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# Any Questions?

Polarity as a Window into the Structure of Questions

A dissertation presented  
by

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to

The Department of Linguistics

in partial fulfillment of the requirements  
for the degree of  
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**Any Questions?**  
**Polarity as a Window into the Structure of Questions**

**Abstract**

This dissertation investigates the peculiar behavior of negative polarity items in questions and argues that a unified account of their distribution across declarative and interrogative constructions is feasible. These items 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, given current analyses of questions there is no way to argue that questions give rise to downward-entailing inferences, which is what otherwise unifies all other NPI licensing environments.

In Chapter 2 I argue for a new semantics of questions wherein strength of exhaustivity is encoded not in different answer-hood operators (cf. Heim 1994), but rather in terms of the presence/absence of a null *only* that adjoins at the level of the question nucleus, building on an observation by Guerzoni and Sharvit (2007) that question strength appears to be the determining factor in whether or not a question allows NPIs.

Chapter 3 focuses specifically on the distribution of NPIs in constituent questions and shows how the analysis put forward in Chapter 2 can account for an array of facts, namely their distribution both in the question nucleus, and in the restrictor of the *wh*-phrase. Further predictions related to NPIs that had not been discussed before are examined, such as how their scope relative to adjunct *wh*-phrases affects their acceptability, as well as the distributional differences between weak and strong NPIs.

In Chapters 4 and 5 we turn to non-*wh* questions, namely alternate and polar questions. In Chapter 4 I argue that alternate questions can and should be given an analysis akin to that of *wh*-questions based on both old and new empirical evidence that the distribution of NPIs is sensitive to the same set of restrictions. In Chapter 5 I argue, contrary to previous analyses, that the acceptability of NPIs is not a function of strength, but rather of how polar questions are interpreted, namely as speech act conditionals.

Lastly, Chapter 6 focuses on complex questions and puts forward an analysis of these questions that sets the stage for an arguably unified semantics of all types of questions.

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*For my parents*

# Chapter 1

## Introduction

This dissertation investigates how the distribution of negative polarity items can inform our understanding of the underlying semantic representation of questions. The overarching goal of this thesis is to argue that the distribution of negative polarity items in questions is governed by the same logical properties that govern their distribution in declarative constructions. Building on an observation due to Guerzoni and Sharvit (2007) that strength of exhaustivity in questions correlates with the acceptability of negative polarity items, I propose a revision of the semantics of questions that can explain this link in already familiar terms from the literature of negative polarity, namely the availability of a local downward entailing environment. In Chapter 2 I argue for a new theory of questions that takes strength of exhaustivity to be encoded internal to the question nucleus rather than in different answer-hood operators. This switch, while conceptually a simple move, has consequences that are far-reaching, both for the distribution of NPIs in questions and the semantics of questions in general, which I discuss in Chapters 3-6.

My proposal builds most directly on two traditions: the Karttunen/Hamblin theory of questions, and recent alternative based analyses of polarity phenomena (from Krifka (1995) and Lahiri (1998) to Chierchia (2006, 2012)). Let us briefly indulge in some background on the semantics of questions and negative polarity items.

## 1.1 Layout of the problem

The observation that negative polarity items (henceforth NPIs) are acceptable in questions is not new. In fact, it dates back to Klima (1964) who noted that interrogative sentences should be analyzed on par with negative sentences as constituting the prototypical environments able to support NPIs. Much advancement has been made since then in the analysis of NPIs on the one hand, and interrogatives on the other. However, while our understanding of these two phenomena has become much more thorough, no account to date has been able to provide a satisfying analysis that can deal with the occurrence of NPIs in questions.

The currently dominating analysis of NPIs on the market is one which accounts for their distribution en masse by stating that, for one reason or another, NPIs are sensitive to the ability of their environment to support entailment reversals; more crudely, that NPIs are licensed in Downward Entailing (DE) contexts. While this approach has been able to unify, for the most part, the environments capable of sustaining NPIs, to date it has proved unable to bring interrogative sentences under the umbrella of possible NPI licensors since questions can be shown not to support the kinds of entailments claimed to be required by NPIs. The goal of any semantics theory for NPI should, however, be able to provide a unifying account for why we see NPIs surviving in run of the mill DE contexts such as in (1) as well as in interrogatives, as in (2).

- (1) a. I don't think *anyone* came to the party.  
b. I doubt that she's *ever* been to Paris.

- (2) a. Did you eat *anything*?  
b. Were you *ever* in Paris?  
c. Who cooked *anything*?  
d. Who has *ever* visited Paris?

Guerzoni and Sharvit (2007, ex. 1)

The first issue that needs to be addressed then is why NPIs are acceptable in questions given that they do not give rise to DE environments, as has convincingly been argued in

Guerzoni and Sharvit (2007). Given the ultimate goal of unification, an approach to NPIs that analyzes them as being licensed in DE contexts would have to be re-evaluated since this approach can not only not account for the data in (2), but would in fact make the opposite predictions, lumping interrogatives with positive declaratives as non-DE environments.

The data in (2) shows that both Yes/No questions and *wh*-questions constitute good licensors of NPIs. However, it has recently been pointed out by Guerzoni and Sharvit (2007) that this is not necessarily true of embedded questions where we observe an asymmetry between these two types of questions. The authors show that while NPIs are acceptable across the board in embedded Yes/No questions, as in (3), the same cannot be said of embedded *wh*-questions, as shown by their varying acceptability in (4).

- (3)
- a. I wonder whether *anyone* came to the party yesterday.
  - b. I wonder whether Mary *ever* visited Paris.
  - c. I asked her whether she ate *anything* weird last night.
  - d. I know whether she *ever* had a roommate in college.
- (4)
- a. I wonder who will bring *anything* for the party tonight.
  - b. I know what countries Mary has *ever* been to.
  - c. \*It surprised me who sold *anything* at the yard sale.
  - d. \*It surprised us what cities Mary *ever* visited.

Guerzoni and Sharvit (2007) propose to attribute the varying acceptability of NPIs in (4) to the nature of the embedding predicate, and more specifically to the types of readings these embedding predicates can support: “strong exhaustive” for (4a-b) versus “weakly exhaustive” readings for (4c-d).

The goals of a complete account of NPIs in questions should thus be two-fold. On the one hand it should offer a convincing story that can explain why NPIs, given their otherwise strong affinity to DE-ness, can survive in un-embedded interrogatives (both Yes/No and *wh*), while on the other hand it would need to make sure this analysis can be extended to accommodate for the ability of strong but not weakly exhaustive readings of embedded *wh* interrogatives to license NPIs.

Guerzoni and Sharvit (2007) observe that the acceptability of NPIs in the nucleus of an embedded question is sensitive to: (i) the nature of the embedding predicate (*know*, *surprise*), and (ii) the type of question (yes/no versus *wh*). This can be shown more clearly with the following data.

(5) **Know**

- a. Claire knows whether Frank has *any* books on Negative Polarity.
- b. Claire knows which students have *any* books on Negative Polarity.

(6) **Surprise**

- a. \*It surprised Bill whether the students have *ever* been to Paris.
- b. \*It surprised Bill which students had *ever* been to Paris.

We can see that NPIs are acceptable in embedded Yes/No questions (the (a) examples) as long as the predicate can otherwise embed this type of question, *know* can, but *surprise* cannot. It's worth noting that the ungrammaticality of (6a) cannot be attributed to the presence of the NPI *ever*, since predicates belonging to the *surprise* class are generally bad polar-question embedders. While this inability is not directly relevant to the issue at hand, we will return to it in a later chapter. As for embedded *wh* questions (the (b) examples), the authors note that predicates differ in their ability to license NPIs. To substantiate this claim they show that predicates such as *wonder* and *ask* always allow NPIs to surface in their nucleus, regardless of which type of question they embed, while predicates such as *surprise*, *realize* never do.

Guerzoni and Sharvit (2007) attribute the varying acceptability of NPIs in embedded *wh* questions to the type of readings the embedding predicates support. Previous literature (cf. Heim 1994 and Beck and Rullmann 1999) has argued that *wh*-questions, when embedded, can give rise to either strongly or weakly exhaustive readings, depending on the predicates that embed them. The proposal made in Guerzoni and Sharvit 2007 is that NPIs are licensed in questions only if their hosting environment is strongly exhaustive. NPIs are therefore always acceptable in polar questions because these questions only allow

for a strongly exhaustive reading. As for the behavior of NPIs in *wh*-questions embedded under *wonder*, *know*, *surprise* predicates, the authors attribute the varying acceptability to the fact that these verbs differ with respect to the type of exhaustivity they can admit.

The authors propose to encode the strength of meaning (i.e. weak versus strong) into the semantics of the question-embedding predicates. They don't, however, show how the semantics of a strongly exhaustive predicate should allow NPIs to survive in its scope. In fact, they claim that strong/weak exhaustivity in questions cannot be connected to the licensing requirements of NPIs and thus a multi-layered account must be provided in order to account for these indefinites' need to be in entailment-reversal environments in indicatives and strongly exhaustive environments in interrogatives. One point of departure when trying to unify these two sets of environments would be to look at the relationship between indicatives and interrogatives, specifically the behavior of NPIs in indicatives and interrogatives embedded under the same verb. For the sake of this argument, we assume that predicates able to embed both indicatives and interrogatives have a common semantic core. What is interesting to note is that while question-embedding *know* can license NPIs, proposition-embedding *know* cannot, (7).

- (7) a. Mary knows who brought anything to the party.  
b. \*Mary knows that John brought anything to the party.

On the other hand, proposition-embedding *surprise* can license NPIs, while its question-embedding counterpart cannot, shown in (8).

- (8) a. She was surprised that Mary brought anything to the party.  
b. \*She was surprised who brought anything to the party.

So it's clear that whatever semantics we give to the question-embedding predicates will have to differ enough from the semantics we give to their proposition-embedding counterparts if we want to capture the varying availability of NPI licensing by appealing to a difference in the semantics of the embedding predicates. Such an approach would first have to provide support for the following two somewhat controversial assumptions:

- (9) a. Proposition-embedding verbs and question-embedding verbs have a common semantic core and one can be derived from the other (or both from some other abstract form)
- b. The strength of exhaustivity in embedded questions resides within the semantics of the embedding predicate

It's clear though that even if we follow Guerzoni and Sharvit's suggestion, we have yet to see an obvious relationship between the strength of the question and the survival of NPIs, assuming that a unified semantics for the licensing environments of NPIs can be sustained. Furthermore, how the strong exhaustivity encoded in the embedding predicates should carry over compositionally to direct questions remains a mystery.

At this point we are faced with the following questions.

- (10) Why can Y/N and *wh*-questions always license NPIs?
- (11) Why can Y/N questions always license NPIs, regardless of whether or not they are embedded?
- (12) Why should the strength of the question matter when it comes to NPI licensing?
  - a. What is it about being a strongly exhaustive question that allows for NPIs to survive in their scope?
  - b. How are weakly exhaustive questions different, compositionally, from strongly exhaustive questions, and how can we relate this to the licensing of NPIs?

In order to answer the first question, one might be tempted to ask whether questions, more generally, can give rise to DE inferences, and attribute the licensing of NPIs to this factor. Guerzoni and Sharvit (2007) show that questions cannot be regarded as DE due to the fact that they don't support entailment reversals. We see in (13b) that a negative quantifier like *no* creates a DE context by allowing inferences from sets to subsets.

- (13) a. A student has a car.  $\Rightarrow$  A student has a mode of transportation.
- b. No student has a car.  $\Rightarrow$  No student has a red car.

On the other hand, talking about the ability of a question to give rise to a DE environment is not as easy as with indicatives since establishing what it would mean for a question to entail another question is a difficult task in and of itself. One intuitive way of thinking about this, adopted by Guerzoni and Sharvit (2007), is to assume that a question entails another whenever asking the first question automatically leads to asking the second question. In this sense it's then clear that questions are not automatically DE, since in asking whether John has a car I am by no means necessarily interested in whether or not he has a specific kind of car.

(14) Does John have a car?  $\not\Rightarrow$  Does John have a red car?

Given that questions cannot be shown to be DE<sup>1</sup>, if we want to maintain a uniform analysis of NPI licensing we need to either (i) loosen the requirements from DE to something that can include questions and still exclude positive declaratives, or (ii) consider an altogether different approach to NPIs that does not rely on the DE character of the context, but instead derives this apparent requirement from independently-motivated attributes of the indefinite. Independent of this issue, an alternative-based semantics for NPIs and polarity-sensitive items more generally has been proposed in the literature and this account makes appeal to the lexical semantics of these items and the method through which they compose with other elements in a structure to derive their sensitivity to DE-ness. The advantage to distancing ourselves from a purely DE-licensing approach is that we might be able to find different avenues for relating the licensing of NPIs to the strength of questions beyond mere speculation.

## 1.2 An exhaustification-based approach to the polarity system

For the remainder of this paper, I adopt an analysis of polarity-sensitive items that takes their restricted distribution to be a product of the interaction between the lexical semantics of these items and the contexts in which they occur, following in large part the work in Chierchia (2006, 2012), Fălăuș (2010) and Gajewski (2011). Before delving into the realm

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<sup>1</sup>Without a better understanding of entailment between questions we cannot make the stronger claim that they are in fact not DE.



of polarity-sensitive items, however, let's first consider the case of scalar implicatures, a phenomenon closely related to the matter at hand.

The main insight that I will adopt for this analysis is that scalar implicatures (henceforth SIs), should be viewed as a form of exhaustification of the assertion, an approach rigorously defended in Chierchia, Fox, and Spector (2012). The authors argue that SIs come about as a result of active alternatives and the way the grammar chooses to use up these alternatives, via covert alternative-sensitive operators that must apply at some point in the derivation in order to 'exhaust' the active alternatives. One such operators is *Exh*, which has basically the same contribution as *only*. The only difference between overt *only* and *Exh* is that *Exh* asserts rather than presupposes that its prejacent is true.

$$(15) \quad \text{Exh}(p) = p \wedge \forall q \in \text{Alt}(p) [p \not\subseteq q \rightarrow \neg q]$$

*(the assertion p is true and any alternative q not entailed by p is false)*

Consider the examples below, where the relevant alternatives are brought about by association with focus (Rooth, 1992):

- (16) John talked to [a few]<sub>F</sub> of the students.
- a. Alternatives: {John talked to a few of the students, John talked to many of the students, John talked to most of the students, John talked to all of the students}
  - b. *Exh*(John talked to [a few]<sub>F</sub> of the students) = John talked to a few of the students and he didn't talk to many/most/all of the students.

In (16), exhaustification proceeds via **O** and in doing so all non-entailed alternatives are eliminated. That is, it negates all statements which, upon replacing the focused element with its alternatives, entail the assertion.

Focus is not a prerequisite for active alternatives, however. Scalar items, which are lexically endowed with alternatives, are also prone to this type of semantic enrichment. Relevant examples include the elements of a Horn-scale: *<one, two, ... >*, *<or, and >*, *<some, many, all >*, *<few, no >*, *<sometimes, often, always >*. If the context is such that the alternatives are relevant, then they will be activate and thus will have to be factored into the meaning via an exhaustification operator. Take for example (17) where we see that the scalar elements

*one* and *or* have the potential to give rise to enriched meanings. These scalar implicatures ( $\rightsquigarrow$  will henceforth be used to indicate an implicature) come about by exhaustification of their respective alternatives, *two*, *three*, ... and *and*, which we assume are relevant in the context of these utterances.

- (17) a. I talked to two boys yesterday.  
 $\rightsquigarrow$  I didn't talk to three or more boys.
- b. I talked to Mary or John yesterday.  
 $\rightsquigarrow$  I didn't talk to both of them.

Beyond scalar alternatives, scalar items are also optionally endowed with sub-domain alternatives. Fox (2007) convincingly argues for their presence based on the free choice effects observed with disjunction in the scope of possibility modals. That is, aside from the scalar alternative of the disjunction, the conjunction, we also have to take into account its sub-domain alternatives, that is, the individual disjuncts. Deriving the implicature in (18) would not be possible without also having access to the sub-domain alternatives. I refer the reader to Fox 2007 for the details of how these alternatives are exhaustified so as to derive this implicature.

- (18) You can eat ice cream or cake.  $\rightsquigarrow$  You can eat ice cream and you can eat cake.
- a.  $\diamond[\text{eat ice cream} \vee \text{eat cake}] \rightsquigarrow \diamond\text{eat ice cream} \wedge \diamond\text{eat cake}$
- b. Scalar-alt:  $\diamond[\text{eat ice cream} \wedge \text{eat cake}]$
- c. Sub-Domain-alt:  $\diamond\text{eat ice cream}, \diamond\text{eat cake}$

What we saw in this section is that we can derive SIs in a purely compositional way by looking at the interaction between alternatives and the method by which they get factored into meaning. We saw above two sources of alternative activation: focus, on the one hand, and the lexical semantics of the scalar item, on the other. In the above cases, the alternatives, whatever their source, are only optionally available, which is supported by the fact that these SIs are cancelable. This optionality is precisely the dimension along which NPIs, and PSIs more generally, differ from their regular indefinite counterparts - NPIs must obligatorily activate alternatives. This analysis of NPIs, pursued by Krifka (1995) and further

advanced by Chierchia (2006) and Chierchia (2012), takes their distribution to be a product of the alternatives they activate and the way the grammar takes these alternatives into account.

Krifka (1995) and Chierchia (2012), among others, assume that NPIs are minimally different from regular indefinites in that they obligatorily activate alternatives, which, like all instances of active alternatives, need to be factored into the meaning of the utterance. NPIs are commonly split into two main classes, the *any* type and minimizers like *sleep a wink*. The differences among them can be classified based on the type of alternatives they activate and the method in which these alternatives get factored into meaning. The remainder of this section deals with each type of NPI in turn. Consider the following dialogue, and in particular B’s response which contains the NPI *any*.

- (19) A: Did Mary read books during her summer vacation?  
 B: No, Mary didn’t read any books.

In using an NPI in her response, B conveys the meaning that Mary didn’t read any of the books in the domain of discourse. In a sense, this response brings into discussion the existence of all types of books (books about cats, logic, cooking, etc.) and asserts that none of them are such that Mary read them. These ‘types’ of books are precisely the sub-domain alternatives claimed to always be active when an NPI like *any* is used.<sup>2</sup> I take NPIs to be existential indefinites that obligatorily activate smaller domain alternatives. Schematically, the alternatives can be represented as in (20), with D containing three books, and its six sub-domains containing one or two books each.<sup>3</sup>

- (20) a. any book =  $\lambda P. \exists x \in D [\text{book}(x) \wedge P(x)]$   
 b. any book<sup>alt</sup> =  $\{\lambda P. \exists x \in D' [\text{book}(x) \wedge P(x)]: D' \subseteq D\}$   
           {a, b, c}  
 c.    {a, b}    {b, c}    {a, c}  
       {a}     {b}     {c}

---

<sup>2</sup>NPIs also have a scalar alternative, the conjunction of the disjuncts. However, in the scope of negation this alternative will always be weaker, and thus its role in the derivation negligible.

<sup>3</sup>I use *a, b, c* as shorthand for the sub-domain alternatives, that is, the books in D.

Recall the discussion on SIs where it was argued that activating alternatives means having to incorporate them into the meaning. NPIs like *any* do so via the covert operator  $\mathcal{E}xh$ . Syntactically, one can think of NPIs as involving a form of agreement with this operator: NPIs bear the feature [+D] which must be checked by an operator carrying the same feature, an exhaustifying operator is. Doing so allows us to encode the need to exhaustify alternatives in the syntax. Semantically, NPIs must occur in a DE environment in order to satisfy the requirements of the exhaustification operator. This operator targets the alternatives and eliminates them just as long as they are stronger than (entail) the assertion; otherwise exhaustification by  $\mathcal{E}xh$  is vacuous and simply returns the original assertion. Observe that in the scope of sentential negation the alternatives are all entailed by the assertion, since not reading any book whatsoever entails not reading a specific kind of book. Thus (21) turns out to be interpreted as a plain negative existential statement.

(21) Mary didn't read any book.

- a. Assertion:  $\neg\exists x\in D[\text{book}(x) \wedge \text{read}(\text{Mary},x)]$
- b. Alternatives:  $\{\neg\exists x\in D'[\text{book}(x) \wedge \text{read}(\text{Mary},x)]: D' \subset D\}$
- c.  $\mathcal{E}xh(\text{Mary didn't read any book}) = \text{Mary didn't read any book}$

In fact, all environments that license inferences from sets to subsets will allow NPIs to appear in their scope since the alternatives (the subsets) are entailed by the assertion (superset), hence the general description of NPI licensors as DE operators.

In UE contexts, the alternatives are stronger than the assertion; entailments hold from subsets to supersets since reading a book about cats entails reading any book whatsoever. Since the alternatives entail the assertion, exhaustification by  $\mathcal{E}xh$  requires them to be negated. Negating these stronger alternatives amounts to saying that for any possible book, Mary didn't read it, which is in clear contradiction with the assertion which says that Mary read a book. So while the syntactic requirement of NPIs is met, that is, the [+D] feature is checked by  $\mathcal{E}xh$ , the semantic requirement is not, rendering NPIs in UE contexts ungrammatical.

One can see then how these distributional restrictions can be explained straightfor-

wardly as soon as a compositional semantics of NPIs is adopted. Essentially, what such an alternative-based account says is that NPIs are low elements on a scale and, unlike regular indefinites, obligatorily activate alternatives. Their need to be in negative contexts falls out automatically once we look at the interaction between the types of alternatives being activated and the way they are factored into meaning. For the purposes of this overview I assumed that the different types of PSIs are specified for which exhaustifier is invoked, that is, they carry either a [+D<sub>E</sub>] or a [+D<sub>O</sub>] feature, which dictates which exhaustifying operator they can enter into a checking relation with.<sup>4</sup> While this choice can be thought of as a form of agreement, the hope is to have a more principled analysis in the end.<sup>5</sup>

Yet another dimension along which NPIs vary is determined by the strength of the operator. Take the NPIs *ever* and *in weeks* and observe that *in weeks* is acceptable in a subset of the environments that can support *ever*.

- (22) a. Nobody has *ever* been to New York.  
 b. Nobody has been to New York *in weeks*.

- (23) a. Few people have *ever* been to New York.  
 b. \*Few people have been to New York *in weeks*.

Gajewski (2011), following Chierchia 2004, accounts for this variation in terms of whether or not the non-truth conditional meaning (presupposition or implicature) of the negative element is taken into account in the exhaustification of the NPI. The basic idea is simple and I encourage the interested reader to refer to these works for the details of the implementation. What distinguishes *in weeks* from *ever* is that exhaustifying the former requires us to take into account the non-truth conditional aspects of meaning as well, that is, to include any implicatures and presuppositions that the assertion gives rise to. Once we consider the enriched meaning of the assertion, *in weeks* will no longer be in a downward entailing

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<sup>4</sup>I would like to thank to Hedde Zeijlstra (p.c.) for this suggestion.

<sup>5</sup>Chierchia (2012) proposes an ‘optimal fit’ principle that would take *Exh* as the default exhaustifier unless the alternatives being acted upon are linearly ordered with respect to entailment, as is the case with minimizers. As we will see later, however, we still need to maintain that some indefinites, and in particular PPIs, can only appeal to exhaustification via **E**, regardless of the shape of their alternatives.

context in (23b) since *few* gives rise to the implicature *but some*, and the exhaustification of the NPI will no longer be able to proceed consistently since the alternatives are stronger and yet not excludable without arriving at a contradiction.

- (24) Few people have been to New York *in weeks*.  $\sim \rightarrow$  Few people have been to New York *in weeks* but some people have been to New York *in weeks*.

On the other hand, the enriched meaning of (22) is equivalent to the assertion since *nobody*, unlike *few*, occupies the strong endpoint of its scale and therefore does not introduce an implicature. To reiterate, the difference between *ever* and *in weeks* is that the latter, but not former, is exhaustified with respect to the enriched meaning of the assertion. In the case of sentential negation, negative quantifiers and *without*, the enriched meaning will be equivalent to the assertion since no implicatures are available, thus both types of NPIs will be acceptable in their scope. In the scope of *few* and other implicature/presupposition-carrying elements, however, only weak NPIs like *ever* can survive since their exhaustification proceeds only with respect to the truth conditional meaning; strong NPIs like *in weeks* are sensitive to the presence of implicatures and presuppositions and cannot survive in such environments.

## Chapter 2

# Constituent questions

### 2.1 Introduction

The goal of this chapter is to argue for a unified account of the distribution of negative polarity items (henceforth NPIs) in constituent questions, which has posed a problem for both the semantics of questions and theories of NPIs. These items 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 otherwise unifies all other NPI environments. Building on an observation by Guerzoni and Sharvit (2007) that the distribution of NPIs is even more constrained than initially thought, namely that NPIs are acceptable only in questions that receive a strongly exhaustive interpretation, I maintain, with others, that current theories of questions are not fine-grained enough to account for the systematic behavior of NPIs in questions on the one hand, and declaratives on the other. I will argue that this calls for a re-evaluation of the semantics of questions, particularly with respect to how we can encode the ambiguity in strength they exhibit in embedded contexts, and I will show that via a conceptually minimal switch in the semantics of questions we can not only explain why the distribution of NPIs should correlate with the strength of the question, but we can also do so in a manner that allows us to maintain a unified account for the behavior of NPIs in both declarative and interrogative contexts.

### 2.1.1 The problem of NPIs at a glance

Negative polarity items can be found in a number of contexts, as shown below for *ever*, a prototypical NPI.

- (1) a. Negation
  - (i) I don't think that Mary ever liked pizza.
  - (ii) \*I think that Mary ever liked pizza.
- b. Negative Quantifiers
  - (i) Few/no/at most 10 people have ever heard of linguistics.
  - (ii) \*Many/most people have ever heard of linguistics.
- c. Left argument of *every*
  - (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. Antecedent of conditionals
  - (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. Scope of *only*
  - (i) Only John<sub>F</sub> has ever failed this class.
  - (ii) \*John<sub>F</sub> has ever failed this class.
- f. Questions
  - (i) Who has ever failed this class?
  - (ii) \*John has ever failed this class.

What unifies (most of) these environments is the fact that they can be shown to give rise to downward entailing inferences. Consider, for example, the case of *every*. In (2) we can see that the left but not right argument of *every* allows for inferences from sets to subsets, i.e. downward entailing inferences. In (2a) we can infer from the fact that everyone who took a math passed the test that everyone who took a calculus class passed it. Note that the inference does not go the other way around as well. That is, if (2a-ii) is true it does not automatically follow that (2a-i) is true as well. Once we turn to the right argument of *every*,



namely its nuclear scope, the directionality of the inference is switched in that given a set, we can only infer that something holds true of a superset of that set.

- (2) a. left argument of *every*: set  $\Rightarrow$  subset
- (i) Everyone [who has taken a math class] [passed the test].  
 $\Downarrow$   $\Uparrow$
- (ii) Everyone [who has taken a calculus class] [passed the test].
- b. right argument of *every*: subset  $\Rightarrow$  set
- (i) Everyone [who passed the test] [has taken a math class].  
 $\Downarrow$   $\Uparrow$
- (ii) Everyone [who passed the test] [has taken a calculus class].

The same pattern of deduction can be argued to hold for every environment in the examples in (1), with one main exception: 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? We could define it in terms of whether asking one question automatically leads to asking another question. If that were the case, we would expect there to be an inference from (3a) to (3b).

- (3) a. Who passed a math class?  
 b. Who passed a calculus class?

However, asking (3a) does not lead to asking (3b). Guerzoni and Sharvit argue that even if one did find a semantics for questions according to which they can be shown to give rise to downward-entailing inferences, 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 (modulo some intervention facts which will be discussed in greater detail in Chapter 3):

- (4) 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:

- (5) 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 has ever participated in that competition.
- (6) 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 (c.f. Heim 1994, Beck and Rullmann 1999, a.o.). The questions in (5) receive a strongly exhaustive (SE) interpretation while those in (6) a weakly exhaustive (WE) interpretation. In a nutshell, different strength amounts to different answers to the same question, and 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. The same holds true of all other predicates in (5). Turning not to the examples in (6), we see that 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 can't be surprised by someone who didn't. Here too it can be shown that the same inference holds for all other predicates in (6).

The conclusion drawn by Guerzoni and Sharvit (2007) is that NPIs are only acceptable in questions that receive a strongly exhaustive (SE) reading, summarized below:

- (7) \* the predicates in (5) embed SE questions → NPIs are acceptable  
 \* the predicates in (6) embed WE questions → NPIs are not acceptable  
 \* root questions are always SE → NPIs are acceptable

This immediately raises the question of how we can account for the correlation between the strength of the question and the distribution of NPIs and, more specifically, what it is about being interpreted as strongly exhaustive that makes a question license NPIs. Guerzoni and Sharvit claim that there is no way to account for this correlation, that is, that *SE* questions are ‘no more *DE*’ than *WE* questions, and conclude that we must 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” (Guerzoni and Sharvit, 2007, p. 5). 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. In order to do so, however, we first need to understand what this difference in strength is, and how it has been previously analyzed.

### 2.1.2 The semantics of embedded constituent questions

For the remainder of this work we will assume that questions denote sets of possible answers, the Hamblin-Karttunen approach, rather than partitions, the Groenendijk-Stokhof approach. What that means is that a question such as (8a) will be analyzed as denoting the set of possible answers, a set of propositions.

- (8) a. Which guests ate cake?  
 b. {Bill ate cake, Mary ate cake, Bill and Mary ate cake}  
 c.  $\lambda P_{\langle s,t \rangle} . \exists x \in [\text{guests}]^{w_0} \ \& \ p = \lambda w . x \text{ ate}_w \text{ cake}$

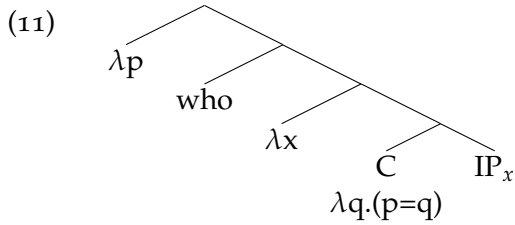
I follow Karttunen (1977) and take *wh*-phrases to be existential quantifiers with essentially the same semantics as a regular existential quantifier like *someone*. The only difference between the two is that *who* is additionally endowed with a [+WH] feature.

- (9) a.  $[\text{who}] = \lambda P_{\langle e,t \rangle} . \exists x [\text{person}(x) \wedge P(x)]$   $\langle et, t \rangle$   
 a.'  $[\text{which}] = \lambda P_{\langle e,t \rangle} . \lambda Q_{\langle e,t \rangle} . \exists x [P(x) \wedge Q(x)]$   
 b.  $[\text{someone}] = \lambda P_{\langle e,t \rangle} . \exists x [\text{person}(x) \wedge P(x)]$   $\langle et, t \rangle$   
 b.'  $[\text{some}] = \lambda P_{\langle e,t \rangle} . \lambda Q_{\langle e,t \rangle} . \exists x [P(x) \wedge Q(x)]$

In order to compositionally derive the set in (8b-c) we need to assume that questions, unlike declaratives, additionally contain a semantically non-vacuous morpheme in the head position of the CP. I will refer to this morpheme simply as *C*. There have been different proposals for how this head combines with its sister to ultimately give us the set of possible answers, but what they all agree on is that syntactically, it carries a [WH] feature which drives the movement of the *wh*-phrase(s) to its specifier position, while semantically it denotes the relation of identity in (10).

$$(10) \quad \llbracket C \rrbracket = \lambda q_{\langle s,t \rangle} \cdot (p = q) \quad \langle st, t \rangle$$

Following Sauerland (1998) (but see also von Stechow 1996), I take the unbound propositional variable introduced by *C* to be bound higher up in the structure, above the level of the moved *wh*-phrased, schematically represented as in (11).

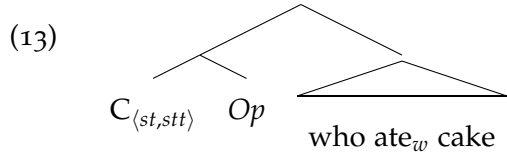


This move by itself is not optimal as it does not represent a seamless translation of the syntactic logical form into the semantic form of representation, given that we generally assume that lambda abstractors like  $\lambda p$  in (11) are introduced as a result of movement. In order to avoid appealing to such special composition rules, I follow Fox (2012) in assuming that the interrogative head is actually a complex head, consisting of two elements:  $C_{int}$  and an operator that needs to undergo movement. Under this view, the meaning of  $C_{int}$  is provided in (12), taking as its first argument a propositional variable bound by a lambda abstractor.

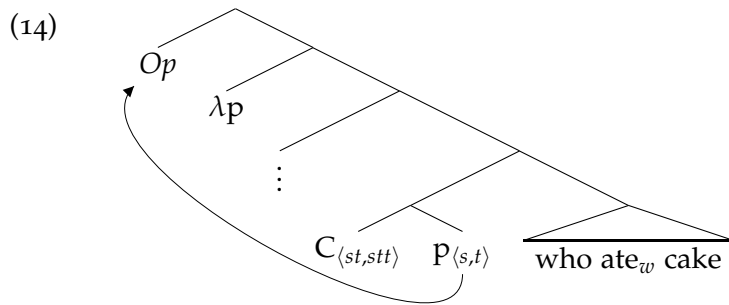
$$(12) \quad \llbracket C_{int} \rrbracket = \lambda p_{\langle s,t \rangle} \cdot \lambda q_{\langle s,t \rangle} \cdot p = q \quad \langle st, stt \rangle$$

One possible way to implement this, that is, to get the variable  $p$  and the abstraction over it, is either by assuming movement of a semantically vacuous element which leaves a trace of type  $\langle s, t \rangle$ , or via movement of an operator which takes question denotations as its

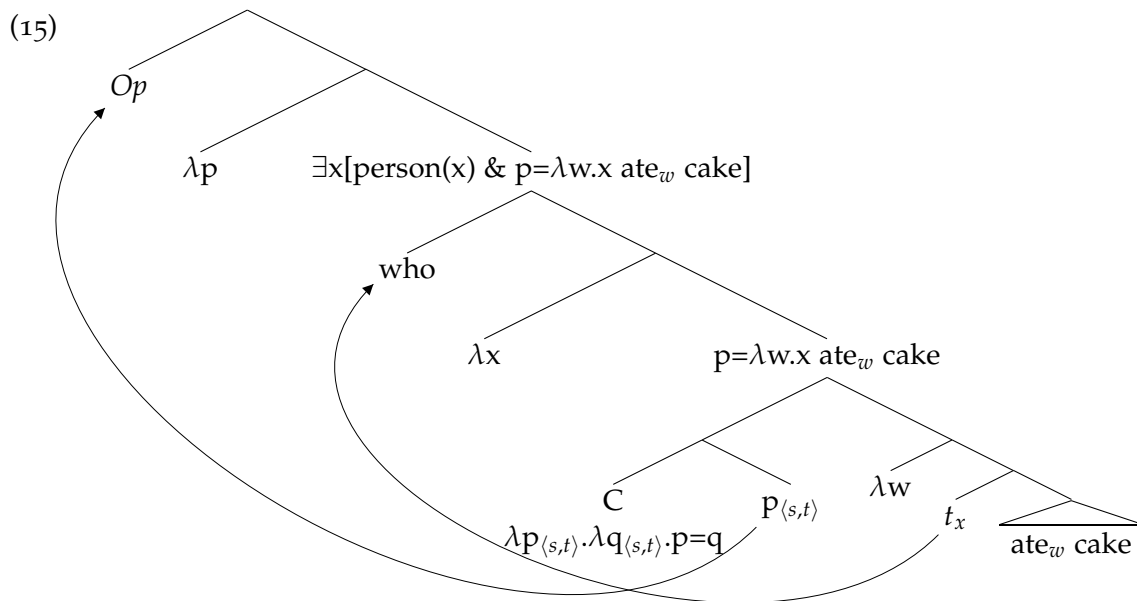
argument. Assuming that there is such an operator, which we can simply refer to as  $Op$  for now, it will be base-generated as a sister of  $C$ , creating the complex head in (13). I will henceforth use  $C$  to refer to the object in (12).



Given that we are taking  $Op$  to be a question-level operator, its type will be  $\langle\langle st, t \rangle, \alpha\rangle$  (leaving  $\alpha$  as an unspecified type for now), meaning that if left in situ, it would give rise to a type mismatch as  $C$  wants a sister of type  $\langle s, t \rangle$ . In order to rectify this type mismatch,  $Op$  moves out of the complex head leaving behind a trace of type  $\langle s, t \rangle$  and abstracting over it, as in (14).



Putting all the pieces together, and assuming that the  $[WH]$  feature on the  $C$  head triggers the movement of the  $wh$ -phrase to its Spec position, we derive the structure in (15).



Having established what the underlying structure of a question is, we can now turn to embedded questions and give some content to this *Op*. The idea most commonly endorsed is that a question-embedding predicate takes as its argument the answer to the embedded question and *Op* operates on the denotation of a question to return that answer. Now, depending on the predicate embedding it, an embedded question may receive one of two possible readings: a weakly exhaustive (WE) reading or a strongly exhaustive (SE) reading.<sup>1</sup> The WE answer corresponds to the proposition that denotes the conjunction of all the true members in the question denotation. So for someone to know (16) on its WE reading, they need to know for every *x* such that *x* ate cake that *x* ate cake. Assuming that Bill is the only one who ate cake, this would amount to the propositional knowledge in (16b).<sup>2,3</sup> On the other hand, the SE answer to (16) is the proposition that the conjunction of the true members is the complete answer, namely the proposition *Bill and nobody else ate cake*. To know the SE answer to *Who ate cake?* is to know for every *x* who ate cake that *x* ate cake, and furthermore to know for every *x* who didn't eat cake that *x* didn't eat cake.

- (16) Who ate cake?
- a. {**Bill ate cake**, Mary ate cake, Bill and Mary ate cake}
  - b. John knows who ate cake.  $\sim_{WE}$  John knows that Bill ate cake.
  - c. John knows who ate cake.  $\sim_{SE}$  John knows that Bill and nobody else ate cake.

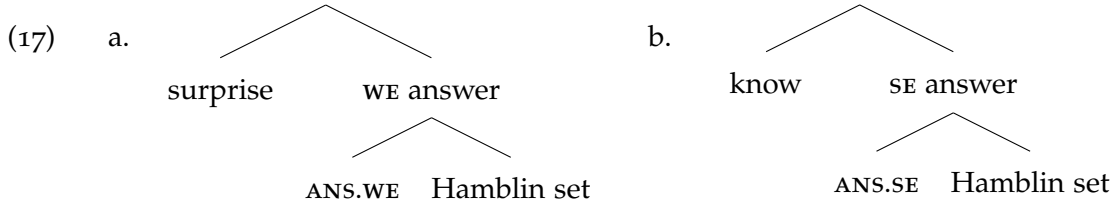
Proponents of this way of approaching embedded *wh*-questions advocate that strength should be represented by means of two answer-hood operators (cf. Heim (1994)) that combine with the Hamblin set, the set of possible answers, and deliver the two answers above. In the system outlined above, that would mean that *Op* plays the role of the answer-hood operator, and furthermore, that question embedding predicates sub-categorize for one of these two operators, as in (17):

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<sup>1</sup>We will, for the time being, ignore mention-some readings and return to them in a later chapter.

<sup>2</sup>Note that I'm making the crucial assumption that *know* can embed both WE and SE readings, despite much debate in the literature with respect to this issue; see in particular George 2011 who advocates that *know* is exclusively SE.

<sup>3</sup>From this point on I will use bolding as a way to indicate which propositions are assumed to hold true in the actual world, with bold indicating true and non-bold indicating false propositions.



Taking  $Q$  to be the extension of the derived set of propositions, as in (18), the two types of answers can be defined as in (18b-c):

- (18)  $\llbracket Q \rrbracket = \lambda p_{\langle s,t \rangle}. \exists x [x \in \llbracket \text{person} \rrbracket^{w_0} \wedge p = \lambda w. x \text{ ate}_w \text{ cake}]$   
 a.  $\llbracket \text{ANS.WE} \rrbracket = \lambda Q. \lambda w. \lambda w'. \forall p \in Q [p(w)=1 \rightarrow p(w')=1]$   
 b.  $\llbracket \text{ANS.SE} \rrbracket = \lambda Q. \lambda w. \lambda w'. \forall p \in Q [p(w) = p(w')]$

The role of these ANS operators is to take a set of propositions and return a function from worlds to the proposition that constitutes the true, and possibly complete, answer given that set. For example, given a set of propositions  $Q$  and a world  $w_0$ , the two possible answers to that question in the world of evaluation,  $w_0$ , will be the proposition in (19) and (20) respectively:

(19)  $\llbracket \text{ANS.WE} \rrbracket(Q)(w_0) = \lambda w. \forall p \in \{p: \exists x \in \llbracket \text{person} \rrbracket^{w_0} \wedge p = \lambda w. x \text{ ate}_w \text{ cake}\} [p(w_0)=1 \rightarrow p(w)=1]$

★ *the set of worlds such that the people who ate cake in  $w_0$  also ate cake in those worlds*

(20)  $\llbracket \text{ANS.SE} \rrbracket(Q)(w_0) = \lambda w. \forall p \in \{p: \exists x \in \llbracket \text{person} \rrbracket^{w_0} \wedge p = \lambda w. x \text{ ate}_w \text{ cake}\} [p(w_0)=p(w)]$   
 $= \lambda w. \forall p \in \{p: \exists x [x \in \llbracket \text{person} \rrbracket^{w_0} \wedge p = \lambda w. x \text{ ate}_w \text{ cake}]\} [p(w_0) \rightarrow p(w) \wedge p(w) \rightarrow p(w_0)]$

★ *the set of worlds which agree with  $w_0$  in terms of the people who ate cake*

★ *the set of worlds such that the people who ate cake in  $w_0$  also ate cake in those worlds and furthermore, the people who ate cake in those worlds also ate cake in  $w_0$*

One way to test whether the distinction between (19) and (20) is made in the grammar is by seeing whether there are predicates that can only select for one these answers. Consider

the case of question-embedding *surprise* and the following sentence.

(21) Jeremy was surprised by who came to the party.

The idea is that there are situations in which (21) would be judged as false if Jeremy is surprised by the strongly exhaustive answer to the question *who came to the party*. Such examples involve cases where Jeremy's expectations are at odds only with the WE answer, and not with the SE answer. Consider the situation in (22):

(22)		Mary	Suzy	Ann
	party goers	yes	yes	no
	Jeremy's expectations	yes	yes	yes

In this situation Jeremy expected all those who showed up, Mary and Suzy, to show up but furthermore expected someone else, Ann, to show up even though she ended up not coming to the party. In such a situation the complete answer to *who came to the party* would be that Mary and Suzy and nobody else showed up, which would be surprising to Jeremy given that he expected Mary and Suzy and Ann to show up. And yet (21) is judged as false, suggesting that appealing to the SE answer in this case gives us the wrong result. On the other hand, if we look at the WE answer, namely the proposition that *Mary and Suzy showed up*, we can see that the sentence in (21) is correctly judged as false given that Jeremy's expectations regarding the WE answer conform with the facts, hence his lack of surprise that who came. Such cases have been taken by Heim (1994), following Berman 1991, to indicate that strong exhaustivity is too strong in certain cases and thus that a notion of weak exhaustivity needs to be appealed to.

### 2.1.3 Motivating a new semantics of questions

The fact that question strength is a real distinction made by grammar can also be seen when we look at the behavior of NPIs in embedded interrogatives. Guerzoni and Sharvit (2007) observe that the acceptability of NPIs in the nucleus of an embedded question is sensitive to the nature of the embedding predicate. Specifically, it appears to be the case that only questions that receive a strongly exhaustive reading allow NPIs in their scope.



Take, for example, the contrast in (23) and (24). The predicates in (23) have been argued to embed only WE readings of questions while those in (24) to embed SE readings. The same argumentation as above can be used to show that the predicates in (23) cannot make reference to SE interpretations.

(23) WE questions

- a. \*It surprised Mary which boys brought her any gifts.
- b. \*Ben realized which students had ever been to Paris.
- c. \*It amazed her which girls had ever participated in a dance competition.
- d. \*Jay was disappointed by who sold any antique books.
- e. \*Will was annoyed at which guys had ever dated his girlfriend.

(24) SE questions

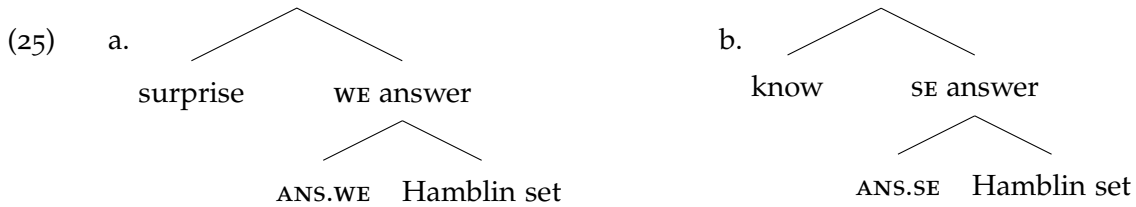
- a. Mary wants to know which boys brought her any gifts.
- b. John wonders who has ever been Paris.
- c. Chris asked me who took any linguistics classes.
- d. Jason found out who stole anything from the safe.
- e. Jenny discovered who stole anything from her home.

The problem with the current, or for that matter, any other previous analyses of questions is that they have no way to account for the correlation between the strength of a question and the acceptability of an NPI in that question, suggesting that we need to amend our analysis of embedded questions.

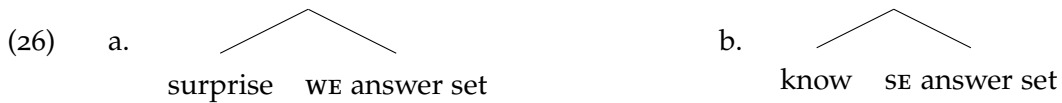
Another area that has proven to be problematic for a theory of questions that takes them to denote the WE/SE answer, namely a proposition, concerns the semantics of question-embedding predicates. Spector and Egré (2007, 2012), as well as George (2011), discuss cases where it appears to be necessary for a question-embedding predicate to make reference not only to the true answer to the embedded question, but also other possible answers, suggesting that if we want to maintain a purely compositional account of embedded questions, something needs to change.

### 2.1.4 A glance at the new proposal

The crux of my proposal is that strength should be encoded at the level of the question, rather than in the answer-hood operator. More specifically, in order to derive the two types of readings, I claim that instead of having two answer-hood operators apply to the same set of propositions, schematically represented in (25)



We actually have the difference be derived internal to the question, giving us two distinct sets of propositions, as in (26):



I depart from previous analyses in two main respects. First, I propose, following George (2011), that question-embedding predicates take as arguments sets of propositions, as in (26), rather than just propositions, as in (25). This switch, I will show, allows for more nuanced readings of question-embedding constructions. Second, I claim that not all questions are created equal in that some may denote a *WE* set of propositions, basically the Hamblin set in (27), while others a *SE* set of propositions, as in (28).

(27) The *WE* answer set is the Hamblin set, as before, the set of possible answers

$$Q_w = \{\text{Bill ate cake, Mary ate cake, Mary and Bill ate cake}\}$$

(28) The *SE* answer set, what I will call the  $Q_s$ , is the set of propositions in (29):

$$Q_s = \{\text{Mary and nobody else ate cake, Bill and nobody else ate cake, Mary and Bill and nobody else ate cake}\}$$

Notice that the *SE* answer set is simply the set of all possible *SE* answers. While my approach will ultimately yield the same interpretation for *SE* questions, I will depart from previous proposals in terms of the compositional steps that derive this set. Specifically, I

will argue for a more nuanced underlying representation of SE questions which will allow us to understand why NPIs behave the way they do in these types of questions. The idea, in a nutshell, will be that globally, SE questions denote sets of propositions that create non-monotonic environments, but that at some level underlyingly, a Strawson-DE environment is created. It is crucially the existence of this local Strawson-DE level that allows NPIs to be licensed. I will argue that assuming a more complex underlying representation of questions allows us to account for a number of phenomena related to the distribution of NPIs while leaving intact those already well understood phenomena.

## 2.2 Moving the ambiguity to the question nucleus

As discussed in the previous section, the weak/strong exhaustivity distinction is often encoded at the level of the ANS operator. In this section I propose a new way to think about this distinction which takes the difference to be encoded at the level of the question nucleus. That is, instead of talking about the weak and strong answer, we can talk about the weak answer set and the strong answer set. We already know what the weak answer set is, namely the Hamblin set. The question now is what the strong answer set is, and how we can derive it without making reference to ANS.SE. Recall what ANS.SE delivers for a question such as *Who ate cake?*: the true proposition of the form *x and nobody else ate cake*, where *x* is an element in the domain of the *wh*-phrase. The strong answer **set** should thus consist of all possible propositions of this form. Observe, furthermore, that we can think about each such proposition as the conjunction of two components: that *x ate cake* and that *nobody who's not x ate cake*. Notice that the second of these components creates an environment that is downward entailing, and this is going to turn out to be the crucial piece when reasoning about the acceptability of NPIs. Latching onto that insight, I propose that at some level in the derivation of a SE question these two components are, in a sense, separate enough that the DE component is the only component that is relevant when it comes to the licensing of the NPI.

Observe that a proposition like (29) is itself decomposable into these components, with the only difference being that (29a) is presupposed rather than asserted.

- (29) Only Bill ate cake.
- a. Bill ate cake.
  - b. Nobody who's not Bill ate cake.

von Stechow 1999 refers to environments where the assertive component is DE but the presupposition non-DE, such as those created by *only*, as Strawson downward monotonic and claims that such environments are capable of supporting NPIs, see (30a).<sup>4</sup> Crucially, NPIs are not acceptable when they occur in the scope of the enriched version in (30b), that is, when the presupposition becomes part of the assertive component.

- (30) a. Only Bill ate anything.
- b. \*Bill and nobody other than him ate anything.

The task we are faced with is the following. We want SE questions to denote sets of propositions of the form in (30b), and yet we want NPIs to behave as if they occurred in propositions of the form in (30a).

### 2.2.1 Covert *only*

As discussed above, it seems that thinking about the SE answer set in terms of sets of exhaustified propositions is almost in line with our intuitions about what it means to be a possible SE answer. I propose that we can arrive at such a set by assuming that SE questions contain, in their underlying representation, a silent *only* which adjoins to the question nucleus, right below the question operator.<sup>5</sup> Taking *only* to be an IP-level operator that associates with the trace of the *wh*-phrase gives us the LF in (31).<sup>6</sup>

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<sup>4</sup>For the remainder of this section I will continue talking in these abstract terms when discussing the licensing of NPIs.

<sup>5</sup>One could have imagined a much more straightforward way of deriving this, which would have been by adjoining an exhaust operator to the Hamblin denotation (c.f. Menéndez-Benito 2010), as in (i). This is no more different than what we generally encounter in theories of grammar that appeal to the existence of alternatives and assume that these alternatives end up being exhaustified with respect to each other.

(i)  $\mathcal{E}xh(Q) = \{\lambda w. p(w) \wedge \forall q (q \in Q \wedge q(w)) \rightarrow (p \subseteq q) \mid p \in Q\}$

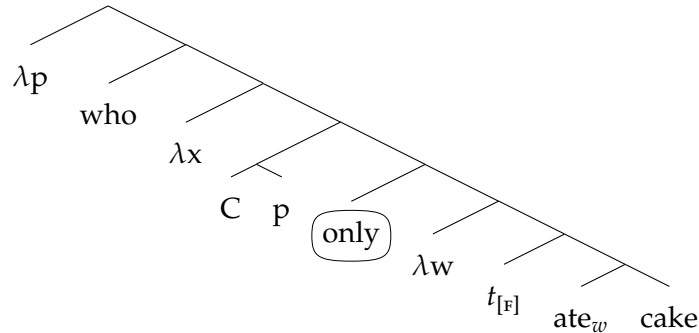
While this derives the final SE answer set, the problem is that exhaust operators are non-monotonic operators and that would not get us any closer to understanding why NPIs are licensed in these environments.

<sup>6</sup>Another option could have been to take *only* to be an adnominal operator, but see the Appendix to Chapter 3 for why this approach turns out not to be feasible.

(31) Who ate cake?

a.  $\lambda p. \exists x [x \in \llbracket \text{person} \rrbracket^{w_0} \wedge p = \text{only } x \text{ ate cake}]$

b.



Following Rooth (1992), I take *only* to be a two place operator which takes a contextual variable and a proposition  $p$ , its prejacent; this variable, henceforth referred to as  $\mathcal{Alt}(p)$ , represents a contextually determined set of alternatives which is obtained by replacing the trace of the *wh*-phrase with an alternative provided by the domain of the *wh*-phrase, illustrated in (32) for the question in (31):

(32)  $\mathcal{Alt}(\lambda w. g(1) \text{ ate cake}) = \{\lambda w. x \text{ ate}_w \text{ cake} \mid x \in \llbracket \text{person} \rrbracket\}$

The denotation of *only* is generally assumed to be that in (33): a function from a proposition  $p$  and a set of alternatives, to the negation of all alternatives not entailed by  $p$ .

(33)  $\llbracket \text{only} \rrbracket(\mathcal{Alt}(p))(p) = \lambda w. \forall q \in \mathcal{Alt}(p) [p \not\subseteq q \rightarrow q(w)=0]$  *equivalently*  
 $= \lambda w. \forall q \in \mathcal{Alt}(p) [q(w)=1 \rightarrow p \subseteq q]$

We know, however, that *only* also contributes a presupposition, the nature of which we turn to next.

### 2.2.2 The presupposition of covert *only*

What presupposition overt *only* contributes has been highly debated in the literature (cf. Horn 1996, Geurts and van der Sandt 2004, Ippolito 2008, among many others). The main two contenders are the prejacent presupposition and the existential presupposition. One

claim is that *only* presupposes its prejacent, as in (34).<sup>7</sup>

$$(34) \quad \llbracket \text{only} \rrbracket(\mathcal{A}lt(p))(p) = \lambda w: p(w)=1. \forall q \in \mathcal{A}lt(p) [q(w)=1 \rightarrow p \subseteq q]$$

Under this account, a strongly exhaustive question will have the denotation in (35), namely a set of partial propositions that have a presupposition that *x ate cake*, where *x* is a person or group of people, and asserts that everybody who's not *x* did not eat cake.

$$(35) \quad \lambda p. \exists x[\text{person}_{w_0}(x) \wedge p = \lambda w: x \text{ ate}_w \text{ cake}. \\ \forall a \in \mathcal{A}lt(x) [(a \text{ ate}_w \text{ cake}) \rightarrow (x \text{ ate}_w \text{ cake}) \subseteq (a \text{ ate}_w \text{ cake})]]$$

So a potential answer to *Who ate cake?* would be *Only Bill ate cake*, which, under the analysis provided above, would amount to asserting that nobody other than Bill ate cake. Under the assumption that presuppositions are definedness conditions, such an answer would only be defined if the presupposition that *Bill ate cake* is part of the common ground. However, as pointed out to me by Veneeta Dayal as well as an anonymous reviewer, it seems highly unlikely that one would seek information about something that is already part of the common ground. That is, given the semantics of *SE* questions we are currently entertaining, namely (35), the question should be rendered un-askable since the answer, or at least a part of it, is assumed to be part of the common ground.

Another option that has been entertained for the presupposition of *only* is to relax the presupposition to be that of mere existence, as in (36).

$$(36) \quad \llbracket \text{only} \rrbracket(\mathcal{A}lt(p))(p) = \lambda w: \exists r \in \mathcal{A}lt(p) r(w)=1. \forall q \in \mathcal{A}lt(p) [q(w)=1 \rightarrow p \subseteq q]$$

In the case at hand, it would result in having a *SE* question denote the set of partial propositions in (37).

$$(37) \quad \lambda p. \exists x[\text{person}_{w_0}(x) \wedge p = \lambda w: \exists y (y \text{ ate}_w \text{ cake}). \\ \forall a \in \mathcal{A}lt(x) [(a \text{ ate}_w \text{ cake}) \rightarrow (x \text{ ate}_w \text{ cake}) \subseteq (a \text{ ate}_w \text{ cake})]]$$

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<sup>7</sup>Here and throughout I adopt the notation in Heim and Kratzer (1998) to represent partial functions.  $\lambda\phi: \psi. \chi$  stands for “the function that maps  $\phi$  to  $\chi$  is defined only if  $\psi$ ”.

With this presupposition, a possible answer would presuppose that someone ate cake and for a person or group of people  $x$ , it would assert that everybody who is not a part of  $x$  did not eat cake. Basically, every proposition would presuppose that someone ate cake, and assert, for every  $x$  in the domain of the *wh*-phrase, that everyone other than  $x$  did not eat cake. As far as the presupposition is concerned, this seems like a better approximation of what these questions denote since what is now part of the common ground is merely the fact that there is someone who satisfies the scope of the question, a presupposition we would want to be present regardless of the strength of the question.

A good way to keep track of what predictions we are making is by comparing the outcome of this account with the outcome of an ANS.SE account. Consider the question *Who saw Mary?* and suppose that Bill and John saw Mary and nobody else did. Under the weak presupposition version of covert *only*, i.e. that in (36), the answer would be (38a), while the answer under the ANS.SE analysis would be as in (38b).

- (38) Who saw Mary?
- a. ASSERTS: Nobody who's not John and Bill saw Mary.  
PRESUPPOSES: Somebody saw Mary.
  - b. ASSERTS: John and Bill saw Mary and nobody else saw Mary.

The proposition denoted by the answer in (38a) is weaker, i.e. strictly entailed by the proposition denoted by the answer in (38b). To see this, all we need to do is find a situation in which (38a) is true and (38b) is false. One such case would come about if the facts were as follows: Bill saw Mary but John didn't see Mary. Such a situation would be consistent with (38a) but not with (38b). What this means for the meaning of questions is that even if in the actual world the facts were as in (39a), for someone to know the answer to this question, under the truth conditions in (38a), it would suffice for her to know either of (39b-d) for (39) to count as appropriate. And yet this is clearly too weak since for someone to know a question, be it in the weak or strong sense, they need to, at a minimum, know for each person who saw Mary that that person saw Mary, a requirement that (38a) does

not impose.<sup>8</sup>

- (39) She knows who saw Mary.
- a. FACTS: Bill and John saw Mary.
  - b. She knows that Bill saw Mary.
  - c. She knows that John saw Mary.
  - d. She knows that Bill and John saw Mary.

It would appear then that we have hit a wall with this approach. On one hand we want SE questions to denote propositions of the form *only x saw Mary* to account for the acceptability of NPIs, while on the other hand we saw that assuming a presuppositional semantics for *only* would give rise either to un-askable questions, or to very weak truth conditions. One suggestion might be to take this covert *only* to be presuppositional-less, that is, to make everything be part of its assertive component. That, however, would result in propositions of the form in (40a) or (40b), neither of which allows NPIs in its scope.<sup>9</sup>

- (40) a. John and Bill saw Mary and nobody else saw Mary.  
b. Somebody saw Mary and nobody other than John and Bill saw Mary.

Let's, instead, go back to the original idea that *only* presupposes its prejacent and re-evaluate the intuition that this presupposition is part of the common ground. Specifically, we need to ask ourselves if/how these presuppositions project out of questions. Is it really the case that when we're dealing with sets of partial propositions, each of which has a different presupposition, every single presupposition projects? If the way questions project presuppositions is by having the presupposition of each member of the question be accommodated into the common ground, then we would run into a much bigger problem than the fact that the question presupposes the answer. Having every presupposition associated with *only* in the denotation of a question like *Who saw Mary?* project would amount to presupposing that for every *x* in the domain of the *wh*-phrase, *x* saw Mary, which is clearly

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<sup>8</sup>I'd like to thank Danny Fox for helping me see the issue with adopting such an account.

<sup>9</sup>This would more or less be the same as the analysis proposed by George (2011), with the only difference being that he takes *wh*-phrases to denote abstracts. Also similar to this would be an account that takes the distinction between WE and SE to be due to the presence of a silent exhaustifier, the same exhaustifier that delivers scalar implicatures. (cf. Menéndez-Benito 2010, Klinedinst and Rothschild 2011).



wrong. What I want to argue for here is that in these cases presuppositions need to be locally accommodated. We will see in the following section that what this amounts to is saying that *SE* questions are locally Strawson-DE (i.e. good for NPI licensing but bad for questioning purposes) but globally non-monotonic (i.e. good for questioning purposes but bad for NPI licensing).

One question that arises is whether this need to accommodate is a specific rule for questions or a more general rule that calls for local accommodation whenever global accommodation would give rise to a clash with the pragmatics of the discourse. If this were a specific rule for questions we would predict that a question such as (41a) would actually be interpreted as in (41b), which is not the case.

- (41) a. Who talked to his father?  
 b. Who has a father and talked to him?

The second option is thus not only appealing conceptually but also empirically better. The idea is that *only* gives rise to a defective question and this calls for a targeted form of local accommodation, to be explicated below.

### 2.2.3 Local accommodation

In this section we will fine-tune the account of *SE* questions presented in the previous section so as deal with the issues related to NPI licensing and presupposition projection. Recall the LF I proposed for these questions:

- (42)  $\lambda p$  [who [ $\lambda 1$  [ $_{CP}$  [C p] [ $_{IP_2}$  only [ $_{IP_1}$   $\lambda w$  [ $g(1)_{[F]}$  [ $saw_w$  Mary ]]]]]]]]]]

And assume, once again, that the contribution of *only* is as in (43):

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

What this means is that at the level of the question nucleus, at the  $IP_2$  level, we will have an object of the form in (44), namely a partial proposition.

- (44)  $\lambda w: g(1) saw_w Mary. \forall a \in \mathcal{A}lt(g(1)) (a saw_w M) \rightarrow (g(1) saw_w M) \subseteq (a saw_w M)$

This partial proposition creates a Strawson-DE environment (UE presupposition & DE assertion), meaning that if we were to replace *Mary* with *anybody*, we would be able to show that at this level, the NPI is licensed given that it is part of a context whose assertive component is DE. I will go over the details of this account in Section 3, but for now it suffices to note that the analysis would be the same as for why NPIs can survive under overt *only*, a Strawson-DE operator (c.f. von Stechow (1999))

Turning next to the projection-related issues we discussed above, I claim that we can appeal to the notion of local accommodation in order to avoid them. Informally, accommodation amounts to reinterpreting the sentence in such a way that renders the presupposition part of the assertion. This move is motivated by the assumption that all utterances should express propositions that have a 0 or 1 truth-value in each world of the context set (Stalnaker, 1978). The problem, however, is that presuppositional sentences are not felicitous, i.e. do not have a truth-value, in all contexts by virtue of the fact that their presuppositions are not always part of the context set.<sup>10</sup> This can be achieved via the assertion operator  $\mathcal{A}$  (Beaver and Kraemer, 2001), an operator that can be merged at any scope position. When applied to a partial proposition,  $\phi_p$ , this operator returns a total proposition that represents the conjunction of the proposition with its presupposition,  $p$ , as in (45).

$$(45) \quad \llbracket \mathcal{A} \rrbracket(\phi_p) = \phi_p \wedge p$$

Before delving into the analysis, let's consider what the contribution of  $\mathcal{A}$  is in run of the mill contexts such as (46) and (47) adopted from Romoli (2012). Since the first sentence in (46) is presuppositional, it needs to be reinterpreted so as to meet the felicity condition mentioned above.<sup>11</sup> One way to do so is like in (46a), by merging the  $\mathcal{A}$  operator globally. Doing so will give us the meaning in (46b), which is in line with our understanding of what this first sentence means.<sup>12</sup>

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<sup>10</sup>Hence the reason why *The king of France is bald* is considered to be false. Accommodating the presupposition that *there is a king of France* amounts to asserting the conjunction that *There is a king of France and he is bald*. Given that the first conjunct of this reinterpreted sentence is false, the entire sentence ends up being false.

<sup>11</sup>Although there are also cases where one of the speakers may choose to object to the presupposition, as in the *Hey, wait a minute!* cases.

<sup>12</sup>Recall that negation is a hole for presuppositions, meaning that a negated sentence has the same presuppositions as its positive counterpart.

(46) John doesn't drive his Ferrari to school. He doesn't want to show off.

- a.  $\mathcal{A} [\neg[\text{John drives his Ferrari to school}]]$
- b. John has a Ferrari and doesn't drive it to school.

Looking at (47), we see that global accommodation, as in (46), would give rise to a meaning that is in contradiction with the continuation. In order to avoid such contradictions, we have the option of locally merging  $\mathcal{A}$  below negation, as in (47a), which yields a meaning compatible with the continuation.

(47) John doesn't drive his Ferrari to school. He doesn't have one.

- a.  $\neg[\mathcal{A} [\text{John drives his Ferrari to school}]]$
- b. It's not true that [John has a Ferrari and drives it to school]

Returning now to the concern raised in the previous section, I propose that the  $\mathcal{A}$  operator is merged right above the question nucleus and before the level of question-formation, as in (48). In (48a-f) I provide the denotations at each relevant node.

(48)  $[_{CP_3} \lambda p [_{CP_2} \text{who} [\lambda \mathbf{1} [_{CP_1} [C p] [_{IP_3} \mathcal{A} [_{IP_2} \text{only} [_{IP_1} \lambda w [g(\mathbf{1})_{[F]} [\text{saw}_w \text{Mary} ]]]]]]]]]]]]]]$

- a.  $[[IP_1]] = \lambda w. g(\mathbf{1}) \text{saw}_w \text{Mary}$
- b.  $[[IP_2]] = \lambda w: g(\mathbf{1}) \text{saw}_w \text{Mary}.$   
 $\forall a \in \mathcal{A}lt(g(\mathbf{1})) (a \text{saw}_w M) \rightarrow (g(\mathbf{1}) \text{saw}_w M) \subseteq (a \text{saw}_w M)$
- c.  $[[IP_3]] = \lambda w. g(\mathbf{1}) \text{saw}_w \text{Mary} \wedge$   
 $\forall a \in \mathcal{A}lt(g(\mathbf{1})) (a \text{saw}_w M) \rightarrow (g(\mathbf{1}) \text{saw}_w M) \subseteq (a \text{saw}_w M)$
- d.  $[[CP_1]] = p = \lambda w. g(\mathbf{1}) \text{saw}_w \text{Mary} \wedge$   
 $\forall a \in \mathcal{A}lt(g(\mathbf{1})) (a \text{saw}_w M) \rightarrow (g(\mathbf{1}) \text{saw}_w M) \subseteq (a \text{saw}_w M)$
- e.  $[[CP_2]] = \exists x \in [[\text{person}]]^{w_0} \wedge p = \lambda w. x \text{saw}_w \text{Mary} \wedge$   
 $\forall a \in \mathcal{A}lt(x) (a \text{saw}_w M) \rightarrow (x \text{saw}_w M) \subseteq (a \text{saw}_w M)$
- f.  $[[CP_3]] = \lambda p. \exists x \in [[\text{person}]]^{w_0} \wedge p = \lambda w. x \text{saw}_w \text{Mary} \wedge$   
 $\forall a \in \mathcal{A}lt(x) (a \text{saw}_w M) \rightarrow (x \text{saw}_w M) \subseteq (a \text{saw}_w M)$

Assuming that the presupposition associated with *only* is locally accommodated gets us around the issue of how the presupposition of *only* projects out of questions since at the

level of question formation there no longer is such a presupposition given that the IP is reinterpreted as asserting said presupposition. What this means is that globally, the question denotes a set of total propositions of the form in (49).

- (49) { $x_1$  and nobody other than  $x_1$  saw Mary,  $x_2$  and nobody other than  $x_2$  saw Mary,  $x_3$  and nobody other than  $x_3$  saw Mary, ... }

Crucially, by this point the  $\mathcal{A}$  operator will have turned the Strawson-DE environment at the  $IP_2$  level into a non-monotonic environment. If the licensing of NPIs were to be checked globally, they would turn out not to be licensed in  $SE$  questions given the non-DE character of the overall environment. However, we know that NPI licensing can be checked with respect to a local environment since they can be felicitous even in globally non-DE environments such as (50) as long as there is an embedded level that creates a downward entailing context.

- (50) [ $IP_2$  Mary doubts that [ $IP_1$  John didn't talk to anybody]]  
 a.  $IP_1$  is DE  
 b.  $IP_2$  is non-DE

It's thus crucial that the presupposition become part of the assertive component at a separate stage in the derivation so as to maintain a level in the derivation where NPIs are still licensed. If we changed the meaning of covert *only* so as to assert the prejacent, we would no longer be able to account for the acceptability of NPIs since there would be no level in the underlying representation that is DE with respect to the NPI. This will all be formalized in Chapter 3 when we return to the behavior of NPIs in questions. Lastly, note that it might turn out to be the case that we need to assume  $\mathcal{A}$  operates selectively on the presupposition induced by *only* so as not to wipe-out all of the presuppositions in the question nucleus. That this is independently needed was observed by Romoli (2011). If this does indeed turn out to be case, one possible way to implement it would be to claim that  $\mathcal{A}$  operators can be co-indexed with specific presuppositional triggers.

A possible issue with the architecture of this account is that it seems to over generate to non-interrogative cases. Note specifically that accommodating (via  $\mathcal{A}$ ) the presupposition

of this silent *only* gives us essentially the same result as if we had applied the regular silent exhaustifier we appeal to when deriving scalar implicatures (cf. Chierchia et al. 2012). This operator, generally referred to as *Exh*, takes as its argument a proposition and returns the conjunction of that proposition with the negation of all its weaker alternatives.

- (51) *Exh* [Some students finished their homework] =  
Some but not all students finished their homework.

Given that  $Exh = \mathcal{A}+only$ , and I crucially argued that we need the separation between  $\mathcal{A}$  and *only* in the underlying representation of questions so as to account for the acceptability of NPIs, one might wonder why this option is not also available in the case of regular declaratives, as in (52), given that the end result is the same.

- (52)  $\mathcal{A}$  [*only* [Some students finished their homework]] =  
Some but not all students finished their homework.

If the representation in (52) were possible, then we would wrongly predict NPIs to be licensed in overtly non-DE contexts such as (53):

- (53) \*Some students finished any homework.

It stands to reason then that the  $\mathcal{A}+only$  'bundle' should only be available in questions. There are a few reasons why this looks like the correct conclusion. One is that we need to constrain the distribution of this covert presuppositional *only* operator. In other words, it cannot be unleashed every which way, because then we would end having propositions presupposing themselves without any overt indication. For example, if *only* adjoined to (53), this proposition would end up being presupposed rather than asserted. We generally take it for granted that when an interlocutor asserts a proposition, he doesn't take it to be part of the common ground but in fact indicates that it should be included into the common ground, namely that his assertion is a signal that the proposition is meant as an update.<sup>13</sup> A general rule of thumb is that only lexically visible triggers, such as overt *only*,

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<sup>13</sup>I mentioned earlier in the discussion that the reason why  $\mathcal{A}$  turns out to be necessary in the context of interrogatives is due to the fact that in its absence, we would run into a clash with the pragmatics of the discourse as the question would end up presupposing (the conjunction of) its answer(s). Clearly the same

can bring about presuppositions. In order to implement this compositionally, I propose to take covert *only* to be a question-specific exhaustifier, a dedicated exhaustifier, no more different than what had previously been assumed to be true of *ANS.SE*. One could consider an implementation wherein null *only* bears a [WH] feature such that it can only enter into an agree relation with other *wh*-elements.

#### 2.2.4 Taking stock

In this section I have offered a proposal for dealing with strength in questions which encodes the ambiguity between *WE* and *SE* questions at the level of the question nucleus, namely before the question-forming operator is merged. To reiterate, I claimed that the LFs for the *WE* and *SE* readings of questions are as in (54a) and (54b), respectively.

- (54) a.  $\lambda p$  [who [ $\lambda \mathfrak{I}$  [ [C p] [ $\lambda w$  [g( $\mathfrak{I}$ ) [saw<sub>w</sub> Mary ]]]]]]]  
 b.  $\lambda p$  [who [ $\lambda \mathfrak{I}$  [ [C p] [ $\mathcal{A}$  [only [ $\lambda w$  [g( $\mathfrak{I}$ )<sub>[F]</sub> [saw<sub>w</sub> Mary ]]]]]]]]]

Doing so, I've argued, allows us to finally understand why NPIs are acceptable only in questions that receive a *SE* reading, as observed by Guerzoni and Sharvit (2007). As I've shown in the beginning of this chapter, encoding strength via the *ANS* operator, a longstanding tradition in the semantics of questions starting with Heim 1994, leaves the behavior of NPIs unexplained as there is no way to unify their pattern of acceptability in interrogatives with their acceptability in declaratives, an area for which we have an arguably coherent grasp of their behavior. I am putting off a formal account of NPIs in questions under this new analysis until Chapter 3 where I will focus exclusively on their behavior, both in the nucleus and restrictor of *wh*-phrases.

An initial consequence of this proposal is that removing the ambiguity from the answerhood operators into the question nucleus basically renders these operators obsolete given the semantics we offered for them at the beginning of this chapter. Let's recall what the proposed semantics of these operators were, as adapted from Heim 1994:

- (55) a.  $\llbracket \text{ANS.WE} \rrbracket = \lambda Q. \lambda w. \lambda w'. \forall p \in Q [p(w)=1 \rightarrow p(w')=1]$

cannot be true in the case of (53) since nothing about the presupposition clashes with the pragmatics of the discourse.

$$b. \llbracket \text{ANS.SE} \rrbracket = \lambda Q. \lambda w. \lambda w'. \forall p \in Q [p(w) = p(w')]$$

Their role is two fold. First, they tell us what an answer to a question is supposed to be, depending on the reading we're interested in. Second, they pick out the true such answer in a given world. The first of these can be achieved, as I've shown, at the level of the question nucleus. It's their second role, that of picking out the true answer given a set of possible answers, that we have yet no way of retrieving. We could, at this point, claim that it's only ANS.SE which has been rendered obsolete, and continue maintaining that all questions involve ANS.WE, which, depending on which LF it merges with, would deliver either the WE or SE answer to a question. In a sense, the story could easily just end here. We've set out to account for the correlation between the acceptability of NPIs in a question and the strength of the question and we have shown how that can be achieved. But there are still a number of facts we have ignored up to this point that seem to indicate that ANS.WE, as defined in (55a), is both too weak and too strong. To these issues we turn next.

## 2.3 What about the ANS operator?

### 2.3.1 ANS.WE is too weak

Another topic that comes up in the literature on questions is that of uniqueness, also discussed under the term maximality, which deals with the issue that comes up when we compare the questions in (56) in terms of the types of answers they allow for.

- (56) a. Who does John like?  
 b. Which women does John like?  
 c. Which woman does John like?

The observation, dating back to Srivastav 1991 and later developed in Dayal 1996, is that while (56a) allows for either response in (57), a question with a plural *which* phrase like (56b) will allow as an answer only a plurality of women, while a question with a singular *which* phrase, like (56c), will only accept an answer that names a single woman, namely (57b).

- (57) a. John likes Mary and Suzy.  
 b. John likes Mary.

Dayal (1996) proposes to account for these nuances by taking the choice of *wh*-phrase to dictate what types of propositions can comprise the answer set. Namely, she takes monomorphemic *wh*-phrases, like *who* in (56), to range over atomic and sum individuals, similarly to plural *which* phrases, while restricting singular *which* phrases to ranging exclusively over atomic individuals. That is, the Hamblin set associated with (56a-b) will be as in (58a), while that associated with (56c) will be as in (58b).

- (58) a. {John likes Mary, John likes Suzy, John likes Ann, John likes Mary and Suzy, John likes Mary and Ann, John likes Suzy and Ann, John likes Mary and Suzy and Ann}  
 b. {John likes Mary, John likes Suzy, John likes Ann}

This move by itself is not enough to account for the observation above. The issue is that, given the answerhood operator we have assumed, there is no way to restrict how many propositions in the Hamblin set can hold true, meaning that in a situation in which John likes Mary and Suzy, applying the *ANS.WE* operator to either set in (58) will return the same set of worlds, namely those in which John likes Mary and Suzy. We want, however, a way to rule out such answers when the question involves a singular *which* phrase. Dayal suggests that one way to think about these cases is by invoking the notion of maximality; specifically, by requiring the answer to a question to denote the maximally informative proposition in the answer set, similar in a sense to the contribution of the definite article *the*. Redefining the answer-hood operator to accomplish this would amount to the following two claims: the answer to a question needs to be a true proposition belonging to the denotation of the questions, and that furthermore, that proposition needs to be the strongest such proposition, as in (59).

- (59)  $[[ANS]] = \lambda Q. \lambda w: \exists p [p(w) = 1 \wedge Q(p) = 1 \wedge \forall p' \in Q (p'(w) \rightarrow p \subseteq p')]$       presup.  
 $\iota p [p(w) = 1 \wedge Q(p) = 1 \wedge \forall p' \in Q (p'(w) \rightarrow p \subseteq p')]$       denotation



Let's consider again a scenario in which John likes two girls, Mary and Suzy. A question such as (60) will denote the set in (60a), where the bolded propositions correspond to the propositions true in the actual world. Despite the fact that there are three true propositions in the question denotation, only one of them, namely (60b), counts as the most informative answer. This comes out as such given Dayal's semantics for ANS because (60b) entails each of the other two true propositions.

- (60) Which women does John like?
- a.  $Q = \{\mathbf{John\ likes\ Mary}, \mathbf{John\ likes\ Suzy}, \text{John likes Ann}, \mathbf{John\ likes\ Mary\ and\ Suzy}, \text{John likes Mary and Ann}, \text{John likes Suzy and Ann}, \text{John likes Mary and Suzy and Ann}\}$
  - b.  $ANS(Q) = \text{John likes Mary and Suzy}$

On the other hand, using a singular *which* phrase to ask this question in the same situation would be infelicitous. Dayal's ANS operator accounts for this because given the set of possible answers in (61a) no true (bolded) proposition would count as the unique maximally informative proposition.

- (61) Which woman does John like?
- a.  $Q = \{\mathbf{John\ likes\ Mary}, \mathbf{John\ likes\ Suzy}, \text{John likes Ann}\}$
  - b.  $ANS(Q)$  is undefined

The fact that plural *which* phrases appear to be restricted to situations where the answer is a plurality while monomorphemic *wh*-phrases are not, is claimed to come about as a conversational implicature dictated by the fact that there is a singular-plural distinction made overtly so with *which* but not with *who*.

One might ask though whether adopting Dayal's ANS operator is still necessary given the new semantics of questions I've been entertaining up till this point. My claim was that SE questions, of which unembedded questions are assumed to be a type of, actually denote sets of propositions as in (62):

- (62) a. Which women does John like?

$Q = \{\text{John likes only Mary, John likes only Suzy, John likes only Ann, **John likes only Mary and Suzy**, John likes only Mary and Ann, John likes only Suzy and Ann, John likes only Mary, Suzy and Ann}\}$

- b. Which woman does John like?

$Q = \{\text{John likes only Mary, John likes only Suzy, John likes only Ann}\}$

Given that these sets consist of exhaustified propositions, there will never be a case in which more than one proposition could be true in a given world. For example in (62a), if it's true that *John likes only Mary and Suzy*, then it cannot also be true that *John likes only Mary*, nor that *John likes only Suzy*. So in this case, Dayal's ANS operator would return the same object as ANS.WE. On the other hand, (62b) would be undefined in such a scenario by virtue of the fact that no proposition in the set would be true in the actual world. Here is one place where Dayal's ANS operator proves to be superior to ANS.WE since it imposes the requirement that there be an answer in the actual world, something that ANS.WE does not. Nevertheless, while Dayal's ANS operator seems to be (almost) vacuous in root questions under the analysis pursued here, we would still need to appeal to it to account for the fact that the same contrast between singular and plural *which* phrases is observed when we look at WE questions, namely those embedded under predicates like *surprise*.

- (63) a. Bill was surprised by which women John likes.  
b. Bill was surprised by which woman John likes.

(63b) seems to presuppose that John likes a single woman, while (63a) that he likes multiple women. Under my analysis of WE readings of questions, they denote the sets in (60) and (61), meaning that the same problem Dayal claims to arise for unembedded questions would carry over to my analysis of embedded WE questions. That is to say, Dayal's ANS operator would still be required in order to account for the asymmetry in (63).

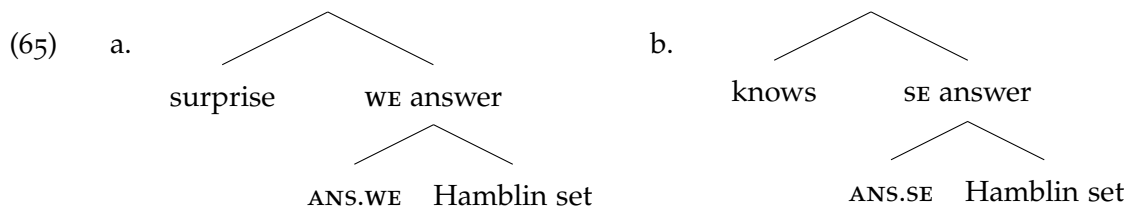
In this section I have shown that ANS.WE, as we know it, has too weak of a semantics to account for the range of data discussed above. In the next section I will discuss a set of phenomena which points to the conclusion that ANS.WE might actually be too strong.

### 2.3.2 ANS.WE is too strong

The basic idea, as pursued by the proponents of ANS.WE, is that embedding a question amounts to embedding the proposition which constitutes the answer to that question. For example, in a scenario in which John likes only Mary and Suzy, (64a) and (64b) would be taken to be equivalent.

- (64) a. Bill knows who John likes.  
 b. Bill knows that John likes only Mary and Suzy.

In essence, for Bill to stand in the *know* relationship to the question *who John likes*, (64a), he needs to stand in the *know* relationship to the answer to that question, namely to the proposition *John likes only Mary and Suzy*, as in (64b). That this is what a theory based on ANS.WE predicts can be seen when we remind ourselves what the proposed LF for embedded questions is, repeated in (65):



If things were as simple as that, there would be nothing more to say about question-embedding predicates since their semantics would literally be the same as that of their proposition-embedding counterparts. The problem is that the facts are not nearly as simple as above. In this section I will focus on two cases: questions embedded under non-veridical predicates and situations where propositional knowledge does not determine question knowledge.

Consider the question in (66) under the same scenario as before, where John likes Mary and Suzy and he doesn't like Ann.

- (66) Bill is certain of who John likes.  
 a. John likes only Mary and Suzy.  
 b. John likes only Ann.

The issue is that a proposition such as (66) would count as true even if Bill were certain of the proposition in (66b). In other words, as long as Bill is certain of a proposition which counts as a possible answer to the question, he will count as being certain of that question. However, under the semantics of the answer-hood operator presented above, what would end up being fed as an argument for *certain* is the proposition which counts as the true answer in the actual world, (66a) and not (66b), making (66) false under the scenario we are considering. What this example shows is that since it is possible to be certain of a false proposition, true answers are not privileged over false answers in this particular case, suggesting that the semantics of *ANS.WE*, as we know it, is too strong. Lahiri (2002) proposes to account for this peculiar behavior of *be certain*, which also holds of *agree on*, by loosening the requirements on the answer-hood operator so as to allow for variation in what can count as an answer. Informally, he proposes to move from a built-in truth requirement, to a condition that takes  $p$  to be an answer to a question as long as it belongs to the denotation of the question and to the set of propositions  $C$ , where  $C$  would be contextually determined as in (67); he assumes, furthermore, that there is a default restriction to true propositions, as in (67b), Lahiri (2002, p. 100).

- (67) a. *certain*:  
 $\forall x [x \text{ is the agent of } V \rightarrow C \subseteq \lambda p [\text{consider-likely/possible}(w)(p)(x)]]$
- b. *know, surprise*:  
 $C \subseteq \lambda p [p(w)=1]$

Even with this tweak in the semantics of the answer-hood operator, other, possibly more serious, issues arise given a semantics of questions that takes them to denote the (usually true) answer. This set of data pertains to weakly exhaustive readings of questions embedded under *know* and is due to Spector (2005), further developed in Spector and Egré 2007 and George 2011. Consider the following situation. Bill believes that among Mary, Suzy and Ann, John likes every single girl. Suppose that in fact John only likes Mary and Suzy. We can represent Bill's beliefs and the facts in the actual world as in (68).

(68)		John likes Mary	John likes Suzy	John likes Ann
	Facts	yes	yes	no
	Bill's beliefs	yes	yes	yes

Recall that applying *ANS.WE* to the question in (69a) delivers the proposition in (69b), meaning that for someone to know this question on its weakly exhaustive reading, they would simply need to know that (69b) is true.

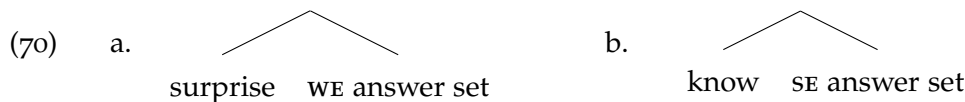
- (69)
- a. Which girls does John like?
  - b. John likes Mary and Suzy.
  - c. Bill knows which girls John likes.

Given Bill's beliefs in (68), it is clear that he stands in a know relation to the proposition in (69b), meaning that for him to know the question in (69a) it suffices to know its answer in (69b) (given that questions denote their *WE* or *SE* answer). In other words, given a semantics of *ANS.WE* which takes a set of (non-exhaustified) propositions and returns the proposition true in the actual world, Bill would count as knowing which girls John likes. That, however, is wrong, given what we know about Bill's beliefs. Since Bill falsely believes that John also likes Ann, we tend to judge a sentence such as (69c) as false. What this shows is that simply knowing the proposition which constitutes the weakly exhaustive answer is not enough to render someone as knowing that question. They would additionally need to hold no false beliefs about the other possible answers to the question. However, in a system in which question-embedding *know* takes as an argument the answer to the question, there would be no way to compositionally impose the requirement that the agent stand in any sort of relation with the other propositions in the question denotation since at LF, the predicate would be, in a sense, too far away from the question denotation.

What we've seen is yet another set of data which suggests that *ANS.WE* over generates. In the following section I propose a new way to think about questions that no longer takes them to denote their true answer.

### 2.3.3 Doing away with answer-hood operators

In the present formulation, an answer-hood operator, be it *ANS.WE* or Dayal's *ANS*, takes a set of propositions as its argument and returns a single proposition, the true (maximally informative) answer. As we saw in the previous section, however, it seems to be the case that we need question embedding verbs to have access to more than just the answer, they need to have the ability to quantify over every possible answer. This suggests then that question-embedding predicates should act directly on sets of propositions, meaning that we should simply do away with the answer-hood operator, leaving us with a representation such as in (70).



While this would allow us to provide a compositional semantics for how question-embedding predicates can have access to all possible answers (leaving aside the actual semantics of these predicates for now), it would still be plagued by the same problems *ANS.WE* was when dealing with the contrast between singular and plural *which* phrases. The relevant data is repeated in (71).

- (71) a. Bill was surprised by which women John likes.  
 b. Bill was surprised by which woman John likes.

The fact that questions with singular *which* phrases always seem to carry the presupposition that in the actual world the question nucleus is true of a single individual suggests that questions should always carry a uniqueness presupposition, regardless of whether they are embedded and/or their strength.<sup>14</sup> In other words, doing away completely with an answer-hood operator as in (70) is too strong of a move, unless we are willing to assume that the question-embedding predicates themselves carry a presupposition that imposes uniqueness on their sisters, a somewhat ad-hoc move. One other option would be to assume that this uniqueness requirement is specific to *which*-phrases. The issue with this approach is

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<sup>14</sup>When we look at pair-list readings for multiple *wh*-questions we will see even stronger evidence for the presence of this uniqueness presupposition.

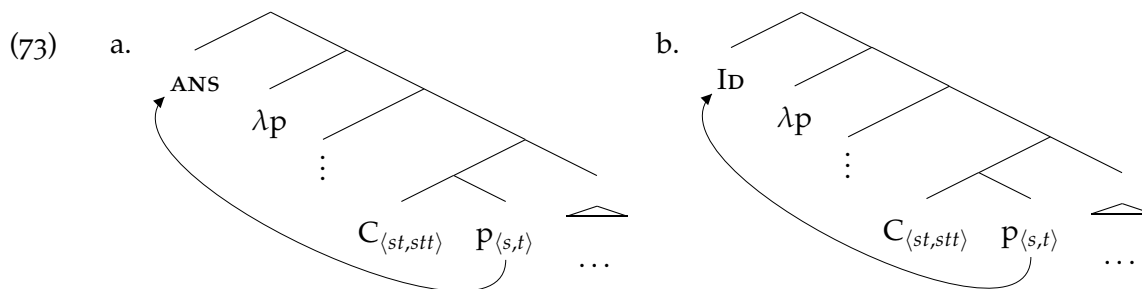
that it would miss an important observation that maximality/uniqueness effects surface even in questions that don't contain *which*-phrases, specifically when looking at cases involving negative islands (c.f Rullmann (1995), Fox and Hackl (2007), Spector and Abrusán (2011), Fox (2010), among others).

A simpler solution would be to add this uniqueness restriction as a filter of sorts on the set of possible answers. This filter/operator would act on a set of propositions and return that same set if and only if the set contains a maximally informative member; in other words, its presuppositional component encodes the requirement imposed by Dayal's ANS operator. Its meaning would be that in (72):<sup>15</sup>

$$(72) \quad \llbracket \text{ID} \rrbracket = \lambda Q. \lambda w: \exists p \in Q \wedge p = \text{ANS}(Q)(w). Q$$

$$= \lambda Q. \lambda w: \exists p \in Q \wedge p = \iota p [p(w) = 1 \wedge \forall p' \in Q (p'(w) \rightarrow p \subseteq p')]. Q$$

Specifically, I propose that instead of having an answer-hood operator generated as the sister of C, as the general take has been, (73a), we actually have an ID operator merged in that position, as in (73b).



What this means for our theory of questions is that questions will at no point in the derivation denote anything but a set of possible answers, because, unlike ANS, ID will always return a set of propositions. The complete LF of a WE and SE question is provided

<sup>15</sup>Danny Fox points out an issue with the denotation in (72), namely that it makes the wrong prediction when we look at non-veridical predicates like *certain*. For a question such as (i), (72) would presuppose that there is a unique girl that Bill likes in the actual world, which seems to be too strong given that (i) could be used even in a situation in which we, the audience, know it to be true that Bill likes multiple girls. All that is conveyed by (i) is that in John's belief worlds there is a unique girl that Bill likes.

(i) John is certain which girl Bill likes.

It looks like what we might actually want is not a partial function from worlds to questions, but rather a function from worlds to sets of partial propositions, partial questions in a sense.

(ii)  $\llbracket \text{ID} \rrbracket(Q) = \lambda w. \lambda p: \exists p' \in Q [\text{ANS}(Q)(w) = p' \wedge p'(w) = 1]. p \in Q$

in (74a) and (74b), respectively.

- (74) a.  $\text{ID} [\lambda p [\text{who} [\lambda_1 [ [C p] [\lambda w [\text{John likes}_w g(1) ]]]]]]$   
b.  $\text{ID} [\lambda p [\text{who} [\lambda_1 [ [C p] [\mathcal{A} [\text{only} [\lambda w [\text{John likes}_w g(1) ]]]]]]]]$

### 2.3.4 Taking stock, again

We began the previous section by arguing that we can do away with  $\text{ANS.SE}$  by providing a different way to encode question strength directly at the level of the question nucleus. This way, I claimed, would derive the behavior of NPIs straightforwardly without having any ripple effects in other domains of questions. In the following chapter I will show how powerful this account is in its ability to account for a number of phenomena related to the acceptability of NPIs in interrogatives that up to this point had surfaces in the literature merely as empirical generalizations.

By arguing for an analysis that encodes strength within the question nucleus, we have basically rendered  $\text{ANS.SE}$  irrelevant. In this section we turned our attention to  $\text{ANS.WE}$  and looked more in depth at what its contribution actually is. We started by looking at data from Dayal 1996 where she argues for a stronger, presuppositional, version of the answer-hood operator in order to account for uniqueness presuppositions observed with singular *which* phrases. Data from Spector 2005 and George 2011, on the other hand, strongly indicated that when it comes to embedding questions, the presence of an answer-hood operator requires us to provide non-compositional semantics for the embedding-predicates. Putting these observations together, we concluded that a better candidate for the position of the answer-hood operator would be a filter-like operator that does the work of Dayal's  $\text{ANS}$  operator without raising the concerns noted by Spector and George. This operator takes a set of propositions, Hamblin or exhausted, and returns the same set of propositions if and only if they contain a unique (true) maximally informative proposition among them, basically Dayal's operator sans the assertive component.

Up till this point we have only briefly mentioned what the semantics of embedded questions is. We turn to a more detailed analysis of this in the next section.

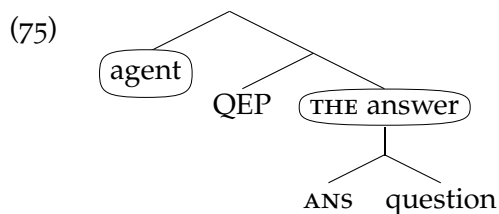


## 2.4 Embedding questions

This concluding section discusses the final piece required of an analysis which takes questions to denote propositions at the highest level, namely how predicates embed questions. In the first part of this section I discuss different types of question-embedders and choose a representative from within each class to illustrate what a possible semantics for them might look like. A large portion of this section will involve summarizing already existent proposals. In the second part I turn to the main problem faced by theories of questions that do away with answer-hood operators, which is the issue of sub-categorizing for a particular type of reading. I begin by discussing a possible way to deal with this problem and end by noting certain advantages to adopting such an approach, one of which relates to an observation made by Sharvit (2002) regarding the unavailability of non-veridical predicates which select exclusively for WE readings.<sup>16</sup>

### 2.4.1 The semantics of embedders

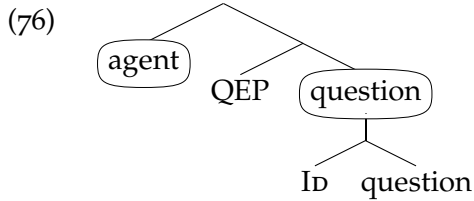
Despite the fact that most theories of questions invoke a syntactically projected answer-hood operator, when it comes to providing a semantics for the predicates that embed them, they usually always make reference to the possible sets of answers in the denotation of the question-embedder (henceforth QEP). This, however, should not be possible given that the question denotation, namely the set of answers, will never act as an argument of the predicate in the syntax. The only objects the predicate can have access to are the agent and the proposition returned by applying the answer-hood operator to the question denotation, as shown below.



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<sup>16</sup>A non-veridical predicate is one which does not entail the truth of its complement; contrast this with a veridical predicate which does entail the truth of its complement. These are not to be confused with factive/non-factive predicates, which are used to refer to predicates which presuppose (or don't) the truth of their complements.

And yet a perusal of the literature will clearly point to an array of non-compositional accounts which provide QEPs with a semantics that makes reference to the more embedded object denoted by the question. On the other hand, in an analysis such as the one pursued here, which replaces the answer-hood operator with an identity function on questions, compositionality is no longer an issue since  $\text{ID}$  in (76) returns the question and thus gives the QEP access to each proposition in the set.



We have already discussed a question-embedding predicate that requires this type of access, namely *know*. *Know*, when embedding questions, has been claimed to allow for both weakly and strongly exhaustive readings (cf. Guerzoni and Sharvit 2007, Sharvit 2002, Beck and Rullmann 1999, among many others). On its  $\text{SE}$  reading, for Bill to know which girls John likes, he would have to know for every girl who John likes that he likes her, and furthermore for every girl who he doesn't like that he doesn't like her. In other words, Bill needs to believe the true exhaustive proposition that constitutes the answer to *Which girls does John like?*. Based on these intuitions, a possible semantics of  $\text{know}_Q$  would look as in (77a), with (77b) constituting the semantics for  $\text{know}_p$ . Note that just like with the semantics for  $\text{ID}$ , I appeal to the shorthand  $\text{Ans}(Q)$  in the denotation I ascribe to  $\text{know}_Q$ . To reiterate, this is merely a shorthanded way of expressing (77c).

- (77)
- a.  $\llbracket \text{know}_Q \rrbracket = \lambda w. \lambda Q. \lambda x. \text{know}_p(w)(\text{Ans}(Q)(w))(x)$
  - b.  $\llbracket \text{know}_p \rrbracket = \lambda w. \lambda p. \lambda x: p(w). \text{believe}(w)(p)(x)$
  - c.  $\text{Ans}(Q)(w) = \iota p[p(w) \wedge \forall p' \in Q (p'(w) \rightarrow p \subseteq p')]$

Recall that in the present analysis, a  $\text{SE}$  reading of  $\text{know}_Q$  amounts to having the question nucleus contain a silent *only*. In other words, the set of propositions denoted by  $Q$  is a set of exhaustive propositions of the form *John likes x and nobody else*.

Turning now to the  $\text{WE}$  reading of  $\text{know}_Q$ , its argument is going to denote sets of propositions of the form *John likes x*. For Bill to know this question on its  $\text{WE}$  reading, he needs

to know for every girl liked by John that John likes her, which is equivalent to knowing the true most informative proposition in  $Q$ . But, as argued by Spector (2005), this is not enough since it would also allow for cases where Bill wrongly believes of a girl not liked by John that John likes her. In order to exclude such situations, we can furthermore impose a condition that the agent hold no false beliefs with respect to the argument of the predicate. One way to do so would be by adding a second conjunct to the entry for  $know_Q$  which would say that for every proposition in  $Q$  that the agent believes, that proposition must be true. This augmented entry is provided in (78).

$$(78) \quad \llbracket know_Q \rrbracket = \lambda w. \lambda Q. \lambda x. know_p(w)(Ans(Q))(x) \wedge \forall p \in Q [\text{believe}(w)(p)(x) \rightarrow p(w)]$$

More recently, however, George (2011) has argued that the WE reading of questions embedded under *know* is an artifact of one of a couple possible confounds: domain uncertainty (not knowing all the individuals in the domain) and complementation failure (cases where the verb in the question nucleus, *like* in the case at hand, and its negation *not like* do not divide the domain). For George, the fact that (79) is not contradictory is not enough to claim that *know* also allows for WE readings since it could simply be due to the fact that Bill is either not aware of the full range of people under discussion, or that not all of the people in the domain can be divided into being liked and being disliked by John.

(79) Bill knows who John likes but he doesn't know who John doesn't like.

While I agree with his intuition about these cases, I still think that there are situations in which a SE reading of the embedded question under *know* can give rise to stronger meanings than intended. For example, consider a situation in which I'm at a party, chatting with a relative, and I'm waiting for my three friends Ann, Bill and Chris to show up. Since I'm standing by the door, I can see who comes in and I notice that Ann and Bill walked in, but given that I'm also engaged in a conversation, it's very possible that I missed someone walking in. In such a situation it seems that I could still claim that *I know who came to the party*, namely that *I know that Ann and Bill came*, without committing myself to the belief that only the two of them showed up.<sup>17</sup>

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<sup>17</sup>I think it's crucial to note that this is distinct from a mention some answer since I'm answering the question

Another question-embedding predicate that allows both types of readings is reciprocal *agree on*, which differs from *know* in that unlike for *know*, the facts of the real world are irrelevant. Predicates like this, which do not entail the truth of their complements, have been referred to as non-veridical question-embedding predicates. Consider the following scenario:

(80)	John likes Mary	John likes Suzy	John likes Ann
Fred's beliefs	yes	yes	no
Bill's beliefs	yes	yes	no
Facts	yes	yes	yes

In this scenario, (81) is true by virtue of the fact that Fred's beliefs coincide with Bill's beliefs. Notice that this is so despite the fact that their beliefs regarding Ann conflict with the actual facts. What is relevant is simply the fact that the agents share their beliefs.

- (81) Fred and Bill agree on who John likes.
- a. Fred and Bill agree that John likes only Mary and Suzy.
  - b. John likes Mary, Suzy and Ann.

The lack of veridicality with *agree on* means that we cannot give it a semantics such as in (82a) since that would require the agents to believe the true maximally informative answer, (81b). In order to get around this problem, we can simply require of the agents to believe a possible maximally informative answer, as in (82b). Since *John likes only Mary and Suzy* is a proposition in the set denoted by  $Q$ , it counts as a possible answer.<sup>18</sup>

- (82) a.  $\llbracket \text{agree on}_Q \rrbracket = \lambda w. \lambda Q. \lambda X. \forall x \in X [\text{believe}(w)(\text{Ans}(Q)(w))(x)]$ <sup>19</sup> ← bad!
- b.  $\llbracket \text{agree on}_Q \rrbracket = \lambda w. \lambda Q. \lambda X. \exists w' \text{Ans}(Q)(w') \wedge \forall x \in X [\text{believe}(w)(\text{Ans}(Q)(w'))(x)]$

In a scenario such as the one above it is hard to discern between the WE and SE reading

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to the full extent of my beliefs.

<sup>18</sup>We could, if we wanted to be consistent, use the same strategy for  $\text{know}_Q$ . In that case it wouldn't make a difference however since  $\text{know}_p(\text{Ans}(Q))$  is defined only if  $\text{Ans}(Q)$  is true in the actual world. That is, while you can believe a false proposition, you cannot know a false one. In other words, existentially quantifying over worlds in the case of factive predicates becomes vacuous.

<sup>19</sup>Here  $X$  refers to a plural individual.

of the QEP since they are both true. That is,  $Q$  could denote either the set in (83a) or the set in (83b) and the sentence in (81) would still be judged as true since both sets contain a proposition that both Bill and Fred agree on.

- (83) a.  $Q_w = \{\text{John likes Mary, John likes Suzy, John likes Ann, **John likes Mary and Suzy**, John likes Mary and Ann, John likes Suzy and Ann, John likes Mary and Suzy and Ann}\}$
- b.  $Q_s = \{\text{John likes only Mary, John likes only Suzy, John likes only Ann, **John likes only Mary and Suzy**, John likes only Mary and Ann, John likes only Suzy and Ann, John likes only Mary and Suzy and Ann}\}$

To see that there are cases where two people can be said to agree on a question even if they don't agree on their negative beliefs, consider the augmented scenario in (84) that includes a fourth girl, Julie. And assume, furthermore, that Fred believes that John doesn't like Julie while Bill has no beliefs about her.

(84)

	J likes Mary	J likes Suzy	J likes Ann	J likes Julie
Fred's beliefs	yes	yes	no	no
Bill's beliefs	yes	yes	no	??

Speakers agree that even in such a case it would be valid to claim that Fred and Bill agree on who John likes. What is happening here is that their beliefs concern a possible maximally informative proposition in the weakly exhaustive answer set, namely *John likes Mary and Suzy*, rather than a proposition in the strongly exhaustive set. Sharvit (2002) uses a similar scenario to point out that *agree on* is not exclusively a WE question-embedding predicate and that it does, in fact, also allow for an SE interpretation. Consider the following dialogue:

- (85) A: Fred and Bill agree on who John likes.  
 B: They don't really agree on who John likes since Fred believes that John likes Julie while Bill has no opinion.

What (85) shows us is that speaker A uses *agree on* on its WE reading while speaker B uses it on its SE reading since she takes the lack of a complete alignment of Fred and Bill's

beliefs to be enough grounds for them not to count as standing in agreement (as there is no maximally informative proposition in the SE answer set that Bill believes).

What has been concluded based on these empirical facts is that some predicates, regardless of their veridicality, allow for both WE and SE readings. What this means for the present account is that some QEPs are free to embed either type of question denotation, be it the plain Hamblin question, or the exhaustive question containing a silent *only*. Not all predicates exhibit this freedom, however. Take for example *surprise* and the sentence in (86), adapted from Heim 1994.

(86) It surprised Bill who cheated on the exam.

As discussed at the beginning of this chapter, (86) cannot be used to indicate that Bill expected someone to cheat that ended up not cheating. The surprise can only refer to the positive extension of the question, meaning that the predicate must only make reference to the non-exhaustified set of answers. Intuitively, for someone to be surprised by who cheated, they need to have expected a cheater to not have cheated. For it to be true that Bill is surprised by who cheated, then, it can only be the case that his surprise is due to someone who ended up cheating, rather than surprise at someone who didn't cheat. This translates into a requirement that to be *surprised<sub>Q</sub>* you need to be surprised by a proposition in the denotation of the Hamblin set, and crucially not by a proposition in the denotation of the exhaustified Hamblin set. To see this more clearly, consider the scenario in (87), a scenario under which it is judged false that *Bill was surprised by who cheated*.

(87)

	Mary	Suzy	Ann
cheaters	yes	yes	no
Bill's expectations	yes	yes	yes

Assume the semantics for *surprised<sub>Q</sub>* in (88):

(88) Bill was surprised by who cheated.

- a.  $\llbracket \text{surprised}_Q \rrbracket = \lambda w. \lambda Q. \lambda x. \exists p \in Q \wedge p(w) \wedge \text{surprised}_{p(w)}(p)(x)$
- b.  $Q_w = \{\text{Mary cheated, Suzy cheated, Mary and Suzy cheated}\}$

- c.  $Q_s = \{\text{only Mary cheated, only Suzy cheated, only Mary and Suzy cheated}\}$

If the argument of *surprise*,  $Q$ , were to denote the exhaustified Hamblin set, then for Bill to be surprised by who cheated he would need to be surprised by a true proposition in the set of strongly exhaustive answers, namely (88c). Since Bill expected Mary, Suzy and Ann to cheat, he would indeed be surprised upon finding out that the true member in (88c), *only Mary and Suzy cheated*, is true given that he also expected Ann to cheat. What this means then is that if we allow  $surprise_Q$  to embed the exhaustified Hamblin set, we would expect (88) to be true in a scenario like (87), contrary to fact. On the other hand, if we restrict  $surprise_Q$  in such a way so that it can only embed Hamblin sets, (88) will correctly be predicted to be judged false.

We have so far discussed three types of question-embedding predicates: veridical predicates that allow for both *SE* and *WE* readings (*know*), veridical predicates that allow only *WE* readings (*surprise*), and non-veridical predicates that allow for both *WE* and *SE* readings (*agree on*). Give this typology, we expect a fourth kind of predicate, a non-veridical predicate that can only receive a *WE* interpretation.

(89)

	<b>WE exhaustive</b>	<b>WE/SE exhaustive</b>
<b>veridical</b>	surprise	know
	amaze	wonder
	disappoint	ask
	annoy	discover
<b>non-veridical</b>	????	agree on be certain

As already pointed out by Sharvit (2002), such verbs do not appear to exist. An immediate reaction would be to see if we can offer an explanation for this otherwise accidental gap. In the next and final section of this chapter I turn to this issue and discuss potential avenues for further research.

### 2.4.2 Selectional requirements

Let's begin by discussing the selection requirements of question-embedding predicates. Specifically, why is it that *surprise*, as well as other emotive factives (e.g. *amaze*, *disappoint*, *annoyed*), cannot receive SE readings? Within a framework that takes the difference between these readings to come about as the result of applying different answer-hood operators to the question denotation, one can argue (as many have), that *surprise*-like predicates subcategorize for a type of answer, as in (90):

- (90) a.  $\text{surprise}_Q [\text{ANS.WE} [\text{question} ]]$   
b.  $*\text{surprise}_Q [\text{ANS.SE} [\text{question} ]]$

At the same time, predicates like *know* and *agree on* would be underspecified, in the sense that either of (91a) or (91b) would be allowed by the grammar.

- (91) a.  $\text{know/agree on}_Q [\text{ANS.WE} [\text{question} ]]$   
b.  $\text{know/agree on}_Q [\text{ANS.SE} [\text{question} ]]$

Under the present account, however, this approach is no longer an option given that the difference in strength is encoded at a level embedded much lower within the question. So unless we can allow for the possibility of a predicate to subcategorize for structures that lack a certain operator (silent *only*) as in (92), syntactic sub-categorization will not do the trick anymore.

- (92)  $*\text{surprise} [\dots\textit{only} \dots]$

There is, however, another way we could look at the problem. Instead of thinking about sub-categorization for certain syntactic objects, we can think about it in terms of sub-categorization for certain semantic objects. On this note, observe that the propositions denoted by the exhausted Hamblin set for the question in (93), provided in (93a), are always going to be mutually inconsistent in that for no world will it ever be possible for more than one proposition in that set to be true. The same cannot be said for the plain



Hamblin set, (93b).<sup>20</sup>

(93) Who came?

- a.  $Q_s = \{\text{only } x_1 \text{ came, only } x_2 \text{ came, only } x_3 \text{ came, only } x_1 \text{ and } x_2 \text{ came, } \dots\}$
- b.  $Q_w = \{x_1 \text{ came, } x_2 \text{ came, } x_3 \text{ came, } x_1 \text{ and } x_2 \text{ came, } \dots\}$

Given that *surprise*-like predicates can only take as their argument the set in (93b), what we can say then is that certain predicates (semantically) subcategorize for a set of mutually consistent propositions, i.e. for  $Q_w$ . In other words, a subcategorization story is viable even after switching from a system with answer-hood operators to one where the strength of exhaustivity is encoded within the question nucleus, with the only difference being that now we talk about semantic rather than syntactic subcategorization. The question is whether this move affords us any more flexibility in terms of predicting which types of predicates will behave in a certain way. I claim that it does, and below I outline a few potential lines of inquiry for further research.

There are two main questions worth exploring: (i) why don't *surprise*-like predicates ever embed *SE* readings, and (ii) why are there no non-veridical predicates that cannot exclusively embed *WE* readings. For starters, observe that the predicates that satisfy (i) form a natural semantic class, i.e. they are all emotive factives. This suggests that one place to look for an answer would be to investigate what these types of predicates have in common to the exclusion of others.

In their propositional incarnation, emotive factive predicates carry a presupposition that the speaker knows the complement, namely that (s)he believes it to be true and furthermore that it is actually true, something that neither *know*-type predicates, nor *agree on*-type predicates do.<sup>21</sup> Now, how do we encode semantic subcategorization in the grammar? One way to do so is via a presupposition on the predicate that its argument must satisfy some requirement. For example, we could claim that these predicates, when they take questions, carry something akin to a plurality presupposition of belief over the propositions in the question denotation. That is, we could say that there is a class of QEPs that are defined

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<sup>20</sup>One could also think about it in terms of  $Q_w$ , but not  $Q_s$ , being closed under conjunction.

<sup>21</sup>*Agree on p* presupposes agent opinionatedness, meaning belief that its possible p or possible not p.

only if the speaker takes it to be possible that a plurality of  $Q$  is true, as in (94):<sup>22</sup>

(94) plurality presupposition:  $\exists p, q \in Q \wedge \diamond_s(p \wedge q)$

What one would like to know at this point is how, if at all, such a presupposition might be related to the presupposition these predicates carry when they embed propositions. Namely how does a predicate go from presupposing knowledge in its propositional incarnation, to presupposing mutual compatibility in its question-embedding incarnation? While I do not have a good answer to this question, I do, nonetheless, believe it is worth pursuing given that it might open the door to understanding why non-veridical non-SE predicates do not exist. Not only that, but we will see in Chapters 4 and 5 that this requirement can also straightforwardly account for the inability of these predicates to embed either alternate or polar questions.<sup>23</sup>

There is a certain class of predicates that has not been attested, namely non-veridical predicates that embed exclusively WE readings. Under an analysis that accounts for these patterns in terms of syntactic sub-categorization, this accidental gap remains unaccounted for. I believe that the account presented above gets us a step closer to understanding why such question-embedding predicates should be non-existent. By virtue of being non-veridical, these predicates cannot carry presuppose that the agent knows (believes and takes it to be true) the complement proposition. If we take the mutual compatibility presupposition to come about as a result of speaker factivity in the propositional incarnation, we expect predicates that lack this presupposition to impose no restrictions on their question complements. Without such a presupposition, there would be nothing to preclude them from embedding sets of mutually inconsistent (exclusive) propositions.

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<sup>22</sup>This should be a speaker belief rather than an agent belief since *realize* doesn't seem to presuppose that the agent believes  $p$ . This can be seen by noting that a negated *realize p* proposition presupposes speaker and not agent belief. Both Guerzoni and Sharvit (2007) and Guerzoni (2007) note that what these predicates have in common is a presupposition of speaker factivity.

<sup>23</sup>One concern that was raised by Veneeta Dayal is what happens with questions with singular *which*-phrases embedded under *surprise* and the likes of it, given that the requirement imposed by  $\text{ID}$  is at odds with the presupposition I assume is present with these predicates. For example, given a set  $\{p_1, p_2, p_3\}$ ,  $\text{ID}$  imposes the requirement that there can only be one true proposition in this set, while *surprise* requires it to be possible that two propositions are true. The idea would be to somehow divorce these two requirements so that they don't conflict with each other.

Beyond being emotive factive, there are two other semantic properties that distinguish the two classes of predicates in (95).

- (95) a. WE **exhaustive**: surprise, amaze, disappoint, annoy  
b. WE/SE **exhaustive**: know, wonder, discover, agree on, be certain

The predicates in the *know* class universally quantify over their complements while the predicates in the *surprise* class quantify existentially since to be surprised/amazed/annoyed by who came, it suffices there to be one person whose arrival was unexpected. Yet another differentiation criterion is the fact that in their propositional incarnation, the predicates in the *surprise* class are all Strawson-DE, contrary to those in the *know*-class. One solution that immediately suggests itself is that of appealing to the notion of maximize strength (cf. Heim (1991), Singh (2011)), which is what we see more generally in cases where strengthening is precluded from taking place in the scope of downward-entailing operators as that would give rise to a weaker meaning than if no strengthening had taken place. Given that the strongly exhaustive reading of a question is stronger, more informative, than its weakly exhaustive reading, and that *surprise* and others in its class create DE contexts, we could imagine that some version of maximize strength could be invoked in order to rule out the stronger readings of a question from being embedded under these predicates as that would give rise to a weaker meaning than if the weakly exhaustive question had been embedded.<sup>24</sup> While these options may seem more attractive than one that rides solely on the fact that *surprise*-like predicates carry a plurality presupposition, by virtue of being emotive factives, it's difficult to see how they would be made to work so as to also account for the lack of non-veridical non-SE question-embedding predicates.

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<sup>24</sup>I say "some version" of maximize strength because maximize strength as we know it is an overridable pragmatic constraint in grammar, and that by itself would be too weak in these cases.

## Chapter 3

### NPIs in questions

In this chapter we focus on the behavior of NPIs in constituent questions. Having laid the foundations for an analysis in the previous chapter, we can now take an in depth look at why these items exhibit the peculiarities they do. We begin with a general discussion of how questions with quantifiers behave, focusing specifically on the predictions made by an analysis which takes strength to be encoded internal to the question. This discussion will pave the way for the account I present in Section 2 of the behavior of NPIs in the scope of questions given that NPIs too are taken to be quantifiers. This section will also discuss a contrast observed by Han and Siegel 1997 that NPIs are licensed only when they are c-commanded by the *wh*-phrase. I will show how the present account is fully endowed to deal with this contrast and furthermore predicts that non-argumental *wh*-phrases should exhibit the same asymmetry with respect to their position relative to the NPI. One other prediction that will fall out seamlessly from my account concerns strong NPIs like *in weeks* which turn out to be disallowed from questions regardless of their strength or the relative c-command order with the *wh*-phrase. Finally, in Section 3 we change gears, switching our attention from the nuclear scope of the *wh*-phrase to its restrictor. Here too I build on an observation made by Guerzoni and Sharvit (2007) and provide a compositional analysis to account for why plural and not singular *which*-phrases allow NPIs in their restriction, regardless of the overall strength of the question. I will ultimately argue that understanding how to account for this contrast can help us make sense of why NPIs can never function as (or embedded within) the focus associate of overt *only*.

### 3.1 Quantifiers in questions

Having postulated the presence of a covert operator in the structure, we now need to make sure its presence does not give rise to unattested readings. Specifically, we're interested to see what, if any, other readings are predicted when we look at the interaction between *only*, a propositional operator that associates with the trace of the *wh*-phrase, and other scope-bearing elements in the structure. In particular, what happens when we have quantifiers in questions and how do they scopally interact with this covert operator? In the appendix to this chapter I discuss a different analysis that takes *only* to be a phrasal operator and point out how such an account would make the wrong predictions with respect to the behavior of quantifiers in questions.

Questions with quantifiers have been known to give rise to multiple readings, such as single pair, pair list and functional readings. For the purposes of this section, we will focus solely on the single pair reading, which is taken to come about as a result of moving the quantifier, for type-theoretical reasons, right under the question operator; in other words, at the lowest IP level, as in (1) and (2). For transparency, I will use *Q* to stand in for the complex *C* head. For each question below, (a.) represents its LF, (b.) its semantics and (c.) the set it denotes.

(1) Who did everyone kiss?

- a.  $\lambda p$  [who [2 [Q [everyone [1 [t<sub>1</sub> kissed t<sub>2</sub>]]]]]]
- b.  $\lambda p. \exists x$  [person(x)  $\wedge$  p =  $\forall y$  [person(y)  $\rightarrow$  y kissed x]]
- c. {Everyone kissed Mary, Everyone kissed John, Everyone kissed Bill, ... }

(2) Who kissed everyone?

- a.  $\lambda p$  [who [1 [Q [everyone [2 [t<sub>1</sub> kissed t<sub>2</sub>]]]]]]
- b.  $\lambda p. \exists x$  [person(x)  $\wedge$  p =  $\forall y$  [person(y)  $\rightarrow$  x kissed y]]
- c. {Mary kissed everyone, John kissed everyone, Bill kissed everyone, ... }

Under the analysis entertained in this thesis, however, direct questions, by virtue of

being interpreted strongly exhaustively, have a more complex underlying representation than shown in (1)-(2). They also contain a silent *only* which is merged at the IP-level, that is, the first scope level of the question nucleus, and which associates with the trace of moved *wh*-phrase. The presence of a covert *only*, a scope bearing element itself, allows for a second scope position, meaning that quantifiers (QP for short) have the option of QRing either below or above *only*, as illustrated in (3).

- (3) a. *only* [QP kissed who]  $\left\{ \begin{array}{l} \text{lowQR: who [}_2\text{ [Q [only [QP [}_1\text{ [t}_1\text{ kissed t}_2\text{]]]]]]]} \\ \text{highQR: who [}_2\text{ [Q [QP [}_1\text{ [only [t}_1\text{ kissed t}_2\text{]]]]]]]} \end{array} \right.$
- b. *only* [who kissed QP]  $\left\{ \begin{array}{l} \text{lowQR: who [}_1\text{ [Q [only [QP [}_2\text{ [t}_1\text{ kissed t}_2\text{]]]]]]]} \\ \text{highQR: who [}_1\text{ [Q [QP [}_2\text{ [only [t}_1\text{ kissed t}_2\text{]]]]]]]} \end{array} \right.$

Let's begin by looking at *every* in both subject and object position and the two possible readings that come about depending on whether the quantifier QRs below or above *only*. The first case we'll consider is *every* in subject position, and for transparency, we'll only look at what happens below the Q operator, namely what follows  $p =$  in the final denotation. (Since *only* associates with the trace of the *wh*-phrase, these LFs should be read as "it's only the case that everyone kissed  $g(2)_F$ ".)<sup>1</sup>

- (4) *only* [everyone kissed who]
- a. *only* [everyone [1 [t<sub>1</sub> kissed  $g(2)$ ]]]
- $$\forall a \in \mathcal{A}lt(g(2)) [(\forall x(x \text{ kissed } a)) \rightarrow (\forall x(x \text{ kissed } g(2))) \subseteq (\forall x(x \text{ kissed } a))]$$
- b. *everyone* [1 [only [t<sub>1</sub> kissed  $g(2)$ ]]]
- $$\forall x[\text{person}(x) \rightarrow \forall a \in \mathcal{A}lt(g(2)) [(x \text{ kissed } a) \rightarrow (x \text{ kissed } g(2)) \subseteq (x \text{ kissed } a)]]$$

These LFs yield different truth conditions. (4a) is true in those worlds where the only person who was kissed by everyone is  $g(2)$  while (4b) furthermore imposes the restriction that  $g(2)$  be the only person who was kissed; that is, that every person kissed only  $g(2)$ .<sup>2</sup> Observe that the highQR reading, namely *every*>*only*, entails the lowQR reading *only*>*every*. When

<sup>1</sup>We'll also be ignoring the assertion operator  $\mathcal{A}$  since its contribution is irrelevant for our present purposes.

<sup>2</sup>I'm silently assuming that  $g(2)$  here can quantify over atoms as well as pluralities, i.e. groups of people, given that this is generally the assumption we make about the elements that belong to the quantificational domain of monomorphemic *wh*-phrases (cf. Dayal 1996).

we step back and look at what the question *Who did everyone kiss?* is asking, we see that the lowQR construal yields the correct interpretation, since (4a) but not (4b) corresponds to the salient reading for this question. For example, consider a situation where everybody kissed Mary and furthermore some, but not all boys also kissed Suzy. There is no individual who satisfies the highQR LF in this situation since even though Mary is kissed by everyone, she's not the only one who was kissed, as required by (4b). Given that in this situation *nobody* is not an appropriate answer, but a misleading answer at best, we can conclude that the highQR reading is disallowed.

Observe that we see a similar contrast in the case in (5), which disallows the inverse scope reading in (5b).

- (5) John didn't meet every student of mine.
- a. *not* > *every*
  - b. \**every* > *not*

One proposal for why these readings are systematically ruled out (or strongly dispreferred) comes from Mayr and Spector (2011), who advocate for a generalized scope economy condition wherein a covert scope shifting operation (QR in this case) cannot apply if the meaning associated with the resulting scopal configuration is equivalent to or stronger than (i.e. entails) the meaning associated with the surface scope LF, which is the case in both (5b) as well as the highQR LF for the question.

Turning now to the question in (6), where the *wh*-phrase *c*-commands the quantifier, we derive the two readings in (6a) and (6b), depending on the QR site of the quantifier with respect to *only*.

- (6) only [who kissed everyone]
- a. only [everyone [2 [g(1) kissed t<sub>2</sub>]]]  
 $\forall a \in \mathcal{A} \text{It}(g(1)) [(\forall x(a \text{ kissed } x)) \rightarrow (\forall x(g(1) \text{ kissed } a)) \subseteq (\forall x(a \text{ kissed } x))]$
  - b. everyone [2 [only [g(1) kissed t<sub>2</sub>]]]  
 $\forall x[\text{person}(x) \rightarrow \forall a \in \mathcal{A} \text{It}(g(1)) [(a \text{ kissed } x) \rightarrow (g(1) \text{ kissed } x) \subseteq (a \text{ kissed } x)]]$

Here once again we see that the low QR, (6a), gives rise to a weaker reading, which coincides with our interpretation of the corresponding interrogative. (6a) requires that only  $g(1)$  be such that he kissed everyone, while (6b) furthermore requires that no one be kissed by anyone other than  $g(1)$ . This second reading where the quantifier QRs above *only* entails the low QR reading, and we can rule it out by appealing to the same generalization as before.

Summing up, it looks that in order to derive the readings corresponding to the information sought by the question, the universal quantifier needs to QR below *only*. One possible way to enforce the fact that *only* needs highest scope is by appealing to the generalization in Mayr and Spector 2011 regarding scope-shifting operations where it's claimed that the grammar rules out the inverse scope LF if the meaning corresponding to it is strictly stronger than the meaning corresponding to the surface scope LF.

Let's turn now to existential quantifiers like *someone*. Here the judgements are much more subtle, which is mainly due to the nature of indefinites which can also be interpreted as specific indefinites. We begin by looking at cases where the indefinite is in subject position, as in (7):

- (7) only [someone kissed who]
- a. only [someone [<sub>1</sub> [<sub>t<sub>1</sub></sub> kissed  $g(2)$ ]]]
- $$\forall a \in \mathcal{A}lt(g(2)) [\exists x(x \text{ kissed } a) \rightarrow \exists x(x \text{ kissed } g(2)) \subseteq \exists x(x \text{ kissed } a)]$$
- b. someone [<sub>1</sub> [only [<sub>t<sub>1</sub></sub> kissed  $g(2)$ ]]]
- $$\exists x[\text{people}(x) \wedge \forall a \in \mathcal{A}lt(g(2)) [x \text{ kissed } a \rightarrow x \text{ kissed } g(2) \subseteq x \text{ kissed } a]]$$

The LFs in (7) correspond to the following two readings: under the lowQR LF in (7a), the question corresponds to a reading for which the only (group of) person(s) that was kissed is  $g(2)$ , while on its highQR LF in (7b) it says that there are some people who kissed only  $g(2)$ , without excluding cases where other people were kissed. The lowQR LF gives us the reading that corresponds most closely to what we ask for when we pose the question *Who was kissed by someone?*. As for the reading corresponding to the highQR LF, unlike in the case of universals, I believe that it too is possible and that in fact constitutes the most



natural single-pair reading for a question such as *Who did one of your friends kiss?*. That this reading would be more salient is due to the fact that indefinites have a tendency to be interpreted specifically and this is what QRing them high amounts to, a specific reading.

We have two options at this point: we could either give up on the claim that *only* targets a special high position wherein quantifiers cannot QR above it, which seemed to be the conclusion to draw based on the universal data, or we could see if there is another way to derive the specific reading for indefinites without appealing to highQR. Incidentally, there is such a way. It is a well documented phenomenon that indefinites appear to exhibit unusually high scope, namely that their scope-taking abilities don't seem to be syntactically constrained in the same manner as that of other quantifiers. It has been argued, however, that these specific readings do not, necessarily, have to be attributed to the fact that they undergo high QR. One such proposal is due to Schwarzschild (2002) who claims that we can still maintain normal scopal behavior (akin to that of universals, say) by taking indefinites to be existential quantifiers over singleton domains. Taking an indefinite such as *one of your friends* to have as its domain a singleton set essentially renders the quantifier scopeless. The idea is that by virtue of denoting a singleton, whether it QRs above or below a scope-bearing element will become irrelevant since it would give rise to the same interpretation; this is essentially identical to treating *one of your friends* on par with the lifted version of a definite description which we know to be immune to scope. Suffice it to say, the fact that indefinites exhibit highQR-like readings is not necessarily a reflection of their syntactic behavior. We can thus continue to assume that indefinites, just like universals, QR below *only*, but that unlike universals, they also have the option of quantifying over singleton domains, giving rise to a second possible reading.

The same situation seems to hold when the indefinite is in object position, as in (8):

- (8) only [who kissed someone]
- a. only [someone [2 [g(1) kissed t<sub>2</sub>]]]
 
$$\forall a \in \mathcal{A}lt(g(1)) [\exists x(a \text{ kissed } x) \rightarrow \exists x(g(1) \text{ kissed } x) \subseteq \exists x(a \text{ kissed } x)]$$
  - b. someone [2 [only [g(1) kissed t<sub>2</sub>]]]
 
$$\exists x[\text{person}(x) \wedge \forall a \in \mathcal{A}lt(g(1)) [a \text{ kissed } x \rightarrow g(1) \text{ kissed } x \subseteq a \text{ kissed } x]]$$

Here again we see that the lowQR LF more closely corresponds to the non-specific reading of the indefinite, while the highQR LF gives us the interpretation for the specific reading. (8a) says that only  $g(1)$  did any kissing, while (8b) says that there is someone that only  $g(1)$  kissed, but doesn't exclude other kissing situations by non  $g(1)$  people. Just like before, I claim that the specific reading in these cases comes about via the same lowQR LF in (8a), with the difference being that the domain of the existential is a singleton.

Lastly, when we look at negative quantifiers we see that the same condition holds true in these cases, namely that *only* requires highest scope within the question IP.

(9) only [nobody kissed who]

a. only [nobody [ $t_1$  kissed  $g(2)$ ]]

$$\forall a \in \mathcal{A}lt(g(2)) [\neg \exists x(x \text{ kissed } a) \rightarrow \neg \exists x(x \text{ kissed } g(2)) \subseteq \neg \exists x(x \text{ kissed } a)]$$

b. nobody [ $t_1$  [only [ $t_1$  kissed  $g(2)$ ]]]

$$\neg \exists x[\text{people}(x) \wedge \forall a \in \mathcal{A}lt(g(2)) [x \text{ kissed } a \rightarrow x \text{ kissed } g(2) \subseteq x \text{ kissed } a]]$$

For the question corresponding to (9), *Who did nobody kiss?*, only (9a) is a possible reading; (9a) says that nobody kissed  $g(2)$  while (9b) says that nobody is such that they kissed only  $g(2)$ , which is clearly not the reading we get for such questions. Similarly for (10):

(10) only [who kissed nobody]

a. only [nobody [ $g(1)$  kissed  $t_2$ ]]

$$\forall a \in \mathcal{A}lt(g(1)) [\neg \exists x(a \text{ kissed } x) \rightarrow \neg \exists x(g(1) \text{ kissed } x) \subseteq \neg \exists x(a \text{ kissed } x)]$$

b. nobody [ $g(1)$  [only [ $g(1)$  kissed  $t_2$ ]]]

$$\neg \exists x[\text{person}(x) \wedge \forall a \in \mathcal{A}lt(g(1)) [a \text{ kissed } x \rightarrow g(1) \text{ kissed } x \subseteq a \text{ kissed } x]]$$

(10a) corresponds to a reading that picks out the (group of) individual(s) that kissed nobody, as requested by the question. (10b), on the other hand, selects the individuals who are such that they are not the only ones who kissed someone, i.e., the people who kissed someone who was also kissed by somebody else. This reading is clearly not available for such questions.

In summary, we have shown that when it comes to the relative scope of quantifier phrases and the silent operator *only* I claim to be present in direct questions, *only* always

ends up receiving highest scope. Despite the availability of two QR positions for the quantifiers, the only possible reading is that which corresponds to the lowQR LF. In the case of universal quantifiers we saw that independently motivated constraints, such as the one proposed in Mayr and Spector (2011), can help us understand why interpretations corresponding to the highQR LF are not possible. On the other hand, in the case of indefinites, it looked as if both low and high QR gave rise to acceptable readings. We saw, however, that by appealing to an analysis of existentials as quantifiers over singleton domains we could derive both readings solely on the basis of a lowQR LF. And lastly, in the case of negative quantifiers, similarly to universal quantifiers, we noted that only the lowQR LF corresponds to the information sought by the corresponding question. We can conclude from the data presented above that *only* requires highest scope. This constraint could be due to a semantic restriction on scope, à la Mayr and Spector (2011), or it could also be due to a syntactic requirement that takes *only* to target a special high position in the clause, possibly one that is too high for QR.

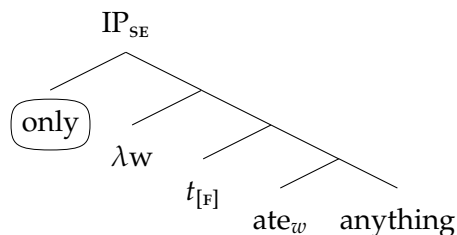
### 3.2 NPIs in the scope of questions

Recall the generalization made in Guerzoni and Sharvit 2007: NPIs are acceptable in a question only if the question is interpreted as strongly exhaustive. The authors showed that under the account of questions they were assuming, there was no way to substantiate this generalization by appealing to what we already know about the licensing of NPIs, namely that they are acceptable only if in the scope of a downward entailing operator. They were hence forced to assume that a multi-layered approach is needed in order to account for the acceptability of NPIs: NPIs would thus be sensitive to entailment reversal in declarative sentences, but to strength of exhaustivity in interrogatives.

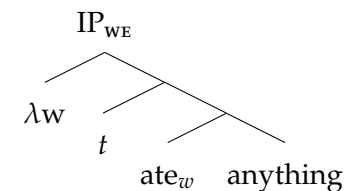
One of the goals of this thesis is to show that we can maintain a “one-layered” approach to account for the distribution of NPIs: NPIs are sensitive to entailment reversal in both declaratives and interrogatives. This proposal hinges on the claim I made in the previous chapter that strength of exhaustivity is encoded at the level of the question nucleus, rather than via different answer-hood operators. By taking the difference in strength to be

contingent on the presence versus absence of a silent *only*-like operator and recognizing that *only* is a Strawson-DE operator, we will have essentially gone from a description of the facts, namely Guerzoni and Sharvit’s claim that strength is relevant for NPI licensing, to an explanation of these facts. Informally, the layout of the argument will be as follows. If the acceptability of NPIs is, in a sense to be spelled-out later, dependent on the monotonicity of their environment, and *only* reverses the entailment pattern, we should be able to show that the embedded IP is the level at which NPI licensing either works, in the case of *SE* questions see (11a), or fails, in the case of *WE* readings see (11b).

(11) a. NPI licensed



b. NPI not licensed



In its simplest form, the argument is that NPIs are licensed in *SE* questions for the same reason they are licensed in the declarative corresponding to the question IP, namely (12).

(12) Only John<sub>[F]</sub> ate anything.

Similarly, we can account for their unacceptability in *WE* questions by noting their unacceptability in (13b), the declarative counterpart of (12b).

(13) \*John ate anything.

By reducing the behavior of NPIs in questions to their behavior of declaratives, this account requires no additional machinery to derive the (un)acceptability of NPIs. That is, whatever analysis one uses to account for the acceptability of NPIs in the scope of *only* in regular declaratives will carry over to account for their behavior in strongly exhaustive questions. The facts, however, are not quite as straightforward, and to that we turn to next.

### 3.2.1 A contrast in questions with NPIs

Observe the contrast in (14) where it appears that the relative base position of the *wh*-phrase and the NPI has an effect on the acceptability of these questions. Namely, if the NPI is not c-commanded by the *wh*-phrase, the only possible reading is that of a rhetorical, emphatic, question.<sup>3</sup> For the remainder of this section, a starred question is one that cannot receive a non-emphatic interpretation.

- (14) a. Who ate anything at the party yesterday?  
b. \*What did anybody eat at the party yesterday?

To adduce support to this generalization, and furthermore reinforce the fact that this is not simply a constraint against having *any* in subject position, observe the facts in (15) where the NPI acts as the object of a ditransitive verb. Han and Siegel (1997) note that an NPI is acceptable in a DOC only if it acts as the indirect object and the *wh*-phrase as the direct object, namely, if the NPI is c-commanded by the *wh*-phrase in their base positions.<sup>4</sup>

- (15) a. Who did Jeff introduce to anyone at the party?  
b. \*Who did Jeff introduce anyone to at the party?

Yet more evidence that this contrast is real comes from looking at adverbial NPIs like *ever* which too appear sensitive to their position relative to the base position of the *wh*-phrase.

- (16) a. Which girls have ever visited Paris?  
b. \*Which girls did John ever kiss?

Further reinforcing the fact that this contrast is related to the interaction between the NPI and the *wh*-word, and not a constraint against having NPIs in subject position in questions, note that in polar questions NPIs may serve as either the subject or object, without giving rise to unacceptability:

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<sup>3</sup>Rhetorical questions differ from regular constituent questions in that they are not information-seeking, basically being used for declarative purposes, suggesting that they ought to be given a different analysis to begin with. I will not discuss such questions in this thesis but the interested reader can consult Han 2002, Abels 2003, Guerzoni 2004 and Caponigro and Sprouse 2007, among others.

<sup>4</sup>Recall that direct objects asymmetrically c-command indirect objects in DOCs (cf. Barss and Lasnik 1986, Bruening 2001).

- (17) a. Did you eat anything?  
 b. Did anyone eat the cake?

The goal of any theory of questions that aims to account for the behavior of NPIs is to explain why NPIs receive non-emphatic interpretations in constituent questions only when the *wh*-phrase c-commands the NPI in their base positions, as summarize in (18).

- (18) a. ✓ *wh*>NPI acceptable  
 b. \*NPI>*wh* ruled out

Recall that, informally, the analysis we're pursuing here takes the acceptability of NPIs in a question to depend on their acceptability in the declarative corresponding to the question IP. Since direct questions are always interpreted exhaustively, that is to say, there is no weak/strong exhaustivity distinction, the questions in (14) will correspond to the declaratives in (19), respectively.

- (19) a. It's only the case that *x* ate anything.  
 b. It's only the case that anyone ate *x*.

At this point we need to understand what it is about (19b) that makes the corresponding question unacceptable under a non-emphatic interpretation. Intuitively, the solution seems pretty straightforward: in (19b) but not in (19a) the NPI linearly intervenes between the covert *only* and its associate, the *wh*-trace. However, what still needs to be done in order for this analysis to hold any water is to substantiate this generalization by showing how it can be derived compositionally. Essentially, we want the argument to go as follows:

- ★ When the NPI is c-commanded by the *wh*-phrase, it ends up interpreted in the scope of *only*, which creates a downward entailing context, as required by the NPI
- ★ When the NPI c-commands the *wh*-phrase, it ends up being interpreted outside the scope of *only*, hence in a non-DE environment, rendering the NPI unacceptable

### 3.2.1.1 The problem

Let's begin by taking a closer look at the underlying structures of these types of questions. Recall that we're dealing with a quantifier, the NPI, which needs to undergo QR. The key to the solution is where the NPI QRs to with respect to *only*. In the following LFs I illustrate the three possible landing sites for the NPI, either below *only* (a.), above *only* but below the *wh*-phrase (b.), or above the *wh*-phrase (c.):

- (20) only [who likes anyone]
- a. lowQR: who [1 [Q [only [anyone [2 [t<sub>1</sub> likes t<sub>2</sub>]]]]]]
  - b. midQR: who [1 [Q [anyone [2 [only [t<sub>1</sub> likes t<sub>2</sub>]]]]]]
  - c. highQR: anyone [2 [who [1 [Q [only [t<sub>1</sub> likes t<sub>2</sub>]]]]]]
- (21) only [anyone likes who]
- a. lowQR: who [2 [Q [only [anyone [1 [t<sub>1</sub> likes t<sub>2</sub>]]]]]]
  - b. midQR: who [2 [Q [anyone [1 [only [t<sub>1</sub> likes t<sub>2</sub>]]]]]]
  - c. highQR: anyone [1 [who [2 [Q [only [t<sub>1</sub> likes t<sub>2</sub>]]]]]]

The question we need to ask ourselves now is the following: is each landing site possible, and if not, what rules it out? Recall from the previous section where we argued that quantifiers appear to be ruled out from QRing above *only* for interpretive reasons: QRing a quantifier above *only*, be it an existential or a universal, is going to give rise to a non-existent reading. In effect, the conclusion we drew in the last section is that *only* needs to be an operator with highest scope in the nucleus of the question; that is, an operator that applies to the matrix IP. Having established that, we can now eliminate the (b.) and (c.) LFs from our pool of possible alternatives, leaving us solely with the following LFs:

- (22) only [who likes anyone]
- LF: who [1 [Q [only [anyone [2 [t<sub>1</sub> likes t<sub>2</sub>]]]]]]
- (23) only [anyone likes who]
- LF: who [2 [Q [only [anyone [1 [t<sub>1</sub> likes t<sub>2</sub>]]]]]]

As discussed at the beginning of the section, there is a contrast between (22) and (23) in terms of their acceptability. (23) is unacceptable and the consensus in the literature is that this is due to the fact that the *wh*-phrase does not c-command the NPI in their base positions. However, as it stands, nothing in our arsenal of constraints helps us distinguish between the two LFs above. What I mean by that is that where the NPI is with respect to the trace of the *wh*-phrase is not predicted to matter since the NPI ends up being interpreted in the DE environment created by *only* regardless of whether it is the subject or object; so we falsely predict it to be licensed. We can see this by looking at the formulas in (24), which correspond to the two LFs in (22) and (23), and noting that both are downward entailing with respect to D.<sup>5</sup>

- (24) a.  $\forall a \in \mathcal{A} \text{It}(y) [\exists x \in D \text{ like}(a,x) \rightarrow (\exists x \in D \text{ like}(y,x) \subseteq \exists x \in D \text{ like}(a,x))]$   
 b.  $\forall a \in \mathcal{A} \text{It}(y) [\exists x \in D \text{ like}(x,a) \rightarrow (\exists x \in D \text{ like}(x,y) \subseteq \exists x \in D \text{ like}(x,a))]$

And yet we know that (23) is unacceptable, contrary to what is predicted if the low QR LF is available in cases where the NPI is not c-commanded by the trace of the *wh*-phrase; that is, if (23) receives the interpretation in (24b) then we are out of luck (see fn 4). The goal then is to pin point what other independently motivated constraint we can use to rule out the low QR configuration in cases where the NPI c-commands the *wh*-phrase so as to derive the fact that such questions are unacceptable, i.e. that they cannot receive the interpretation in (24b).

One could say then that we are at an impasse, as it appears that our way of construing strongly exhaustive questions over-generates: while it accounts for the acceptability of NPIs in such questions, (22), it also wrongly predicts that NPIs should be acceptable in strongly exhaustive questions across the board, (23). Fortunately for us, however, the analysis is not

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<sup>5</sup>Let's prove that (24b) is downward entailing with respect to D. In order to do so we need to show that (ia) entails (ib), where  $D'$  is a subset of  $D$ .

- (i) a.  $\forall a \in \mathcal{A} \text{It}(y) [\exists x \in D \text{ like}(x,a) \rightarrow (\exists x \in D \text{ like}(x,y) \subseteq \exists x \in D \text{ like}(x,a))]$   
 b.  $\forall a \in \mathcal{A} \text{It}(y) [\exists x \in D' \text{ like}(x,a) \rightarrow (\exists x \in D' \text{ like}(x,y) \subseteq \exists x \in D' \text{ like}(x,a))]$

We proceed with a proof by contradiction. Assume that (ia) is true and (ib) is false. For (ib) to be false, by the rules of logic, it must be the case that the antecedent is true and the consequent false. For the consequent to be false, however, it has to be the case that  $\exists x \in D' \text{ like}(x,a)$  is false, namely that its own consequent is false. But we already assumed that the antecedent of (ib),  $\exists x \in D' \text{ like}(x,a)$ , is true, so how can it be the case that  $\exists x \in D' \text{ like}(x,a)$  is false. We have thus shown that (ia) cannot be true while (ib) is false.



as simple as I have made it out to be up to this point. Namely, the careful reader will have noticed that so far we have completely ignored the question of how exactly NPIs are “licensed”. For ease of exposition I have simply been assuming that NPIs are acceptable whenever they appear in a DE environment, which served our purposes just fine up to this point. That NPIs are licensed in DE environments, however, is simply a description of the facts and provides no explanatory value; not to mention that it makes the wrong predictions in some cases, such as the ones we are concerned with here.

In the following section I will show why taking seriously the issue of how NPIs are licensed will provide us with the necessary tools to rule out the unacceptable configuration in (23). By taking the distribution of NPIs to be governed by the interplay between their activation of alternatives and a grammatical requirement that alternatives be used up by an exhaustifying operator, the problematic configuration will fall out as a violation of the constraint against crossing dependencies. In section 3.2.1.3 I pursue a different way of thinking about this contrast which relies heavily on the notion of superiority and aims to connect the unavailability of NPI > *wh* configurations to the unavailability of pair-list readings for questions with quantifiers whenever the quantifier is c-commanded by the *wh*-phrase in their base positions.

### 3.2.1.2 An intervention account

As mentioned above, the account I will provide for the contrast in (25) relies on the exhaustification-based analysis of NPIs that I have outlined in the introductory chapter.

- (25) a. Who ate anything?  
b. \*What did anybody eat?

Recall the structure of the argument, repeated from Chapter 1. NPIs have the semantics of regular existential quantifiers with the only difference being that they are additionally endowed with obligatorily active (scalar and domain) alternatives, as shown in (26a-b). Grammar encodes the presence of alternatives via a feature on the item, call it [D], and their need to be used up (since alternatives need to be incorporated into the meaning) by requiring all items that bear such features to enter into an agree relationship with an

alternative-exhaustifying operator that bears the same feature, call it  $\mathcal{E}xh_{[D]}$ . Besides checking the feature on the NPI, this exhaustifier also has a semantic contribution, given in (26c), namely that of negating all non-entailed alternatives.

- (26) a. anything =  $\lambda P. \exists x \in D [\text{thing}(x) \wedge P(x)]$   
 b. anything <sup>$\mathcal{A}lt$</sup>  =  $\{\lambda P. \exists x \in D' [\text{thing}(x) \wedge P(x)]: D' \subseteq D\}$   
 c.  $\mathcal{E}xh = \lambda p. \lambda w. p(w) \wedge \forall q \in \mathcal{A}lt(p) [q \rightarrow p \subseteq q]$

In such a system, the fact that NPIs end up being acceptable only in DE environments falls out without having to stipulate a licensing by DE-operators condition. Once we take into account the nature of the alternatives (subdomains) and the semantics of the exhaustifying operator, we see that in UE environments a contradiction will ensue, while its contribution in DE contexts is vacuous and simply returns the assertion.

- (27) a.  $*\mathcal{E}xh_{[D]} [_{UE} \dots \text{anything}_{[D]} \dots]$  contradiction  
 b.  $\mathcal{E}xh_{[D]} [_{DE} \dots \text{anything}_{[D]} \dots]$  vacuous

Returning now to the issue of NPIs in questions, I claim that we can account for the unacceptable cases by looking at the interaction between focus association of covert *only* with the *wh*-trace, and the exhaustification of the NPI. Specifically, the unacceptability of (25b) will turn out to be due to conflicting requirements between the syntactic constraints that govern agreement relations and the semantics of the operators involved.

Consider the two questions in (28) and (29). For each question we have to consider the two possible LFs that come about as a result of adjoining  $\mathcal{E}xh_{[D]}$  either below or above  $only_{[F]}$ , which, recall, is obligatorily present in direct questions given that they are always interpreted strongly exhaustive.

- (28) Who ate anything?  
 a.  $only_{[F]} [\mathcal{E}xh_{[D]} [t_{[F]} \text{ate anything}_{[D]}]]$  crossing dependencies  
 b.  $\mathcal{E}xh_{[D]} [only_{[F]} [t_{[F]} \text{ate anything}_{[D]}]]$  nesting dependencies

(29) What did anyone eat?

- a.  $\text{only}_{[F]} [\mathcal{E}xh_{[D]} [\text{anyone}_{[D]} \text{ate } t_{[F]}]]$  nesting dependencies
- b.  $\mathcal{E}xh_{[D]} [\text{only}_{[F]} [\text{anyone}_{[D]} \text{ate } t_{[F]}]]$  crossing dependencies

What we see above is that the relative position of the NPI and the *wh*-trace dictates the relative adjunction sites of the two covert operators in terms of what type of dependency is created. Assuming that crossing dependencies are ruled out by the syntax (cf. Pesetsky 1982, Kitahara 1997), and that the acceptability of a structure depends on the satisfaction of both syntactic and semantic constraints, we can put aside the cases where we have crossing dependencies and look only at the nesting dependencies to check whether the semantics gives rise to a coherent interpretation. When we consider configurations with nesting dependencies it is generally assumed that the outer dependency is evaluated with respect to the result of the innermost one. In other words, for our purposes, we can assume that the most embedded dependency is calculated first, the results of which I outline below. In (28b), we first take care of the  $[\text{only}_{[F]} \dots g(1)_{[F]}]$  dependency, as in (30a), and then the  $[\mathcal{E}xh_{[D]} \dots \text{anyone}_{[D]}]$  dependency, as in (30b).

- (30)  $\mathcal{E}xh_{[D]} [\text{only}_{[F]} [g(1)_{[F]} \text{ate anything}_{[D]}]]$
- a.  $\text{only}_{[F]} [g(1)_{[F]} \text{ate anything}_{[D]}]$   
 $= \forall a \in \mathcal{Alt}(g(1)) [\exists x \in D(a \text{ ate } x) \rightarrow \exists x \in D(g(1) \text{ ate } x) \subseteq \exists x \in D(a \text{ ate } x)]$
- b.  $\mathcal{E}xh_{[D]} [\text{only}_{[F]} [g(1)_{[F]} \text{ate anything}_{[D]}]]$   
 $= \forall a \in \mathcal{Alt}(g(1)) [\exists x \in D(a \text{ ate } x) \rightarrow \exists x \in D(g(1) \text{ ate } x) \subseteq \exists x \in D(a \text{ ate } x)]$

Since the  $[\text{only}_{[F]} \dots g(1)_{[F]}]$  dependency is calculated first, this creates a downward entailing environment, by virtue of the semantics of *only*, as in (30a). This means that when it comes to calculating the  $[\mathcal{E}xh_{[D]} \dots \text{anyone}_{[D]}]$  dependency, the NPI will end up being interpreted as a regular indefinite given that the exhaustification of its alternatives is vacuous, as in (30b).<sup>6</sup> This is precisely the meaning corresponding to this question: who are the people who ate something.

<sup>6</sup>Recall that exhaustification is vacuous whenever the alternatives are entailed.

Turning now to (29a), repeated below in (31), we see that we are now dealing with the reverse situation. We first have to take care of the [ $\mathcal{E}xh_{[D]}$  ...  $anyone_{[D]}$ ] dependency, followed by the [ $only_{[F]}$  ...  $g(1)_{[F]}$ ] dependency, the steps of which I spelled out below.

- (31)  $only_{[F]} [\mathcal{E}xh_{[D]} [anyone_{[D]} ate g(1)_{[F]}]]$   
 a.  $\mathcal{E}xh_{[D]} [anyone_{[D]} ate g(1)_{[F]}]$   
 $= \exists x \in D (x ate g(1)) \wedge \forall D' \subseteq D \neg \exists x \in D' (x ate g(1)) = \perp$   
 b.  $only_{[F]} [\mathcal{E}xh [anyone ate g(1)_{[F]}]] = \perp$

Here we see that syntactically, the NPI needs to be exhausted before *only* has been able to apply and create the DE environment necessary for the NPI's consistent exhaustification, rendering it ungrammatical. In a sense, the NPI is checked for semantic coherence to the exclusion of *only*, showing that just because the NPI is c-commanded by a DE-creating operator does not ensure that the environment supports downward entailing inferences at every single node in its c-commanding domain.<sup>7</sup> Given that the NPI is exhausted in an upward entailing environment, a contradiction will ensue even before the second dependency can be calculated, thus rendering the entire construction unacceptable.

Putting these observations together, as in (32), 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.

- (32) a. Who ate anything?  
 i.  $only_{[F]} [\mathcal{E}xh_{[D]} [t_{[F]} ate anything_{[D]}]]$   
 ii.  $\mathcal{E}xh_{[D]} [only_{[F]} [t_{[F]} ate anything_{[D]}]]$   
 b. What did anyone eat?  
 i.  $only_{[F]} [\mathcal{E}xh_{[D]} [anyone_{[D]} ate t_{[F]}]]$   
 ii.  $\mathcal{E}xh_{[D]} [only_{[F]} [anyone_{[D]} ate t_{[F]}]]$

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

<sup>7</sup>Basically, the NPI is too close to the DE operator for it to have the necessary effects.

One might worry at this point about the prediction made by assuming this exhaustification-based account of NPIs, namely the fact that we must now assume that *only* does not, necessarily, have highest scope, as proposed in the last section. This should not be a problem though, since the *Exh* operator is vacuous and does not affect the semantics. The constraint on highest scope for *only* could thus be reformulated so as to require that we ultimately end up with a set of mutually exclusive propositions. In other words, what we took to be a syntactic constraint up till now, could in fact be a semantic one. That this is possibly a better formulation relates back to the claims made in the previous chapter where we discussed the selectional requirements of question-embedding predicates. I claimed that *surprise*-like predicates cannot embed *SE* questions due to a presupposition they carry which requires their sister to denote a set of propositions such that some plural subset of it needs to consist of mutually compatible propositions.

A possible follow-up question could be to ask whether we can rule out the problematic constructions on purely semantic grounds. In other words, is there a way we can think of the syntactic constraint on crossing dependencies in terms of a violation of semantic principles? One such possibility would be to say that covert *only* is an un-selective binder. What that would mean is that in (32b.ii) *only* would not be able to “skip over” the NPI’s alternatives as it targets the trace, that is, it would operate unselectively on both sets of alternatives. Given that the NPI’s alternatives are all stronger than the assertion, *only* operating on them amounts to negating them all, which would result in a crash. Basically, the ungrammaticality of (32b.ii) could be attributed to the same factors that rule out a declarative such as *Only anyone came to the party*. In (32a.ii), however, *only* can stop once it hits its target, meaning that it is not forced to enter into an agree relation with any lower alternative-bearing items as long as it hits its target.

In conclusion, we have shown that the unacceptable constructions are those where the only semantically coherent interpretation would arise by assuming a configuration with crossing dependencies, which is independently ruled out on syntactic grounds (and possibly semantic grounds as well). For this type of account to hold, we had to assume that NPIs need to enter into an agree relation with an exhaustifying operator *Exh* (cf. Chierchia,

2012) and furthermore that a covert *only* needs to associate with the *wh*-trace. This section is entitled “an intervention account” because it appeals to the same principles used to rule out cases such as (33), which involve the intervention of a universal quantifier between the NPI and the DE-creating operator (cf. Linebarger 1980, Gajewski 2011, among others).<sup>8</sup>

(33) \*Mary didn’t tell everybody to buy any books.

While the problem here is of a different nature, the solution is essentially the same: the interplay between the syntactic constraint against crossing dependencies and the semantic requirements of the exhaustifiers. Simplifying a bit for ease of exposition, assume that all quantifiers are endowed with active scalar alternatives, represented by the feature  $[\sigma]$ , which must be exhausted by an operator that eliminates all non-entailed alternatives,  $\mathcal{E}xh_{[\sigma]}$ . In the case of *everybody*, its scalar alternative will be the existential, as in (34a). If exhaustification occurs above negation, the alternatives become stronger and their exhaustification gives rise to a scalar implicature, as in (34b).

(34) a.  $\text{everyone}^{\mathcal{Alt}} = \{\lambda P. \forall x [\text{person}(x) \rightarrow P(x)], \lambda P. \exists x [\text{person}(x) \wedge P(x)]\}$   
 b.  $\mathcal{E}xh_{[\sigma]} \text{ Mary didn't see everybody}_{[\sigma]} = \neg \forall x [\text{person}(x) \rightarrow \text{saw}(\text{Mary}, x)] \wedge \exists x [\text{person}(x) \wedge \text{saw}(\text{Mary}, x)]$

So returning to the intervention cases, we see that just as before, in the presence of two distinct dependencies, we expect two possible LFs, depending on the relative order of the two exhaustifiers, as illustrated in (35). Of these two LFs, however, only one conforms to the syntactic requirement of non-crossing dependencies, namely (35a). The problem with this configuration, however, is that the scalar implicature is calculated first, meaning that by the point the exhaustification of the NPI takes place, the environment will no longer be DE, but rather non-monotonic (see (34b)), which renders its exhaustification contradictory. In (35b) the exhaustification of the NPI is calculated before the implicature associated with *everybody* is included, resulting in a semantically coherent LF. The problem with this LF though, as mentioned, is that it requires crossing dependencies, which are ruled out inde-

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<sup>8</sup>Such sentences can, however, receive an acceptable interpretation if the intervening quantifier “moves out” the path of negation, in other words, if it receives wide scope. For this sentence, this reading would be something along the lines of “everyone is such that Mary didn’t tell them to buy any books.”

pendently by the syntax.

(35) \*Mary didn't give everybody anything.

- a.  $\mathcal{E}xh_{[D]} \mathcal{E}xh_{[\sigma]}$  Mary didn't give everybody<sub>[\sigma]</sub> anything<sub>[D]</sub>
- b.  $\mathcal{E}xh_{[\sigma]} \mathcal{E}xh_{[D]}$  Mary didn't give everybody<sub>[\sigma]</sub> anything<sub>[D]</sub>

SYN	SEM	ALL
✓	✗	✗
✗	✓	✗

There is a preponderance of such instances in the literature on polarity items, including intervention by presuppositional elements (cf. Homer (2011) and Chierchia (2012) on how to implement these fact within an alternative-based approach), as well as the peculiar behavior that governs the co-occurrence of PPIs and NPIs discussed in Homer (2011) and Nicolae (2012).

### 3.2.1.3 A superiority account

Questions with quantifiers can also give rise to pair-list readings of the type in (36b), besides their regular single-pair reading in (36a).

(36) What did everyone eat?

- a. SP: Everyone ate pizza.
- b. PL: Mary ate cake, John ate pizza and Bill ate salad.

While the single pair answer is always a possible answer to a question with a quantifier, the pair list reading is only available if the quantifier c-commands the *wh*-trace, as in (36). For (37), where the *wh*-trace c-commands the quantifier, the pair list answer is not a possible answer:

(37) Who ate everything?

- a. SP: Mary ate everything.
- b. PL: \*Mary ate cake, John ate pizza and Bill ate salad.

While single pair answers come about via short QR of the quantifier under the question operator, that is, within the question nucleus, as in (38a) and (39a), pair list answers are

claimed to come about as a result of quantifying-in; that is, as a result of QR'ing the quantifier to a position above the *wh*-phrase, as in (38b) and (39b)<sup>9</sup>:

(38) What did everyone eat?

a. LF-SP: what [2 [Q [only [everyone [1 [t<sub>1</sub> ate t<sub>2</sub>]]]]]]

b. LF-PL: everyone [1 [what [2 [Q [only [t<sub>1</sub> ate t<sub>2</sub>]]]]]]

(39) Who ate everything?

a. LF-SP: who [1 [Q [only [everything [2 [t<sub>1</sub> ate t<sub>2</sub>]]]]]]

b. LF-PL: everything [2 [who [1 [Q [only [t<sub>1</sub> ate t<sub>2</sub>]]]]]] ←ruled out!

If quantifying-in is what gives rise to pair-list readings, why is (39b) not a possible LF for (39)? One account for this contrast was offered by Chierchia (1993) who attributes the unavailability of (39b) to the same principle that rules out weak crossover effects in declaratives with quantifiers. For example, (40) cannot receive the interpretation that would result under the indexing given below because the binder, the quantifier *everybody*, needs to crossover at LF its intended bindee, the pronominal *his mother*, thus giving rise to a weak crossover violation.

(40) \*His mother<sub>i</sub> loves everybody<sub>i</sub>.

Chierchia shows that we can carry over this analysis to account for the unavailability of pair-list readings for questions where the *wh*-trace c-commands the quantifiers, as in (39b). In order for these cases to be parallel, however, it's crucial that *wh*-traces are analyzed as functional traces, meaning that they are co-indexed with both the moved *wh*-phrase, as well as the quantifier, as in (41).<sup>10</sup> Under this assumption, (39b) becomes a case of weak crossover since the quantifier, the binder, crosses over its bindee, the *wh*-trace t<sub>1</sub><sup>2</sup>.

(41) LF-PL: everything [2 [who [1 [Q [only [t<sub>1</sub><sup>2</sup> ate t<sub>2</sub>]]]]]]

<sup>9</sup>The LFs I provide for pair-list readings in this section are greatly simplified. We will return to these questions in Chapter 6 where I provide a compositional analysis for how these readings are derived.

<sup>10</sup>The move to functional traces is independently assumed to be necessary in order to deal with the functional reading of these questions.



One other possible way to rule out this reading for questions is offered by Fox (2012) who claims that we can think about the problematic cases as a type of superiority violation. Namely, he wants to derive the lack of pair-list readings in *wh*>QP questions as a violation of superiority since the relative order of these elements within the CP projection does not respect their base-positions at LF. Specifically, looking at (41) we see that in order to derive the pair-list reading, *everything* must move to a position that c-commands *who*, which is the opposite of the c-commanding relation established within the question nucleus, namely under Q. His account is meant to deal specifically with the asymmetry observed with pair-list readings for questions with quantifiers. I claim that we can extend his account a step further so as to also cover the asymmetry with NPIs in regular single-pair readings. Under such an extension, the proposal would be that superiority is checked not only with respect to copies within the CP projection, as Fox crucially assumes for his account, but rather with respect to all copies that end up being interpreted, irrespective of their landing positions. Reiterating, his account can only make predictions for questions that receive pair-list readings since that is the only instance when the quantifier will end up in the CP projection. In other words, his account would only be able to account for the unacceptability of the pair-list reading for *What did anybody read?*, having nothing to say about the unavailability of the single-pair reading.

Extending his proposal for the present cases would go as follows: the linearization of the highest copies of the *wh*-phrase and the quantifier needs to respect the linearization of their lower copies, namely their traces. If the *wh*-phrase c-commands the quantifier in their base positions, at LF the head of the *wh* chain needs to c-command the head of the quantifier chain. Similarly, if the *wh*-phrase is c-commanded by the quantifier in their base positions, at LF the head of the *wh* chain needs to be c-commanded by the head of the quantifier chain.<sup>11</sup>

This constraint would derive the unavailability of pair-list readings for questions where the quantifier is c-commanded by the *wh*-phrase in their base positions, as already argued by Fox. It would, furthermore, also rule out the problematic single-pair answers for

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<sup>11</sup>It's crucial that this be a constraint specific to *wh*-phrases or else we would predict that scope ambiguities could never arise, at least not syntactically.

questions with NPIs. Specifically, we saw that if the NPI c-commands the *wh*-phrase, the single-pair answer is unavailable. If we assume that the landing sites of quantifiers need to respect the relative order of their respective traces, the contrast between the two LFs in (42) would be derived straightforwardly: (42a) can receive a single-pair answer while (42b) cannot.

- (42) a. Who likes anybody?  
 LF-SP: who [1 [Q [only [anyone [2 [t<sub>1</sub> likes t<sub>2</sub>]]]]]]
- b. \*Who does anyone like?  
 LF-SP: who [2 [Q [only [anyone [1 [t<sub>1</sub> likes t<sub>2</sub>]]]]]] ←ruled out!

We predict then that (42b) should only receive a pair-list reading, but since that would require the NPI to have wide scope and thus be interpreted outside the scope of *only*, this reading would be ruled out for the same reason that NPIs are ruled out in UE environments.

This account, however, is slightly more powerful than the one proposed by Fox in that it furthermore predicts that certain questions should never allow single-pair answers. While Fox's account was applicable only to pair-list readings, the present one extends to single-pair readings as well since it doesn't look only at copies within the CP projection any more. Specifically, when we look at questions where the *wh*-phrase is c-commanded by the quantifier, we predict that the only available LF should be one where the quantifier is interpreted above the *wh*-phrase, meaning that the only possible answer to such questions should be the pair-list answer. This is not right though, since we showed at the beginning of this section, also repeated below, that such questions can easily receive a single pair answer as well.

- (43) What did everyone eat?
- a. LF-SP: what [2 [Q [only [everyone [1 [t<sub>1</sub> ate t<sub>2</sub>]]]]]] ←ruled out?  
 Everybody ate pizza.
- b. LF-PL: everyone [1 [what [2 [Q [only [t<sub>1</sub> ate t<sub>2</sub>]]]]]]  
 Mary ate pizza, John ate salad and Bill ate cake.

In order to reconcile this analysis with the empirical facts, we would thus have to claim that what appears to be a single pair reading is in fact one possible reading of the pair list answer, namely the case where every single person ate the same thing; in other words, we are not dealing with a real structural ambiguity here, unlike what has generally been assumed. Essentially, this account commits us to a proposal wherein there are no true single-pair answers to questions with quantifiers when the quantifier c-commands the *wh*-phrase; that is, such questions will always denote, depending on the analysis of quantifying-in we end up adopting, either lifted questions or a family of questions, but in either case a higher type than regular questions. So the obvious next step would be to see if we can find situations where quantifying-in/pair-list are blocked, but single-pair are possible, since under this account the two should be, in a sense, interchangeable. One such example is (44), which can receive either a single-pair or functional reading, but definitely not a pair-list reading, contrary to what our account predicts:

- (44) Who does nobody like?
- a. Nobody likes their mother in law.
  - b. Nobody likes Susan.
  - c. \*John doesn't like Susan, Bill doesn't like Mary, . . . .

More generally, this issue is always going to arise when dealing with downward entailing quantifiers since this account predicts that they should be able to quantify into a question for the purposes of obtaining the single-pair or functional reading. But this cannot be possible since a quantifying-in analysis would require us to specify for no person who they like. One possible fix for this, which, understandably, would undermine the overall viability of the system, would be to adopt a principle such as the one in (45). Doing so would allow us to revert to low QR even when that would lead to a superiority violation as defined in this case.

- (45) If it's sensible to quantify in, you must

In essence, the idea is that superiority can be violated whenever the alternative, namely quantifying-in, is semantically ruled out. It's not sensible to quantify-in DE quantifiers,

since asking a question about no person is not reasonable. Note that this principle would have to be sensitive only to the quantificational force of the quantifier, meaning that it would only be applicable to DE quantifiers and not to NPIs, which, for all intents and purposes, are regular existential quantifiers and should thus be able to quantify-in without a problem. Another issue with this account is that it wrongly predicts that for John to know the single-pair answer to a question, namely (46a), he needs to know the pair-list answer as well, (46b). This doesn't seem to be quite right, however, since John could easily be completely ignorant about the identity of the eaters.

- (46) John knows what everybody ate.
- a. John knows that everybody ate pizza.
  - b. John knows that Mary ate pizza, that Bill ate pizza and that Fred ate pizza.

It might, ultimately, turn out that this account is not feasible, especially given the issues brought up above. However, even if we do give up on this account, we can still maintain Fox's superiority proposal (limited to the extended CP projection) to account for the unavailability of pair-list readings for quantifiers in object position. In other words, the initial version of the superiority story might be right even if we decide to stick with the intervention analysis in order to account for the subject-object asymmetry with NPIs. We will return to issues pertaining to quantifiers in questions in Chapter 6.

#### 3.2.1.4 A previous account: Han and Siegel (1997)

Up to date, the most detailed account for the asymmetry in (47) is due to Han and Siegel 1997.

- (47) a. Who ate anything?  
b. \*What did anybody eat?

The authors assume a Groenendijk and Stokhof (1984) analysis of questions wherein questions denote partitions, but argue that their proposal is also compatible with a semantics of questions which takes them to denote sets of possible answers. To facilitate this discussion, I will present their account in a Hamblin/Karttunen style. They assume the questions in

(47) denote the sets of answers in (48a) and (48b), respectively.

- (48) a.  $\left\{ \begin{array}{l} \text{Nobody ate anything,} \\ \text{Mary ate anything,} \\ \text{John ate anything,} \\ \vdots \end{array} \right\}$       b.  $\left\{ \begin{array}{l} \text{Anybody ate nothing,} \\ \text{Anybody ate cake,} \\ \text{Anybody ate salad,} \\ \vdots \end{array} \right\}$

Their proposal is quite brilliant in its simplicity. The idea is that what is responsible for the licensing of the NPI in (48a) but not in (48b) is the availability of a proposition in the answer set in which the NPI is licensed, namely the negative proposition *nobody ate anything*. They claim that whenever the NPI is c-commanded by the *wh*-phrase in their base positions, one of the possible answers is going to be the proposition in which the NPI is c-commanded by a negative quantifier. Given that NPIs are licensed by negative quantifiers in regular declaratives, the acceptability of NPIs in these questions would fall out instantly. On the other hand, whenever the NPI is not c-commanded by the *wh*-phrase, no answer, not even the one with a negative quantifier, would constitute a proposition in which the NPI is licensed, as seen by the form of the answers in (48b).

This account, while elegant in its simplicity, suffers from a number of pitfalls. Among them is the crucial reliance on the presence of negative answers. In order for this asymmetry to hold, Han and Siegel need to assume that question denotations contain negative answers. This, however, goes against what is generally assumed to be the case. As we discussed in the previous chapter, questions carry an existence presupposition (be it due to an answer-hood operator or a filter), meaning that negative answers will never actually be part of the denotation of the question. There are, of course, cases where negative answers are felicitous. In order to account for the felicity of a discourse such as in (49), the general take has been to assume that negative answers implicitly deny the presupposition of the question, rather than actually answering it (cf. Dayal 1996, Comorovski 1996, among others).

- (49) Who ate cake?  
Nobody did.

Dayal points out a contrast with cleft questions to illustrate this more clearly. The idea here is that cleft constructions carry a conversational implicature that it is part of the common ground that somebody ate cake, making a negative answer infelicitous since the hearer cannot implicitly deny a presupposition that he himself holds in his common ground.

- (50) Who is it that ate cake?  
#Nobody did.

Note, furthermore, that NPIs are perfectly fine even in cleft questions, despite the fact that they are unacceptable in the corresponding declaratives.

- (51) a. Who was it that brought any veggie dishes to the reception?  
b. \*It was John who brought any veggies dishes.

The fact that NPIs are acceptable in questions that otherwise disallow negative answers, suggests that an account of the acceptability of NPIs that relies on the availability of a negative answer cannot, at best, be the whole story.

Another issue that arises with Han and Siegel's account is the fact that it has nothing to say about the weak/strong exhaustivity distinction and why that seems to play a role in the acceptability of NPIs. Given the way they set up their proposal, it is hard to imagine how they would deal with WE questions other than by possibly claiming that WE questions do not allow negative answers, an otherwise purely stipulative move.

Finally, I'd like to point out another set of data that, as far as I can tell, has not been discussed in the literature on NPIs in interrogatives. This concerns so-called strong NPIs which have a more restricted distribution than the *any/ever*-type NPIs. Among these strong NPIs we find *in weeks* and *either*. Just like *any* and *ever*, they are ruled out in positive contexts and acceptable in the scope of negation and negative quantifiers.

- (52) a. Mary has \*(not) seen John in weeks/either.<sup>12</sup>  
b. Nobody has talked to me in weeks/either.  
c. Mary has \*(not) seen anybody.

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<sup>12</sup>A star before parentheses indicates that the sentence is unacceptable without the element in the parentheses.

- d. Nobody ever talked to anybody.

Unlike *any* and *ever*, however, they are not acceptable in the scope of *few* and *only*, as shown below.

- (53) a. Few students brought anything to the reception.
- b. Only the students brought anything to the reception.
- c. \*Few students have seen her in weeks.
- d. \*Only John has talked to me either.

Incidentally, these strong NPIs are also ruled out from questions, even when they are commanded by the *wh*-phrase.

- (54) a. \*Who read that essay *either*?
- b. \*Who has visited Mary *in weeks*?

These facts create a problem for an account that takes the acceptability of NPIs to be dependent on their acceptability in the negative answer (granting, of course, that there actually is such an answer). Given that both *either* and *in weeks* are perfectly acceptable in the scope of negative quantifiers, as shown above, Han and Siegel's account would lead us to conclude that they should also be acceptable in questions, contrary to fact. In the following subsection I outline how the present account of questions can derive and in fact actually predicts that this asymmetry should hold between weak NPIs like *any* and strong NPIs like *in weeks*.

### 3.2.2 Prediction: Strong NPIs in questions

Strong NPIs such as *in weeks* and *either* (cf. Gajewski 2011) are characterized by their inability to survive in weakly-negative environments, such as the scope of *only*.

- (55) a. Bill hasn't visited Mary *in weeks*.
- b. \*Only Bill has visited Mary *in weeks*.
  
- (56) a. Mary doesn't like you *either*.
- b. \*Only Mary likes you *either*.

As mentioned above, it turns out that these strong NPIs are also disallowed from occurring in questions, both embedded and non-embedded, as shown in (57).

- (57) a. \*Mary wants knows who has visited John *in weeks*.  
b. \*Who read that essay *either*?  
c. \*Who has visited Mary *in weeks*?

The present analysis straightforwardly accounts for these facts since it assumes a covert *only* is present in questions. In doing so, we can reduce the unacceptability of strong NPIs in questions to their unacceptability in the scope of *only*; that is, whatever account we use to rule out strong NPIs from the scope of overt *only* in declaratives we can use to account for their unacceptability in questions. Below I present one such account.

Recall that we take *only* propositions to be partial propositions:

- (58) [[Only Bill ate cake]]  
a. is defined if Bill ate presup  
b. if defined, it asserts that nobody other than Bill ate denotation

The issue with *only*, as discussed in detail by von Stechow (1999), is that it is not as clearly downward entailing as other operators that license NPIs, such as negation or negative quantifiers. One way to see this is by looking at the two sets of propositions in (59).

- (59) a. (i) Only Bill ate pizza.  
(ii) Only Bill ate mushroom pizza.  
b. (i) Nobody ate pizza.  
(ii) Nobody ate mushroom pizza.

The problem presented by *only* is that (59a.i) doesn't necessarily entail (59a.ii), while constructions of the form (59b.i) always support inferences to their subset counterparts, (59b.ii). Von Stechow claims that the difficulty with (59a) is due to the fact that *only* carries a presupposition, and specifically, that the entailment is reliant on that presupposition being satisfied. In other words, if we take for granted that Bill ate pizza, and furthermore, that he ate mushroom pizza, we will have no problem inferring from the fact that he is the only one



who ate pizza that he is also the only one who ate mushroom pizza.

Now, returning to the issue related to the behavior of NPIs in the scope of *only*, one proposal for the asymmetry between weak and strong NPIs comes from Gajewski 2011 and Chierchia 2012. These authors claim that weak NPIs like *any* and *ever* are licensed in a partial proposition as long as they are licensed in the assertive component of meaning. In other words, the fact *any* is acceptable in (60) is due to the fact that the entailment from (60a) to (60b) goes through, that is, because *any* is in a DE environment with respect to the non-presuppositional contribution of *only*.

- (60) Only Bill ate any pizza.
- a. Nobody other than Bill ate pizza.
  - b. Nobody other than Bill ate mushroom pizza.

On the hand, in order to account for the unacceptability of *in weeks* or *either* in these same environments, their proposal is that strong NPIs are also sensitive to the other components of meaning. Since the presuppositional component of an *only* proposition, namely its pre-jacent, creates an upward entailing environment, the enriched meaning will no longer be downward entailing (but merely non-monotonic). So the fact that these NPIs are unacceptable under *only*, like in (61), can be attributed to the lack of entailment between (61a) and (61b), two non-monotonic propositions (I'm using *in days* to represent a subset alternative to *in weeks*).

- (61) \*Only Bill has seen Mary in weeks.
- a. Bill has seen Mary in weeks and nobody other than Bill has seen her in weeks.
  - b. Bill has seen Mary in days and nobody other than Bill has seen Mary in days.

One way to implement this in an alternative exhaustification framework is to say that the exhaustifier with which strong NPIs agree is different than the one that agrees with weak NPIs. The strong NPI exhaustifier, call it  $\mathcal{E}xh_{[p-s]}$ , is such that it negates alternatives whenever they are not entailed by the assertion with respect to the enriched meaning. Since the enriched meaning of *only* is always going to be non-monotonic, all sub-domain alternatives will be non-entailed, and thus required to be negated. Negating them, however,

will contradict the assertion, rendering these NPIs unacceptable in such environments. I outline the contrast between weak and strong NPIs in (62).

- (62) a. \* $\mathcal{E}xh_{[D-S]}$  [only ... in weeks<sub>[D-S]</sub> ...] contradiction  
 b.  $\mathcal{E}xh_{[D]}$  [only ... anything<sub>[D]</sub> ...] vacuous

In conclusion, what we have shown in this subsection is that given an analysis of questions that takes their strongly exhaustive reading to be the result of a covert *only*, the asymmetry between weak and strong NPIs in the scope of such questions falls out immediately simply by appealing to independently-motivated proposals for the behavior of such NPIs.

### 3.2.3 Prediction: High vs Low *wh*-adjuncts

Another prediction made by this account relates to the behavior of NPIs with respect to non-argumental *wh*-phrases. Specifically, we should expect a difference between high and low *wh*-adjuncts with respect to the acceptability of subject NPIs. If we assume that low *wh*-adjuncts, such as *how* and *where* adjoin at the VP level and are thus base-generated below the subject, questions with subject NPIs should only allow for a rhetorical interpretation, similarly to cases where the *wh*-phrase is the object of the verb. Effectively, a low adjunct should behave like an object *wh*-phrase with respect to an NPI in subject position since the NPI ends up outside the c-commanding domain of the *wh*-trace. That this contrast holds can be seen in (63) where we see that high *wh*-adjuncts like *why* allow for non-emphatic readings even with subject NPIs.<sup>13</sup>

- (63) a. Why did anyone leave before the party was over?  
 b. \*How did anyone cook this?  
 c. \*Where did any linguist go to grad school?

At the same time, we expect no difference in acceptability between high and low adjuncts when the NPI is in object position, as shown in (64). The idea here is that regardless of the high/low distinction, *wh*-adjuncts will always attach only as low as the VP, meaning that transitive objects will always end up in their c-command domain.

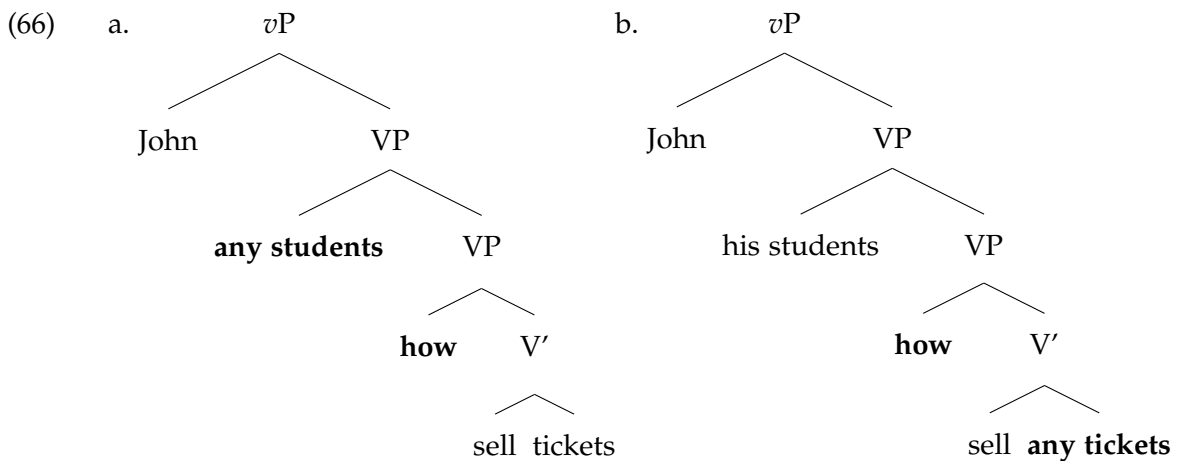
<sup>13</sup>Recall that I use an asterisk to indicate the unavailability of a non-emphatic reading.

- (64) a. Why did Mary bring anything?  
 b. How did he manage to cook anything?  
 c. Where does Mary do any of her homework?

Further arguments that this is a robust structural asymmetry comes from double object constructions involving manner adverbs such as *how*.<sup>14</sup> Consider the examples below:

- (65) a. \*How did John sell any students tickets?  
 b. How did John sell his students any tickets?

Since we are dealing with a double object construction, we know that the dative object, the NPI *any students* in (65a), is generated high, in Spec of VP, and that the manner adverb, *how*, is a VP adjunct, hence lower in the structure than the NPI (Larson 1988, Larson 1990). On the other hand, when the NPI serves as the direct object, it functions as the complement of the verb, and thus ends up being c-commanded by the adjunct, helping us understand the contrast between the sentences in (65). The structures we are dealing with in (65) are provided in (66a) and (66b) respectively:



This prediction regarding *wh*-adjuncts is not necessarily specific to my account but rather falls out as a consequence of the claim that NPIs are licensed only if c-commanded by the *wh*-phrase. One could imagine that Han and Siegel's account could also explain this observation under the assumption that questions with *wh*-adjuncts also allow for negative

<sup>14</sup>I'd like to thank Masha Polinsky for bringing these examples to my attention.

answers, albeit it would be quite difficult to imagine what such answers would look like.<sup>15</sup>

### 3.3 NPIs in the restrictor of the *wh*-phrase

#### 3.3.1 The problem

Our discussion up to this point has focused exclusively on the behavior of NPIs in the nucleus of questions. However, as pointed out by Guerzoni and Sharvit (2007), when NPIs appear in the restrictor of the *wh*-phrase, their acceptability appears to be independent of whether the question is interpreted strongly or weakly exhaustive. In (67) we have two unembedded questions which are independently assumed to be strongly exhaustive. In (68), on the other hand, the questions are embedded under *surprise*, which is assumed to embed only weakly exhaustive questions. The fact that we observe the same variability in terms of the acceptability of the NPI in the restrictor of the *wh*-phrase suggests that their acceptability in these environments is to be attributed to a different source.

- (67) a. Which students who have any books on NPIs are selling them?  
b. \*Which student who has any books on NPIs is selling them?
- (68) a. It surprised her which students who took any linguistics passed the exam.  
b. \*It surprised her which student who took any linguistics passed the exam.

For the present account, the fact that NPIs are acceptable even in questions such as (68b) suggests that the licensing of the NPI occurs at a more embedded level than what we have been assuming to be the case when NPIs occur in the nucleus of the question; in other words, (68a) but not (68b) has a level at which the NPI can be said to be licensed. At the same time, we see that whatever licenses NPIs in strongly exhaustive questions as in (67) is either not available, or simply blocked, as can be seen by the fact that (67b) is unacceptable. What I hope to convince the reader in this section is that what is interesting about this data set is not so much the fact that NPIs can, sometimes, be acceptable in weakly exhaustive

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<sup>15</sup>I can imagine that some might find even the questions marked as “good” bad. One potential response to that could be that their grammars simply don’t allow *only* to associate with non-arguments.

questions, as in (68a), but rather the fact that they are **not uniformly** acceptable in strongly exhaustive ones, as in (67b).

Looking at the data in (67) and (68), we see that the only difference between the (a) and (b) sentences is the fact that the *wh*-phrase is plural in (a) and singular in (b). So the first question we need to address is what it is about the plurality of *wh*-phrases that, in a sense, rescues NPIs from an environment that otherwise would have led to a crash. In trying to account for this observation, Guerzoni and Sharvit point out the parallel with sentences such as those in (69) where we see that NPIs are licensed in the restrictor of a plural definite phrase, (69a), but not in the restrictor of a singular definite, (69b).

- (69) a. The students who took any linguistics classes passed the exam.  
 b. \*The student who took any linguistics classes passed the exam.

To account for why NPIs are licensed in the restrictor of the plural definite determiner, consider its truth-conditions in (70). The idea is that the assertive component of the definite determiner, given in (70a), is precisely the same as that of *every*, meaning that its left argument, the restrictor, supports downward entailing inferences, hence the acceptability of NPIs in this position.

- (70) The students who took any linguistics passed the exam.  
 a. *Assertion:*  $\forall x [(x \text{ is a student who took any ling}) \rightarrow (x \text{ passed})]$   
*Presupposition:*  $|\{\lambda x. x \text{ is a student who took any ling}\}| \neq \emptyset$   
 b.  $[\mathcal{E}xh_{[D]} [\text{the students who took } [\text{any ling}]_{[D]}]] \text{ passed}$   $\checkmark \mathcal{E}xh > \text{the}_{pl}$

Turning now to the singular definite determiner, I follow Gajewski 2011 and Chierchia 2012 and propose that its assertive component is as in (71a), with the difference between the singular and plural being that the singular also has an existence requirement incorporated into the assertive component. See Yablo 2005 for a discussion on why the behavior of singular definites might suggest that the non-empty requirement is part of the assertive component (rather than merely a presupposition). It's precisely this additional requirement that disrupts the otherwise downward monotonicity of the restrictor, accounting for the

unacceptability of the NPI in this position.

(71) \*The student who took any linguistics passed the exam.

- a. *Assertion:*  $\exists y [(y \text{ is a student who took any ling}) \wedge \forall x [(x \text{ is a student who took any ling}) \rightarrow (x \text{ passed})]]$

*Presupposition:*  $|\{\lambda x. x \text{ is a student who took any ling}\}| = 1$

- b. \* $[\mathcal{E}xh_{[D]} [\text{the student who took } [\text{any ling}]_{[D]}]]$  passed  $\quad \times \mathcal{E}xh > \text{the}_{sg}$

To recap, the denotations of the determiners are as in (72):

(72) a.  $[[\text{the}_{pl}]] = \lambda P. \lambda Q: |P| \neq \emptyset. \forall x [P(x) \rightarrow Q(x)]$

b.  $[[\text{the}_{sg}]] = \lambda P. \lambda Q: |P| = 1. \exists y [P(y) \wedge \forall x [P(x) \rightarrow Q(x)]]$

Guerzoni and Sharvit (2007) propose to account for the facts regarding NPIs in the restrictor of *which*-phrases by taking these phrases to behave like definite noun phrases: “the idea would be, then, that a *which*-phrase contains a hidden, cross-categorial, *the* (which means that the restrictor of *which* is in the scope of *the*)” Guerzoni and Sharvit (2007, p. 19).<sup>16</sup> However, beyond noting the similarities between the two sets of data, which in itself is a very significant observation, they do not provide a compositional account that shows why this parallel should hold. The next section presents one such account.

### 3.3.2 A reconstruction account

#### 3.3.2.1 Weakly exhaustive questions

Following the intuition in Guerzoni and Sharvit I propose to account for the contrast we observe in (73) by the same means that give us the contrast discussed above between the singular and plural definite article.

- (73) a. It surprised her which girls who took any linguistics classes passed the exam.  
 b. \*It surprised her which girl who took any linguistics classes passed the exam.

<sup>16</sup>Although they assume a different analysis for why plural and not singular definite articles license NPIs, the details of which are orthogonal to the present discussion.

The trick behind compositionally deriving the parallel between the restrictor of *which*-phrases and that of the definite article is to consider how *wh*-traces are interpreted. Incidentally, the semantics of movement, namely the copy theory of movement, takes us one step closer (cf. Chomsky 1993, , Sauerland 1998, Fox 1999, Fox 2002). For transparency, up to this point I have taken the trace of the *wh*-phrase to be interpreted as a plain variable, as it made no difference one way or the other for the purposes of the analysis. We know, however, that copies can be more complex than that. Specifically, in the case of hand, I propose that the traces of the *which*-phrases will be interpreted as in (74a) and (74b), respectively, where I provide the LFs for the nucleus of the question, namely the embedded IPs, as well as their corresponding interpretations.

- (74) a.  $[IP\ the_{pl}\ [girls\ who\ took\ any\ ling]\ [passed]]$   
 $\rightarrow \forall x [(girl\ took\ any^{\checkmark}\ ling)(x) \wedge x=z] \rightarrow [passed(x)]$
- b.  $[IP\ the_{sg}\ [girl\ who\ took\ any\ ling]\ [passed]]$   
 $\rightarrow \exists y [(girl\ took\ any^{\times}\ ling)(y) \wedge y=z] \wedge$   
 $\forall x [(girl\ took\ any^{\checkmark}\ ling)(x) \wedge x=z] \rightarrow [passed(x)]$

Assuming, as we have, that the NPI can be licensed/exhaustified within the nucleus of the question, it should be pretty easy to see that the NPI will be licensed in (74a) and not in (74b), since it occurs in a DE environment in the former, the restriction of a universal, but not in the latter. Note that for this parallel to hold, it's crucial to assume that the definite article is specified for whether it is plural or singular.

We still need to worry about the higher copy of the moved *wh*-phrase however. If we assume that *which*-phrases are existential quantifiers, as we have been assuming all along, and that the relative clause is also interpreted in the higher copy, then we make the prediction that NPIs should be ruled out regardless of the plurality of the head noun. To see why, consider the LFs for the full question in (75) and (76).

- (75)  $[CP\ which\ girls\ who\ took\ any\ ling\ [I\ [Q\ [IP\ the_{pl}\ girls\ who\ took\ any\ ling\ passed]]]]$

- (76)  $[CP\ which\ girl\ who\ took\ any\ ling\ [I\ [Q\ [IP\ the_{sg}\ girls\ who\ took\ any\ ling\ passed]]]]$

Under the assumption that the relative clause is also interpreted in the highest copy, we now have to check whether the NPI is licensed in this position as well. Given an account that takes *which* phrases to be existential quantifiers, the NPI in the higher copy will always end up being interpreted in the restrictor of an existential, irrespective of the plurality of the head noun. Since the restrictor of an existential is not the right environment for an NPI, we predict NPIs to fail across the board. In (77) I offer the semantics corresponding to the LFs in (75) and (76) and use ✗ and ✓ to indicate which copy of the NPI is licensed where.

- (77) a.  $\exists z [(girl\ took\ any^{\times}\ ling)(z) \wedge$   
 $p = \forall x [(girl\ took\ any^{\checkmark}\ ling)(x) \wedge x=z] \rightarrow [passed(x)]]$
- b.  $\exists z [(girl\ took\ any^{\times}\ ling)(z) \wedge$   
 $p = \exists y [(girl\ took\ any^{\times}\ ling)(y) \wedge y=z] \wedge$   
 $\forall x [(girl\ took\ any^{\checkmark}\ ling)(x) \wedge x=z] \rightarrow [passed(x)]]$

What we see then is that in order for NPIs to survive in the restrictor of a *which*-phrase, the relative clause containing the NPI cannot be interpreted in its surface position, as the semantics in (77) shows. What we want then, is a way to interpret only the lower copy of the NPI. This can easily be achieved by imposing obligatory reconstruction of the relative clause, a phenomenon independently observed in cases of binding (cf. Fox 1999, Fox 2002, Sauerland 2000). Consider the examples below:

- (78) a. \*[Which argument that John<sub>i</sub> was wrong]<sub>j</sub> did he<sub>i</sub> accept t<sub>j</sub> in the end?  
 b. [Which girl that John<sub>i</sub> saw]<sub>j</sub> did he<sub>i</sub> like t<sub>j</sub> better?  
 c. [Which girl that he<sub>i</sub> saw]<sub>j</sub> did John<sub>i</sub> like t<sub>j</sub> better?

The ungrammaticality of (78a) shows us that arguments, namely *that John was wrong*, are obligatorily reconstructed in their base positions. Since *John* is part of the argument of the head noun, it must reconstruct, ending up in a position c-commanded by the co-indexed pronominal *he*. This, however, induces a Condition C violation, hence the ungrammaticality of (78a). Adjuncts, unlike arguments, do not have to reconstruct, which can be seen by the acceptability of (78b) (cf. Safir 1999). However, in cases where lack of reconstruction would induce a Condition C violation, the adjunct has the option of reconstructing, as it must be



the case in (78c). In other words, we see that adjuncts can optionally reconstruct whenever interpretation in their surface position would give rise to an unacceptable configuration.

Returning to the case at hand, I claim that in order for questions with NPIs in the restrictor of *which* phrases to be acceptable, the *wh*-phrases must reconstruct, which, in effect, is similar to what goes on in (78c), where the only plausible interpretation is one involving reconstruction of the *wh*-phrase below the R-expression.<sup>17</sup> Thus the actual LFs for the questions under discussion will be as in (79):

- (79) a. [<sub>CP</sub> which girls [<sub>1</sub> Q [<sub>IP</sub> the<sub>1(pl)</sub> [girls who took any ling] [passed]]]]  
 $\exists z$  [girl(z)  $\wedge$  p =  $\forall x$  [(girl took any<sup>✓</sup> ling)(x)  $\wedge$  x=z]  $\rightarrow$  [x passed]]
- b. [<sub>CP</sub> which girl [<sub>1</sub> Q [<sub>IP</sub> the<sub>1(sg)</sub> [girl who took any ling] [passed]]]]  
 $\exists z$  [girl(z)  $\wedge$  p =  $\exists y$  [(girl took any<sup>✗</sup> ling)(y)  $\wedge$  y=z]  $\wedge$   
 $\forall x$  [(girl took any<sup>✓</sup> ling)(x)  $\wedge$  x=z]  $\rightarrow$  [x passed]]

Before turning to strongly exhaustive questions, let's consider a final derivation involving NPIs in the restrictor of a non-subject *wh*-phrase, as in (80). We'll see that even though this derivation is slightly more complex than those presented above, it ultimately gives us the intended meaning, assuming once again that the relative clause can reconstruct to a position where the NPI is licensed.

- (80) It surprised me which girls who took any linguistics you passed.

Since the *which*-phrase originates in object position, it must undergo two separate movements: one in order to resolve the type mismatch caused by the fact that we are dealing with a quantifier in object position, and another to check the [+wh] feature.<sup>18</sup> Assuming trace conversion throughout, the first QR must leave behind a copy of type *e* in order to satisfy the type requirements of the verb. In order to leave a type *e* trace behind, the defi-

<sup>17</sup>Note that I'm ignoring the question of whether the head noun is also interpreted in the upstairs copy since this issue is still being debated in the literature and makes no difference one way or the other for our purposes. For more on this issue, see Sauerland 1998, Sauerland 2000, Safir 1998, Sharvit 1999, to name just a few.

<sup>18</sup>Note that in general, a single move would suffice to satisfy both requirements. This is not an option in the present case, however, since a single move would leave us with no landing site at which the singular and plural *which*-phrases would be differentiated for the purposes of NPI licensing given that the lowest copy will always be interpreted as the unique individual satisfying the relevant property.

nite article needs to be interpreted as the uniqueness operator. The second instance of QR, i.e. the *wh* feature-driven movement, will leave behind a copy headed by the higher type definite determiner, similarly to what we assumed above. In (81) I provide the LF of the plural *which*-phrase and the corresponding interpretation (the gray material corresponds to the copies that end up not being interpreted).

- (81) [<sub>CP</sub> which girls who took any ling [<sub>1</sub> [Q [<sub>IP</sub> the<sub>1(pl)</sub> girls who took any ling [<sub>1</sub> [you passed the<sub>1(t)</sub> girls who took any ling]]]]]]
- a.  $\exists z$  [girl(z)  $\wedge$  [ $\lambda v$ . p = the<sub>pl</sub>[ $\lambda x$ . (girls who took any ling)(x)  $\wedge$  x=v][ $\lambda v$ . you passed the<sub>i</sub>[ $\lambda y$ . (girls who took any ling)(y)  $\wedge$  y=v]]](z)]
- b.  $\exists z$  [girl(z)  $\wedge$  [p = the<sub>pl</sub>[ $\lambda x$ . (girls who took any ling)(x)  $\wedge$  x=z][ $\lambda z$ . you passed the<sub>i</sub>[ $\lambda y$ . (girls who took any ling)(y)  $\wedge$  y=z]]]
- c.  $\exists z$  [girl(z)  $\wedge$  p =  $\forall x$ [(girls who took any ling)(x)  $\wedge$  x=z]  $\rightarrow$  [you passed  $t_y$ [(girls who took any ling)(y)  $\wedge$  y=x]]]
- d.  $\exists z$  [girl(z)  $\wedge$  p =  $\forall x$ [(girls who took any ling)(x)  $\wedge$  x=z]  $\rightarrow$  [you passed x]]

So what we see here is that in order for the NPI to be licensed, we need genuine reconstruction of the relative clause to a QR position, namely the middle copy. Note that I'm assuming the relative clause is not interpreted in the lowest copy, as that would mean having the NPI in the nucleus of a universal, an upward-entailing environment.<sup>19</sup>

There are also cases such as (82) which involve both the potential for a Condition C violation, as well as the issue of NPI licensing.

- (82) [Which boys who gave Mary<sub>i</sub> any flowers]<sub>j</sub> did she<sub>i</sub> ask  $t_j$  on a date?

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<sup>19</sup>This same issue arises in simple cases such as (i) where the trace of the QRed object must be interpreted as a plain variable, as in (ia), in order to avoid having the NPI also be interpreted in the nucleus of the universal, as in (ib).

- (i) John passed every girl who ever took a linguistics course.
- a. every [ $\lambda x$ . girl who ever took a linguistics course(x)][ $\lambda y$ . John passed the girl y]
- b. every [ $\lambda x$ . girl who ever took a linguistics course(x)][ $\lambda y$ . John passed the (girl who ever took a linguistics course) y]

But consider cases like (ii) which have the NPI in an argument position.

- (ii) John read every review of any linguistics book.
- Since arguments obligatorily reconstruct, the NPI will end up being interpreted in the nuclear scope of the universal, an UE position, so the sentence should be ruled out. Incidentally my informants agree that there is a contrast between (i) and (ii) so this account might be on the right track.

On the one hand we need the adjunct to reconstruct so as not to have the NPI be interpreted in the restrictor of an existential, while at the same time we need to avoid complete reconstruction so as to avoid a Condition C violation which would come about by interpreting the R-expression below the pronoun. Such examples also point to the need for intermediate reconstruction.<sup>20</sup>

### 3.3.2.2 Strongly exhaustive questions

What about the strongly exhaustive questions in (83)?

- (83) a. Which students who took any linguistics classes passed?  
b. \*Which student who took any linguistics classes passed?

The acceptability of (83a) is quite straightforward since it follows from the same principles as the acceptability of an NPI in the restrictor of a plural *which*-phrase under *surprise*. What's not as straightforward, however, is why (83b) is unacceptable given that the NPI ends up in the scope of the covert *only* assumed to always be present in direct questions. In other words, what we need to ask ourselves is why the NPI can't be licensed/exhaustified above the covert *only* where it should be felicitous given that *only* supports downward entailing inferences in its scope. One reaction might be to say that this doesn't work because the NPI is in the subject position and we saw earlier on that NPIs are never acceptable in subject position (modulo rhetorical questions). Notice, however, that what is actually relevant is the relative position of the NPI with respect to the *wh*-phrase. So the fact that the NPI is (embedded within) the subject is irrelevant, as supported by the following example where the NPI is in object position and still unacceptable.

- (84) \*Which student who took any linguistics did you pass?

So essentially we need to figure out why the licensing cannot take place above *only*. In a framework that assimilates licensing conditions with agreement relations between an alternative-bearing item, the NPI, and a covert exhaustifier, the question becomes the following: why can't exhaustification occur above the covert *only*, as in (85a). The analysis we

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<sup>20</sup>I'd like to thank Uli Sauerland for bringing these constructions to my attention.

used to account for the subject/object asymmetry in the previous section readily suggests itself for this set of facts. Here too we witness a clash between the syntactic conditions on dependencies (crossing versus nesting) and the semantic requirements of exhaustification.

(85) \*Which girl who took any linguistics passed?

	SYN	SEM	ALL
a. $\mathcal{E}xh_{[D]}$ [only <sub>[F]</sub> [[the girl who took [any ling] <sub>[D]</sub> ] <sub>[F]</sub> passed]]	✗	✓	✗
b. only <sub>[F]</sub> [ $\mathcal{E}xh_{[D]}$ [[the girl who took [any ling] <sub>[D]</sub> ] <sub>[F]</sub> passed]]	✓	✗	✗

That this is not a problem when we turn to plural *which*-phrases can be seen in (86b) where we see that the presence of a plural definite description allows for the NPI to be exhaustified below *only*, thus satisfying the syntactic requirement.

(86) Which girls who took any linguistics passed?

	SYN	SEM	ALL
a. $\mathcal{E}xh_{[D]}$ [only <sub>[F]</sub> [[the girls who took [any ling] <sub>[D]</sub> ] <sub>[F]</sub> passed]]	✗	✓	✗
b. only <sub>[F]</sub> [ $\mathcal{E}xh_{[D]}$ [[the girls who took [any ling] <sub>[D]</sub> ] <sub>[F]</sub> passed]]	✓	✓	✓

What we've shown in this section is that the licensing of an NPI when it occurs in the restrictor of a plural *which*-phrase takes place at the level of the (reconstructed) *wh*-phrase, rather than at the level of the embedded question which is what otherwise dictates the acceptability of NPIs in the scope of *wh*-phrases. This is in line with the generalization proposed by Guerzoni and Sharvit (2007) that the licensing of NPIs in the restrictor of *wh*-phrases is independent of the strength of the question. The way this generalization is couched in the present analysis is by showing that exhaustification necessarily takes place below *only* when the NPI is in the restrictor of the *wh*-phrase, thus rendering the presence, or lack thereof, of *only* irrelevant for the purposes of exhaustification. This is in sharp contrast with the cases discussed in the previous section where the acceptability of NPIs in the nucleus of the question is reliant on the presence of *only*, in that exhaustification must take place above the *only* operator.

### 3.3.3 Prediction: NPIs within the focus associate of overt *only*

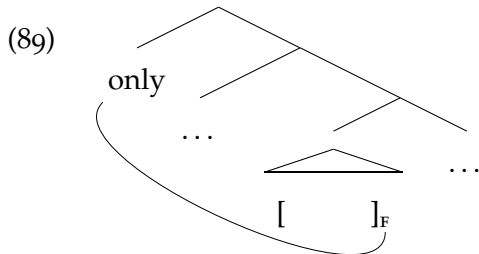
The account presented in this section has immediate consequences for our understanding of why NPIs are ruled out from the focus associate of overt *only*, a generalization argued for in Wagner (2006). While his ultimate goal is to argue for an association-via-movement account of *only*, Wagner points out the significant empirical observation that when *only* associates with a DP, no NPIs are licensed within it, as shown by (87a).

- (87) a. \*Only [an author of any comic]<sub>[F]</sub> met Particle Man.  
 b. Only [an inhabitant of Twin Earth]<sub>[F]</sub> ever met any aliens. Wagner (2006, ex. 23b-c)

This peculiar aspect of the behavior of NPIs, namely the fact that they are acceptable only outside the focus associate of *only*, remains a mystery, particularly for accounts which take *only* to be a propositional operator. The problem is that as a propositional operator, *only* is blind to the sub-constituency of its propositional argument. That is, the notion of restrictor versus scope does not arise when calculating the semantics of *only*. We saw this same problem come up in the discussion on the subject-object asymmetry of NPIs in questions in the previous section when I argued that both (88a) and (88b) are downward entailing with respect to  $x$ .

- (88) a.  $\forall a \in \mathcal{A} \text{It}(y) [\exists x \in D \text{like}(a,x) \rightarrow (\exists x \in D \text{like}(y,x) \subseteq \exists x \in D \text{like}(a,x))]$   
 b.  $\forall a \in \mathcal{A} \text{It}(y) [\exists x \in D \text{like}(x,a) \rightarrow (\exists x \in D \text{like}(x,y) \subseteq \exists x \in D \text{like}(x,a))]$

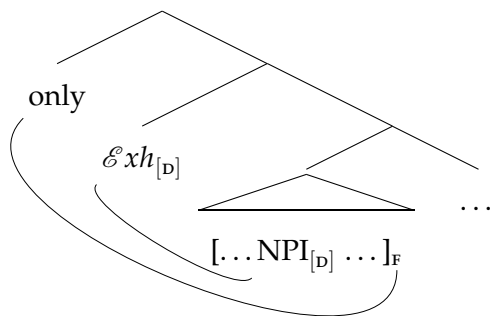
The idea pursued in this chapter, which I claim here can be extended outside the domain of questions, is that while semantically *only* is a propositional operator, syntactically it enters into an agreement relation with a constituent of its argument. The idea is that we can have long-distance agreement between *only* and its focus associate, as in (89).



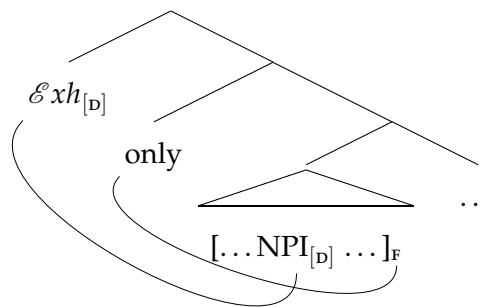
As soon as an NPI comes into the picture, a second agree relation needs to be established between it and an exhaustifier. Whenever there are multiple agreement relations, constraints on path containment need to be respected.<sup>21</sup> As I show in the examples below, the only configuration involving an NPI in the scope of *only* which is both syntactically and semantically coherent is one where the NPI is distinct from the focus associate of *only* and furthermore c-commanded by it, as in (91).

(90) NPI is embedded in the focus associate of *only*

a. ✓syntax, ✗semantics

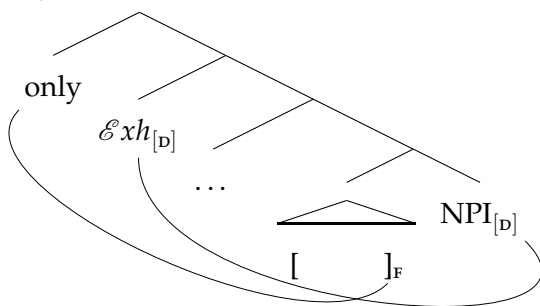


b. ✗syntax, ✓semantics

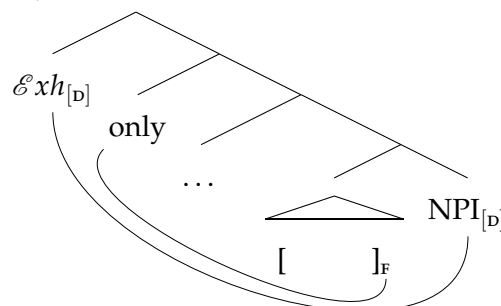


(91) NPI is distinct from and follows the focus associate

a. ✗syntax, ✗semantics



b. ✓syntax, ✓semantics



<sup>21</sup>I use path containment to refer to the constraint against crossing dependencies.

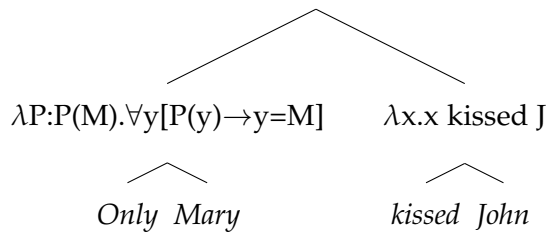
Summing up, the prediction made by this take on questions is that given an unacceptable question containing an NPI, we expect the corresponding assertive sentences involving overt association of a focused element with *only* to also be ruled out, as shown below. The generalization that comes out from this is that the focus associate of *only* needs to c-command the NPI in order for it to be licensed.

- (92) a. (i) \*What did anyone eat?  
 (ii) \*I only said that anyone ate cake<sub>F</sub>.  
 b. (i) Who ate anything?  
 (ii) I only said that John<sub>F</sub> ate anything.

### 3.4 Appendix: Adnominal *only*

Another possible way to implement the idea that questions can be interpreted exhaustively is by taking *wh*-phrases to be base generated as sisters to an adnominal *only*, whose denotation is provided in (93).

- (93) a.  $\llbracket \text{only} \rrbracket = \lambda x. \lambda P: P(x). \forall y [P(y) \rightarrow y=x]$   $\langle e, \langle et, t \rangle \rangle$   
 b.  $\lambda w: \text{Mary kissed John}. \forall y [y \text{ kissed John} \rightarrow y=\text{Mary}]$

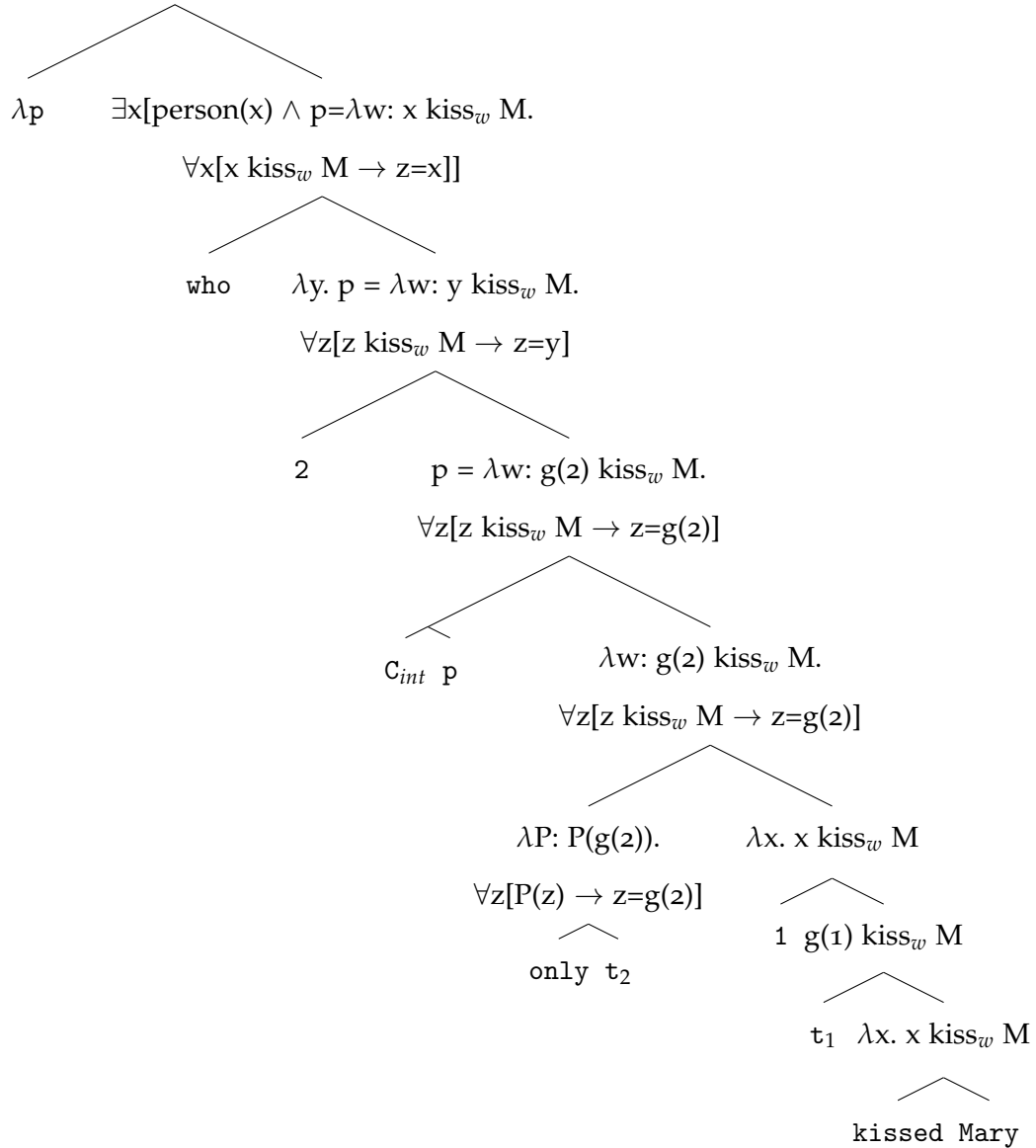


So a question nucleus, before the C head applies to form a question, would look either as in (94a), for SE readings, or as in (94b) for WE readings.

- (94) a. *Who kissed Mary?*  
 only who kiss Mary
- b. *Who did Mary kiss?*  
 Mary kissed only who

Below I provide the full derivation of the SE reading for *Who kissed Mary?*:

(95)  $\lambda p. \exists x [\text{person}(x) \wedge p = \lambda w: x \text{ kiss }_w \text{ M. } \forall z (z \text{ kiss}_w \text{ M} \rightarrow z=x)]$



Let's consider now what happens when we replace *Mary* with a quantifier like *everybody*. One possible reading for these questions, the one we will focus on in this section, is the single pair reading, which is taken to come about as a result of QR'ing the quantifier right under the question operator; in other words, leaving it within the question nucleus. Since we're assuming that the *wh*-term is base-generated as a sister of adnominal *only*, i.e. that it starts embedded in a quantifier phrase, it itself needs to undergo QR. So under this new approach, questions with quantifiers actually involve **two** quantificational elements: the *only*-phrase and the other QP. Given that we have two QPs, an issue that is going to arise



is that of the relative scope of QR: either the *only*-phrase QRs above *everybody*, or *everybody* QRs above *only*. Let's consider each options in turn. For transparency, I will henceforth abbreviate the complex head  $C p$  as  $Q$ .

(96) Who kissed everybody?

a. *only* > *every*

$\lambda p$  [who [3 [Q [ [only  $t_3$  ] [1 [everybody [2 [t<sub>1</sub> [kissed  $t_2$  ]]]]]]]]]]

b. *every* > *only*

$\lambda p$  [who [3 [Q [everybody [2 [ [only  $t_3$  ] [1 [t<sub>1</sub> [kissed  $t_2$  ]]]]]]]]]]

These two LFs turn out to have different truth conditions. An easy way to compute these differences is by looking at the simpler case in (97) and its two possible LFs:

(97) Only John kissed every girl.

a. [only John] [1 [every girl [2 [t<sub>1</sub> kissed t<sub>2</sub>]]]]

b. every girl [2 [[only John] [1 [t<sub>1</sub> kissed t<sub>2</sub>]]]]

The LFs in (97) correspond to the truth conditions provided in (98):

(98) a. *only* > *every*

$\forall y$  [ $\forall x$ [girl(x)  $\rightarrow$  y kissed x]  $\rightarrow$  y=John]

b. *every* > *only*

$\forall x$ [girl(x)  $\rightarrow$   $\forall y$ [y kissed x  $\rightarrow$  y=John]]

(98a) describes a situation that is true in those worlds where John is the only person who kissed every girl, thus allowing for other kissing pairs so long as nobody else kisses every single girl. (98b), on the other hand, furthermore imposes the restriction that John should also be the only kisser; that is, every girl needs to be kissed only by John. Note that this inverse scope reading entails the surface scope reading since there cannot be a situation for which (98b) is true without (98a) also being true. Notice, however, that (98b), the inverse scope reading, is not actually a salient reading of (97). We see a similar contrast in the case in (99), which also disallows the inverse scope reading in (99b).

- (99) John didn't meet every student of mine.
- a. *not* > *every*
  - b. \**every* > *not*

One proposal for why these readings are systematically ruled out (or strongly dispreferred) comes from Mayr and Spector (2011), who advocate for a generalized scope economy condition wherein a covert scope shifting operation (QR in this case) cannot apply if the meaning of the resulting scope is equivalent to or stronger than (i.e. entails) the meaning of the surface scope.

Returning now to questions, it appears to be the case that this principle carries over to the domain of questions as well. Namely, if the LF where *every* has scope over *only* were a possible configuration, then we would predict that a question such as *Who kissed every girl?* could be answered negatively even if there is someone who kissed every single girl. For example, consider a situation where every girl was kissed by John and furthermore some, but not all, girls were also kissed by Bill. As we already mentioned, this situation is false under the truth conditions of the inverse scope LF. Given that in this situation *nobody* is not an appropriate answer, a misleading answer at best, we can conclude that the inverse scope LF is disallowed.

Let's turn now to questions where the *wh*-word is c-commanded by the quantifier.

- (100) Who did every boy kiss?
- a.  $\lambda p$  [who [3 [Q [ [every boy] [1 [ [only t<sub>3</sub>] [2 [t<sub>1</sub> [kiss t<sub>2</sub> ]]]]]]]]]]
  - b.  $\lambda p$  [who [3 [Q [ [only t<sub>3</sub>] [2 [ [every boy] [1 [t<sub>1</sub> [kiss t<sub>2</sub> ]]]]]]]]]]

In order to evaluate which LF corresponds to the possible interpretation, let's consider the corresponding declarative and evaluate it in the scenario provided next to it.

(101) Every boy kissed only Mary.

a. [every boy] [1 [[only Mary] [2 [t<sub>1</sub> kissed t<sub>2</sub> ]]]]

$\forall x[\text{boy}(x) \rightarrow \forall y(x \text{ kissed } y \rightarrow y = \text{Mary})]$

b. [only Mary] [2 [[every boy] [1 [t<sub>1</sub> kissed t<sub>2</sub> ]]]]

$\forall y[\forall x(\text{boy}(x) \rightarrow x \text{ kissed } y) \rightarrow y = \text{Mary}]$

Scenario:

b<sub>1</sub> → Mary

b<sub>2</sub> → Mary

b<sub>3</sub> → Mary, Sue

The LF in (101a) corresponds to a situation where the only person that was kissed was Mary and furthermore, she was kissed by every single boy, rendering it false in the scenario above. The LF in (101b) corresponds to a situation where the only person that was kissed by everyone is Mary; this allows for cases where other people were kissed by some boys, so long as nobody other than Mary was kissed by everyone, consistent with the scenario. We see then that here the opposite occurs; namely, the surface scope reading entails the inverse scope reading, since (101b) true in more situations than (101a). Interestingly, it once again appears to be the case that only the surface scope reading is a possible interpretation for this sentence; namely (101) is judged to be false in this scenario, i.e. on its weaker inverse scope reading.

Let's return to the question *Who did every boy kiss?*. This question seems to be after the set of people who were kissed by every boy, and nothing else; in other words, the inverse scope LF looks like a better characterization of the truth conditions of the question, contrary to what we saw in the previous case. So while the declarative receives the strong reading associated with the SS LF in (101a), the interrogative has the weaker reading associated with the IS LF in (101b), which is a problem! The lack of parallelism between the declarative and interrogative in terms of where quantifiers are interpreted suggests that there's a problem with adnominal *only*.

## Chapter 4

### Alternate questions

In this chapter we turn our attention to non *wh*-questions and focus specifically on what are generally referred to as alternate, or disjunctive, questions, as in (1).

(1) Did you order cake<sub>F</sub> or flan<sub>F</sub> for dessert?

I ordered cake.

Alternate questions are characterized by the presence of a disjunctive phrase whose individual disjuncts bear focus. Notice that when the disjuncts are not focused, as in (2), the only possible answers are yes or not, meaning that the question takes on a polar meaning.

(2) Did she order cake or flan for dessert?

Yes, she ordered one of those desserts. / No, she ordered the soufflé.

While they differ from regular *wh*-questions in their lack of a morphologically-marked *wh*-phrase, they resemble *wh*-questions in the types of answers they receive. I will capitalize on this parallel and offer an analysis that accounts for both the similarities and differences between *wh*-questions and alternate questions. As before, I will use NPI behavior to inform our understanding of the semantics of these questions.

Given the lack of a *wh*-marked phrase, as well as the fact that when embedded they resemble polar questions, most analyses of alternate questions take them to be a variant of polar questions.

## 4.1 Background

We begin this chapter with a brief overview of some of the current proposals for alternate questions.<sup>1</sup> The starting point when dealing with these questions is a comparison with their minimally different counterparts, polar questions. The form of a question such as (3) corresponds to two possible questions: an alternate question (3a) or a polar question, (3b).

- (3) Did your order cake or flan?
  - a. Which of cake or flan did you order?
  - b. Did you order cake or flan, or not?

Crucially, these two interpretations correspond to different answers, a constituent answer for the alternate reading and a yes/no answer for the polar reading. This parallel carries over even in embedded positions where they both end up being embedded with *whether*:

- (4) Mary knows whether your ordered cake or flan.
  - a. Mary knows which of the two you ordered.
  - b. Mary knows if you ordered cake or flan, or not.

These parallels have been taken as support for a uniform analysis of the alternate and polar reading of a question containing a disjunctive phrase. One possible account, due to Karttunen (1977), is to analyze these questions as polar questions across the board. Assuming that the polar reading of a question denotes the set containing it and its negation, Karttunen takes alternate questions like (5) to denote the disjunction of two polar readings, like in (5a). Given that polar questions denote a set of two propositions, the disjunction of two polar questions would denote a set of four propositions, as in (5b).

- (5) Did your order cake or flan?
  - a. Did you order cake, or did you order flan?
  - b. {I ordered cake, I didn't order cake, I ordered flan, I didn't order flan}

---

<sup>1</sup>This is in fact a very crude, yet hopefully representative, overview of the proposals that are out there in the literature. I refer the interested reading to Han and Romero (2004a), Pruitt and Roelofsen (2011), Groenendijk and Roelofsen (2009), Biezma and Rawlins (2013), among many others.

The issue with such an account is that it predicts that any one of the propositions in the set above should count as an appropriate answer, contrary to fact. The only possible answers to alternate questions are the affirmative propositions corresponding to the disjuncts, and crucially, not their negations.

Such an analysis also runs into problems once we turn to the behavior of NPIs in these questions. As is well known, NPIs are acceptable in polar questions across the board:

- (6) a. Did anyone eat soup?
- b. Did John eat anything?

If alternate questions were in fact analyzed as polar questions, then we would expect NPIs to behave similarly to how they do in regular polar questions. This, however, turns out not to be the case, as shown below in (7), which only allows for a yes/no answer, that is, it can only be interpreted as a polar question.

- (7) Did anyone eat soup or salad?
- a. Y/N: Is it the case that anyone ate soup or salad? Yes.
- b. \*ALT: Which of soup or salad did anyone eat? *unavailable*

The issue is that if (7) were analyzed as a family of polar questions under its alternate reading, as in (8), then we would expect the NPI to be acceptable under this alternate reading, given its acceptability in the two respective polar questions:

- (8) Did anyone eat soup? or Did anyone eat salad?

Yet a more recent approach, which I will also adopt in my analysis in section 2, is to take alternate questions like (9a) to denote the set of propositions in (9b).

- (9) a. Did she order cake or flan?
- b. {she ordered cake, she ordered flan}

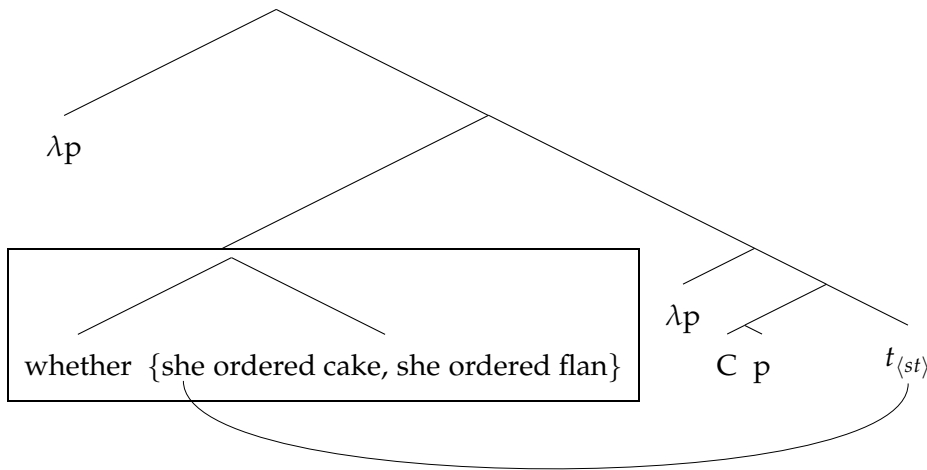
The debate within this camp concerns the compositional mechanisms that derive these answers. In the remainder of this section I discuss one such account, due to Han and Romero (2004b). Their account crucially relies on the assumption that both movement and ellipsis

are involved. The claim is that all alternate questions involve *whether*, either covertly (root questions) or overtly (embedded questions), and that this element is a *wh*-phrase that moves to the specifier of CP, similarly to any other *wh*-phrase. Following Larson (1985), they take *whether* to be the *wh* variant of *either* and assume that it is base-generated adjacent to the disjunctive phrase. Lastly, following Schwarz (1999), they take the underlying representation to contain a form of ellipsis, namely gapping as in (10a). In this account, the fact that the individual disjuncts bear focus is due to the nature of ellipsis and the requirement that the contrast between the remnant and its correlate be made overtly, i.e. via focus on the relevant constituents.

- (10) Did she order cake or flan?  
 a.  $\text{whether}_i \text{ did } t_i \text{ [she order cake or } \cancel{\text{she order}} \text{ flan]}$   
 b.  $\{\text{she ordered cake, she ordered flan}\}$

In so far as I understand their account, if we were to adopt Han and Romero’s proposed representation to fit within the general framework of questions I am adopting in this thesis, we would predict that whether the question involves a disjunction over the object, verb or subject should have no effect on the compositional mechanisms that yield the set of propositions in (10b) given that such questions are uniformly taken to be disjunctions over propositions. The LF of a question such as (10) would thus be as in (11), where the *either p or q* proposition undergoes *wh*-movement to the specifier of C.

- (11)  $\lambda p. \exists q \in \{\lambda w. \text{she ordered}_w \text{ cake}, \lambda w. \text{she ordered}_w \text{ flan}\} \wedge p = q$



In the following section I propose a different account of alternate questions that ultimately delivers the same denotation as Han and Romero’s but arrives at this denotation via a different mechanism. I will crucially build on an observation by Krifka (2011) that alternate questions should be analyzed on par with constituent questions and show how we can derive these similarities compositionally.<sup>2</sup> I will argue in section 3 that adopting such an analysis allows us to account for the distribution of NPIs as well as explain a contrast that has not been noted before in the literature.

## 4.2 A new take on alternate questions

The stance I take in this thesis is that alternate readings are, underlyingly, constituent questions with the domain of the *wh*-phrase restricted to the atomic members of the disjunction. In other words, the alternate reading of a non *wh*-question with a disjunctive phrase comes about by interpreting the disjunctive constituent as a *wh*-phrase. To adduce support to this claim, observe that the questions in (12) will always receive the same answer in a context that involves only two girls.

- (12) a. Did John kiss Mary<sub>[F]</sub> or Suzy<sub>[F]</sub>?  
 b. Which girl did John kiss?  
 c. John kissed Mary.  
 d. #John kissed Mary and Suzy.  
 e. #John didn’t kiss either girl.

The fact that neither (12a) nor (12b) allows for an answer that names two girls, as in (12d), nor a negative answer as in (12e), constitutes further evidence that these questions denote the same sets of answers, which I provide in (13). For the time being, I am ignoring the issue of exhaustivity, to which I return in a later section.

- (13) a. {John kissed Mary, John kissed Suzy}  
 b.  $\lambda p. \exists x \in \{\text{Mary, Suzy}\} \wedge p = \lambda w. \text{John kissed}_w x$

---

<sup>2</sup>As Krifka (2011, p. 16) pointedly notes: “As there is no overt movement of a question constituent, they appear syntactically as a subtype of polarity questions, yet semantically they are similar to constituent questions.”



I claim that this parallel is not just coincidence, but rather that both questions in (12a) and (12b) have the same underlying representation. That is, the answer set in (13) is achieved via the same compositional mechanism for both questions.

#### 4.2.1 Alternate questions as *wh*-questions

Notice that the equivalence between (12a) and (12b) parallels a similar phenomenon we observe in declarative sentences. That is, both (14a) and (14b) denote the same proposition, namely (14c), when the context specifies two girls.

- (14) a. John likes Mary or Suzy.  
b. John likes a/some girl.  
c.  $\exists x \in \{\text{Mary, Suzy}\} \wedge \lambda w. \text{John kissed}_{w,x}$

Understanding why this is so for declaratives will get us a step closer to a compositional account of alternate questions. Specifically, in order to derive the parallel between alternate and constituent questions compositionally, we essentially need to explain how and why the disjunction takes on the flavor of a *wh*-word. Breaking it down even further, that amounts to understanding why the following hold true:

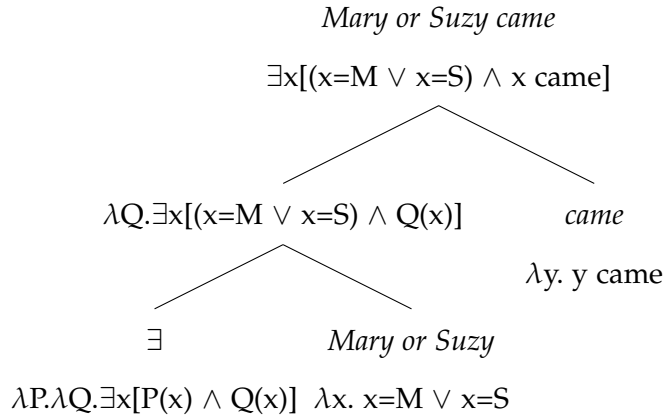
- ★ semantically, the disjunction is interpreted as a *wh*-term
- ★ syntactically, the disjunction undergoes the same movement as a *wh*-term

I have already hinted at an answer for the semantic component, namely the parallel we see in declaratives between disjunctive phrases and existential quantifiers in (14). In order to show that the disjunctive phrase is interpreted as a *wh*-phrase, it will be enough to argue that the disjunctive phrase has the same semantics as an existential quantifier given that we are already taking for granted the fact that *wh*-phrases are existential quantifiers at their core. I follow Ivlieva (2012) and claim that disjunction is a generalized quantifier consisting of a covert existential quantifier and a predicate, as in (15a).<sup>3</sup>

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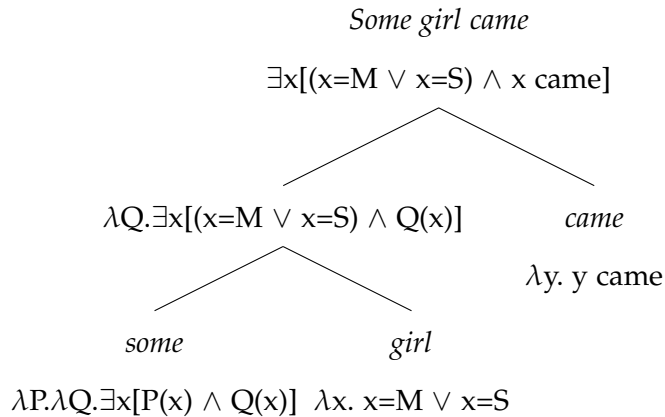
<sup>3</sup>We could in fact assume that the covert existential can optionally be realized as *either*, which might turn out to be an even more faithful representation of the parallel between disjunctive phrases like (*either*) *Mary or Sue* and quantificational phrases like *some girl*.

(15)



Note that a sentence with an existential quantifier denotes the same proposition in a context containing only two girls, Mary and Suzy.

(16)

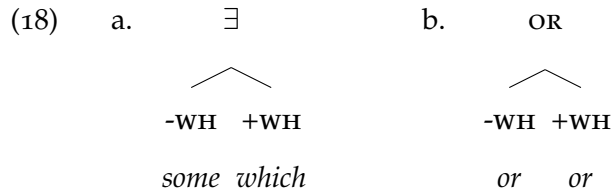


Given that a *wh*-phrase like *which girl* has the same semantics as *some girl*, we have shown how disjunctive phrases turn out to have the same denotation as singular *which* phrases:

- (17) a.  $\llbracket \text{Mary or Suzy} \rrbracket = \lambda Q. \exists x [x \in \{\text{Mary, Suzy}\} \wedge Q(x)]$   
 b.  $\llbracket \text{some girl} \rrbracket = \lambda Q. \exists x [x \in \{\text{Mary, Suzy}\} \wedge Q(x)]$   
 c.  $\llbracket \text{which girl} \rrbracket = \lambda Q. \exists x [x \in \{\text{Mary, Suzy}\} \wedge Q(x)]$

The next hurdle in understanding why disjunctions can take on the behavior of *which*-phrases is figuring out the syntactic part. Recall the claim I made at the beginning of the section, namely that disjunctive questions are compositionally identical to constituent questions. Basically, all we have left to show is why the disjunctive constituent undergoes *wh*-movement like a *wh*-phrase. The proposal for why disjunctions can function both as regular existentials and as interrogative existentials is that they can optionally bear a WH

feature. Just like existential quantifiers have a +WH and -WH incarnation, (18a), so do disjunctive phrases, (18b). The only difference is that  $or_{+WH}$  undergoes covert *wh*-movement (only at LF) while regular *wh*-words move overtly.

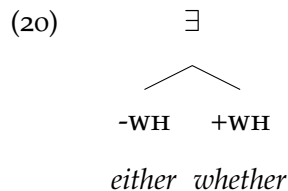


Putting all the pieces together, we end up with the following derivation for the ALT reading of *Did John kiss Mary or Suzy?*.

- (19) Did John kiss Mary or Suzy?
- a.  $\text{ID} [\lambda p [[\exists \text{ Mary or Suzy}] [\lambda_1 [[C p] [\lambda w [\text{John kissed } g(1)]]]]]]$
  - b.  $\text{ID}(\lambda p. \exists x \in \{\text{Mary, Suzy}\} \wedge p = \lambda w. \text{John kissed}_w x)$
  - c.  $\{\text{John kissed Mary, John kissed Suzy}\}$

The fact that neither a negative answer nor an answer that names both girls counts as appropriate falls out immediately given that the set of propositions is determined by the quantificational domain of the disjunction, which includes only the individual disjuncts.

Yet another option that begs exploring is assuming, like most other work on this topic, that *whether* is the *wh*-counterpart of *either*, as in (20).

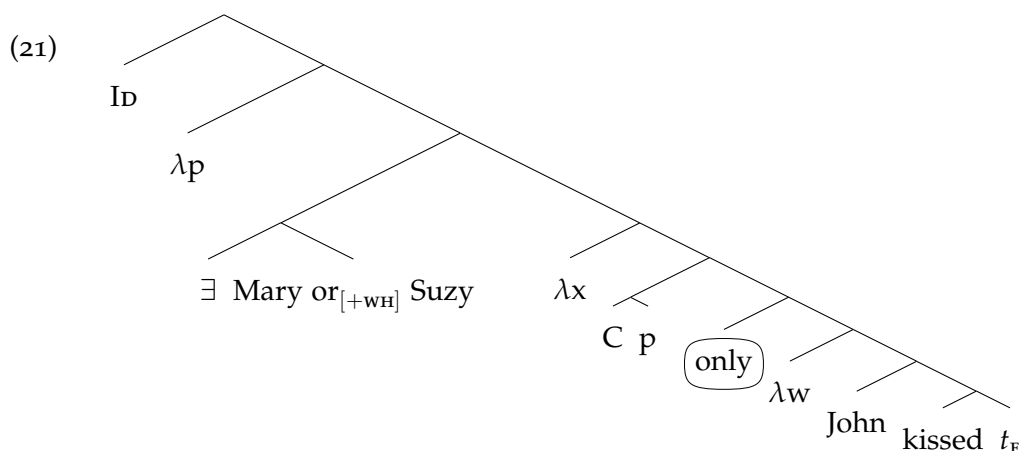


As it stands, my account makes no reference to *whether*, a discussion I postpone for when we discuss embedding. In an account as the one above, disjunctive phrases would be base-generated in the complement of a phrase headed by *either*, which I take to be a determiner similarly to *some/which*. A number of issues would arise in regards to this proposal: why does *whether* never surface in direct questions, and when it does, in embedded questions, how is it possible that the head of the phrase, *whether*, ends up spelled out in the specifier

of CP while its complement, the disjunction *Mary or Suzy*, ends up spelled out in its base position? As it stands, I see no good answer to either of these questions, so I will continue assuming that what we're dealing with is a disjunctive phrase headed by a covert existential operator endowed with a +WH feature. The viability of this account over the one in (20) is reliant on how plausible my analysis for the obligatory presence of *whether* in embedded clauses is, which will be presented in section 4.

#### 4.2.2 Focused disjuncts

Like in constituent questions, we have the option of adjoining *only* at the level of the question nucleus, as in (21), and having it associate with the trace of *wh*-phrase, which in the case of (21) would be *Mary or Suzy*.<sup>4</sup>



Having *only* associate with the *wh*-trace gives us the set of propositions in (22) as the denotation of the question, which is in line with the intuition in Dayal (in progress, ch 4, p. 14) that an alternate question is only asked in situations where it is presupposed that exactly one of the alternatives will be answered.

- (22) {John kissed Mary and not Suzy, John kissed Suzy and not Mary}

Recall that in order for a question with a disjunctive phrase to receive an alternate reading, the disjuncts need to be prosodically marked with focus. It seems fair to conclude

<sup>4</sup>As before, this would be accompanied by local accommodation in order to avoid problems caused by presupposition projection. Unless otherwise relevant, I will henceforth ignore this node.

that the reason why these readings always involve focus on the disjuncts is due to the fact that the disjunction ends up being analyzed as the focus associate of *only*.<sup>5</sup> Notice that in the corresponding declarative, overt *only* has the same prosodic effect:

(23) John kissed only Mary<sub>[F]</sub> or Suzy<sub>[F]</sub>.

The next issue we need to address is whether the presence of *only* is optional (in embedded contexts), as we took it to be in the case of regular *wh*-questions. In the next section I will adduce evidence to indicate that one place where alternate questions differ from *wh*-questions is in the optionality of *only* in embedded contexts. Specifically, I will claim that (22) is the only available underlying representation for these types of questions.

#### 4.2.3 Alternate questions are obligatorily strongly exhaustive

That alternate readings pattern with the *SE* readings of *wh*-questions in terms of the obligatory presence of *only* is based on the fact that when embedded, *ALT* readings surface only under predicates that embed *SE* readings, like *know* in (24a), and never under a predicate like *surprise*, as in (24b), which was argued in a previous chapter to disallow *SE* readings of *wh*-questions.

- (24) a. Bill knows whether John kissed Mary<sub>[F]</sub> or Suzy<sub>[F]</sub>.  
b. \*It surprised Bill whether John kissed Mary<sub>[F]</sub> or Suzy<sub>[F]</sub>.

One can see that in the absence of *only*, my analysis predicts that the question in (25a) would denote the same set of propositions as the *WE* reading of (25b), namely (25c).

- (25) a. Did John kiss Mary or Suzy?  
b. Which of Mary and Suzy did John kiss?  
c. {John kissed Mary, John kissed Suzy}

That is, the absence *only* would translate into lack of focus on the disjuncts and in turn no strong exhaustivity. If that were possible, we would expect (26a) to be possible, similar to

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<sup>5</sup>Crucially, this is different from regular *wh*-questions because the focus associate of *only*, the disjunctive phrase, ends up being spelled out in-situ, rather than in its higher copy. This, I claim, is the driving force behind why focus is prosodically realized in alternate questions but not in regular *wh*-questions.

how (26b) is for the minimally different *wh*-question. But this is clearly not an available reading of the embedded question in (26a), since the only possible reading in the absence of focus is a YES/NO reading, which too is ruled out from occurring in the scope of *surprise*.

- (26) a. \*It surprised Bill whether John kissed Mary or Suzy.  
b. It surprised Bill which girl John kissed.

Why are these questions always interpreted strongly exhaustive? As it stands, I do not have a good answer to this question. One possible way to think about it would be as follows. I have basically claimed that disjunctive phrases are equivalent to *which<sub>sg</sub>* phrases, both in their semantics and their syntax. Language usually avoids appealing to different constructions in order to convey the same meaning, suggesting that at some level, there must be a difference between the two.<sup>6</sup> One such difference could be their ability to associate with *only*: while *wh*-phrases can optionally associate with *only*, it is conceivable to imagine a requirement that takes disjunctive phrases to do so obligatorily, possibly by virtue of them being overtly scalar.<sup>7</sup> What that would mean for the general architecture is that the alternate reading, by being unambiguously SE, is more restricted in its use, and can thus be used whenever one wants to disambiguate between the weakly and strongly exhaustive reading of the corresponding *wh*-question, a situation that can only arise when embedding under predicates like *know* which allow for both WE and SE.

Regardless of how we choose to couch this distinction, the bottom-line is that alternate readings are syntactically and semantically no different than their *wh*-counterparts. In the following section I outline a number of predictions made by this analysis and use them to argue that this analysis is superior to other analyses of alternate questions.

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<sup>6</sup>One could say that the covert versus overt movement is already a difference, but since this has no effect on the overall meaning, I take it to be irrelevant.

<sup>7</sup>If we adopt an analysis that takes these phrases to be headed by *either*, we could relate this observation to a principle that requires the complement of *either* always to be interpreted exhaustively. For example, in (i), the only reading we can get is one where Mary likes only one of the boys.

(i) Mary likes either John or Bill.

See for example the suggestion in Spector (2012) that French *soit ... soit*, 'either', is obligatorily exhaustive.

### 4.3 NPIs in alternate questions

Turning now to the distribution of NPIs in these questions, it's been observed that a question such as (27), where the NPI functions as the subject, can only receive a polar-question reading (cf. Higginbotham 1993 and Guerzoni 2011); in other words, focusing the disjuncts is not possible.

(27) Did anyone eat soup or salad?

- a.  $\gamma/N$ : Is it the case that anyone ate soup or salad? Yes.
- b. \* $ALT$ : Which of soup or salad did anyone eat? *unavailable*

Contrast this with the minimally different (28) which allows for both readings.

(28) Did John eat soup or salad?

- a.  $\gamma/N$ : Is it the case that John ate soup or salad? Yes.
- b.  $ALT$ : Which of soup or salad did John eat? Soup.

As it stands, the behavior of NPIs in alternate questions is not well understood and in fact, for theories which take alternate questions to denote a family of polar questions, such as Karttunen, their unacceptability is especially problematic. The main issue with such an account is the fact that the acceptability of NPIs would remain a mystery since, unlike in alternate questions, see (27), NPIs are always acceptable in polar questions, regardless of whether they function as the subject or object of the verb:

- (29) a. Did you talk to anyone at the party?  
b. Did anybody come to the party?

If it were in fact the case that alternate questions denote the disjunction of two polar questions, given that NPIs are acceptable in polar questions across the board, we would have to blame their unacceptability in alternate questions on something else. As it stands, I know of no comprehensive account that can deal with the distribution of NPIs in a uniform man-

ner.<sup>8</sup> Another mention of NPI-licensing in these questions is made in Han and Romero (2004b, fn. 13) where the authors point out explicitly that their account makes no predictions with respect to NPI licensing. In fact, as they mention themselves, given the acceptability of NPIs in polar questions and the fact that they assume similar underlying structures for both polar and alternate questions, their account would predict NPIs to behave similarly in alternate and polar questions, contrary to fact.

Under the present account, on the other hand, taking alternate questions to have the same underlying representation as strongly exhaustive *wh*-question, we expect the peculiar distribution of NPIs to have the same source in both questions. Specifically, I claim that the availability of an alternate reading for a question with an NPI is governed by whether or not the corresponding *wh*-question is acceptable. Recall that in *wh*-questions, NPIs are acceptable only when they are c-commanded by the *wh*-phrase in their base positions, as repeated in (30).

- (30) a. Who talked to anyone? *wh*>NPI  
 b. \*What did anyone bring? \*NPI>*wh*

As argued for in Chapter 3, this asymmetry can be attributed to where the NPI is interpreted with respect to the covert *only* that associates with the *wh*-phrase. If the NPI is c-commanded by the trace of the *wh*-phrase, and the *wh*-question is interpreted as strongly exhaustive, i.e. there is a covert *only* underlyingly, the NPI will be interpreted in the scope of *only*, and hence in a DE environment. On the other hand, if the NPI c-commands the *wh*-trace, no syntactically acceptable configuration would allow for the NPI to be interpreted in the scope of *only*, resulting in a crash. I repeat the relevant facts in (31).

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<sup>8</sup>In so far as I understand her proposal, Guerzoni 2011 tries to provide an account for why ALT readings with NPIs are ruled out under the assumption that underlyingly, these questions involve the disjunction of two propositions (similarly to how polar questions would involve the disjunction of an affirmative and negative proposition). Her account crucially rests on the assumption that NPIs in polar questions are “licensed” by the covert negation present in the **or not** disjunct, which, however, is not present for ALT questions since the two disjuncts are the propositions *anyone ate soup* and *anyone ate salad*, rather than *anyone ate soup or salad* and *not [anyone ate soup or salad]*. As far as I can tell, her account would be unable to account for acceptability of (i) since she takes these structures to involve disjunctions over entire propositions rather than just over constituents.

(i) Did Mary<sub>[F]</sub> or John<sub>[F]</sub> win anything?



- (31) a. Who ate anything?  
 i.  $\text{only}_{[F]} [\mathcal{E}xh_{[D]} [t_{[F]} \text{ ate anything}_{[D]}]]$   
 ii.  $\mathcal{E}xh_{[D]} [\text{only}_{[F]} [t_{[F]} \text{ ate anything}_{[D]}]]$   
 b. What did anyone eat?  
 i.  $\text{only}_{[F]} [\mathcal{E}xh_{[D]} [\text{anyone}_{[D]} \text{ ate } t_{[F]}]]$   
 ii.  $\mathcal{E}xh_{[D]} [\text{only}_{[F]} [\text{anyone}_{[D]} \text{ ate } t_{[F]}]]$

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

Taking alternate readings to have the same underlying representation as SE *wh*-questions predicts that NPIs should behave similarly across the two constructions. Specifically, we expect that a non-*wh*-question containing a disjunctive phrase will disallow an alternate interpretation whenever the NPI is base-generated above the disjunctive phrase. This is borne out given that (32) can only receive a polar reading, while (32b), its *wh*-variant, is simply ruled out (on the non-emphatic reading).

- (32) Did anyone eat soup or salad?  
 a. Y/N: Did anyone eat something?  
 b. \*<sub>ALT</sub>: Which of soup or salad did anyone eat?

I claim that whatever account we use to rule out an NPI from constituent questions when it's not c-commanded by the *wh*-word can be used in this case as well. To illustrate what happens in a case such as (32), consider the two possible LFs that come about as a result of adjoining  $\mathcal{E}xh_{[D]}$  either below or above  $\text{only}_{[F]}$ ; recall that we are assuming NPIs need to enter into an agree relation with a silent exhaustifier  $\mathcal{E}xh_{[D]}$ .

- (33) Did anyone see Mary<sub>[F]</sub> or Sue<sub>[F]</sub>?  
 a.  $\mathcal{E}xh_{[D]} [\text{only}_{[F]} [\text{anyone}_{[D]} \text{ see } [M \text{ or } S]_{[F]}]]$  crossing dependencies  
 b.  $\text{only}_{[F]} [\mathcal{E}xh_{[D]} [\text{anyone}_{[D]} \text{ see } [M \text{ or } S]_{[F]}]]$  nesting dependencies  
 (i)  $\mathcal{E}xh_{[D]} [\text{anyone}_{[D]} \text{ saw } g(1)_{[F]}]$   
 $= \exists x \in D(x \text{ saw } g(1)) \wedge \forall D' \subseteq D \neg \exists x \in D'(x \text{ saw } g(1)) = \perp$   
 (ii)  $\text{only}_{[F]} [\mathcal{E}xh_{[D]} [\text{anyone}_{[D]} \text{ saw } g(1)_{[F]}]] = \perp$

Ignoring the case involving crossing dependencies, this leaves us with (33b), which, while syntactically plausible, gives rise to a contradiction by virtue of having to exhaustify the NPI before *only* has had the chance to create a downward entailing environment. In other words, this is exactly the same case as (31b-i).

This is not to say that NPIs are always ruled out from alternate questions. A prediction made by this account is that NPIs should exhibit the same subject/object asymmetry in these questions as they do in *wh*-questions. Specifically, we predict that a question with a disjunctive term in subject position and an NPI in object position should be able to receive an alternate interpretation, which is corroborated by the acceptability of (34):<sup>9</sup>

- (34) Did Mary or John win anything in the raffle?
- a.  $\gamma/\mathbf{N}$ : Did they win anything? Yes, they did.
  - b. ALT: Which of Mary and John won anything in the raffle? Mary did.

Such cases allow for an alternate reading because, unlike before, the NPI is exhaustified in the scope of *only* and doesn't give rise to a syntactic violation, as illustrated below in (35b).

- (35) Did Mary<sub>[F]</sub> or John<sub>[F]</sub> win anything in the raffle?
- a.  $\text{only}_{[F]} [\mathcal{E}xh_{[D]} [[M \text{ or } J]_{[F]} \text{ win anything}_{[D]}]]$  crossing dependencies
  - b.  $\mathcal{E}xh_{[D]} [\text{only}_{[F]} [[M \text{ or } J]_{[F]} \text{ win anything}_{[D]}]]$  nesting dependencies
    - (i)  $\text{only}_{[F]} [g(1)_{[F]} \text{ win anything}_{[D]}]$   
 $= \forall a \in \mathcal{A}lt(g(1)) [\exists x \in D(a \text{ ate } x) \rightarrow \exists x \in D(g(1) \text{ win } x) \subseteq \exists x \in D(a \text{ win } x)]$
    - (ii)  $\mathcal{E}xh_{[D]} [\text{only } [g(1) \text{ win anything}_{[D]}]]$   
 $= \forall a \in \mathcal{A}lt(g(1)) [\exists x \in D(a \text{ win } x) \rightarrow \exists x \in D(g(1) \text{ win } x) \subseteq \exists x \in D(a \text{ win } x)]$

Finally, another interesting parallel with constituent questions is exhibited by the availability of alternate readings when the NPI occurs within the individual disjuncts. Guerzoni (2011) points out that the following question is ruled out when the disjuncts bear focus.

- (36) \*Did John open with any Russian openings<sub>[F]</sub> or end with any Sicilian endgames<sub>[F]</sub>?

---

<sup>9</sup>To my knowledge, this empirical fact is not discussed anywhere else in the literature.

The unacceptability of such questions falls out straightforwardly in the present account once we observe that questions such as (36) and (37a) are fully parallel to the ungrammatical (37c).

- (37) a. \*Did the student with any linguistics<sub>[F]</sub> background or with any philosophy<sub>[F]</sub> background pass?  
 b. Did the student with math<sub>[F]</sub> or logic<sub>[F]</sub> background pass?  
 c. \*Which student with any linguistics or philosophy background pass?

The idea is that when the NPI occurs within the focused disjunct, the only way to exhaustify the NPI without giving rise to a syntactic violation is below *only*, that is, in an upward entailing context. I illustrate the relevant configurations in (38).

- (38) \*Did the student with any linguistics<sub>[F]</sub> background or with any philosophy<sub>[F]</sub> background pass?

- a.  $\mathcal{E}xh_{[D]}$  [only<sub>[F]</sub> [[the student with [any g(1)]<sub>[D]</sub>]<sub>[F]</sub> pass]]  
 b. only<sub>[F]</sub> [ $\mathcal{E}xh_{[D]}$  [[the student with [any g(1)]<sub>[D]</sub>]<sub>[F]</sub> pass]]

SYN	SEM	ALL
✗	✓	✗
✓	✗	✗

What we've seen in this section is that as far as NPI behavior is concerned, alternate questions behave as one might expect given an account that takes them to be completely parallel to *wh*-questions underlyingly.

#### 4.4 Embedding alternate questions

Note that when embedding non-*wh* questions, *whether* is always present.

- (39) John was wondering whether Mary had soup or salad for lunch.  
 a. John was wondering whether she had soup or salad, or something else.  
 b. John was wondering whether she had soup, or whether she had salad.

The fact that alternate questions and polar questions are introduced by *whether* is one of the main reasons why these questions have been claimed to have basically identical underlying

representations. One drawback of the present account is that by taking alternate questions to be a variant of constituent questions, we would expect them to behave similarly with respect to embedding patterns. In particular, given that *wh*-questions can never co-occur with *whether* when embedded, my account predicts that the same should be the case with alternate questions. As an example, consider the fact that the *wh* variant of the alternate question in (39b), namely (40), surfaces as (40a) when embedded, and not as (40b) or (40c).

- (40) Which of soup or salad did she have for lunch?
- a. John was wondering which of soup or salad she had for lunch.
  - b. \*John was wondering whether which of soup or salad she had for lunch.
  - c. \*John was wondering whether she had which of soup or salad for lunch.

And yet, in embedded contexts, alternate questions must be introduced by *whether*, like polar questions and unlike constituent questions. Note that what unifies alternate and polar questions, to the exclusion of *wh*-questions, is the fact that both lack phonologically marked *wh*-phrases. The fact that *whether* surfaces only in embedded contexts and only with questions that lack a phonologically-marked *wh*-phrase points towards an account that takes *whether* to be a dummy element whose function is simply that of a repair strategy for embedded +WH CPs whose specifier positions are phonologically null. The idea is that we have to employ some strategy for embedded clauses to indicate that we are dealing with an embedded question rather than a plain declarative. The problem with English is that embedded clauses do not employ I to C movement, meaning that there is no way to differentiate between an embedded declarative and an embedded non-*wh* question. For that reason, a language like English needs to resort to a different strategy in order to indicate that the embedded clause is a question and one way to do so is via a dummy element like *whether*, which would be semantically vacuous. The prediction is that if a language (call it English prime) employed I to C movement for both root and embedded questions, no such repair strategy should be needed given that we would be able to differentiate between an embedded declarative, (41a), and an embedded question, (41b).

- (41) Did John come to the party? English prime

- a. Mary wants to know that John came to the party.
- b. Mary wants to know did John come to the party.

Further support for such a proposal comes when we look at the co-occurrence of disjunctive phrases and regular *wh*-phrases in embedded contexts. The fact that *whether* is not allowed in these cases adds support to the proposal outlined above since the presence of a phonologically-marked *wh*-phrase, *which girl*, is indicative of a +WH CP and thus further disambiguation is not needed.

- (42)
- a. \*Mary wants to know whether John or Bill kissed which girl.
  - b. Mary wants to know which girl John or Bill kissed.

An account such as Han and Romero's, or for that matter any account that takes *whether* to be the *wh*-counterpart of *either* or disjunction more generally, would run into problems with the data above since it would have to rule out the co-occurrence of *whether* and other *wh*-phrases on independent grounds. There are pros and cons to both approaches but as it stands, no knock-down argument for either one. In the next chapter we turn our attention to polar questions and we will see that unfortunately, the picture becomes even murkier with respect to the status of *whether*.

## Chapter 5

### Polar questions

In this chapter we turn our attention to polar questions, a type of interrogative that, like alternate questions, lacks phonologically marked *wh*-phrases. This type of question requests an answer that specifies whether the proposition expressed by the question holds or does not hold. There are two ways to ask such a question, and they can be distinguished by the presence versus absence of an *or not* constituent.

- (1) a. Did Mary come to the party or not?  
b. Did Mary come to the party?

Most analyses take the questions in (1) to denote the same set of propositions, namely (2):

- (2) {Mary came to the party, Mary didn't come to the party}

Despite this apparent similarity which might suggest that underlyingly there is no difference between the two, we see one domain where they do differ, namely with respect to NPI behavior. Guerzoni (2011) notes that there is a contrast, however slight, between (3a) and (3b) in terms of the acceptability of NPIs in their scope.

- (3) a. \*Did Mary eat anything or not?  
b. Did Mary eat anything?

Using the contrast above as a starting point, I will propose, with others, that the *p or not p?* polar question is a type of alternate question that denotes a set containing the proposition

corresponding to the question nucleus and its negation. This, I will show, is responsible for the unacceptability of NPIs in questions such as (3a). On the other hand, in order to account for the acceptability of NPIs in *p?* questions like (3b), I depart from previous accounts and propose that these types of polar questions have a different underlying representation that resembles a conditional-like structure.

## 5.1 Background

Polar questions are generally taken to denote a set of two propositions,  $\{p, \neg p\}$ . The standard compositional semantics for questions that we adopted in the earlier chapters, namely one that involves quantifying in of a *wh*-phrase, does not appear to be available in these cases as there is no overt *wh*-phrase. Karttunen (1977) proposes to deal with these questions by putting the burden on (a possible silent) *whether*, which is claimed to take as its sister the singleton set containing the proposition and return a set containing the proposition and its negation, with the semantics in (4).

$$(4) \quad \llbracket \text{whether} \rrbracket = \lambda Q_{\langle st, t \rangle}. \lambda p. p \in Q \vee \neg p \in Q$$

His account relies on the presence of a proto-question forming operator that delivers this singleton set. Within the present architecture of questions, which lacks such an operator, Karttunen's *whether* would have to adjoin at the top most level, as in (5a), delivering the set of propositions in (5b):

$$(5) \quad \begin{array}{l} \text{a. } \llbracket \text{whether} [\text{Id } [\lambda p \llbracket [\text{C } p] \llbracket \lambda w. \text{Mary came}_w \text{ to the party} \rrbracket]] \rrbracket \\ \text{b. } \llbracket \text{whether} \rrbracket (\lambda p. p = \lambda w. \text{Mary came}_w \text{ to the party}) = \\ \quad \{ \text{Mary came to the party, Mary didn't come to the party} \} \end{array}$$

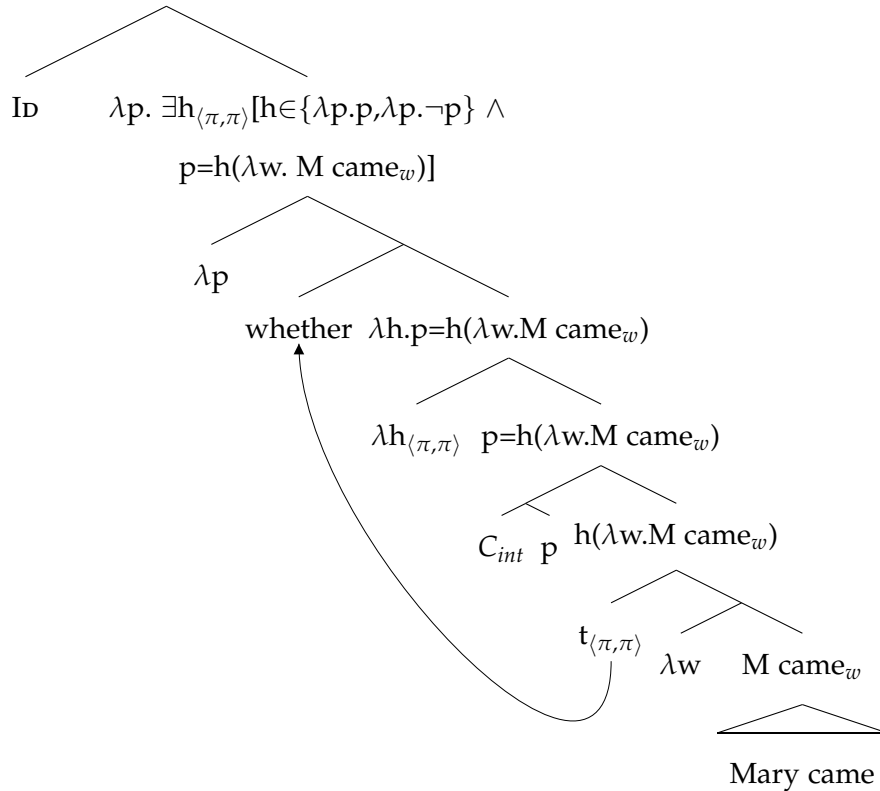
Guerzoni 2003 agrees with the baseline assumption that polar questions involve a possibly covert *whether* but calls instead for a unification of polar and *wh*-questions by suggesting that *whether* should be analyzed on par with other *wh*-phrases. Namely, she proposes to analyze *whether* as an existential that, like other *wh*-phrases, undergoes movement to the specifier of C and leaves behind a trace. Under this account, *whether* denotes an existential

quantifier over functions of type  $\langle st, st \rangle$ , and comes with an implicit restrictor, a set containing the identity and negation  $\{\lambda p.p, \lambda p.\neg p\}$ . For transparency, I will henceforth abbreviate  $\langle s, t \rangle$ , the type of propositions, with  $\pi$ .

$$(6) \quad \llbracket \text{whether} \rrbracket = \lambda f_{\langle \langle \pi, \pi \rangle, t \rangle}. \exists h \in \{\lambda p.p, \lambda p.\neg p\} \wedge f(h) \quad \langle \langle \langle \pi, \pi \rangle, t \rangle, t \rangle$$

Similarly to *who*, we can think of *whether* as *which of yes or no*, i.e. the *wh* counterpart of a polarity phrase, PolP. One of the main advantages of such an account is that it maintains a uniform analysis of all questions and in effect, groups together questions by taking them all to involve existential quantification over a certain domain. In (7) I provide the (adapted) LF proposed by Guerzoni 2003.

(7) Mary came, Mary didn't come



While this account constitutes a step closer towards a unification of polar and *wh*-questions, it still leaves open a number of questions. For one thing, it is difficult to imagine what the non-*wh* counterpart of *whether* might be. Most significantly, however, it leaves open the question of how this carries over to alternate questions, discussed in the previous chapter,



which too must (obligatorily) co-occur with *whether*. It's difficult to see what Guerzoni, or for that matter Karttunen, would be able to say about alternate questions which denote the disjunction of two affirmative propositions given that the denotation of *whether* is specifically catered to derive a negative proposition on their account. Lastly, this family of accounts makes no suggestion as to whether or not the polar questions in (8) are to be given the same analysis.

- (8) a. Did Mary come?  
 b. Did Mary come or not?

In the following section I provide an account for the question in (8b) that analyses it on par with alternate questions. This account is by no means novel but merely a notational variant of previous proposals, as many have already suggested that polar and alternate questions should receive a similar analysis based on the fact that they both involve the disjunction of two propositions and obligatorily co-occur with *whether* when embedded.

## 5.2 *p* or not *p*? polar questions

### 5.2.1 *p* or not *p*? questions as alternate questions

Han and Romero (2004b) claim that all *whether...or* questions should receive a parallel account based on the claim that they uniformly involve clausal disjunction at some underlying level. For example, for the questions in (9a) and (9b), they claim that the two clauses that are being disjoined are as in (9a') and (9b'), respectively.

- (9) a. Did Mary order or not?  
 a.' [<sub>IP<sub>1</sub></sub> Mary ordered] or [<sub>IP<sub>2</sub></sub> ~~Mary not ordered~~]  
 b. Did Mary order cake or flan?  
 b.' [<sub>IP<sub>1</sub></sub> Mary ordered cake] or [<sub>IP<sub>2</sub></sub> ~~Mary ordered~~ flan]

In order to derive the question meaning, that is, to get from a disjunction of propositions to a set of propositions, Han and Romero (2004b) propose that, just like in regular questions, here too we are dealing with an interrogative CP and *wh*-movement. The element they

claim to undergo *wh*-movement is *whether*, which they take to be the *wh*-counterpart of disjunctive *either...or*. The proposed LF for these questions is the following:<sup>1</sup>

$$(10) \quad \text{ID } [\lambda p \text{ [whether}_i \text{ [[C p] [t}_i \text{ [IP}_1 \text{ ... ] or [IP}_2 \text{ ... ]]]}] ]$$

I already discussed in the previous chapter why this account is not ideal for the case of alternate questions where I claimed that what actually undergoes *wh*-movement is not *whether*, but rather the disjunctive phrase. I claimed *whether* is merely a dummy element that is used only in embedded cases. I furthermore departed from Han and Romero's analysis by taking the disjunction to be phrasal rather than clausal, and involve only those elements that overly flank the disjunction *or*. I repeat the proposed LF for alternate questions below:

$$(11) \quad \begin{array}{l} \text{a. } \text{ID } [\lambda p \text{ [[}\exists \text{ cake or flan]}_i \text{ [}\lambda i \text{ [ [C p] [}\lambda w \text{ [Mary [ordered}_w \text{ t}_i \text{ ]]]]]}] ] \\ \text{b. } \lambda p. \exists x \in \{\text{cake, flan}\} \wedge p = \lambda w. \text{Mary ordered}_w x \end{array}$$

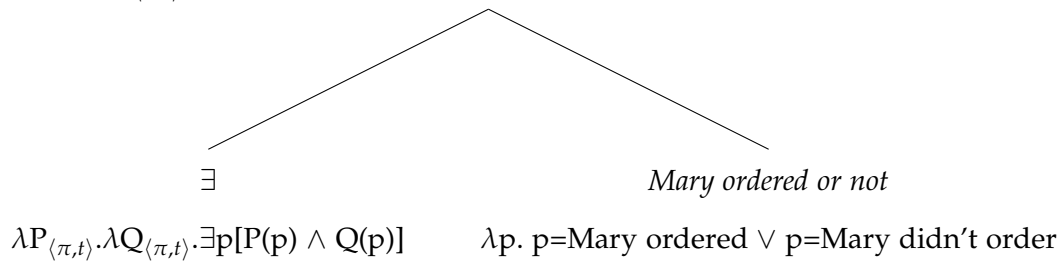
Turning now to polar questions of the form *p or not p?*, I follow Han and Romero's suggestion that these questions are to be analyzed on par with alternate questions. What that would mean in the present account is that what undergoes movement in this case is the constituent representing the disjunction *Mary ordered or not*, that is, a quantifier over propositions. Here I side with them in taking the disjunction to be at the IP level, and assume, as before, that it's base generated as a sister to a covert existential, as in (12). I furthermore follow Han and Romero and assume that in these cases (but crucially not in the case of alternate questions), we are dealing with ellipsis (cf. Schwarz 1999).<sup>2</sup>

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<sup>1</sup>As before, I'm incorporating their account into the general architecture of questions assumed in this thesis. These changes, as far as I can tell, do not affect the general outcome.

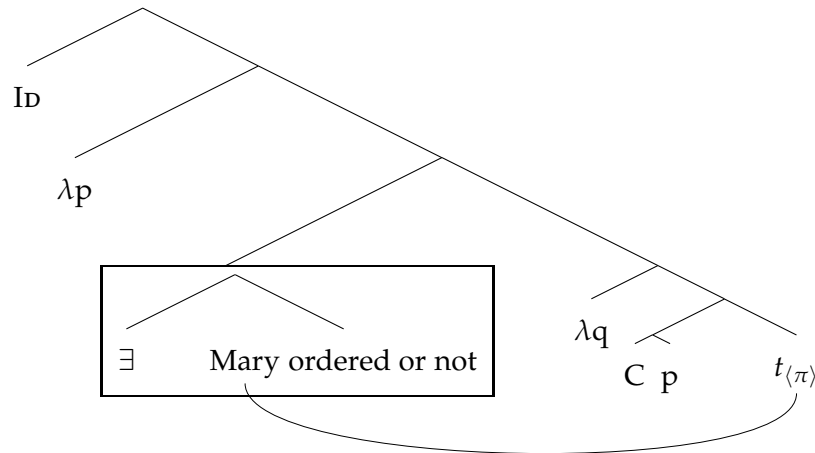
<sup>2</sup>I'm taking *or* to be an unselective operator of type  $\langle \alpha, \langle \alpha, \alpha t \rangle \rangle$ , where  $\alpha$  stands for any conjoinable type. In the case of *Mary or Suzy*, the type of *or* would have to be  $\langle e, \langle e, et \rangle \rangle$ , while in the cases at hand, it would have to be  $\langle st, \langle st, stt \rangle \rangle$ .

(12)  $\lambda Q_{\langle \pi, t \rangle}. \exists p[(p = \text{Mary ordered} \vee p = \text{Mary didn't order}) \wedge Q(p)]$



At this point the rest of the derivation falls out straightforwardly. As in the case of alternate questions, I claim that the existential in (12) bears a [+WH] feature, which attracts it to the specifier position of C.<sup>3</sup> This movement leaves behind a trace of type  $\langle \pi \rangle$ , giving us the LF in (13a), which the corresponding denotation in (13b).

(13) a. Did Mary order or not?



b.  $\lambda p. \exists q \in \{\text{Mary ordered}, \text{Mary didn't order}\} \wedge p = q$

c.  $\{\text{Mary ordered}, \text{Mary didn't order}\}$

What we've shown in this section is that a uniform account of *wh*-questions, alternate and polar questions is not out of the realm of possibilities and in fact falls out arguably easy once we assume that disjunctive phrases can also bear a [+WH] feature that leads to them being interpreted on par with regular *wh*-phrases.

<sup>3</sup>Recall that unlike in the case of regular *wh*-phrases, this movement occurs at LF.

### 5.2.2 Embedding polar questions

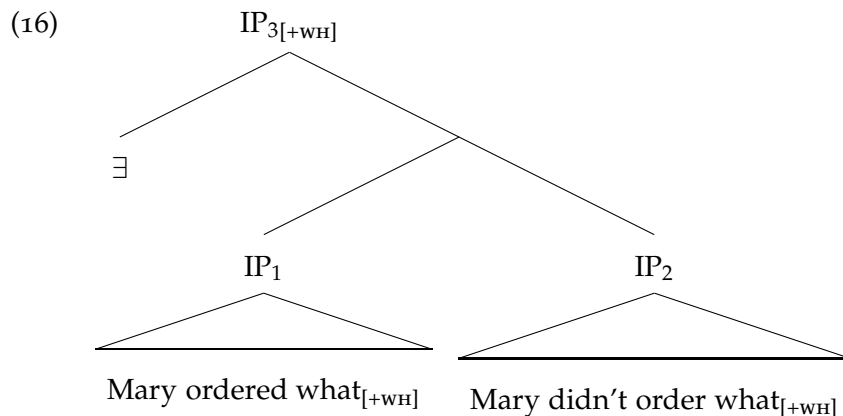
Turning now to the behavior of polar questions in embedded contexts, we see that similarly to the case of alternate questions, the presence of *whether* is obligatory. I propose a similar solution as in the previous chapter, namely one that takes *whether* to be a dummy element that needs to be adjoined to the embedded question in the lack of other morphological cues that the embedded CP is a question, such as other morphologically-marked *wh*-phrases. Under such an account, the issue of why *whether* never co-occurs with other *wh*-phrases never arises. An embedded question such as (14) would simply not be generated by the grammar in the presence of another *wh*-phrase.

(14) \*John wonders whether Mary ordered what or not.

We do, however, still need to rule out questions like those in (15), that is, address why it is that polar questions are incompatible with *wh*-questions.

- (15) a. \*What did Mary order or not?  
 b. \*John wonders what Mary ordered or not.

I see a couple of ways to go about dealing with this problem. First of all, note that the *wh*-phrase *what* is embedded within a constituent that it itself bears a [+WH] feature. The question nucleus would thus look as below:



Assuming that this configuration is even possible, although one could imagine that this is what actually rules out these configurations to begin with,, presumably the topmost [+WH]

would move first, followed by across the board movement of the *wh*-phrase *what*, giving us the LF in (17).

(17)  $\text{ID } [\lambda p \text{ [what}_j \text{ } [\lambda j \text{ } [ [\exists [\text{Mary ordered } t_j \text{ or Mary didn't order } t_j]]_i \text{ } [\lambda i \text{ } [ [C \text{ p}] t_i]]]]]]]$

The denotation of this question would be as in (18a), and it would correspond to the set in (18b), assuming a domain with two dishes.

(18) a.  $\lambda p. \exists x \in \{\text{cake, flan}\} \wedge \exists q \in \{\text{Mary ordered } x, \text{Mary didn't order } x\} \wedge p=q$   
 b.  $\{\text{Mary ordered flan, Mary ordered cake, Mary didn't order flan, Mary didn't order cake}\}$

The issue with having questions denote such sets is that when we apply ID to it, we are going to end up with a presupposition failure. Consider a situation in which Mary ate cake. In this case, there will be two propositions that are true in the set above, *Mary ate cake* and *Mary didn't eat flan*. The problem is that neither of these two counts as most informative (since they don't stand in an entailment relation), meaning that the requirement of ID will not be satisfied.<sup>4</sup> This observation is due to Bittner (1998), also adopted by Dayal (in progress) who points out that appealing to the notion of the existence of a maximally informative answer can help shed light on this incompatibility. Such questions will be defined, i.e. have a maximally informative answer, only in cases in which the nucleus holds true of all the individuals in the domain, i.e. both cake and flan above. However, given that such questions are not defined for the general case, such as in situations as the one above, polar questions with *wh*-phrases turn out to be unanswerable and thus deviant. Ultimately, whether we want to say that it is this deviance, or the fact that we are dealing with two *wh*-phrases embedded within each other, we have good reasons to rule out the co-occurrence of *wh* and polar questions.

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<sup>4</sup>The same would hold true if the constituent question is interpreted strongly exhaustive, i.e. if it associates with *only*. In this case we would have the propositions in (i).

(i)  $\{\text{Mary ordered only cake, it's false that Mary ordered only cake, Mary ordered only flan, It's false that Mary ordered only flan}\}$

Here *it's false that Mary ordered only flan* would be true but again it wouldn't entail *Mary ordered only cake*; nor the other way around, hence the lack of a unique maximally informative proposition.

A big question that looms over the literature of question embedding predicates is why certain predicates cannot embed polar questions despite their ability to embed regular constituent questions. For example *surprise* and *realize* can only embed *wh*-questions:

- (19) a. Mary was surprised by who showed up at the party.  
 a.' \*Mary was surprised by whether John showed up at the party or not.  
 b. Mary realized who showed up at the party.  
 b.' \*Mary realized whether John showed up at the party or not.

One possible answer would be to say that these particular predicates cannot co-occur with *whether*, due to some lexical constraint that says \**surprise/realize+whether*. This, however, is a purely stipulative story that merely describes the facts and doesn't capture the fact that these predicates are the same ones that disallow strongly exhaustive questions as their complements (cf. Lahiri 1991, Guerzoni 2003, Guerzoni and Sharvit 2007). In Chapter 2 I addressed the issue of why certain predicates cannot embed strongly exhaustive questions and offered a solution in terms of presupposition failure. I claimed that predicates like *surprise*, when they embed a question, carry a presupposition of mutual compatibility. That is, they require that the set of propositions they embed be mutually consistent, which cannot be possible if they embed a set of exhausted propositions such as in (20).

- (20)  $Q_{se} = \{\text{Mary ate only cake, Mary ate only flan}\}$

Incidentally, this same account carries over to the case of polar questions, which, by virtue of denoting a set containing a proposition and its negation, will always consist of mutually inconsistent propositions since in no world can both *p* and *not p* hold true. The fact that the account for why certain predicates cannot embed strongly exhaustive questions can be carried over seamlessly to deal with their inability to embed polar questions suggests that an analysis of questions that does away with answer-hood operators like the one I adopt in this thesis is superior to previous ones. In a theory that appeals to answerhood operators, in order to account for the aforementioned constraints one would have to appeal to selectional restrictions of different predicates such as claiming that *surprise/realize* cannot embed a question headed by *ANS.WE* (cf. Guerzoni 2003). Not only are restrictions of this sort stip-

ulative and lack in explanatory value, they also run into problems when trying to deal with the parallel between strongly exhaustive and polar questions given that they are forced to assume that polar questions can only be headed by ANS.SE in order to account for why *surprise/realize* cannot embed them. Since a polar question would deliver the same answer if headed by ANS.WE or ANS.SE, nothing prevents us from having both weak and strongly exhaustive polar questions, so these theories need to either stipulate that polar questions are obligatorily headed by ANS.SE, or offer a different account for why they pattern with strongly exhaustive questions.

### 5.2.3 No weak/strong ambiguity

As mentioned above, polar questions, unlike *wh*-questions, do not exhibit a weak/strong ambiguity given that the true proposition in the denotation of a polar question will always count as the complete, or exhaustive, answer. What a complete answer is depends exclusively on the alternatives with respect to which we evaluate that answer. In the case of *wh*-questions, the complete, or strongly exhaustive, answer will be the proposition that conjoins the maximally informative true proposition with the negation of all propositions in the set that are not entailed by it. With the exception of special cases, i.e. those where every proposition in the set denoted by the question is true, a weakly exhaustive answer to a question like (21), namely (21a), will be different (and in fact weaker) than the strongly exhaustive answer to the question, namely (21b).

- (21) What did Mary order?
- a. Mary ordered flan.
  - b. Mary ordered flan and it's false that Mary ordered cake.

The same is not true in the case of polar questions. Given that the propositions in the set denoted by these questions are mutually exclusive regardless of the situation, a weakly exhaustive answer to (22) will be equivalent to a strongly exhaustive answer, i.e. (22a)=(22b), since the strongly exhaustive answer is obtained by negating all non-entailed propositions. This, of course, is rendered vacuous in this case by virtue of the fact that  $p \wedge \neg(\neg p) = p$ .

- (22) Did Mary order or not?
- a. Mary ordered.
  - b. Mary ordered and it's false that Mary didn't order.

What this suggests for the theory entertained in this chapter is that given that the presence of *only* in polar questions is rendered vacuous, there is no reason to assume that this operator is present in the LF of *p or not p?* questions.

#### 5.2.4 NPIs in *p or not p?* questions

Just about every work on polar questions that also discusses NPIs points out that questions like the following are acceptable across the board, regardless of whether the NPI is in subject or object position.

- (23) a. Did Mary order any dessert?  
b. Did any girls come to the party?

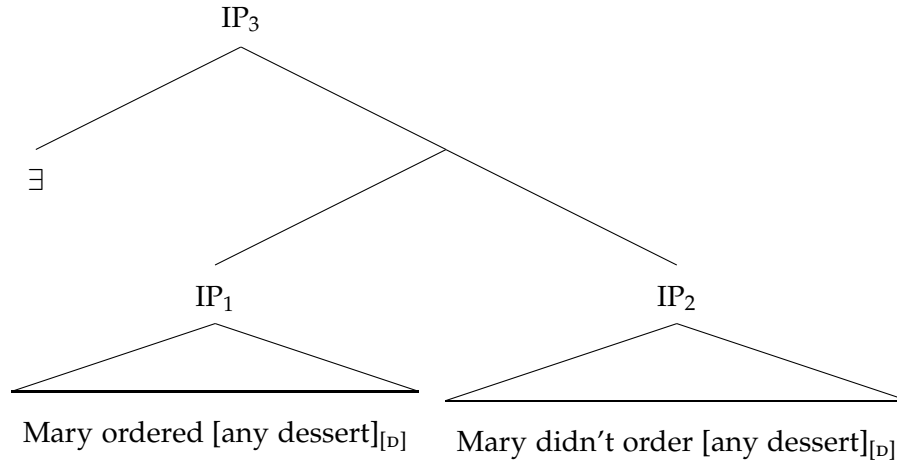
The issue, however, is that none of these questions involve the constituent *or not*. Guerzoni (2011) observes that the *or not* equivalent of these questions is significantly degraded.

- (24) a. \*Did Mary order any dessert or not?  
b. \*Did any girls come to the party or not?

As mentioned at the beginning of the chapter, the fact that there is a contrast between these two ways of asking questions with respect to the behavior of NPIs suggests that underlyingly they have different representations. In the following section I will provide an account for polar questions of the form in (23) that can explain why NPIs are acceptable. For the remainder of this section, however, we will try to understand why NPIs are ruled out in *p or not p?* polar questions. Consider what the question nucleus of a question such as (24a) looks like, repeated from before.

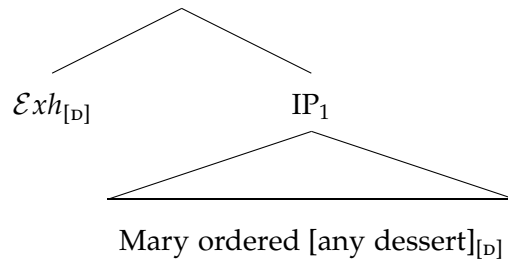


(25)

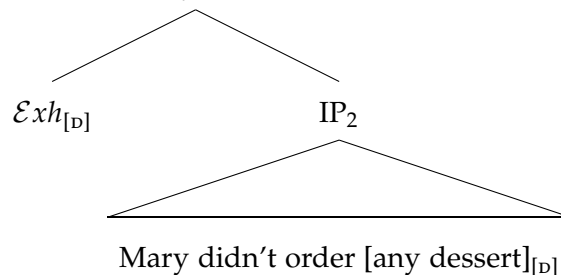


The presence of the NPI calls for a silent exhaustifier,  $\mathcal{E}xh_{[D]}$ . Under the assumption that  $\mathcal{E}xh_{[D]}$  is a propositional operator, it must adjoin to each of  $IP_1$  and  $IP_2$ .<sup>5</sup> The problem, however, is that while the exhaustification of the NPI in  $IP_2$  is consistent given that *any dessert* occurs in the scope of negation, the exhaustification of the NPI in  $IP_1$  is not, precisely for the same reason that NPIs cannot occur in declarative sentences that create upward entailing contexts. I illustrate this below.

(26) a.  $\exists x \in D$  [Mary ordered  $x$ ]  $\wedge$   $\forall D' \subset D$  [ $\neg \exists y \in D'$  [Mary ordered  $y$ ]] □ ⊥



b.  $\neg \exists x \in D$  [Mary ordered  $x$ ] where  $D = \llbracket \text{dessert} \rrbracket$



<sup>5</sup>We could equivalently say that  $\mathcal{E}xh_{[D]}$  adjoins to the node immediately dominating these IPs and applies point wise to every proposition in the set.

Under the arguably reasonable assumption that failure of even one instance of exhaustification will lead to an overall crash, we can now see clearly why NPIs are ruled out from *p or not p?* polar questions given that one of its two occurrences cannot be exhausted coherently.

### 5.3 *p?* polar questions

In this section I turn to polar questions of the form in (27).

(27) Did Mary order cake?

I refer to these as *p?* polar questions so as to contrast them with the nearly equivalent *p or not p?* questions discussed above. Most of the literature on polar questions takes these questions to have the same underlying representation and thus to denote the same two-membered set, and claim that the only difference lies in how much of the second disjunct is elided (cf. Han and Romero 2004b). Given the contrast observed by Guerzoni (2011) with respect to the behavior of NPIs, I side with those who claim that the two types of questions are in fact semantically distinct. One such account is due to Biezma and Rawlins (2013), who take a *p?* polar question to denote a singleton set containing the nucleus proposition. They assume then that (27) ends up denoting the set in (28).

(28) {Mary ordered cake}

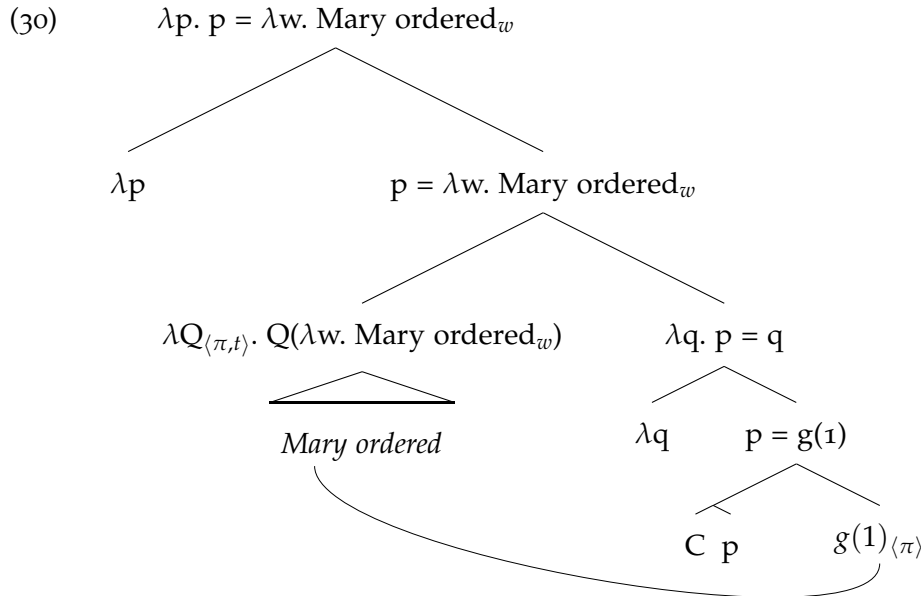
Given that I will ultimately end up proposing a similarly-minded account, it's worth trying to understand how such a set would be compositionally derived. The idea is that since we are dealing with a question, we must have an interrogative C head, which in turn requires the presence of a constituent that bears a [+WH] feature. In the case of *p?* questions I assume that this constituent is the nucleus proposition itself. Assuming a flexible mapping between propositions and their type denotations, I take this type  $\langle \pi \rangle$  proposition to type-shift to a  $\langle \pi, \pi t \rangle$  element, a generalized quantifier over propositions, as in (29).<sup>6</sup>

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<sup>6</sup>This is no different than the flexibility endorsed by Partee and Rooth (1983) and Partee (1986) in order to deal with the need of lifted meanings for noun phrases.

$$(29) \quad \lambda w. \text{Mary ordered}_w \xrightarrow{\text{lift}} \lambda Q_{\langle \pi, t \rangle}. Q(\lambda w. \text{Mary ordered}_w)$$

Putting all the pieces together, we can derive the singleton proposition via the same mechanisms as before:



Biezma and Rawlins (2013) don't discuss the question of how NPIs are licensed in these questions and given their proposal, it's unclear how their would actually account for these facts. We can see that simply moving from the two-membered set  $\{p, \neg p\}$  to the singleton  $\{p\}$  will not get us any closer to accounting for the acceptability of NPIs, given that the exhaustification of the NPI would be checked with respect to an upward entailing environment. Something more needs to be said.

In order to capture the fact that NPIs are actually licensed in these questions, I propose that  $p?$  polar questions can (optionally) be reinterpreted as conditionals. That is, there are two possible ways to interpret these types of questions. One option is to interpret them as  $p$  or not  $p?$  questions and assume that the *not p* constituent undergoes ellipsis, similar to the approach taken in Han and Romero 2004b, while another option is to interpret (31a) as a conditional, like in (31b).

- (31) a. Did Mary order the cake?  
 b. I want to know if Mary ordered the cake.

This move is arguably quite intuitive given that asking the question in (31a) conveys the same meaning as the conditional in (31b). Most striking, however, is that by encoding this likeness in the semantics we end up interpreting the nucleus proposition in the antecedent of a conditional, an environment well known for its ability to license NPIs.

### 5.3.1 *p?* questions as conditionals

Given the assumption that all direct questions are to be interpreted as speech acts, namely as embedded under a silent *I want to know*, for the remainder of this section all the examples will involve questions embedded under overt *I want to know* since I take the analysis of embedded and unembedded questions to be equivalent. As mentioned above, I will endorse a hybrid account of *p?* questions wherein they can receive one of two interpretations. A *p?* question like (32) can optionally receive the same interpretation as its *p not p?* counterpart, with the only difference between the two being in terms of how much material is elided, as in (32a) (cf. Han and Romero (2004b)). Another option for *p?* questions is to be interpreted as conditionals, like in (32b).

- (32) Did Mary order?
- a. I want to know whether Mary ordered ~~or Mary didn't order~~
  - b. I want to know if Mary ordered.

There are a couple of ways to go about delivering the conditional meaning in (32b). One option is to say that although *whether* is a dummy element, it is actually not semantically vacuous (contrary to what I have claimed up to this point) and has the meaning in (33).<sup>7</sup>

$$(33) \quad \llbracket \text{whether} \rrbracket = \lambda P_{\langle \pi, t \rangle} . \lambda Q_{\langle \pi, t \rangle} . \forall p [P(p) \rightarrow Q(p)] \quad \langle \langle \pi, t \rangle, \langle \langle \pi, t \rangle, t \rangle \rangle$$

Under this approach we would take *whether* to be a quantifier over sets of propositions, with essentially the same meaning as that of a universal quantifier. When adjoined to a question, it creates a quantifier phrase which in turn must QR above the matrix subject. The LF for the question would be as in (34). Given that the constituent *whether Mary ordered*

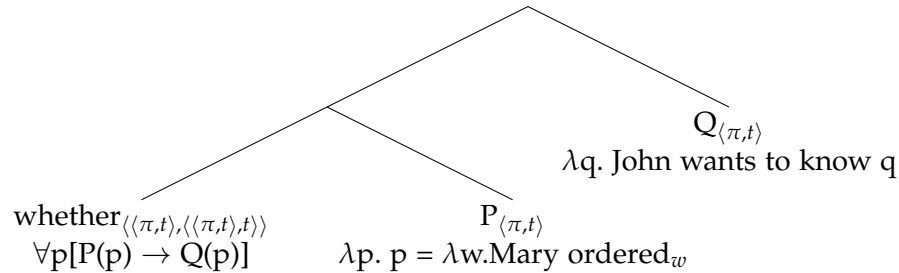
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<sup>7</sup>Alternatively, we could take *if* to carry this meaning.

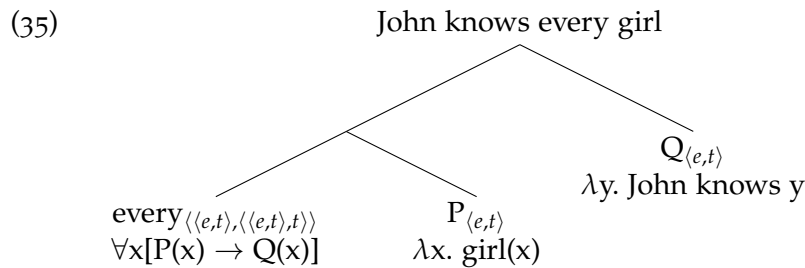
is of type  $\langle\langle\pi, t\rangle, t\rangle$ , it leaves behind a type  $\langle\pi\rangle$  trace which is subsequently abstracted over:

(34) a.  $[[\text{whether Mary ordered}] [\lambda p_{\langle\pi\rangle} [\text{John} [\text{wants to know } t_{\langle\pi\rangle}]]]]$

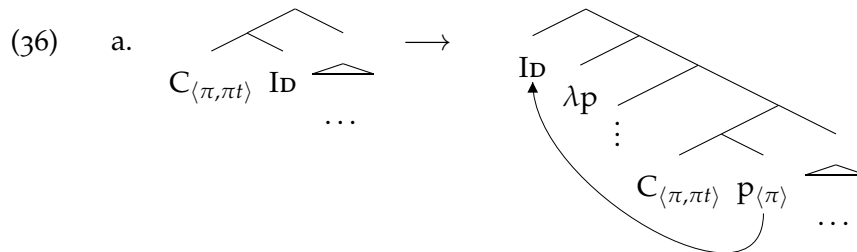
b.



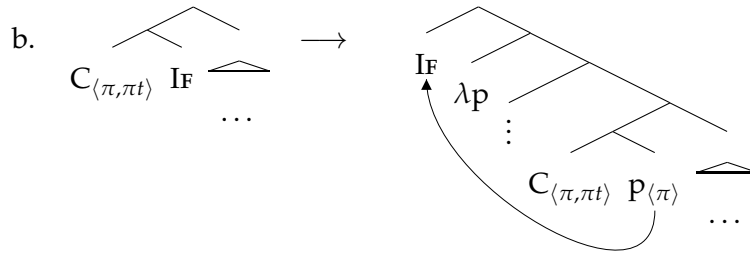
This is not any different from the run of the mill cases of QR of quantifier phrases from object position, like (35):



Yet another option is to maintain, as before, that *whether* is devoid of any meaning and that the conditional interpretation comes about via an operator that is base-generated in the interrogative C head, as below. That is, instead of having the ID operator be the internal argument of C, like in (36a) for constituent questions, in the case of polar questions what is actually merged in that position is an operator IF, like in (36b), with the meaning in (36c).<sup>8</sup>



<sup>8</sup>Taking IF to be merged as a sister to the question operator is similar to the account proposed in Heim (2012) where she assumes a similar underlying structure for polar questions, with the main difference being that her operator, Op2, constructs partitions.



- c.  $\llbracket \text{IF} \rrbracket = \lambda P_{\langle \pi, t \rangle} . \lambda Q_{\langle \pi, t \rangle} . \forall p [P(p) \rightarrow Q(p)]$   $\langle \langle \pi, t \rangle , \langle \langle \pi, t \rangle , t \rangle \rangle$
- d.  $\text{IF} [\lambda p [[C p] [\lambda w [\text{Mary ordered}_w ]]]]$

These two options for deriving the conditional-like meaning of *p?* polar questions differ only in terms of how the antecedent of the conditional is obtained: either via a contentful *whether* that adjoins to the question, or by positing a different complex interrogative C head. Both options agree on the fact that these questions end up being interpreted as generalized quantifiers over questions and must undergo QR over the matrix subject. Whichever option we adopt, we will end up with the same final meaning:

- (37) a. John wants to know whether Mary ordered.  
 b.  $\forall p [p \in \{\lambda p. p = \lambda w. \text{Mary ordered}_w\} \rightarrow p \in \{\lambda q. \text{John wants to know } q\}]$   
 c. If Mary ordered, John wants to know that Mary ordered.

### 5.3.2 NPIs in *p?* questions

Let's turn now to NPIs and see how this analysis of *p?* questions can derive their acceptability in these types of polar questions. Consider again the LF of such a question. As we well know by now, in the presence of an NPI, an *Exh* needs to be adjoined at a scope position. We could, as before, adjoin this operator at the level of the question nucleus, as in (38a), but this would result in a contradiction for the same reason why exhaustifying an affirmative proposition containing an NPI crashes. There is, however, another scope position available for *Exh*, namely the topmost IP, the conditional, as in (38b).

- (38) John wants to know whether Mary ordered anything.
- a.  $\forall p [p \in \{\lambda p. p = \text{Exh}_D [\lambda w. \text{Mary ordered}_w \text{ anything}_D]\} \rightarrow p \in \{\lambda q. \text{John wants to know } q\}]$



- b.  $\mathcal{E}xh_D [\forall p \in \{\lambda p. p = \lambda w. \text{Mary ordered}_w \text{ anything}_D\}$   
 $\rightarrow p \in \{\lambda q. \text{John wants to know } q\}]$  ☑

When the  $\mathcal{E}xh$  operator adjoins at the topmost level as in (38b), the exhaustification of the NPI takes place with respect to a downward entailing environment given that the NPI occurs in the restrictor of a universal quantifier. This, I claim, is why NPIs are acceptable in these types of polar questions.

Assuming this underlying representation for  $p?$  polar questions furthermore allows us to understand two other NPI-related facts: the lack of a subject-object asymmetry and the unacceptability of strong NPIs. The fact that no subject-object asymmetry is observed in polar questions, as seen in (39), is due to the fact that the entire question nucleus is interpreted in the restrictor of a universal, a DE environment, so whether the NPI is an object or subject is deemed irrelevant.

- (39) a. Did Mary order anything?  
 b. Did anybody order cake?

On the other hand, a contrast that does surface in both polar and *wh*-questions is that of the weak/strong NPI divide. While weak NPIs like *any* and *ever* are acceptable in these questions, strong NPIs like *in weeks* and adverbial *either* are not. For constituent questions we derived this contrast by taking NPIs to be base generated in the scope of a covert *only*. We saw that NPIs exhibit the same weak/strong contrast when in the scope of overt *only*, and since this is how they are interpreted in strongly exhaustive questions, the fact that only weak NPIs are acceptable fell out immediately. Incidentally, a conditional analysis for polar questions allows us to apply the same reasoning. We independently know that weak, but not strong NPIs are acceptable in the antecedent of conditionals and the restrictor of universals, as in (40).

- (40) a. If Mary *ever* calls you, let me know.  
 a.' \*If Mary called John *in weeks*, I want to know.  
 b. Every girl who has ever taken a linguistics class passed the admittance test.  
 b.' \*Every girl who has taken a linguistics class *either* passed the admittance test.

By assuming that  $p?$  polar questions are conditionals underlyingly, the fact that strong NPIs are ruled out from these questions can, and should be, attributed to the same factors that rule them out in regular conditionals. I refer the interested reader to Chierchia 2012 for an exhaustification-based account of why conditionals are not good licensors of strong NPIs. The account is similar to what we see with *only* as it relates back to the Strawson-DE character of these operators (von Stechow, 1999).

### 5.3.3 Conditional strengthening

In the previous subsections I claimed that in order for NPIs to be acceptable in  $p?$  polar questions, the question needs to take on a conditional-like meaning. Crucially, we assumed that the question, at its core, denotes a singleton, the set containing the nucleus proposition. This was a necessary move so as to avoid running into the same problem as in the case of  $p$  or *not p?* questions where the NPI occurs in two propositions that give rise to opposite entailment patterns. However, even a question such as (41) can receive a negative answer, and under a theory of questions that takes answers to be “picked out” from the question denotation, this conditional analysis runs into problems.

- (41) Did Mary order anything?
- a. Yes, she did.
  - b. No, she didn't.

In other words, it seems that beyond the conditional in (42a), we also want to somehow derive the conditional that comes about from substituting  $p$  for  $\neg p$ , as in (42b):<sup>9</sup>

- (42) a. If Mary ordered anything, John knows that she did.  
 b. If Mary didn't order anything, John knows that she didn't.

---

<sup>9</sup>A somewhat similar problem is faced by Biezma and Rawlins (2013) since they too analyze these questions as singletons. They propose an anti-singleton coercion mechanism (p. 25) via which a singleton proposition  $\{A\}$  is coerced into the denotation  $\{\lambda w. A(w), \lambda w. \neg A(w)\}$ , which amounts to giving the  $p?$  question the same denotation as its  $p$  or *not p?* counterpart. This is not going to be of any use to us since it would deliver a conditional of the form in (i) and exhaustification of the NPI at the matrix level, i.e. above the conditional, would result in a contradiction as one of the NPIs is in the scope of two downward entailing operators, the embedded negation and the conditional.

(i) If Mary ordered anything or Mary didn't order anything, John knows that.



As it stands, this portion of the meaning is not predicted in this account. In order to obtain this second conditional, I claim that can we appeal to the notion of conditional perfection from von Fintel 2001. The basic idea is that sentences such as (43a) convey not just *if p, q* but also *if not p, not q*, which von Fintel claims to come about via the mechanism of Conditional Perfection.

- (43) a. If you mow the lawn, I'll pay you 5 dollars.  
 b. If you don't mow the lawn, I won't pay you 5 dollars.

In a nutshell, the inference from (43a) to (43b) comes about as follows: *if p, q* has an alternative *q no matter what*, which is essentially equivalent to *if not p, q*. Since this alternative is stronger, we have to negate it, which amounts to *if not p, not q*.<sup>10</sup>

Turning to the conditional in (42), we see that Conditional Perfection is going to give us (44a), which is not right. What we need is (44b).

- (44) a. If Mary didn't order anything, it's not the case that John knows that she did.  
 b. If Mary didn't order anything, John knows that she didn't.

This issue arises due to the factivity of *know*, which in (44a) contradicts the antecedent. Since *know* presupposes that its complement is true and negation is a hole for presuppositions, the consequent will end up presupposing the complement of *know*, that *Mary ordered*, which is incompatible with the presupposition of the conditional, namely that the antecedent *Mary didn't order* must be possible. To avoid this problem I claim that *know* in these cases is not actually factive, meaning that *to know whether p* should actually be *to believe whether p*, where *believe* is the non-factive variant of *know*.<sup>11</sup> At this point we see that the inference from (45a) to (45b) will come out right away given that *believe* is neg-raising and thus  $\neg(\textit{believe } p) = \textit{believe } (\neg p)$ .

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<sup>10</sup>Negating *if not p, q* gives us *if not p, not q* due to the fact that conditionals obey the law of Conditional Excluded Middle (CEM) (Stalnaker 1981, Gajewski 2005). This law is stated as in (i):

(i)  $(\textit{if } p, q) \vee (\textit{if } p, \textit{not } q)$

So in the case of *if not p, q*, CEM would give us  $(\textit{if not } p, q) \vee (\textit{if not } p, \textit{not } q)$ . Since negating one of the disjuncts amounts to asserting the other disjunct,  $\neg(\textit{if not } p, q)$  is equivalent to *if not p, not q*.

<sup>11</sup>Doing completely away with the factive presupposition of *know* is too strong so we'll probably want to say that this presupposition is encoded at a different level.

- (45) a. If Mary ordered anything, John believes that she did.  
b. If Mary didn't order anything, John doesn't believe that she did.  
= If Mary didn't order anything, John believes that she didn't.

#### 5.3.4 Outstanding questions

In the previous section I proposed a new way to interpret polar questions so as to account for the fact that NPIs are acceptable in these types of questions. I claimed that one possible way to go about accounting for their acceptability is by reanalyzing polar questions of the form *p?* as conditionals and I discussed two options for how we might want to derive this conditional interpretation. One way would be to assume that *whether* is not semantically vacuous and that its contribution to meaning is that of a universal quantifier over questions, giving us the conditional flavor of these questions. Yet another option would be to maintain that *whether* is semantically vacuous and its contribution is simply that of a morphological flag that the embedded CP is an interrogative. Under this proposal, the conditional meaning would come about by assuming that *p?* polar questions are associated with a different complex C head, one where an operator  $I_F$ , a quantifier over questions, is base generated as the sister of the interrogative C head. The second part of the proposal is the same regardless of which of the above we adopt. The question, which at this point denotes a singleton proposition, undergoes QR above the matrix IP and ends up being interpreted in the restrictor of a universal, which accounts for the acceptability of NPIs and furthermore lets us understand why strong NPIs are ruled out from these questions by drawing an analogy to their behavior in the restrictor of universal quantifiers over individuals.

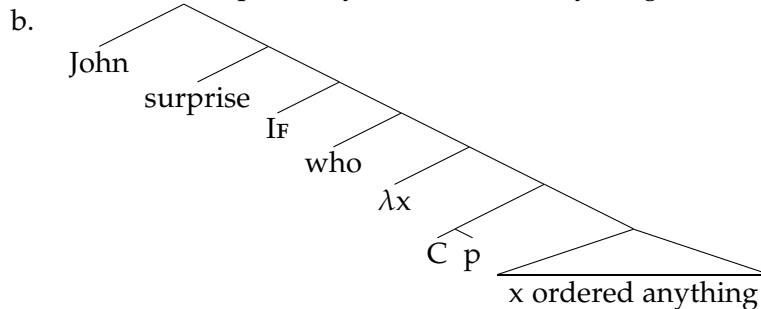
Two issues need to be addressed in connection with these proposals. Why is it that *surprise*-type predicates cannot embed these questions and what prevents us from employing this same conditional reinterpretation for other questions. In addressing the first issue, I claim that these questions cannot function as the complement of *surprise* for the same reason why strongly exhaustive *wh*-questions, alternate questions or *p or not p?* polar questions cannot: its complement does not denote a set of mutually consistent propositions. If we can convince ourselves that *surprise* and its kins carry a presupposition as in (46), then

this will in fact not be an issue given that a singleton complement will never be able to satisfy this requirement.

$$(46) \quad \llbracket \text{surprise}_Q \rrbracket = \text{defined iff } \exists p, q \in Q \wedge \diamond(p \wedge q)$$

Let's turn now to the second problem, namely why this conditional re-interpretation is not available for regular *wh*-questions. Here the answer will depend on which of the above two approaches we adopt. If we take *whether* to adjoin to a question if and only if there are no other morphologically-marked *wh*-phrases in the structure, and furthermore assume that what is responsible for the conditional meaning is *whether* itself, then it will never be the case that *whether* could co-occur with another *wh*-phrase and hence it will never be possible to derive this conditional meaning for these questions.<sup>12</sup> But what if we assume that the conditional meaning is not encoded in *whether*, but rather in the C head? What prevents us from having this version of C with regular questions? One instance where it's clear that we want to avoid this option is in the case of weakly exhaustive questions embedded under *surprise*. If (47b) were a possible LF for (47a), then we would wrongly predict NPIs to be licensed in these cases since they would end up being interpreted in the restrictor of a universal, as in (47c).

(47) a. \*John was surprised by who ordered anything.



c.  $\forall p [p \in \{x \text{ ordered anything} \mid x \in \llbracket \text{person} \rrbracket\}] \rightarrow \text{John was surprised that } p]$

Even putting aside the issue of NPIs, it's clear that this is not the right meaning we want for *surprise*. For John to be surprised by who ordered cake, it suffices that he be surprised by one proposition in the denotation of the question, and not all as (47b) would require.

<sup>12</sup>The reader can check that this gives us the right meaning for both alternate questions and *p or not p?* polar questions, the other types of interrogatives that co-occur with *whether*.

At this point all we can do is leave this as an open problem and suggest that one possible avenue for dealing with this is to have If itself carry some sort of presupposition that its complement not denote a set of mutually compatible propositions (i.e. the opposite of what *surprise* requires). One might even aim to have this constraint fall out from independently motivated assumptions about conditionals.

## Chapter 6

### Higher-order questions

A full story cannot be complete without looking at more complex questions, such as multiple *wh*-questions, questions with quantifiers, and mention some questions. First and foremost, one needs to check whether the theory proposed in this thesis holds water once these more complex questions are considered. In particular, we need to look at the distribution of NPIs in these types of questions and see whether it follows from the predictions we made for the basic cases. The discussion of these empirical facts will be mostly expository in nature as much field work still remains to be done in order to obtain the full range of data. At first glance, however, we will see that the judgements align with the predictions made by the general theory presented in Chapters 2 and 3, namely that NPIs are acceptable in root questions whenever they are c-commanded by a *wh*-phrase.

Second, since I am basically arguing for a new semantics of questions, one needs to understand how this analysis extends to the more complex cases mentioned above. The discussion in this chapter is preliminary and aims mainly to pave the way for a more thorough investigation of the complications we run into once we turn to higher-order questions. On perusing the literature on this topic, one can find two types of analyses given to these questions; on the one hand there are theories that aim to offer a unified account of single and multiple *wh*-questions that cannot be easily extended to questions with quantifiers, while on the other hand we have analyses that look at single *wh*-questions and questions with quantifiers but exclude multiple *wh*-questions from the analysis. The issue, as it stands, is that it is not clear how these two types of solutions can be made compatible with each

other and the goal of this chapter is to offer a possible unification of all these phenomena by more or less adopting the essence of both approaches. In the last section of this chapter I turn to mention some questions and I propose a novel way to account for these readings compositionally and uniformly in such a way that is compatible with the theory of questions this thesis advocates for.

## 6.1 Multiple *wh*-questions

### 6.1.1 Single pair readings

Similarly to single *wh*-questions, the single-pair reading for multiple *wh*-questions is derived as in (1), with the only difference being that in this case the C head attracts two [+wh] elements, with the LF in (1a) and the denotation in (1b). As before, I take the ID operator to originate as a sister of C and move out in order to avoid a type mismatch.

(1) Which girl kissed which boy?

Ann kissed John.

a.  $\text{ID} [\lambda p \text{ [which girl } [\lambda x \text{ [which boy } [\lambda y \text{ [[C p] [x [kissed y]]]]]]]]]$

b.  $\text{ID}[\lambda p. \exists x \exists y [x \in \llbracket \text{girl} \rrbracket^{w_0} \wedge y \in \llbracket \text{boy} \rrbracket^{w_0} \wedge p = \lambda w. x \text{ kissed}_{w_0} y]]]$

Let's assume for the remainder of this chapter a scenario with three girls, Ann, Mary and Suzy, and four boys, Bill, Greg, John and Fred. In this scenario, the question will denote the set of propositions in (2). Recall that since we are dealing with singular *which* phrases, each proposition in the answer set will denote a relationship between atomic individuals, rather than plural individuals (Dayal, 1996).

(2) {Ann kissed John, Ann kissed Fred, Ann kissed Greg, Ann kissed Bill, Mary kissed John, Mary kissed Fred, Mary kissed Greg, Mary kissed Bill, Suzy kissed John, Suzy kissed Fred, Suzy kissed Greg, Suzy kissed Bill}

Recall the meaning of the ID operator, repeated below in (3).

(3)  $\llbracket \text{ID} \rrbracket = \lambda Q. \lambda w: \exists p \text{ ANS}(Q)(w) = p. Q$

where  $\llbracket \text{ANS} \rrbracket = \lambda Q. \lambda w. \iota p [p(w)=1 \wedge Q(p)=1 \wedge \forall p' \in Q (p'(w) \rightarrow p \subseteq p')]$

Applying this operator to the set in (2) will return the same set if and only if this set contains a unique maximally informative true proposition. For that to be the case, there can be only one girl who did any kissing and only one boy who was kissed. That is, the only way the presupposition of *Id* can be satisfied when applied to this question is if only one of the propositions in (2) is true. Single pair readings for multiple *wh*-questions will thus arise whenever there is a single ordered pair that satisfies the relationship denoted by the main predicate. Note, however, that if instead of asking the question using singular *which* phrases we had asked its more neutral variant in (4a), a possible answer would also allow for one-to-many pairings, as in (4b), given that *who* is not restricted to atoms but can instead range over pluralities as well.

- (4) a. Which girl kissed who?  
 b. Ann kissed John and Fred.

As we did in the case of single *wh*-questions, we need to see how NPIs behave in these questions, and namely, if we see a contrast depending on the relative position of the NPI and the *wh*-phrases.

- (5) a. Who wrote what in their papers?  
 b. Who wrote what in any of their papers?

(5b) is just as acceptable as (5a), suggesting that NPIs are acceptable even in multiple *wh*-questions. We are also interested, however, to see what happens when the NPI occurs between the two *wh*-phrases, such as in (6). The problem is that speakers vary on which they find acceptable making it difficult to agree on what the right empirical facts are. The problem may easily stem from a more general processing issue in cases involving multiple *wh*-phrases and quantifiers and this is a place to amass judgements on a large-scale in the future. Nonetheless, it does appear to be the case that questions where the NPI is c-commanded by both *wh*-phrases, namely (6b), fare better than when it intervenes between the two, (6a).

- (6) a. Who gave any assignment to which student?
- b. Who gave which student any feedback?

Future work should also investigate whether the weak/strong distinction holds as robustly in multiple *wh*-questions as it does in regular *wh*-questions. *Prima facie*, the prediction seems to hold that NPIs are indeed more likely to be acceptable in a multiple *wh*-question embedded under *know* than in one embedded under *surprise*.

- (7) a. Mary was surprised by which girl sent which greeting card to anybody.
- b. John knows which girl sent which greeting card to anybody.

We will return to a discussion of covert *only* and its contribution at the end of this section.

### 6.1.2 Pair list readings

In cases where the presupposition of ID is not satisfied, namely when there are multiple true answers, a question such as (8) can receive a pair-list reading, as in (8a). What characterizes these readings is the fact that the uniqueness presupposition observed for single pair readings with *which* phrases is replaced by two distinct requirements: that every girl kissed some boy, and furthermore, that every girl kissed only one boy, which can be seen by the awkwardness of (8b) and (8c) when used as responses to this question.

- (8) Which girl kissed which boy?
  - a. Ann kissed Fred, Mary kissed Greg and Suzy kissed Bill.
  - b. #Ann kissed Fred and Mary kissed Greg.
  - c. #Ann kissed Fred and John, Mary kissed Greg and Suzy kissed Bill.

We will return to a discussion of how these requirements can be derived at the end of this section. For now, let's focus on understanding how these pair list readings come about.

#### 6.1.2.1 Families of questions

One position in the literature (cf. Hagstrom 1998, Dayal in progress and Fox 2012), which I adopt in this paper, is that pair list answers come about by interpreting the question as a



family of questions. Basically, the idea is that one first creates a question that asks about a specific girl which boy she saw, and then asks that question for every girl in the domain of quantification, which in set notation would look as in (9):

$$(9) \quad \{ \{ \lambda w. x \text{ kissed}_w y : y \in \llbracket \text{boy} \rrbracket^{w_0} \} : x \in \llbracket \text{girl} \rrbracket^{w_0} \}$$

Considering the same scenario as before, the set in (9) will denote a set of three questions, as there are three girls:

$$(10) \quad \left\{ \begin{array}{l} \text{Which boy did Ann kiss?} \\ \text{Which boy did Mary kiss?} \\ \text{Which boy did Suzy kiss?} \end{array} \right\}$$

Each question in (10) is going to contain four propositions, as there are four possible boys the girls could have kissed:

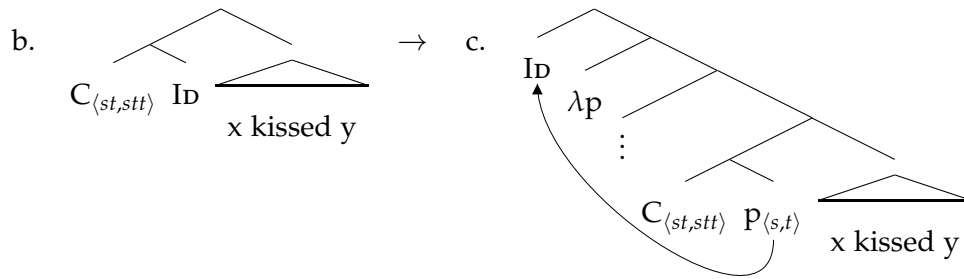
$$(11) \quad \left\{ \left\{ \begin{array}{l} \text{Ann kissed John} \\ \text{Ann kissed Fred} \\ \text{Ann kissed Greg} \\ \text{Ann kissed Bill} \end{array} \right\}, \left\{ \begin{array}{l} \text{Mary kissed John} \\ \text{Mary kissed Fred} \\ \text{Mary kissed Greg} \\ \text{Mary kissed Bill} \end{array} \right\}, \left\{ \begin{array}{l} \text{Suzy kissed John} \\ \text{Suzy kissed Fred} \\ \text{Suzy kissed Greg} \\ \text{Suzy kissed Bill} \end{array} \right\} \right\}$$

Each proposition in (11) has the form in (12), where  $x$  varies with the girls.

$$(12) \quad \lambda p. \exists y \in \llbracket \text{boy} \rrbracket^{w_0} \wedge p = \lambda w. x \text{ kissed}_w y$$

The next step is figuring out how to get from (12) to the family of questions denotation compositionally. The idea we will pursue here is that getting from a question to a set/family of questions is going to proceed via the same mechanism that we used to get from a proposition to a set of propositions. Recall that in the case of a simple question we had the C head in (13a) do all of the work by assuming that it starts off its life as the complex head in (13b) and ends up as in (13c) via the type-driven QR of the Id operator.

$$(13) \quad \text{a. } C_{\langle st, stt \rangle} = \lambda p_{\langle st \rangle} . \lambda q_{\langle st \rangle} . (p=q)$$

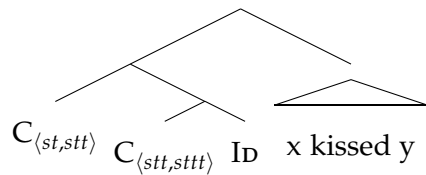


Deriving a family of questions amounts to proposing a second instantiation of C above (13c) which would take a question and return a family of questions, similarly to how the first C takes a proposition and returns a family of propositions. In order to do so, we can lift the meaning of this second C from (13a) to be as in (14a).

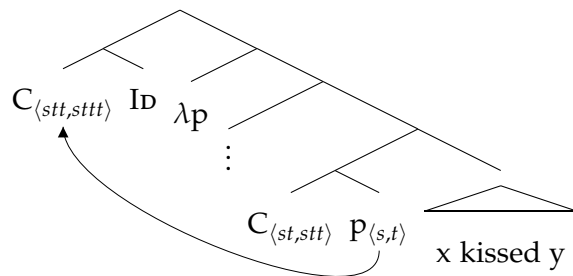
(14) a.  $C_{\langle stt, sttt \rangle} = \lambda Q_{\langle st, t \rangle} . \lambda Q'_{\langle st, t \rangle} . (Q = Q')$

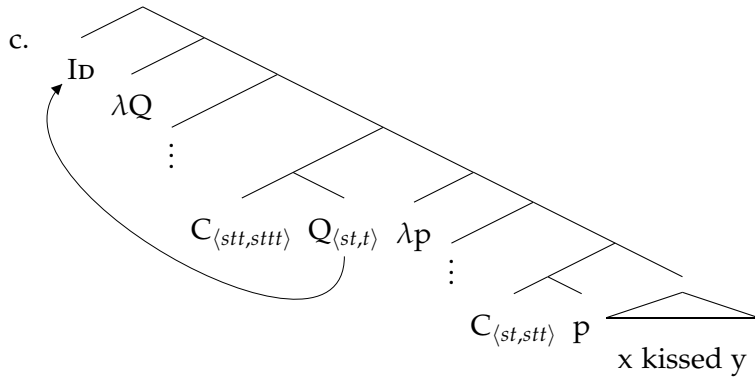
How does this all come together however? One implementation, following Fox (2012), who in turn follows Shimada (2007), is to assume that in these cases we are dealing with a complex head, as in (15a). Type-theoretical considerations force the embedded complex head to move out, leaving behind a variable of type  $\langle s, t \rangle$ , as in (15b). The newly moved head itself faces a type mismatch, which can be rectified by moving out the ID operator and leaving behind a variable of the appropriate type,  $\langle st, t \rangle$ , as in (15c).

(15) a.



b.





Basically, what we want in the end is for the *Id* operator to end up in the top-most position, so it can apply to the question denotation, be it a plain question or a family of questions. However, given that it originates in an doubly-embedded position, it needs to undergo two separate movements, with each instance of head movement corresponding with the QR of one of the *wh*-phrases. Crucially, since we are essentially dealing with an extended projection of the same head, we assume that the relative order of the moved *wh*-phrases needs to respect their base c-command positions (cf. Richards (1997)). Below I go over the step-by-step derivation of such a family of questions. We first move the lower *wh*-phrase:

(16) [which boy [ $\lambda y$  [ $C_{\langle st, stt \rangle}$  [ $C_{\langle stt, sttt \rangle}$  *Id*]] [which girl kissed y]]]

Next the internal complex [*C Id*] moves, leaving behind a trace of type  $\langle s, t \rangle$ :

(17) [[ $C_{\langle stt, sttt \rangle}$  *Id*] [ $\lambda p$  [which boy [ $\lambda y$  [ $C_{\langle st, stt \rangle}$  *p*] [which girl kissed y]]]]]

The second *wh*-phrase moves out:

(18) [which girl [ $\lambda x$  [[ $C_{\langle stt, sttt \rangle}$  *Id*] [ $\lambda p$  [which boy [ $\lambda y$  [ $C_{\langle st, stt \rangle}$  *p*] [*x* kissed y]]]]]]]

Finally, we move the *Id* operator as in (19), leaving behind a trace of type  $\langle st, t \rangle$ .

(19) [*Id* [ $\lambda Q$  [which girl [ $\lambda x$  [[ $C_{\langle stt, sttt \rangle}$  *Q*] [ $\lambda p$  [which boy [ $\lambda y$  [[ $C_{\langle st, stt \rangle}$  *p*] [*x* kissed y ]]]]]]]]]]

We see then how via a combination of successive head movement and *wh*-movement, a family of questions is created. Its final denotation is as in (20), a set of questions *Q* that ask for each *x* who is a girl, which boy that girl kissed.

$$(20) \quad \lambda Q. \exists x \in \llbracket \text{girl} \rrbracket \wedge Q = \lambda p. \exists y \in \llbracket \text{boy} \rrbracket \wedge p = \lambda w. x \text{ kissed}_w y$$

The next step in the analysis is to understand how ID applies to a family of questions. This part of the analysis will have far-reaching consequences, both for our understanding of question-embedding, as well as for dealing with the fact that with families of questions, the presupposition on ID manifests itself not as a uniqueness presupposition, but as a domain-exhaustivity and point-wise uniqueness constraint.

### 6.1.2.2 Point-wise uniqueness and domain exhaustivity

Recall the family of questions obtained in our scenario and assume that the true propositions are those bolded in (21).

$$(21) \quad \left\{ \left\{ \begin{array}{l} \text{Ann kissed John} \\ \mathbf{\text{Ann kissed Fred}} \\ \text{Ann kissed Greg} \\ \text{Ann kissed Bill} \end{array} \right\}, \left\{ \begin{array}{l} \text{Mary kissed John} \\ \text{Mary kissed Fred} \\ \mathbf{\text{Mary kissed Greg}} \\ \text{Mary kissed Bill} \end{array} \right\}, \left\{ \begin{array}{l} \text{Suzy kissed John} \\ \text{Suzy kissed Fred} \\ \text{Suzy kissed Greg} \\ \mathbf{\text{Suzy kissed Bill}} \end{array} \right\} \right\}$$

Given the set in (21), what must the role of ID be such that for someone to know (22a), they need to know (22b)?

- (22) a. Which girl kissed which boy?  
 b. Ann kissed Fred, Mary kissed Greg and Suzy kissed Bill.

A big debate in the literature has been trying to understand why singular *wh*-questions impose a uniqueness requirement while multiple *wh*-questions do not. That is, while the question in (23a) presupposes that only one girl did any kissing, the multiple *wh*-question in (23b) does not. In fact, (23b) requires something else: that all the girls under consideration engaged in kissing and that no girl kissed more than one boy, which can be seen by the fact that (23bi-ii) would not count as appropriate answers (c.f. Dayal 1996).

- (23) a. Which girl kissed John?  
 (i) #Mary and Suzy kissed John.  
 b. Which girl kissed which boy?

- (i) #Mary kissed Greg and Suzy kissed Bill.
- (ii) #Ann kissed Greg and John, Mary kissed Greg and Suzy kissed Bill.

These two requirements have been referred to as point-wise uniqueness – that each girl kissed only one boy – and domain exhaustivity – that each girl kissed a boy. I provide the following two examples from Fox 2012 to better illustrate the reflex of this presupposition:

(24) Domain exhaustivity

- a. Guess which of these 3 kids will sit on which of these 4 chairs.
- b. #Guess which of these 4 kids will sit on which of these 3 chairs.  
*suggests that two kids will sit on the same chair*

(25) Point-wise uniqueness

- a. I wonder which one of the 3 boys will do which one of the 3 chores.
- b. #I wonder which one of the 3 boys will do which one of the 4 chores.  
*suggests that one of the chores will not be done*

So the question now is how to account for the fact that ID delivers a uniqueness requirement when applied to a single *wh*-question, but point-wise uniqueness and domain exhaustivity requirements when applied to a multiple *wh*-question. Under the account of multiple *wh*-questions proposed above, I see at least two possible ways of deriving the relationship between the role of ID in questions and its role in families of questions: one option would be to have ID apply to a family of questions via plural predication, while a second option would be to have it apply point-wise.

This relationship will fall out straightforwardly once we assume that ID can apply to a family of questions via plural predication.<sup>1</sup> In the case at hand, I take plural predication of ID to amount to taking the grand union of the questions obtained by applying ID to every member of the family, returning an object of type  $\langle st, t \rangle$ , namely another question. Informally, this would look like in (26), with the formal definition of ID updated as in (27).

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<sup>1</sup>Fox (2012) attributes this observation to Heim (2010). Note, however, that he appeals to the ANS operator to derive these facts. A similarly-minded proposal, albeit pragmatically-based, is given in Hagstrom 1998.

$$(26) \quad \text{ID} \left( \left( \begin{array}{l} \text{Which boy did Ann kiss?} \\ \text{Which boy did Mary kiss?} \\ \text{Which boy did Suzy kiss?} \end{array} \right) \right) = \cup \left( \begin{array}{l} \text{ID}(\text{Which boy did Ann kiss?}) \\ \text{ID}(\text{Which boy did Mary kiss?}) \\ \text{ID}(\text{Which boy did Suzy kiss?}) \end{array} \right)$$

$$(27) \quad \llbracket \text{ID} \rrbracket = \begin{cases} \lambda Q_{\langle st,t \rangle} . \lambda w : \exists p \text{ ANS}(Q)(w) = p . Q \\ \lambda K_{\langle stt,t \rangle} . \lambda w : \forall Q \in K [\exists p \text{ ANS}(Q)(w) = p] . \cup K \end{cases}$$

Now, we know that ID imposes the requirement that there be a true proposition in the question denotation which is maximally informative. For there to be only one such proposition in each question belonging to the family of questions in (26), there must be only one boy that say, Ann kissed, given that *which*-phrases quantify over atomic individuals; this derives the point-wise uniqueness requirement of multiple *wh*-questions discussed above. Furthermore, by imposing that there be one such answer, we're basically requiring each question to have an answer, namely that each girl kissed somebody, satisfying the domain exhaustivity requirement of multiple *wh*-questions.

Yet another option, which seems more appropriate given our claims regarding the contribution of ID, would be to say that ID is what it is, a filter on questions, with no assertive contribution whatsoever. The proposal would be that when it acts on families of questions it has the option of applying point wise to each member of the family. Under this view,  $\text{ID}(\{Q\})$  would simply return  $\{Q\}$ , the same family of questions if and only if each member satisfies the uniqueness presupposition, deriving the point-wise uniqueness requirement. For each question to satisfy the uniqueness presupposition, each question must have an answer, which in turn gives the requirement of domain-exhaustivity. I provide the two versions of ID in (28).

$$(28) \quad \llbracket \text{ID} \rrbracket = \begin{cases} \lambda Q_{\langle st,t \rangle} . \lambda w : \exists p \text{ ANS}(Q)(w) = p . Q \\ \lambda K_{\langle stt,t \rangle} . \lambda w : \forall Q \in K [\exists p \text{ ANS}(Q)(w) = p] . K \end{cases}$$

### 6.1.3 Embedding families of questions

Let's turn now to the question of how predicates embed families of questions, focusing specifically on the example in (29).

(29) Jeremy knows which girl kissed which boy.

Jeremy knows that Ann kissed Fred, Mary kissed Greg and Suzy kissed Bill.

Here again we will have two options, depending on which way we choose to interpret  $ID$ 's contribution. By plural predicating  $ID$  of a family of questions, (26) basically returns the same set we obtain from the single-pair reading, (30), with the only difference being that this set allows, and in fact requires, the existence of multiple maximally informative true answers by virtue of having had  $ID$  apply before taking the union.

(30)  $\{\lambda p. \exists x \in \llbracket \text{girl} \rrbracket^{w_0} \wedge \exists y \in \llbracket \text{boy} \rrbracket^{w_0} \wedge p = \lambda w. x \text{ kissed}_w y\}$

At this point, *know* would apply to this set as in (31). Given that in this case  $Q$  contains three true propositions, for someone to know this question on its pair list reading, they need to believe three distinct propositions (and additionally have no false beliefs).

(31)  $\llbracket \text{know} \rrbracket = \lambda w. \lambda Q. \lambda x. \forall p \in Q [p(w) \rightarrow \text{believe}(w)(p)(x)] \wedge$   
 $\forall p \in Q [\text{believe}(w)(p)(x) \rightarrow p(w)]$

There are a few problems with this approach. First of all, we are no longer taking  $ID$  to be vacuous given that it actually contributes to meaning when it acts on families of questions by returning not the same family, but a set of propositions. Second,  $know_Q$  can no longer have a meaning in terms of its propositional counterpart, as in (32), since in these cases to know a question requires knowing more than one proposition, contrary to what *Ans* in (32a) would return.

(32)  $\llbracket \text{know}_Q \rrbracket = \lambda w. \lambda Q. \lambda x. \text{know}_p(w)(\text{Ans}(Q)(w))(x)$

a.  $\text{Ans}(Q)(w) = \iota p [p(w) \wedge Q(p)=1 \wedge \forall p' \in Q (p'(w) \rightarrow p \subseteq p')]$

And lastly, by taking families of questions to ultimately denote questions, we can no longer account for the observation in Fox 2012 that pair-list readings exhibit a multiple question effect, as in (33). Fox appeals to the notion of quantification variability to illustrate that there is a difference (if ever so slightly) between single *wh*-questions, the (i) examples, and multiple *wh*-questions, the (ii) examples. The idea is that modifiers such as *for the most part*, *in every case*, or *with no exceptions* can be used with families of questions to indicate what subset of the families of questions the agent stands in a *know* relation with.<sup>2</sup> This difference between the (i) and (ii) cases, however, can only hold true if families of questions and regular questions have different denotations. By taking *Id* to return a question when applied to a family of questions, there would no longer be a type difference between families of questions and regular questions so the contrast in (33) would have to be accounted for differently.

- (33) a. (i) \*For the most part, I would like to know who will vote for John in the upcoming elections.  
 (ii) ?For the most part, I would like to know who will vote for whom in the upcoming elections.  
 b. (i) \*In every case I would like to know who voted for Bush (except for Bill).  
 (ii) ?In every case I would like to know who voted for whom (except for Bill).  
 c. (i) \*With no exceptions, I would like to know who voted for Bush.  
 (ii) With no exceptions, I would like to know who voted for whom.

Let's turn now to how embedding works under the assumption that *Id* is a filter throughout. What that would mean is that *know* would have as a sister a set of sets of propositions, rather than a set of propositions. This should not be an issue since we can have *know* apply to this set distributively, as shown in (34). Under this account, we can maintain a somewhat more uniform denotation for *know*(*Q*), provided in (34a).

- (34) a.  $\llbracket \text{know}_{\langle stt,t \rangle} \rrbracket = \lambda w. \lambda K_{\langle stt,t \rangle}. \lambda x. \forall Q \in K \rightarrow \text{know}(Q)$

<sup>2</sup>Although, crucially, I take questions to denote sets of propositions, while Fox takes them to denote propositions. Nonetheless, the idea would still be the same in that families of questions are of a higher type than regular questions and that this is what accounts for the difference.



$$b. \llbracket \text{know}_{\langle st,t \rangle} \rrbracket = \lambda w. \lambda Q_{\langle st,t \rangle}. \lambda x. \text{know}_p(w)(\text{Ans}(Q)(w))(x)$$

This approach will furthermore allow for a better understanding of the multiple question effect illustrated above.

Concluding the discussion on families of questions, we discussed two options for how to deal with the point-wise uniqueness and domain-exhaustivity requirements that surface in multiple *wh*-questions. One option took ID to act on a family of questions and return a question, while the second option had it take on its regular filter-like meaning and return the same family of questions. Depending on which one of these approaches we adopted, I showed that we end up having to provide different stories for how predicates embed pair list readings. I outline these two options below.

(35)  $\llbracket \text{John} [\text{knows} [\text{ID} [\text{which girl kissed which boy}]]]] \rrbracket$

OPTION 1: (step i) plural predication of ID( $\llbracket \text{which girl kissed which boy} \rrbracket$ )

(step ii) functional application of know( $\llbracket \text{ID}(\text{which girl kissed which boy}) \rrbracket$ )

OPTION 2: (step i) point wise application of ID( $\llbracket \text{which girl kissed which boy} \rrbracket$ )

(step ii) distributive meaning of know( $\llbracket \text{ID}(\text{which girl kissed which boy}) \rrbracket$ )

#### 6.1.4 A note on covert *only*

How does covert *only* fit into the picture? Given the acceptability of NPIs in multiple *wh*-questions, its presence is not up for debate, at least under an analysis such as the one advanced in this thesis. I propose that there are two possible configurations: either *only* associates with both *wh*-traces, in which case we would only get the single pair reading, or it associates with the lower *wh*-trace, which would allow for either the single pair or the pair list reading. The idea is that by associating with both traces, the contribution of *only* is basically that of saying that there is a single pair of kissers, hence disallowing cases involving multiple kissing partners.<sup>3</sup>

(36) Which girl kissed which boy?

{it's only the case that Mary kissed John, it's only the case that Mary kissed Bill,

---

<sup>3</sup>As in the case of single *wh*-questions, observe that the presence of *only* makes the contribution of ID superfluous as there can ever only be one single proposition that is true in a given world.

it's only the case that Suzy kissed John, it's only the case that Suzy kissed Bill}

On the other hand, by taking *only* to associate only with the lower *wh*-trace, we allow for any kissing pairs as long as for every kisser there is only one kissee, which is consistent with either the single pair reading, (37a), or the pair list reading, (37b).

- (37) Which girl kissed which boy?
- a. {Mary kissed only John, Mary kissed only Bill, Suzy kissed only John, Suzy kissed only Bill}
  - b. {{Mary kissed only John, Mary kissed only Bill},  
{Suzy kissed only John, Suzy kissed only Bill}}

The question that remains is the following: what disallows *only* from associating only with the higher *wh*-trace? I claim that this option is not completely ruled out, and in fact the reading it brings about is consistent with the question in (38), which is the superiority-violating version of the question we have been discussing up till this point. I have not discusses issues of superiority in this thesis, but one proposal in the literature is that superiority can be violated whenever the overall meaning conveyed by the question is distinct from the non-superiority violating structure.

- (38) Which boy did which girl kiss?

This issues requires further thought, but what seems to be the case is that *only* associates with whatever *wh*-phrases occupy the innermost specifier of C: both *wh*-phrases in the case of a single pair reading, or the lower/higher one in case of a pair list reading, depending on the meaning tried to get across.

## 6.2 Questions with quantifiers

On its pair list reading, a *wh*-question with a universal quantifier, (39a), appears to call for a similar answer, (39c), as the corresponding multiple *wh*-question, (39b). It asks for an exhaustive list of all the girls and their kissing partners, and presupposes that the number

of boys each girl kissed not exceed one.<sup>4,5</sup>

- (39) a. Which boy did every girl kiss?  
b. Which boy did which girl kiss?  
c. Ann kissed Fred, Mary kissed Greg and Suzy kissed Bill.

Similarly, a *wh*-question with an existential quantifier such as *two girls* in (40a) receives an equivalent answer as the pair-list reading of the corresponding multiple *wh*-question in (40b), under the assumption that *which girl* quantifies over a set of two girls, the choice of which is left up to addressee.

- (40) a. Which boy did two girls kiss?  
b. Which boy did which girl kiss?  
c. Ann kissed Fred and Mary kissed Greg.  
d. Ann kissed Fred and Suzy kissed Bill.

In a sense, asking something like (40a) amounts to providing the addressee with a number of questions and letting him choose one of those questions to answer fully (while respecting domain-exhaustivity and point-wise uniqueness). Put differently, to know a pair list answer to *which boy did two girls kiss*, it suffices to know for some group of two girls, which girl kissed which boy.

The big question faced by any analysis that aspires to unify all these types of questions is how to compositionally derive the similarity between questions with quantifiers and multiple *wh*-questions in terms of the answers they receive, while at the same time capturing the observation that questions with existential quantifiers involve a choice that is not available for multiple *wh*-questions. In other words, taking *two girls* to be a plain existential and assuming it can behave like a regular *wh*-phrase would not be enough to

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<sup>4</sup>All of these questions also allow for single pair readings as well as functional readings. For a discussion on how the single pair readings can be obtained, I refer the reader to Chapter 3, section 1.

<sup>5</sup>One needs to be careful in constructing these examples so as to avoid instances where the pair list readings of questions with quantifiers can be reduced to functional readings (Engdahl, 1986). The goal is to relate pair list reading readings of questions with quantifiers to pair list readings of multiple *wh*-questions, so one needs to argue against an alternative analysis which takes pair list reading readings of questions with quantifiers to be reducible to functional readings. There are proposals out there that take these readings to be no different from functional readings, but see arguments in Groenendijk and Stokhof 1984 and Chierchia 1993 that functional readings pattern with single pair readings rather than with pair list readings.

capture the fact that questions with existential quantifiers involve a choice among possible groups of two girls. If we assume that pair list readings can only ever be derived via one mechanism, the one employed in multiple *wh*-questions, namely by having two existentials, each in the scope of a separate  $C_{int}$  head, another dilemma will be how to deal with the fact that universal quantifiers end up receiving an existential-like interpretation, akin to the interpretation we ascribe to *wh*-phrases.

In the remainder of this section I provide answers to these questions and offer an account of questions with quantifiers that tries to depart as little as possible from independently needed assumptions regarding questions. I begin the discussion with an informal outline of the pieces we seem to need and postpone the formal analysis till a later subsection.

The proposal that I use as a springboard for my analysis is the one in Chierchia 1993, itself inspired by the account provided by Groenendijk and Stokhof (1984), which analyses the pair list readings of questions with quantifiers as generalized quantifiers over questions, with the denotation in (41).

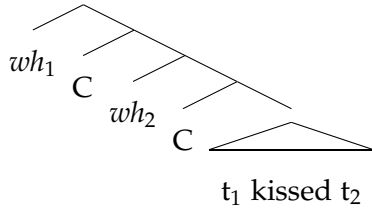
$$(41) \quad \lambda K_{\langle Q,t \rangle}. \exists S \in \text{MWS}(\text{every girl/two girls}) \wedge \\ K(\lambda p. \exists x \exists y [S(x) \wedge \text{boy}(y) \wedge p = \lambda w. x \text{ kissed}_w y])$$

I will make little reference to the specifics of this account as they are much too involved and would distract from the flow of the presentation. Suffice it to say, however, that this account is, to date, one of the better attempts at addressing all the issues I discussed above: the relation between questions with quantifiers and the corresponding multiple *wh*-question, the idea of having a choice among possible questions, and a uniform analysis of all quantifiers as existentials. The account I will end up proposing is nothing more than an update on an already capable theory of questions with quantifiers.

### 6.2.1 Deriving the pair-list interpretation

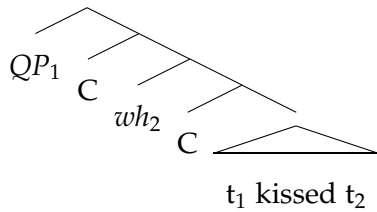
We already know how pair list readings for multiple *wh*-questions are obtained: two interrogative  $C$  heads, each with a separate *wh*-phrase in its specifier, simplified as in (42).

(42) pair list readings for multiple *wh*







In order to derive the fact that questions with quantifiers give rise to similar readings, and crucially, that pair list readings have only one source (i.e. (42)), I propose we assume that quantifier phrases (QPs) have the option of “taking on” *wh* meanings. That is, that they can move like *wh*-phrases to the specifier of C heads, and that they can be interpreted like *wh*-phrases, namely as existentials.

(43) pair list readings for questions with quantifiers



Getting quantifiers to move like *wh*-phrases should not be too hard of a task since we can simply say that they are optionally endowed with a [WH] feature.<sup>6</sup> Having them be interpreted as existentials, across the board and regardless of their quantificational force, is, however, quite the leap. Nonetheless, let’s take it as a given for now that this option is actually there in the grammar. What that would mean then is that the universal and existential quantifiers would be interpreted as in (44a) and (44b), respectively (note that there would be no change in the meaning of the existential).

- (44) a.  $\lambda P.\forall x[\text{girl}(x) \rightarrow P(x)]$   $\xrightarrow{\text{WH}}$   $\lambda P.\exists x[\text{girl}(x) \wedge P(x)]$
-   
every girl
-   
some girl
- b.  $\lambda P.\exists x[\text{girl}(x) \wedge |x|=2 \wedge P(x)]$   $\xrightarrow{\text{WH}}$   $\lambda P.\exists x[\text{girl}(x) \wedge P(x)]$
-   
two girls
-   
some girl

<sup>6</sup>Crucially, however, this feature would have to be parasitic on the presence of an actual *wh*-phrase somewhere in the structure or else the system would have the option of over-generating interrogative meanings even in cases without actual *wh*-phrases.

Given these initial assumptions regarding the behavior of QPs in questions and the fact that *wh*-phrases are themselves analyzed as existentials, we would predict the following three questions to have the same denotation on their pair-list reading, namely the set of questions in (45d). Assume we're in a situation with three girls.

- (45) a. Which girl kissed which boy?  
 b. Which boy did every girl kiss?  
 c. Which boy did two girls kiss?  
 d.  $\left\{ \begin{array}{l} \text{Which boy did Ann kiss?,} \\ \text{Which boy did Mary kiss?,} \\ \text{Which boy did Suzy kiss?} \end{array} \right\}$

(45d) gives us the right meaning for (45a) and (45b), but crucially not so for (45c). What this question asks for is not an answer to every question in (45d), but an answer to any two of those questions. In other words, the addressee is given the option to answer one of the questions in (46).

- (46) a. Which girl<sub>Ann,Mary</sub> kissed which boy?<sub>pl</sub> =  $\left\{ \begin{array}{l} \text{Which boy did Ann kiss?,} \\ \text{Which boy did Mary kiss?} \end{array} \right\}$   
 b. Which girl<sub>Ann,Suzy</sub> kissed which boy?<sub>pl</sub> =  $\left\{ \begin{array}{l} \text{Which boy did Ann kiss?,} \\ \text{Which boy did Suzy kiss?} \end{array} \right\}$   
 c. Which girl<sub>Suzy,Mary</sub> kissed which boy?<sub>pl</sub> =  $\left\{ \begin{array}{l} \text{Which boy did Mary kiss?,} \\ \text{Which boy did Suzy kiss?} \end{array} \right\}$

It looks then that interpreting *two girls* as a regular existential does not give us the right meaning for the question, while it does by interpreting *every girl* as an existential.

An easier way to understand what's going on in the existential cases is by looking at the meaning of such questions in embedded contexts. For example, if someone tells you that *John knows which boy two girls kissed*, you infer that there is a set of two girls for which *John knows which girl kissed which boy*. Essentially, what seems to happen in these cases is that the set of girls under consideration is reduced to 2 membered subsets of the set of girls. It's as if we were answering the question *which girl kissed which boy* in a scenario in which there are two and not three girls. The closest approximation to the meaning conveyed by these questions is as follows: we have a multiple *wh*-question where the restrictor of the *wh*

corresponding to the QP, *which girl*, is allowed to vary in a way that is determined by the meaning of the QP itself.

- (47) John knows which boy two girls kissed.
- a. There is a set of two girls such that John knows which of those girls kissed which boy.
  - b.  $\exists S \in [\text{two girls}] \wedge \text{John knows which } S \text{ kissed which boy.}$

Maybe an even more compelling example that these questions involve a choice is that given the same situation, I would not necessarily assume that Jenny and Will in (48a) share the same knowledge, while I would take it for granted that Jeremy and Chris share the same knowledge in (48b).

- (48) a. (i) Jenny knows which boy two girls kissed.  
(ii) Will knows which boy two girls kissed.
- b. (i) Jeremy knows which girls kissed which boy.  
(ii) Chris knows which girls kissed which boy.

The conclusion we can draw from this observation is that if we want to maintain that the pair list reading of questions with quantifiers is obtained the same way as the pair list reading for multiple *wh*-questions, something more needs to be said about these choice readings.

### 6.2.2 Deriving the quantificational force

Recall the baseline assumption: questions with quantifiers denote families of questions on their pair list readings similarly to multiple *wh*-questions. In order to derive this compositionally we need to assume that at some level, quantifier phrases denote existentials, just like *wh*-phrases. As we saw above, the crucial difference between the existential corresponding to the QP and the existential corresponding to the *wh*-phrase rests on how the restriction is chosen. In a regular *wh*-question, this restriction is assumed to be the entire domain of discourse. So for a question like (49a), the first *wh*-phrase would correspond to an existential quantifier over the set of all girls (in the discourse), while the second one

to an existential over the set of all boys, as indicated in the denotation of this question provided in (49b).

- (49) a. Which girl kissed which boy?  
 b.  $\lambda Q_{\langle st,t \rangle}. \exists x \in \llbracket \text{girl} \rrbracket \wedge Q = \lambda p_{\langle st \rangle}. \exists y \in \llbracket \text{boy} \rrbracket \wedge p = \lambda w. x \text{ kissed}_{w} y$   
 c.  $\llbracket \text{girl} \rrbracket = \{ \text{Ann, Mary, Suzy} \}$

On the other hand, a question with a quantifier like (50) would still denote a family of questions, but in this case the restriction of the existential corresponding to *two girls* would range over a set S, which has the property of denoting a set containing two girls (no more, no less), as in (50c).

- (50) a. Which boy did two girls kiss?  
 b.  $\lambda Q_{\langle st,t \rangle}. \exists x \in S \wedge Q = \lambda p_{\langle st \rangle}. \exists y \in \llbracket \text{boy} \rrbracket \wedge p = \lambda w. x \text{ kissed}_{w} y$   
 c.  $S \in \{ \{ \text{Ann, Mary} \}, \{ \text{Ann, Suzy} \}, \{ \text{Mary, Suzy} \} \}$

It's precisely the availability of a plurality of such sets (containing exactly two girls) that gives rise to the choice-like reading for these questions. This is what makes it possible for Jenny, Will and Chris to know different things in (51); they know the question in (50b) for different values of S.

- (51) a. Jenny knows which boy two girls kissed.  
 b. Will knows which boy two girls kissed.  
 c. Chris knows which boy two girls kissed.

We can represent the variability in these questions via existentially quantifying over these sets S, as in (52), which amounts to the disjunction of three propositions in (52a-c):

- (52)  $\exists S \in \{ \{ \text{Ann, Mary} \}, \{ \text{Ann, Suzy} \}, \{ \text{Mary, Suzy} \} \}$   
 $\wedge$  Jenny knows which S kissed which boy.  
 a. Jenny knows which girl<sub>Ann,Mary</sub> kissed which boy.  
 b. Jenny knows which girl<sub>Ann,Suzy</sub> kissed which boy.  
 c. Jenny knows which girl<sub>Mary,Suzy</sub> kissed which boy.

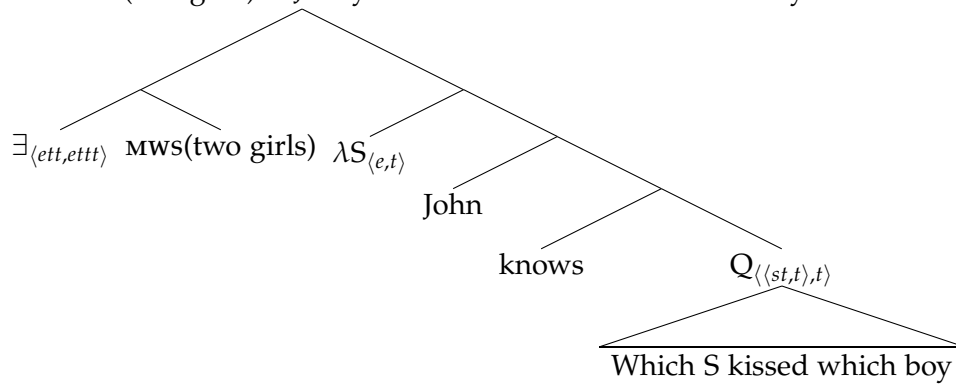


What these sets  $S$  denote and how they are selected depends on the meaning of the quantifier phrase. A quantifier phrase,  $\langle et, t \rangle$ , denotes a set of sets. In the case of *two girls*, it denotes the set consisting of all sets of individuals containing at least two girls, as in (53a). These are sometimes referred to as the witness sets of the quantifier (Barwise and Cooper, 1981). The issue is that in the context of questions, we are interested only in a subset of (53a), namely those sets which don't have a subset that belongs to the denotation of the quantifier, i.e. every set that has two girls and no other individual, (53b). This subset is referred to as the minimal witness set of the quantifier and I will henceforth refer to it as  $\text{mws}(\text{QP})$ .

- (53) a.  $\llbracket \text{two girls} \rrbracket = \{ \{ \text{Ann, Mary} \}, \{ \text{Ann, Suzy} \}, \{ \text{Mary, Suzy} \}, \{ \text{Ann, Mary, Suzy} \}, \{ \text{Ann, Mary, Jim} \}, \{ \text{Ann, Suzy, Bill, Chris} \}, \{ \text{Mary, Suzy, Chris} \}, \dots \}$   
 b.  $\text{mws}(\text{two girls}) = \{ \{ \text{Ann, Mary} \}, \{ \text{Ann, Suzy} \}, \{ \text{Mary, Suzy} \} \}$   
 c.  $\text{mws}(\text{QP}) = \{ S : S \in \llbracket \text{QP} \rrbracket \wedge \neg \exists S' [ S' \in \llbracket \text{QP} \rrbracket \wedge S' \subset S ] \}$

Putting all these pieces together, it looks like we want the final denotation of a question with a quantifier, on its pair list reading, to be as in (54):

- (54) *Jenny knows which boy two girls kissed.*  
 $\exists S \in \text{mws}(\text{two girls}) \wedge \text{Jenny knows which } S \text{ kissed which boy.}$



Before we try to understand how this can be derived compositionally, note that the same denotation would be appropriate for a question with the quantifier *every girl*, provided in (55a). The only difference would be that here we are quantifying over minimal witness sets of *every girl*. Since there is only one set, the set containing all the girls and nobody else, (55b), the embedded question in (55) can only ever denote one family of questions

given that there is only one option for the value of S (rather than three possible families of questions as was the case with *two girls*).

- (55) Jeremy knows which boy every girl kissed.
- a.  $\exists S \in \text{MWS}(\text{every girl}) \wedge \text{Jenny knows which S kissed which boy.}$
  - b.  $\text{MWS}(\text{every girl}) = \{\{\text{Ann, Mary, Suzy}\}\}$

Existentially quantifying over a singleton set is vacuous so this move gets us nothing that we couldn't already obtain by assuming universal quantifiers can optionally be interpreted as existentials.<sup>7</sup> While this way of deriving the pair list reading of a *wh*-question with a universal quantifier is more involved than possibly necessary, it does point towards a unified account of quantifiers in questions by taking both existentials and universals to involve quantification over minimal witness sets. Another advantage to invoking minimal witness sets in the context of quantifiers in questions is that it allows us to account for the lack of pair list readings for questions such as (56):

- (56) a. Which boy did no girl kiss?  
b. Which boy did at most two girls kiss?

The account, due to Chierchia (1993) and Groenendijk and Stokhof (1984) is that these questions lack pair list readings because the quantifiers are downward entailing and thus have no minimal witness sets; there is no set of individuals in the denotation of *no girl* that contains no girls and is furthermore a subset of every other such set. Similarly for *at most two girls* and any other downward entailing quantifier.

There are, of course, some issues with this approach. For example, *most*, an upward entailing quantifier that has minimal witness sets, does not appear to allow for pair-list readings in questions (cf. Chierchia (1993)).

- (57) What do most students like?  
\*Mary likes phonology, John likes syntax, . . . .

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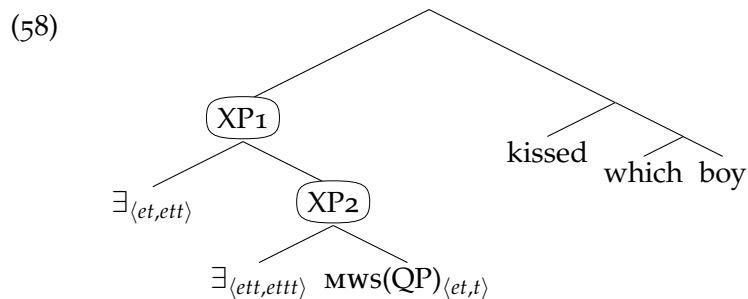
<sup>7</sup>Which was clearly a far-fetched assumption to begin with.

Dayal (1996) proposes to deal with this problem by minimally changing the account so as to only allow quantifiers that have **unique** minimal witness sets. Since *most* does not have a unique such set, she correctly rules it out. The problem is that while this approach makes the right prediction for *most*, it also rules out all indefinites as they too lack unique minimal witness sets. I leave this as an open problem and continue appealing to minimal witness sets for the remainder of the chapter.

### 6.2.3 Higher order quantifiers

The main issue in dealing with the quantifier is understanding the compositional mechanisms that drive it to be interpreted in two places in the structure, both times differently (ignoring the trace which ends up being interpreted as a regular variable). We need to account not only for this peculiar fact, but also for the fact that, regardless of its quantificational force, it will systematically give rise to existential interpretations. The only point where the quantificational power of the QP makes a difference is at the topmost level, when we decide how to select the quantificational domain of the restriction, which too is done by existentially quantifying over the QP's minimal witness sets.

That one quantifier could correspond to two separate instances of quantification could be understood as follows. Assume that in questions, generalized quantifiers can optionally start their lives as complex XPs, such as in (58).<sup>8</sup>

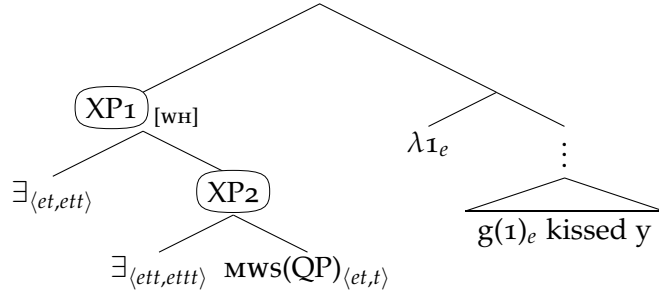


First, XP<sub>1</sub> leaves behind a trace of type *e* and subsequently abstracts over it. I argue that this is *wh*-movement, meaning that XP<sub>1</sub> carries a WH feature, akin to other *wh*-phrases.<sup>9</sup>

<sup>8</sup>What I'm doing here is extending the idea of head movement out of complex heads (cf. Shimada 2007) to account for phrasal movement.

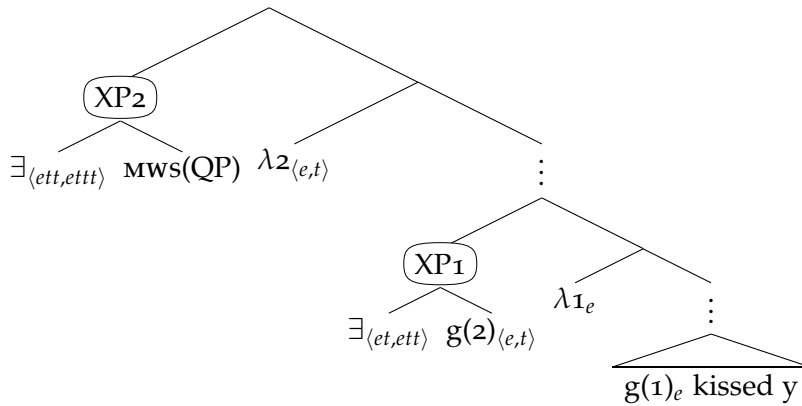
<sup>9</sup>Two issues arise in connection to this. Why is it that these guys move covertly, unlike other *wh*-phrases? One possible answer would be to say that, at least in English, only phonologically marked *wh*-phrases can be spelled out in the specifier position of C. Second of all, note that we need to block these guys from surfacing

(59)



The second instance of movement, that of XP<sub>2</sub>, is type-driven since XP<sub>2</sub> is type  $\langle ett, t \rangle$ , the wrong type to combine with the silent existential quantifier that heads XP<sub>1</sub>,  $\exists_{\langle et, ett \rangle}$ . This QR-type move leaves behind a trace of type  $\langle e, t \rangle$ , a predicate, and once we lambda abstract over it we give it a sister of the correct type,  $\langle et, t \rangle$ .

(60)



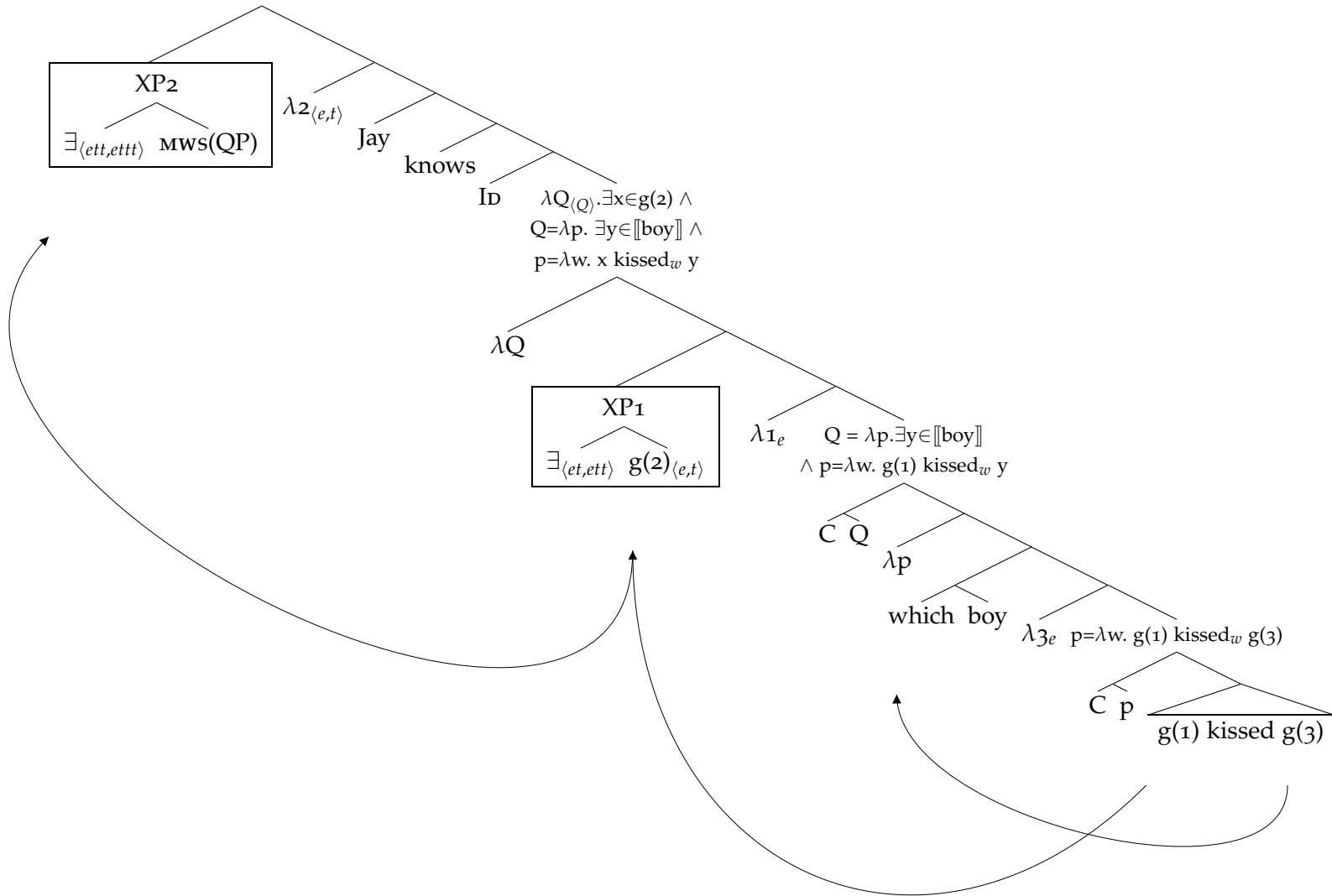
The meaning of these XPs is provided in (61), where  $mws(QP)$  is a set of predicates, a set containing the minimal witness sets of the GQP.

- (61) a.  $\llbracket XP_1 \rrbracket = \lambda P_{\langle e, t \rangle}. \exists x [S(x) \wedge P(x)]$                       quantifier over individuals  
 b.  $\llbracket XP_2 \rrbracket = \lambda P_{\langle et, t \rangle}. \exists S [(mws(QP))(S) \wedge P(S)]$                       quantifier over predicates

Where in the structure do these guys move to? XP<sub>1</sub>, by virtue of undergoing *wh*-movement, will end up in the specifier of a  $C_{int}$ , similarly to what any other *wh*-phrase would do. This move is what's going to give us the family of questions meaning, i.e. create the second-order question. But what about XP<sub>2</sub>? This move also needs to take place at a phrasal level, i.e. a scope site, a type  $t$  node. The first such node above XP<sub>1</sub> is going to be the topmost node, corresponding to *Jay knows . . .*. It all comes together as in (62). There is some set  $S$  of girls for which Jay knows which girl in  $S$  kissed which boy.

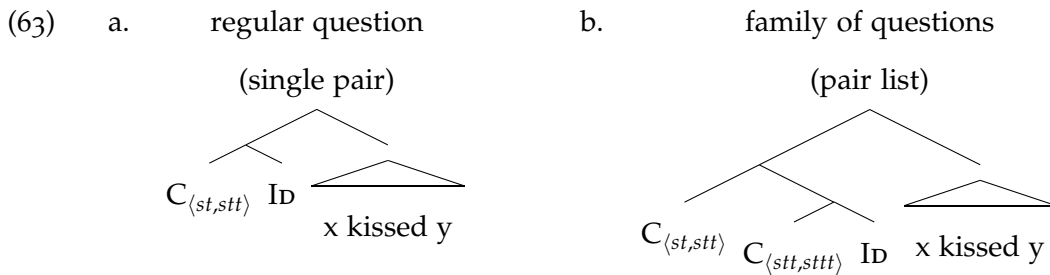
solo, i.e. in the absence of other *wh*-phrase, since that would dramatically over-generate; see fn 3.

- (62) Jay knows which boy every girl/two girls kissed.  
 $\exists S [S \in (\text{MWS}(\text{every girl/two girls})) \wedge \text{Jay knows Id}[\lambda Q_{(Q)}. \exists x \in S \wedge Q = \lambda p. \exists y \in [\text{boy}] \wedge p = \lambda w. x \text{ kissed}_w y]]$



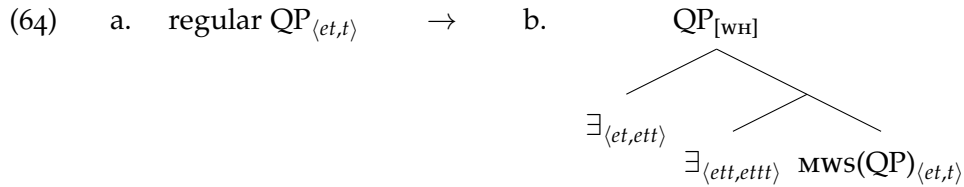
### 6.2.4 Interim conclusion

In this section I focused on the pair list readings of questions with quantifiers and offered a compositional account that can derive these readings. Given the striking similarity between pair list readings of multiple *wh*-questions and pair list readings of questions with quantifiers, the overarching goal was to deviate as little as possible from the overall architecture of the system that I presented in section 1.2 for the pair list readings of multiple *wh*-questions. Just like with the move from single pair to pair list readings for multiple *wh*-questions, questions with quantifiers can go from a simple question denotation to a family of questions denotation by moving from the complex C head in (63a), which gives us a regular question, to the even more complex C head in (63b), which gives us a family of questions.



Given a system in which the number of C heads needs to be at most as high as the number of XPs that bear a *wh* feature ( $|C^o| \leq |XP_{[WH]}|$ ),<sup>10</sup> I had to propose that quantifiers in questions can optionally take on the role of a *wh*-phrase so as to justify the move from (63a) to (63b), i.e. to a family of questions. We can think of the switch from a regular quantifier meaning to a *wh*-like meaning, repeated in (64), as a possible repair mechanism that allows us to reinterpret the question on a pair list reading whenever the single pair reading is not available in the context.

<sup>10</sup>Recall, this is a stipulation that we need to make in order to avoid over-generating higher-order questions in the absence of multiple *wh*-phrases.



Under this *wh*-meaning, through a combination of *wh*-movement and QR, a portion of the complex quantifier will end up quantifying in all the way at the top, the first available scope position above the question. What this approach amounts to is creating a family of questions wherein the quantifier is interpreted as an existential over a variable of type  $\langle e,t \rangle$ . This variable ends up bound above the question, and this provides the domain of quantification of the existential corresponding to the quantifier.

One question that still needs to be addressed is what happens in un-embedded questions, where there is no embedding-predicate, and for that matter, no scope position for the quantifier to QR to. On my account, I have tacitly assumed that un-embedded questions are interpreted as speech acts, as in (65b) for (65a) (cf. Krifka 2001 on this topic). This allows us the freedom to QR out of the question similarly to the embedded cases.<sup>11</sup>

- (65) a. Who came to the party?  
 b. I want to know who came to the party.

The careful reader will have noticed that we have disregarded the option where the quantifier is interpreted on its *wh*-meaning, as in (64b), and the interrogative C head on its regular question meaning, (63a). This would amount to interpreting the question in (66) on its single pair reading, with the denotation in (66b), and would thus allow for an answer that names a single pair of kissers in a situation in which only one girl did any kissing. This reading doesn't seem to be there. That is, there's an expectation that when asking this question it is common knowledge that there are at least two girls who kissed somebody.

<sup>11</sup>An issue that arises related to this is pointed out by Szabolcsi (1997), also following Moltmann and Szabolcsi (1994), that the availability of pair list readings with root questions with quantifiers is much more restricted than I have actually presented it in this chapter. In particular, Szabolcsi observes that basically only the universal gives rise to a pair list reading in root questions, while in embedded contexts, the readings are more liberal. It's unclear what the reasoning behind this might be, especially on an analysis such as mine which takes both root and embedded questions to be interpreted as the argument of a (possibly covert) question-embedding predicate.

(66) Which boy did two girls kiss?

a. Ann kissed Fred.

b.  $\exists S [S \in (\text{mws}(\text{two girls})) \wedge$

I want to know  $\text{Id}[\lambda p. \exists x \in S \wedge \exists y \in [\text{boy}] \wedge p = \lambda w. x \text{ kissed}_w y]$

Nothing that we have said this far excludes such structures. The issue we encounter here is reminiscent of what we see with the difference between singular and plural *which* phrases. The question in (67a) presupposes that there is only one girl who kissed John, which we can deal with easily once we assume that singular *which* phrases can only quantify over atoms. (67b), on the other hand, comes with the inference that a plurality of girls kissed Fred, despite the fact that in a situation in which only one girl kissed Fred, the semantics we give these questions would derive that as a possible answer since plural *which* phrases quantify over both pluralities and atoms.

(67) a. Which girl kissed John?

b. Which girls kissed Fred?

It's unclear to me how to deal with this contrast but I believe that a solution to (67) will pave the way for an understanding of why (66) disprefers a single pair reading.<sup>12</sup>

An advantage of this general approach to questions with quantifiers is that we don't have to appeal to a special embedding rule since everything we have said about embedding families of questions carries over smoothly to these cases. In particular, the *Id* operator will function similarly to how it does with a family of questions, via point wise application, and it will require each member of the family of questions to contain one (and only one) maximally informative true proposition.

### 6.2.5 Two types of single pair readings

This section dealt specifically with the pair list reading of questions with quantifiers. Before moving on to mention some questions, it's worth noting (again) that questions with quantifiers can also receive single pair readings. In fact, on their non pair-list readings, questions

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<sup>12</sup>It could also just be the case that *wh*-marked quantifiers cannot share a specifier position with another *wh*-element.



with existentials can receive one of the two readings in (i) and (ii).

- (68) a. Which boy did some girl kiss?  
 (i) John, he was kissed by a girl.  
 (ii) Ann kissed John.
- b. Which boy did some girls kiss?  
 (i) Fred, he was definitely kissed by at least a couple of girls.  
 (ii) Suzy and Mary kissed Fred.

That these readings are in fact different can be observed more easily when we look at what happens in embedded contexts. For someone to know *which boy some girl(s) kissed*, it would be enough to know the identity of the boy who was kissed by a singularity/plurality of girls. This reading corresponds to (68a.i)/(68b.i), and is derived by interpreting the quantifier within the nucleus of the question, as in (69).<sup>13</sup>

- (69) Someone knows  $\text{ID}[\lambda p. \exists y \in \llbracket \text{boy} \rrbracket \wedge p = \lambda w. \exists x \in \llbracket \text{girl(s)} \rrbracket \wedge x \text{ kissed}_w y]$

There is also another reading, (68a.ii) and (68b.ii), which corresponds to a case in which someone knows not only who that boy was, but can also identify the girl(s) who kissed him. In order to derive this reading we would have to allow the quantifier to receive wide scope, that is, to QR to a position above the question, as in (70).

- (70)  $\exists x \in \llbracket \text{girl(s)} \rrbracket \wedge \text{someone knows ID}[\lambda p. \exists y \in \llbracket \text{boy} \rrbracket \wedge p = \lambda w. x \text{ kissed}_w y]$   
*there is a y (an individual or plurality) and someone knows that y kissed Fred*

---

<sup>13</sup>One issue that came up in Fox 2012 is what predictions do we make in a situation such as the following. Consider that Ann kissed John but that Jim wrongly believes it to be the case that Suzy kissed John. Would it still be true that *Jim knows which boy some girl kissed*? My intuition is that this would count as true because Jim correctly believes that there is a girl who kissed John, despite him being wrong about the identity of that girl. As far as I can tell, the denotation in (69) can account for this reading since we evaluate John's belief set with respect to propositions of the form in (i) which make no reference to the identity of the kisser.

(i)  $\exists y \in \llbracket \text{boy} \rrbracket \wedge p = \lambda w. \exists x \in \llbracket \text{girl(s)} \rrbracket \wedge x \text{ kissed}_w y$   
 For people whose judgements don't coincide with mine, I would have to claim that their only interpretation of such questions is via wide-scope of the quantifier, as in (70).

### 6.3 Mention some questions

Throughout most of the discussion in the previous chapters we have dealt with the issue of weak versus strong exhaustivity and tacitly assumed that un-embedded questions always go for a strongly exhaustive interpretation so as to convey the maximally informative true proposition. This is not always the case, however. There are instances where something less than the maximally informative answer suffices, and this tends to happen particularly in the presence of existential quantifiers and existential modals. Consider the questions in (71). The answers provided seem very appropriate despite the fact that they don't necessarily exhaust the list of possibilities. The umbrella term for these questions is mention some questions.

- (71) a. What did some of your students write about in their final papers?  
Greg wrote about plurality, Julie wrote about classifiers.
- b. Who can finish a whole pizza?  
John can finish a whole pizza.

What makes these questions "mention some" is the presence of a particular element that makes it possible for the question to receive an answer that, on a particular representation, would still count as a maximally informative answer. Existential quantifiers like *some students* and existential modals like *can* are precisely such elements. Something about the way they interact with other elements in the question is responsible for the availability of these peculiar readings. Observe that the minimally different variants of the questions in (71) do not exhibit this same variability, see (72).

- (72) a. What did your students write about in their final papers?
- b. Who finished a whole pizza?

One way to see this "optionality" at work is by comparing the meaning of their embedded variants. Jill and Jamie can have different belief sets in (73a) and still count as knowing the question, while the same is not true for (73b) where the only way for them to count as knowing the question is by sharing the same (relevant) set of beliefs.

- (73) a. (i) Jill knows what some of your students wrote about in their papers.  
 (ii) Jamie knows what some of your students wrote about in their papers.  
 b. (i) Jill knows what your students wrote about in their papers.  
 (ii) Jamie knows what your students wrote about in their papers.

The issue that needs to be addressed at this point is how to account for the availability of mention some readings for questions with existential quantifiers or existential modals without weakening the requirement that questions seek the most informative answer.

### 6.3.1 Existential quantifiers

In the previous section we looked at questions with quantifiers, and in particular at the different readings that arise in the presence of existential quantifiers. I described those readings as choice readings, but for all intents and purposes, a choice reading is equivalent to a mention some reading. Briefly recapping that discussion, I claimed that the choice/mention some reading for a question such as (74a) comes about via a reinterpretation of the quantifier as a complex existential quantifier that bears a *wh* feature. Having it bear a *wh* feature allowed us to analyze these questions on par with multiple *wh*-questions and thus derive the fact that at some level, they denote families of questions that need to respect the same restrictions as regular questions: point wise uniqueness and domain exhaustivity (by virtue of having ID apply to the family of questions). Furthermore, by reinterpreting the quantifier as a complex existential, we had to invoke quantifying in, an operation which gave us the option of choosing a subset of the quantifier for which to answer the question fully. Hence the choice reading in (74b).

- (74) a. What did some of your students write?  
 b. For some subset S of your friends, I want to know what S wrote.

The task ahead of us is to see if and how we can carry over this analysis to account for the mention some readings of questions with existential modals in a systematic way. Since modals cannot bear *wh* features, or be reanalyzed as complex modals, the trick we used for existential quantifiers will not be of use. And yet, maybe it can . . . .

### 6.3.2 Existential modals

Consider the question in (75) and assume that *wh*-phrases are interpreted distributively, as if they were the sister of a silent *each*, following Fox (2012).<sup>14</sup> The idea here is that depending on where you distribute, i.e. below or above the existential modal, you will obtain different sets of propositions:

- (75) Who can chair this committee?
- a. LF1:  $\lambda p$  [who  $\lambda X$  [[C p]  $\lambda w$  [X each]  $\lambda y$  can y chair this comm]]  
 $\{\forall y \in \text{ATOM}(X) \diamond[\text{chair}(y, \text{comm})]: X \in (\text{people})\}$
- b. LF2:  $\lambda p$  [who  $\lambda X$  [[C p]  $\lambda w$  can [X each] chair this comm]]  
 $\{\diamond \forall y \in \text{ATOM}(X)[\text{chair}(y, \text{comm})]: X \in (\text{people})\}$

Under a high construal of *each*, LF1 denotes a set which is closed under conjunction since it denotes a set of propositions of the form *each of Ann and Mary can serve on this committee*, which entail that Ann can serve on the committee and that Mary can serve on the committee:  $\diamond A \wedge \diamond M \rightarrow \diamond A$ , etc. This LF should yield the mention all answer  $\{\diamond A \wedge \diamond M \wedge \diamond S\}$

- (76) LF1:  $\{\diamond A, \diamond M, \diamond S, \diamond A \wedge \diamond M, \diamond A \wedge \diamond S, \diamond M \wedge \diamond S, \diamond A \wedge \diamond M \wedge \diamond S\}$

Under a low construal of *each*, LF2 is going to denote the set of answers in (77), a set of propositions that is not closed under conjunction since  $\diamond A \wedge \diamond M \not\rightarrow \diamond(A \wedge M)$ ; assuming that more than one person can chair the committee in the world of evaluation, the fact that this set is not closed under conjunction amounts to saying that there is no unique maximally informative proposition in this set. In other words, applying ID to this set would result in a presupposition failure.

- (77) LF2:  $\{\diamond A, \diamond M, \diamond S, \diamond(A \wedge M), \diamond(A \wedge S), \diamond(M \wedge S), \diamond(A \wedge M \wedge S)\}$

<sup>14</sup>This is a harmless assumption that might in fact be necessary in other parts of the system in order to deal with distributive readings of *wh*-phrases. This distributive operator is analyzed as in (i):

- (i) a.  $[[\text{each}]](X_e) = \lambda P. \forall y \in \text{ATOM}(x)(P(y)=1)$   
 b.  $\text{ATOM}(X_e) = \{y: y \leq X \text{ and } y \text{ is atomic}\}$

And yet any of the answers in (78) would count as good answers (under a mention some reading).

- (78) a. Ann can chair this committee.  
 b. Mary can chair this committee.  
 c. Suzy can chair this committee

Given the lack of a maximally informative answer, applying ID to the set in (77) is going to fail. I propose that in such cases, i.e. when there is no maximally informative answer, we have the option of reinterpreting the question and answering it with respect to a smaller domain of quantification of the *wh*-phrase. Basically, in cases where ID gives rise to a presupposition failure, as is the case in (77), a cooperative addressee will still try to answer the question but do so with respect to a sub-question. An easy way to think about it is as follows. Suppose the question is *Who of Ann, Mary and Suzy can chair this committee?* and that all three of them are good candidates. As shown above, interpreting the question on LF2 will return a set that contains no maximally informative answer. In order to get around this problem, the addressee has the option of answering a sub-question instead, so one of questions in (79a); I use subscripts to indicate the domain of the *wh*.

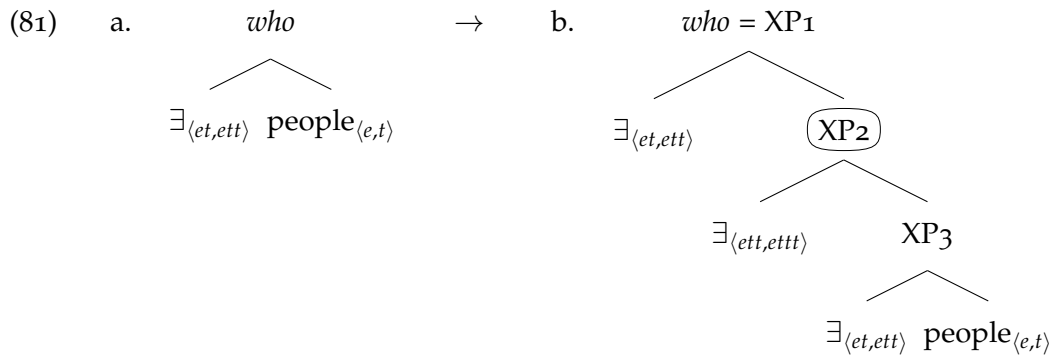
- (79) Who<sub>Ann,Mary,Suzy</sub> can chair this committee?  
 a. Who<sub>Ann,Mary</sub> can chair this committee?  
 b. Who<sub>Ann,Suzy</sub> can chair this committee?  
 c. Who<sub>Mary,Suzy</sub> can chair this committee?  
 d. Who<sub>Ann</sub> can chair this committee?  
 e. Who<sub>Mary</sub> can chair this committee?  
 f. Who<sub>Suzy</sub> can chair this committee?

Of these sub-questions, only (79d-f) will have a maximally informative answer, and thus the addressee can respond by offering an answer to one of these questions. If ID fails in (80a), we can reinterpret the question as in (80b):

- (80) a. Jay [knows [FAIL!] ID [ $\lambda p$  [ $\exists x \in \{A, M, S\}$  [ $\lambda x$  [ [C p] [can [x chair]]]]]]]]]]

- b. Jay [knows [ Id [λp [∃x∈S [λx [ [C p] [can [x chair]]]]]]]]]  
 where S is a subset of {A, M, S}

There are a number of ways we could formalize this re-interpretation. My goal is to depart as little as possible from independently motivated assumptions. One tool at our disposal is the concept of quantifier phrases having the option of being reinterpreted as complex quantifiers. So far we have only appealed to this in the context of regular quantifier phrases, like *two girls*, *some students* and *every girl*. I propose we extend this so as to allow *wh*-phrases to have this option as well. Namely, *who* in (81a) can also surface as the complex XP in (81b).

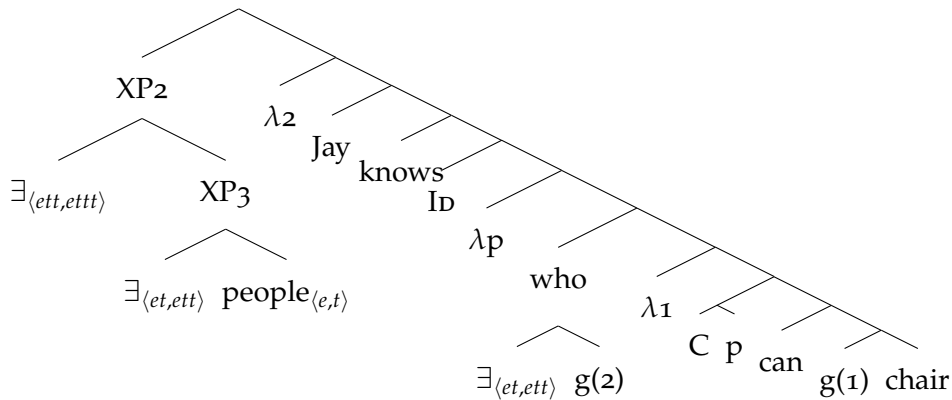


As with the case of regular quantifiers, the complex *who* in (81b) will move in two stages: first *wh*-movement will move the entire complex to the specifier of C (as it would have regardless), followed by a type mismatch driven QR of XP<sub>2</sub> outside of the question. I provide the meaning of each node in (81b) below:

- (82) a. XP<sub>3</sub> = [[some people]] = {{Ann, Mary, Suzy}, {Ann, Mary}, {Mary, Suzy}, {Ann, Suzy}, {Ann}, {Mary}, {Suzy}}  
 b. XP<sub>2</sub> = ∃S∈[[XP<sub>3</sub>]] = ∃S∈{some people}  
 a set of all subsets of XP<sub>3</sub>

The final derivation will look as in (83):

- (83) ∃S∈{some people} ∧ Jay knows Id[λp. ∃x S(x) ∧ p=λw. ◇ x chair]  
 There is a set of people for which Jay knows who can chair the committee.



Reinterpreting this question as in (83) allows us to understand how it is that mention some readings arise. Under the representation in (83), there will be three sub-questions for which ID doesn't fail, namely those where the domain of the *wh*-phrase is a singleton. The idea is not much different than what happens in the case of choice readings with existential quantifiers. The only difference is what drives this re-interpretation, which in this case I take to be a repair strategy driven by the failure of ID to find a maximally informative answer in the question denotation.<sup>15</sup>

This same mechanism is going to be in place for a question such as (84) where the situation is such that one or two people can act as chairs. The issue is that neither LF<sub>1</sub> nor LF<sub>2</sub>, as described above, would give us the answer we want, namely (84b), since even though they are all maximally informative in a sense, logically one is stronger than the others. I leave this example for future work but I am hopeful that an analysis along the lines described above is capable of deriving the intuitive answer.

(84) a. Who can chair this committee?

<sup>15</sup>An issue that I have nothing to say about at this point is why it seems to be the case that you want to “cut” as little as possible from the initial question. That is, why in a sense it seems to be a requirement that if you can't answer the full question, you need to answer a maximal subquestion of the question vis a vis the world: a question that has a maximally informative true answer and is not a proper subset of any subquestion that has a maximally informative answer. That this is something we might need to account for is based on Fox's observation that a question such as (i), even on its mention some reading, seems to require an answer like (ia) rather than (ib) in a context in which committees consist of two people. The problem here is that while (ib) is a true proposition, it isn't as informative as (ia).

- (i) Who can serve on this committee?
- a. Ann and Mary can serve on this committee.
  - b. Ann can serve on this committee.

- b. Mary can chair, or John can chair, or Mary and John can chair.

Before I conclude this section I need to address some potential concerns regarding the over-generating power of a system in which *wh*-phrases have the option to be interpreted as complex quantifiers in case ID gives rise to a presupposition failure. Sometimes we actually do need ID to fail, as is the case with singular *which* phrases whenever the question nucleus holds true of more than one individual. Recall that it was precisely these examples that drove Dayal (1996) to formulate a uniqueness presupposition on her answer-hood operator, which I adopted for the ID operator.

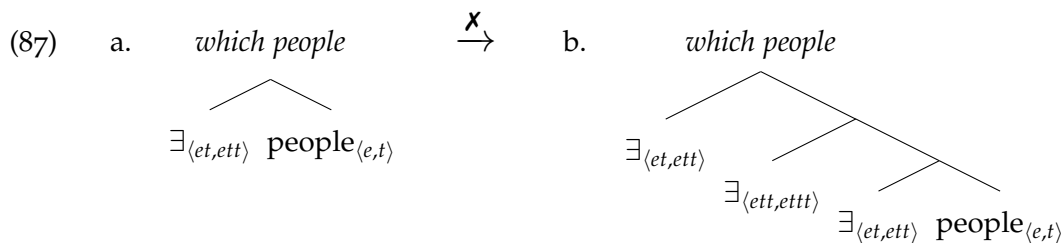
If singular *which* phrases were allowed to undergo the same reinterpretation as *who* above, then we would predict a question such as (85), in a context in which Mary and Suzy kissed John, to receive the mention some answer in (85a) or (85b).

- (85) Which girl kissed John?  
 a. Mary kissed John.  
 b. Suzy kissed John.

So we need to somehow rule out re-interpretation from taking place in these cases. In the same vein, a similar observation was made by Fox (2012), building on Spector (2007), that *which* phrases do not allow for mention some readings with existential modals. Notice the contrast between (86a) and (86b). The claim is that only (86b) allows for a mention some reading.

- (86) a. At which gas station can you get gas?  
 b. Where can you get gas?

Based on these facts, it seems to be the case that *which* phrases do not have the option of being reinterpreted as in (87b).





One possibility would be to say that since the restriction on *which*-phrases is made overtly, we don't have the option of tampering with it like we do with monomorphemic *wh*-phrases.<sup>16</sup> To this constellation of empirical facts also belongs the quantifier *each*, which, unlike *every*, does not exhibit a subject-object asymmetry in pair list readings in questions with quantifiers. I take this as a welcome result since it's been a long-standing assumption that *which* and *each* share some commonalities, namely their 'D-linking' character. I follow Dayal and use D-linking to indicate that a quantifier cannot be used in contexts where no discourse referent has been established. One possible account for the difference between *each* and *every* is to say that unlike *every*, *each* does not allow for a reinterpretation as a complex quantifier, i.e. as a [WH]-bearing element; this is exactly the same proposal I gave for the difference between *which* and *who* above. If we take the subject-object asymmetry we see in questions with quantifiers to have the same roots as the superiority facts observed with multiple *wh*-questions, then one possible direction would be to say that since *each* cannot be re-interpreted as a *wh*-element, unlike *every*, superiority effects could not be said to come into play since we would not be dealing with multiple *wh*-elements. Under this proposal one would still need to understand how the pair list reading with *each* can arise in the absence of re-interpretation.<sup>17</sup>

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<sup>16</sup>A question that is worth investigating in relation to this observation is whether this restriction is at all similar to Spector's observation that *which* phrases cannot receive higher-order interpretation. For that matter, one should also try to understand to what extent my proposal for higher-order quantifiers is related to his intuition that *wh*-phrases need to have the option of being interpreted as higher-order in order to account for their behavior in modalized questions. It might ultimately turn out to be the case that my proposal for higher-order quantifiers finds support in other domains as well.

<sup>17</sup>For more on the peculiar character of quantifiers in questions see Beghelli 1997, Beghelli and Stowell 1997, Szabolcsi 1997, Agüero-Bautista 2001, to name just a few.

## Chapter 7

### Looking ahead

In this thesis I have argued that a unified account of negative polarity items in questions is desirable and I offered a new semantics of questions that shows how this is possible. In order to do so I had to argue that the ambiguity exhibited by questions in terms of their weakly versus strongly exhaustive interpretations should be encoded at the level of the question nucleus rather than in different answer-hood operators. This allowed us to make a number of predictions regarding the behavior of negative polarity items, such as their distribution in the nucleus and restrictor of the *wh*-phrase, subject-object asymmetries, and the varying acceptability of different types of NPIs (weak versus strong). Overall, I hope to have shown that this new account has far-reaching consequences in the domain of NPIs as well as questions. We were able to, for example, understand why constituent and alternate questions exhibit similar restrictions with respect to the distribution of NPIs by assuming that underlyingly, alternate questions have the same structure as regular *wh*-questions.

Some open problems inherited from previous proposals remain even with this account however. For example, we are still unclear as to why certain predicates appear to select only for weakly exhaustive questions (e.g. *surprise*) while others appear to impose no such restrictions (e.g. *know*). At the end of Chapter 2 I offered some suggestions as to how we might go about dealing with these issues. One possibility would be a proposal in terms of Maximize Strength, building on the observation that question-embedding predicates that select for weak exhaustivity are downward-entailing in their propositional incarnations. Another issue that I hope to address in future work is why there should be no non-veridical

predicates that impose similar restrictions as the *surprise*-class predicates.

Returning to NPIs, some issues that I was unable to touch upon in this dissertation involve their behavior in rhetorical questions. It is a well-documented fact that NPIs can give rise to rhetorical questions, depending either on the c-command relation of the NPI with respect to the *wh*-phrase, or the nature of the NPI, i.e. if it is a minimizer and contributes an emphatic effect even in declaratives. While these issues are immediately relevant to the larger picture of how NPIs behave in questions, they were not discussed in this thesis for reasons that have to do with our limited understanding of what the semantics of rhetorical questions is outside the domain of NPIs. Another point of interest for future research is to look in closer detail at the behavior of free choice items in questions and see what predictions the present account makes with respect to their distribution, given the close resemblance of free choice items and negative polarity items.

The most open-ended chapter in this dissertation is the last chapter, which deals with higher order questions. Like most ongoing research, there are a lot of moving pieces and finding a way to fit them all together can, at first, appear to create more problems than it actually solves. The main goal of that chapter was to show what a possible analysis that unifies multiple *wh*-questions, questions with quantifiers and mention some questions might look like. To the extent that this approach is feasible, one still needs to understand how functional readings of questions and superiority effects can be captured within such a system as they are closely related to the fundamental issue of what level of flexibility we can assume at the level of the *wh*-phrase. Other issues that I did not touch upon involve quantificational variability effects and long-distance list readings which too will help us get a clearer picture of how this system will ultimately come together. One particular point of interest, however, should be the distribution of negative polarity items in higher-order questions as no literature has dealt with the weak/strong exhaustivity ambiguity in these types of questions. Despite its shortcomings, I do believe that this last chapter provides a window, however small, into the overall architecture of questions, helping us see where the differences and similarities lie between the basic types of questions discussed in the first chapters, and these more complex ones.

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