause is going to be discussed in more detail below (cf. 13.)

Turning to the question why epistemic adjectives can be more easily embedded under information seeking interrogatives than epistemic adverbs, a closer look at the syntactic structure reveals a crucial difference.

As shown by Lasersohn (2005: 648, 672–678), certain adjectives are predicates of personal taste which involve an extra argument position for a judge/attitude holder who can optionally be realised as a *for*-PP or some other phrase. Following Stephenson (2007), it is assumed here that epistemic adjectives are a subtype of predicates of personal taste which contribute an attitude holder argument that can optionally be realised as *for*-PP/*für*-PP. In Figure 3 it is illustrated that this optional attitude holder argument is represented just like any argument of predicative adjectives of the adjective's ARG-ST. Müller (2013b: 28) provides much evidence in favour of an analysis in which arguments of predicative adjectives end up at the copula's COMP-list via argument attraction and verbal cluster formation, as commonly assumed.

This yields a similar structural configuration as with reportative verbs. In accordance with the *Hierarchy of Salience* the variable for the deictic centre is going to be bound by the EXP-argument of the epistemic predicate formed by predicative epistemic adjective and copula. In contrast, epistemic adverbs do not raise their arguments into the main verb's ARG-ST. It is only the CONT-value of the adjunct daughter is token-identical to that of the mother by virtue of the *Semantics Principle* (cf. Pollard and Sag 1994: 56–57), the CAT-value and the ARG-ST of the adverb are not inherited to the mother node by means of the *Subcat Principle* (cf. Pollard and Sag 1994: 31–34), as illustrated in Figure 2. As a consequence, the the optional attitude holder argument does not end up at the predicate's COMP-list.

Independent evidence for a parallel treatment of predicative epistemic adjectives and reportative modal verbs comes from the fact that reportative modal verbs are also known to be more readily acceptable in non-canonical environments than epistemic modal verbs (cf. Doherty 1985: 118–119 and Reis 2001: 296).

A formal analysis has to be able to explain why epistemic operators can surface as different expressions: speaker oriented adverbials (cf. 7a), epistemic modal verbs (cf. 7b), predicative epistemic adjectives (cf. 7c) and reportative modal verbs (cf. 7d) and that examples (7a) and (7b) are more or less synonymous and that (7c)

is nearly synonymous with the former two.

(7) a. … dass wahrscheinlich der Joseph die Maria kennt.
that probably the Joseph the Mary 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. … der es wahrscheinlich ist, dass der Joseph die Maria kennt.
that it probable is that the Joseph the Mary knows
'…that Joseph probably knows Mary.'

d. … 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 order to account for the parallel meanings, one has to investigate the nodes in which the epistemic operator is combined with the maximal argument structure, acknowledging the facts that the epistemic operator may come from a head daughter or a non head daughter and that maximal argument structure list may be contributed by different predicates, which is going to be illustrated in great detail in what follows.

Turning to speaker oriented adverbs as in (7a) they can be modelled along the lines of lexicon entries of negation as suggested by Müller (2020: 223) or Kim (2021: vii), cf. (8). Two aspects of this entry deserve closer attention: Firstly, *wahrscheinlich* has two arguments, one propositional argument which is mapped to the state of affairs expressed by the modified VP 1 and an optional argument which represents the deictic centre 2. Secondly, the latter argument remains on the ARG-ST as there is no evidence that it can form a syntactic phrase with it.

(8)
$$\left[\begin{array}{ll} \text{CAT} & \left[\begin{array}{ll} \textit{adverb} & \\ \text{HEAD} & \left[\text{MOD}\left[\text{LOC}\left[\begin{array}{ll}\text{CAT} & \left[\text{HEAD}\ \textit{verb}\right]\\ \text{CONT} & \boxed{1}\end{array}\right]\right]\right] \\ \text{COMPS} & \langle\rangle \\ \text{ARG-ST} & \langle \boxed{1}, \boxed{2}\rangle \end{array}\right] \\ \text{CONT} & \left[\begin{array}{ll} \textit{epistemic-adv} & \\ \text{SOA} & \boxed{1} \\ \text{DC} & \boxed{2} \end{array}\right] \end{array}\right]$$

The epistemic flavour of the extended VP, comprising the epistemic operator and the deictic centre is contributed by the non-head daughter *wahrscheinlich* and category of the entire phrase is determined by the finite verb *kennen*, cf. Figure 2.

(9)
$$\left[\begin{array}{ll} \text{CAT} & \boxed{5}\left[\begin{array}{ll}\text{HEAD} & \textit{verb}\\ \text{COMPS} & \langle\rangle \\ \text{ARG-ST} & \langle\left(\text{NP}\boxed{4}\right)\rangle\end{array}\right] \\ \text{CONT} & \boxed{1}\left[\begin{array}{ll}\text{SOA} & \boxed{3}\\ \text{DEICT-CTR} & \boxed{4}\\ \textit{epistemic} & \end{array}\right] \end{array}\right]$$

adj / head

$$\left[\begin{array}{ll} \text{CAT} & \left[\begin{array}{ll}\text{HEAD|MOD} & \boxed{2}\\ \text{COMPS} & \langle\rangle\end{array}\right] \\ \text{CONT} & \boxed{1}\left[\begin{array}{ll}\text{SOA} & \boxed{3}\\ \text{DEICT-CTR} & \boxed{4}\\ \textit{epistemic-soa} & \end{array}\right] \end{array}\right] \quad \boxed{2}\left[\begin{array}{ll} \text{CAT} & \boxed{5}\left[\text{HEAD}\ \textit{verb}\right] \\ \text{CONT} & \boxed{3}\left[\begin{array}{ll}\textit{kennen} & \\ \text{ARG0} & \boxed{6}\\ \text{ARG1} & \boxed{7}\\ \text{ARG2} & \boxed{8}\end{array}\right] \end{array}\right]$$

Turning to epistemic modal verbs (7b), the lexicon entry of epistemic *dürfte* could be modelled as illustrated in example (10), following the standard analysis for raising verbs developed by Müller (2013a: 277). The CONT-value involves a propositional argument 3 and an argument for the deictic centre.

(10)
$$\left[\begin{array}{ll} \text{CAT} & \left[\begin{array}{ll}\text{HEAD} & \left[\begin{array}{ll}\text{VFORM}\ \textit{fin}\\ \text{IC}\ +\\ \textit{verb}\end{array}\right]\\ \text{ARG-ST} & \boxed{2}\oplus\boxed{3}\oplus\left\langle \text{V}\left[\textit{bse}, \text{LEX}+, \text{COMPS}\ \boxed{2}\right]:\boxed{3}\right\rangle\end{array}\right] \\ \text{CONT} & \left[\begin{array}{ll}\textit{epistemic-soa} & \\ \text{DC}\ \textit{ind} & \\ \text{SOA}\ \boxed{3} & \end{array}\right] \end{array}\right]$$

In opposition to the cases with epistemic sentence adverbs, the category and the epistemic flavour of the VP is contributed by the epistemic modal verb *dürfte*. As the verbal head of a verb-cluster the epistemic modal verb takes scope over the prejacent proposition by taking it as a propositional argument 3, cf. Figure 1.

(11)
$$\left[\begin{array}{ll} \text{CAT} & \left[\begin{array}{ll}\text{HEAD} & \left[\begin{array}{ll}\text{VFORM}\ \textit{fin}\\ \text{IC}\ +\\ \textit{verb}\end{array}\right]\\ \text{ARG-ST} & \textit{NP}\left[\textit{str}\right]\boxed{2}\oplus\left\langle \text{V}\left[\textit{bse}, \text{LEX}+, \text{COMPS}\ \boxed{2}\right]\right\rangle\end{array}\right] \\ \text{CONT} & \left[\begin{array}{ll}\textit{epistemic-soa} & \\ \text{EXP} & \boxed{2}\\ \text{DC} & \boxed{2}\\ \text{CLOSED}\ + & \end{array}\right] \end{array}\right]$$

The lexicon entry for reportative *wollen* given in example (11) can be modelled according to the analysis of subject control verbs in Müller (2013a: 280). The essential difference between reportative modal verbs and their epistemic counterparts is that the former introduce experiencer arguments which are bound off by their EXP-arguments. In other words, the truth commitment is attributed to an argument of the modal verb itself. The lexicon entry for *sollen* would be analogous except that its EXP-argument remains with out phonological realisation (cf. Becker 1836: 181, Bech 1949: 11). The fact that the deictic centre is bound at the most local level with reportative modal verbs makes them more easily acceptable in non-canonical environments such as questions and optatives, as observed by Doherty (1985: 118–119), Reis (2001: 296) and Scholz (1991: 276). This circumstance is expressed by the feature CLOSED+. As will be shown below in more detail, the benefit of the boolean feature CLOSED is to indicate

which type of clausal constituent can be embedded by other modal operators. Whenever a clausal constituent bears the feature CLOSED+ it is excluded from the scope of other modal operators.

Finally, predicative epistemic adjectives as in (7c) can be modelled along the lines of scope bearing adjectives discussed by Pollard and Sag (1994: 330) and Müller (2013a: 80–82):

(12)
$$\left[\begin{array}{ll} \text{CAT} & \left[\begin{array}{ll} \text{HEAD} & \left[\begin{array}{ll} \text{PRD} & + \\ & \textit{adjective-prd} \end{array}\right] \\ \text{SUBJ} & \langle\, \boxed{1}\, \textit{dass}\text{-S} \,\rangle \\ \text{COMPS} & \langle\, \boxed{2} \,\rangle \\ \text{ARG-ST} & \langle\, \boxed{1}, \langle\, \text{PP}_{\textit{für}}\boxed{2} \,\rangle \,\rangle \\ \text{MOD} & \langle\rangle \end{array}\right] \\ \text{CONT} & \left[\begin{array}{ll} \textit{epistemic-soa} & \\ \text{SOA} & \boxed{1} \\ \text{DC} & \boxed{2} \\ \text{CLOSED} & + \end{array}\right] \end{array}\right]$$

The predicative epistemic adjective *wahrscheinlich* has two arguments, the propositional argument maps to a *dass*-clause in subject position, which is going to be mapped SUBJ and the deictic centre can optionally be realised as a $\text{PP}_{\textit{für}}$ on the COMP-list. If not phonetically expressed, this argument is interpreted in a similar way than arbitrary PRO. This would also account for the observations that with predicative epistemic adjectives the judgement is supported by more attitude holders than the speaker alone, resulting in a somewhat more 'objective' interpretation.

When combined with a predicative copula in accordance with scheme for copulas developed by Müller (2013b: 28), the copula attracts the arguments from the COMP-list of *wahrscheinlich* and treats them as its own arguments. Inspired by Müller's (2009: 226) lexicon entry for predicative copulas, it is assumed here that the copula inherits the epistemic semantics and the deictic centre from the embedded predicative adjective. All in all the compound of the predicate copula and the predicative epistemic adjective resembles much the configuration with reportative modal verbs, cf. Figure 3.

The fact that both reportative modal verbs and verbal complexes consisting of predicative epistemic adjectives and a copula can be explained by assuming that both of them involve deictic centres which are bound by their own arguments, yielding VPs which bear the feature CLOSED+. This is result of the Hierarchy of Salience which is formalised as follows:

Case with epistemic predicates that have EXPERIENCER ARGUMENTS such as reportative *wollen* and *sollen* and copulas combined with predicative epistemic adjectives:

(13)
$$\left[\begin{array}{ll} \text{CAT} & \left[\begin{array}{ll} \text{HEAD} & \textit{verb} \\ \text{ARG-ST} & \textit{list} \oplus \left\langle\, \text{NP}_{\boxed{1}} \,\right\rangle \oplus \textit{list} \end{array}\right] \\ \text{CONT} & \left[\begin{array}{ll} \textit{epistemic-soa} & \\ \text{EXP} & \boxed{2} \end{array}\right] \end{array}\right] \rightarrow$$

$$\left[\begin{array}{ll} \text{CONT} & \left[\begin{array}{ll} \text{EXP} & \boxed{2} \\ \text{DEC} & \boxed{2} \\ \text{CLOSED} & + \end{array}\right] \end{array}\right]$$

Turning to cases with epistemic modal predicates that are embedded by attitude predicates, it is assumed here that embedded clauses bear the feature independent clause IC−, as suggested by Ginzburg and Sag (2000: 45). With many clause embedding predicates the deictic centre is identified with their EXP-argument, as the proposition in which they occur does not involve a binder for the deictic centre they are marked as CLOSED−, cf. Figure 4.

Cases with unembedded finite epistemic modal predicates in declarative clauses involve the head feature IC+ as they are independent clauses. The type of CONT is *proposition*, as it is a declarative clause, as suggested by Ginzburg and Sag (2000: 120–126). In such a setting, the deictic centre is identified with the speaker, cf. Figure 5.

Note that cases with interrogatives are almost identical except for that the CONT is of the type *question* and the deictic centre is identified with the addressee.

It is a well-established fact that circumstantial modal operators cannot embed epistemic ones, cf. Maché (2013: 309–311, 375–377) for discussion. Based on this analysis, a circumstantial modal operator can be modelled by selectional restriction which disallows the embedding of epistemic predicates with the value CLOSED−.

Finally the difference in argument structure between epistemic adverbs and predicative epistemic adjectives can be achieved by a derivational rule which derives the adverb and the predicative adjective from the simple adjective stem.

Summing up, epistemic adjectives can more easily be embedded in questions and other contexts because they provide an attitude holder argument which is available as a binder for the the deictic centre variable by virtue of predicate complex formation. As the variable is bound in the most local context, the proposition in which occurs can be embedded under other operators. In contrast, epistemic adverbs do not participate in predicate complex formation and as a consequence they fail to contribute a potential binder for the variable of the deictic centre. As a result, this variable remains unbound and thus it is excluded from the scope of other modal and certain illocutionary operators. Finally, the different types of mandatory context shift become evident assuming a variable of a deictic centre which has to be bound by the most local representation of an attitude holder argument.

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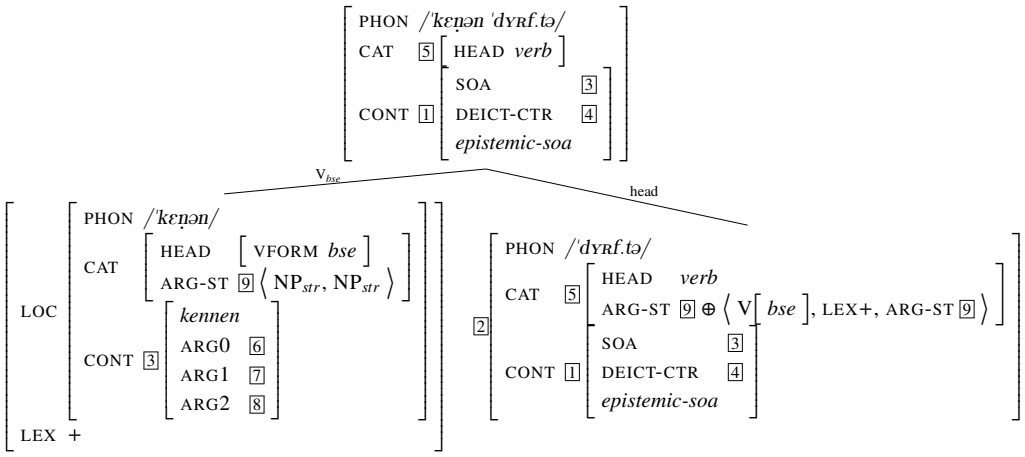

Figure 1: Extended VP with epistemic modal verb

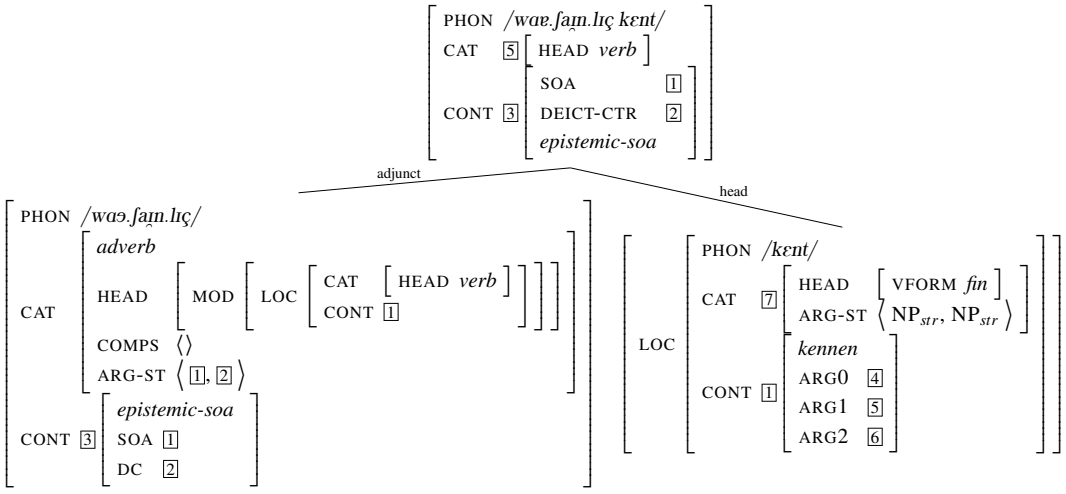

Figure 2: VP with epistemic adverb

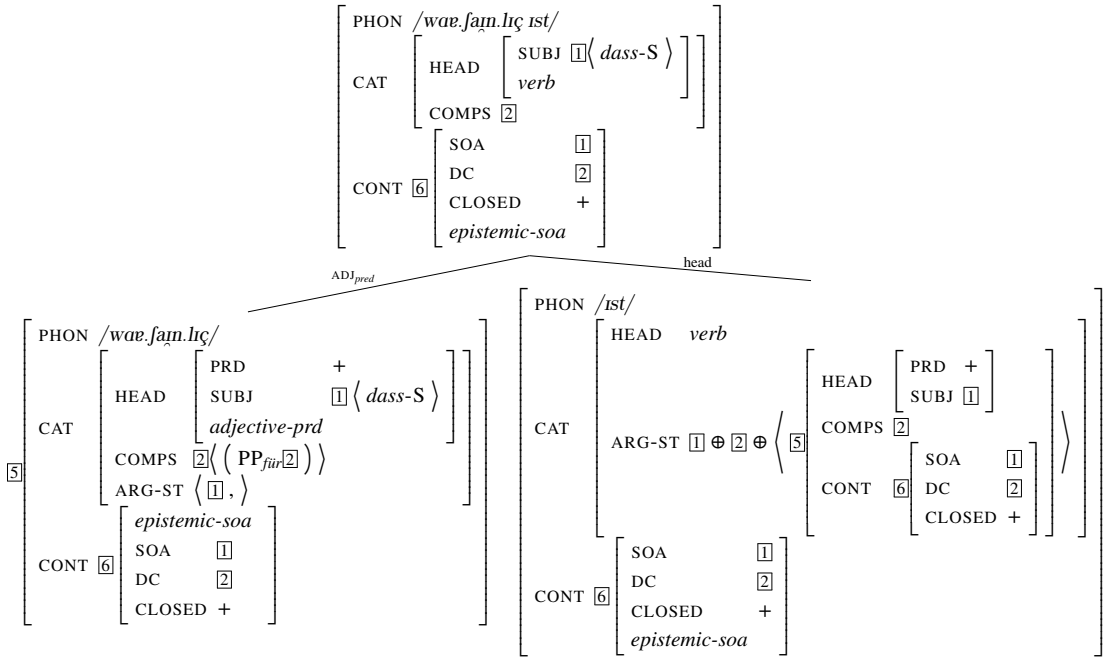

Figure 3: Extended VP with copula and predicative epistemic adjective

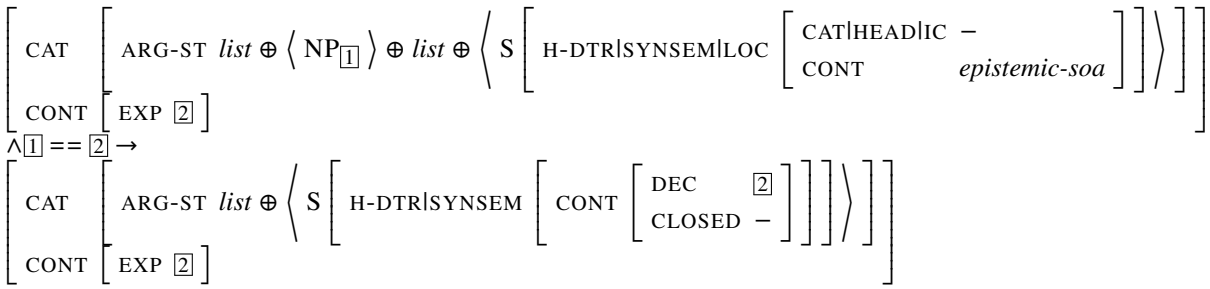

Figure 4: Hierarchy of Salience: Embedded clauses

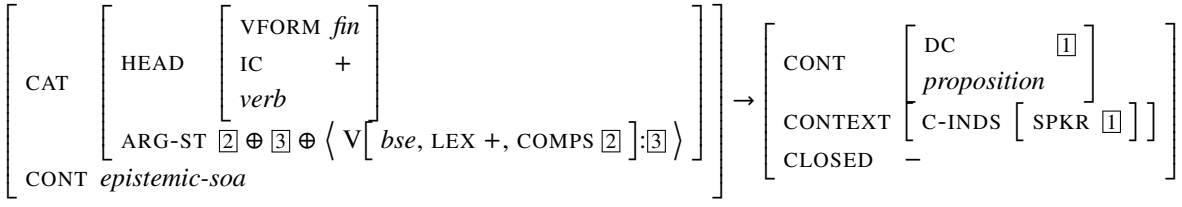

Figure 5: Hierarchy of Salience: Unembedded clauses

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