Encoding strength of exhaustivity within the question nucleus

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September 11, 2013

The goal of this project

- ⋆ Reevaluate the semantics of questions from the perspective of negative polarity items.
- ⋆ Claim that a uniform account of NPIs is possible and requires a minimal change in the semantics of questions.
- ⋆ Show how this change can account for a host of issues, related both to the peculiar distribution of NPIs as well as to other issues pertaining to questions.

Roadmap

- ⋆ Background on NPIs – show why questions pose a problem.
- ⋆ Note the varying acceptability of NPIs in questions and how it's currently analyzed.
- ⋆ Understand why this is not enough to account for the distribution of NPIs.
- ⋆ Argue for a new take on questions and in particular, the weak/strong ambiguity.
- ⋆ Show why question strength correlates with NPI acceptability under this new take.
- ⋆ Argue that we can do away with subcategorization of question-embedding predicates.

1 Background

- ⋆ The distribution of negative polarity items is quite varied:

(1) a. (i) I don't think that Mary ever liked pizza.
(ii) *I think that Mary ever liked pizza.
b. (i) Few/no/at most 10 people have ever heard of linguistics.
(ii) *Many/most people have ever heard of linguistics.

I would like to thank Gennaro Chierchia, Veneeta Dayal, Danny Fox, Uli Sauerland and Maria Polinsky for their comments and suggestions, as well as the three anonymous SuB reviewers.

c. (i) Everyone who has ever taken a math class passed the admission test.
(ii) *Everyone who has taken a math class ever passed the admission test.

d. (i) If she ever wants to visit us, she should give us a call.
(ii) *If she wants to visit us, she should ever give us a call.

e. (i) Only John_{F} has ever failed this class.
(ii) *John_{F} has ever failed this class.

f. (i) Who has ever failed this class?
(ii) *John has ever failed this class.

⋆ What unifies these environments is the fact that they can be shown to give rise to downward entailing inferences, with one exception: **questions**.

1.1 NPIs in questions

⋆ Guerzoni and Sharvit (2007) claim that when it comes to the distribution of NPIs in questions, downward entailing-ness cannot be a factor.

⋆ What would it mean to define a notion of entailment between questions?

- The complete answer to a question entails the complete answer to another question.
- But then we would expect there to be an inference from (2a) to (2b):

(2) a. Who passed a math class?
b. Who passed a calculus class?

⋆ The only reasonable characterization of DE-ness in questions cannot be of help here.

⋆ Guerzoni and Sharvit (2007) argue that even if one found a semantics for questions according to which they are DE, it would still not be enough to understand why NPIs are good in them, because not all types of question license NPIs.

⋆ NPIs are acceptable across the board in direct questions (but see Appendix):

(3) a. Who will bring anything to eat for this party?
b. Which one of you has ever vacationed in Iceland?
c. Did she read any relevant articles?

⋆ However, once we turn to embedded questions, we observe a contrast:

(4) a. Mary knows which boys brought her any gifts.
b. John wonders who has ever been Paris.

c. Chris asked me who took any linguistics classes.
d. Jenny discovered who had ever participated in that competition.

(5) a. *It surprised Mary which boys brought her any gifts.
b. *It amazed her which girls had ever participated in a dance competition.
c. *Jay was disappointed by who sold any antique books.
d. *Will was annoyed at which guys had ever dated his girlfriend.

⋆ The split correlates with an independently noted ambiguity in questions, namely that questions can receive either a weakly or strongly exhaustive reading, depending on the predicate that embeds them (cf. Heim 1994, Beck and Rullmann 1999, a.o.).

1.2 Exhaustivity in questions

⋆ The questions in (4) receive a strongly exhaustive (SE) interpretation while those in (5) a weakly exhaustive (WE) interpretation.

⋆ In a nutshell, different strength amounts to different answers, i.e. predicates differ with respect to which answer to the embedded question they make reference to:

- For Mary to know who brought her gifts, she needs to know for every boy who brought her gifts that he did, and for every boy who didn't bring her gifts, that he didn't.
- For Mary to be surprised by who brought her gifts, she must be surprised by the boys that brought her gifts (i.e. someone she didn't expect to bring gifts ended up bringing gifts); she doesn't need to be surprised by someone who didn't.

⋆ NPIs are only acceptable in questions that receive a strongly exhaustive (SE) reading:

- the predicates in (4) embed SE questions → NPIs are acceptable
- the predicates in (5) embed WE questions → NPIs are not acceptable
- root questions are always SE → NPIs are acceptable

⋆ How can we account for the correlation between the strength of the question and the distribution of NPIs?

- What is it about being interpreted as strongly exhaustive that makes a question license NPIs?

⋆ Guerzoni and Sharvit (2007) claim that there is no way to account for this correlation; i.e. that SE questions are 'no more DE' than WE questions:

→ Appeal to a "multi-layered approach in which both entailment reversal and strength of exhaustivity of the hosting linguistic environment must play a crucial role"

⋆ I will argue that we can actually maintain a uniform analysis of the distribution of NPIs in both declaratives and questions by re-evaluating the semantics of embedded questions, namely what governs this weak/strong split.

1.3 Exhaustivity encoded in answer-hood operators

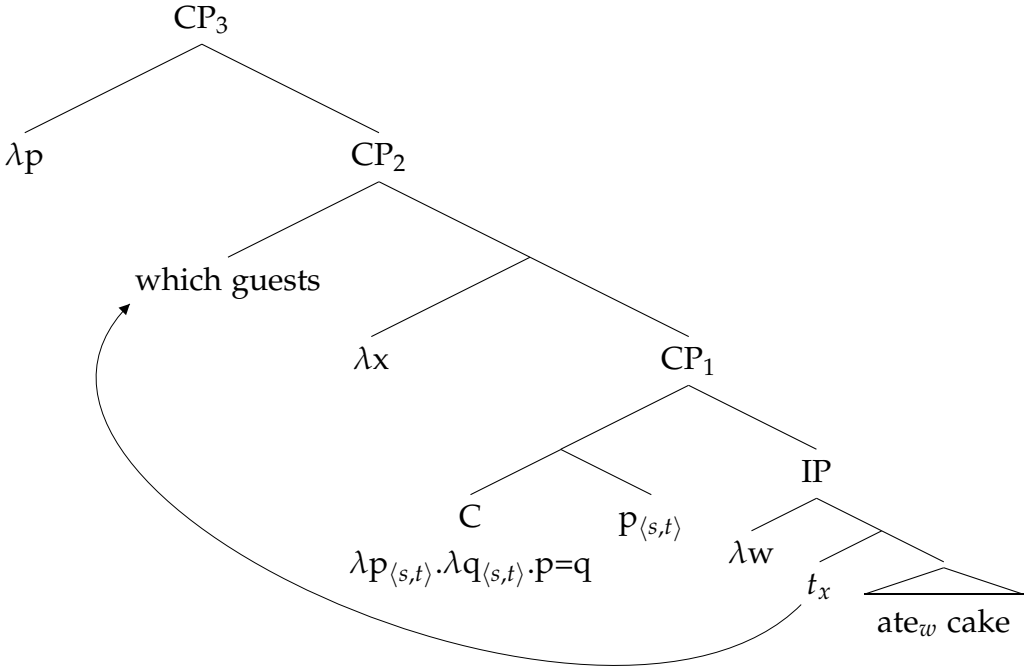
⋆ A standard theory of questions that I will follow takes questions to denote sets of propositions – the set of possible answers to the respective question:

- *wh*-words are existential quantifiers that furthermore bear a [WH] feature
- the interrogative C head carries a [WH] feature that drives the *wh*-movement of the *wh*-phrase, and furthermore takes us from a proposition, the question nucleus, to a set of propositions (cf. Hamblin 1973, Karttunen 1977)

(6) a. Which guests ate cake?

b. {Bill ate cake, Mary ate cake, Bill and Mary ate cake}

c.



(i) IP: λw. x ate$_w$ cake

(ii) CP_1: p = λw. x ate$_w$ cake

(iii) CP_2: $\exists$x[person(x) & p=λw. x ate$_w$ cake]

(iv) CP_3: λp. $\exists$x[person(x) & p=λw. x ate$_w$ cake]

⋆ The usual take is that strength is represented by means of two answer-hood operators (cf. Heim (1994)) that combine with the set of possible answers, i.e. adjoin to CP_3, and return the WE/SE answer; consider the denotations provided by Dayal (1996):

(7) a. $\textsc{ans.we}_{w_0}(Q)$ = Bill ate cake
$= \iota p\ [p(w) = 1 \wedge Q(p) = 1 \wedge \forall p' \in Q\ (p'(w) \rightarrow p \subseteq p')]$

b. $\textsc{ans.se}_{w_0}(Q)$ = Only Bill ate cake. $\sim$ Bill and nobody else ate cake
$= \lambda w.\ [\textsc{ans.we}_{w_0}(Q) = \textsc{ans.we}_{w}(Q)]$

⋆ In a situation in which *Bill ate cake* is the only true proposition in (6b),

(8) a. John was surprised at who ate cake.
$\xrightarrow{\text{WE}}$ John was surprised that Bill ate cake.

b. John knows who ate cake.
$\xrightarrow{\text{SE}}$ John knows that Bill ate cake and that nobody else ate cake.

⋆ Note that replacing *cake* with *any cake* results in unacceptability, for both answers.

(9) a. *Bill ate any cake.
b. *Bill and nobody else ate any cake.

⋆ Neither answer creates a DE environment and thus there is no way to account for the correlation between strength and NPI licensing; at least not by appealing to the idea that NPIs are acceptable only in DE environments.

⋆ What if the weak/strong ambiguity had a difference source?

2 A new semantics for strength

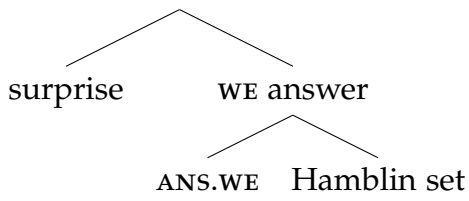
2.1 Displacing the ambiguity from answers to questions

⋆ The crux of my proposal:

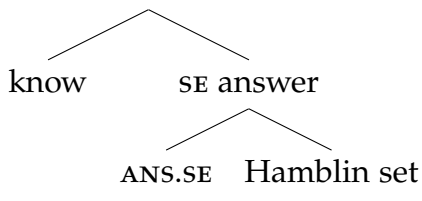
- Strength is encoded at the level of the question, not in different answer operators.

⋆ Instead of having two ANS operators apply to the same set of propositions, as in (10),

(10) a.



b.



⋆ We actually have the difference derived internal to the question, giving us two distinct sets of propositions, as in (11) and (12):[1]

(11) The WE answer set, the Hamblin set:
Q_{WE} = {Bill ate cake, Mary ate cake, Mary and Bill ate cake}

(12) The SE answer set:
Q_{SE} = {Only Bill ate cake, Only Mary ate cake, Only Mary and Bill ate cake}

⋆ I will argue that this move allows us to understand why NPIs are acceptable in strongly exhaustive questions and not in weakly exhaustive questions.

2.2 The null *only* hypothesis

⋆ In order to derive the different questions, repeated below:

(13) Q_{WE} = {Bill ate cake, Mary the cake, Mary and Bill ate cake}

(14) Q_{SE} = {Only Bill ate cake, Only Mary ate cake, Only Mary and Bill ate cake}

⋆ I propose we have a "null" *only* operator optionally adjoin at the level of the question nucleus, i.e. at the IP level.

(15) a. LF-Q_{WE}: [λp [who [λx [C^0 [$_{IP}$ λw [t_x ate$_w$ cake]]]]]]
b. LF-Q_{SE} : [λp [who [λx [C^0 [$_{IP_2}$ *only* [$_{IP_1}$ λw [t_x ate$_w$ cake]]]]]]]

⋆ This *only* has the same semantics as its overt counterpart (cf. von Fintel 1999), and I take it to associate with the trace of the *wh*-phrase:[2]

(16) a. $[\![\text{only}]\!](\mathscr{A}lt(\text{p}))(\text{p}) = \lambda\text{w: p(w)=1. } \forall\text{q}\in\mathscr{A}lt(\text{p})\ [\text{q(w)=1} \rightarrow \text{p}\subseteq\text{q}]$
b. $\mathscr{A}lt(\lambda\text{w. g(1) ate cake}) = \{\lambda\text{w. x ate}_w\text{ cake} \mid \text{x}\in[\![\text{person}]\!]\}$

⋆ We thus have two possible question nuclei:

(17) a. $IP_{WE} = \lambda$w. x ate$_w$ cake
b. $IP_{SE} = \lambda$w: x ate$_w$ cake. $\forall$y$\in\mathscr{A}lt$(x) [(y ate$_w$]) $\rightarrow$ (x ate$_w$) $\subseteq$ (y ate$_w$)]]

⋆ Based on these different questions nuclei we derive either (18a) or (18b):

[1] George (2011) argues on independent grounds against an analysis in terms of answer-hood operators, following observations made in Spector 2005 and Spector and Egré 2007.

[2] I assume that it differs from run of the mill exhaustifiers in that it can, among other things, associate with a trace, setting it apart from what Beaver and Clark (2008) claim to be the case for exclusive particles otherwise.

(18) a. Q_{WE} = {x ate cake: x is a guest}
b. Q_{SE} = {only x ate cake: x is a guest}

⋆ At this point the distribution of NPIs will fall out straightforwardly.

- NPIs are not acceptable in WE questions because the question nucleus creates an upward entailing environment.
- NPIs are acceptable in SE questions because the question nucleus creates a (Strawson) downward entailing environment (cf. von Fintel 1999).

⋆ In its simplest form, the argument is that NPIs are licensed in SE questions for the same reason they are licensed in the declaratives corresponding to the question IP:

(19) Only John$_{[F]}$ ate anything.

⋆ Similarly, we can account for their unacceptability in WE questions by noting their unacceptability in (20), the declarative counterpart of (19).

(20) *John ate anything.

⋆ A quick note on formalism (cf. Krifka 1995, Chierchia 2013, a.o.):

- NPIs are existential quantifiers that furthermore activate sub-domain alternatives.[3]
- Active alternatives are represented in the grammar by means of a feature on the NPI, call it [D], that needs to enter into an agree relation with an operator, $\mathscr{E}xh_{[D]}$.
- This operator not only checks the feature on the NPI, but also has a semantic contribution, namely that of negating all the non-entailed alternatives.

(21) a. anything = λP. $\exists$x$\in$D [thing(x) $\wedge$ P(x)]
b. anything$^{\mathscr{A}lt}$ = {λP. $\exists$x$\in$D′ [thing(x) $\wedge$ P(x)]: D′$\subseteq$D}
c. $\mathscr{E}xh$ = λp. λw. p(w) $\wedge$ $\forall$q$\in\mathscr{A}lt$(p) [q $\rightarrow$ p$\subseteq$q]

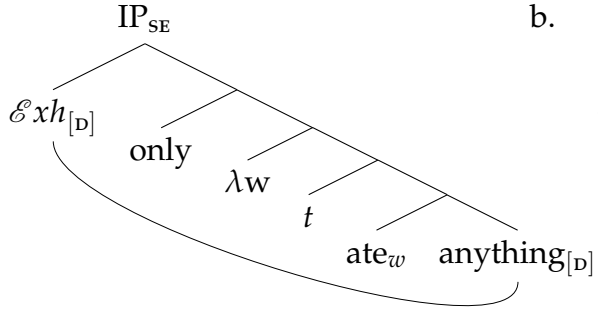
⋆ In a nutshell, the idea is that NPIs need to be exhaustified, and due to the alternatives they activate, this exhaustification is felicitous only in DE environments:

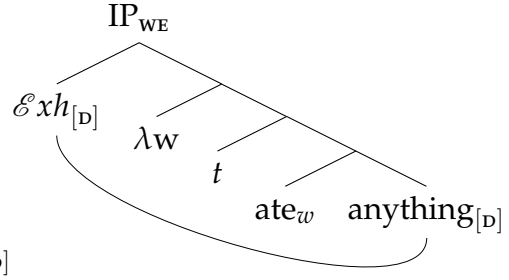
(22) a. *$\mathscr{E}xh_{[D]}$ [$_{UE}$ … anything$_{[D]}$ …] contradictory

b. $\mathscr{E}xh_{[D]}$ [$_{DE}$ … anything$_{[D]}$ …] felicitous

[3] An easy way to think about it as follows: existential quantifiers are disjunctions over the members of a domain ($a \vee b \vee c$). The sub-domain alternatives are the individual disjuncts ($a \vee b, a \vee c, b \vee c, a, b, c$).

⋆ Carrying this over to the current proposal, we have the following:

(23) a. 

b. 

⋆ Syntactically they're both ok; i.e. the feature checking can take place.

⋆ Semantically, only (23a) is felicitous; (23b) gives rise to a contradiction.

2.3 Summary and prediction

⋆ Questions are ambiguous between two possible interpretations: a weakly exhaustive and a strongly exhaustive reading.

⋆ I propose to encode this ambiguity at the level of the question nucleus, via an optional null *only*, so as to derive the following two possible sets of propositions:

(24) Q_{WE} = {Bill ate cake, Mary ate cake, Mary and Bill ate cake}

(25) Q_{SE} = {Only Bill ate cake, Only Mary ate cake, Only Mary and Bill ate cake}

⋆ I claim that this switch (moving the ambiguity into the questions) allows us to maintain a uniform account of NPI licensing, both in declaratives and questions.

- The idea is that NPIs end up in the scope of *only*, which we know independently to be a good NPI licensor from their behavior in declaratives.

⋆ This account makes the following prediction:

- NPIs can survive in strongly exhaustive questions only if they are otherwise acceptable in the scope of overt *only*.

⋆ There is a class of NPIs, sometimes referred to as strong NPIs, that cannot survive in the scope of *only* (cf. Gajewski 2011).

(26) a. *Only Bill has visited Mary *in weeks*.
b. *Only Mary likes you *either*.

⋆ These same NPIs are also ruled out from questions, WE or SE.

(27) a. *Who has visited Mary in weeks?
b. *I know who likes Joanne either.

3 Embedding questions and subcategorization

⋆ The divide between WE and SE-embedding predicates is couched in terms of different predicates subcategorizing for a certain ANS operator:

(28) a. surprise [ANS.WE [Q]]
b. know [ANS.SE [Q]]

⋆ However, by doing away with the two answer-hood operators, we lose the ability to account for why certain predicates embed only WE questions or only SE questions, i.e. we lose the subcategorization story.

- I argue that this is a desired effect as it affords us the opportunity to give a more explanatory, and less descriptive, account of the facts.

⋆ Under the analysis proposed here, the subcategorization would take on the form of a constraint against an embedded null *only* under *surprise*-like predicates:

(29) a. *surprise [$_Q$ . . . *only* . . .]
b. know [$_Q$ . . . *only* . . .]

⋆ A generalization that has managed to flow under the radar is that, by and large, the QEPs that admit only weakly exhaustive readings of their embedded questions, are, in their propositional incarnations, S-DE.

(30) a. WEAKLY EXH: surprise, amaze, disappoint, annoy, . . .
b. STRONGLY EXH: know, wonder, ask, discover, . . .

⋆ One solution that immediately suggests itself is the notion of Maximize Strength (cf. Chierchia et al. 2012, Fox and Spector 2009) to account for (29).

- Exhaustive operators are not allowed if they are globally weakening.
- Strengthening (= insertion of null *only*) is precluded from taking place in the scope of DE operators as that would give rise to a weaker meaning than if no strengthening had taken place.

⋆ The idea would be that exhaustification by null *only* is a default (Strongest Meaning?) that can be overridden in cases where it would give rise to a weaker meaning, such as under DE operators.

⋆ By employing Maximize Strength, we do away with subcategorization altogether since we can take the split between WE- and SE-QEPs to be governed by constraints already present in other parts of the grammar. → a conceptual step forward

⋆ It furthermore helps us make sense of the peculiar behavior of *know* wherein it appears to lead a double life as both a SE and WE QEP (cf. Guerzoni and Sharvit 2007, Sharvit 2002, a.o.), illustrated by the fact that (31) is acceptable.

(31) Mary knows who ratted her out but she doesn't **really** know who didn't rat her out.

⋆ While *know* is normally a SE-QEP, i.e. it involves a null *only*, if you explicitly deny it like in (31), you get a contraction so you have to reconstrue it without inserting the exhaustifier, i.e. interpret it as a WE-QEP.

⋆ Subcategorization stories might say that *know* is underspecified, but that wouldn't explain its tendency to embed SE questions.

⋆ Under the present analysis the acceptability of the discourse in (31) is akin to our analysis of what happens when you explicitly deny an implicature.

(32) Some of the students passed the class. In fact, all of them did.

4 Summary

⋆ The distribution of NPIs in questions poses a problem for both the semantics of questions and the theory of NPIs.

- NPIs are acceptable in questions, despite the fact that questions do not *prima facie* share anything in common with the other environments in which NPIs surface.
- Specifically, there is no way to argue that questions give rise to downward-entailing inferences, which is what unifies all other NPI environments.

⋆ Furthermore, Guerzoni and Sharvit (2007) observe that not all questions allow NPIs in their scope, and note that there is a correlation between the acceptability of NPIs and the strength of the question.

⋆ I showed that through a conceptually minimal switch in the semantics of questions – a move from encoding strength not in answer-hood operators but within the question, we can maintain a unified account for the distribution of NPIs in both declaratives and interrogatives.

⋆ The crux of the proposal was to show that shifting the locus of ambiguity from the answer-hood operators into the question nucleus allows us to see why questions that are construed exhaustively create (locally) downward entailing environments.

⋆ This proposal also allows us to re-evaluate the issue of subcategorization of question-embedding predicates and, by appealing to the notion of Maximize Strength, show that there is no such thing as subcategorization.

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Appendix 1: NPIs and intervention in questions

⋆ Even strongly exhaustive questions don't allow NPIs across the board.

⋆ Han and Siegel (1997) note a contrast depending on the relative position of the *wh*-trace and the NPI.[4]

(33) a. Who ate anything at the party yesterday? *wh*>NPI
b. *What did anybody eat at the party? NPI>*wh*
c. Who did Jeff introduce to anyone at the party? *wh*>NPI
d. *Who did Jeff introduce anyone to at the party? NPI>*wh*

⋆ NPIs are acceptable in a question iff the question is interpreted strongly exhaustive and furthermore the NPI is c-commanded by the *wh*-trace.

- The goal is to offer a unified account for these phenomena.

⋆ This contrast falls out arguably nicely under the present account.

⋆ It turns out to be an interplay between:

- A semantic requirement (the need to exhaustify NPIs in DE environments)
- A syntactic requirement that dependencies not cross.

⋆ Recall the crucial pieces of the account:

- null *only* associates with the *wh*-trace
- NPIs associate with a corresponding exhaustifier, $\mathscr{E}xh_{[\mathrm{D}]}$, and the semantics of $\mathscr{E}xh_{[\mathrm{D}]}$ require it to occur above a DE operator, i.e. above *only*.

⋆ Consider the following:

(34) Who ate anything?
a. only$_{[\mathrm{F}]}$ [$\mathscr{E}xh_{[\mathrm{D}]}$ [$t_{[\mathrm{F}]}$ ate anything$_{[\mathrm{D}]}$]] crossing dependencies
b. $\mathscr{E}xh_{[\mathrm{D}]}$ [only$_{[\mathrm{F}]}$ [$t_{[\mathrm{F}]}$ ate anything$_{[\mathrm{D}]}$]] nested dependencies

[4] I use a star to indicate that the question cannot receive a non-emphatic interpretation. Note also that *anyone* in these cases could be construed as a free-choice element, in which case both (ib) and (id) could receive generic-like interpretations. The switch from an NPI to a FCI use is governed by the same principles as in declaratives. (c.f. Dayal 1996, Chierchia 2013, a.o.).

(35) *What did anyone eat?

a. $\mathscr{E}xh_{[D]}$ [only$_{[F]}$ [anyone$_{[D]}$ ate $t_{[F]}$]] crossing dependencies

b. only$_{[F]}$ [$\mathscr{E}xh_{[D]}$ [anyone$_{[D]}$ ate $t_{[F]}$]] nested dependencies

⋆ Crossing dependencies are ruled out by the grammar so we need only consider the LFs in the (b.) examples.

(36) a. Who ate anything?
$\mathscr{E}xh_{[D]}$ [only$_{[F]}$ [$t_{[F]}$ ate anything$_{[D]}$]] nested dependencies

b. *What did anybody eat?
only$_{[F]}$ [$\mathscr{E}xh_{[D]}$ [anyone$_{[D]}$ ate $t_{[F]}$]] nested dependencies

⋆ Syntactically, both (36a) and (36b) are well-formed.

⋆ Semantically, only (36a) is felicitous since in (36b), the NPI ends up being exhaustified in an upward-entailing environment, namely below *only*; this fails for the same reason an NPI in a positive declarative is ruled out.

⋆ Putting these observations together, as in (37), we can see straight away why NPIs give rise to unacceptable questions when not c-commanded by the *wh*-trace: of the four possible LFs, only one of them satisfies both the syntactic and semantic constraints discussed above.

(37) a. Who ate anything?
i. only$_{[F]}$ [$\mathscr{E}xh_{[D]}$ [$t_{[F]}$ ate anything$_{[D]}$]]

ii. $\mathscr{E}xh_{[D]}$ [only$_{[F]}$ [$t_{[F]}$ ate anything$_{[D]}$]]

b. What did anyone eat?
i. only$_{[F]}$ [$\mathscr{E}xh_{[D]}$ [anyone$_{[D]}$ ate $t_{[F]}$]]

ii. $\mathscr{E}xh_{[D]}$ [only$_{[F]}$ [anyone$_{[D]}$ ate $t_{[F]}$]]

SYNTAX	SEMANTICS	OVERALL
✗	✗	✗
✓	✓	✓
✓	✗	✗
✗	✓	✗

Appendix 2: Presupposition projection

⋆ The story, as presented above, raises the issue of presupposition projection.

⋆ Recall that I'm taking null *only* to make the same contribution as overt *only*:

(38) $[\![\text{only}]\!](\mathscr{A}lt(\text{p}))(\text{p}) = \lambda\text{w: p(w)=1. } \forall\text{q}\in\mathscr{A}lt(\text{p}) \text{ [q(w)=1} \rightarrow \text{p}\subseteq\text{q]}$

⋆ *only* takes a proposition p and returns a partial proposition that is defined only if p is true. If defined, it asserts that any stronger alternative to p is false.

(39) Only Bill ate cake.

a. Bill ate cake. presupposition

b. Nobody other than Bill ate cake. assertion

⋆ Assume that the domain of the *wh*-phrase consists of John, Bill and Mary.

⋆ Under the analysis presented above, the strongly exhaustive construal of (40) would consist of the following three partial (i.e. presuppositional) propositions:

(40) Which guest ate cake?

$$\left\{\begin{array}{l}\text{Only John ate cake} = \lambda\text{w: John ate}_w\text{ cake. nobody but John ate}_w\text{ cake,}\\ \text{Only Bill ate cake} = \lambda\text{w: Bill ate}_w\text{ cake. nobody but Bill ate}_w\text{ cake,}\\ \text{Only Mary ate cake} = \lambda\text{w: Mary ate}_w\text{ cake. nobody but Mary ate}_w\text{ cake}\end{array}\right\}$$

⋆ The idea is that whenever we assert a partial proposition, its presupposition becomes part of the common ground (i.e. taken to be true by the discourse participants).

⋆ So what happens in questions, where we have sets of such propositions?

⋆ If the presupposition of each member of the question were to project (i.e. be accommodated into the common ground), it would mean that (40) presupposes (41):

(41) John ate cake and Bill ate cake and Mary ate cake.

⋆ This is clearly not good as it gives rise to a clash with the pragmatics of the discourse.

⋆ This problem only arrises, however, if we assume that every presupposition projects.

⋆ What I want to argue is that in these cases we need to invoke the notion of local accommodation of the presupposition.

⋆ The idea is that *only* gives rise to a defective question and this calls for a targeted form of local accommodation.

- Local accommodation is equivalent to saying that the presupposition becomes part of the assertive component.
- This can be achieved via the assertion operator $\mathcal{A}$ (Beaver and Krahmer, 2001), which applies to a partial proposition, ϕ_p, and returns a total proposition that represents the conjunction of the proposition with its presupposition, p, as in (42).

(42) $[\![\mathcal{A}]\!](\phi_p) = \phi_p \wedge p$

⋆ Locally accommodating each presupposition will take us from a set of partial propositions to a set of total propositions, as in (43):

(43) Which guest ate cake?

$$\left\{ \begin{array}{l} \text{John and nobody else ate cake,} \\ \text{Bill and nobody else ate cake,} \\ \text{Mary and nobody else ate cake} \end{array} \right\}$$

⋆ Specifically, I claim that the LF of a strongly exhaustive question is actually as in (44):

(44) $[_{CP_3}\ \lambda p\ [_{CP_2}$ who $[\lambda 1\ [_{CP_1}\ C^0\ [_{IP_3}\ \mathcal{A}\ \ [_{IP_2}$ only $[_{IP_1}\ \lambda w\ [g(1)_{[F]}\ [ate_w$ cake$]]]]]]]]]$

⋆ This does not affect the account of NPIs as there will still be a level underlyingly, namely IP_2, that represents a downward entailing environment.