# Epistemic Bias in Embedded Polar Questions

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# Introduction: Embedded polar questions

- Observation 1: 'outside' negation polar questions (ONPQs) and 'inside' negation polar questions (INPQs) show asymmetries in embedded environments:
  - INPQs, which are typically associated with a bias towards the negative answer and license NPIs, appear to embed freely.
  - ONPQs, which have a bias towards the positive answer and do not license NPIs (Ladd 1981), show variable acceptability.

(1) a. John is wondering if/whether Mary doesn't like spinach (either/too).
b. John is asking if/whether Mary doesn't like spinach (either/too).
c. John knows if/whether Mary doesn't like spinach (either/*too).
d. John remembers if/whether Mary doesn't like spinach (either/*too).
e. Whether Mary doesn't like spinach (either/too) is not very clear to John.

# Introduction: Embedded polar questions

- Observation 2: 'outside' negation polar questions (ONPQs) share various properties with sentences containing a subjective epistemic modal.
    - Subjective epistemics correspond to the evaluation of a proposition through the invocation of less widely accepted evidence, and hence highlight a personal belief state, whereas the evaluation of objective epistemics invokes evidence accepted by the relevant community (Lyons 1977, Papafragou 2006, Tancredi 2007, Anand & Hacquard 2009)
- Subjective epistemics obligatorily take very wide scope (e.g. Drubig 2001, Von Fintel & Iatridou 2003). The same is true of negation in ONPQs (see Ladd 1981 and much subsequent literature).
- Subjective epistemics give rise to scope freezing effects (Constantinou & Van de Koot 2015). As will be shown, negation in ONPQs does too.

# The proposal in a nutshell

- **Hypothesis 1**: The embedding restriction observed with ONPQs is tied up with the presence of a subjective epistemic bias.
- More specifically, we attribute the presence of a subjective epistemic evaluation in an ONPQ to the fact that it contains a verum operator in the scope of a question operator (see Romero & Han 2004).
  - When one asks an ONPQ regarding *p*, one is asking the interlocutor for assistance in the re-evaluation of one's private belief that *p*.
  - In addition, an ONPQ is indexical, just like a subjective epistemic, in the sense that the worlds in the conversational background in which *p* is true are restricted to what the speaker knows as of the time of utterance.

# The proposal in a nutshell

- We explore the idea that certain predicates have selectional properties that are incompatible with the expression of a subjective epistemic bias.
- We propose an analysis that links this incompatibility to the very wide scope of subjective epistemics.

# The proposal in a nutshell

- **<u>Hypothesis 2</u>**: the scope freezing effects found with ONPQs result (indirectly) from the presence of a subjective epistemic operator, which must take very wide scope (namely the verum operator).
- More specifically, Constantinou & Van de koot (2015) analyze the scope freezing effects with subjective epistemic modals as resulting from obligatory covert scope extension.
- ONPQs involve (obligatory) scope extension of negation, which must outscope the verum operator. As a result, Constantinou & Van de Koot's account of scope freezing with epistemic models generalises to ONPQs.

# The proposal in a nutshell

- The proposal has implications for INPQs.
- These may also carry an epistemic bias but do not have to.
- We therefore predict that the embedding restrictions should manifest themselves when the epistemic bias is present.
- We will show that this is correct.

# Plan for the talk

1. We begin by exploring observation 2, namely that outside negation has several properties also found with subjective epistemic modals and show that
   - both induce Epistemic Containment;
   - both exhibit further peculiar scope-freezing effects;
2. We then present an account of the scope freezing facts involving subjective epistemics and show how it generalises to ONPQs.

- In a nutshell, scope extension by a category A freezes the scope of other scope-taking elements in A's path of scope extension.
- In a sentence with a subjective epistemic modal, that modal extends its scope; in an ONPQ, it is negation (which must outscope the verum operator)

# Plan for the talk

3. We then return to observation 1, the embedding restriction found with ONPQs:
   - On the hypothesis that ONPQs involve a subjective epistemic attitude, we expect ONPQs and clauses containing a subjective epistemic modal to pattern together.
   - We show that this is borne out: both outside negation and subjective epistemic modals resist embedding under veridicals, factives and proffering predicates.
4. Of course, we would then like to address the question of what is responsible for the embedding constraint.
   - Intuitively, this is a simple matter. The problematical embedding predicates are factive or veridical when they take a *that*-clause, and such environments have been argued to be unsuitable for the expression of a subjective epistemic bias (Lyons 1977 and subsequent work).
   - But there are obvious obstacles:
     - polar complements do not give rise to factive presuppositions
     - in what sense can a verb with a polar complement be called veridical?
   - We propose an analysis that gets around these obstacles and that simultaneously captures why factivity/veridicality is incompatible with the expression of a subjective epistemic attitude.

# Plan for the talk

5. We conclude with a look at the behaviour of INPQs:

   - We show that these also exhibit the embedding restrictions. In particular, they are unable to be associated with an epistemic bias when embedded.
   - We provide some tentative data suggesting that biased INPQs do not give rise to scope freezing, but more informant work is needed to put this on am empirically firmer footing.

# Part1

# Observation 2: Similarities between outside negation and subjective epistemic modals

# Epistemic containment

- Epistemic Containment Principle (ECP): A QP cannot have scope over an epistemic modal (Von Fintel & Iatridou 2003: 174)
- Subsequent work explores the relevance of subjectivity (e.g. Papafragou 2006, Tancredi 2007, and Anand & Hacquard 2009)

(2) a. # Every party guest might be the murderer (but not every one of them can be the murderer).
(every > might relatively inaccessible)

b. Given the currently available evidence, every party guest might be the murderer.
(every > might easily accessible)

(3) #Every guest is perhaps/possibly the murderer.

a. Perhaps/possibly every guest is the murderer.
(inconsistent, satisfies ECP)

b. For each guest x, x is perhaps/possibly the murderer.
(consistent, *ECP)

# Epistemic containment with outside negation

(4) [Context: I had 30 students in my final year syntax class. They all passed the coursework, but to obtain their degree, they had to pass my exam. For about 10 of them, I was almost certain that they would. My TAs marked all the scripts and I ask ...]
#Haven't fewer than half of the students managed to pass the exam?

- That the unacceptability of (4) results from the fact that the context forces wide scope for the QP is corroborated by the fact that the same example is compatible with the context in (5), which facilitates the narrow scope reading that QP.

(5) [Context: I have 30 students in my final year syntax class and it is a weak cohort. They all passed the coursework. However, they also all have to pass my exam. Usually, around half of each year's cohort manages to pass the exam, as it is very hard. Now I'm pretty certain that not even half will pass it. My TAs marked all the scripts and I ask ...]

Haven't fewer than half of the students managed to pass the exam?

# Further scope freezing effects with subjective epistemic

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| (6) | a. | Waarschijnlijk | heeft | tenminste | één | student | ieder | artikel | gelezen. |
| | | *probably* | *has* | *at-least* | *one* | *student* | *every* | *article* | *read* |
| | | (∃>∀;∀>∃) | | | | | | | |
| | b | Tenminste | één | student | heeft | waarschijnlijk | ieder | artikel | gelezen. |
| | | *at-least* | *one* | *student* | *has* | *probably* | *every* | *article* | *read* |
| | | (∃>∀;*∀>∃) | | | | | | | |
| | c. | Tenminste | één | student | heeft | ieder | artikel | waarschijnlijk | gelezen. |
| | | *at-least* | *one* | *student* | *has* | *every* | *article* | *probably* | *read* |
| | | (∃>∀;*∀>∃) | | | | | | | |
| | | ‘At least one student has probably read every article.’ | | | | | | | |

- In (6a), two QPs occur in the c-command domain of *waarschijnlijk* ‘probably’. Naturally, this sentence may receive a surface scope interpretation, but for a subset of Dutch speakers the inverse scope reading is available as well.
- However, for these speakers the inverse scope reading becomes inaccessible as soon as one of the quantifiers c-commands the epistemic adverb, as in (6b). More remarkably, the scope freezing effect is also present if *waarschijnlijk* is c-commanded by both QPs, as in (6c).

# Parallel scope freezing effects with outside negation

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| (7) | a. | Had | niet | tenminste | één | student | ieder | artikel | gelezen? |
| | | *had* | *not* | *at-least* | *one* | *student* | *every* | *article* | *read* |
| | | ONPQ: ∃>∀; ∀>∃ | | | | | | | |
| | b. | Had | tenminste | één | student | niet | ieder | artikel | gelezen? |
| | | *had* | *at-least* | *one* | *student* | *not* | *every* | *article* | *read* |
| | | ONPQ: ∃>∀;*∀>∃ | | | | | | | |
| | c. | Had | tenminste | één | student | ieder | artikel | niet | gelezen? |
| | | *had* | *at-least* | *one* | *student* | *every* | *article* | *not* | *read* |
| | | ONPQ: ∃>∀;*∀>∃ | | | | | | | |

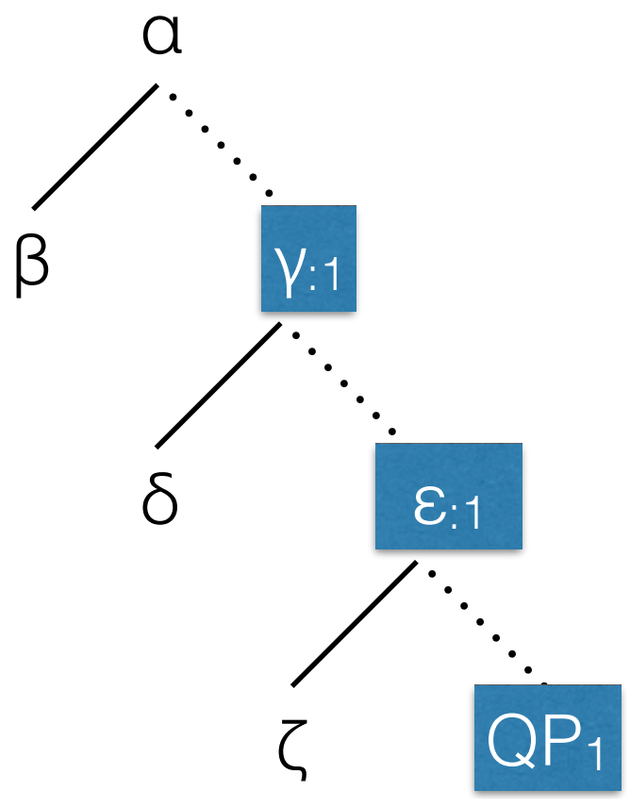
- The data in (7) show acceptability and scope judgments for an ONPQ containing an indefinite and a universal.
- Only (7a), with the very high negation not found with INPQs, allows inverse scope. This parallels (6a).
- When negation is sandwiched between the two quantifiers, as in (7b), scope inversion is blocked.
- Most remarkably, low negation (as in (7c)) also blocks scope inversion.
- The facts in (7b,c) parallel those in (6b,c).

# Part 2
# Accounting for the scope facts

# Accounting for the scope freezing effects

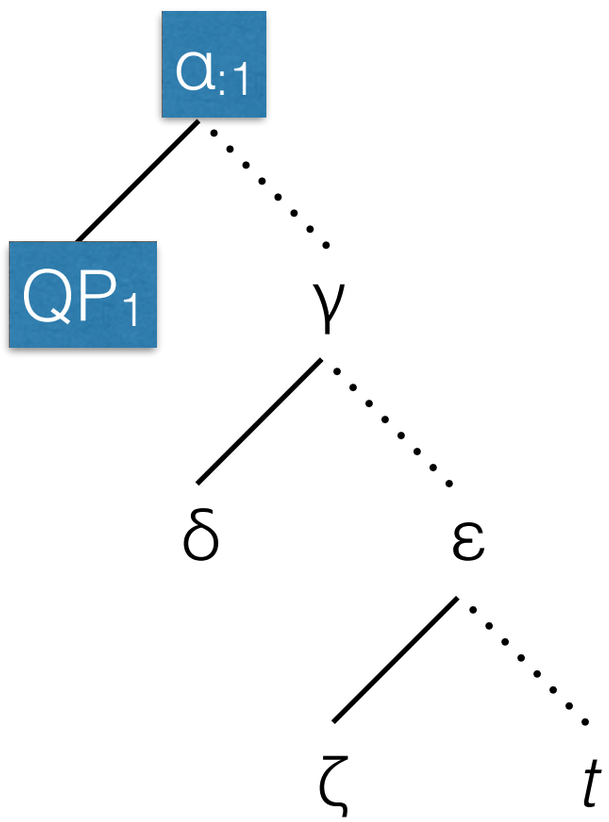
- Constantinou & Van de Koot (2015) account for Epistemic Containment and related scope freezing effects with subjective epistemic modals by
  - assuming that these modals must mark clausal scope and
  - adopting a theory of scope that predicts minimality effects: if QP2 is in the scope extension path of QP1, then QP2 cannot extend its scope as well (the Condition on Scope Shift of Neeleman & Van de Koot 2012).
- If outside negation is like a subjective epistemic modal in its scope taking properties, then we can extend our account of Epistemic Containment and scope freezing effects in sentences with subjective epistemic modals to those containing outside negation.
- I therefore briefly summarise the scope theory.

# A novel syntactic encoding of scope



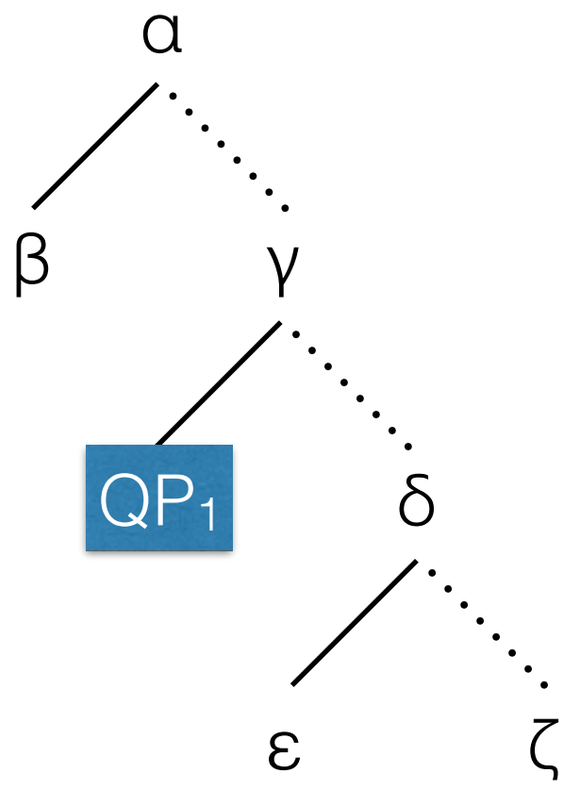

- An argument QP carries a scope index that may be percolated to a dominating node to mark the QP's extended scope (Williams 1994)
- The scope of $QP_1$ in the tree on the left corresponds to the largest category that carries its scope index (γ), minus the QP itself.
- We place inherited indices after a colon (to distinguish them from an index introduced by a quantifier, which precedes the colon).

# A novel syntactic encoding of scope




- In some languages, the scope of a QP argument may also be marked through movement (such scope-motivated movement is found in German and Japanese, for example).
- Following the spirit of Williams's proposals, we assume that the scope of a moved QP is marked in the landing site, through percolation of the QP's scope index to its mother node.
- Thus, the scope of QP in the tree on the left is **α** minus QP.

# A novel syntactic encoding of scope




- An argument QP may also fail to percolate a scope index altogether.
- In that case, it takes surface scope.
- So the scope of $QP_1$ in the tree on the left is δ.

# A condition on scope shift

(8) *Condition on Scope Shift (CSS)*
No node may inherit two scope indices.

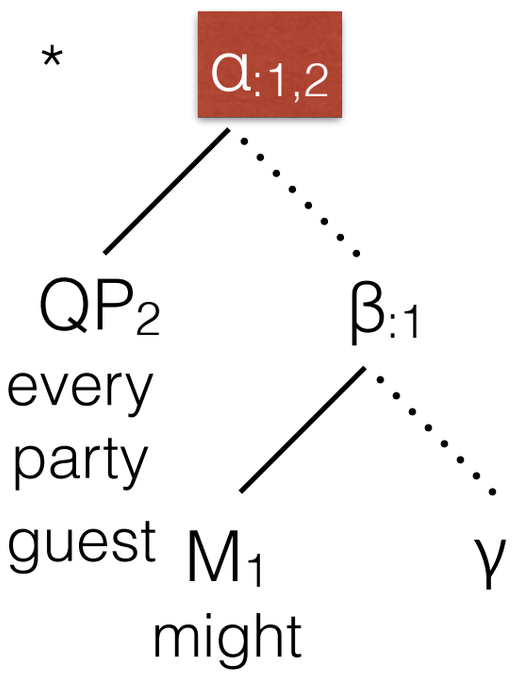
(Neeleman and Van de Koot 2012)

- We combine the index-based marking mechanism with the Condition on Scope Shift in (8).
- There is much I must gloss over here in the interest of time.
- One such issue is that the CSS is incompatible with the widely held view that there is a syntactic level of Logical Form (LF) that provides a transparent and complete representation of scope relations (Chomsky 1976; May 1977).
- It is better aligned with the alternative view of scope according to which LF only represents deviations from surface scope (see Reinhart 1983,1995, 2006; see also Lakoff 1972, Huang 1982 and Hoji 1985).
- On this view, scope extension is limited to structures in which it generates an interpretation that is otherwise unavailable.

# A CSS-based account of the containment

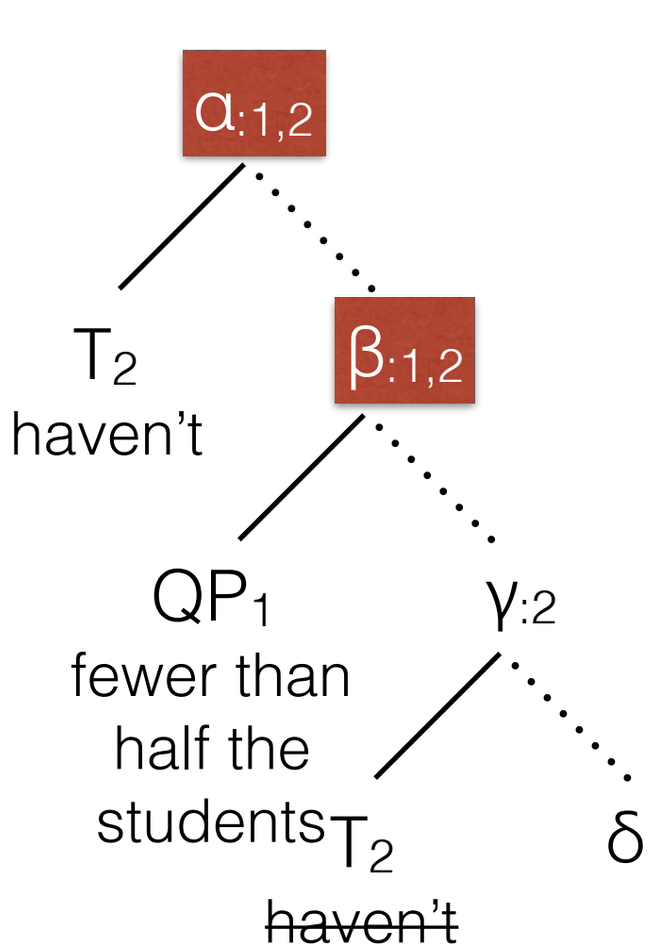
| | |
|---|---|
| (9) | *Scope of Subjective Epistemic Modality (SSEM)*<br>A category carrying subjective epistemic modality must mark widest scope in its clause (by percolating its quantificational index). |

- We now adopt (9) and derive the ECP effect in (2a) from the CSS.



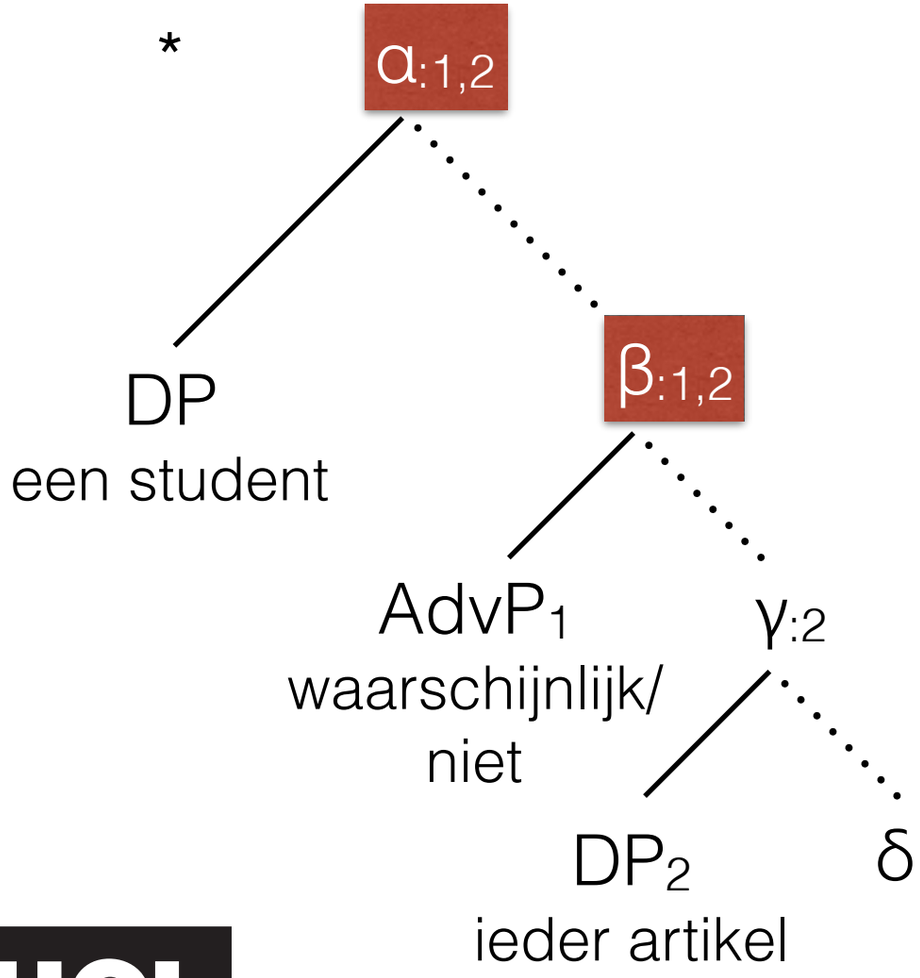
# A CSS-based account of containment with ON

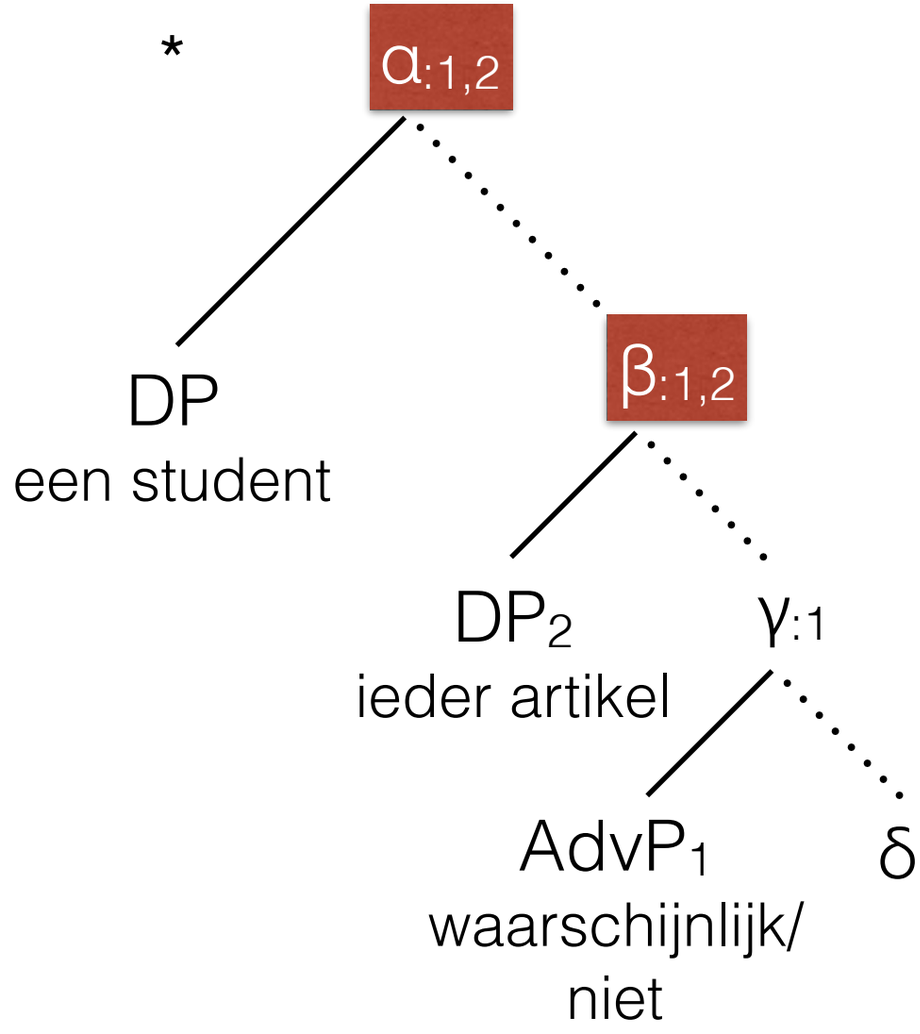
- The containment effect in (4), with outside negation, receives a parallel account: if outside negation must mark clausal scope, then the QP *fewer than half the students* cannot also percolate an index to outscore negation.



# Capturing further scope freezing effects

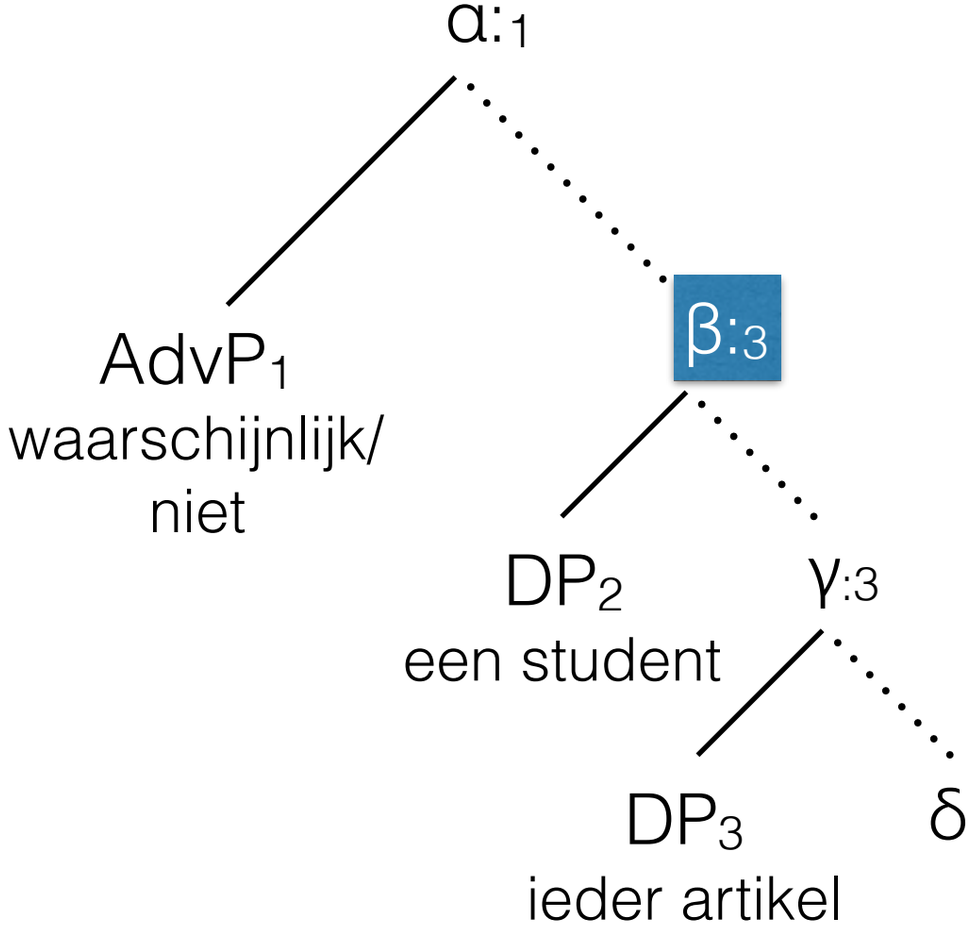
- To rule out the inverse scope reading of (6b), with the subjective epistemic adverb *waarschijnlijk* 'probably', and of (7b) with outside negation, it would suffice to assume that the index of these adverbs percolates to its mother node, since that would block scope extension of the universal below it.
- However, the scope freezing effects in (6c) and (7c) can only be understood if the index of these adverbs percolates to the top of the clause.



# Capturing further scope freezing effects

- The wellformedness of (6a) and (7a) on the inverse scope reading falls out from the fact that the percolation path of the universal may terminate in β (highlighted). Hence it does not overlap with the percolation path of negation or the epistemic adverb.



# Part 3
# Observation 1: embedding restrictions with ONPQs and subjective epistemics

# Embedding parallels

- If ONPQs involve subjective epistemic modality, then we should expect constraints on where subjective epistemics can appear to apply to outside negation as well.
- Epistemic modals can only appear in the complement of attitudes of acceptance (see (10a)). These are attitudes that are said to be correct whenever the proposition expressed by their complement is true (Stalnaker 1984). They will not embed under bouletics (see (10b)). (Examples from Anand & Hacquard 2009).
- We therefore predict outside negation to be impossible under bouletics as well. This prediction is confirmed by the data in (11).

| | | | |
|---|---|---|---|
| (10) | a. | | John {believes, argues, assumed} that the Earth might be flat. |
| | b. | * | John {hopes, wishes, commanded} that the Earth might be flat. |

| | | | |
|---|---|---|---|
| (11) | a. | * | John cares if/whether Mary doesn't like spinach, too. |
| | b. | * | Whether Mary doesn't like spinach too is important to me. |

# Embedding parallels

- Among the attitudes of acceptance, doxastic predicates like *wonder* and *ask* clearly do not trigger any factive presupposition.
- They should therefore lack whatever property interferes with subjective epistemics and outside negation.
- We have already seen that this is correct for outside negation.
- They also allow subjective epistemics (see (12)) and exhibit ECP effects in their complements (see (13)).

| | | | |
|---|---|---|---|
| (12) | a. | | John is wondering whether Mary perhaps likes spinach. |
| | b. | | John is asking whether oil perhaps floats on water. |

| | | | |
|---|---|---|---|
| (13) | a. | # | Holmes wondered whether every party guest might be the murderer. |
| | b. | # | Holmes asked whether every party guest might be the murderer. |

# Embedding parallels

- Semi-factive doxastics like *know* and *remember* do trigger a factive presupposition when combined with a *that*-clause.
- We have already seen that these verbs are incompatible with embedded ONPQs (see (1c,d) repeated as (14a) below).
- They should therefore also resist having subjective epistemics embedded under them, as confirmed by (14b).
- In line with this behaviour, these verbs do not trigger Epistemic Containment in their complement, as shown by the fact that the wide scope reading for the universal in (15a,b) seems quite accessible.

| | | | |
|---|---|---|---|
| (14) | a. | * | John knows/remembers whether Mary doesn't like spinach, too. |
| | b. | ?? | John knows/remembers that Mary perhaps likes spinach. |
| | | | |
| (15) | a. | | Holmes knows that every guest might be the murderer. |
| | b. | | Holmes remembered that every guest might be the murderer. |

# Embedding parallels

- Similarly, the subjective epistemic reading of *may* in (16a) is unavailable in the polar complement of *know*, while the objective reading in (16b) is unproblematical.

| | | | |
|---|---|---|---|
| (16) | a. | * | John knows whether it may rain tomorrow (according to his personal beliefs). |
| | b. | | John knows whether it may rain tomorrow (according to the weather forecast). |

# Embedding parallels

- The facts in (17a,b) indicate that veridical and veridical responsive predicates pattern with factives. (The judgment for (17b) assumes that its complement is read as an ONPQ).
- Such predicates also do not trigger Epistemic Containment in their complement, as confirmed by the fact that the wide scope reading for the QP is very accessible in (17c):

| | | | |
|---|---|---|---|
| (17) | a. | * | John will correctly predict that the bakery is perhaps just around the corner. |
| | b. | * | John will correctly predict whether the bakery isn't just around the corner. |
| | c. | | John will correctly predict that every party guest might be the murderer. |

# Embedding parallels

- Non-veridical predicates, by contrast, do seem to be able to embed subjective epistemics, as well as outside negation, as shown in (18a,b).
- This then leads us to expect that such verbs might also trigger Epistemic Containment, and that too appears to be the case, as illustrated in (18c).

| | | | |
|---|---|---|---|
| (18) | a. | | John conjectured that the bakery was perhaps just around the corner. |
| | b. | | John conjectured (about) whether the bakery wasn't just around the corner. |
| | c. | # | John conjectured that every party guest might be the murderer. |

# Embedding parallels

- A final class of verb that exhibits factive characteristics is formed by verbs of proffering.
- Anand & Hacquard (2009) analyze these as reports of discourse moves which attempt to settle an issue
- The 'objective' (= non-subjective) reading of the complement of proffering predicates is then attributed to the evaluation of the proposition in the projected common ground of the discourse move, where the issue has been adopted by all participants.
- Note that the objective reading of the complement concerns a non-actual common ground. It is the objective of the discourse move to move the participants to acceptance of this non-actual common ground.

# Embedding parallels

- If the embedding parallel we are pursuing stands up to scrutiny, then outside negation should be unavailable in the complement of verbs of proffering, which is indeed the case, as shown in (19).
- The findings with outside negation are mirrored by the relative unacceptability of subjective epistemic modals in the complement of such verbs (see (20)).

| | | | |
|---|---|---|---|
| (19) | a. | * | John implied whether Mary doesn't like spinach, too. |
| | b. | * | John demonstrated whether oil doesn't float on water. |

| | | | |
|---|---|---|---|
| (20) | a. | * | John implied that Mary perhaps likes spinach. |
| | b. | * | John demonstrated that oil perhaps floats on water. |

# Questions about the embedding parallels

- The embedding parallels just reviewed confirm our hypothesis that ONPQs involve a subjective epistemic attitude.
- But they are really quite remarkable for two reasons:
  - Assume for a moment that it is obvious that the expression of a subjective epistemic bias is incompatible with a factive or veridical environment.
  - Why should this pattern persist with polar complements? In what sense can such complements be considered factive or veridical?
  - If they cannot be considered factive or veridical, then one would have thought that polar complements should invariably present the perfect conditions for the expression of an epistemic bias, contrary to what we find.

# Questions about the embedding parallels

- But why should the expression of a subjective epistemic bias be incompatible with a factive or veridical environment?
- Suppose these environments involve an attitude holder and that the factive presupposition or the veridical entailment is somehow ‘guaranteed’ by that attitude holder.
- Then obviously that attitude holder cannot simultaneously entertain a subjective epistemic attitude towards the relevant proposition.
- But why can that subjective epistemic attitude not be attributed to some other attitude holder (say, the speaker)?
- This is precisely what happens in dialogues, where a factive or veridical ‘attitude’ towards a proposition does NOT disqualify an interlocutor from expressing a subjective attitude towards that same proposition.

# Embedding matters

(21) [Context: Frank has died. His children John, Bill and Mary are awaiting the reading of his will by Frank's lawyer Richard, that evening at 9 pm. John is the black sheep of the family and it is not clear whether he will get his fair share of the inheritance, although John, Bill and Mary all expect Frank to have been even-handed. At 4 pm Richard, who of course already knows what is written in the will, walks into the room where Bill and Mary are having tea and says: "Guess what! …]

#John has just correctly predicted whether he won't get a third of the inheritance(, too).

(22) [Context: Frank has died. His children John, Bill and Mary are awaiting the reading of his will by Frank's lawyer Richard, that evening at 9 pm. John is the black sheep of the family and it is not clear whether he will get his fair share of the inheritance, although John, Bill and Mary all expect Frank to have been even-handed. At 4 pm Richard, who of course already knows what is written in the will, walks into the room where Bill and Mary are having tea and says: "Guess what! John has just correctly predicted whether he will get a third of the inheritance." At this point Mary looks at Bill and says…]

Well, won't John get a third of the inheritance(, too)?

# Part 4:
# Capturing the embedding restrictions

# Capturing the embedding restriction

- We adopt Romero & Han's (2004) analysis of ONPQs as involving a verum operator in the immediate scope of the question operator.
- There are two potential implementations:
  - Verum may be base-generated just below Q (in line with SSEM), with negation percolating its scope index to the node directly dominating it:
    - LF: [$_{CP}$ Q [$_{:1}$ VERUM [$_{IP:1}$ … not$_1$ …]]]
- Alternatively, verum is part of a semantically complex negative operator not-verum, and it is this complex operator that takes wide scope, in line with SSEM:
  - LF: [$_{CP}$ Q [$_{IP:1}$ … not-verum$_1$ …]]]

# Capturing the embedding restriction

- Second, we assume that the factive or veridical import of a predicate is encoded through the presence of an operator that scopes over the embedded proposition.
- We furthermore assume that this operator is present whether the complement of the predicate is semantically a proposition or a question (a set of polar alternatives; see Spector and Égré 2015 for a related proposal).
- If it is a question, the operator is located below the question operator and thereby encodes that the answer to the embedded polar question should be taken to be true.
- This does not, of course, result in a factive presupposition (or a veridical entailment), since the complement of, say, *know* when it selects a question is not a proposition, but a set containing two factive polar alternatives.

# Capturing the embedding restriction

- The presence of the factive operator in an embedded polar question does have the effect of
  - encoding that the subject stands in the relation expressed by the matrix predicate to a true proposition and
  - triggering existence presuppositions for indefinites in the polar complement of such predicates,
  - and for predicting that such presuppositions are absent in the complement of non-factive predicates like wonder.
- This seems correct.

| | | | |
|---|---|---|---|
| (23) | a. | | John is wondering whether Mary owns a unicorn.<br>>/> Unicorns exist. |
| | b. | ? | John knows whether Mary owns a unicorn.<br>>> Unicorns exist. |

# Capturing the embedding restriction

- We analyze proffering predicates and veridical predicates analogously. Recall that Anand & Hacquard analyze proffering predicates as encoding a kind of modalized factivity: the complement is treated as a fact in the projected common ground.
- This approach is supported by the fact that these predicates pattern with true factives in triggering existence presuppositions for indefinites in their complement. That veridical predicates should do so, too, is of course expected.

| | | | |
|---|---|---|---|
| (24) | a. | | John believes that Mary owns a unicorn.<br>>/> Unicorns exist. |
| | b. | ?? | John implied that Mary owns a unicorn.<br>>> Unicorns exist. |
| | c. | * | John correctly predicted that Mary owns a unicorn.<br>⊨ Unicorns exist. |
| | d. | * | John regrets that Mary owns a unicorn.<br>>> Unicorns exist. |

# Capturing the embedding restriction

- With these assumptions in place, the embedding restrictions on subjective epistemic modals (including outside negation) follow from the combined effect of selection for factivity, the wide scope requirement for subjective epistemic modality (SSEM), and the condition on scope shift (the CSS).
  - Selection for factivity is only satisfied with the factive operator taking widest scope.
  - SSEM is only satisfied with the subjective epistemic operator taking widest scope.
  - Finally, the CSS is violated if the operators both attempt to "share" widest scope by both percolating an index to the same node.

# Capturing the embedding restriction

- The proposal correctly predicts that ONPQs under semi-actives like *know* should be possible when the factive presupposition is cancelled under negation (25b), epistemic downgrading (25b), and yes/no question formation (25c).
- Note that the epistemic bias in (25a-c) may be attributed to the speaker or some other discourse participant whose epistemic bias regarding Mary's liking of spinach is at issue.
- Finally, given the indexical properties of subjective epistemics (Papafragou 2006), we should expect embedding of an ONPQ under *know* to improve if the polar alternatives concern an issue whose outcome can only be determined in the future. As the acceptability of (22d) shows, this prediction is also borne out.

| | | | |
|---|---|---|---|
| (25) | a. | | John doesn't know if/whether Mary doesn't like spinach (too). |
| | b. | | John might know if/whether Mary doesn't like spinach (too). |
| | c. | | Does John know if/whether Mary doesn't like spinach (too)? |
| | d. | | John will know tomorrow evening if/whether Mary doesn't like spinach (too). |

# Part 5:
# Epistemic bias with INPQs

# Capturing the embedding restriction

- The proposals we have put forward for ONPQs have implications for INPQs.
- As is well-known, these may also carry an epistemic bias but do not have to.
- We predict that the embedding restrictions should manifest themselves when the epistemic bias is unambiguously present.
- This seems correct.

| | | | |
|---|---|---|---|
| (26) | a. | | John is asking whether Mary does not like spinach (either). |
| | b. | | John is asking whether Mary does NOT like spinach. (He previously believed that she did.) |
| | c. | | John knows whether Mary does not like spinach (either). |
| | d. | * | John knows whether Mary does NOT like spinach. (He/I previously believed that she did.) |
| | e. | | John will demonstrate whether Mary does not like spinach (either). |
| | f. | * | John will demonstrate whether Mary does NOT like spinach. (He/I believe(s) that she does.) |

# Capturing the embedding restriction

- Whether INPQs are associated with scope freezing effects is less easily decided.
- On the one hand, the very high position of negation is systematically impossible in INPQs (see (27a)).
- When negation is very low, as in (27c), my impression is that inverse scope is available. If this is correct, it would support an implementation of Romero and Han's theory with the verum operator generated independently of negation. Negation would then simply not extend its scope.
- But when negation occupies the intermediate position, as in (27b), scope inversions seems unavailable. It is not clear why this should be so.
- If further empirical work were to show that scope freezing effects *are* present, then that might be taken to support the second implementation, where a complex operator verum-not extends its scope.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| (27) | a. | Had | niet/NIET | tenminste | één | student | ieder | artikel | gelezen? |
| | | *had* | *not* | *at-least* | *one* | *student* | *every* | *article* | *read* |
| | | INPQ: * | | | | | | | |
| | b. | Had | tenminste | één | student | NIET | ieder | artikel | gelezen? |
| | | *had* | *at-least* | *one* | *student* | *not* | *every* | *article* | *read* |
| | | INPQ: ∃>∀;*∀>∃ | | | | | | | |
| | c. | Had | tenminste | één | student | ieder | artikel | NIET | gelezen? |
| | | *had* | *at-least* | *one* | *student* | *every* | *article* | *not* | *read* |
| | | INPQ: ∃>∀; ∀>∃ | | | | | | | |

# Summing up

# Conclusions

- Polar questions with an epistemic bias patterns with subjective epistemic modals in resisting embedding under factive and veridical predicates.
- An account of this pattern would seem to require an approach to embedded questions in the spirit of Spector and Égré 2015, as well as some account of the mutual incompatibility of factivity and subjective epistemic bias.
- The proposal put forward here relied on the SSEM and the CSS, the two principles that also featured in our account of the scope freezing effects associated with subjective epistemics.
- Our analysis of ONPQs and INPQs is broadly in line with that of Romero and Han (2004) and the observations reported here may be taken as providing additional support for a proposal along those lines.

Thank you!

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