Epistemic Modals: High ma non troppo*

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1. Introduction

This paper presents arguments against the received view that epistemic modals are universally interpreted in a structural position higher than T (Cinque 1999, Stowell 2004, Hacquard 2006 a.o.). The main fact supporting this received view[1] is that the time of modal evaluation (TME) of epistemics in a number of languages including English seems to always be the time of the context (but see von Fintel and Gillies 2007 for potential counterexamples in English). The analysis of French epistemic modal verbs that I propose falsifies the received view. I show three things: first, French epistemics cannot be generated above T because they bear tense and perfect morphology, and because the time of modal evaluation can (and actually must, for some epistemics) be the reference time (section 2); second, they cannot move past T for interpretation because such a movement leads to scope paradoxes when negation and tense are taken into account (this argument draws on the fact, established for the first time in this paper, that some universal modals are PPIs) (section 3); third, I show in section 4 that epistemic modals are interpreted above Viewpoint-Aspect (whereas root modals are interpreted below it).

2. French Epistemic Modals Are not Base-Generated above T

2.1 Basics

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[1] For reasons of space, I will not discuss another fact invoked by some supporters of the received view, namely the speaker-orientedness of epistemics. Hacquard (2006, 2010) argues that modals are relative to an event of evaluation and have an event variable in their restriction which needs to be bound locally; specifically, epistemics are anchored to the topmost speech event binder and are thus relativized to the speaker and to the speech time. It is true that the evaluator is always the author of the context: but I think that this fact suggests that we need a judge parameter, and that the judge is part of the index (Stephenson 2007). The indexicality of the judge makes the height of the modal potentially irrelevant to the explanation of the so-called speaker-orientedness of epistemics.

TME of epistemics can always be the context time (CT), in particular when the reference time (RT, the argument of T that T orders w.r.t. CT) is past; but TME can also, in that very same situation, be located at RT (cf. section 2.3).

(1) Il pouv$_{epis}$-ait/dev$_{epis}$-ait pleuvoir.
It might-PAST/must-PAST rain
'It is held possible/certain (by me) now that it was raining then.'
Or: 'It was held possible/certain (by me) then that it was raining then.'

The same holds of perfect sentences: TME is either equal to CT or to RT. This difference is neutralized in (2), because CT and RT are both present.

(2) Il a p$_{epis}$-u/d$_{epis}$-û pleuvoir.
It has might-PPART/must-PPART rain
'It is held possible/certain (by me) now that it has rained.'

(3) Il avait p$_{epis}$-u/d$_{epis}$-û pleuvoir.
It had might-PPART/must-PPART rain
'It is held possible/probable (by me) now that it had rained.'
Or: 'It was held possible/certain (by me) then that it had rained.'

The fact that TME can be identical to RT has not been acknowledged by past researchers. For them, RT only determines the time of the eventuality denoted by the complement of the modal; when past-shifting of TME seems to occur, it is analyzed as an artifact of sequence of tense or of free indirect discourse (I will disprove these analyses in due course, cf. section 2.3); it is then argued that the time variable of the modal is locally bound by the topmost binder, out of the scope of RT. But it should be said at the outset that even if it were attested (and perhaps it is in English), obligatory reference to CT would not argue directly in favor of structural height: an analysis in terms of indexicality of TME[2] would predict the same facts without any appeal to relative height.

2.2 Morphology

Base-generating epistemic modals above T can only be done under nonstandard assumptions about head movements. Just like any other verb in French, modals in general and epistemic modals in particular inflect for tense, person and number: there is thus no a priori reason to imagine that they are not subject to V-to-T movement. If one were to pursue the hypothesis that epistemic modals are generated above T, then in the case of simple tenses (1), one would have to assume that the T suffix raises to combine with the verbal stem in a very unusual manner (Stowell 2004). Compound tenses (2)-(3) pose a harder challenge yet: one has to picture a scenario in which the past participle morpheme raises to combine with the modal, crossing the auxiliary *avoir* 'have' and T in violation of the HMC; the auxiliary moves to T (nothing unusual here; however if one is willing to

[2] I argue that the TME argument of epistemics is either an indexical or a bound variable, cf. section 4.

accept that the T suffix exceptionally raises to its complement, this case adds an exception to the exception) and the complex head hence formed moves across the modal (an unmotivated movement) again in violation of the HMC. Since no independent evidence supports this derivation, morphology offers an argument against base-generating French epistemic modals above T.

2.3 Interpretation under T

(4) *(On the day of the utterance D0, the speaker's grandfather asks her why she panicked and stormed out of the house yelling on D-6, when she saw him lying on the floor. The man is 90 years old but the speaker knows at D0 that he has never had any health problem; right after her fit of panic on D-6, the speaker realized that her grandfather was in fact meditating on the floor.)*

Tu	pouv$_{epis}$-ais	très	bien / dev$_{epis}$-ais	sûrement
You	might-PAST	very	well / must-PAST	surely
avoir	eu une	crise	cardiaque.	
have	had a	attack	cardiac	

'It was held very likely/certain (by me) that you had had a heart attack.'

The context of (4) makes it clear that none of the speaker's current doxastic alternatives are worlds in which her grandfather had a heart attack. Therefore the possibility, if it is an epistemic one, must hold at the past RT. And there is every reason to think that it is an epistemic modal: the choice of the predicate embedded under the modal ensures that this is not a metaphysical modal in Condoravdi's (2002) sense (because the eventuality is settled at the time of evaluation); and none of the root interpretations is plausible. Note that the evaluation time in (4) could also be CT: the sentence is ambiguous, because in some other context, in which the possibility of a heart attack has not been ruled out at the utterance time, the sentence could be uttered felicitously. Let's now show that this sentence is a genuine example of past-shifting of TME. Hacquard (2006) discusses a similar example and dismisses it on the grounds that the sentence might contain a silent past tense attitude verb embedding the overt sentence, *je pensais que* 'I thought that'. Under those premises, the past tense observed in (4) need not count from the time of the embedded context: it might be a present in disguise (embedded CT) with a past morphology on the verb as a mere reflex of sequence of tense (SOT). Now there are at least three reasons this proposal does not apply to (4). First, a silent attitude verb or a silent adjunct such as *according to me at the time*[3] cannot be freely inserted, witness (5) (uttered in the same context as (4)), which says without qualification that the addressee did have a heart attack.

(5) #Je t' assure que ~~selon~~ ~~moi~~ ~~à~~ ~~l'~~ ~~époque~~ / ~~je~~ ~~pensais~~ ~~que~~ tu

I	you assure that			according-to	me	at the	time I thought that you
avais	eu	une	crise	cardiaque.			
had	had	a	attack	cardiac			

[3] Although the adjunct *selon moi à l'époque* 'according to me at the time' does not trigger SOT, it can shift the anchoring of the judge and probably of TME as well: this is why I run the test on it too.

'I assure you that you had had a heart attack.'

Second, the SOT analysis for (4) leads to expect that other SOT phenomena triggered by attitude verbs in the past should be possible in the sentence under discussion. (6) contains a past tense embedding attitude verb and two embedded verbs, an epistemic modal and a non-modal verb *arriver* 'arrive'; the morphology on the latter is a reflex of SOT: the eventuality time of the embedded verb is located in the future w.r.t. the eventuality time of the embedding verb so it bears a future-in-the-past morphology.

(6) Je pensais que tu pouv$_{epis}$-ais très bien avoir eu une crise
I thought that you might-PAST very well have had a attack
cardiaque et que l' ambulance n' arrive-r-ait pas
cardiac and that the ambulance NEG arrive-FUT-PAST NEG
à temps.
on time
'I thought that it was very likely that you had had a heart attack and that the ambulance would not arrive on time.'

If a silent attitude verb triggers an SOT construal in (4), one wrongly predicts that by parity of reasoning the future-in-the-past morphology should be licit in (7) too:[4]

(7) *~~Je pensais que~~ tu pouv$_{epis}$-ais très bien avoir eu une crise
I thought that you might-PAST very well have had a attack
cardiaque et ~~que~~ l' ambulance n' arrive-r-ait pas
cardiac and that the ambulance NEG arrive-FUT-PAST NEG
à temps.
on time
'I thought that it was very likely that you had had a heart attack and that the ambulance would not arrive on time.'

If a silent attitude is unable to trigger an SOT construal in (7), I can see no reason why it should be able to do so in (4). Third, SOT is not mandatory with embedded epistemic modals in French: in (8), TME is located six days prior to the utterance time, while the eventuality time of the verb *expliquer* 'explain' is located five days later (at the time of the conversation the speaker no longer entertains the hypothesis of a heart attack).

(8) *(On day D-1, the day before the day of the utterance D0, the speaker's mother asked her why she panicked and stormed out of the house yelling on D-6, when she saw her grandfather lying on the floor. The man is 90 years old but the speaker knows at D-1 that he has never had any health problem; right after her fit of panic on D-6, the speaker realized that her grandfather was in fact meditating on the floor.)*
Hier j' ai expliqué à ma mère que mon grand-père

[4] The future-in-the-past morphology can actually be found in matrix contexts in so-called free indirect discourse. But (4) is not an example thereof, cf. the discussion of (10) below.

Yesterday I have explained to my mother that my grandfather
pouv$_{epis}$-ait très bien avoir eu une crise cardiaque.
might-PAST very well have had a attack cardiac
'Yesterday I explained to my mother that it was very likely that my grandfather had had a heart attack.'

Lastly, another alternative analysis of the *imparfait* in (4) should be dismissed, namely an analysis of the past tense as counting from a non-actual speech time, as is the case with so-called 'free indirect discourse'. The *imparfait* morphology is typically used in novels to report the thoughts of a character; the fact that the sentence under scrutiny is used in the context of a conversation and is addressed to an actual person (hence is in direct discourse) is incompatible with this analysis. Indexicals provide a vivid illustration of this incompatibility: a characteristic property of free indirect discourse is that it allows shifted temporal indexicals, i.e. indexicals which are evaluated with respect to a non-actual speech act as shown in (9) with the adverb *aujourd'hui* 'today'. However in (10), the adverb must be interpreted w.r.t. the actual speech act and as a result modifies a past-shifted sentence, giving rise to a temporal clash.

(9) Julien était anxieux: aujourd'hui, il allait demander une
Julien be-PAST nervous today he go-PAST ask an
augmentation.
raise
'Julien was nervous: today he would ask for a pay raise.'

(10) #Tu pouv$_{epis}$-ais très bien avoir eu une crise cardiaque.
You might-PAST very well have had a attack cardiac
Aujourd'hui j' allais peut-être perdre mon parent le plus cher.
Today I go-PAST maybe lose my parent the most dear
Intended: 'It was very likely that you had had a heart attack. On that day I was perhaps going to lose my dearest relative.'

To sum up, TME can coincide with RT (4) (or with CT). How is this identity achieved? Is TME pragmatically determined to be identical to a contextually salient time, or is the identity achieved through some syntactically implemented relation (e.g. binding)? The following example, where the (present) RT is clearly distinct from a pragmatically salient past time, militates in favor of the latter hypothesis: TME cannot be set to equate a contextually salient past time at which some relevant epistemic state was held, e.g. the speaker's childhood. The only (odd) interpretation of (11) is one in which the speaker currently entertains the possibility that the addressee is already dead.

(11) *(The speaker is talking about his childhood in the 1980's: when he was a child, he thought that there was a very good chance the addressee would die in 2000. The sentence is uttered in 2010; at the utterance time, the speaker is well aware that the addressee is alive.)*
#Tu peux$_{epis}$ très bien être (déjà) mort.
You might-PRES very well be already dead

'You might very well be (already) dead.'

2.4 Obligatory Interpretation under T

The epistemic modal *pouvoir* can be preceded by the morpheme *se* (while *devoir* cannot): it then takes an expletive grammatical subject, its complement is a tensed CP, and its TME *has to* be RT, a fact which is clearly at odds with the received view:[5]

(12) Il se pouv$_{epis}$-ait qu' elle soit enceinte, #mais je
It REFL might-PAST that she be-SUBJ pregnant, but I
n' avais aucun doute qu' elle ne l' était pas.
NEG had no doubt that she NEG it was NEG
'It was held possible (by me) that she was pregnant, but I had no doubt that she wasn't.'

2.5 Summary

French epistemic modals cannot be base-generated above T, for morphological and interpretive reasons. But one could still argue that they *move* past T for interpretation. It is immediately clear that there is no clear motivation for this movement, since interpretation under T is always possible (4) and sometimes required (12). The following section shows that the movement hypothesis (i.e. epistemics take *syntactic* scope over T through movement) leads to scope paradoxes.

3. Lessons Learned from Negation

3.1 Scope Paradox I: Existential Epistemics Never Outscope Negation

My argument against movement relies on the relation of *semantic* scope (notated '$x > y$') between modals, tense and negation: I show that the semantic wide scope that epistemic modals seem to have over T (when TME doesn't coincide with RT) cannot correspond to *syntactic* scope. The reason is that this leads to scope paradoxes (under the premise that syntactic scope is a transitive relation). First, *pouvoir*$_{epis}$ always scopes under negation:

(13) Marc ne peut$_{epis}$ pas être le coupable.
Marc NEG might-PRES NEG be the culprit
'Marc can't be the culprit.' (NEG > POUVOIR$_{epis}$;*POUVOIR$_{epis}$ > NEG)

Deontic modals always scope under tense (TME is always RT or PTS):

(14) Marc pouv$_{deon}$-ait/dev$_{deon}$-ait courir.
Marc can-PAST/must-PAST jog
'Marc was allowed/had to jog.' (T > MODAL$_{deon}$; *MODAL$_{deon}$ > T)

[5] These observations are new, to the best of my knowledge; also unnoticed is the fourth peculiarity of *se pouvoir*, namely its utter ungrammaticality in the *passé composé* and the *plus-que-parfait,* a fact which is reminiscent of the oddity of Italian epistemic modals in compound tenses.

(15) Marc ne doit$_{deon}$ pas parler à Léa.
Marc NEG must-PRES NEG talk to Léa
'Marc mustn't talk to Léa.' (DEVOIR$_{deon}$ > NEG)
Or: 'Marc doesn't have to talk to Léa.' (NEG > DEVOIR$_{deon}$)

(16) Marc ne peut$_{deon}$ pas parler à Léa.
Marc NEG can-PRES NEG talk to Léa
'Marc can't talk to Léa.' (NEG > POUVOIR$_{deon}$; *POUVOIR$_{deon}$ > NEG)

To sum up, we have: > = {⟨POUVOIR$_{epis}$, T⟩, ⟨NEG, POUVOIR$_{epis}$⟩, ⟨T, MODAL$_{deon}$⟩, ⟨DEVOIR$_{deon}$, NEG⟩, ⟨NEG, DEVOIR$_{deon}$⟩, ⟨NEG, POUVOIR$_{deon}$⟩, …}. We're interested here in the alleged *syntactic* wide scope of epistemic *pouvoir* over T. When deontic *devoir* 'must' takes wide scope over negation, it is in fact structurally higher than negation: it takes *syntactic* scope over it. This is shown in (17), where the indefinite subject scopes under the modal and above negation (either by reconstruction under the modal or by covert movement of the modal past both the indefinite and negation).

(17) *(Context: the rules of this bowling game state that exactly one pin must remain standing, no matter which one. . .)*
Exactement une de ces quilles ne doit$_{deon}$ pas être renversée.[6]
Exactly one of those pins NEG must-PRES NEG be knocked.down
'Exactly one of those pins mustn't be knocked down.' (DEVOIR$_{deon}$ > EXACTLY-ONE > NEG)

Note that even though deontic *devoir* scopes over negation (both semantically and syntactically), it is linearized after the negative marker *ne* and before the negative marker *pas*. As a matter of fact, sentential negation (when the clause is tensed) is always realized this way: *ne* cliticizes on T, and *pas* appears after the first verbal element (which can be an auxiliary or a lexical verb). So deontic *devoir* can take syntactic scope over negation when linearized between *ne* and *pas*; this is a key observation, because by parity of reasoning if (i.) syntactic scope is transitive (and it certainly is), (ii.) the apparent wide scope of *pouvoir*$_{epis}$ over T corresponds to *syntactic* scope (i.e. c-command) as is generally claimed, and (iii.) T takes syntactic scope over *devoir*$_{deon}$ (this is not questionable) which itself can take *syntactic* scope over negation, then epistemic *pouvoir*$_{epis}$ is predicted to be able to outscope negation in (18) (it appears in the exact same frame as *devoir*$_{deon}$ in (15) and (17)). This prediction, however, is not borne out:

(18) Marc ne peut$_{epis}$ pas être le coupable.
Marc NEG might-PRES NEG be the culprit
'Marc can't be the culprit.' (*POUVOIR$_{epis}$ > NEG)

[6] The facts are the same in English. I choose a non-motonic quantifier because I want to ensure that all the components of the subject DP are in the scope of the modal, and the scope of non-monotonic quantifiers is notoriously hard to explain in terms of split scope and choice functions (Abels & Marti 2009).

3.2 Scope Paradox II: Some Modals are PPIs but Do not Outscope T

Although the main topic of this paper is French epistemic modals, it presents an interesting finding about root modals: a number of universal root modals[7] are Positive Polarity Items (this paper is the first to substantiate this claim and to provide evidence for it; the claim is made independently by Iatridou & Zeijlstra 2009). This fact places additional constraints on the scope of epistemic modals, due to the transitivity of syntactic scope. The demonstration is about English deontic *must* (but is also valid for *should*, *ought to* and *supposed to*) rather than French $devoir_{deon}$, which is a PPI too (I will show it shortly); the argument is much harder to make about $devoir_{deon}$ because a narrow scope reading of the modal w.r.t. negation is always available (a fact that I attribute to homophony between a PPI and a non-PPI *devoir*).

While it is generally claimed that *must* always outscopes clausemate anti-additive (AA) operators (negation and negative DPs in particular), there are many environments in which it is interpreted in the scope of a clausemate AA operator, and this behavior is typical of a PPI of the *some* type. Observe (19): *some* is not licit in the scope of a clausemate negation, but if the quantifier *always* takes intermediate scope between the two elements, a narrow scope reading of the indefinite is possible (it is 'rescued' cf. Szabolcsi 2004). Although it lacks an object narrow scope reading, (19a) is grammatical under a wide scope reading of the indefinite. This is, I submit, because *some* can move covertly past negation, unlike other PPIs like *would rather* (**John wouldn't rather leave*). I propose to label this behavior 'escaping'.

(19) a. John didn't call someone. SOME > NEG; *NEG > SOME
b. John doesn't always call someone. NEG > ALWAYS > SOME

Similarly, *must* can be rescued (=interpreted under negation) in (20b), thanks to the intervention of *always*:

(20) a. Fun $must_{deon}$n't be expensive. $MUST_{deon}$ > NEG; *NEG > $MUST_{deon}$
b. *(Found in a booklet advertising cheap cruises).* Fun $must_{deon}$n't always be expensive. NEG > ALWAYS > $MUST_{deon}$

This means that *must* is generated under negation, and that in the absence of a rescuer, it has no option but to escape past the offending AA operator as (20a) indicates (we know that when French *devoir* outscopes negation, it is interpreted in a structurally high position cf. (17); the facts are identical with *must* in the English counterpart of (17)). So *must* can escape, and I submit that the movement involved is QR. The intervention of *always* in (19b)-(20b) is one among the many ways a PPI can be *rescued*. In the following pairs, *some* and *must* march lockstep, suggesting that *must* is indeed a PPI: they can both be interpreted under a clausemate AA operator if some third party comes to their

[7] Epistemic modals which outscope negation, i.e. *might*, epistemic *must* and French epistemic *devoir* might be PPIs too, but the fact is not easy to establish (in particular due to Epistemic Containment).

rescue, *viz* an intervening universal quantifier (21)-(22) (in (21b), the universal quantifier needs to reconstruct under negation to rescue the PPI), a superordinate negation (23), or if both the AA operator and the PPI are in the antecedent of a conditional (24), in the restrictor of *every* (25), in the prejacent of *only* (26), in the scope of *few* (27), or embedded under *regret* (28).

(21) a. John didn't show every boy something. NEG > EVERY > SOME
b. Everything must$_{deon}$n't be expensive to be worthwhile. NEG > EVERY > MUST$_{deon}$

(22) a. A student doesn't necessarily have something interesting to say.
NEG > NECESSARILY > SOME
b. A student's mistakes must$_{deon}$n't necessarily be hurled on the shoulders of his teachers. NEG > NECESSARILY > MUST$_{deon}$

(23) a. I'm not sure John hasn't seen something. NEG > NEG > SOME
b. *(Speaking about a five-year-old boy, whose parents are very demanding.)*
—This poor kid does so many chores: he must$_{deon}$ empty the dishwasher, feed the dog, clean his bedroom, make his bed…
—Yes, you're right, and I'm not sure he must$_{deon}$n't rake the leaves too.
NEG > NEG > MUST$_{deon}$

(24) a. If I don't find something interesting to read by tomorrow, I will watch TV instead. IF > NEG > SOME
b. If I must$_{deon}$n't read this very long book by tomorrow, I will watch TV instead. IF > NOT > MUST$_{deon}$

(25) a. Every boy who doesn't find something interesting to read will watch TV instead. EVERY > NEG > SOME
b. Every boy who must$_{deon}$n't read this very long book will watch TV instead. EVERY > NEG > MUST$_{deon}$

(26) a. Only John didn't call someone. ONLY > NEG > SOME
b. Only John must$_{deon}$n't read this very long book. ONLY > NEG > MUST$_{deon}$

(27) a. Few boys didn't call someone. FEW > NEG > SOME
b. Few boys must$_{deon}$n't read this very long book. FEW > NEG > MUST$_{deon}$

(28) a. I regret that John didn't read something interesting. REGRET > NEG > SOME
b. I regret that John must$_{deon}$n't read this very long book. REGRET > NEG > MUST$_{deon}$

Lastly, both *some* and *must* can be interpreted under a superordinate negation (note that escaping is not an option due to the boundedness of QR):

(29) a. The doctor doesn't think Peter saw someone. NEG > SOME

b. The doctor doesn't think Peter must$_{deon}$ jog. NEG > MUST; *MUST > NEG

I will not attempt to spell out the conditions under which PPIs are anti-licensed (see Szabolcsi 2004 for a theory); instead I will content myself with highlighting the striking similarities between *must* and a well established PPI, namely *some*. The data presented here support the claim that *must* is base-generated under its clausemate negation, and can be either interpreted in its scope under some strict conditions (=rescuing) or moved past it if those conditions are not met (=escaping). At this stage, it is important to dismiss two possible alternative explanations of the data presented here. Examining (20b), one might propose that *must* is in fact generated above negation and that negation forms with the contiguous adverb *always* a constituent which can move covertly past the modal; however this solution won't apply to (21b), in which *every* and negation are not contiguous. Alternatively, one might be willing to grant that *must* is generated below negation but suggest that the narrow scope interpretation of negation is the outcome of the computation of the truth-conditional meaning of the sentence together with a *homogeneity* presupposition attached to the predicate (the presupposition that the predicate either holds of its complement p or its negation ¬p): this is the standard analysis of neg-raisers e.g. *want* and *think* (Gajewski 2005). Granted, neg-raising is optional under double negation (parallel to (23b)). However (i.) neg-raising is possible with an extra-clausal negation whereas *must* cannot outscope negation in such a configuration (29b); (ii.) intervening quantifiers don't block neg-raising but they can block a narrow scope interpretation of negation under *must* (21b); (iii.) the analysis cannot derive the meaning MUST > EXACTLY-ONE > NEG of (30) (even with reconstruction of the subject DP under *must*) but derives an unattested one instead:

(30) Exactly one pin mustn't be knocked down.
i. Assertion: It's not the case that it is required that exactly one pin is knocked down.
ii. Hypothetical presupposition: It is required that exactly one pin is knocked down or that a number of pins n≠1 is knocked down.
iii. Predicted meaning (combining i. and ii.): It is required that a number of pins n≠1 is knocked down.

Back to French now. I explained earlier that a narrow scope reading of *devoir* w.r.t. negation is always available so that the above tests, although they apply equally well in French, are not in general conclusive. However there are some cases of obligatory narrow scope reading of the modal in French, namely the intervention cases.[8] When the adverb *souvent* 'often' (which is a PPI rescuer) scopes under a clausemate negation, the modal has lowest scope, as shown in (31):

(31) Jean ne doit$_{deon}$ pas souvent m' aider.
Jean NEG must-PRES NEG often me help
'Jean is not often required to help me.'

[8] This suggests that escaping is forbidden when the environment of the PPI relevant for the computation of its anti-licensing conditions is not AA.

Or (marked): 'Jean is required to not help me often.'

The second (marked) reading obtains, I submit, when *souvent* is in the infinitival complement (hence doesn't intervene) and is fronted within it (which is always marked). If this option is barred (e.g. by right-dislocation), the only reading is the predicted one:

(32) Jean ne le doit$_{deon}$ pas souvent, m' aider.
Jean NEG it must-PRES NEG often, me help
'Jean is not often required to help me.' (only reading)

Now that we've established that there is a deontic *devoir* which is a PPI, and that it QRs to escape from the scope of a clausemate AA operator (unless it is rescued), we can reexamine the hypothesis that epistemic modals move past T for interpretation. Epistemic *pouvoir* always scopes under negation, therefore if it takes syntactic scope above T, there has to be a negation above T as well (by transitivity of syntactic scope). If so, we make a prediction: when this high negation is merged, the PPI deontic *devoir* raises past it (='escaping' of the PPI), and can therefore, just like epistemic modals, be interpreted above T. The claim that epistemics can move past T for interpretation wrongly predicts that the TME of negated *devoir*$_{deon}$ can be present when RT is past:

(33) *(Context: A popular revolution has taken place in this country recently. Having been rich under the former regime is now considered a crime. From now on…)*
#On ne dev$_{deon}$-ait pas être riche sous l' ancien régime.
One NEG must-PAST NEG be rich under the former regime
'It is not allowed to have been rich under the former regime.'

4. Proposal

Let's review the facts that any analysis of French modals should account for. Epistemic modals show tense (and perfect) morphology, and their modal evaluation time, although it can always be the time of the context, can also be the reference time, argument of T. The anaphoric relation between TME and RT is a binding one. These reasons militate against generating epistemic modals above T. Furthermore, our exploration of the scope relations of tense, negation and modals shows that the hypothesis that they can move past T leads to two scope paradoxes: it wrongly predicts that existential epistemic modals can be interpreted above negation, and that *devoir*$_{deon}$, since it is a PPI, can be interpreted above T when it QRs above a high negation.

So I propose that epistemic modals are generated and interpreted under T. But how low are they in the structure? To determine this, I spell out my assumptions about the temporo-aspectual architecture of the clause (here I follow Pancheva & von Stechow 2003 with slight modifications). A sentence in the perfect comprises among other elements a PerfectP (whose head is realized as the auxiliary), a PastParticipleP (whose head is semantically vacuous but has a morphological spell-out), and an AspectP. The head of AspectP is a Viewpoint-Aspect operator, i.e. a quantifier over events which locates the runtime of an eventuality w.r.t. an evaluation interval; it is always perfective

(Pfv) in the compound tenses *passé composé* and *plus que parfait;* as such it locates the eventuality time within the Perfect Time Span (PTS) introduced by PERFECT. A sentence in the *imparfait* has the imperfective Aspect composing directly with T; imperfective locates RT within the eventuality time.

(34) a. [$_{TP}$ T [$_{PerfectP}$ Perfect [$_{PPartP}$ PPart [$_{AspectP}$ Pfv [$_{vP}$ Aktionsart]]]]]
b. [$_{TP}$ T [$_{AspectP}$ Impfv [$_{vP}$ Aktionsart]]]

(35) $[\![\text{PRES}]\!]^{c,s,j} = \lambda p_{it}.\lambda t_i[t=t_c \ \& \ p(t)]$ where t_c is the time of the context
$[\![\text{PAST}]\!]^{c,s,j} = \lambda p_{it}.\lambda t_i[t<t_c \ \& \ p(t)]$ where t_c is the time of the context
$[\![\text{PERFECT}]\!]^{c,s,j} = \lambda p_{it}.\lambda t_i.\exists t'_i[t' \preceq t \ \& \ p(t')]$ where t' is the PTS
$[\![\text{PFV}]\!]^{c,s,j} = \lambda P_{vt}.\lambda t_i.\exists e_v[\tau(e) \subseteq t \ \& \ P(e)]$
$[\![\text{IMPFV}]\!]^{c,s,j} = \lambda P_{vt}.\lambda t_i.\exists e_v[t \subseteq \tau(e) \ \& \ P(e)]$
$[\![\text{vP}]\!]^{c,s,j} = \lambda e_v.P(e)$

Epistemic modals take a proposition, a world and two time arguments, the first of which is the time of modal evaluation.

(36) $[\![\text{devoir}_{epis}]\!]^{c,s,j} = \lambda Q_{sit}.\lambda w_s.\lambda t'_i.\lambda t_i.\ \forall w' \in \text{Acc}_j(w)(t')\ Q(w')(t)$

It appears that epistemic modals should not be interpreted below Aspect (Pfv or Impfv) for at least two reasons (whereas root modals are interpreted below Aspect, cf. Homer 2010). First, Pfv imposes selectional restrictions on its complement: the predicate of eventualities it selects must be bounded. However it can compose with a stative predicate e.g. *coûter* 'cost', if it is coerced, i.e. turned into a bounded predicate by some operator. One of those coercion operators gives rise to a 'supervenient' interpretation, illustrated in (37): the sentence asserts that the house was worth €100,000 *and* that it was bought for that price (the buying event supervenes on the property).

(37) La maison a coût-é 100 000 €.
The house has cost-PPART €100,000
'The house was bought for €100,000.'

Epistemic modals, unlike root modals (Homer 2010) do not disrupt this phenomenon of coercion (38).

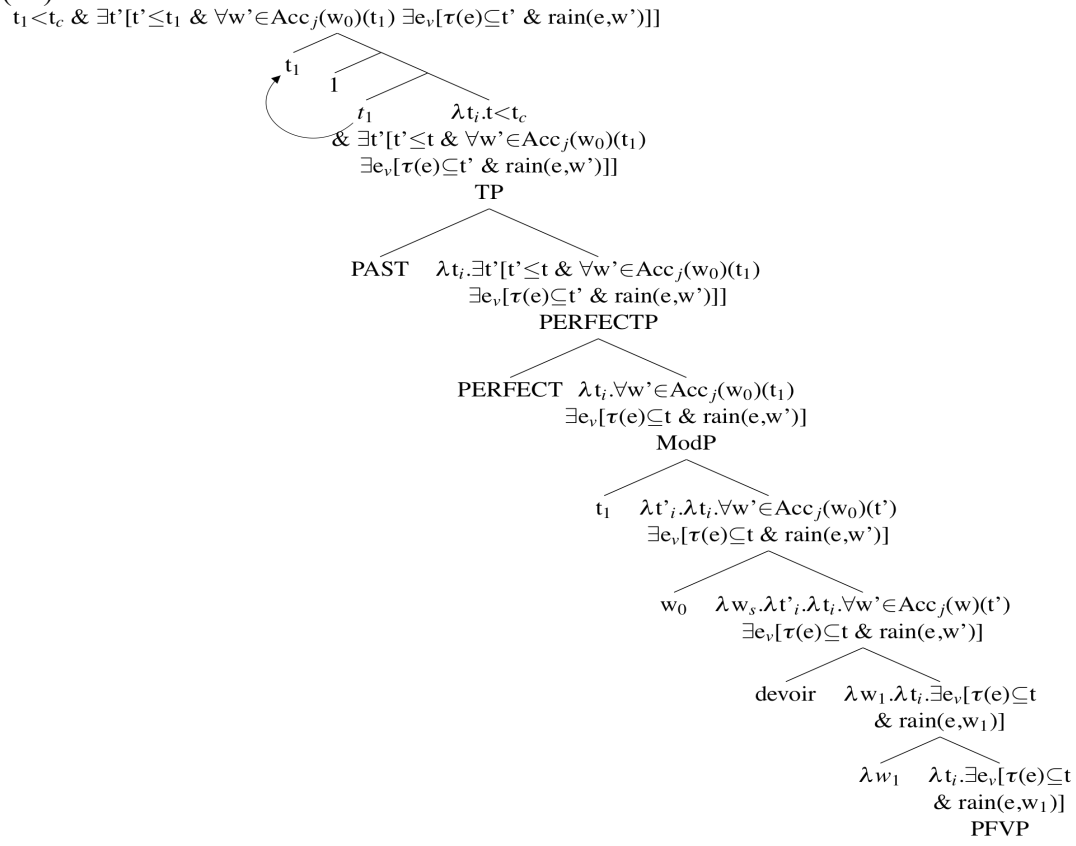
(38) La maison a d_{epis}-û coûter 100 000 €.
The house has must-PPART cost €100,000.
'The house must have been bought for €100,000.'

Second, if epistemics had a type that allowed them to be interpreted below Aspect, what Aspect would situate w.r.t. PTS or RT would be the epistemic possibility/necessity itself,[9] instead of the runtimes of the eventualities in the denotation

[9] This is precisely what happens with root modals: the possibility/necessity is be located in PTS (*Il a dû partir* 'he has had to leave') or spans RT (*Il devait partir* 'he was required to leave').

of the complement of the modal (contrary to what we observe). Thus it seems desirable to interpret epistemic modals above Viewpoint-Aspect. But is this compatible with morphology? Yes it is, provided that epistemics are not interpreted higher than PPart. This is because they bear the past participle morphology, which importantly is not a spell-out of the perfective: past participles are also used to form passives, which are not perfective per se (*Il est emmené à l'hôpital* 'he's being taken to the hospital'). Likewise, the *imparfait* morphology marks past, not imperfective (the difference between *Il av-ait plu* 'it had rained' and *il a-∅ plu* 'it has rained' is that RT is past in the former and present in the latter). The TME argument is either an indexical (because it can always refer to CT[10]) or a variable bound by RT, as illustrated in the following partial tree for the sentence *Il avait dû pleuvoir* 'It was held certain (by me) then that it had rained'.

(39)



5. Conclusion

This paper shows that French epistemic modals can neither be base-generated nor interpreted above T, and therefore challenges the claim that epistemic modals universally occupy a high structural position at LF. It also makes an important claim (which it substantiates for the first time) about modals: some of them, e.g. deontic *must* and *devoir,* are PPIs. It seems that all languages have at least one modal (typically a universal root

[10] Some languages, in particular English, might only feature this first option.

modal) which outscopes negation; further research will show whether these are PPIs too. This finding has far-reaching theoretical consequences and puts new questions on the agenda. Among them, why are modals sensitive to polarity (we know that *need* and epistemic *can* are NPIs)? Is there a connection between quantificational force of an item and its polarity sensitivity (positive vs. negative)? PPI modals also offer new insights on scope shifting operations: to name one, 'escaping' seems to be blocked when made unnecessary (=when the PPI is rescued), although it would have a semantic effect if it took place (and would hence be allowed according to standard assumptions about movement, in particular Fox's Scope Economy Principle).

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