Epistemic Containment

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This article concerns a new constraint on the interaction of quantifier phrases and epistemic modals. It is argued that QPs cannot bind their traces across an epistemic modal, though it is shown that scoping mechanisms of a different nature are permitted to cross epistemic modals. The nature and source of this constraint are investigated.

Keywords: quantification, modality, scope ambiguity, raising, clause structure, reconstruction

1 Introduction

When a sentence contains two quantificational items, it is quite often ambiguous between two logical structures that differ in the relative scope of the two quantifiers. Until recently, it was widely assumed that scope ambiguities are generally due to an instance of Move α called Quantifier Raising (QR), which was assumed to operate quite freely (although it was known to be constrained by finite clause boundaries).[1] The assumption was, and is, that the investigation of QR will yield an increased understanding of the level of syntactic representation that interfaces with the interpretive component.

Along the way, consensus has been converging toward certain beliefs. Research has shown many ways in which scopal relations are much more rigid than previously suspected.[2] At the same time, some scopal relations seem freer than one might expect, especially if one looks at the properties of indefinite quantifiers (e.g., indefinites can take scope out of islands). In order to explain the unexpectedly wide scope of indefinites, a currently popular approach is that indefinite quantifiers have alternative ways of scope taking, including choice functions, Skolem functions, and unselective binding by overt or covert operators.[3] In other words, it is only an illusion that

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[1] See among others Rodman 1976 and May 1977, 1985.

[2] See among others Aoun and Li 1993, Szabolcsi 1997, Fox 2000, and Bruening 2001. Early work already contained much evidence for strong constraints on quantifier scope (see, e.g., Ioup 1975).

[3] See Heim 1982 for unselective binding. See Reinhart 1997a,b, Winter 1997, and Kratzer 1998 for choice-function indefinites.

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QR as a movement is freer than overt (Ā-) movement; when indefinites take higher scope than expected, it is not QR that is responsible. On the other hand, the conclusion that QR is more restricted than originally thought *is* taken to be real, as research uncovers the existence of different sorts of intervention effects and other constraints that block QR.

Here, we add to this exploration a new observation, a constraint on the scopal interaction of quantifiers with epistemic modals[4] that we call the *Epistemic Containment Principle*.[5]

(1) *The Epistemic Containment Principle (ECP)*
A quantifier cannot have scope over an epistemic modal.

The structure of the article is as follows. In section 2, we present two kinds of evidence for the ECP, one involving simple scope judgments and one involving binding (im)possibilities. In section 3, we consider the nature of the ECP. We conclude that it is a valid descriptive generalization, but we do not decide between two ways of integrating it into the grammar. In section 4, we discuss reconstruction of A-moved quantifiers. In section 5, we briefly mention some ways of scope taking that do not involve quantifier movement.

2 Evidence for the ECP

2.1 Scope Judgments

The ECP says that a quantifier cannot have scope over an epistemic modal—an unexpected claim, since sentences containing quantifiers and modal or temporal elements routinely show clear scope ambiguities. Here is an example of a scope ambiguity between quantifiers and temporal operators:

(2) Most of our students will be professors in a few years.

(3) Most of our students will be foreigners in a few years.

The most natural readings for these two sentences involve different scopes: (2) says that most of our *current* students will in a few years be professors (*most of our students* $\succ$ *will*), while (3)

[4] Very recently, we became aware of a manuscript by Drubig (2001), who independently claims that quantifiers cannot take scope over epistemic modals. As far as we can tell, Drubig gives no evidence to support his conclusion, however. On page 15, he cites Leech (1971:73) as having observed that quantifiers seem to be unable to take scope over epistemic modals. Drubig cites this example from Leech:

(i) Every clause must contain a finite verb.

He then comments, ''The deontic reading of [(i)] is compatible with wide and narrow quantifier scope, whereas the epistemic modal always can only have wide scope'' (p. 15). But of course with two expressions having universal force, *every* and *must,* scope ambiguities are exceedingly hard to diagnose. That is why we use at least one nonuniversal expression in the quantifier scope examples discussed below. From Leech's original passage, it is clear that he did not in fact anticipate our ECP but correctly observed that for principled reasons, no scope ambiguity is detectable in (i).

[5] The name of this constraint was carefully chosen by one of the authors. The other author warned that he vaguely remembered from syntax courses he took as a graduate student that there was another principle that went by the abbreviation ECP. But he was assured that that had been a temporary aberration in the science and that the competing principle had now deservedly sunk into near oblivion.

says that in a few years most of our students at that time will be foreigners (*will* ≻ *most of our students*).[6]

Quantifiers also appear to show scope ambiguities with deontic modal operators.

(4) Most of our students must get outside funding —
  a. for the department budget to work out.
  b. the others have already been given university fellowships.

The sentence in (4) is ambiguous, an ambiguity brought out by the different continuations. (4a) brings out the reading where *most of our students* takes scope below the deontic modal: for the budget to work, it needs to be the case that most of the students get outside funding. (4b) makes salient a wide scope reading for *most of our students,* since the obligation is imposed on those specific students who have not already been given fellowships.

What the ECP is saying is that parallel facts do not obtain with epistemic modals. So, it predicts that there is no scope ambiguity in (5), with only the order in (5a) being possible, not the one in (5b).

(5) Most of our students must be home by now.
  a. must ≻ most of our students
  b. *most of our students ≻ must

We predict that (5) only has a reading in which the quantifier *most of our students* has narrow scope under the epistemic modal *must.* This means that in order for (5) to satisfy the ECP, the quantifier needs to establish narrow scope by LF.

Of course, it is very hard to figure out what the relative scope of *most* and epistemic *must* in (5) is. Consequently, our evidence for the ECP will have to involve different combinations of quantifiers and epistemic modals.

We are standing in front of an undergraduate residence at the Institute. Some lights are on and some are off. We don't know where particular students live but we know that they are all conscientious and turn their lights off when they leave. So, we clearly know that not all of the students are out (some lights are on and they wouldn't be on if the students were away). It could in fact be that all of them are home (the ones whose lights are off may already be asleep). But it is also possible that some of them are away. Since we don't know which student goes with which light, for every particular student it is compatible with our evidence that he or she has left. With this background, consider the following sentence:

(6) Every student may have left.
  a. every student x (may x have left) — true, *ECP
  b. may (every student have left) — false, ^{OK}ECP

Informants reliably judge (6) to be false in the scenario just sketched. This is predicted if the

[6] Of course, many issues are glossed over here. See Musan 1997 for in-depth exploration of this topic.

ECP is operative. It would force (6) to be read with narrow scope for the quantifier *every student,* which gives rise to a reading that is false in our scenario. The ECP prohibits the reading where *every student* has scope over the modal, a reading that would be true in the given scenario. A raw truth-value judgment then supports our claim that there is an ECP.

The judgment is perhaps even sharper when we consider a continuation of (6) that would be consistent only with the scope *every* ≻ *may,* which is ruled out by the ECP. We expect a clear feeling of contradiction, and indeed, (7) is beyond repair.[7]

(7) *Every student may have left but not every one of them has.

Here is another case showing that *every* cannot have scope over *may:*

(8) #Every student is the tallest person in the department.

(9) #Every student may be the tallest person in the department.
   a. every student x (may x be the tallest) — sensible, *ECP
   b. may (every student be the tallest) — nonsense, OK ECP

If there were no ECP, (9) would be predicted to be sensible since the quantifier would be able to have scope over *may.* But because of the ECP, this is not possible and the obligatory narrow scope of the quantifier leads to a pragmatically odd reading on a par with the oddness of (8).

Imagine a group of people who were exposed to an infectious agent. From anonymous test results, we have concluded that half of the people are healthy, but we don't know which ones they are. For any given person, then, we don't know whether he or she is infected. If the ECP didn't hold, we would be able to report this situation to the people involved as follows:

(10) Half of you are healthy. #But everyone may be infected.
   a. every person x (may x be infected) — consistent, *ECP
   b. may (every person be infected) — inconsistent, OK ECP

However, this sequence seems utterly inconsistent. The reason is by now clear: the second sentence can only be read as asserting the possibility that everyone is infected, which contradicts the first sentence.[8]

The ECP effect also arises with quantifiers other than universal *every.* Consider the following example, which indicates that the scope order *must* ≻ *fewer than half* is possible:

[7] We have sometimes encountered people who thought that with the right kind of intonation they might get readings that the ECP would rule out. We are unsure about whether this is sometimes possible. But (7) at least is a clear case where no amount of prosodic acrobatics helps. What does help with (7) and (9), as well as many of our other examples, is using *any* instead of *every.* We are well aware of that and ask the reader to wait until section 5.2 for an explanation.

[8] By the way, the ECP seems to concern not only epistemic modals in the form of auxiliaries. Example (10) remains unacceptable when we switch to an adverbial modal.

(i) #Half of you are healthy. But everyone is possibly infected.

An *LI* reviewer points out further that the (at least quasi-epistemic) modal *be bound to* also gives rise to ECP effects. However, at this point we are not in a position to widen our inquiry beyond a small class of modal auxiliaries, so we will leave the matter with just these observations.

(11) Fewer than half of the students must have passed the test. (Otherwise there wouldn't be this uproar.)

We claim that (11) lacks the reading 'Fewer than half of the students are such that it can be said with certainty about them that they have passed the test'. This is the reading ruled out by the ECP. We can show that the reading is absent by combining the sentence with a continuation that would force the wide scope reading of the quantifier over the modal, producing a contradictory statement.

(12) #Fewer than half of the students must have passed the test, but perhaps all of them did.

(12) is contradictory since the ECP forces an interpretation like 'It must be the case that fewer than half the students passed the test, but perhaps all of them did'.

One might wonder whether the ECP concerns only strong quantifiers. But we think there is clear evidence that all quantifiers are subject to the constraint.

(13) #Two friends of John's from Texas may have come to visit him this weekend, but they can't both have come (because they hate each other).

A scenario that would go with the sentence in (13): regarding two friends of John's from Texas, we know that either one may well have visited him, but we also know that they did not both visit him. But the ECP forces the quantifier *two friends* to have narrow scope under the modal, which expresses that it is possible that both of them came, which in turn is inconsistent with the follow-up. (13) is therefore unacceptable. Indefinites raise other issues as well, which we will look at in section 5.

We would like to add one last instance of the ECP, noted by Heim (2001). Compare (14) and (15).

(14) The paper is allowed to be less long than that.
Reading A: It is allowed that the paper be shorter than that.
Reading B: It is not allowed that the paper be that long.

(15) The paper might be less long than that.
Reading A: It might be the case that the paper is shorter than that.
Reading B: It is not possible that the paper is that long. (unavailable!)

Heim suggests that the B reading of (14) is due to LF movement of the degree-quantifier phrase across the modal operator. She observes that (15) does not have a B reading. She conjectures that this effect is due to the ECP.

2.2 Binding (Im)possibilities

We said earlier that the ECP cannot be detected in simple scope judgments involving *every* and *must,* because they are both universal quantifiers. But even with this combination, the ECP can

be shown to rule out a structure where the quantifier has scope over the epistemic modal. The trick is to determine where the quantifier is located by looking at what it can bind.

You are going to the same dorm as before, planning to visit Chris but worrying whether you might wake him up. Kim tells you to look at his dorm window because Chris must be awake if his light is on. So Kim says:

(16) Chris must be awake if his light is on.

Kim's implicit suggestion is to find the window of Chris's room and check whether the light is on. If it is on, you can conclude that Chris is awake. You ask Kim how she can be so sure. She tells you that Chris is a very conscientious guy and would never leave the light on when he leaves his room or when he goes to sleep. In fact, she thinks that every student who lives in this dorm has this property. So, she might be tempted to assert that

(17) *Every student$_i$ must be awake if his$_{j/*i}$ light is on.

The puzzling fact is that Kim can't say what she is tempted to say. The sentence in (17) is unacceptable under the intended meaning (where the quantifier *every student* binds the pronoun *his*). Armed with the ECP, we correctly predict the actual status of (17). Without the ECP, (17) is predicted to have two possible LF configurations, depending on whether the quantifier has scope over the modal (as in (18a)) or the modal has scope over the quantifier (as in (18b)).[9]

(18) a. *every* $\succ$ *must* + *if*
every [λx. student x]
[λx. must [λw. if his$_x$ light is$_w$ on] [λw. x be$_w$ awake]]

b. *must* + *if* $\succ$ *every*
must [λw. if his$_x$ light is$_w$ on]
[λw. every [λx. student$_x$] [λx. x be$_w$ awake]]

The structure that comes closest to being available for (17) is the one in (18b). But note that in (18b), the quantifier cannot bind the pronoun, since the requisite c-command relation does not hold between the quantifier and the pronoun.[10]

[9] We are assuming here without argument that the *if*-clause in (17) is restricting the epistemic modal *must,* in the sense of the Lewis-Kratzer view of *if*-clauses (see Lewis 1975, Kratzer 1978, 1986, Heim 1982). We assume further that to restrict the modal, the *if*-clause needs to be local to the modal at LF. We ignore here the possibility that the *if*-clause might be restricting the quantifier *every student,* functioning in a way like a relative clause. In von Fintel and Iatridou 2002, we show that *if*-clauses cannot restrict nominal quantifiers like *every student.*

[10] We of course assume the following near triviality:

(i) *LF condition on variable binding*
Quantifiers (or the λ-operators associated with them) can only bind variables in their LF c-command domain.

In addition, we adopt the following common assumption:

(ii) *LF locality of restrictor*
At LF, restrictors are local to the elements they restrict.

So, the pronoun in (18b) remains free. Indeed, a sentence pronounced the same as (17) has the (18b) reading, where the pronoun remains unbound by the quantifier. We can understand it as meaning something like 'If his (e.g., the janitor's, or some other salient individual's) light is on, it must be the case that every student is awake'. But the fact remains that there is no reading where the pronoun is bound, as indicated in (17). The structure in (18a) is crucially ruled out by the ECP. The result is the judgment indicated in (17).

Note that the ECP only concerns the interaction of quantifiers with epistemic modals. As soon as we use a nonepistemic modal, then, we should find acceptable structures—a correct prediction.

(19) Every student$_i$ must contact the dean if he$_i$ is too sick to attend the exam.

In this sentence, the modal *must* has a deontic reading stating an obligation following from some body of rules and regulations.

3 The Nature of the ECP

Our initial formulation of the ECP in (1) stated that a quantifier cannot have scope over an epistemic modal. In this section, we explore further the nature of this principle. We will consider two possible ways of understanding the ECP: (a) as an intervention effect blocking quantifier-variable relations, and (b) as a reflection of the strict ordering of projections in the topology of clauses.

3.1 Against a Radical Intervention Account

One way to derive the ECP in a natural fashion would be to claim that for deep reasons epistemic modals do not tolerate complements that contain variables bound from outside. The intuition might be that epistemic modals do not tolerate ''open propositions'' as their complement. This is certainly a view worth considering. In fact, there is one place in the literature where just such a phenomenon has been described: Kratzer's work on the fact that the German discourse particle *ja* does not tolerate binding across it (Kratzer 1999). While this area of inquiry is exciting and we have every intention of pursuing it ourselves in future work, we do not think that epistemic modals behave in this manner. In fact, we have convincing counterexamples to the hypothesis that epistemic modals do not allow binding of variables across them.

First, a quantifier can bind a pronoun across an epistemic modal.

(20) Every student$_i$ is convinced that I think that the dean may well expel him$_i$.

(21) Every man in the room$_i$ was asked to come here because he$_i$ may well have seen the accident.

(22) a. Every student$_i$ thinks that he$_i$ may well be a genius.
b. Every student$_i$ thinks that Mary may/must like him$_i$ the most.

Second, a *wh*-phrase can bind its trace across an epistemic modal.[11]

(23) Who$_i$ must she have hired t_i for that job?

(24) Who$_i$ did Bill say that Susan must have married t_i?

(25) Who$_i$ must Bill have said that Susan married t_i?

(26) Where$_i$ did Bill say that Bill must have seen Susan t_i?

(27) Where$_i$ must Bill have said that Bill saw Susan t_i?

(28) It didn't take me long to find out which workers the boss must have reprimanded.

What about *wh*-in-situ? Consider a typical multiple question in English.

(29) Who thinks that Susan talked with who?

What happens when an epistemic modal is inserted in the path between the two *wh*-phrases?[12]

(30) Who said that Susan must have talked with who?

Most speakers we have consulted find no contrast between (29) and (30). Depending on what analysis of structures like (29) one assumes, one can conclude either (a) that epistemic modals do not block the relation between a *wh*-phrase moved covertly at LF and its trace, or (b) that epistemic modals do not block the dependency between a *wh*-phrase in situ and whatever it is related to in the matrix C position.[13] In any case, the conclusion is that epistemic modals do not block *wh*-in-situ dependencies.[14]

[11] We should note that Drubig (2001) claims that epistemic modals cannot occur in *wh*-questions. He cites McDowell 1987 in support of this claim and gives examples like these:

(i) Why must/may John leave early tonight?

(ii) Who must/may leave early tonight?

Note that these involve eventive/nonstative predicates, which Drubig elsewhere in his paper correctly discusses as resisting epistemic readings anyway. (Similarly, Drubig uses the wrong predicate to illustrate that epistemic modals are excluded from the protasis of a conditional.

(iii) If John must/may leave early tonight, . . .)

The test really requires stative predicates such as the perfect tense ones we use in the text. The following additional examples are from Brennan 1993:24:

(iv) What may he have done?

(v) Where must the murder weapon be hidden, in your view?

(vi) Who can have left this baby on my doorstep?

[12] Andy Barss (personal communication) prompted us to consider such cases.

[13] For analyses of multiple questions that involve, not covert movement of the lower *wh*-phrase, but some other kind of possibly long-distance dependency, see Baker 1970, Tsai 1994, Reinhart 1997b, Pesetsky 2000.

[14] The ECP might be reminiscent of some effects concerning covert movements of *wh*-elements. Beck (1996a) discusses a variety of *wh*-related movement constructions where there is a choice of leaving some material in situ at S-Structure. One kind of example is this (Pesetsky 2000, cited from Beck 1996a):

We conclude that under the intervention effect view, the ECP must be stated as a condition that is specifically about the relationship between quantifiers and their traces at LF. As such, the ECP prohibits LF raising of a quantifier across an epistemic modal and forces quantifiers that have raised on the surface past an epistemic modal to take scope back under the modal. So, instead of ''A quantifier cannot *have* scope over an epistemic modal,'' this analysis now says, ''A quantifier cannot *take* scope over an epistemic modal.'' More precisely:

(31) *The ECP revised as a condition on QR*
At LF, a quantifier cannot bind its trace across an epistemic modal.
*Q_i . . . [Epistemic Modal (. . . t_i . . .)]

We needed the ECP to explain the fact we observed about (17). If our suspicion about the ECP is right, we expect that the following ways of expressing the intended content of our puzzle sentence (17) should be acceptable, since they involve variable binding across the modal but not quantifier movement.

(i) *Who + among DP*

a. *No separation, no intervener*
[Wen von den Musikern] hat Hans ____ getroffen?
whom of the musicians has Hans ____ met
'Who among the musicians has Hans met?'

b. *Separation, no intervener*
Wen hat Hans [____ von den Musikern] getroffen?

c. *No separation, intervener*
[Wen von den Musikern] hat keine Studentin getroffen?
whom of the musicians has no student met
'Who among the musicians has no student met?'

d. *Separation, intervener*
??Wen hat keine Studentin [____ von den Musikern] getroffen?

As (ia) and (ib) show, the German *wh*-word *wen* can be separated from the rest of the noun phrase it belongs to by moving just it and not the whole phrase. The choice between (ia) and (ib) is entirely optional. But when a quantifier like *keine Studentin* intervenes between the source position of the phrase and its movement target, the whole phrase has to move: (ic) is acceptable, while (id) is not. Beck suggests that at LF the leftover material *von den Musikern* has to move to join the *wh*-word. This LF movement, she argues, cannot cross an intervening quantifier. There is no intervener blocking the LF rendezvous between the two partners in (ib), but there is one in (id).

We do not think that the ECP can be reduced to the effect that Beck discusses. Epistemic modals do not appear to act as blocking interveners in the structures Beck discusses.

(ii) Wen müsste Maria behauptet haben [[____ von den Musikern] getroffen zu haben]?
who must Maria claimed have of the musicians met to have
'Who must Maria have claimed to have met of the musicians?'

Here, the epistemic modal *müsste* lies on the path between the fronted *wh*-word and the rest of its phrase. Nevertheless, the separation does not make the sentence unacceptable, in contrast to (id). Sigrid Beck (personal communication) has provided us with a further demonstration that the ECP is not subsumed by her intervention effects. In Beck 1996b, she showed that partially reconstructed readings of *how many*–questions are not available across the kind of barriers she had identified. But again, epistemic modals do not disrupt such readings.

(iii) Wieviele Bücher müsste er der Maria versprochen haben mitzubringen?
how-many books must he the Maria promised have with-bring
'How many books must he have promised Maria to bring with him?'
Possible answer: He must have promised her to bring six books.

(32) Every student (in this dorm) is such that he must be home if his light is on.

(33) We know of every student (in this dorm) that he must be home if his light is on.

(34) ?Every student (in this dorm) is so reliable that he must be home if his light is on.

Our prediction appears to be correct: these examples are somewhat stilted but are acceptable.[15]

3.2 The Clause Topology Account

The data we have discussed so far are also compatible with the obvious competitor to the intervention effect view—namely, a view that takes the ECP to be the result of the hierarchical structure of the clause. One could adopt from Cinque (1999) the idea of a very rigid and articulated functional hierarchy in the architecture of sentences, and in particular the commonly held notion that epistemic modality is located very high in the clause. One could then combine this with the idea associated with Beghelli and Stowell (1997) that quantifier movement targets particular positions in the sentence (rather than being an adjunction process that can target many kinds of projection). If all the quantifier targets are below the high position for epistemic modals, we derive the ECP for monoclausal cases. The fact that *wh*-dependencies can cross epistemic modals even in monoclausal structures would result from the fact that the checking position for *wh* is higher than the position of epistemic modals. What would remain to be explained is *why* epistemic modals are so high in the structure.[16]

3.3 Clause Topology or Intervention Effect?

In the remainder of this section, we will consider two facts that may inform our choice between the intervention effect account and the clause topology account. We will look at (a) antecedent-contained deletion cases that are in principle problematic for either account but perhaps more so for the intervention effect account, and (b) facts involving the ECP with epistemic modals that are arguably quite low in the clausal topology, thus constituting cases that are quite problematic for the clause topology account.

3.3.1 ACD and the ECP Antecedent-contained deletion (ACD) has repeatedly been seen as a good argument for the existence of LF movement of quantifiers (Sag 1976, Williams 1977, May 1985, Fiengo and May 1994). It has more recently been used to argue against feature-checking, A-movement accounts of quantifiers such as Beghelli and Stowell's (1997) analysis mentioned in section 3.2 (see Kennedy 1997).

We have found that there are cases of ACD that appear to violate the ECP. We say ''appear to'' because the judgments are notoriously hard and we have found it very difficult to make sure

[15] An *LI* reviewer disagrees and finds these examples just as unacceptable as (17). We don't know what to say about that.

[16] Drubig (2001) offers some intriguing speculations, but we will not explore this question further here.

that the epistemic modal is indeed included in the composition of the interpretation. Nevertheless, the following example seems to be quite good:

(35) John thinks that Sarah must have played on every piano that we had predicted he would.

For ACD to be resolved, the QP [*every piano that we had predicted he would e*] must LF-move over the modal *must* into the higher clause.

Consider now what this means for the ECP. Under the clause topology account, (35) should probably be seen as an example of ACD making available an additional avenue of quantifier interpretation. It violates the locality of feature checking; but as soon as it does this by moving the quantifier into a higher clause, we in fact expect the ECP to be circumvented (since it was nothing more than the claim that there is no feature-checking position for quantifiers above an epistemic modal in the clause of that modal). Under the intervention effect view, we need to say that the quantifier chains created by ACD are different from those created by ''normal'' QR. Both views then need to appeal to the view that ACD is different from normal QR in important ways.

The latter might appear to be a desperate move. But in fact, ACD-resolving QR (henceforth *ACD-QR*) is well known to have different properties from non-ACD-resolving QR (henceforth *Scope-QR*).

- ACD-QR can move a QP out of a tensed clause, while Scope-QR cannot.

(36) John said that (they wrote that) Mary played on every piano that we predicted he would.

(37) A different / Some student said that Mary likes every boy. (**every ≻ a different/some*)

- ACD-QR bleeds Condition C, while Scope-QR does not (Fiengo and May 1994, Fox 2000).

(38) a. ??I reported him_i to [every cop that $John_i$ was afraid of].
b. I reported him_i to [every cop that $John_i$ was afraid I would].

- ACD-QR can cross negation, while Scope-QR cannot. Imagine John, who for years has been accusing Mary of being a racist and a sexist. Now there is an exam coming up and we predict that John will take this opportunity to make the same point; that is, we predict that he will say that Mary will fail women and minority students. In this scenario, the following sentence seems fine:

(39) John said that Mary will not pass every student that we predicted he would.

In other words, the QP [*every student that we predicted he would e*] raises out of the embedded clause over sentential negation. On the other hand, Scope-QR cannot easily cross sentential negation.

(40) John didn't touch every dessert. (**?every ≻ not*)

The same holds for movement over negative quantifiers. Imagine that John, who took part in a dessert competition, is always negative about certain rival cooks. We predict that he

will say that people don't like the desserts made by these cooks. In this scenario, the following statement seems fine:

(41) John said that nobody will touch every dessert that we predicted he would.

On the other hand, Scope-QR cannot easily cross a negative quantifier.

(42) Nobody touched every dessert. (*?*every* ≻ *nobody*)

Clearly, the differences between ACD-QR and Scope-QR are not negligible. In this context, the fact that ACD-QR and Scope-QR also differ in their sensitivity to the ECP does not appear all that surprising. In fact, across all these facts we find Scope-QR subject to constraints that ACD-QR appears to be able to violate.

We could then adopt the attitude that the fact that ACD behaves differently from normal scope taking is a problem for all accounts and hence not one that either of our candidate accounts of the ECP is directly responsible for.[17]

3.3.2 Low Epistemic Modals In the spirit of the clause topology account that we have been exploring, Drubig (2001) claims that negation cannot have scope over epistemic modals. Relevant examples include these:

(43) a. John must not be at home. ($\Box \neg$)
b. John may not be at home. ($\Diamond \neg$)
cf. John may not leave. (deontic: $\neg \Diamond$)

The epistemic modals *must* and *may* cannot be in the scope of negations, whereas deontic *may* can. We concede that an attractive account of this proceeds along the lines we have outlined above. But we have to add that it is in fact possible to find cases where epistemic modal expressions are apparently low enough to be in the scope of negation. Relevant examples include the more ''verbal'' modal *have to*.

(44) John does not have to be at home. ($\neg \Box$) He might be at work.

Furthermore, there appear to be perfectly epistemic modals that are almost specialized as narrow scope epistemic modals.

(45) a. John *need not* be home. ($\neg \Box$) He might be at work.
b. John *can't* be at home. ($\neg \Diamond$) He must be at work.

If there are indeed epistemic modals that are low enough to be in the scope of negation, and since quantifiers can have scope over negation (especially if they are in subject position), we can conduct an interesting experiment. Consider (46) and (47).

[17] Chomsky (2001:23) takes this situation to indicate that ACD does not involve anything like QR but is to be reduced to some kind of base-generated afterthought construction followed by VP-ellipsis.

(46) Every student can't be home. (*$\forall \neg \Diamond$, only $\neg \Diamond \forall$)

(47) Every student need not be home. (*$\forall \neg \Box$, only $\neg \Box \forall$)

As these sentences show, even when a quantifier occurs in a clause with one of the epistemic modals that are arguably quite low in the clause topology, the quantifier has narrow scope. This is prima facie an impressive argument for the intervention effect account. Cinque (1999) claims that these modals are not really epistemic modals but ''alethic'' ones and that alethic ones are low enough to be in the scope of negation. We find this somewhat dubious, but in any case it does not help with the analysis of (46) and (47), unless one argues that alethic modals do allow negation on top but that there is nevertheless no position above the negation for the quantifier to land.

We conclude that the ECP is most likely an LF intervention effect. A quantifier-trace chain cannot cross an epistemic modal. Having established this, one might explore how this intervention effect could be derived. There are two possible perspectives to consider: (a) the epistemic modal is unhappy, because it does not tolerate the foot of a quantifier-trace chain below it or does not tolerate such a chain crossing it, and (b) the quantifier is unhappy, because the modal does something to the chain to disrupt it so that the quantifier is unable to maintain its relationship to its trace. We will not pursue this interesting question here, wanting merely to lay out the logical space.

4 The ECP, A-Movement, QR, and Reconstruction

We have shown that when a quantifier and an epistemic modal are in the same minimal sentence, the only possible scopal order permitted by the ECP is the one where the modal has scope over the QP. However, the quantifier of course often precedes the epistemic modal at S-Structure, as in (48).

(48) Every student must be home.

This means that at LF we must somehow undo what has happened in (48). There are at least two imaginable ways of doing this. The first is to move the epistemic modal to a position above the S-Structure position (or LF position) of the quantifier. The second would be to diminish the scope of the quantifier by a mechanism usually called *reconstruction*.[18] The question then arises, Are sentences like (48) brought into compliance with the ECP by raising of the modal or by scope diminishment of the quantifier?

4.1 Raising the Modal

We will start with the possibility of raising the modal over the QP in (48). There are two ways to look at this possibility. In the clause topology account introduced in section 3, we could say that the position where the epistemic modal checks certain relevant (e.g., ''epistemic'') features

[18] We will opt for the more neutral term *scope diminishment* to stay away from the exact nature (syntactic or semantic) and details (lowering, interpretation of a lower copy, etc.) of these mechanisms.

happens to be higher than the projection(s) where quantifiers end up. So, before everything is said and done the modal has to raise over the subject quantifier. In a more standard QR account, one would say that the movement of the modal to a higher position is allowed and then made obligatory in the relevant examples because without it the ECP would rule out the structure.

We[19] are skeptical about the possibility of allowing raising of the modal. One reason is that if modal operators are allowed to move, we would expect to find scope ambiguities between two modal operators, since one of them might covertly move over the other. It seems that this never happens. Sentences with stacked modal verbs seem to be unambiguous and show only those readings where the scopes of the operators reflect their surface hierarchy.

(49) a. I have to be allowed to graduate.
b. #I am allowed to have to graduate.

If in (49b) the lower modal were able to take wide scope over the higher modal, the example would have a sensible reading equivalent to the one (49a) has. But (49b) only has the rather odd surface scope reading. This is strong evidence that modals cannot take nonsurface scope. Of course, this might be explained by appropriate constraints on the movement of modal operators, and such constraints may even come for free in the right syntactic theory. Also, we should investigate the empirical facts much more comprehensively before we reach any verdict. If it is true, however, that modal operators engage in scope interaction only with DPs and never with each other, then a theory that does not allow any movement of modals at all could claim the advantage of having a simple and principled explanation for this fact.

Another way in which raising the modal would be peculiar is that the movement would only have the desired effect of giving a wide scope interpretation of the modal if the movement left behind no semantically active trace. If the movement did leave behind a trace, that trace would have to be of the same type as the modal; otherwise, type mismatches would result. But whenever an expression leaves behind a trace of the same type as itself, the movement is semantically vacuous, which is not what we want here.

To summarize, satisfying the ECP by raising the modal does not seem very promising to us.

4.2 Scope Diminishment

Scope diminishment is a phenomenon discussed since May 1977 (see also Lechner 1997, Lebeaux 1998, Fox 1999, 2000, Boeckx 2001, Elbourne and Sauerland 2002), motivated by the fact that in sentences like (50) the indefinite can be interpreted above or below *guaranteed*.

(50) Someone from New York$_i$ is guaranteed t_i to win the lottery.

At this point, we could have just suggested that readers pick a favorite among the proposals about how to manage to interpret the QP essentially in its trace position in (51).

[19] The material in this paragraph and the next is taken from class notes on intensional semantics by Kai von Fintel and Irene Heim.

(51) Every student$_i$ must have t_i left.

All we would have needed to add was that ever since Perlmutter 1970 and 1971 and Jackendoff 1972, the idea has been on the table that epistemic modals involve raising, as evidenced by classic tests like the appearance of expletives and idioms in subject position.

(52) There must have been many chairs in that room.

(53) The shit must have hit the fan.

However, recently there have been rumors to the effect that no such thing as scope diminishment in A-chains exists. We therefore feel we have to address some of those points. We will try to do so while still remaining neutral about the specifics of scope diminishment mechanisms. In particular, we will address the skepticism about scope diminishment in Chomsky 1995 and Lasnik 1999.

4.2.1 Chomsky (1995) on the Absence of A-Reconstruction Chomsky (1995) argues that there is no such thing as reconstruction in A-movement—that reconstruction occurs only in Ā-movement. His empirical arguments are as follows. Consider (54) (Chomsky 1995:327).

(54) *John$_i$ expected [him$_i$ to seem to me [t_i to be intelligent]].

Sentence (54) is unacceptable when *John* and *him* are coindexed. This is presumably a Condition B violation. If reconstruction to the position of trace t_i were possible, Chomsky argues, (54) with coindexation would not result in a Condition B violation as the antecedent would be outside the binding domain of the pronoun, as in (55).

(55) John expected [to seem to me [him to be intelligent]].

Chomsky's second empirical argument is based on the contrast between (56a–b) and (56c). In (56a–b), the QP can take scope under negation; in (56c), it cannot.

(56) a. (It seems that) everyone isn't here yet.
b. I expected [everyone not to be there yet].
c. Everyone seems [t not to be there yet].

In Chomsky's framework, all this means that there is no A-reconstruction.[20] But then what about the ambiguity of cases like (57)?

[20] Chomsky's third empirical argument is this. There is reason to believe that PRO has moved from the position marked *t* to where it appears in (i).

(i) [PRO to appear [t to be intelligent]] is harder than one might think.

Does PRO reconstruct to t? No, Chomsky says. Note that there is a feeling of ''quasi agentivity'' with derived subjects, as in (ii).

(ii) John deliberately appears to be stupid.

We find the same feeling of quasi agentivity in (i). In fact, this feeling is impossible to shake in (i) (and (ii)). This quasi agentivity appears to be a side effect of derived subjecthood. So, being unable to shake off quasi agentivity in (i) means being unable to remove (reconstruct) PRO from its derived subject position. Hence, no reconstruction has taken place. We will not address this argument here.

(57) Someone from New York is guaranteed t to win the lottery.

Chomsky says that no reconstruction takes place here either. What corresponds to the reconstructed reading (i.e., the reading where the DP is interpreted below the matrix predicate) Chomsky says is the result of a separate process of Quantifier Lowering (QL). QL would bring the DP not to the position of its trace but to an IP-adjoined position from which it can still c-command its Spec,IP trace.[21]

We have a potential paradox: there appear to be no reconstruction effects for binding purposes but there do appear to be reconstruction effects for scope purposes. Chomsky's solution is to say that there is no reconstruction at all and that the apparent scope inversion in (57) is due to the separate phenomenon of QL. In a way, for our purposes all that we need is something that will bring about scope diminishment; Chomsky's rejection of reconstruction in favor of QL causes our account no harm, as a mechanism for scope diminishment would still exist. However, for completeness' sake, we would like to make some quick comments.

To rebut Chomsky's first argument, we refer the reader to Lebeaux 1998 and cite the following passage from Wurmbrand and Bobaljik 1999, as it captures in few words the conclusion that arguments from Condition B that prove or disprove reconstruction in A-chains are unlikely to be found:[22]

''Condition B effects''

[(58)] a. *John expected [him to seem to me [t to be intelligent]] Chomsky 1995:327
→ Reconstruction of *him* (to t) would avoid a condition B violation at LF
b. *He seems to John/him [t to be expected [t′ to win]] Lebeaux 1995
→ Reconstruction of *him* (to t′) would avoid a condition B/C violation at LF

Yes, but . . .

Lack of reconstruction (or lack of A-trace, as Lasnik suggests) would also yield problems for Condition B:

[(59)] a. *John/He seems to me [t to be expected to like him] (vs. himself)
b. *He was expected [t to seem to him [t to like [her]]] [example amended/KvF,SI]

- For principle B, the entire A-chain (base, surface and intermediate positions) of the pronoun are relevant.

[21] This is in fact the mechanism argued for by May (1977) for cases like (57).

[22] Condition A is compatible with reconstruction.

(i) Pictures of himself$_i$ seem to John t_i to be the best possible present for Mary.

However, as has been pointed out many times, the problem is the apparent discrepancy between Conditions A and B/C. Condition B is discussed in the main text. With respect to Condition C, if reconstruction were possible, we could avoid a Condition C violation in (ii), as then it would be like (iii).

(ii) *He$_i$ seems to John$_i$'s mother t_i to be the best candidate.

(iii) It seems to John$_i$'s mother that he$_i$ is the best candidate.

See Fox 2000 and references therein on the Condition A and Condition C arguments.

[(58a)] is correctly excluded iff the surface position of the pronoun is relevant.
[(59a)] is correctly excluded iff the base position of the pronoun is relevant.
[(59b)] is correctly excluded iff the intermediate position of the pronoun is relevant.

[(60)] The following assumptions cannot both be true:
Binding Theory (Principle B, and maybe C) holds only at LF
Pronouns occupy one and only one position at LF

- Whatever these facts challenge though, they do not pose a specific challenge to a theory that countenances A-reconstruction. I.e., [(59)] is no more a challenge to A-reconstruction than is [(60)] an argument for it.
- The observation is that Conditions B and C seem to require reference to the whole A-chain, i.e., in terms of Lasnik and Saito 1992 they are ''everywhere conditions'' (as opposed to Condition A which needs to be satisfied only once, and perhaps requires c-command at LF). This is the upshot of Lebeaux 1995. One may choose to state this as derivational conditions, without an intermediate level of S-structure with the same effect.

  However this is to be implemented, it is orthogonal to the question of A-reconstruction if scope is truly a question of syntactic positions . . . (Wurmbrand and Bobaljik 1999:14–15)

With respect to Chomsky's second argument, based on the ambiguity in (56a–b) and its absence in (56c), one could observe the following. On the one hand, to obtain the reading where the QP takes scope under negation in (56a–b), a mechanism for scope diminishment would be needed, since moving negation over the quantifier would have the same problems as discussed in section 4.1 for raising the modal. So (56a–b) show that intraclausal (henceforth, *short*) scope diminishment) exists. On the other hand, (56c) would show that strong quantifiers cannot undergo interclausal (*long*) scope diminishment.

4.2.2 Lasnik (1999) on the Nonexistence of Scope Diminishment Lasnik (1999) claims that there is no scope diminishment in A-chains whatsoever. He attributes this to the position that A-movement does not leave traces, unlike Ā-movement, which does leave traces/copies and which shows reconstruction effects. We will not go into the question of how to account for movement without traces here.

Lasnik presents arguments from (lack of) reconstruction for binding purposes and (lack of) scope diminishment. We will not address his examples supporting lack of A-reconstruction for binding purposes since we looked at such cases above. What we will do is to address (a) Lasnik's skepticism regarding May's original claim about lower readings of quantifiers[23] and (b) Lasnik's discovery of constraints on scope diminishment.

4.2.2.1 The Interpretive Evidence for Scope Diminishment Lasnik writes that ''it is not entirely clear precisely what the phenomenon of QL is'' (1999:205). He seems doubtful about the assumption that paraphrases are a good tool for bringing out the alleged ambiguity. In this, we have to agree—at least to a point. Sometimes one reads discussions according to which the lowered/reconstructed/de dicto reading is supposed to be represented by a paraphrase that turns out to be

[23] See also Boeckx 2001 for a critique of Lasnik's position on this point.

just as ambiguous as the target sentence itself. This was already noted by Montague (1973), who said that

(61) A unicorn appears to be approaching.

and

(62) It appears that a unicorn is approaching.

are synonymous, with two readings each. (Of course, the fact that (62) has a wide scope/de re reading of *a unicorn* is actually hard to explain (under the assumption that QR does not easily reach beyond finite clause boundaries), making most analysts reach for special mechanisms like world indices and choice functions. But that is not the point of our debate here, which is instead whether (61) has a lowered/de dicto reading that necessitates some kind of reconstruction. And to establish this, comparing (61) and (62) is indeed fruitless.

As we see it, the proper argument is this: (a) we need to show that (61) indeed has a de dicto reading (and to say what that means in precise terms), and (b) we need to show that this reading cannot be derived from an LF representation in which the subject has wide scope over the modal operator. The conclusion would be that (61) has a reading that can only be accounted for using some kind of reconstruction.

The easiest way of constructing the argument is this. We show that (61) has a reading that is not the de re reading. We then show that when we force the subject to have wide scope, we get only the de re reading. This means that we need to start off by characterizing what the de re reading of (61) would be. This can be done via a paraphrase:

(63) There is a unicorn which appears to be approaching.

(63) is unambiguous and has the important property that it entails that there is a unicorn. Now, we observe that we are not forced to read (61) as having that entailment. In other words, (61) but not (63) could be uttered sincerely by someone who does not believe in the existence of unicorns.

Fox's (2000) example

(64) Somebody from New York is likely to win the lottery.

and its unambiguous de re paraphrase

(65) There is somebody from New York who is likely to win the lottery.

can also be used to make the point. (65) can only be uttered about a bizarre lottery: either it is fixed/fraudulent so that there is somebody from New York who has been predetermined to have a great chance of winning or there is somebody from New York who has bought a large majority of the tickets. We observe that (64) can also be uttered in a more unremarkable scenario where what happened is simply that most of the tickets were sold to New Yorkers.

We think these considerations establish the first part of the argument, that (61) and (64) have readings that are not the de re readings conveyed by (63) and (65). The second part of the

argument comes from May's observation. When the subject binds a pronoun in an additional argument of the modal operator, it cannot be seen as having narrow scope inside the clausal argument of the modal operator. We then observe that the resulting sentences no longer have a reading distinct from the de re reading. Relevant examples of course are these:

(66) A unicorn appeared to its owner to be approaching.

(67) Somebody from New York seems to himself to be likely to win the lottery.

These sentences have only de re readings. (66) entails the existence of a unicorn. (67) can only be uttered about a bizarre kind of lottery (or a deluded New Yorker). The conclusion is that (61) and (64) have additional readings because their subjects are not forced to have wide scope. Therefore, there must be a mechanism that gives their subjects narrow scope.

Lasnik (p. 206) has this to say about May's argument:

> [(68)] some professor$_i$ is believed by his$_i$ students to be a tyrant
>
> It is certainly true that [(68)] cannot be paraphrased as [(69)].
>
> [(69)] *it is believed by his$_i$ students that some professor$_i$ is a tyrant
>
> But it is not clear what we can conclude from the fact that a sentence cannot be paraphrased by an ungrammatical sentence (in this case, one that violates the Weak Crossover Constraint). I will thus continue to tentatively assume that it is not a syntactic operation that is responsible for the ''lowered'' reading of raised indefinites.

But as far as we can see, there is no appeal to (69) in the standard argument. So we don't see how Lasnik's point undermines the argument. We have tried to present the standard view here without making precise what the de dicto and de re readings are. This can be (and has been) done in a precise and explicit semantic system. Once this is done, the empirical argument we rehearsed here is strengthened: de dicto readings are the result of a DP taking narrow scope under a modal operator. Since (61) and (64) have de dicto readings, there must be some kind of reconstruction.

All this still leaves open the choice among many different ways of giving the subject narrow scope. It also leaves open the issue of what restrictions there are on which subjects can be ''lowered,'' to which we now turn.

4.2.2.2 Restrictions on Scope Diminishment The most important contribution of Lasnik's (1999) paper lies in his discussion of the absence of scope diminishment in certain environments. We believe, however, that he draws too strong a conclusion from the data he presents. We think that he is absolutely right in claiming that there is no scope diminishment in most of the cases he presents. However, we do not think that he can therefore conclude that there is no such thing as scope diminishment. One cannot point to islands for extraction and conclude that extraction does not exist. So we do not think that his arguments counteract the considerable evidence amassed over the years that scope diminishment in A-chains exists. Let us take a closer look at what we will consider to be the constraints on scope diminishment that Lasnik has found.

Lasnik shows that negative DPs do not exhibit scope diminishment. The sentences in (70) (Lasnik's (64) and (65)) lack the readings in (71) (Lasnik's (66) and (67)).

(70) a. No large Mersenne number was proven to be prime.
b. No one is certain to solve the problem.

(71) a. It was proven that no large Mersenne number is prime.
b. It is certain that no one will solve the problem.

Lasnik also points out that there is no scope diminishment in (72), as (72) lacks the interpretation that (73) has (his (68) and (69)).

(72) Every coin is 3% likely to land heads.

(73) It is 3% likely that every coin will land heads.

Lasnik makes the assumptions that (a) a QP headed by *every* as in (72) would be expected to undergo scope diminishment, if there were such a thing as reconstruction, and (b) because *likely* is a raising predicate, *3% likely* is also (and therefore, if there were such a thing as scope diminishment, it would manifest itself with *3% likely*).

We agree with Lasnik: it appears that negative quantifiers cannot undergo short or long scope diminishment. In combination with the ECP, this constraint on scope diminishment makes a certain prediction about sentences with epistemic modals and negative QP subjects: namely, that they should be ungrammatical.[24]

(74) *Nobody may have pushed him. (Maybe he just fell.)
(cf. Maybe nobody pushed him. Maybe he just fell.)
a. may $\succ$ nobody — ^{OK}ECP, *Lasnik
b. nobody $\succ$ may — *ECP, ^{OK}Lasnik

(75) *No student may have solved the biology problem.
(cf. It may be the case that no student solved the biology problem.)

(76) *Nobody may be home.
(cf. Maybe nobody is home. It may be the case that . . .)

These, then, are the constraints identified so far:

Constraint A
Strong quantifiers can undergo short scope diminishment. They cannot undergo long scope diminishment.

Constraint B
Negative quantifiers cannot undergo short or long scope diminishment (modulo footnote 24).

Let's go on to (72) and (73) (Lasnik's (68) and (69)). Given constraint A, these sentences do not yet show anything about the predicate *3% likely*. However, even with QPs that can in principle undergo long scope diminishment, this predicate indeed blocks scope diminishment. In

[24] It seems that these examples improve somewhat with the modal *must*. Since we don't know *why* negative quantifiers don't reconstruct so easily, we don't know why sometimes they *can* reconstruct, apparently back under *must*.

(77), only surface scope is possible; in (78), the pronoun cannot be bound by the universal quantifier; and in (79), *a Russian* is interpreted as having wide scope over the elided modal (see Fox 2000 for this test).

(77) A soldier is 3% likely to die in every battle.

(78) Someone from his class seems 3% likely to every professor to be a genius.

(79) An American runner is 3% likely to win a gold medal and a Russian too.

In other words, even with a DP that can in principle undergo scope diminishment, *3% likely* does not permit scope diminishment across it. Why should this be? Either *3% likely* blocks scope diminishment, or *likely* is a raising predicate but *3% likely* is not. The latter is indeed a possibility. For one thing, *likely* can take an expletive subject, but *3% likely* cannot.

(80) There are likely to be many students waiting for you.

(81) *There are 3% likely to be many students waiting for you.

The same holds with the other classical test for raising, namely, idioms.

(82) Advantage is likely to have been taken of John.

(83) *Advantage is 3% likely to have been taken of John.

So perhaps *3% likely* is a control predicate but *likely* is a raising predicate, or possibly, ambiguous between a control and a raising predicate. With a control predicate, of course, we do not expect scope diminishment. This would explain why scope diminishment is not possible across *3% likely*.

In fact, it was Lasnik and Saito (1992) who first proposed that *likely* is ambiguous between control and raising and that *how likely* behaves like a control predicate. Building on their work, Martin (1992) (as reported in Boeckx 2001) observes that *how likely* brings about scopally unambiguous sentences. In (84), only the *someone* $>$ *likely* reading is permitted; that is, no scope diminishment takes place.

(84) How likely to win the lottery is someone from New York?

So if *3% likely* is indeed only a control predicate, then we expect the absence of scope diminishment. Of course, the question remains why *3% likely* could not be a raising predicate. This is indeed a hard question.[25] There is one thing we would like to set the reader's mind at ease about, though.

[25] Partly for this reason, it has been proposed that *3% likely* is indeed a raising predicate but that scope diminishment is blocked in it. This is the position taken by Boeckx (2001), who agrees with Sauerland (1999) that there is only one *likely* and it is always a raising predicate. He claims that *3%* is a quantificational element and the reason that it does not display scope diminishment is that it blocks the lowering of the QP (for Boeckx, scope diminishment in A-chains is due to actual lowering).

The status of (81) is attributed by Boeckx to a similar blocking effect: the presence of a degree head blocks the Agree relationship between the expletive and its associate. It is unclear what he would say about (83), as he does not discuss such examples. Is it possible for a quantificational head to cause intervention effects in an Agree relationship? Maybe a quantificational/degree element can cause an intervention effect in QL, as this is compatible with the spirit of Relativized Minimality to which Boeckx attributes his reasoning. But that an intervening quantificational/degree element

It may not be an attractive solution to say that *3% likely,* unlike *likely,* is a control predicate. However, that may be just how things are. It has proven impossible to tell what sets the class of raising predicates apart. Of all propositional predicates, which ones permit a raising alternative? What, for example, is the difference between *likely* and *possible* such that the former is a raising predicate and the latter is not? It almost seems like a lexically idiosyncratic property.[26] And it could be, for instance, that the adjective *likely,* when it is amount-modified like *3% likely* or *how likely,* is more like *possible* than it is like unmodified *likely.* After all, *3% likely* is closer to the meaning of *possible* than it is to the meaning of *likely,* which indicates high probability.

In short, maybe *3% likely* does not show scope diminishment because it is not a raising environment to begin with.[27]

To summarize: There are constraints on A-reconstruction. These constraints are very interesting, and future research will reveal much about the nature of A-chains. However, we have no reason to abandon the position that scope diminishment in A-chains does exist. This means that it is possible to appeal to scope diminishment to satisfy the ECP in cases where the QP linearly precedes the epistemic modal.

5 Scoping Mechanisms without Movement

We have said that the ECP constrains the relation between a quantifier and its trace. We therefore predict that if there are scoping mechanisms that do not involve movement, they should be able to apply across epistemic domains. Recent work on the syntax-semantics interface has indeed explored several such mechanisms. We will look at two prominent kinds of cases: (a) pseudoscope indefinites and (b) generic indefinites.

5.1 Pseudoscope Indefinites

Here are two examples of indefinites that can be read with wide scope for the indefinite even though the indefinite appears in what is otherwise assumed to be a domain out of which scope-

should cause problems for an Agree relationship does not follow straightforwardly from the spirit of Relativized Minimality. Nor is it clear that it actually does.

(i) There is always a chair in this room.

So it is not clear why the absence of scope diminishment with *3% likely* should be due to a blocking effect.

[26] We would like to note that of the many adjectives that Quirk et al. (1972) list as occurring in the frame *it is A that . . .*, only three are raising predicates. Anything can be said about such a small class.

[27] We would like to add that, even though *3% likely,* if proven to be a control predicate, may not belong to this class, it may well be that there are raising predicates that do not permit scope diminishment of DPs that do otherwise (i.e., with other predicates) undergo scope diminishment. For example, (i) is ambiguous, but with raising predicates of ''universal force,'' modified numerals seem to us to have only wide scope. That is, scope diminishment is blocked in (ii).

(i) At least/At most 50 cheetahs are likely to be born this year.

(ii) At least/At most 50 cheetahs are certain/guaranteed to be born this year.

affecting quantifier movement is impossible:

(85) Everyone reported that John had insulted Max and some lady.

(86) Each teacher overheard the rumor that the dean had summoned a student of hers.

A much-explored approach to this phenomenon employs choice-functions in interpreting such indefinites.[28] It assumes representations roughly like these:

(87) $\exists$f: everyone reported that John had insulted Max and f(lady)

(88) each teacher$_i$ $\exists$f: x_i overheard the rumor that the dean had summoned f(student of hers$_i$)

Now, as hinted above, since this choice-function mechanism does not involve long-distance quantifier movement of the indefinite, we expect it to be able to apply across epistemic modals.

(89) Everyone reported that John may have insulted Max and some lady.

This sentence is correctly predicted to have a reading equivalent to 'There is some lady such that everyone reported that it may be the case that John insulted Max and her'. But it achieves that reading without moving *some lady* (or *Max and some lady*) across the epistemic modal and out of the embedded clause—and therefore, it is not a counterexample to the ECP. The same applies to a variant of (86).

(90) Each teacher overheard the rumor that the dean may have summoned a student of hers.

The power of the choice-function mechanism should of course also apply in simpler examples. So, we expect a pseudo-wide-scope reading of the indefinite even in examples where the indefinite is not buried in some lower clause.

(91) John may have invited two friends of his from Texas.

This will be interpreted as follows: 'There is a way f of choosing elements from sets such that it may be the case that John invited the element that f chooses from the set of pluralities which are two friends of John's'. This reduces to 'There is a particular plurality of two friends of John's such that it may be the case that John invited this plurality'.

It is crucial that the reading that the choice-function mechanism produces for (91) be a wide scope collective reading of *two friends of John's.* The mechanism cannot produce a wide scope distributive reading. Such a reading could only be produced by treating *two friends of John's* as a distributive quantifier and moving it across the modal, which is ruled out by the ECP. Hence the unacceptability of example (13), repeated here:

(92) #Two friends of John's from Texas may have come to visit him this weekend, but they can't both have come (because they hate each other).

[28] See Reinhart 1997a,b, Winter 1997, and Kratzer 1998, among others.

5.2 Generic Indefinites

We would like to mention one other kind of scoping mechanism that does not involve quantifier movement. We assume that generic readings of indefinites are produced by having a covert generic operator bind the variable introduced by an indefinite.[29] The indefinite itself is not a quantifier. So, even if the indefinite needs to move to ensure that it ends up in the restrictor of the generic operator (which is for example part of the analysis of such sentences in Heim 1982), this will not result in a configuration where a quantifier binds its trace across an epistemic modal. We therefore expect generic indefinites to be able to have scope over epistemic modals.

(93) a. A dog may well be asleep when his eyes are open.
Dogs may well be asleep when their eyes are open.
b. Gen [λx. dog x & his_x eyes are open] [λx. may [x be asleep]]

Our expectation seems to be borne out.[30] This possibility offers another way of approximating in a grammatical fashion the meaning that (17) tries to express but cannot.

(94) a. A/Any student whose light is on must be awake.
b. Gen [λx. student x & x's light is on] [λx. must [x be awake]]

Here as well, the generic quantifier binds the variable introduced by the indefinite *a student* or the ''free-choice'' indefinite *any student.* No quantifier has moved across the epistemic modal. The sentence is acceptable and expresses something very close to the intended meaning of (17). What is different is that this is a generic quantification and not the merely universal quantification that (17) wants to express.[31]

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[29] This analysis is found in Heim 1982 and many subsequent works. It is of course controversial, so we will need to investigate whether our view of the ECP is an argument for this approach against one that builds the generic quantificational force into the meaning of the indefinite NP itself. For now, we will simply assume that the account involving a covert generic operator is correct.

[30] Note that examples can also be constructed where generic claims are in the scope of an epistemic modal operator.

(i) Q: Why is Chaucer so grumpy?
A: I don't know much about dogs.
a. Maybe dogs do not like it when you blow in their faces.
b. Dogs may not like it when you blow in their faces.

[31] Note that we have now provided the discussion promised in footnote 7. This concludes the article.

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