

Epistemic Modals: High, ma non troppo

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NELS 40, MIT, Boston. November 13-15, 2009

- It looks like epistemic modals can be interpreted above T (Butler 2002, Stowell 2004, Hacquard 2006, Zagana 2009 a.o.).
- The so-called speaker-orientedness of epistemic modals has been used to argue that they have **syntactic** scope over T.
- For example Hacquard (2006) assumes that epistemic modals are relative to the speech event (and hence the speaker and the speech time).

- (1) *Marc doit_{epis} être le coupable, mais il/#je est/suis*
Marc must-PRES be the culprit, but he/I is/am
convaincu que ce n' est pas lui.
convinced that it NEG is NEG him
'Marc must be the culprit, but he/I is/am convinced that it's not him.'

- The time of modal evaluation can be present even when the matrix tense is past.
- (2) (John was an employee at Enron; he sold his stock of the company two days before it collapsed; I didn't know about the real situation of Enron until it went bankrupt.)
John had to know the catastrophic financial situation of Enron.
- (3) (Same context.) (*French*)
John devait_{epis} connaître la situation financière
John must-IMPF know the situation financial
catastrophique de la compagnie.
catastrophic of the company
'John had to know the catastrophic financial situation of Enron.'

Questions

- Are epistemic modals base-generated above Tense?
- Do they have syntactic scope over Tense?

▶ To both questions, I am going to answer **no**. ◀

Proposal

Epistemic modals are not base-generated and they don't have syntactic scope over T...

- Morphological facts;
- Epistemic modals can be interpreted below T;
- Paradoxes of wide scope.

...so I propose that

- Epistemic modals are generated and interpreted under Tense (and Perfect) and above Viewpoint-Aspect.

Roadmap

- I. **Against Base-generation above T** ◀
 - i. Morphology
 - ii. Interpretation below T
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Part I: Against Base-generation above T

No Base-generation above T: Morphology

- Morphological facts are incompatible with base-generation above T (*pace* Stowell 2004, Hacquard 2006).
 - If epistemic modals were generated above Tense, their complement should receive Tense morphology (but it doesn't):
- (4)
- a. John certainly is in the kitchen.
 - b. *John **must** is in the kitchen.
 - c. John **must** be in the kitchen.

No Base-generation above T: Morphology

- Morphological facts are incompatible with base-generation above T (*pace* Stowell 2004, Hacquard 2006).
- In French, the Tense morphology is realized on the modal itself:

(5) (I wonder why the ground is wet. . .)

Il a pu/dû pleuvoir.

It has can/must_{epis}-PPART rain

'It might/must have rained.'

(6) (Looking at a picture that was taken before I was born; I wonder why everybody in the picture is soaked. . .)

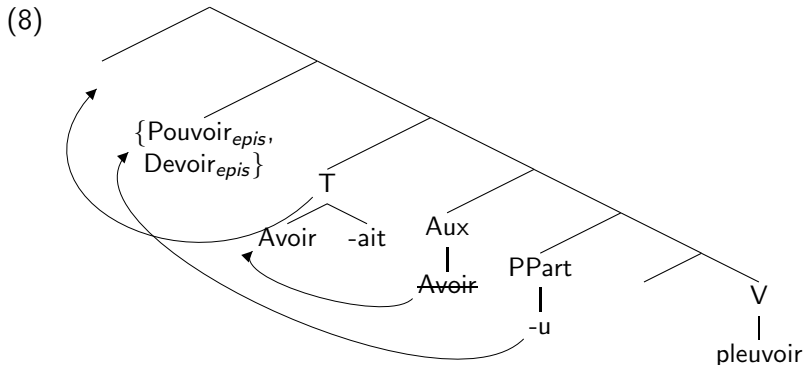
Il avait pu/dû pleuvoir.

It had can/must_{epis}-PPART rain

'It is possible/probable that it had rained.'

- (7) Il avait pu/dû pleuvoir.
'It is possible/probable that it had rained.'

- The derivation should involve uncommon and unmotivated head movements.



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No Base-generation above T: Interpretation below T

- (9) (Context: My grandfather asks me why I panicked and stormed out of the house yelling last Monday when I saw him lying on the floor. He's 90 years old but to this day has never had any health problem.)

Tu pouvais_{epis} très bien avoir eu une crise cardiaque,
You can-IMPF very well have had a stroke cardiac,
donc j' ai eu peur.

so I have had fear

'It was very possible that you had had a heart attack, so I got scared.'

- The eventuality *'have had a heart attack'* rules out a metaphysical (Condoravdi 2001) or a circumstantial reading of the modal.
- Sentence (9) is not in free indirect discourse (*pace* Boogaart 2005), because temporal indexicals are not shiftable.

(10) #*Tu pouvais_{epis} très bien avoir eu une crise cardiaque,*
You can-IMPF very well have had a stroke cardiac,
alors qu' hier encore tu étais en parfaite santé.
whereas yesterday still you were in perfect health
'It was very possible that you had had a heart attack,
while you were perfectly well the day before.'

- An idea (Hacquard 2006): there is a hidden attitude verb in (9) such as '*Je pensais que...*' ('*I thought that...*') and the past tense (*Imparfait*) is a fake one (sequence of tense).
- If this is correct, we should observe other kinds of sequence of tense (future-in-the-past) (11).

- (11) *Je pensais que tu pouvais avoir eu une crise*
 I thought that you can_{epis}-IMPF have had a stroke
cardiaque et que l' ambulance n' arrive-r-ait
 cardiac and that the ambulance NEG arrive-FUT-PAST
pas à temps.
 NEG on time
 '*I thought it was possible that you had had a heart attack*
and the ambulance would not arrive on time.'

- But future-in-the-past is impossible in this context (12).

(12) #*Tu pouvais_{epis} très bien avoir eu une crise cardiaque,*
You can-IMPF very well have had a stroke cardiac,
et l' ambulance n' arrive-r-ait pas à temps.
and the ambulance NEG arrive-FUT-PAST NEG on time
'It was very possible that you had had a heart attack and
the ambulance would not arrive on time.'

- Sentence (9) doesn't contain a silent adjunct '*according to me at the time*', which should rescue (13) in the context, contrary to fact.

(13) (Same context as (9).)

#Je t' assure que ~~selon~~ moi à l' époque tu
I you assure that according-to me at the time you
avais eu une crise cardiaque.
had had a stroke cardiac
'I assure you that you had had a heart attack.'

- The time of modal evaluation can be bound by matrix Tense, and is not contextually determined.

(14) (I'm talking about my childhood: when I was a child, I thought that it was possible that you die in 2000.)

#*Tu peux_{epis} très bien être déjà mort.*

You can-PRES very well be already dead

'You might very well be already dead.'

- Conclusion: epistemic modals are sometimes interpreted in a position below Tense, so they cannot be generated above it.

No Base-generation above T: Interpretation below T

- There is an epistemic modal in French whose evaluation time is **obligatorily** fixed by matrix T, namely se *pouvoir*.

(15) *Il se pouvait_{epis} qu' elle soit enceinte, #mais je*
It REFL can-IMPF 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 possible that she was pregnant, but I had no doubt
that she wasn't.'

Can Epistemic Modals Be Interpreted above T?

- Interim conclusion: Epistemic modals are base-generated below T.
- Now, this means, if one wants to maintain that they are (sometimes) interpreted above T, that they move at LF into this position across T (and, as far as $\text{devoir}_{\text{epis}}$ is concerned, across a high negation).
- Let's assume this hypothesis is correct. Is the picture that we get coherent?

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Part II: No Movement past T

Pairwise Scope Relations

- $x > y$ means 'x is interpreted as having scope over y'.

(16) *Marc ne doit pas être le coupable.*
 Marc NEG must_{epis} NEG be the culprit
 'Marc must not be the culprit.' devoir_{epis} > NEG

(17) *Marc ne peut_{epis} pas être le coupable.*
 Marc NEG can-PRES NEG be the culprit
 'Marc can't be the culprit.' NEG > pouvoir_{epis}

(18) *Marc pouvait/devait_{epis} être fatigué.*
 Marc can/must-IMPF be tired
 'Marc might/must have been tired.' Modal_{epis} > T

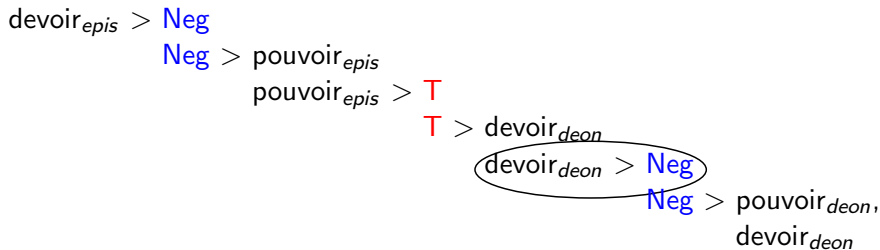
Caveat: I'm going to say that this scope is not syntactic.

Pairwise Scope Relations

- (19) *Marc pouvait/devait_{deon} fumer.*
 Marc can/must-IMPF smoke
 'Marc was allowed/had to smoke.' Not: 'Marc is allowed/required to have smoked.'
 $T > \text{pouvoir/devoir}_{deon}$
- (20) *Marc ne doit_{deon} pas parler à Léa.*
 Marc NEG must-PRES NEG talk to Léa
 'Marc mustn't talk to Léa.' $\text{devoir}_{deon} > \text{NEG}$
 Or: 'M. doesn't have to talk to L.' $\text{NEG} > \text{devoir}_{deon}$
- (21) *Marc ne peut_{deon} pas parler à Léa.*
 Marc NEG can-PRES NEG talk to Léa
 'Marc can't talk to Léa.' $\text{NEG} > \text{pouvoir}_{deon}$

Pairwise Scope Relations

- Let's put these ordered pairs together.



Pairwise Scope Relations

Taking stock:

- Devoir_{deon} can take scope below negation, and above it (which is crucial).
- Devoir_{deon} is always interpreted below Tense.
- If epistemic modals can be interpreted above T and if syntactic scope is transitive, we need **two negations**, one above and one below T, which have the same realization, i.e. *ne... T... pas*.

- Question: is the wide scope of epistemic modals **syntactic?**
- When devoir_{deon} is interpreted above Neg, it takes **syntactic scope** over Neg (see Appendix).

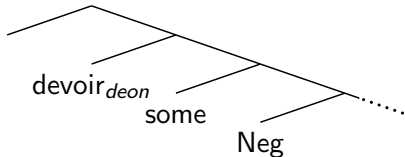
(22) (Context: the rules of this card game state that in order to end the game. . .)

Un joueur ne doit_{deon} plus avoir de cartes.

A player NEG must anymore have of cards

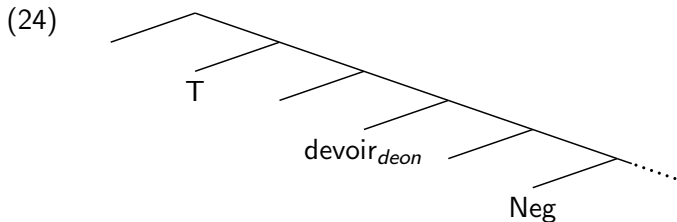
'Some player must not have any cards left.'

$\text{devoir}_{deon} > \text{SOME} > \text{NEG}$

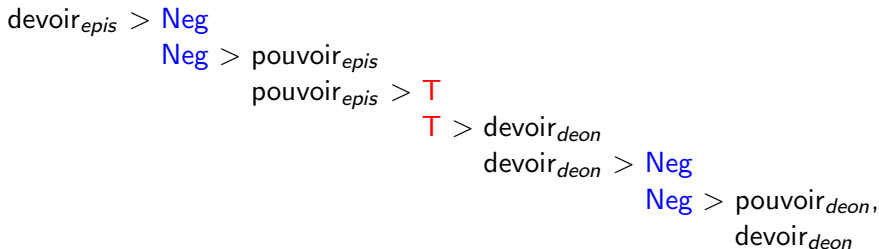


• So we have:

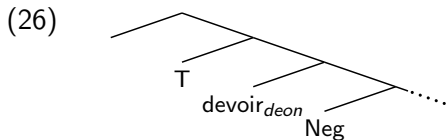
(23) Marc **ne** doit_{deon} **pas** parler à Léa. (Marc mustn't talk to Léa.)



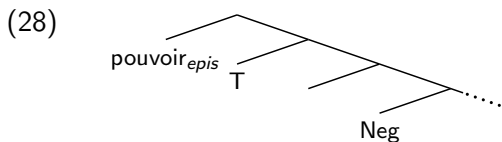
- Remember the scope relations:



(25) Marc **ne** doit_{deon} **pas** parler à Léa. (Marc mustn't talk to Léa.)



(27) Marc **ne** peut_{epis} **pas** être le coupable. (Marc can't be the culprit.)



- The negative marker *ne* can be linearized before $\text{devoir}_{\text{deon}}$ ('*Marc ne doit pas. . .*', (20)), even when $\text{devoir}_{\text{deon}}$ takes syntactic scope over negation.
- **Prediction:** $\text{pouvoir}_{\text{epis}}$ can take syntactic scope over negation even when it is linearized after the negative marker *ne*.
- This prediction is **not borne out.** Problem #1

(29) *Marc ne peut_{epis} pas être le coupable.*
 Marc NEG can-PRES NEG be the culprit
 '*Marc can't be the culprit.*' **Not:** '*It is possible that Marc is not the culprit.*'

Another Option

- The wide scope of *deon* w.r.t. negation can be due to base-generation or to movement.
- **Novel observation:** *Must_{deon}* is a PPI (sensitive to antiadditive environments) (see Appendix).
- Just like *some*, it can be ‘rescued’ (Szabolcsi 2004).

- (30) a. John didn’t call **someone**. *NOT > SOME
 b. John doesn’t **always** call **someone**.
 NOT > ALWAYS > SOME

- (31) a. Fun **mustn’t** be expensive. *NOT > MUST_{deon}
 b. Fun **mustn’t always** be expensive.
 NOT > ALWAYS > MUST_{deon}

- (32) a. John didn't show **every** boy **something**.
NOT > EVERY > SOME
- b. **Everything** **mustn't** be expensive to be worthwhile.
NOT > EVERY > MUST_{deon}
- (33) a. A student doesn't **necessarily** have **something**
interesting to say.
NOT > NECESSARILY > SOME
- b. A student's mistakes and wrong acts **must not**
necessarily be hurled on the shoulders of his
teachers. NOT > NECESSARILY > MUST_{deon}

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

- (36) a. There isn't anyone who didn't do **something** to help. NOT > NOT > SOME
- b. *(Context: Suppose that second year students have to turn in their theses by the end of the quarter, except for John, who was sick for six weeks, and is therefore allowed to be a little late. This is important, he is allowed to but need not turn in his thesis late.)*
 The chair: There isn't any student who **must not** finish their thesis by the end of the quarter. Sorry, I forgot, John doesn't have to, because he has a special treatment.
 NOT > NOT > MUST_{deon}

- Must_{deon} can take scope under an extracausal negation.

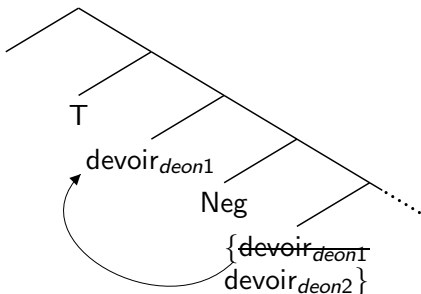
- (37)
- The doctor doesn't think Peter saw **someone**.
 NOT > SOME
 - The doctor doesn't think Peter **must** smoke.
 NOT > MUST_{deon}

- There is **no cyclicity** in (37-b) repeated as (38-a).

- (38)
- The doctor doesn't think Peter must smoke.
 (38-a) cannot mean: The doctor thinks that Peter mustn't smoke.
 - The doctor doesn't think that Peter wants to smoke.
 (38-b) can mean: The doctor thinks that Peter wants not to smoke.

- It is thus possible that there are in fact two homophonous devoir_{deon} (devoir_{deon1} and devoir_{deon2}), one of which is a PPI.
- Both lexical items are base-generated below Neg, and PPI devoir_{deon} (labelled devoir_{deon1}) QRs past Neg at LF.

(39)



A New Problem

- The standard assumptions (epistemic modals are interpreted above T) led us to posit two negations, one above and one below T.
- *Pouvoir_{epis}* is supposed to (be able to) raise past T for interpretation.
- How can it skip T? Is it generally true that raised modals skip intermediate heads?
- If French does have a PPI *devoir_{deon}*, and given that there is a high negation in the hypothetical picture, we make a prediction.
- **Prediction:** *devoir_{deon}* can skip and outscope T when it raises past the higher negation.

- This prediction is **not borne out**. Problem #2

(42) (The law has just changed in the country where I reside as a foreign student: in order to claim a tax exemption, it is no longer allowed to have lived in the country three years before the application. A friend of mine asks me why I'm upset.)

#*À compter d'aujourd'hui, je ne devais_{deon} plus*

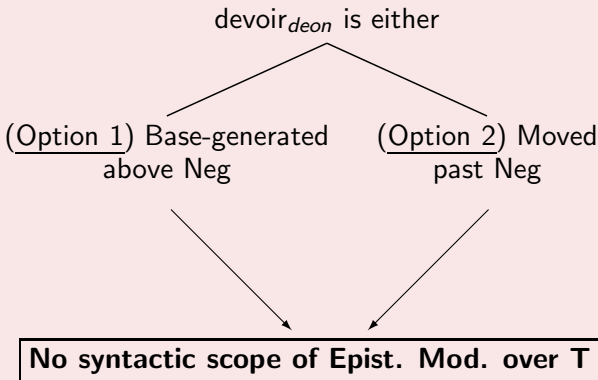
To count of today, I NEG must-IMPF anymore

vivre dans le pays il y a trois ans.

live in the country there-are three years

'Starting today, it is no longer allowed to have lived in the country three years ago.'

Two options...



Roadmap

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Part III: Proposal

Proposal

- Temporo-aspectual structure of the clause (Pancheva & von Stechow 2003).

$[_{TP} T [_{PerfP} \text{Perfect} [_{AspectP} \text{Viewpoint-Aspect} [_{vP} \text{Aktionsart}]]]]$

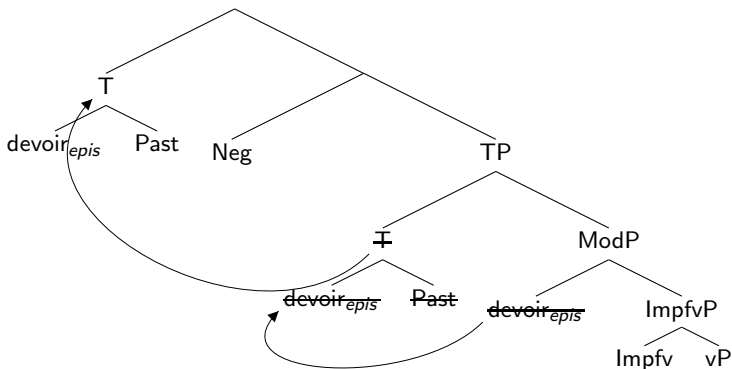
- (43) $\llbracket \text{PRES} \rrbracket = \lambda p_{it} . \exists t_i [t = t_c \ \& \ p(t)]$ where t_c is the speech time
- $\llbracket \text{PAST} \rrbracket = \lambda p_{it} . \exists t_i [t < t_c \ \& \ p(t)]$ where t_c is the speech time
- $\llbracket \text{PERFECT} \rrbracket = \lambda p_{it} . \lambda t_i . \exists t'_i [XN(t', t) \ \& \ p(t')]$ where $XN(t', t)$ iff t is a final subinterval of t'
- $\llbracket \text{PERFECTIVE} \rrbracket = \lambda P_{vt} . \lambda t_i . \exists e_v [\tau(e) \subset t \ \& \ P(e)]$
- $\llbracket \text{IMPERFECTIVE} \rrbracket = \lambda P_{vt} . \lambda t_i . \exists e_v [t \subseteq \tau(e) \ \& \ P(e)]$
- $\llbracket vP \rrbracket = \lambda e_v . P(e)$

How Low?

- Epistemic modals must be interpreted no higher than the heads that assign visible morphology to them.
- Epistemic modals show Tense and Perfect morphology: they have to be generated no higher than Perfect.
- I propose that they are generated and interpreted above Viewpoint-Aspect, i.e. Imperfective/Perfective (see Appendix). Root modals are generated and interpreted below Viewpoint-Aspect.
- There is only one negation, and it is above T (otherwise, we run into the same paradoxes).

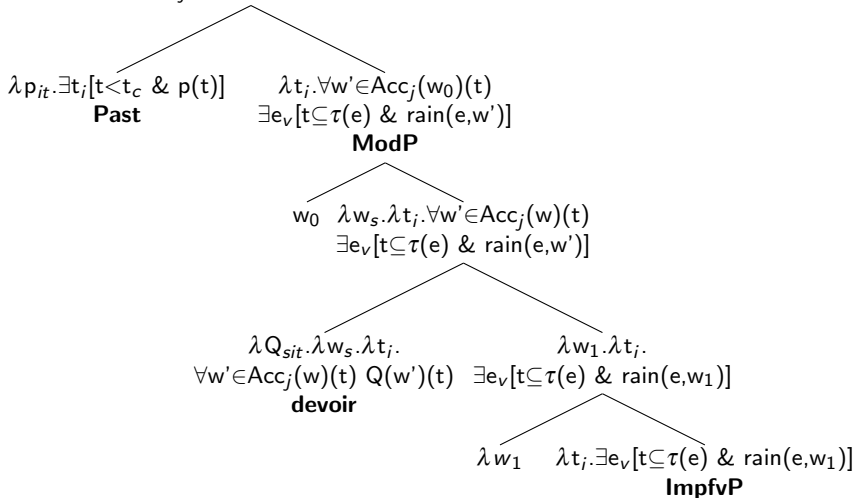
- How to get devoir_{deon} interpreted below T and above negation, then?
- Idea: devoir_{deon} can have scope over negation (there is a PPI devoir_{deon}) and under T (actually under Viewpoint-Aspect), even when negation is above Tense (all that matters is that it does not get interpreted under Neg): devoir_{deon} combines with Tense and all aspectual heads and the complex head is then raised to escape out of the scope of negation.
- ▶ PPI modals **pied-pipe** the temporo-aspectual projections above them.
- Epistemic modals show Tense and Perfect morphology: they have to be generated no higher than Perfect.
- Assuming that devoir_{epis} is a PPI too, it will also move past Neg and remain interpreted in the scope of Tense and Perfect.

(44) Il ne devait_{epis} pas pleuvoir.



(45) Il devait_{epis} pleuvoir. (It had to be raining.)

$\exists t_i[t < t_c \ \& \ \forall w' \in \text{Acc}_j(w_0)(t) \ \exists e_v[t \subseteq \tau(e) \ \& \ \text{rain}(e, w')]]$



Conclusion

- Epistemic modals are interpreted below T (and Perfect) and above Viewpoint-Aspect (root modals are generated and interpreted under Viewpoint-Aspect).
- Some modals are PPIs.
- When they take syntactic scope above negation, they pied-pipe the temporo-aspectual heads above them, thus remaining in their scope.

Acknowledgments

Thank you!

Special thanks to

- Daniel Büring, Isabelle Charnavel, Emmanuel Chemla, Guglielmo Cinque, Bart Geurts, Hilda Koopman, Angelika Kratzer, Alda Mari, Fabio del Prete, Jessica Rett, Philippe Schlenker, Roger Schwarzschild, Benjamin Spector, Dominique Sportiche, Tim Stowell, and for their judgments, Natasha Abner, Robyn Orfitelli, Matteo Residori, Craig Sailor, Chad Vicens.
- And to Valentine Hacquard, whose work inspired mine.

- All the contexts where must_{deon} can be interpreted under negation are also contexts where neg-raising is impossible.
- But there are important facts that show that wide scope of must_{deon} cannot be due to a presupposition of the modal (cf. the standard analysis of neg-raising, Gajewski 2005).

- Analysis of neg-raising (with homogeneity presupposition):

(46) John doesn't want to leave the party.

- i. *Assertion*: It's not the case that John wants to leave the party.
- ii. *Presupposition of 'John wants to leave the party'*: John wants to leave or John wants not to leave the party.
- iii. *Meaning*: John wants not to leave the party.

- Assuming that must_{deon} has a homogeneity presupposition (which doesn't seem intuitively correct btw), we would get:

(47) Some player must_{deon} n't have any cards left.
MUST > SOME > NOT

- Assertion*: It's not the case that it is necessary that some player has some cards left.
- Presupposition of 'It is necessary that some player has some cards left'*: It is necessary that some player has cards left or that no player has any cards left.
- Meaning*: It is necessary that no player has any cards left.
MUST > NOT > SOME

- Sentence (47) doesn't have this meaning.

- A neg-raiser can outscope negation when the negation is the clausemate of a superordinate neg-raiser (of the right kind, i.e. *think* or *believe*). This is called **cyclicity**.

(48) The doctor doesn't think that Peter wants to smoke.
(48) can mean: The doctor thinks that Peter wants not to smoke.

- There is **no cyclicity** in (49).

(49) The doctor doesn't think Peter must smoke.
(49) **cannot** mean: The doctor thinks that Peter mustn't smoke.

Why above Viewpoint-Aspect?

- Because this is compatible with morphology: past participles are the mark of perfect, not of perfective.
- Perfective is incompatible with progressive.

- (50) a. *??Il a été en train de danser sur la table.*
He has been in train of dance on the table
'He has been dancing on the table.'
- b. *Il aurait été en train de danser sur la table.*
He would-have been in train of dance on the table
'He would have been dancing on the table.'

- Similarly, the morphology in the *Imparfait* marks past, not imperfective.
- Imperfective is incompatible with eventives (or leads to aspectual coercion → habitual).

(51) *Pierre tomba malade et deux ans après, il mourait.*
Pierre fell ill and two years later, he die-IMPF
'Pierre became ill and died two years later.'

- (52) a. Il a plu. (It has rained.) (*Passé composé*)
b. Il avait plu. (It had rained.) (*Plus-que-parfait*)

Why above Viewpoint-Aspect?

- Epistemic modals don't give rise to 'actuality entailments' (Hacquard 2006), unlike root modals.

- (53) Le voleur a pu_{circum} passer par la fenêtre. (The burglar has can-PPart enter through the window.)
 \rightsquigarrow The burglar did enter through the window.
- (54) Le voleur a pu_{epis} passer par la fenêtre. (The burglar has can-PPart enter through the window.)
 \nrightarrow The burglar did enter through the window.

Why above Viewpoint-Aspect?

- The Aktionsart of the verb is transparent to Viewpoint-Aspect through epistemic modals.
- Aspectual coercion occurs as if the modal wasn't there.

(55) La maison a coûté cher. (The house has cost expensive.)
↪ The house was sold.

(56) La maison a dû_{epis} coûter cher. (The house has must-PPart cost expensive.)
↪ The house was sold.

Why above Viewpoint-Aspect?

(57) Il a dû_{epis} pleuvoir. (It has must-PPart rain.)

- Viewpoint-Aspect quantifies over events and locates their temporal trace w.r.t. some temporal interval.
- Having the universal modal in the scope of this quantifier leads (at best) to simultaneous eventualities across possible worlds in (57), which is not desired.