Epistemic Modal Verbs, Functional Projections and Tense

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1 Introduction

In this talk I am going to summarise some problems concerning the interpretation of Epistemic Modal Verbs (henceforth (E)MVs) and their relation with tense, the semantic properties of the embedded verb and other elements which can affect in some way the verbal complex.
It is a well-known fact that two different temporal orderings may obtain in sentences containing an (E)MV:

- Absolute temporal reference (ATR), i. e. the relation between the time expressed by the MV w. r. t. time of utterance. This relation is more natural in root contexts: in other words, this reference is a direct expression of tense (morphologically marked on the MV), as we can see in the following German examples,

  (1) a. Das Kind **muss** seine Hausaufgabe machen
  The child must do his homeworks
  b. Das Kind **musste** seine Hausaufgabe machen
  c. Das Kind **hat** seine Hausaufgabe machen **müssen**
  d. Das Kind **wird** seine Hausaufgabe machen **müssen**

- Relative temporal reference (RTR), i. e. the relation between the epistemic evaluation and the time of the verbal complement. This relation is more natural in epistemic contexts: for this reason epistemic modality is often referred to as "atemporal", the embedded verb being morphologically marked,

  (2) a. Er **muss** krank sein
  he must be ill

b. Er **muss** krank gewesen sein
he must have been ill

c. **Deve** essere malato

d. **Deve** esser stato malato

It has always been claimed that

- RTR is the most natural ordering in epistemic contexts
- ATR is excluded in epistemic contexts

A true past reading seems therefore impossible and for this reason EMVs are expected to be outside the scope of tense; the hierarchy of functional projections proposed in Cinque (1999) seems to confirm this hypothesis.
Here is (a subset of) the hierarchy (Cinque (2006)),

[Mood (speech act) [Mood (evaluative) [Mood (evidential) **[Mod (epistemic)** [T(Past) [T (future) [Mood (irrealis) [Mod (necessity) [Mod (possibility) [Mod (volitional) [Asp (habitual) [Asp (repetitive(I)) [Asp (frequentative(I)) [Asp (celerative) [T (Anterior) [Asp (terminative) [Asp (continuative) [Asp (perfect) [Asp (retrospective) [Asp (proximative) [Asp (durative) [Asp (generic-progressive) [Asp (prospective) **[Mod (obligation) [Mod (permission/ability) [Asp (completive)** [Voice [Asp (celerative(II)) [Asp (repetitive(II)) [Asp (frequentative(I))

2 Epistemic ATR?

The idea that EMV are outside the scope of tense seems to hold in English. In both (3a) and (3b),

(3) a. John must be ill
b. John must have been ill

the epistemic evaluation time is simultaneous to speech time: it is the reference time of the verbal complement that shows a shift. Simultaneity in the former and anteriority in the latter case. Thus, there seems to be no way to express a real past reading with English EMV.
Forms like, e. g., *could* are either the past of *can* in dynamic contexts (4a) or they are counterfactual rather than epistemic (4b) and (4c),

(4) a. John could win the race
b. John could have won the race
c. She could have been a great dancer!

However, Eide (2003) and Boogaart (2003) – among others – have pointed out that in Norwegian and Dutch respectively, the epistemic evaluation time seems to be *before* the speech time,

(5) a. Han har måtta arbeidd med det i heile natt (Norw. dial.)
He must have been working on it all night long
b. Han har skullet bo i Århus (Dan.) ["misplaced perfect", Vikner(1988)]
He is said to have lived in Århus
c. Hij moest ziek zijn (Dut.)
he must have been ill

How can we account for examples (5)?
Example (6) is the Dutch translation of (4b),

(6) Hij kon de wedstrijd gewonnen hebben

Boogaart claims that it is possible to assign (6) two different epistemic readings: the preterite of the modal either expresses a lower degree of certainty (similar to its English counterpart) or it can be interpreted as a *real past*, i. e. the epistemic evaluation time is situated before the speech time.
Moreover, the preterite of epistemic *moeten* ('must') is intepreted *only* as a "real past",

(7) Hij moest ziek zijn
= it *was* very likely that...

Boogaart suggests that this difference between *kunnen* and *moeten* is to be understood in a (kind of) semantic incompatibility: the non-temporal reading of the past tense (like in (6)) is used to convey a low degree of confidence in what the speaker knows to be true. *Moeten* expresses something necessarily true[1] and for this reason the real past reading is the only possible.
In Italian the imperfect tense of modals can be used in epistemic contexts, but this past form has no real past tense values,

(8) a. Dovevano essere le 5
(it) must-IMPF be 5
b. Devono essere state le 5
(it) must-PRES have been 5

In (8a) the epistemic evaluation is simultaneous with speech time in any case.
Is this a sort of "shift" of the aspectual properties of the embedded verb onto the modal?

[1] I am not sure I follow this line of reasoning: "something necessarily true" seems to me alethic rather than epistemic. Nevertheless, I realise this is – in many cases – just a subtle difference that may play a minor role in Boogaart's analysis.

2.1 ATR and embedded aspect

It has been proposed that these occurences of "epistemic ATR" or, in few words, past EMV are instantiations of the so-called *free indirect speech*: a covert verb of thinking/believing in the (abstract) matrix clause selects for the clause containing the modal.
The MV in the past form is *semantically empty*, since it just copies this covert past tense.
As Boogaarts himself points out, this proposal challenges a unified analysis of the semantics of past tense, and my Italian data also seem to disconfirm it as can be seen in (9c),

(9) a. Maria doveva amare molto i suoi genitori
M. must-IMPF love her parents so much

b. Maria deve aver amato molto i suoi genitori
M. must have loved her parents so much

c. ??Pensavo che Maria doveva/dovesse amare molto i suoi genitori
(I) thought that M. must-IMPF/must-IMPF-CONJ love her parents so much (different meaning)

Thus, as far as Dutch is concerned, it has been proposed that examples like (7) have an intrinsic imperfective aspect, since "they express simultaneity with some indipendently provided time in the past, like the time of a covert intensional predicate" (Boogaart (2003))[2].
If this is true, we could have a (semantic) explanation of why the Italian imperfect is the only past form in which an EMV can surface. At any rate, there is an important difference, as we have already pointed out: even if Italian imperfect is a past tense, it has no real-past connotation in epistemic contexts.
Therefore, I would like to propose that (at least) Italian EMV seem to be "transparent" to the aspectual features of the embedded verb, which must be intrinsically imperfective in order that an epistemic reading obtains, otherwise it must surface in the infinitive perfect form; compare (9a-b) with (10a-b),

(10) a. Gianni doveva partire
G. must-IMPF leave ('G. had to leave') root only

b. Gianni deve essere partito
G. must have left

[2]In fact, according to him, the past interpretation of (7) does not differ from the past tense of root *moeten*,
i) Hij moest op tijd thuis zijn.
He must-PAST be home on time.

German displays a somewhat different pattern: epistemic forms and preterite seem to be mutually exclusive.
For this reason (11b) is odd (ungrammatical for some speakers)

(11) a. Dein Hund muss sehr intelligent gewesen sein
Your dog must have been very intelligent
b. ??Dein Hund musste sehr intelligent sein
Your dog must-PRET be very intelligent

Examples (11) = alethic?
The fact that the aspectual properties of the embedded verb play a crucial role in interpretation seems to be further proved by the so-called "progressive" construction with EMV. Whereas in English (12a) is ambiguous, since the embedded progressive may have a posterior reading (hence the MVs turn out to be performative), the Dutch, German and Italian counterparts are *only* epistemic,

(12) a. He must be leaving
b. Hij moet an het vertrekken zijn
c. % Er muss am Verreisen sein
d. Deve stare partendo
'he must be at the leaving'

3 Root RTR?

As we have seen, the construction [MV_{pres} + Inf. Perf.] gets an epistemic reading more naturally, by virtue of the fact that the Inf. Perf. is interpreted as a past form. If something with a future denotation is added, like a PP or a whole sentence, then the root reading is the only possible,

(13) a. Du bør ha gjort ferdig leksene dine før du går på kino (Standard Norw.)
you should have done finished homeworks yours before you go to the movies
b. Jan moet morgen zijn kamer opgeruimd hebben (Dut.)
John must have cleaned his room (by) tomorrow
c. Gianni deve aver letto l'articolo entro domani
G. must have read the article by tomorrow
d. Hans muss das Buch bis morgen gelesen haben

It is worth remembering that in Afrikaans a construction like [$\text{MV}_{\text{pres/pret}}$ + Inf. Perf.] may get a root reading, even if a future reference point is absent,

(14) a. Ek het alles gedoen, wat ek moes gedoen het [Donaldson (1993)]
I have done everything, that I must-PRET have done

b. Ek moet na die uitstalling gegaan het
I must-PRES have gone to the exibition

Even in Middle High German (and in the late phase of Old High German) the presence of an Inf. Perf. did not trigger an epistemic reading by default,

(15) a. uuánda ér máhti iz firmíten háben (OHG)
denn er hätte es vermeiden können (modern Ger.)

b. Si mæchten einen sterckeren man dar zuo wole erwelt han (MHG)
Sie hätten einen stärkeren Mann dazu erwählt haben (modern Ger.)

Why is it necessary to express this perfective marking on the infinitive?
Going back to the ambiguity in the interpretation of the perfect complement,

(16) a. Jon må ha spist
Jon must have eaten

b. Jon må ha spist før han kommer
Jon must have eaten before he arrives

Eide points out that a possible explanation for this puzzle could be found in a compositional tense system, where "tense elements [...] express dyadic relations of temporal ordering. Each tense element establishes a temporal ordering between two *events* where the speech event S may be one of these events" (Eide (2003)).
I am convinced that Eide's proposal is on the right track, but I would like to add something as far as Italian is concerned.
I have the impression that the feature [+ Perf] plays an important role in a sentence like (17),

(17) Devi aver letto l'articolo {entro domani}, {se vuoi passare l'esame}
(you) must have read the article {by tomorrow}, {if you want to pass your examination}

It seems to me that *aver letto*, 'have read' not only has a future reference point by virtue of the PP, but also suggests that the action must be carried out till its natural end[3] or – in other words – to completion.
For this reason, one of the low aspectual heads in Cinque's hierarchy may play a decisive role, namely $\text{Asp}_{completive}$, the (root) modal being base-generated in $\text{Mod}_{obligation}$.
... [Asp (prospective) [Mod (obligation) [Mod (permission/ability) [Asp (completive) [Voice ...

[3]In this sense it differs minimally with *devi leggere l'articolo entro domani*, '(you) have to read the article by tomorrow'.

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