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CONTEXTUAL VARIABLES

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University of Connecticut, 2003

The hypothesis pursued in this dissertation is that contextual variables (C) of the kind assumed for quantifiers like *every* or *only* are pronouns. One major advantage of taking this position is that if the behavior of contextual variables is regulated by principles that are needed independently for pronouns, language acquisition is made easier on the child. This is specially important because the behavior of C varies cross-linguistically.

The C of quantificational expressions like *every* or *no* can be bound and is subject to the kinds of constraints that bound pronouns are subject to. In particular, C is subject to WCO in English, Chinese and Spanish. In addition, whenever we find exceptions to WCO with pronouns in English, we find the same exceptions with C. The distribution of Chinese bound pronouns is more constrained than in English, and the distribution of C in Chinese is also more constrained.

As for free instances of C, I argue against analyses of association with focus that postulate non-pronoun-like constraints on C, since such analyses force a departure from the hypothesis that C is a pronoun. In the alternative analysis of association with focus proposed here, the burden of explanation is shifted to constraints on (implicit) discourse structure (Roberts (1996/1998), to which I add a principle based on maximal informativity. These constraints narrow down the kinds of contexts where sentences are felicitous. It is because of properties of the contexts in which sentences with *only* are felicitous that association-with-focus readings obtain: they contain only one suitable antecedent for the contextual variable of *only*. The same analysis is pursued for *even*, *also* and *always*, where certain difference between *always* and *only* (Beaver and Clark (2001, 2002a, b), Cohen (1999)) are explained. Maximal informativity finds additional support from facts independent of association. Other analyses of association, such as Rooth's (1992), are critically reviewed.

CONTEXTUAL VARIABLES

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CONTEXTUAL VARIABLES

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Chapter 1 Contextual Variables: Introduction

1.1 Goals of the dissertation

This dissertation is an investigation of the properties of the contextual variables of items like *every(body)* or *only*. Contextual variables are variables that receive a value from the context and play a major role in natural language quantification. Consider (1):

- (1) [Speaker A is relating to Speaker B the experiences of last night, when A and some of his students went out for a pizza]
A: Everybody_C had a great time (von Fintel (1994: 28, 1995: 163))

Speaker A in (1) does not intend to convey the idea that every student in the whole world had a great time. Rather, the quantification is over a *restricted* set of people, those that went out for a pizza last night with A. Positing a contextual variable (C) in the lexical entry of the quantified determiner *every* is one way to capture this context dependency. A common notational device adopted by this approach is a subscript 'C', as shown in (1A).

An analysis that relies on contextual variables of the kind I will assume here is not the only possible analysis of facts like (1). The context dependency of *every* also results if the domain of evaluation of the sentence is restricted to the smaller situation described by the material in brackets in (1). That is, suppose that (1A) makes a claim that is literally true, but it is true only in the situation described in the brackets¹. Arguments have been provided in the literature that setting a domain of evaluation for the sentence as a whole

¹ Neale (1990: 95) calls this the *implicit strategy*, and the one discussed above the *explicit strategy*.

does not do. von Fintel (1994: 29) and Westerståhl (1985) discuss examples like the following (adapted):

- (2) Sweden is a funny place. Every tennis player looks like Björn Borg, and more men than women watch tennis on TV. But *many people* dislike *most foreign tennis players*

Consider the interpretation of the quantifiers in the last sentence in (2). The first NP, *many people*, must be interpreted in a situation that contains only Swedish people (or, only Swedish people who watch TV). In a situation that contains only Swedish people, however, the second NP, *most foreign tennis players*, cannot be successfully interpreted. The approach that makes use of C, on the other hand, has the resources to deal with (2), since a different C can be postulated for each quantifier. The same point can be made with the example in (3), from Soames (1986), discussed by von Fintel:

- (3) Everybody is asleep and is being monitored by a research assistant

A research assistant monitoring people cannot be interpreted against a background in which every individual in the universe of discourse is asleep. What we need is a mechanism that restricts the domain of quantification for each of the expressions involved, not for the sentence as a whole. This is what is achieved by postulating a contextual variable that interacts with the recursive semantics. See von Fintel (1994: 28-9) for further discussion, and also Neale (1990: 95-102).

Once contextual variables like C are postulated, the following important question arises: what is the status of C in the grammar? That is, is C a new grammatical object,

with properties independent of the properties of other variables? Or is C an instance of something we already know? Answering these questions is a major goal of this dissertation. Clearly, the answer depends on the properties that we find C to have. But, from a conceptual point of view, we should strive to come up with a theory where the properties of C are not unique. Whatever behavior we find C to have should follow from the principles that govern the behavior of other variables. This position is advantageous from the point of view of language acquisition. If the principles that govern the behavior of C are the same as the principles that govern the behavior of other variables, then the burden of language acquisition is lessened on the child. This is because once the principles that regulate the behavior of a particular item are in place, the child does not have to learn about the behavior of other items of the same kind. This issue is important, since, as we will see, the behavior of C, just as that of pronouns, can vary across languages.

The hypothesis that I defend in this dissertation is that C is a (silent) pronoun. If this hypothesis is correct, there are a number of expectations about its behavior, given the behavior of pronouns. One important expectation is that C should be able to be bound, which I argue for in Chapter 2. The findings of this chapter is that C can be bound, and, significantly, that the constraints on the binding of C are the same as the constraints on the binding of pronouns in a number of interesting ways.

Of course, C is expected to be able to be free as well. (1), for example, shows that C can be free. Now, a number of analyses of the phenomenon known as association with focus, however, put constraints on free instances of C that force a departure from the hypothesis that C is a pronoun. This is because the constraints that these analyses place

on C are very much unlike constraints that are necessary to explain the behavior of pronouns like *he*. Two options can be considered at this point. First, we could draw the conclusion that these analyses are right and that C is after all different from pronouns like *he*. Or, we could propose an alternative analysis of the phenomenon of association with focus that allows us to maintain the hypothesis that C is a pronoun. It is this second approach that I explore in detail in Chapters 3 and 4.

The organization of this chapter is as follows. §1.2 lays out basic assumptions about the nature of C and the semantics that interprets it, and offers a preview of the contents of Chapter 2. §1.3 deals with free C and offers a preview of the contents of Chapter 3 and 4. §1.4 briefly discusses association with focus phenomena across languages.

Since Chapters 2 and 3 are concerned with focus, we will need a semantics of focus. The system I will be assuming here, that in Rooth (1985), is laid out in an appendix to this chapter.

1.2 Bound and free variables

1.2.1 Bound and free pronouns

Pronouns can be bound by a quantifier or a quantificational NP². This possibility is exemplified in (4):

² A note on terminology. I use the term ‘quantifier’ to refer to items such as *every*, *always* or *everybody*. I use the term ‘quantificational NP’ to refer to items such as *every student*.

- (4) Every student thought that he aced the exam

In (4), the reading in which the pronoun *he* is bound by *every student* is one which says, “every student x is such that x thought that x aced the exam”. Pronouns can also be free (that is, not bound), as exemplified in (5):

- (5) Mary just walked into the living room. She is wearing red pants

In (5), the pronoun *she* refers to the individual Mary, introduced in the previous sentence and thus salient in the discourse.

Heim and Kratzer (1998) is a recent instantiation of the standard analysis of bound and free pronouns. In this analysis, it is assumed that bound and free pronouns (and traces) are variables that come with a numerical index, interpreted via the variable assignment, a function that maps indices to individuals. Variable binding is effected via a λ -operator, left by movement and subject to the rule of λ -abstraction. The basic rules of this system are in (7)-(8):

- (6) **Variable Assignment**
A variable assignment is a partial function from $[N$ into D
- (7) **Proforms and Traces Rule (P&T)**
If α is a proform or a trace, i is an index, and g is an assignment whose domain includes i , then $[[\alpha_i]]^g = g(i)$
- (8) **λ -Abstraction (λ -A)**
Let α be a branching node with daughters β and γ , where β dominates only a λ -abstractor with numerical index i . Then, for any variable assignment g , $[[\alpha]]^g = \lambda x \in D_{\langle e \rangle}. [[\gamma]]^{g(x/i)}$,

where $g(x/i)$ is a variable assignment just like g except that i maps into x .

The nuclear scope of the example in (4), with representation as in (9), is interpreted as in (10):

(9) $[\lambda_1 [t_1 \text{ thought that } he_1 \text{ aced the exam}]]$

(10) $[[[\lambda_1 [t_1 \text{ thought that } he_1 \text{ aced the exam}]]]]^g =$
 $\lambda x \in D_{\langle e \rangle}. [[t_1 \text{ thought that } he_1 \text{ aced the exam}]]^{g(x/1)} =$ (λ-A)
 $\lambda x \in D_{\langle e \rangle}. x \text{ thought that } x \text{ aced the exam}$ (among others, x2 P&T)³

The sentence in (4) then says that every student has the property in (10), as desired. The proper treatment of free variables requires the addition of the principles in (11) and (12):

(11) **Appropriateness Condition**

A context c is appropriate for an LF ϕ only if c determines a variable assignment g_c whose domain includes every index which has a free occurrence in ϕ

That is, the variable assignment must include a mapping for all indices that are not bound. It must not only be the case that the variable assignment assigns some value to free indices, it must be that it assigns it a salient value (i.e., Mary in (5)). This assumption is in (12)⁴:

(12) **The value of a free index is a salient object**

³ Several applications of the operations of Functional Application (FA), λ-Conversion (λ-C) and replacement of object-language item with lexical entry (Lex) get us to the final step in (10).

⁴ As Yael Sharvit (p.c.) points out, (11) and (12) could be reduced to just one principle. I will keep them separate here.

The interpretation of the last sentence in (5) is provided in (13):

- (13) $[[[she_1 \text{ is wearing red pants}]]^{g(Mary/1)} = 1 \text{ iff}$
 $[\lambda x. x \text{ is wearing red pants}] ([[[she_1]]^{g(Mary/1)}) = 1 \text{ iff (FA, PM}^5, \text{ several Lex \& } \lambda\text{-C)}$
 $[\lambda x. x \text{ is wearing red pants}] (Mary) = 1 \text{ iff (P\&T)}$
 $Mary \text{ is wearing red pants} (\lambda\text{-C})$

This system is assumed throughout the dissertation.

1.2.2 Bound and free contextual variables

C can also be bound. In the example in (14), the C associated with the quantifier *no* is bound by the quantificational NP *only one class* (from Heim (1991: 24); von Fintel (1994: 31, 1995: 162)):

- (14) Only one class was so bad that no student passed the exam

The most salient reading of this sentence is “only one class *x* was such that *x* was so bad that no student in *x* passed the exam”⁶. According to von Fintel (1994: 31), this reading suggests that C has a complex structure: it is composed of a functor variable and an argumental variable (cf. Chierchia (1993), Cooper (1979), Engdahl (1986), Jacobson

⁵ ‘PM’ is abbreviation for Predicate Modification, a rule needed to interpret ‘red pants’.

⁶ In fact, this is the only pragmatically plausible reading of (14). A reading in which C is free is odd in that it would be true in a situation in which there is this one class that was so bad that no student in some contextually relevant set (e.g., in the set of students who attend the school) passed the exam.

(2000), Heim (1990) on other pronominal items like certain *wh*-traces or E-type and ‘paycheck’ pronouns):

$$(15) \quad C = f_i(x_j), i, j \in \mathbb{N}$$

His proposal is that the analysis of the bound reading of (14) is as in (16):

$$(16) \quad [\text{only one class}] [\lambda_1 [t_1 \text{ was so bad that no}_{t_2(v_1)} \text{ student passed the exam}]]$$

The functor variable *f* remains free and refers to contextually salient entities of the appropriate type. This variable takes another variable as its argument. It is this argumental variable that gets bound by the quantificational NP *only one class*. The functor variable *f* takes one argument, a class (of type $\langle e \rangle$), and returns the set of individuals in that class (of type $\langle e, t \rangle$)⁷:

$$(17) \quad g(2) = \lambda y \lambda x: x, y \in D_e. \text{ student}(x) \ \& \ \text{class}(y) \ \& \ x < y,$$

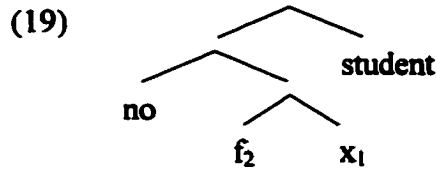
⁷ The variable assignment must be modified to deal with variables of types other than $\langle e \rangle$ (e.g., it must be able to map the index 2 into an object of type $\langle e, \langle e, t \rangle \rangle$). I follow Heim and Kratzer (1998: 292) in assuming that an index is a pair of a number and a semantic type. (i) is the new definition of the variable assignment, intended to replace (6) (‘dom(*g*)’ is the domain of *g*):

- (i) A partial function *g* from indices to denotations (of any type) is a variable assignment iff it fulfills the following condition: for any number *n* and type τ such that $\langle n, \tau \rangle \in \text{dom}(g)$, $g(n, \tau) \in D_\tau$

where '<' is the part-whole relation. This set of individuals is then intersected with the first argument of the quantifier *no*, *student*, to yield the set of students in that class. The denotation of the node dominating the λ -operator in (16) is thus as follows:

(18) $\lambda y. y$ was so bad that no student in class y passed the exam'

I follow von Fintel in postulating that *C* is of a complex nature. (19) shows the kind of structure I assume for the NP *no student*. One important feature here is that *C* is hypothesized to be present in the syntax, an assumption neither Heim nor von Fintel make:



Thus, a quantifier like *no* is assumed to take three arguments:

(20) $[[no]]^g = \lambda C \lambda k \lambda h: C, k, h \in D_{\langle e, \langle t, t \rangle \rangle}. \{x: C(x)=1 \ \& \ k(x)=1\} \cap \{x: h(x)=1\} = \emptyset$

The denotation of the subordinate clause *no student passed the exam* in (16) is as in (21):

(21) $[[[[no \ [f_2 \ v_1] \ student] \ passed \ the \ exam]]]^{g(x/1)} =^g$
 $[[no]]^{g(x/1)} ([[f_2]]^{g(x/1)} ([[v_1]]^{g(x/1)})) ([[student]]^{g(x/1)}) ([[passed \ the \ exam]]^{g(x/1)}) =$
 (several FA)

^g The variable assignment is modified at the point where λ -A is applied, higher up in the tree than the subordinate clause.

$$\begin{aligned}
& [[\text{no}]]^{g(x/1)}([\lambda y \lambda v: v, y \in D_e. \text{student}(v) \ \& \ \text{class}(y) \ \& \ v < y](x))(\lambda z. z \text{ is a student})(\lambda v. \\
& v \text{ passed the exam}) \quad (\text{several FA \& Lex, x2 P\&T}) \\
& [[\text{no}]]^{g(x/1)}(\lambda v: v \in D_e. \text{student}(v) \ \& \ \text{class}(x) \ \& \ v < x)(\lambda z. z \text{ is a student})(\lambda v. v \\
& \text{passed the exam}) = 1 \text{ iff} \quad (\lambda\text{-C}) \\
& [\lambda C \lambda f \lambda g: C \in D_{\langle e, t \rangle} \ \& \ f \in D_{\langle e, t \rangle} \ \& \ g \in D_{\langle e, t \rangle}. \{y: C(y) = 1 \ \& \ f(y) = 1\} \cap \{y: g(y) = \\
& 1\} = \emptyset] (\lambda v. \text{student}(v) \ \& \ \text{class}(x) \ \& \ v < x)(\lambda z. z \text{ is a student})(\lambda v. v \text{ passed the} \\
& \text{exam}) = 1 \text{ iff} \quad (\text{Lex}) \\
& \{y: [(\lambda v. \text{student}(v) \ \& \ \text{class}(x) \ \& \ v < x)](y) = 1 \ \& \ [\lambda z. z \text{ is a student}](y) = 1\} \cap \{y: \\
& [\lambda v. v \text{ passed the exam}](y) = 1\} = \emptyset = 1 \text{ iff} \quad (\text{x3 } \lambda\text{-C}) \\
& \{y: \text{student}(y) \ \& \ \text{class}(x) \ \& \ y < x\} \cap \{y: y \text{ passed the exam}\} = \emptyset \quad (\text{x3 } \lambda\text{-C})
\end{aligned}$$

That is, the set of students in class x who passed the exam is empty. (14) thus ends up claiming that only one class x was so bad that the set of students in class x who passed is empty, as desired.

C can also be free; in fact, we have already seen an instance of this in (1). For instances where C is free, one can assume that C has the same functional-argument structure as bound C , but that the functional part does no significant work. In this case, the functional variable would be the identity function and its argument would be a set of salient individuals. (1A) would be analyzed as in (22), with truth-conditions calculated in (24) and lexical entry for *everybody* in (23)⁹:

$$(22) \quad [\text{Everybody } [f_2 \ x_1]] \text{ had a great time}$$

$$(23) \quad [[\text{everybody}]]^g = \lambda C \lambda h: C, h \in D_{\langle e, t \rangle} \ \& \ \forall x(C(x) \rightarrow \text{person}(x)). \{x: C(x)=1\} \subseteq \{x: h(x) = 1\}$$

$$\begin{aligned}
(24) \quad & [[[\text{everybody } [f_2 \ x_1] \ [t_3 \text{ had a great time}]]]]^g = 1 \text{ iff} \\
& [[\text{everybody}]]^g ([f_2]^g ([v_1]^g))(\lambda x. x \text{ had a great time}) = 1 \text{ iff} \\
& \quad \quad \quad (\text{PM, } \lambda A, \text{ several FA \& } \lambda C) \\
& [[\text{everybody}]]^g (g(2) (g(1)))(\lambda x. x \text{ had a great time}) = 1 \text{ iff} \quad (\text{x2 P\&T}) \\
& [[\text{everybody}]]^g ([\lambda k.k](\lambda x: x \in D_{\langle e, t \rangle}. x \text{ is salient}))(\lambda x. x \text{ had a great time}) = 1 \text{ iff} \\
& [[\text{everybody}]]^g (\lambda x: x \in D_{\langle e, t \rangle}. x \text{ is salient})(\lambda x. x \text{ had a great time}) = 1 \text{ iff} \quad (\lambda\text{-C})
\end{aligned}$$

⁹ Putting aside a more appropriate analysis of *everybody*.

$$\begin{array}{ll}
[\lambda C \lambda h. \{y: C(y)=1\} \subseteq \{y: h(y) = 1\}](\lambda x: x \in D_{\langle e \rangle}. x \text{ is salient})(\lambda x. x \text{ had a great time}) = 1 \text{ iff} & (\text{Lex})^{10} \\
\lambda h. \{y: y \text{ is salient}\} \subseteq \{y: h(y) = 1\}](\lambda x. x \text{ had a great time}) = 1 \text{ iff} & (x2 \lambda\text{-}C) \\
\{y: y \text{ is salient}\} \subseteq \{y: y \text{ had a great time}\} & (x2 \lambda\text{-}C)
\end{array}$$

This is the desired result.

Another option is to assume that there is no functional part at all. In this case, *C* would be a simple variable, a set of salient individuals. Choosing either option does not have significant consequences, I think, but I prefer the first option because under this approach *C* has the same internal structure in both its bound and free instances.

Since *C* is assumed to be more complex than a simple variable, the hypothesis that *C* is a (silent) pronoun needs to be made more fine-grained. The hypothesis I pursue in this dissertation is that the argumental variable of *C* is a pronoun. The functional variable of *C* is assumed to be a pronominal item as well but its status is not seriously addressed here. “Bound/free *C*” is thus short for “bound/free argumental variable of *C*”.

Now that some of the assumptions about *C* are in place, we are in a position to preview some of the contents of Chapter 2. In Chapter 2, I first argue against an analysis of facts like (14) in which what gets bound is not *C* but an implicit variable associated with the noun that serves as the first argument of the quantifier. Then, I show that *C* is subject to a well-known constraint on binding, a crossover constraint of the kind pronouns like *he* are subject to in languages like English, Spanish and Chinese (Weak Crossover (WCO)). Moreover, I show that whenever we find exceptions to the crossing constraint with pronouns, we find exactly those exceptions with *C* as well. On the one hand, *C* in English shows exceptions to the crossing constraint in adjunct clauses and in

so-called PRO-gate environments, which have been documented in the literature. On the other hand, the crossing constraint on pronouns like *ta* ‘he’ in Chinese has been shown to be stronger than the one for English *he* and we also find a more restricted distribution of C in this language. The chapter critically evaluates arguments and evidence against the assumption in (19) (Partee (1989)) as well.

1.3 Association with focus

The theory of anaphora says nothing more than what was laid out in §1.2 about the semantics of free pronominal items. Thus, an important constraint that the hypothesis that the argumental variable of C is a pronoun imposes on us is that nothing else is said about free instances of C. In Chapters 3 and 4, I develop a theory of so-called association with focus phenomena, which crucially involve a contextual variable, in which nothing is added to the assumptions we have made so far about how free instances of C are interpreted. In contrast to this, standard analyses of such facts usually add principles to the theory of anaphora. Let us briefly examine an important analysis that does that, Rooth (1985).

Rooth (1985) is concerned, among other things, with the facts in (25):

- (25) a. John only invited [Mary]_F for dinner
b. John only invited Mary for [dinner]_F

¹⁰ Ignoring the presuppositions of *everybody*.

The subscript ‘F’ indicates that the phrase in brackets is focus-marked, or given special intonational prominence. Rooth observed that intonational prominence has truth-conditional effects in cases like (25). Suppose that John invited Mary and Bill for dinner. In this case, (25a) is false, though, as long as he invited Mary for dinner only, (25b) is still true. Now suppose that John invited Mary for dinner and for breakfast. (25b) is false. As long as he invited nobody other than Mary for dinner, (25a) is still true. Approximate paraphrases of the readings that these sentences get are in (26):

- (26) a. John invited Mary and nobody else for dinner (for (25a))
 (cf. *John invited only Mary for dinner*)
 b. John invited Mary for dinner and for nothing else (for (25b))
 (cf. *John invited Mary only for dinner*)

The phenomenon exemplified in (25) is known as association of *only* with focus, because, roughly, *only* seems to “go” with the part of the sentence that bears focus (*Mary* in (25a), *dinner* in (25b)). Rooth’s (1985) analysis of the phenomenon involves postulating a contextual variable in the lexical entry of *only*, as shown in (27)¹¹:

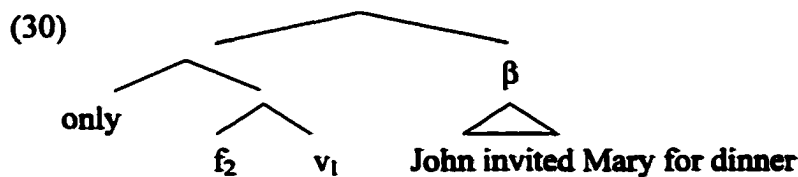
$$(27) \quad [[\text{only}]]^g = \lambda C \lambda p \forall q: p(w). [q \in C \ \& \ q(w) \rightarrow q=p],$$

where ‘w’ stands for the actual world. According to (27), *only* takes two arguments, one is the contextual variable and the other is a proposition. A sentence of the form *only* α asserts that, if a proposition from a set C is true, it is the proposition denoted by α .

Additionally, the sentence presupposes that α is true¹². C is a free variable, and what value gets assigned to it is crucial in deriving the right truth-conditions for sentences such as those in (25). Notice, for example, that if C is set to be the set of propositions indicated in (28), we obtain the truth-conditions in (29) for a sentence like (25a):

- (28) $\{\lambda w'. \text{John invited Mary for dinner in } w', \lambda w'. \text{John invited Sue for dinner in } w', \lambda w'. \text{John invited Peter for dinner in } w', \lambda w'. \text{John invited Anthony for dinner in } w', \dots\} = \lambda p \exists x. p = \lambda w'. \text{John invited } x \text{ for dinner in } w'$
- (29) $\forall q: \text{John invited Mary in } w. [q \in (28) \ \& \ q(w) \rightarrow q = \lambda w'. \text{John invited Mary for dinner in } w']$

(29) says that if a proposition from the set in (28) is true, it is the proposition that John invited Mary for dinner. In other words: those propositions that are members of (28) which are not the proposition that John invited Mary for dinner are false. This is what we want to predict for the example in (25a) (cf. (26a)). In our analysis, a partial structure for (25a) looks as follows¹³:



¹¹ Other assumptions about the argument of *only* are possible and are in fact made in the literature. Roberts (1996/1998), Rooth (1985, 1992) and Schwarzschild (1997), among others, have a property as the argument of *only*.

¹² I do not wish to enter the debate about the status of the information that α is true. See Horn (1996) for a review of proposals and some new ideas. I will assume that this information is presupposed, and this will be harmless because we will put this to no use in our analysis.

¹³ I am assuming that such a structure is available to us in one way or another. See §1.4 for further remarks on this.

The variable assignment assigns the identity function as the value of the functional variable, and the set of propositions in (28) as the value for the argumental variable.

Now, the desired meaning for the sentence in (25a) arises only if the argumental variable is mapped by the variable assignment to a set like that in (28). Suppose the variable assignment mapped it to the set in (31) instead:

- (31) $\{\lambda w'. \text{John invited Mary for dinner in } w', \lambda w'. \text{John invited Mary for breakfast in } w', \lambda w'. \text{John invited Mary for lunch in } w', \dots\} = \lambda p \exists x. p = \lambda w'. \text{John invited Mary for } x \text{ in } w'$

We would then predict that the sentence in (25a) receives the meaning paraphrased in (26b) instead. This is not what we want. But, this *is* what we want for (25b).

Rooth introduces a constraint into the theory of anaphora so that the variable assignment can only assign a set like that in (28) to the argumental variable of the C of *only* in (25a). This constraint is formulated in such a way that only a set like that in (31) gets assigned by the variable assignment to the argumental variable of the C of *only* in (25b). Since the difference between these two examples seems to be in their intonational prominence, Rooth's (1985) constraint makes reference to it. The constraint is in (32)¹⁴:

- (32) $[[C]]^g \subseteq [[\beta]]^{f,g}$

¹⁴ See Rooth (1985) for an explicit procedure on how to construct focus semantic values, summarized in the appendix to this chapter (also Jackendoff (1972); Kratzer (1991); Krifka (1992)).

' $[[\beta]]^{fg}$ ' is the focus semantic value of β (see (30)). (32) says that C must be a subset of the focus semantic value of β (i.e., the set that the variable assignment assigns to the argumental variable (cf. (30))¹⁵.

Focus semantic values are defined in such a way that (28) is the focus semantic value of the β in (25a), and (31) is the focus semantic value of the β in (25b). But, what exactly are focus semantic values?

Rooth assumes that focus introduces alternatives, of the same semantic type to the focused element. For example, because *Mary* is focused in (25a), the set of objects of the same semantic type as *Mary* (i.e., the set of individuals) is introduced. The idea is that this set of objects helps to define an additional meaning to the ordinary semantic value of an expression. So, for example:

- (33) a. $[[\text{Mary}]]^{og} = \text{Mary}$
 b. $[[\text{Mary}]]^{fg} = \{\text{Mary, Sue, Peter, Anthony, ...}\} = D_e$

Going back to (28) and (31), it is because *Mary* is focused in (25a) that (28) contains propositions that vary on who gets invited by John for dinner; it is because *dinner* is focused in (25b) that (31) contains propositions that vary on what John invites Mary for. Following Rooth and others, I assume that the focus semantic value of a complex expression, such as β , is obtained compositionally via the special interpretation function $[[\]]^f$, sensitive to elements marked with the feature 'F'. The details about this procedure are given in the appendix to this chapter.

¹⁵ See Chapter 3 for further discussion of the details of (32).

Having the basics of Rooth's theory in place, let us reflect on the constraint in (32); in particular, I want to reflect on its status within the theory of anaphora described in §1.2. One crucial aspect of (32) is that it makes reference to an object formed compositionally (i.e., the focus semantic value of β). We should ask whether the theory of anaphora assumed here contemplates a constraint that makes use of an object formed compositionally or not. Is there anything of the kind in this theory?

It is not the case that pronouns come without restrictions at all. For example, pronouns like *he*, at least in its free uses, come with a restriction that its referent be male; that is, at least some pronouns are restricted via a lexical feature like 'male'. However, the kinds of restrictions that pronouns can have are clearly different from the kind of restriction that (32) imposes on *C*. Pronouns like *he* do not have restrictions that mention derived objects, objects formed compositionally. What their restrictions do mention is simple lexical features like 'male'. As opposed to compositional objects like the focus semantic value of some expression, lexical features are underived objects.

The importance of this difference is this. Above I have established that a lexical feature is a different kind of object from the focus semantic value of some expression. If we take as unavoidable that, if at all restricted, free pronouns are restricted via lexical features, then restricting *C* via the semantic value of some expression entails that the restrictions on *C* and the restrictions on pronouns are not the same. This, I take it, forces a departure from the attractive hypothesis that *C* is a pronoun. In other words: the only kinds of restrictions that the grammar should be able to impose on free *C* are those effected via underived, simple objects like lexical features. These should be the only permissible constraints.

I develop a theory of association with focus in Chapters 3 and 4 that does not make use of (32). In my theory, the assumptions made above about how free occurrences of variables get a value are maintained as-is, and no constraint on free C is added to the grammar¹⁶. The burden of explanation of facts like those in (25) is placed elsewhere. I suggest that C is anaphoric to the object in (28) in the case in (25a) because principles of discourse structure allow us to assume that such an object is salient in the typical discourse for (25a) (similar remarks hold for (25b)). That is, given the principles in the theory of discourse structure I take as my starting point, that in Roberts (1996/1998), sentences such as (25a) are always accompanied by objects such as (28); (28) is a salient object in the contexts in which (25a) is felicitous. If we have independent means of ensuring that (28) is the only salient object in the context of (25a), then the principles of the theory of anaphora (in particular, (12) and (11)) take care that (28) is assigned by the variable assignment as the value for C (or, more appropriately, as the value of the argumental variable of C).

Chapter 3 discusses how the meanings of sentences like (25) are derived. We will see that most of the contexts in which such sentences are felicitous are contexts in which *only* associates with focus. However, we will also discuss contexts in which sentences with *only* do not have readings in which *only* associates with focus. I claim that my theory of association is naturally equipped to deal with both of these cases. Important in the account of association will be a principle that establishes a preference for maximal informativity. I add this principle to the theory of discourse in Roberts (1996/1998) and suggest that certain empirical problems in this theory, unrelated to association, can be

¹⁶ Notice that pronouns *can* be restricted via lexical features, though presumably we do not want to say that all pronouns must be so constrained. C is not so constrained in the theory to be developed here.

solved with the principle of maximal informativity. Other so-called focus particles, such as *even* and *also*, are also discussed in this chapter. Part of the literature on association with focus is critically reviewed here, including the proposals in Roberts (1996/1998) and, rather importantly, in Rooth (1992), where (32) takes on a different incarnation. I argue that the new proposal in Rooth (1992) is still not adequate in view of the theory of anaphora assumed here, though the inadequacy arises not with respect to C but with respect to a different variable (what he calls the focus variable); I also provide an empirical argument against Rooth (1992). The review of the literature is completed in Chapter 4, where certain additional facts also having to do with association with focus are introduced.

Chapter 4 discusses other focus-sensitive items. *Only*, *even* and *also* are not the only quantificational expressions that can be affected by focus. Adverbs of quantification like *always* or *usually* have been argued to be sensitive to focus as well (see von Stechow (1994, 1995), Rooth (1985)). However, it seems that sentences containing adverbs of quantification and focus allow for readings that sentences with *only* do not allow, as observed by Beaver and Clark (2001, 2002a, b) and Cohen (1999). The idea in this chapter is that the theory developed in Chapter 3 can explain the facts with *always* without adding anything to the theory of anaphora outlined in §1.2. At least some of the facts that Beaver and Clark (2001, 2002a, b) bring up as problematic for existing theories of association can be explained in a principled way with the theory in Chapter 3.

I should say from the start that the proposal I develop in Chapters 3 and 4 does not do away with focus semantic values, the kinds of meanings that Rooth (1985) computes compositionally in parallel to ordinary meanings. While I do not maintain the

constraint in (32), one of the principles of discourse I assume, together with Roberts (1996/1998), makes use of focus semantic values. The contribution of Chapters 3 and 4 is not about focus semantic values—I do not propose a new way to compute focus semantic values, or a new interpretation for focus altogether. Rather, the contribution has to do with how such semantic objects are put to use.

This finishes the overview of the dissertation. In the next section, I discuss how a number of different languages, including Japanese, German, Chinese, Rumanian, Bulgarian, Korean and Spanish, do what English does in (25), as well as some facts with other focus-associating particles (*also*, *even*). Some further basic assumptions about *only* and other focus particles are established there as well.

1.4 Association with focus across languages

English patterns with languages like Chinese in that the word for *only* does not have to appear adjacent to the item it associates with¹⁷:

- (34) *Chinese*
- | | | | | | | |
|----|----------|------------|------------|---------------------|-----|-----------------------|
| a. | Zhangsan | <i>zhi</i> | qing-le | [Lisi] _F | chi | wanfan. |
| | Zhangsan | only | invite-Asp | Lisi | eat | supper |
| b. | Zhangsan | <i>zhi</i> | qing-le | Lisi | chi | [wanfan] _F |
| | Zhangsan | only | invite-Asp | Lisi | eat | supper |

¹⁷ Thanks to Liang Chen and Ning Pan for the Chinese data.

(34a) means that Zhangsan invited Lin and nobody else for dinner, whereas (34b) means that Zhangsan invited Lin for dinner and for nothing else. Thus, just as in English in (25), *only* associates with focus “long-distance”. Languages like Spanish show the same pattern, with the difference that focus, at least in some cases, is not signaled via intonational prominence but via syntactic position, as evidenced in (35)¹⁸:

- (35) *Spanish*
 a. Juan *sólo/solamente* invitó a cenar [a María]_F
 Juan only invited to dine to María
 b. Juan *sólo/solamente* invitó a María [a cenar]_F
 (cf. *Juan invitó a María a cenar*)

The final position in the clause seems to be privileged in that items in this position are assigned the focus feature. *Sólo/solamente* associates with this item. The continuations in (36) show this clearly:

- (36) *Spanish*
 a. Juan *sólo* invitó a cenar [a María], no Pedro
 Juan only invited to dine to María not Pedro
 b. *Juan *sólo* invitó a cenar [a María]_F, no al concierto
 Juan only invited to dine to María, not to-the concert
 c. Juan *sólo* invitó a María [a cenar]_F, no al concierto
 d. *Juan *sólo* invitó a María [a cenar]_F, no a Pedro

Spanish also allow the focus particle to be close to the focused item:

¹⁸ Thanks to Adolfo Ausín, Isabel Pérez, Lara Reglero and Emma Ticio for their judgments on the Spanish data.

- (37) *Spanish*
 a. Juan invitó a cenar sólo/solamente [a María]_F
 b. Juan invitó a María sólo/solamente [a cenar]_F

There are many languages, though, where *only* must be adjacent to the item it associates with. These include Japanese, Rumanian, Korean and Bulgarian, as exemplified in (38)-(41). These examples also show that languages employ varied means to mark focus (e.g. via a focus particle in Korean)¹⁹:

- (38) *Japanese*
 a. John-ga/-wa yuushoku-ni Lyn-*dake*-o shoutaisi-ta.²⁰
 John-Nom/-Top dinner-to Lyn-only-Acc invite-Past
 b. John-ga/-wa yuushoku-*dake*-ni Lyn-o shoutaisi-ta.
 John-Nom/-Top dinner-only-to Lyn-Acc invite-Past
- (39) *Rumanian*
 a. John a invitat-o doar/numai pe Lyn la cina.
 John has invited-her only Acc Lyn to dinner
 b. John a invitat-o pe Lyn doar/numai la cina.
 John has invited-her Acc Lyn only to dinner

¹⁹ Thanks to Tomo Fujii, Takako Iseda, Nobu Miyoshi, Fumi Niinuma, Toshiko Oda, and Koji Sugisaki for the Japanese data; Simona Herdan for the Rumanian data; Bosook Kang, Sei-Rang Oh, and Bum-Sik Park for the Korean data; and Mariana Lambova for the Bulgarian data.

²⁰ 'Nom' stands for 'Nominative case', and 'Top' for 'Topic'. Japanese can also use the discontinuous element *sika...nai* 'only...not' in these cases, as shown in (i). *Sika* must still be adjacent to the item it associates with:

- (i) a. John-ga yuushoku-ni Lyn-*sika* shoutaisi-*nak*-atta.
 John-Nom dinner-to Lyn-*sika* invite-Neg-Past
 'John only invited [Lyn]F for dinner'
 b. John-ga yuushoku-ni-*sika* Lyn-o shoutaisi-*nak*-atta.
 John-Nom dinner-to-*sika* Lyn-Acc invite-Neg-Past
 'John only invited [Lyn]F for dinner'

- (40) *Korean*
- | | | | | |
|-----------|--------------|-----------------|---------------------|-------------------------------|
| a. John-i | tanchi/ochik | Lyn-man(-ul) | chenyuksiksa-ey | chotaeha-ess-ta ²¹ |
| John-Nom | only | Lyn-focpart-Acc | dinner-at | invite-Past-part |
| b. John-i | Lyn-ul | tanchi/ochik | chenyuksiksa-ey-man | chotaeha-ess-ta |
| John-Nom | Lyn-Acc | only - | dinner-at-focpart | invite-Past-part |
- (41) *Bulgarian*
- | | |
|-------------------------|---------------------------------|
| a. Ivan pokani samo | [Lyn] _F na vecherja. |
| Ivan invited only | Lyn to dinner |
| b. Ivan pokani Lyn samo | na [vecherja] _F . |
| Ivan invited Lyn only | to dinner |

In Japanese, for example, making the particle *dake* be non-adjacent to the item it associates with leads to a degraded status for the sentence for many speakers:

- (42) a. ??John-wa [Lyn-o]_F yuushoku-ni shootaishita dake da.
 John-Top Lyn-Acc dinner-for invited only copula
 b. ??John-wa Lyn-o [yuushoku-ni]_F shootaishita dake da.
 John-Top Lyn-Acc dinner-for invited only copula

Or, in Rumanian, a preverbal *numai/doar* is grammatical, but the sentence can only be interpreted with focus on the whole VP^{22, 23}:

- (43) John numai/doar a invitat-o pe Lyn la cina
 John only has invited-her Acc Lyn to dinner
 ‘The only thing John did was invite Lyn for dinner’

²¹ ‘Focpart’ stands for ‘focus particle’ and ‘part’ for ‘particle’.

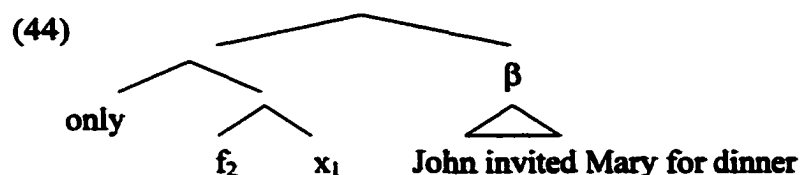
²² The reading (43) gets seems to be scalar; according to (43), John didn’t insist that Lyn come for dinner, for example.

²³ English also allows VP-focus readings, as in (i), though (i) does not necessarily receive a scalar interpretation:

(i) John only [invited Mary for dinner]_F

So, at least with respect to the behavior of *only*, all the languages studied here allow the focus particle to appear next to the item it associates with, and only a subset of them allow the focus particle to appear non-adjacent to it as well. The question is what is the best analysis of both ‘long-distance’ and ‘short-distance’ association, as illustrated in English, Chinese, Spanish, Korean, Japanese, Bulgarian and Rumanian. The theory I develop in Chapter 3 is intended to be an analysis of ‘long-distance’ association but there is a straightforward way of making ‘short-distance’ association fall under its umbrella: by making *only* move from its focused-item adjacent position to the position it occupies in ‘long-distance’ association cases. Let me discuss this in more detail. The discussion that follows includes structural considerations about the input to the semantic interpretation assumed here that are worth discussing at this point anyway.

In Chapter 3, I will presuppose that a structure like that in (30), repeated as (44), is available by the time the computation reaches the semantics:



What is significant about (44) is that *only* does not appear right next to *invited*, though that is its position on the surface in (25). The question is how this structure arises. How we answer this question has consequences for the analysis of the facts in (25) and (34)-(43).

There at least two possibilities. One possibility is that β in (44) corresponds to a projection of the verb (VP), to which *only* attaches. This analysis presupposes the VP-

internal subject hypothesis (see Fukui and Speas (1986); Huang (1993); Koopman and Sportiche (1991)), and that *John* gets to be inside of the VP by the time the computation reaches the semantics via reconstruction. If one doesn't want to assume the reconstruction of the subject to the VP-internal subject position or if there are reasons for assuming that *only* can move, another possibility is to assume that *only* moves at LF from its VP-attached position to a position higher than the subject (i.e., SpecIP).

Choosing the second option means that we have to make the additional assumption that in English and Spanish, *only* can attach to NPs that bear the F-feature as well as VPs that contain an item that bears the F-feature, given facts such as (37) or their English counterparts. Furthermore, it must be assumed that *only* in languages like Japanese, Bulgarian, Rumanian and Korean can only attach initially to F-bearing items, but that at LF it can raise to the appropriate position (i.e., as in (44)). One advantage of this proposal is that the mechanism of long-distance association I propose in Chapters 3 and 4 takes care of all of the above languages; this option reduces cases like (37) and their English counterparts to (35) and (25), respectively, and thus has the advantage that the semantic behavior of *only* in both cases is explained uniformly.

Under the first option, the *only* of (35)/(25) and the *only* of (37) and their English counterparts, respectively, are different items, since the analysis of 'long-distance' association in Chapters 3 and 4 does not carry over to 'short-distance' association. For Japanese, Bulgarian, Rumanian and Korean we must assume that *only* only attaches to F-bearing items (initially or otherwise, unless we want to assume that *only* can move too), whereas English, Spanish and German have the second kind of *only* exemplified in (37).

I assume here the second hypothesis, where (44) is the result of moving *only* to a position above SpecIP. I like it about this hypothesis that both (25), (35), (37) and its English counterpart receive a unified analysis, though some questions remain (e.g., where does *only* move to?). Whether one decides to make this assumption or to adopt the first solution, it is clear that more work needs to be done; in particular, it is necessary to explore the consequences of these assumptions for the syntax and semantics of the languages that do not allow long-distance association. Pending that, I see no particular reason for choosing the first option.

What about other focus-sensitive particles? *Also* and *even* show behavior very similar to *only* in English, as witnessed in the following examples:

- (45) a. John even invited [Mary]_F for dinner
b. John even invited Mary for [dinner]_F
- (46) a. John invited even [Mary]_F for dinner
b. John invited Mary even for [dinner]_F
- (47) a. John also invited [Mary]_F for dinner
b. John also invited Mary for [dinner]_F
- (48) a. John invited also [Mary]_F for dinner
b. John invited Mary also for [dinner]_F

Both *also* and *even*, like *only*, can be attached close to the item they associate with and also allow for long-distance association. As is well-known, the effects of focus with these particles is not truth-conditional but presuppositional. For example, a sentence of the form *also* α , where α is a proposition, presupposes that some proposition that is not α is true, and asserts α . When α contains a focus, what proposition other than α is presupposed to be true is influenced by it. For example, whereas (47a) is felicitous only

in a context in which John invited someone other than Mary for dinner, (47b) is felicitous only in a context in which John invited Mary for something other than dinner. The effects of focus with *even* are presuppositional as well, as discussed in more detail in Chapter 3. The analysis of these effects also relies on the availability of a contextual variable which, in our analysis, is generated as the sister of *also* and *even*.

The behavior of *also* and *even* in English, however, doesn't carry over to other languages, not even to languages in which *only* behaves like English *only*. Consider the case of Spanish. Whereas *también* 'also' can associate 'long-distance' with focus ((49)), *incluso* 'even' must be adjacent to the item it associates with ((50)-(51)). Curiously, *también* cannot be adjacent to the item it associates with ((52)):

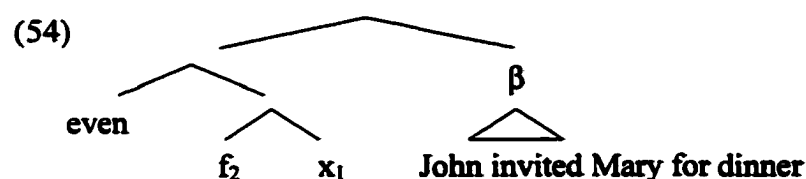
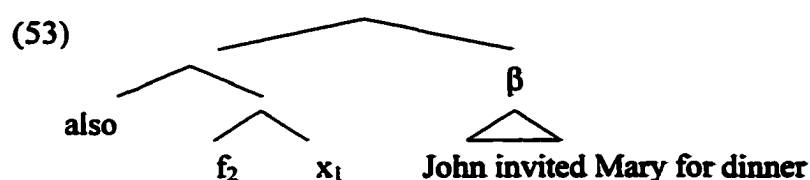
- (49) a. Juan también invitó a cenar [a María]_F
 Juan also invited to dine to María
 b. Juan también invitó a María [a cenar]_F
- (50) a. ??Juan incluso invitó a cenar [a María]_F
 b. ??Juan incluso invitó a María [a cenar]_F
- (51) a. Juan invitó a cenar incluso [a María]_F
 b. Juan invitó a María incluso [a cenar]_F
- (52)²⁴ a. *Juan invitó a cenar también [a María]_F
 b. *Juan invitó a María también [a cenar]_F

²⁴ (ia) and (ib) are slightly better, though still not perfect:

- (i) a. ?? Juan invitó a cenar [a María] también
 b. ?? Juan invitó a María [a cenar]_F también

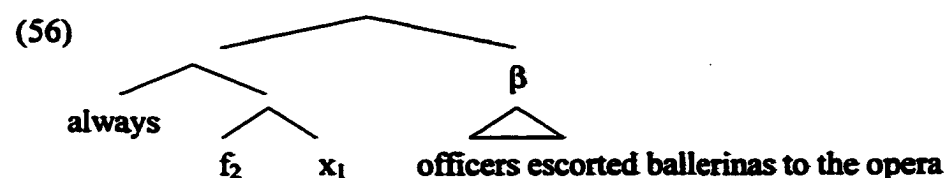
Incluso, then, is like *only* in Japanese, Rumanian, Bulgarian and Korean. *También* is unlike any instance of *only*, since all the languages above allow the ‘short-distance’ strategy with *only*.

I do not speculate about the reasons for this behavior here, but assume that by the point the computation reaches the semantics, the structures in (53) (for *also*) and (54) (for *even*) are available for (45)-(52):



I hold similar assumptions for adverbs of quantification, which are also sensitive to focus (see Chapter 4 and references cited there). (56) is the relevant structure for the sentences in (55):

- (55) a. [Officers]_F always escorted ballerinas to the opera
 b. Officers always escorted [ballerinas]_F to the opera



In sum, I assume that movement of the focus particle leads to the LFs that the semantic component deals with ((44), (53), (54), (56)). A uniform treatment of ‘long-distance’ association and what on the surface looks like ‘short-distance’ association results. Languages vary, however, in whether they allow a specific focus particle to associate ‘long distance’ overtly. In a good number of languages, the only allowed surface word order is that in which the focus particle is next to the focused item. We also find that in some languages some focus particles cannot be next to the focused item.

Appendix How to calculate focus semantic values²⁵

Rooth (1985) enriches the semantics with an additional kind of object, focus semantic values, defined recursively. These focus semantic values are an “extra” kind of denotation, existing in parallel to ordinary semantic values. In order to calculate focus semantic values, a way for calculating focus semantic values for individual expressions and their combinations into bigger units (phrases and sentences) is provided; because focus semantic values are defined in terms of ordinary semantic values, a way of calculating ordinary semantic values for individual expressions and their combinations into bigger units (phrases and sentences) is needed as well²⁶. (57) and (58) lay out the formal system that will allow us to calculate ordinary semantic values; application to some simple examples follows. The formal system that allows us to calculate focus semantic values follows that, with an application to simple examples as well:

(57) Initial Assumptions:

To provide the meaning of an expression is to translate it into a formal language such that:

- a. W is the set of worlds, E is the set of individuals, G is the set of assignment functions
- b. There is an interpretation function F such that for every constant C of type τ , $F(C) \in D_\tau$
- c. For any complex type $\langle \alpha, \beta \rangle$, $D_{\langle \alpha, \beta \rangle}$ is a function from D_α to D_β
- d. The set of assignment functions G consists of all g such that for any variable v of our translation language of type τ , $g(v) \in D_\tau$. Expressions are interpreted relative to an assignment function

²⁵ This section is based on Rooth (1985) and Büring (1997).

²⁶ Ordinary semantic values we already had, nothing new happens here.

e. Certain expressions bear the feature 'F', which at the phonological level triggers a special intonation pattern (see Chapter 1) and at the semantic level has the effects described in (63).

(58) Calculation of ordinary semantic values:

a. Individual expressions:

If α is a constant, then $[[\alpha]]^{0,g} = F(\alpha)$

If α is a constant, then $[[\alpha_F]]^{0,g} = F(\alpha)$ ²⁷

If α is a variable, then $[[\alpha]]^{0,g} = g(\alpha)$

b. Combinations of individual expressions:

FA: If α is of type $\langle\phi, \gamma\rangle$ and β is of type $\langle\phi\rangle$, then $[[\alpha(\beta)]]^{0,g} = [[\alpha]]^{0,g} ([[\beta]]^{0,g})$;
 $[[\alpha(\beta)]]^{0,g}$ is of type $\langle\gamma\rangle$

PM: If α and β are both of type $\langle\phi, \gamma\rangle$, then $[[\alpha \beta]]^{0,g} = [[\alpha]]^{0,g} \cap [[\beta]]^{0,g}$; $[[\alpha \beta]]^{0,g}$ is of type $\langle\phi, \gamma\rangle$

λ -A: If α is of type $\langle\phi\rangle$ and u is a variable of type $\langle\gamma\rangle$, then $[[\lambda u. \alpha]]^{0,g}$ is the function f from D_γ to D_ϕ such that for all $x \in D_\gamma$, $f(x) = [[\alpha]]^{0,g(x/u)}$; $[[\lambda u. \alpha]]^{0,g(x/u)}$ is of type $\langle\gamma, \phi\rangle$ and $g(x/u)$ is the function g' which is like g , except that $g'(u) = x$

Here is how the system works in the case of simple expressions:

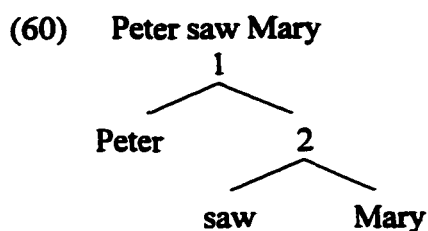
- (59) a. $[[Peter]]^{0,g} = F(Peter) = \text{the individual Peter}$
 b. $[[u]]^{0,g} = g(u)$
 c. $[[eat]]^{0,g} = F(eat) = \lambda x \lambda y. y \text{ eats } x$
 d. $[[Peter_F]]^{0,g} = [[Peter]]^0$

Notice in particular case (59d): the ordinary semantic value of a focused expression is equivalent to the ordinary semantic value of the same expression but without focus.

Focus thus has no effect on ordinary semantic values.

Computing the ordinary semantic value of a sentence involves computing the ordinary semantic value of each of its nodes. Consider the sentence in (60)²⁸:

²⁷ That is, ordinary semantic values are not sensitive to focus.



In order to compute the ordinary semantic value of the node labeled '1', we first need to compute the ordinary semantic value of node 2. Here is the computation for node 2:

$$\begin{aligned}
 (61) \quad [[2]]^{o,g} &= [[\text{saw}]]^{o,g} ([[\text{Mary}]])^{o,g} && \text{(FA)} \\
 &= [\lambda x \lambda y. y \text{ saw } x] (\text{Mary}) && \text{(\lambda-C)} \\
 &= \lambda y. y \text{ saw Mary}
 \end{aligned}$$

Here is the computation of the meaning of node 1:

$$\begin{aligned}
 (62) \quad [[1]]^{o,g} &= 1 \text{ iff } [[2]]^{o,g} ([[\text{Peter}]])^{o,g} && \text{(FA)} \\
 &= 1 \text{ iff } [\lambda y. y \text{ saw Mary}] (\text{Peter}) && \text{(\lambda-C)} \\
 &= 1 \text{ iff Peter saw Mary}
 \end{aligned}$$

We now want to calculate focus semantic values:

(63) Calculation of focus semantic values:

a. Individual expressions:

If α is a constant, then $[[\alpha]]^{f,g} = \{F(\alpha)\}$

If α is a constant of type $\langle \phi \rangle$, then $[[\alpha_F]]^{f,g}$ is the set of $x \in D_{\langle \phi \rangle}$ such that x is an alternative to $[[\alpha]]^{o,g}$

If α is a variable, then $[[\alpha]]^{f,g} = \{g(\alpha)\}$

b. Combinations of individual expressions:

²⁸ I am abstracting away from tense issues here. I have labeled the nodes in the tree with numbers for ease of exposition, what their specific labels are is not important for us.

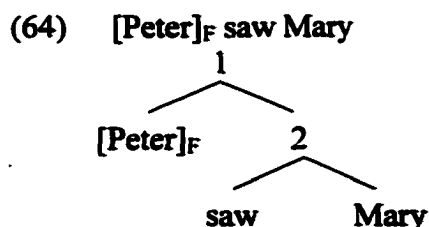
FA: If α is of type $\langle\phi, \gamma\rangle$ and β is of type $\langle\phi\rangle$, then $[[\alpha(\beta)]]^{fg}$ is the set of all $h \in D_\gamma$ such that there is an $h' \in [[\alpha]]^{fg}$ and an $h'' \in [[\beta]]^{fg}$ and $h = h'(h'')$; $[[\alpha(\beta)]]^{fg}$ is of type $\langle\gamma, t\rangle$

PM: If α and β are both of type $\langle\phi, \gamma\rangle$, then $[[\alpha \beta]]^{fg}$ is the set of all $h \in D_{\langle\phi, \gamma\rangle}$ such that there is an $h' \in [[\alpha]]^{fg}$ and an $h'' \in [[\beta]]^{fg}$ and $h = h' \cap h''$; $[[\alpha \beta]]^{fg}$ is of type $\langle\langle\phi, \gamma\rangle, t\rangle$

λ -A: If α is of type $\langle\phi\rangle$ and u is a variable of type $\langle\gamma\rangle$, then $[[\lambda u. \alpha]]^{fg}$ is the set of all functions $f \in D_{\langle\gamma, \phi\rangle}$ such that there is an $h \in [[\alpha]]^{fg}$ and for all $x \in D_{\langle\gamma\rangle}$, $f(x) = h$ interpreted relative to a modified assignment g' such that $g' = g(x/u)$ ($[[h]]^{g(x/u)}$)

The idea that focus induces alternatives is incorporated into the system by means of the clause in (63a) that determines that the focus semantic value of a focused individual expression is the set of alternatives to it (of the same semantic type). The idea driving the clauses in (63b) is that to calculate the focus semantic value of a complex expression \mathfrak{I} via an operation \mathfrak{R} , we take all the elements of the focus semantic value of daughter A of \mathfrak{I} and combine them using \mathfrak{R} with all the elements of the focus semantic value of daughter B of \mathfrak{I} . We then collect all of these applications of \mathfrak{R} into a set.

We can see how this works with example (64):



We want to calculate the focus semantic value of node 1, for which we need to calculate the focus semantic values of all the nodes and lexical items 1 dominates²⁹:

²⁹ I am ignoring tense again.

- (65) $[[\text{Mary}]]^{f,g} = \{F(\text{Mary})\} = \{\text{Mary}\}$
 $[[\text{see}]]^{f,g} = \{F(\text{see})\} = \{\text{see}\}$
 $[[2]]^{f,g} = \text{the set of all } h \in D_{\langle e, \langle e, \langle e, t \rangle \rangle} \text{ such that there is an } h' \in [[\text{see}]]^{f,g} \text{ and an } h'' \in [[\text{Mary}]]^{f,g} \text{ and } h = h'(h'') = \text{the set of all } h \in D_{\langle e, \langle e, \langle e, t \rangle \rangle} \text{ such that there is an } h' \in \{\text{see}\} \text{ and an } h'' \in \{\text{Mary}\} \text{ and } h = h'(h'') = \{\text{see Mary}\}^{30}$
 $[[[\text{Peter}]_F]]^{f,g} = \text{the set of } x \in D_e \text{ such that } x \text{ is an alternative to } [[[\text{Peter}]_F]]^{o,g} = D_e = \{\text{Peter, Mary, John, Arthur, ...}\}$

Now we can calculate the focus semantic value of 1:

- (66) $[[1]]^{f,g} = \text{the set of all } h \in D_{\langle \langle e, \langle e, \langle e, t \rangle \rangle \rangle} \text{ such that there is an } h' \in [[2]]^{f,g} \text{ and an } h'' \in [[[\text{Peter}]_F]]^{f,g} \text{ and } h = h'(h'')$
 $= \text{the set of all } h \in D_{\langle \langle e, \langle e, \langle e, t \rangle \rangle \rangle} \text{ such that there is an } h' \in \{\text{see Mary}\} \text{ and an } h'' \in \{\text{Peter, Mary, John, Arthur, ...}\} \text{ and } h = h'(h'')$
 $= \{\text{Peter saw Mary, Mary saw Mary, John saw Mary, Arthur saw Mary...}\}$

Though this is the procedure adopted by Rooth (1985), and the one adopted here, it is not the only proposal in the literature on how to compute focus semantic values. For example, Kratzer (1991) suggests that we use distinguished variables, and exploits this option to explain meanings that arise in certain cases of VP-ellipsis and focus. However, the end result is the same as that obtained with the procedure discussed here; since the issues of concern in this dissertation do not have to do with how focus semantic values are constructed, but with how they are put to use by the grammar, I will not be concerned with the question of which option is to be preferred³¹.

³⁰ This is the singleton set containing the predicate 'see Mary', which still needs to be fed an individual.

³¹ Krifka (1992) makes use of structured propositions, instead of following the Kratzer or Rooth lines.

Chapter 2 Bound Contextual Variables

In this chapter we study bound instances of the contextual variables of quantificational noun phrases like *every student*. Given the hypothesis that C is a pronoun we expect bound C to behave in ways similar to the way bound pronouns in general behave.

Here are some of the points made in this chapter. First (§2.1), I argue that C can be bound. This involves arguing against analyses of the facts in which the implicit variables arguably associated with (relational) nouns (e.g., *student* in *every student*) are the items that get bound, instead of C. The argument against such analyses is that bound readings can be observed even in examples without (relational) nouns, such as sentences with adverbs of quantification.

Secondly (§2.2), I argue that C is subject to Weak Cross Over (WCO), a well-known constraint on the binding of pronouns. It is not only that C subject to WCO, it's that in environments where it is known that regular pronouns violate WCO, C violates WCO too. I consider two such environments here: variables contained within adjunct phrases (Lasnik and Stowell (1991: 690)) and variables c-commanded by PRO (the 'PRO-gate' phenomenon; see (Higginbotham (1980))). Furthermore, I show that in languages like Chinese, where the distribution of pronouns is more constrained than in English (see Higginbotham (1980)), the distribution of C is also more constrained. These discoveries constitute important evidence for the hypothesis advanced in this dissertation, that the behavior of C is regulated by the same principles that regulate the behavior of pronouns.

Finally, in §2.3, I address some issues raised by Partee (1989) in relation to other implicit contextual variables, those postulated for items like *local*, *nearest*, *enemy*, etc. Because I assume that contextual variables are present in the syntax, I critically examine her arguments against this position, and show that they do not stand up to closer scrutiny. I also provide an analysis of the facts she uses to support her conclusion. The behavior of C is compared with that of these other contextual variables, which are subject to WCO as well. §2.4 is the conclusion.

2.1 Introduction

I take as the point of departure the example in (1), already discussed in Chapter 1 (§1.2.2) (Heim (1991: 24), von Stechow (1994: 31, 1995: 162)):

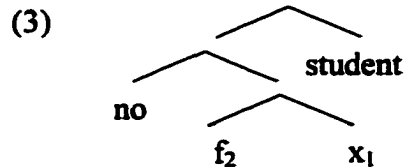
- (1) Only one class was so bad that no student passed the exam

Heim writes: “*no student* here means ‘no student in the respective class’, and not: no student in the whole domain that figures in the evaluation of [(1)]”. A rough approximation to the meaning of (1) is then as follows: “only one class *x* was so bad that no student in *x* passed the exam”. Notice that we get a similarly bound reading in the question in (2):

- (2) Which class was so bad that no student passed the exam?

The most salient reading of this question is this: “which class x was so bad that no student in x passed the exam?”

In §1.2.2, I proposed that the internal structure of *no student* is as (3):



Some of the ingredients/principles used in arriving at the appropriate truth-conditions for (1)-(2) are repeated in (4)-(8):

(4) $g(2) = \lambda y \lambda x: x, y \in D_e. \text{ student}(x) \ \& \ \text{class}(y) \ \& \ x < y$

(5) **Proforms and Traces Rule (P&T)**

If α is a proform or a trace, i is an index, and g is an assignment whose domain includes i , then $[[\alpha_i]]^g = g(i)$

(6) **λ -Abstraction (λ -A)**

Let α be a branching node with daughters β and γ , where β dominates only a λ -abstractor with numerical index i . Then, for any variable assignment g , $[[\alpha]]^g = \lambda x \in D_{\langle e \rangle}. [[\gamma]]^{g(x/i)}$

(7) **Appropriateness Condition**

A context c is appropriate for an LF ϕ only if c determines a variable assignment g_c whose domain includes every index which has a free occurrence in ϕ

(8) **The value of a free index is a salient object**

The argumental variable is bound by the quantifier *only one class* in (1) or by *which class* in (2)¹. The denotation of the subordinate clause in (1) and (2) is as in (9) (see Chapter 1 for the details):

$$(9) \quad \{y: \text{student}(y) \ \& \ \text{class}(x) \ \& \ y < x\} \cap \{y: y \text{ passed the exam}\} = \emptyset$$

That is, the set of students in class x who passed the exam is empty. (1) thus ends up claiming that only one class x was so bad that the set of students in class x who passed is empty, and (2) asks which class x was so bad that the set of students in class x who passed is empty. This is as desired^{2, 3}.

¹ More appropriately, by a λ -operator inserted after the movement of *only one class* or *which class*. Where irrelevant, I simplify and speak of quantifiers/quantificational noun phrases binding C /he.

² I do not study cases where the functional variable gets bound, as I already indicated in Chapter 1. Thus, in the sentences I consider below, only the argumental variable gets bound. Cooper (1979: 66) suggests an example from Hittite where it is the functional variable that gets bound (for him, it's the functor variable of an E-type pronoun):

- (i) aššer-ma-kan kuiēš DINGIR.MEŠ n-aš INA E ^DMezulla pihhun
 remained-but-ptc which god.pl ptc-them to house god-M. I-gave
 Which gods remained, I gave them to the temple of Mezzulla
 'I gave the gods which were left to the temple of Mezzulla' (Raman (1974: 121))

(Notes: 'ptc' stands for 'particle'; I don't know why the words for 'god', 'house' and 'to' are capitalized, or what the superscript 'D' on *Mezulla* means). In his analysis, the functor variable associated with the pronoun *n-aš* 'them' is bound by *aššer-ma-kan* 'the gods which were left' (he argues against an analysis in which the relative clause is initially embedded and then moves to the left periphery of the clause). It might be possible to find examples where something analogous happens with C .

³ von Stechow (1994: 31), who is, to my knowledge, the first to propose that C has a complex, functor-argument structure, does not commit himself to the syntactic presence of C and proposes the following indexing rule:

- (i) **Quantifier-indexing rule:**
 Freely index quantifiers with indices of the form $f_i^a(v_1, \dots, v_n)$, where f_i^a is an n -place functor variable whose arguments are n -tuples in $(A \cup S)^n$, and whose values are sets of individuals in A , and where v_1, \dots, v_n are variables of the appropriate type. A is a set of individuals, S is the set of (possible) situations

I pointed out in Chapter 1 that these are the only pragmatically plausible readings of (1) and (2). A reading for, e.g., (1), in which the argumental variable remains free is odd in that it would be true in a situation in which there is this one class that was so bad that no student in some contextually relevant set (e.g., in the set of students who attend the school) passed the exam. There are examples, however, where both the free and the bound reading of C are felicitous. Consider (10)⁴:

(10) Most people gave money to every charity

The sentence in (10) has two readings. In one reading, C is free. Suppose that there are three salient charities, A, B and D. Out of a set of ten contextually salient people, each of eight people gave money to all of A, B and C. That is, person 1 gave money to all of A, B and D, person 2 gave money to all of A, B and D, etc. A rough paraphrase of this reading would be, “most people gave money to all the charities in a of contextually salient set”.

In the other reading, C is bound by the quantificational noun phrase *most people*. Consider the following situation: each person in a contextually salient group of ten people is a member of a number of charities. Eight out of these ten people gave money to everyone of the charities they are members of. If person 1 is a member of charities A and B, then person one gave money to A and B; if person 2 is a member of charities B, D and E, the person 2 gave money to B, D and E, etc. A paraphrase for this reading would be, “most people x are such that x gave money to every charity x is a member of”. The value

The rule in (i) closely resembles the proposal for E-type pronouns in Heim (1990).

of the functional variable of C in this case is as in (11); the analysis of the sentence is in (12):

(11) $\lambda x \lambda y. \text{person}(x) \ \& \ \text{charity}(y) \ \& \ x \text{ is a member of } y$

(12) $[[\text{most people}] [\lambda_1 [t_1 \text{ gave money to } [[\text{every } [f_2 x_1]] \text{ charity}]]]]]$

Significantly, native speakers report that the bound reading in (10) is not as salient as the free reading, or that it is harder to get. This is something that we will have to worry about throughout this chapter: bound readings are easily obtainable in cases like (1)/(2), where one relevant feature seems to be that the noun that accompanies the quantifier whose C is bound is relational, like *student*.

I follow Barker and Dowty (1992: 51) in that relational nouns are nouns “such that an entity qualifies for membership in the extension of the noun only by virtue of there being a specific second entity which stands in a particular relation to the first, and where that relation is determined solely by the noun’s lexical meaning”. They suggest that it is possible to identify relational nouns on the basis of syntactic tests: these nouns can take an *of*-phrase (*the friend of John*, *the uncle of Mary*) and the *of*-phrase can be paraphrased by a prenominal possessive⁵ (*John’s friend*, *Mary’s uncle*). *Student* is then a

⁴ Thanks to David Braun, Norman Clarke, Sarah Felber, David Gordon, Eric Shortt and William Snyder for the English data reported in this chapter.

⁵ They suggest the prenominal possessive test in order to distinguish relational nouns from nouns like *ring*, which take the *of*-phrase but not the prenominal possessive (??*the gold’s ring*).

relational noun (cf. *the students of this class/this class' students*). *Charity*, on the other hand, doesn't seem to be relational (**the charity of this person⁶/this person's charity*).

(13) further illustrates the difference in the availability of bound readings of C with relational and non-relational nouns:

- (13) a. At least two companies compensated every manager
 b. At least two airlines compensated every family
 c. Every teacher is proud of most students
 d. Everybody is proud of most charities

Note that *manager* and *students* are relational nouns (cf. *the manager of the company, the company's manager*). Bound readings are easily available in (13a) (“at least two companies x compensated every manager of x”) and (13c) (“every teacher x is proud of most students of x”). Neither *charity* nor *family* are relational nouns (cf. *??this airline's families/??the families of this airline⁷*). Bound readings in (13b) (e.g., “at least two airlines x compensated every family that flew with x”) and (13d) (e.g., “every x is proud of most charities x donates money to”) do not seem to be so easily available.

Why is it that it is more difficult to get the bound readings in cases where the noun that accompanies the quantifier is not relational? The idea is this: the bound reading in cases like (10), (13b) and (13d) *is* available, but in out-of-the-blue contexts like these, it is hard to reconstruct the value of the functional variable of C (e.g., the person-charity

⁶ *The charity of this person* is fine if used to mean “the charitable qualities of this person”. *This person's charity* can also be used in this sense. *Charity* might then be said to be relational in one meaning of the word (“charitable qualities”), though not in the other (“non-profit organization”) (it is the latter that is relevant in the text). See Barker (1991) and below for discussion of this.

⁷ *This airline's families/the families of this airline* may marginally be grammatical if understood as “the families of the employees of this airline”. This is not the relevant meaning in (13b). Recall footnote 6.

function in (10)/(13d), or the airline-family function in (13b)). Recall that in these readings, the functional variable of C remains free and needs to be assigned a value by the context.

On the other hand, with relational nouns, the necessary value for the function is easily recoverable (i.e., it is easy to infer the class-students function on the basis of *student*). That this suggestion is on the right track is confirmed by the fact that if a rich-enough context is provided in cases like (10), (13b) and (13d), the bound reading becomes easily available. Compare (10) to (14), where some changes have been made in order to make the example appropriate in the context:

- (14) The people in our neighborhood are affiliated with a number of different charities. For example, John belongs to “Children of the World”, Susan to “Children of the World” and “We are the Children”, Bill to “ActionAid”, Stefan to “We are the children”, “ActionAid” and “PeaceNow”, and so on for the other fifteen neighbors. It is customary to make a donation to the charities you belong to before Christmas. This year, *most people have given money to every charity*. There were only two neighbors who couldn’t afford to give any money at all. But the economic situation has not improved so much that people were able to give money to charities they don’t belong to.

The bound reading, though not the free reading, is compatible with a situation in which nobody gives money to charities they don’t belong to. Importantly, the last sentence in (14) makes this explicit, and the text is still felicitous. Consider also (15) (cf. (13b)):

- (15) Friday was a chaotic day at the airport. Lots of flights arrived very late. The airlines whose planes landed late realized that the people most affected by the situation were the families flying with them. That is why *at least two airlines compensated every family*

The airline-family relation is available in the context prior to the italicized sentence, and the bound reading of the C of *every* is readily available (“at least two airlines *x* are such that *x* compensated every family that flew with *x*”). The value of the functional variable of the C of *every* and the analysis of the italicized sentence in (15) are in (16) and (17), respectively:

(16) $\lambda x \lambda y. \text{family}(y) \ \& \ \text{airline}(x) \ \& \ y \text{ flew with } x$

(17) $[\text{[at least two airlines]} \ [\lambda_1 [t_1 \text{ compensated } [\text{every } [f_2 \ x_1]] \text{ family}]]]]$

This suggests that the apparent lack of a bound reading in cases like (13b) might really be due to the fact that, without explicit context, it is hard to come up with a value of the functional variable of C.

Now, the fact that the noun that accompanies the quantifier in sentences such as (1) and (2) is relational raises the possibility of analyzing these sentences in an alternative way⁸. Suppose that the implicit argument that is generally assumed to be part of the meaning of relational nouns is itself a variable that can be bound. Then this variable could be responsible for what I have called above bound readings of C in (1) and (2), instead of C. If this analysis were feasible, then these examples might not be telling us anything about C.

An analysis of the facts in terms of the implicit variable of relational nouns is not feasible, however. Examples like (10) (cf. (14)) or (13b) (cf. (15)) are already part of the reason for this: bound readings *are* available with non-relational nouns. If bound readings

depended on an implicit variable made available by a relational noun, then these sentences should have no bound readings at all. The fact that it is possible to have such readings, even if one needs to provide a rich-enough context, suggests that there must be a mechanism that allows them. And that is C.

There are (at least) two further classes of examples where an analysis in terms of the implicit argument of a relational noun is not feasible: those which contain a relational noun next to the quantifier but in which its implicit argument is overtly represented ((18)), and those with adverbs of quantification like *always*, which are not accompanied by a relational noun at all ((21), (22)):

- (18) The business professors gathered in the faculty room. The meeting was about the companies with which the School of Business has close contacts. Several of them have had close contact with several representatives from those companies lately.
Most professors admire every representative of Kodak

Every representative of Kodak in the last line of (18) can be understood as “every representative of Kodak with which *x* has been in close contact with lately”, where the variable *x* is bound by *most professors* (“most professors *x* are such that *x* admires every representative of Kodak with which *x* has had close contact lately”)⁹. The value of the functional variable of *every* is as in (19), and the representation of the bound reading is as in (20):

- (19) $\lambda x \lambda y.$ professor(*x*) & representative(*y*) & *x* has been in contact with *y* lately

⁸ Thanks to Polly Jacobson (p.c.) for alerting me about this alternative analysis.

⁹ Some speakers might prefer ‘from Kodak’ instead of ‘of Kodak’.

(20) [[most professors] [λ_1 [t_1 admire [[every [f_2 x_1]] representative of Kodak]]]]

The example is compatible with a situation in which most professors despise representatives of Kodak, as long as these representatives are not the ones the professors had close contact with. An analysis of this reading in terms of an implicit variable argument of the noun *representative* is not feasible because that argument is already filled, by *Kodak*¹⁰.

Consider also (21) and (22). The relevance of these examples is that here what gets bound must be the C of an adverb of quantification; since adverbs of quantification do not take nouns (relational or not) as arguments, the alternative analysis that makes use of the implicit variables presumably introduced by relational nouns cannot apply to them.

(21) Only one summer was so bad that, if it rained, I always missed the bus

(22) Most weekends were so sunny and warm that I always worked in the garden

The bound reading of (21) is as follows: “only one summer x was so bad that all situations in which it rained during x were situations in which I missed the bus”. The paraphrase makes explicit the assumption that *if*-clauses provide the restriction of adverbs of quantification (see Kratzer (1978, 1986), Lewis (1975); this is a standard assumption). I also follow von Stechow (1994) in that adverbs of quantification quantify over situations,

¹⁰ The assumption here is that *Kodak* fills (one of) the argument positions of *representative*; cf. *the representative of Kodak/Kodak's representative*.

but this is not essential (cf. Chapter 4). The bound reading of (22) is as follows: “most weekends x were so sunny and warm that all situations in x were situations in which I worked in the garden”. In this case, we do not have an overt restriction on the adverb via an *if*-clause. The value of the functional variable of the C of *always* in both examples is in (23), and the representations of the reading of, e.g., (22) is in (24)¹¹:

(23) $\lambda x \lambda s. s < x$

(24) $[[\text{most weekends}] [\lambda_1 [t_1 \text{ were so sunny and warm that I } [\text{always } [f_2 x_1]] \text{ worked in the garden}]]]$

Notice that the bound readings for (21) and (22) do not need rich contexts that make the function in (23) salient. I assume that it is not difficult for this function to be available without a context¹².

The summary of this section is as follows. C must be postulated in order to account for certain bound readings, i.e., those in which no relational noun is involved. Bound readings are more easily available with relational nouns because the noun itself makes the needed function salient. Bound readings with non-relational nouns or with no

¹¹ Notice that f is of type $\langle e, \langle s, t \rangle \rangle$ in the case of adverbs of quantification.

¹² Sigrid Beck (p.c.) suggests that it might be possible to claim that all nouns, relational or not, come with an implicit variable of their own. This variable would be useful in the analysis of examples with bound definite descriptions like (i) (see Chierchia (1995), Winter (2000)):

(i) At a shooting range, each soldier was assigned a different target and had to shoot at it. At the end of the shooting we discovered that *every soldier hit the target*

In (i), there is no unique target that *the target* refers to. Instead, what the italicized sentence means is, “every soldier x hit x ’s target”; that is, the definite description receives a bound interpretation. An implicit variable associated with the noun *target* would do the job here, though it is also possible that the variable is actually associated with the definite determiner itself. In any case, this possibility is irrelevant because of examples like (21) and (22), with bound readings and no nouns at all.

nouns at all need a rich context in which the needed function is made salient but are certainly attested.

2.2 Constraints on C

If the argumental variable of C is a pronoun, then binding of this variable should be subject to the same constraints that binding of pronouns is subject to. The main point of this section is to show that this expectation is fulfilled.

Before showing what sorts of constraints operate on bound C, let me first show that C behaves in a certain expected, non-constrained way: it can be bound non-locally; that is, C is not a reflexive pronoun. (25), taken from Percus et al. (2001), shows that *his* can be bound by a non-local antecedent:

(25) Nobody liked the person who Jane sent to his office

(25) admits two interpretations, which depend on what the binder of the pronoun *his* is. In one reading, there is a particular person who is very unpopular. This is the person that Jane sent to his own office. In this reading, *his* is bound by *who*. The other reading is true in a situation in which each person whose office was visited disliked the visitor. Here there is not one particular person who is disliked, but several. In this reading, *his* is bound by *nobody*, which, crucially, is not the closest potential binder, given that *who* can also be a binder for the pronoun.

C, too, can be bound by a non-local binder, which constitutes another piece of evidence that the contextual variable is just like regular pronouns. Consider (26):

(26) No airline reported the person who bribed every family

In a context that makes an airline-family relation salient, the C of *every* can be bound by the quantificational noun phrase *no airline*. This reading says that no airline x is such that x reported the person who bribed every family that flew with x. The reading allows there to be a number of different evil people who bribe families. Binding by a more local binder is of course also possible in (26) (“no airline reported the person who bribed every family that spoke with that person”, in a context in which the relation between families and the people they spoke to is salient)¹³.

¹³ It is not possible to show that C is subject to Condition B, another constraint on pronouns. The binder of a pronoun like *him* cannot be too close to the pronoun. Consider (i):

- (i) a. Every diver likes his mother
 b. Every diver likes him

Every diver is too close to *him* to bind *it* in (ib) (cf. Chomsky (1981)): the binder is contained within the same binding domain (in Chomsky’s terms, *governing category*), the sentence, as the bindee; Principle B of the Binding Theory disallows this configuration. *Every diver* is not too close to *his* in (ia), since the binding domain for *his* is the noun phrase that contains it (*his mother*), and *every diver* is not inside of that binding domain. Presumably C is also subject to Principle B, but, because it is embedded inside of a noun phrase, it is impossible to construct examples in which the binder and the bindee are within the same binding domain.

2.2.1 A constraint on bound C in English, Chinese and Spanish.

Consider the examples with pronouns in (27), (some of them adapted) from Lasnik and Stowell (1991: 687-9):

- (27)
- a. Every man thinks that his boss is lucky
 - b. Who called his boss?
 - c. His boss regrets that no man is lucky
 - d. His mother wonders who Jane saw
 - e. The woman who insulted every boy didn't apologize to him
 - f. Who did his boss call?

The quantified noun phrase *every man* and the *wh*-phrase *who* can bind the pronouns *he* and *his* in (27a) and (27b), respectively. However, binding by *no man*, *who* or *every boy* is not allowed in (27c), (27d), or (27e), respectively. This suggests the following necessary condition for binding (Lasnik and Stowell's (5)):

- (28) A pronoun P is construed as a variable bound by a quantifier Q only if Q binds P at LF

Since *no man*, *who* and *every boy* in (27c), (27d) and (27e) are not, at LF, in a position from which to c-command, and hence bind the pronouns, binding is disallowed. Notice that the scope of the quantificational noun phrases is restricted to the *that*-clause and the relative clause in (27c) and (27e), and that *who* in (27d) takes scope inside the complement of *wonder*. In (27a) and (27b), on the other hand, c-command, and hence binding, obtains:

- (29) a. [[every man] [λ_1 [t_1 thinks [that he_{1/2} is lucky]]]]
 b. [who [λ_1 [t_1 dislikes his_{1/2} boss]]]

An additional constraint on binding must be added in order to rule out binding of pronouns in (27f), since, at LF, c-command *does* obtain:

- (30) [who [λ_1 [does his_{1/2} boss dislike t_1]]]

The generalization proposed in the literature is that binding by a quantifier (*who*) is allowed only when the trace of the quantifier c-commands the pronoun. In Lasnik and Stowell's terms (their (14)):

- (31) In a configuration where a pronoun P and a trace T are both bound by a quantifier Q, T must c-command P

Since the trace of *who* does not c-command the pronoun in the configuration in (30), binding is ruled out (the sentence is grammatical because other interpretations are available)¹⁴. (31) is the WCO generalization.

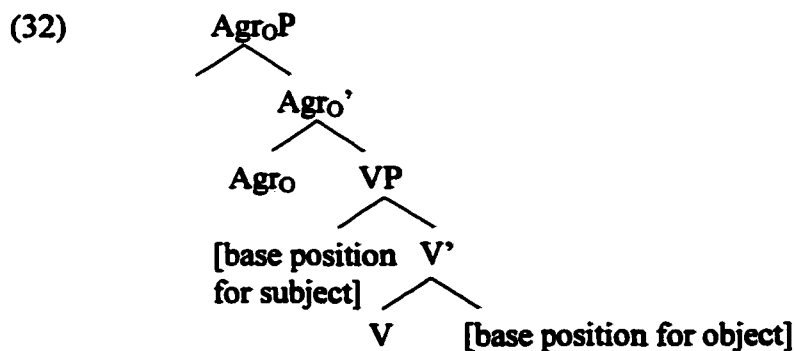
Let me introduce a modification of (31). The modification is prompted by two factors. (31) can't be maintained in its present format if we make two standard (though

¹⁴ I will not discuss Strong Cross Over (SCO) here, exemplified in (i):

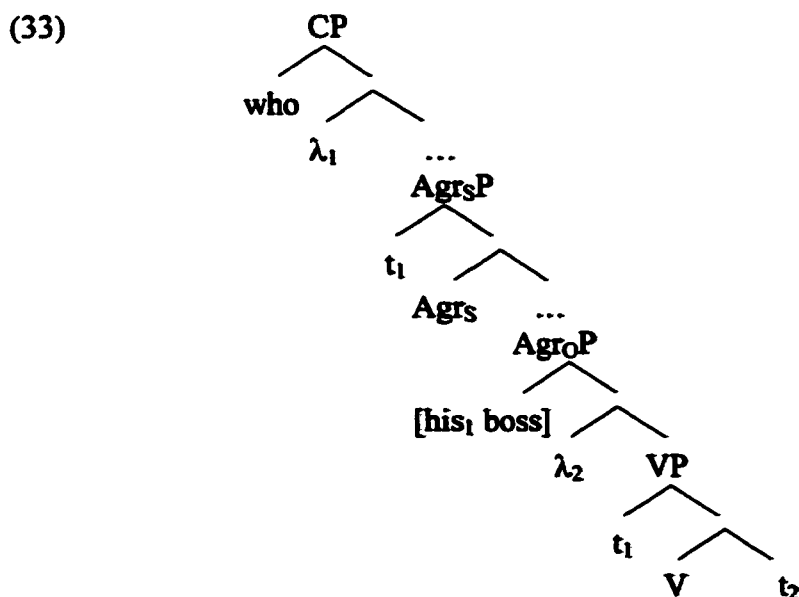
- (i) a. Who does he dislike?
 b. [who [λ_1 [does he dislike t_1]]]

These examples are not relevant for our discussion because our C always appears embedded in some phrase (*every_C student*, *always_C*), like *his* in *his boss*. On SCO, see Chomsky (1981); Postal (1971); Wasow (1972), among others.

not undisputed) assumptions about the syntactic structure of VPs, the VP-internal subject hypothesis (see (Fukui and Speas (1986); Huang (1993); Koopman and Sportiche (1991)) and the movement of objects to an agreement projection right above VP (Chomsky (1993)). With these assumptions, the syntax of VPs is as in (32):



Consider (27b) again. By the time the derivation reaches LF (where, I assume, binding principles apply), the (partial) structure of (27b) is as in (33):



Given (33), (31) is too strong. Binding of the pronoun *his* by *who* is predicted to be impossible since the trace of *who* in the specifier of the VP does not c-command the pronoun. One possible refinement of the principle that does the work is in (34), where ‘DS’ stands for ‘Deep Structure’:

- (34) In a configuration where a pronoun P is bound by a quantifier Q, the DS position of Q must c-command the DS position of P

That is, what is relevant for binding is the original, DS positions of the bindee (i.e., P) and the binder (i.e., Q). This still predicts a difference between (27b) and (27f): in the latter, the DS position of the quantifier, the object position of the verb *call*, does not c-command the DS of the pronoun, the specifier position of the VP. The principle presupposes that it is possible to determine the DS position of an item when the derivation reaches LF, and that the relation of c-command is defined for positions (instead of for the items occupying those positions). I assume that (34), or something very much like it, can be maintained¹⁵.

The second reason why a reformulation of (31) along the lines of (34) is needed is empirical. Consider the following example, from (Büring and Hartmann (2001)):

- (35) *German*
 [Seine Frau] [λ_1 [respektiert jeder Mann t_1]
 his wife respects every-Nom man
 ‘Every man respects his wife’

¹⁵ It is possible that an ‘on-line’ version of (31), where what counts is that the appropriate relation between the trace of Q and P is established at some point in the derivation, is better than (34), though I do not explore this here; also, I do not explore further consequences of (34). For other refinements and discussions of WCO, see, e.g., Koopman and Sportiche (1983); Lasnik and Stowell (1991); Postal (1993); Safir (1996).

(35) can receive an interpretation in which *seine* ‘his’ is bound by the quantificational expression *jeder Mann* ‘every man’, but *seine Frau* ‘his wife’ is topicalized and *jeder Mann* (or, more appropriately, its DS position) c-commands only the DS position of the pronoun. We will see below that certain facts from Chinese also call for something like (34).

The organization of the rest of this section is as follows. First I note two exceptions to the generalization, and then argue that binding of C patterns in exactly the same way as binding of pronouns does: generally abiding by (34), but showing the same exceptions to be noted immediately below. Then I show that languages other than English, in particular, Spanish and Chinese, also restrict the distribution of both pronouns and C with the principle in (34).

The first exception is this: as noted by Lasnik and Stowell, if the pronoun is contained within an adjunct phrase, no WCO effect arises (adapted):

- (36) a. Who did you say was a liar before you met his wife?
b. Who did Jan say she admired in order to please his wife?

His can be bound by the *wh*-phrase both in (36a) and (36b). Yet, the DS position of the *wh*-phrase does not c-command the DS position of the pronoun, as shown by the more conspicuous (37)¹⁶:

- (37) a. [who [λ_1 [did you say [t_1 was a liar] [before you met his_{1/2} wife]]]]
b. [who [λ_1 [did Jan say [she admired t_1][in order to please his_{1/2} wife]]]]
-

Notice that in (37a), the adjunct clause is a modifier of the matrix clause in one reading, and the bound variable interpretation is available on that reading (“which person *x* is such that you said *x* was a liar and you said that before you met *x*’s wife?”). This is relevant because presumably only in the higher reading of the adjunct clause does the DS position of the *wh*-phrase not c-command the DS position of the pronoun¹⁷. (34) then holds except in cases where *P* is contained in an adjunct phrase.

The second exception arises in the following examples, from Higginbotham (1980: 688)):

- (38) a. Mary’s seeing his father pleased every boy
b. Seeing his father pleased every boy

(38a) is impossible with *every boy* binding *his*. However, binding is possible in (38b). Notice that the impossibility of binding in the first case follows from (34): the DS position of *every boy* does not c-command the DS position of the pronoun. But the question arises as to how binding is possible in (38b), since the DS position of *every boy* does not c-command the DS position of the pronoun in this sentence either.

Higginbotham suggests that PRO, which would be postulated in these cases, can act as a binder (the phenomenon is known as the ‘PRO-gate’ phenomenon). PRO is controlled by *every boy* and *who*, and in this way we obtain the effect that binding is possible in these examples. (39) shows some relevant details of the sentences in (38) under this proposal:

¹⁶ From now on, I indicate traces in the DS position of the binder only.

- (39) a. [[every boy] [λ_1 [[Mary's seeing his_{1/2} father] pleased t_1]]
 b. [[every boy] [λ_1 [PRO₁ seeing his_{1/2} father] pleased t_1]

(34) then holds except in cases where a PRO controlled by Q binds P.

Binding of C is constrained in the same way binding is constrained in (27), (36) and (38). Let us first establish the need of c-command at LF (that is, generalization (28)).

If the quantifier that is supposed to do the binding is embedded inside of an island, such as a relative clause, then there is no reading available in which that quantifier binds the C of another quantifier that is outside the island. Consider (40):

- (40) The woman who insulted most students donated money to every charity

The woman in our sentence ends up donating money to every charity in a contextually salient set. The students she insulted may or may not be affiliated with those charities. This is so even if prior discourse makes the charity-student relation salient:

- (41) #Some students in this school are affiliated with a number of charities. It is surprising that *the woman who insulted most students donated money to every charity*, because it is difficult to understand why she would insult people and then donate money to the charities these very same people are affiliated with

(41) is not felicitous because the last sentence in the discourse forces the bound reading of the italicized sentence.

So, lack of c-command at LF results in lack of binding of C. In this sense C is like the pronouns in the examples in (27c), (27d) and (27e), where c-command of the binder

¹⁷ In (37b), the DS position of the *wh*-phrase is presumably too low to be able to c-command the DS position of the pronoun in the purpose clause even on the lower reading of this clause.

is impossible. Only a free reading is available for (42) as well, a more minimal pair for (27d):

(42) Every family wonders which airline will go bankrupt the next day

(42) does not have a reading, “which airline x is such that every family that flew with x wonders which airline will go bankrupt the next day?”. The C of *every* must be free, and its value will be a contextually salient set of families¹⁸.

C is also subject to the crossing constraint in (34). Consider first the example in (43) (cf. (18)):

(43) The business professors gathered in the faculty room. The meeting was about the companies with which the School of Business has close contacts. Several of them have had close contact with several representatives from those companies lately. One of the professors asked...
“Who admires every representative from Kodak?”

The question asked at the end of (43) can have a reading which asks, “which person x was such that x admires every representative from Kodak x has been in contact with?”. In this reading, the argumental variable of the C of *every* is bound by *who*, and the relation that is made salient in the context in which the question is asked is the one in (19), repeated as (44). The representation of the reading is in (45):

(44) $\lambda x \lambda y.$ professor(x) & representative(y) and x has been in contact with y

(45) [who [λ_1 [t_1 admires [[every [f_2 x_1]] representative of Kodak]]]]

Examples (18) from §2.1 and (43) are cases that abide by WCO, since the DS position of the binder c-commands the DS position of the bindee, C, and binding is indeed possible. Also as expected, binding is not possible if the DS position of the binder does not c-command the DS position of the bindee, as in (46):

(46) The business professors gathered in the faculty room. The meeting was about the companies with which the School of Business has close contacts. Several of them have had close contact with several representatives from those companies lately. One of the professors asked...
 *[Who [λ_1 [does [[every [f_2 x_1] representative from Kodak] admire t_1 ?]]]

The question asked at the end of (46) cannot mean “which person x is such that every representative from Kodak x has been in contact with admires x ?”. The question can only be about popular professor(s), liked by every representative from Kodak in some contextually salient set. That is, only the free reading of the argumental variable of the C of *every* is possible^{19, 20}.

¹⁸ (42) has a kind of bound reading, “every family x wonders which airline with which x flew will go bankrupt the next day”, available in a context that makes the family-airline relation salient. This reading I attribute to binding of the C of *which* by the quantificational noun phrase *every family*.

¹⁹ Similar remarks hold for cases where a relational noun is involved, as in (i) and (ii):

- (i) [[Which professor] [λ_1 [t_1 admires [[every [f_2 x_1]] student]]]]?
- (ii) [[Which professor] [λ_1 [does [[every [f_2 $x_{o1/3}$]] student] admire t_1 ?]

Not all speakers get bound readings for (i) or (43), however. Yet, the speakers who reject them accept bound readings in (1) and (2), where, recall, the free reading was pragmatically implausible. It wouldn't then be correct to say that these speakers cannot get bound readings at all for C. A more correct description would be that in principle they do allow this possibility, but that free readings are generally preferred. For yet other speakers, (ii) or (46) on the bound variable reading are not as bad as (27f) on the bound variable reading. I do not have an explanation for this fact.

Those exceptions to WCO we noted above ((36), (38)) are reproducible with C. The C of a quantifier can be bound, in violation of (34), if C is located inside of an adjunct, as shown in the example in (47): -

- (47) [in context similar to (43)/(46)]
 [Who [λ_1 [did Jan say she admired t_1 [because of how [[every [f_2 x_1]] representative of Kodak treats him₁]]]]]]?

The question in (47) has a bound reading, “which person x is such that Jan said that she admired x because of how every representative from Kodak x has been in contact with treats x ”²¹.

The second exception noted above had to do with PRO: binding by a quantifier whose DS position does not c-command the DS position of the pronoun is allowed if the pronoun is c-commanded by PRO, and PRO is controlled by the quantifier. Here are some examples with C:

- (48) [context similar to (43)/(46)]
 a. Seeing every representative from Kodak pleased most professors
 b. Mary’s seeing every representative from Kodak pleased most professors

²⁰ As is well-known, questions like (46) give rise to pair-list and functional readings, whereas questions like (43) do not (cf. Chierchia (1993); Lasnik and Saito (1992); Sloan (1991); Williams (1988)). Speakers were provided only with individual answers (i.e., “Peter”) when asked to judge these examples, in order to avoid complications. It would nevertheless be interesting to see whether there is any interaction between these additional readings and the bound reading I am interested in.

²¹ *Him* inside the *because*-clause can also be bound by *who*, as expected. Because the argumental variable of the C of *every* does not c-command this pronoun, it is plausible to say that C is not itself doing the binding.

(48a) has a bound reading (“most professors *x* are such that *x*’s seeing every representative from Kodak *x* has been in contact with pleased *x*”), whereas (48b) does not; that is, (48b) does not have the reading, “most professors *x* are such that Mary’s seeing every representative from Kodak *x* has been in contact with pleased *x*”. Thus, the behavior of the argumental variable of *C* is entirely parallel to the behavior of pronouns, in a rather interesting way: whenever exceptions with pronouns arise, exceptions with *C* arise as well.

Languages other than English, such as Spanish and Chinese, show obedience to WCO. Discussing other languages is meaningful at this point, since of course it is necessary to test the cross-linguistic validity of the proposal. In addition, discussing basic data from Chinese is necessary at this point since in the next section I will be making a case for cross-linguistic variation in the behavior of *C* that relies on Chinese.

The examples in (49) and (50) illustrate with Spanish *su* ‘his/her’ and Chinese *ta* ‘his/her’. The pattern is the same as in English:

- (49) *Spanish*
 a. ¿Quién admira a su hermano?
 who admires to his/her brother
 ‘Who admires his brother?’
 b. ¿A quién admira su hermano?
 to who admires his/her brother
 ‘Who does his brother admire?’

- (50) *Chinese*
 a. Shei kanjian-le ta muqin?
 who see-Asp²² he mother
 'Who saw his mother?'
 b. Ta muqin kanjian-le shei?
 he mother see-Asp who
 'Who did his mother see?' (Higginbotham (1980), Huang (1982))

Note some differences between English and these other languages with respect to word order. A difference between English and Spanish is in the position of the subject in cases like (49b), since in Spanish it follows the verb, instead of preceding it (cf. (27b))²³. A difference between English and Spanish on the one hand and Chinese on the other is that the relevant configurations arise only at LF in Chinese (i.e., the position of *shei* in the examples in (50) is reached only at LF; see Huang (1982), among many others). In both Spanish and Chinese, binding of a pronoun is allowed when the DS position of the binder c-commands the DS position of the bindee ((49a), (50a)) and disallowed otherwise ((49b), (50b)).

The same behavior is observed with C in these languages as well. Consider first Spanish:

²² 'Asp' stands for 'aspectual perfective marker'.

²³ To derive this word order, we could assume displacement of the subject to a clause-final position (cf. free subject inversion in Belletti and Rizzi (1981), Burzio (1986), Jaeggli (1980, 1984), Kayne and Pollock (1978), Rizzi (1982)), or movement of the verb above the subject (cf. Torrego (1984)). I do not choose here, since in any case (49a) abides by (34) and (49b) doesn't.

(51) *Spanish*

[same context as (43)/(46)]

- a. ¿Quién admira a todos los representantes de Kodak?
 who admires to all the representatives of Kodak
 'Who admires every representative from Kodak?'
- b. ¿A quién admiran todos los representantes de Kodak?
 to who admire all the representatives of Kodak
 'Who does every representative from Kodak admire?'

In a context in which the appropriate relation is made salient, as in that in (43)/(46), (51a)

can have a bound reading, whereas (51b) cannot. This is as expected; cf. (43) and (46).

Consider now Chinese²⁴:

(52) *Chinese*

[The students in the physics department gathered in the lounge. The meeting was about the courses they took in the spring of 2001. At the end of the meeting, the president made a little joke by asking...]

- a. Shei mei-men kecheng dou xihuan?
 who every-CL²⁵ course all like
 'Who liked every course?'
- b. Mei-men kecheng dou rang shei hen laohuo?
 every-CL course all make who very upset
 'Who did every course upset?'

²⁴ The Chinese data from this and the next section, unless otherwise indicated, were collected with the much appreciated help of Liang Chen. He really deserves to be made co-author for all the work he put into it, if it wasn't that the conclusions drawn here are only mine. Thanks are also due to Ning Pan.

²⁵ 'CL' stands for 'classifier'.

In both examples in (52), the second argument of the quantifier *mei-men* ‘every’ is *kecheng* ‘course’, a non-relational noun²⁶. The question the president asks in (52a) can mean, “which person *x* is such that *x* liked every course *x* took in the spring of 2001?”. (52b), on the other hand, cannot mean, “which person *x* is such that every course that *x* took in the spring of 2001 upset *x*”. The value of the functional variable of the C of *mei-men* ‘every’ is as in (53):

(53) $\lambda x \lambda y$. student(*x*) & course(*y*) & *x* took *y* in the spring of 2001

The LFs of these examples on the bound reading are in (54):

(54) a. [Shei [λ_1 [[*mei-men* [f_2 x_1]]] *kecheng*] [λ_3 [*dou* t_1 *xihuan* t_3 ?]
 who every-CL course all like
 b. *[[*shei* [λ_1 [[*mei-men* [f_2 x_1]]] *kecheng*] [λ_3 [*dou* t_3 *rang* t_1 *hen* *laohuo*?]
 who every-CL course all make very upset

The DS position of the binder, *shei*, c-commands the DS position of C in (52a), as shown in (54a), though not in (52b), as shown in (54b). Notice that the quantificational NP that includes C appears preverbally in (52a)/(54a). Lin (1998) (see also (Lee (1986)) notes that quantificational object NPs with *dou* ‘all’ must appear preverbally. *Dou*, an adverb and distributivity operator for Lin²⁷, is obligatory with *mei*-phrases. Lin proposes that

²⁶ *The course of Peter* is acceptable only on a metaphorical sense (“his course in life”), and cannot be used in the sense of “a course that Peter takes”. Thus, on the intended reading here, *course* is not relational. Note that *a course of Peter* seems odd or marginally ok only on the metaphorical reading.

²⁷ See also Cheng (1995); Lee (1986). They argue against the proposal that *dou* is a floating quantifier (Chiu 1993).

object *mei*-phrases must move overtly to the specifier position of a Distributive Phrase (DistrP) above VP headed by *dou*²⁸. As indicated in the representation in (54a), I follow Lin in that the position to which the object quantificational NP moves is above the DS position of the subject binder. It is in part cases like these that prompt the reformulation of the binding principle in (34)^{29, 30, 31}.

²⁸ See also Beghelli and Stowell (1997).

²⁹ If we abandoned the VP-internal subject hypothesis, we could go back to the original binding principle, (31), at least for Chinese, since we could assume that the DS position of *shei* is above the position to which the *mei*-phrase moves to. A problem here would be that *mei*-phrases can move away from DistrP, as evidenced in (i) (Lin's (29d); he assumes that SpecIP/SpecAgrsP is higher than DistrP):

- (i) Mei-yi-ben shu wo dou kan-le
 every-one-CL book I all read-Asp
 'I read every book'

If the *mei*-phrase can move from DistrP overtly, it presumably can do so covertly as well. If so, in (52a), we do not know whether the trace of *shei* c-commands the *mei*-phrase or not.

³⁰ Given the complications of (52), it is tempting to consider *dou*-less object NPs. Binding of the C of *san-fen-zhi-er yishang* 'more than two thirds' by *mei-ge xuesheng* 'every student' is allowed in (i):

- (i) [context similar to (52)]
 Mei-ge xuesheng dou xihuan san-fen-zhi-er yishang de kecheng.
 every-CL student all like two-thirds above DE course
 'Every student liked more than two thirds of the courses'

The problem in testing compliance with (34) in these cases is that it must first be possible to have the object NP take scope over the subject NP (otherwise, (28) is not satisfied), but Chinese usually allows only surface scope (Huang (1982: 112-113)).

³¹ Higginbotham claims that PRO also aids the binding in Chinese, though for my informants PRO can do the binding only if the bound pronoun is *ziji* 'self', instead of *tade* 'his'. Compare (i) and (ii):

- (i) Kanjian tade muqin rang shei dou hen gausying (Higginbotham's (96))
 see his mother made everyone all very happy
 'Seeing his mother made everyone very happy' (binding not ok according to my informants)
 (ii) Kanjian ziji-de muqin shei dou hen gaoxing.
 see self-DE mother everyone all very happy
 'Seeing his own mother made everyone very happy' (binding ok according to my informants)

Pending further investigation, I ignore PRO and adjuncts clauses in Chinese.

The conclusions I want to draw from this section are as follows. The constraints on the binding of C in English, Spanish and Chinese are the same as the constraints on the binding of pronouns in these languages. In particular, binding of C obeys the principle in (34) in all three languages. Also, whenever exceptions to (34) are observed with English pronouns, the exact same exceptions arise for English C.

These conclusions are important for at least two reasons. First, they constitute justification for the hypothesis of this dissertation, that C is a pronoun (or, more appropriately, that the argumental variable of C is a pronoun). Second, it has been shown that the argumental variables of other functional variables (functional *wh*-traces in Chierchia (1993, 1995), ‘paycheck’ pronouns in Jacobson (2000)) are also subject to WCO, so there is additional support for the claim that C behaves like other items of its kind.

2.2.2 Cross-linguistic variation with possessive binders of C.

Higginbotham (1980) observed that the behavior of Chinese pronouns with respect to WCO is slightly different from the behavior of English pronouns. In particular, Chinese pronouns have a more restricted distribution, since they cannot be bound by possessive quantifiers (e.g., *whose*), whereas in English, at least for some speakers, binding by possessive quantifiers is possible. Consider the contrast between the Chinese examples in (55) and (56) and the English ones in (57) and (58):

- (55) Shei de muqin kanjian-le ta?³²
 who mother see-Asp him
 ‘Whose mother saw him?’ (Higginbotham (1980))
- (56) Shei de muqin hen xihuan ta mai-de hua?
 who mother very like he buy flower
 ‘Whose mother liked the flowers that he bought?’
- (57) Every man’s/everyone’s mother loves him (Jacobson (2000), Safir (1996))³³
- (58) Whose picture incriminated his mother? (Safir (1996); see also Postal (1993))

Binding of the pronouns *ta* ‘he/him’ by *hei* ‘whose’ is impossible in Chinese. Notice that this is in accordance to the principle in (34), since the DS position of *shei* does not c-command the DS position of the pronoun. It is English that is surprising: binding of *him/his* is possible by *whose*.

That English shows yet another exception to WCO is of course of great interest (and there are attempts at dealing with it; see, e.g., Kayne (1994: 25-27)), but I will not be concerned here with what the proper explanation of this exception is here. From the perspective taken here, the contrast between (55)/(56) and (57)/(58) is important because the prediction is made that the distribution of C in Chinese, just like the distribution of pronouns in this language, should be more restricted than in English. The purpose of this section is to show that this prediction is indeed met. At the end of the section, I comment

³² *De* is a “marker of a pre-head, specially prenominal, modifier”, “which marks the modifierhood of a prenominal modifier” (Huang (1982: 57, 90)). An NP, as above, followed by *de* before the head noun is a possessive. *De* is claimed to be analogous to Japanese *no* (see Kitagawa and Ross (1982)).

³³ Lasnik (1976), however, judges examples like (i) ungrammatical on the bound reading:

(i) Everyone’s mother thinks he is unfriendly

I do not have an explanation for this fact.

briefly on the importance of these findings from the point of view of language acquisition.

I start, ironically, by noting that it is not true that *shei* 'whose' cannot bind pronouns at all in Chinese. The same speakers who find the bound reading of (55)/(56) ungrammatical find the bound reading of (59) grammatical³⁴:

- (59) *Shei de muqin kanjian-le ta de qizi?*
 who mother see-Asp he wife
 'Whose mother saw his wife?'

So the distribution of pronouns in Chinese is not completely as well behaved as I made it out to be above. Again, this observation has consequences for the proper explanation of the distribution of pronouns, and, again, I am not concerned with what facts such as (59) mean for the theory of binding. I limit myself to considering the consequences it has for the hypothesis that C is a pronoun.

C in Chinese behaves like the pronouns in examples (55) and (56). The examples in (60) and (61) do not allow bound readings of the C of *san-fen-zhi-er yishang* 'more than two thirds' or *mei-men kecheng* 'every course', respectively:

- (60) [context similar to (52)]
Mei-ge ren de muqin dou hen xihuan san-fen-zhi-er yishang de kecheng.
 every-CL man mother all very like two-thirds above course
 'Everyone's mother liked more than two thirds of the courses'

³⁴ Some English speakers find the bound reading of the equivalent of (59) ungrammatical.

- (61) [same context as (52)]
 Shei de muqin mei-men kecheng dou fu-le qian?
 who mother every-CL course all pay-ASP money
 ‘Whose mother paid for every course?’

What the president says in (60) cannot be, “every *x* is such that *x*’s mother liked more than two thirds of the courses *x* took”, and what he asks in (61) cannot be, “which person *x* is such that *x*’s mother paid for every course that *x* took?”. Notice that (61) is important because (60) could be argued to be impossible on independent, pragmatic grounds: it might be difficult to construe of a situation in which someone’s mother likes the course that her son or daughter takes but has no direct experience with it. No such possibility arises with (61). The conclusion I draw from this is that *C* in Chinese is not a possessive pronoun; it is unlike the pronoun *ta* in (59). The right comparison is between *C* and the pronouns in (55) and (56), or maybe more appropriately like the pronoun in (56), since *C* shares with that pronoun that it is embedded in an NP, as opposed to the pronoun of (55). What it is that makes possessive pronouns in Chinese special is left for a future occasion.

Let us consider English now. The expectation that we have is as follows: speakers should allow binding of *C* by possessive quantifiers, just as they allow binding of pronouns. Those speakers who find binding of pronouns by possessive quantifiers impossible should also find binding of *C* by such items impossible. I show here that it is indeed found that speakers who allow binding of pronouns in these contexts allow binding of *C* as well, but lack of relevant data prevents me from establishing the second prediction.

Speakers who find (57) and (58) grammatical on the bound reading of the pronoun find (62) grammatical on the bound reading of the C of *every* as well³⁵:

- (62) [same context as (52)]
whose mother paid for every course?

The example in (62) can mean, “which person x is such that x’s mother paid for every course that x took?”. Just as in (52), the relation between people and the courses they took in the spring of 2001 seems to be available for the functional variable of C to have as its value. A bound reading is of course also available in the case of (63), where the binder is no longer a possessive quantifier but simply *who* (cf. also to (43)):

- (63) [same context as (52)]
who paid for every course?

It is interesting to note that binding of C by a possessive quantifier is not always possible in English. The same speakers who found (62) acceptable on the bound reading found the italicized sentence in (64) impossible on the bound reading (cf. (58)):

- (64) Thousands of students attended the demonstration last weekend. Photographers Smith, Johnson, Stewart and Phillips took numerous pictures of the participants, some of them compromising. They are unsure about releasing them because of the political consequences. We know *whose pictures incriminate every student*, but we don’t know whose pictures incriminate just one or two students

I assume that the function in (65) is made salient in the discourse preceding the sentence in question:

³⁵ One of these speakers finds the bound reading of the equivalent of (59) impossible.

(65) $\lambda x \lambda y$. photographer(x) & student(y) & x took a picture of y

Yet, the sentence cannot have the meaning, “which person x is such that x’s pictures incriminate every student x took a picture of”. Notice that the free reading is pragmatically disfavored, since it involves photographers taking pictures of all the thousands of participants at the demonstration. Yet, the only reading the sentence in question can have is that in which C is free.

Independent factors are to be blamed here. Notice that the bound reading is also unavailable for the italicized sentence in the example in (66), where we abstract away from possessive binders:

(66) Thousands of students and faculty attended the demonstration last weekend. Photographers Smith, Johnson, Stewart and Phillips took numerous compromising pictures of the participants. Some of these photographers decided to use the evidence against the demonstrators in court. We know *which photographer took every student to court*

Independent factors at play here could be that the assumption that the function in (65) is available in the contexts in (64) and (66) is wrong. If there are reasons to suspect that it is available, it could be that the status of *student* as a relational noun interferes so that the relation between people and their teachers or people and their classes is more salient than that in (65).

In any case, it is possible to conclude that the distribution of pronouns and C in Chinese and English with respect to binding by possessive quantifiers confirms the prediction made by the hypothesis that C is a pronoun. The prediction is that the behavior of the two kinds of pronominal items should be the same, and this is indeed what we find.

For Chinese, binding of (non-possessive) pronouns and C by possessive quantifiers is impossible. In order to draw the conclusion that C is a pronoun in Chinese, I was forced to assume that, at least in this language, C is not a possessive pronoun. As for English, those speakers who allow binding of pronouns by possessive binders allow binding of C by possessive binders. Pending further investigation, it is possible that there is dialectal or maybe idiolectal variation in the behavior of C with respect to possessive binders that hopefully correlates with the behavior of pronouns.

These results need to be evaluated from the point of view of language acquisition. Given that there is variation in the distribution of pronouns across languages (or, at least, across English and Chinese), we are forced to postulate a parameter about binding by possessive quantifiers. This parameter allows binding by such items in English but not in Chinese (with qualifications, having to do with binding of possessive pronouns in Chinese and potential dialectal/idiolectal variation in English, as we have seen). That C is covered under the umbrella of this parameter constitutes further support for the hypothesis pursued in this dissertation, that C (or, more appropriately, the argumental variable of C) is a pronoun. This is because if C is a pronoun, the task of language acquisition is made easier on the child, in the sense that only a limited set of data is needed in order to set the parameter right. The English child needs exposure to a limited set of data only, not even necessarily related to C (which, arguably, are more complicated than the data with pronouns such as *he*), in order to draw the conclusion that C can be bound by possessive quantifiers. Likewise, once the Chinese child has drawn conclusions about the behavior of pronouns with respect to binding by possessive quantifiers, he does not need to be exposed to any further data.

An important issue that arises in this discussion is how exactly the child, whether a speaker of Chinese or English, learns the behavior of pronouns with respect to binding by possessive quantifiers. Notice for example the difficulty of the English child learning the behavior of pronouns: what he or she has to learn is not that a sentence is possible, but that a *reading* is possible. Significantly, the Chinese child has to learn, not that a sentence is impossible, but, again, that a *reading* is impossible. One possibility here is to say that the initial assumption made by the child is that readings in which a pronoun is bound by a possessive quantifier are impossible, and only in case the child is provided with positive evidence does he or she change the assumption. This possibility hinges, of course, on the availability of a certain amount of input for the child.

I leave this discussion here noting that whatever its outcome turns out to be (and here I appeal to the experts), it is always advantageous to be able to say that C is a pronoun. Whatever language acquisition mechanisms turn out to be the correct ones, in particular for the acquisition of binding by possessive quantifiers, learning the behavior of C will never come at an extra cost.

2.3 Other contextual variables

In this section I discuss other kinds of contextual variables, those studied in Partee (1989). One of the purposes here is to evaluate arguments Partee brings up against the assumption that certain contextual variables are present in the syntax. Recall from Chapter 1 that I assume throughout that C is present in the syntax.

Partee herself notes that her arguments might not affect *all* contextual variables, not even all the contextual variables she examines. And she does not study C in her article, which is what interests me. The arguments against the syntactic view of the variables she studies pertain to the discussion in this dissertation because the null hypothesis is that all contextual variables are treated alike; thus, an argument against assumptions about one kind of contextual variable has consequences for the treatment of other contextual variables. The point I put forth in this section is that Partee's objections to the assumption that certain contextual variables are present in the syntax do not stand up to closer scrutiny. I not only evaluate her arguments but also suggest an alternative analysis of some of her facts and compare the behavior of these other contextual variables to C.

A preliminary note is in order here. It might be tempting to take the evidence provided in §2.2, which indicates that, roughly, C is subject to WCO, as evidence *for* the position that C is present in the syntax. If WCO is a syntactic constraint, how could it be otherwise. The thing is that WCO does not *have* to be a syntactic constraint. In fact, there are careful and detailed proposals in the literature, such as Jacobson (1999, 2000), in which a non-syntactic version of WCO is proposed. Of course, Jacobson's general assumptions about general matters such as the organization of the grammar or about the very existence of variables are radically different from the assumptions I make here (see Chapter 1). We could say that, if one stays within the set of assumptions that underlie this dissertation (which includes the existence of variables in the grammar and a syntactic WCO), then the data from §2.2 suggests that C is an item present in the syntax. The point

I make in this section is that, whether one follows Jacobson's assumptions or mine, Partee's facts are irrelevant.

Partee reminds us of facts like the following, from Mitchell (1986):

(67) John visited a local bar

(68) Every sports fan in the country was at a local bar watching the playoffs

Local in (67) can be interpreted as "in the vicinity of the speaker" (i.e., in the vicinity of the utterance location) or as "in the vicinity of John". In her words (p. 344): "*local* has to be anchored to some reference location, and means something like 'in the vicinity of [reference location]'. Interestingly, on top of these two possibilities, the *local* of (68) allows a third, bound-variable-like interpretation: the bar can be a different bar for each sports fan, as long as the bar where each sports fan is is local from his (i.e., the sports fan) perspective. This kind of behavior is exhibited by other words, such as *enemy*, *later*, or *away*, as exemplified in (69)-(74)^{36, 37}:

(69) John faced an *enemy*

(70) Every participant had to confront and defeat an *enemy*

(71) John said he would call back *later*

³⁶ Sometimes, a reading may be more or less salient; in (69), for example, it is hard to interpret *enemy* deictically, meaning that the person John faced was an enemy from his, i.e., John's perspective. Similar remarks hold for (73), (70), (72) and (74) all allow the bound-variable-like reading.

³⁷ Some examples are taken directly from Partee's article; others are elaboration on her examples.

- (72) Every man who stole a car abandoned it two hours *later*
- (73) John entered the store and saw a woman he knew. Three feet *away* was a small child
- (74) Peter wonders why every pigeon liked to be thrown a peanut from five feet *away*

The proposal here involves postulating implicit variables for contextual parameters such as [reference location] which are interpreted deictically, anaphorically or as bound variables³⁸. One of the questions that Partee addresses in the paper is whether these implicit variables are phonologically null versions of pronouns or pronoun-like elements (present at “some appropriate level of representation” (p. 350; presumably in the syntax) or they are variables that are manipulated only in the semantics (i.e., not syntactically present).

A syntactic approach to the implicit variable of items like *local* or *enemy* hypothesizes that these variables are syntactic items, i.e., part of the syntactic structure of sensitive and sensitive to syntactic constraints. A particular implementation of this approach is proposed below. As to the analysis of contextual variables in which they are not introduced in the syntax but in the semantics, there is no concrete proposal in Partee (1989), nor have I been able to develop one. Let us, note, however, what some of the features of such an analysis are. Under such an analysis, contextual variables of the kind associated with *local* are not represented syntactically but are introduced after the syntactic computation is done. One must then assume a mechanism that achieves this.

³⁸ An interesting observation about (72) is that not only can there be implicit, contextually-dependent, bound variables, the binder of these variables can itself be implicit: *2 hours later* in interpreted as “2 hours later than the time when he stole the car”, an implicit reference time.

Presumably, the mechanism via which binding is effected in our system (the λ -Abstraction rule; recall Chapter 1) could treat these variables in the appropriate way; if not, a new binding mechanism would have to be assumed. This system would have to treat pronouns like *he* differently from contextual variables, since these items are presumably assumed to be syntactically active. Another option would be to adopt a framework like Jacobson (1999, 2000), which, as I said above, does not assume variables in the syntax at all; in fact, this system has no variables in the semantics either. Jacobson proposes a number of type-shifting rules that have binding of open argument slots as a consequence, which translates into binding of variables in a system with variables. Spelling this out in more detail would take us too far afield, so the reader is referred to Jacobson's work for a more thorough discussion. Most likely, though, the two views don't differ in the end result, but they differ in the level of representation at which the contextual variable is made available.

Partee suggests that the first, syntactic option, has the following two problems to face. First, not all context-dependent words allow for an overt realization of the presumed contextual variable. The problem for the syntactic view is that, if the contextual variable of a word like, say, *local*, is simply a null version of an overt pronoun, then we do not expect asymmetries among context-dependent words. Either all context-dependent words allow overt realizations of the null pronoun, or they don't. But this is not what we find.

For example, the words *foreign*, *foreigner* and *stranger* differ in whether their presumed contextual variable can be realized overtly with the pronoun *them*, as shown in (76); (75) first shows that these words give rise to the bound-variable readings we have seen with *local*, *away*, etc.:

- (75) Citizens of every country find foreign cars/strangers/foreigners attractive
- (76) foreign to them/strangers to them/*a foreigner to them

-

Secondly, in those cases where, as opposed to the case of *foreigner*, there is an overt realization of the variable, there is nevertheless an asymmetry in the behavior of the overt and the covert pronominals. This asymmetry is illustrated in (77) (Partee's examples; see p. 352):

- (77) a. Not everyone who thinks their parents did a bad job of bringing them up actually switches to the *opposite* child-rearing method
- b. *Not everyone who thinks their parents did a bad job of bringing them up actually switches to the child-rearing method *opposite* to it
- c. Every beginning general who loses his first battle switches to a *different* strategy in his second
- d. *Every beginning general who loses his first battle switches to a strategy *different* from it/that in his second

A child-rearing method and a strategy are "induced" only indirectly by the subject noun-phrases in all of these examples. The implicit variables associated with *opposite* and *different* do not seem to mind, they can both be bound so that (77a) means, "not everyone who thinks their parents did a bad job of bringing them up actually switches to the child-rearing method *opposite to the child-rearing method they (i.e., the parents) used*" and (77c), "every beginning general who loses his first battle switches to a strategy *different from the strategy he used in his first battle in his second*". The presumed overt realizations of the contextual variables, via *it/that* in (77b) and (77d), cannot be used in these cases though.

I think that the facts in (76) and (77) are very interesting, but I do not think they are relevant as part of an argument against the syntactic view of contextual variables. First, that words like *foreigner* do not, while words like *foreign* and *stranger* do, allow for an overt realization of the contextual variable might be a matter of mere lexical accident, and not necessarily a problem for the view that these variables are syntactic objects. In fact, it is unclear why, if it turns out that this difference is not a matter of lexical accident, it is the syntactic view, as opposed to the semantic view, that is in trouble. Why would the semantic view have a better chance of expressing the difference?

I also do not think that the differing possibilities exhibited by overt and covert variables in examples like those in (77) should constitute a problem for the syntactic view in particular. It is clear that there is a difference between overt and covert variables in these examples, but I don't think it is necessarily be the case that the difference is expressed in terms of the presence/absence of an item in the syntax; the difference could be expressed as a difference internal structures of the items in question, as I do below. Another way to put it is this: suppose that we take the facts in (77) to suggest that contextual variables of the kind associated with *opposite* or *different* are not present in the syntax. We still need to explain how come they differ from pronouns like *it/that* the way they do.

Let me propose an alternative analysis of the examples in (77). This is necessary here since (77) poses a challenge to the hypothesis that contextual variables are pronouns: all other things being equal, we do not expect contextual variables to behave differently from pronouns.

Suppose we take the contrast between (77a)/(77c) and (77b)/(77d) to be indicative of the internal structure of contextual variables as opposed to simple pronouns. That is, suppose that the contextual variable associated with items like *local* and *enemy* is similar to C in that it is composed of a functional variable and an argumental variable. The functional variable would be free and assigned a contextually salient function by the variable assignment, as in all the cases with C discussed here. In the case of (77a), for example, that would be the function that takes an individual and returns the child-rearing method with which that individual was brought up; i.e.:

(78) $\lambda x.\iota y$ child-rearing method(y) & x was brought up with y,

where ‘ ι ’ is the iota operator. The argumental variable that serves as the argument of this function is bound by *everyone*. The individual that results from the application of the functional variable to the bound argumental variable serves as the argument of *opposite*, with lexical entry in (79). The representation of the bound reading of (77a) under this approach is as in (80):

(79) $[[\text{opposite}]]^g = \lambda y \lambda z. z \text{ is opposite to } y$

(80) [Not everyone $[\lambda_1$ [who₁ thinks their parents did a bad job of bringing them up actually switches to the $[[\text{opposite} [\lambda_2 x_1]]$ child-rearing method]]]]

The denotation of *opposite child-rearing method* that results from these assumptions is in (81):

- (81) $[[[[\text{opposite } [f_2 \ x_1]] \text{ child-rearing method}]]]^{g(y/l)} = \lambda z. z \text{ is a child-rearing method and } z \text{ is opposite to the child-rearing method with which } y \text{ was brought up}$

The variable assignment is modified in (81) because a λ -operator was introduced higher up (' λ_1 ' in (80)). The reading obtained for the whole sentence is in (82):

- (82) $[[[(77a)]]]^g = 1$ iff not every y such that y thinks that y 's parents did a bad job of bringing them up actually switches to the child-rearing method opposite to the child-rearing method with which y was brought up

This is as desired. Suppose now that *it* in e.g., (77b), does not have a complex internal structure but is just a simple variable. The reading that results for (77b) if this is so is in (83):

- (83) $[[[(77b)]]]^g = 1$ iff not every y such that y thinks that y 's parents did a bad job of bringing them up actually switches to the child-rearing method opposite to y

An assumption here is that *opposite* in (77b) is just like *opposite* in (77a), and that the place of the contextual variable is taken up by *to it*³⁹. There is something wrong with a child-rearing method "opposite to person y ". People do not seem to have opposing child-rearing methods, as can be seen from (84):

- (84) *John switched to the child-rearing method opposite to Mary

³⁹ I do not attempt to answer here why *opposite to it/different from it* must appear postnominally, as opposed to *opposite/different*. Another issue that remains to be explored is the role of the preposition *to/from*.

This, I claim, is the source of the ungrammaticality of examples such as (77b). The analysis extends straightforwardly to other similar cases, such as those in (77c) and (77d). Under this approach, the difference between examples such as (77a) and (77b) is then orthogonal to the syntactic presence or absence of contextual variables in the syntax and has to do with the internal make-up of the variables involved and the fact that people do not seem to have opposing child rearing methods (or strategies different from them).

Let us explore two predictions that this analysis makes. First, in cases that do not involve binding of the argumental variable of the contextual variable, there should not be a difference between contextual variables and pronouns. In cases in which the argumental variable of the contextual variable is free, the functional variable is simply the identity function, and the resources to “assign” a child-rearing method to an individual are gone. What does some real work in these cases is the argumental variable, but this is a simple variable, just like the pronoun. The prediction is met. When the antecedent of the argumental variable of the contextual variable and of the pronoun is a child-rearing method, grammaticality results in both cases (cf. (84)):

- (85) Mary brought up her child according to the Spock method, but Steve chose the opposite child-rearing method
- (86) Mary brought up her child according to the Spock method, but Steve chose the child-rearing method opposite to it

Another prediction is this: if the binder of *it* is, e.g., *every child-rearing method*, the example should be grammatical (again, people can’t have opposites, but child-rearing methods can). This expectation is also confirmed, as (87) is grammatical on the reading in which *it* is bound by *every child-rearing method* (cf. (84), (77b)):

(87) [[Every child-rearing method] [λ_t [t_t has an opposite to it_t]]]

One interesting implication of this analysis is that Heim's (1990) analysis of E-type pronouns, which treats these pronouns as functional-argument compounds where the functional variable does the same kind of work that the functional variable of contextual variables does above, cannot be correct. If pronouns are allowed to receive such an analysis, then nothing prevents a functional-argument structure in cases like (77b) or (77d)⁴⁰. An alternative analysis of E-type anaphora is needed, maybe along the lines of Elbourne (2002), who does away with the context-dependent part of E-type pronouns. Finally, an attractive feature of this analysis is that it treats all contextual variables alike in their internal structure: both *C* and the variables associated with items like *local*, *opposite*, *different* or *enemy* have the same structure. This, as I said earlier, is the null hypothesis.

Having dealt with Partee's objections to the syntactic approach to contextual variables and with some of the facts she brings up to bear on the matter, let me finish the section by exploring a bit more the properties of the contextual variables associated with items like *local*, *different*, etc. Partee makes the initial suggestion that these contextual variables are subject to a crossing constraint like (34) (WCO). Consider (88) (her (17)):

⁴⁰ Arguably, the descriptive label 'E-type' pronoun (i.e. the label of the pronoun *it* in the 'donkey'-sentence *every farmer who owns a donkey beats it*) is not applicable to the pronoun in examples such as (77b) or (77d). This label, however, is purely descriptive. As long as an analysis in terms of a functional-argument structure for pronouns of the kind envisaged by Heim is available, the differences in (77) remain mysterious.

- (88) a. Every untenured professor in the state received a letter from the leader of the local union
 b. The leader of the local union wrote a letter to every untenured professor in the state

Partee (p. 349) says: “it is much harder in [(88b)] than in [(88a)] to understand there to be possibly different local unions involved for the different professors”⁴¹. Importantly, the DS position of *every untenured professor in the state* c-commands the DS position of the variable of *local* in (88a) though not in (88b).

(89) shows that binding of the contextual variable of *local* is also possible by *who* when the configuration that results abides by the principle in (34):

- (89) [who [λ_1 [t_1 sent mail to the [local [f_2 x_1]] police station]]]]?

The question in (89) can mean “which person x is such that x sent mail to the police station local from x ’s perspective?”. A situation where this question could be asked is as follows. Suppose that the speaker lives in Willimantic, CT, and that she has friends in the neighboring towns (John, in Willington; Mary, in Ashford; Bill, in Storrs). The speaker knows that one of these people has been sending mail to their police stations. That is, either John has sent mail to the police station in Willington, or Mary has sent mail to the police station in Ashford, or Bill has sent mail to the police station in Storrs. But she doesn’t know which one is the case, so she asks (89) to a knowledgeable person.

⁴¹ Though not all native speakers agree on this; Partee notes that there seems to be quite a bit of speaker variation. I do not have a satisfactory explanation for why this variation obtains.

That this reading is allowed is as expected: the DS position of the binder *c*-commands the DS position of the contextual variable associated with *local*. The question of course also permits a reading where the contextual variable is interpreted from the perspective of the speaker of the utterance (“which person *x* is such that *x* sent mail to the police station *local* from the speaker’s perspective?”)⁴². Compare to (90):

(90) * $[\text{who } [\lambda_1 [\text{did } [[[\text{the local } [f_2 x_1]] \text{ police station}] [\lambda_3 [t_3 \text{ send mail to } t_1]]]]]]]$?

The question in (90) cannot have a reading where the variable of *local* is bound by *who*, as predicted by principle (34) (WCO): the DS position of the binder does not *c*-command the DS position of that variable. That is, the meaning of this question cannot be something like “which person *x* is such that the police station *local* from *x*’s perspective sent mail to *x*?” (of course, (90) allows a free reading of the variable as well).

The same point can be made with the examples in (91) and (92)⁴³:

(91) who smiled to the nearest photographer?

(92) who did the nearest photographer smile at?

⁴² Or, if some location has been made prominent in previous context, from that location’s perspective.

⁴³ I.e., (92) cannot be asked in a situation such as the following. The speaker and a friend are at a fund raiser for a charity. Several photographers have come to take pictures of famous people making donations. The speaker knows that the photographer who was closest to one of the celebrities smiled at the celebrity, but she doesn’t know who the celebrity was. So she asks her friend, who might have had a better view, the question in (92). The friend answers that it was Nicole Kidman, meaning that Nicole Kidman was the person *x* such that the photographer that was closest to *x* smiled at *x*.

Furthermore, as expected, the exceptions to the principle of WCO noted for English in §2.2.1 can be reproduced with these contextual variables. Consider the data in (93)-(94):

- (93) Who did you say Jan admires because the nearest photographer never manages to photograph him?
- (94) Seeing the local police station made every burglar very unhappy

The contextual variable of *nearest* in (93) can be bound by *who*, even though the DS position of *who* does not c-command the DS position of the variable of *nearest*; this is because *nearest* is contained within the adjunct clause⁴⁴. The contextual variable of *local* in (94) can be bound by *every burglar*, because there is a PRO controlled by *every burglar* that binds it.

The conclusions of this section are as follows. First, I have argued that there is no strong reason for not assuming that C, and other contextual variables, are present syntactically. I have suggested that a semantic treatment should not be chosen over a syntactic treatment on the basis of Partee's objections to the latter. Then, I have provided an alternative analysis of some of Partee's facts that does not hinge on the syntactic presence or absence of contextual variables. Some consequences of this analysis were explored. I have also added to the description of Partee's contextual variables (i.e, those

⁴⁴ The same is true, by the way, of the pronoun *him* contained within the *because*-clause, as expected.

associated with *local* or *nearest*) by showing that they are subject to the exceptions to the binding principle in (34), just like regular pronouns and C are⁴⁵.

2.4 Conclusion

In this chapter I have provided evidence that suggests that C is indeed a pronoun. One important piece of evidence is that the kinds of constraints that binding of C is subject to are of exactly the same nature as the constraints that affect other bound variables. In particular, C is subject to the WCO as this principle manifests itself in English, meaning that, where there are exceptions to it with pronouns, those exceptions

⁴⁵ Chinese *dangdi* 'local' behaves differently from English *local* in that *dangdi* cannot give rise to bound readings. In (i), *dangdi* is discourse anaphoric (i.e., Zhangsan ends up working in a bank in Beijing):

- (i) Zhangsan qunian qu-le Beijing
 Zhangsan last-year go-Asp Beijing
 'Zhangsan went to Beijing last year'
 Bujiu ta jiu zai dangdi yi-jia yinghang zhaodao-le yi-fen gongzuo
 soon he then at local one-CL bank find-Asp one-CL job
 'Soon he found a job in a local bank'

But, in (ii) (cf. (68)), it cannot be bound:

- (ii) Zhe-geguojia de mei-yi-ge qiumi dou zai dangdi yi-jia jiuba guankan bisai
 this-CL-country DE every-one-CL sports-fan all at local one-CL bar watch game
 'Every sports fan in the country was at a local bar watching the game'

(ii) can only mean, "every sports fan in the country was at a bar local from the speaker's perspective/from the perspective of a contextually salient location watching the game", even when a bound reading for the presumed contextual variable of *dangdi* would probably be more plausible pragmatically. Notice that this is the case in (iii) as well, where we control for the potential objection that *every sports fan* does not c-command *dangdi*:

- (iii) mei-yi-ge qiumi dou zai dangdi de yi-jia jiuba guankan bisai
 every-one-CL sports-fan all at local DE one-CL bar watch game

Nominal modifiers in Chinese typically appear prenominally (see Huang (1982: 27-8, 62)). I leave further exploration of the phenomenon, as well as a consideration of theoretical implications, for a future occasion.

arise with C as well. Furthermore, C in Chinese is subject to WCO as this principle manifests itself in this other language.

In this chapter we also took a look at different contextual variables from our C, namely, those that Partee (1989) associates with items like *local*. We added the observation that these contextual variables are also subject to WCO. We also evaluated the kinds of arguments that Partee brings up against the assumption that C is present in the syntax; the conclusion here was that these arguments do not stand up to closer scrutiny, so there was no reason not to assume a syntactically-active C.

Chapter 3 Free Contextual Variables I

This chapter deals with sentences that contain particles like *only*, *even* or *also* and a focus. The basic argument is that association of *only*, *even* and *also* with focus can be accounted for without making use of constraints on C that would force a departure from the hypothesis that C is a pronoun. The analysis says that the antecedent for free C, very much like the antecedent of other free variables, is an object in the context. I suggest that this is all we have to say about the antecedent of C.

The burden of explanation shifts from constraints on C to constraints on discourse structure. Principles of discourse structure determine the properties that a felicitous context for a sentence with *only*, *also* or *even* has. It is a property of this kind of context that it contains only one suitable antecedent for the C of the focus-sensitive items *only*, *also* and *even*. This results in the observation that these particles associate with focus.

I take as my point of departure the theory of discourse structure in Roberts (1996/1998), from which I borrow two principles. I add a third principle to her theory, maximal informativity, and show that it is relevant not only in the analysis of association but in the analysis of certain cases problematic for Roberts that are independent of association.

This chapter is the second piece of the general plot outlined in Chapter 1. If C is to be just one more instance of something we already know (i.e., other variables, such as pronouns), then the properties of free C should be the same as those of these other free variables. In particular, free C shouldn't be subjected to constraints that are intrinsically

of a different nature from the constraints that apply to other free variables. In the analysis of association with focus proposed here, free C is not subjected to such constraints.

The organization of the chapter is as follows. §3.1 offers a quick reminder of the theory of focus in Rooth (1985) and discusses it within the context of the theory of anaphora outlined in Chapter 1 and within the context of the theory of focus. §3.2 explores how Rooth's (1992) theory (together with some ideas from von Stechow (1994, 1995)) fares with respect to the conceptual worries in this dissertation and offers an empirical argument against it. §3.3 presents, informally, the analysis of sentences containing *only* pursued here. Several important questions arise at this point and in trying to answer them and thereby ground the analysis in better terms I introduce the theory of discourse in Roberts (1996/1998). This is done in §3.4; an appendix provides more precise definitions of the ones that I use in this section. This section also goes back to facts that were problematic for Rooth (1992)/von Stechow (1994, 1995). §3.5 presents the analysis of sentences containing *even* and *also*. §3.6 critically reviews other approaches which, like this one, rely heavily on the pragmatics, such as Roberts' own analysis and Schwarzschild (1997). §3.7 concludes the chapter.

3.1 A focus constraint on C

Recall that Rooth (1985) is concerned with facts like those in (1):

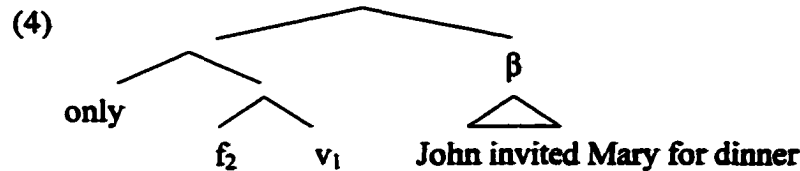
- (1) a. John only invited [Mary]_F for dinner
- b. John only invited Mary for [dinner]_F

(1a), with focus on *Mary*, means that John invited Mary and nobody else for dinner. (1b) differs truth-conditionally from (1a): it means that John invited Mary for nothing other than dinner (e.g., not for lunch).

Rooth (1985) postulates a free C in the lexical entry of *only* ((2)). This variable gets restricted by focus as in (3). The structure I (though not Rooth) assume for the sentences in (1) is in (4)¹:

$$(2) \quad [[\text{only}]] = \lambda C \lambda p: p(w). \forall q [q \in C \ \& \ q(w) \rightarrow q = p]$$

$$(3) \quad [[C]]^g \subseteq [[\beta]]^{L,g}$$



(3) says that the argumental variable of C^2 must be a subset of the focus semantic value of the β . That is, the set that the variable assignment assigns to the argumental variable of C must be a subset of the focus semantic value of β . This gives rise to the desired meanings (recall Chapter 1).

There are at least two conceptual advantages in doing without the principle in (3). One has to do with the status of C as a free variable, as already discussed in Chapter 1 and discussed again below. The other one has to do with the role that focus plays in (3).

¹ Recall that the argumental variable of C in these cases is of the type of a set of propositions, and that the functional variable is just the identity function.

² I will sometimes just say ' C '.

C in (3) is a free variable and ultimately its value is fixed by the context³. The hypothesis that C is a pronoun, however, does not allow us to entertain a principle like (3). One way of putting what is wrong with it is that, even though context plays a role in determining the value of C, it does not play enough of a role with (3). Or, put differently, once we note the kinds of constraints on reference that other variables are subject to, we are forced to conclude that C, at the very least, is a special kind of pronoun, since those constraints are very much unlike (3). Pronouns are usually constrained via lexical restrictions having to do with gender, or number, not via an object formed compositionally, like ‘[[β]]’⁴. I take it that an object formed compositionally and a lexical feature are inherently different kinds of objects. Hence, adopting (3) entails that a kind of constraint we haven’t seen before for other variables is placed on C.

There is one reason for not wanting to adopt (3) that does not have to do with its incompatibility with the hypothesis I am pursuing in this dissertation. This reason has to do with the role that focus (i.e., focus semantic values) plays in it. We have to acknowledge a pragmatic, discourse-regulating role for focus given question-answer pairs like (5) (see, among others, Chomsky (1971); Clark and Haviland (1977); Culicover and Rochemont (1983); Halliday (1967); Jackendoff (1972); Roberts (1996/1998); Rooth (1985, 1992); Schwarzschild (1997); von Stechow (1994); von Stechow (1990)):

³ By the way, the fact that the argumental variable of C is restricted to be a *subset* of the focus semantic value of the VP, and not *equal* to it, is what leaves room for the context to play a role. That is, which particular subset of this object is chosen is presumably determined by pragmatic factors, such as what is salient in the preceding discourse, etc. As pointed out by Rooth (1992), this allows us to account appropriately for the truth-conditions of sentences like (i):

(i) John only [swims]_F

We don’t want to say that the only (in an absolute sense) property John has is that of swimming, since he always have the property of being himself, for example .

- (5) a. Speaker A: Who did John invite for dinner?
 b. Speaker B: John invited [Mary]_F for dinner
 c. #Speaker B: John invited Mary for [dinner]_F

In (5), changing the focused element in the answer affects the felicity of the A-B exchange: only the answer with focus on *Mary* ((5b)) is a felicitous response to the question in A. Independently of the particular explanation that we give of this fact⁴, we have to conclude that focus has a role in determining which discourses count as felicitous and which ones do not. Notice that this role is relevant not only in question-answer exchanges but in other kinds of exchanges as well, as in (6):

- (6) a. Speaker A: John invited Mary for dinner
 b. Speaker B: No, John invited [Peter]_F for dinner
 c. #Speaker B: No, John invited Peter for [dinner]_F (Schwarzschild 1997)

In (3), however, focus does not have the role of determining what counts as felicitous and what does not: there, it restricts a variable. Its role in (3) is of a different kind from its role in whatever principles regulate (5) and (6). So, accepting (3) as part of the grammar means adding to the list of principles that make use of focus semantic values. Theoretically, however, it is more desirable to have as restrictive a role for focus as possible⁵.

⁴ E.g., in terms of new information (see, e.g., Rochemont (1986); Schwarzschild (1999)), in terms of constraints that make use of focus semantic values (Roberts (1996/1998); Rooth (1992); von Stechow (1990), among others), etc. Here I follow this latter kind of theories.

⁵ This does not mean that focus cannot figure in other kinds of rules (phonological, syntactic). I am following the standard assumption that focused constituents (whether focused via intonation or via movement) are marked with a feature 'F' in the syntax, a feature that, in English, receives a particular

Notice, by the way, that it is possible to maintain a theory in which the only semantic role of focus is that of inducing alternatives, as in Rooth (1985) and as I do here. Arguments proposed in the literature for a view in which focus has other semantic effects are not warranted. For example, Kiss (1998) argues that there are two kinds of focus, identification focus (which induces alternatives and is exhaustive; this would be Rooth's focus) and information focus (which conveys new information, and is non-exhaustive; this is different from Rooth's focus). Her argument is made on the basis of examples like the following:

- (7) *Greek*
 a. [Ston Petro]_F dhanisan to vivlio
 to Petro lent the book
 'It was to [Petro]_F that they lent the book
 b. Dhanisan to vivlio [ston Petro]_F
 'They lent the book [to Petro]_F'

In (7a), focus-marking effected via preposing the constituent *ston Petro* induces an exhaustive reading; the focus on *ston Petro* is taken to be an example of identification focus. Focus-marking as in (7b), effected via intonational prominence without movement, is not exhaustive and is taken to be an example of information focus. The meaning of the two sentences differs in whether focus induces exhaustivity. Hence, she argues, there are two kinds of focus.

This is not a warranted conclusion though. Suppose that we assume that focus induces alternatives throughout, as I do here, following Rooth (like Kiss' identification

interpretation in the phonological component, and which can be made use of in syntactic rules. The point in the text is concerned with the semantic/pragmatic interpretation of focus.

focus but without the exhaustivity semantics). Then one can account for the difference between (7a) and (7b) by claiming that the preverbal position to which focus moves in (7a) has the semantics of an exhaustivity operator. The position of the focus item in (7b) has no such semantics; hence the difference in meaning. This analysis entails a uniform, alternative-inducing semantic role for focus throughout; the difference in (7) follows from what the semantics of a special position does with the alternatives⁶.

So the assumptions about focus I make here are that, semantically, focus induces alternatives. Focus semantic values are computed on the basis of these alternatives plus the compositional procedure outlined in the appendix to Chapter 1. Focus semantic values are then put to use in discourse-regulating principles. There is no non-alternative semantics for focus and no non-discourse regulating use of focus semantic values. I sometimes abbreviate focus semantic values as 'FSV'.

These arguments suggest that Rooth (1985) is not the kind of theory of association with focus that we want. I examine now how the new account of the facts in (1) in Rooth (1992), supplemented with certain important ideas from von Stechow (1994, 1995), fares with respect to our concerns about C and focus as well as empirically.

⁶ Alboiu (2000) reaches a similar conclusion. Thanks to Milan Rezac for pointing out this reference to me.

3.2 Rooth (1992) and von Stechow (1994, 1995)

This section discusses the framework of focus interpretation of Rooth (1992). I first present the basics of the theory and discuss an empirical problem for it, then I consider whether the Rooth's (1992) analysis can be fixed, and then I go back to the conceptual worries of §3.1.

3.2.1 An empirical problem

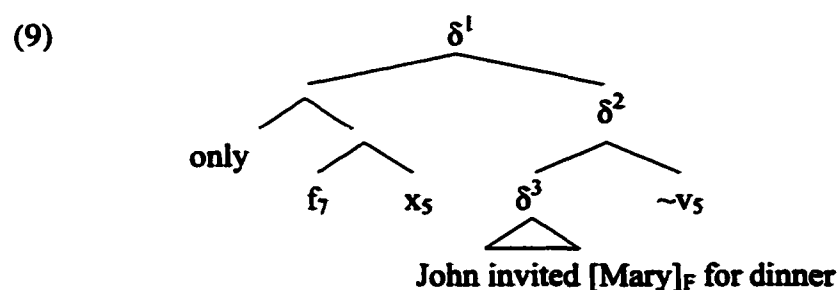
Rooth (1992) attaches a focus operator (the \sim -operator) to LFs; this operator introduces a focus anaphor ('v' below) and restricts it in the manner specified in (8):

- (8) Focus Interpretation Principle (FIP):
- a. Adjoin an operator $\sim v$ (v a variable) to a phrase α at LF. $[\alpha \sim v]$ presupposes either (i) $v \subseteq [[\alpha]]^f$ & $[[\alpha]]^o \in v$ & $\exists z [z \neq [[\alpha]]^o \& z \in v]$ or (ii) $v \in [[\alpha]]^f$ & $v \neq [[\alpha]]^o$
 - b. $[[\alpha \sim v]]^o = [[\alpha]]^o$
 - c. $[[\alpha \sim v]]^f = \{[[\alpha]]^o\}$

The value of the focus anaphor v is either a subset of the focus semantic values of its sister or a member of it (with some extra restrictions on what v contains) ((8a)). Focus has no effect on ordinary semantic values ((8b)). The alternatives to a focused element are not “alive” in nodes higher than the node to which the \sim -operator is attached (thus, focus has “scope”: the alternatives are available only below it; above it, focus semantic values are just singleton sets) ((8c)). The FIP is all there is to the interpretation of focus in the system; there is no mention of a focus-affected restriction on the argumental variable

of C, though (8) (with presuppositions in (8ai)) sometimes ends up restricting it, as shown below.

Association with focus follows from coindexation between the argumental variable of the C of *only* and the focus anaphor. The LF for (1a) is in (9)⁷:



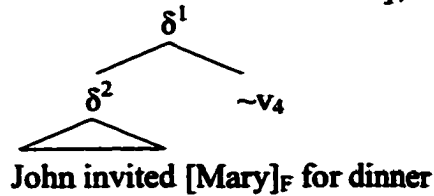
The \sim -operator restricts the argumental variable of C because it is coindexed with the focus anaphor. (8ai) restricts the argumental variable of C to be a subset of the focus semantic value of δ^3 , the sister of the \sim -operator:

$$(10) \quad [[\delta^3]]^f = \{\text{John invited Mary for dinner, John invited Sue for dinner, ...}\}$$

We thus get the same effect that earlier we obtained via (3) (of course, something like (3) is part of (8)). Rooth shows that other focus-related phenomena, including questions/answers, contrastive focus, scalar implicatures, and ellipsis, can also be accounted for with the FIP. The analysis of our earlier (5), repeated here, is as follows:

⁷ Numerical superscripts for ease of reference. I use 'x' as the variable name for the argumental variable of C to avoid confusion with Rooth's focus variable.

- (11) a. Speaker A: Who did John invite for dinner? (=5)
 b. Speaker B: John invited [Mary]_F for dinner
 c. Speaker #B: John invited Mary for [dinner]_F
- (12) [Who did John invite for dinner?]₄ -



The focus anaphor, attached high this time, must be a subset of the focus semantic value of δ^2 , the set of propositions of the form *John invited x for dinner*. The question *who did John invite for dinner?* must be a subset of it too, since it is coindexed with the focus anaphor. Of course, this is the case, so (11a)-(11b) is felicitous. Any other question, however, would not be a subset of the focus semantic value of δ^2 (for example, *what did John invite Mary for?*, or, for (11c), the question in (11a)).

Let me discuss one final example, so that we see (8a_{ii}) at work. Consider (13):

- (13) a. A: Sally taught semantics last year
 b. B: No, she taught [syntax]_F last year
 c. #B: No, she [taught]_F syntax last year

B's response is a denial of A's statement, but not any denial does; in particular, the placement of focus, unsurprisingly, matters. The analysis is this:

- (14) [Sally taught semantics last year]₃
 (LF for (13b)) δ^1
-
- Sally taught [syntax]_ₑ last year

(13b) is a good denial for (13a) because (13a) is a member of the focus semantic value of δ^2 , the set of propositions of the form *Sally taught x last year*. (13a) is not a member of the focus semantic value of δ^2 in (13c), the set of propositions of the form *Sally R-ed syntax last year*, so (13a)-(13c) is not a good exchange.

von Stechow (1994, 1995) makes an observation that is crucial for this system.

Consider (15):

- (15) a. Speaker A: Who did John invite for dinner?
 b. Speaker B: John only invited [Mary]_ₑ for dinner
 c. #Speaker B: John only invited Mary for [dinner]_ₑ

(9) is the LF for (15b). There is an apparent problem for Rooth here: once the \sim -operator makes the focus semantic value of δ^3 restrict the argumental variable of C, there is no longer a way to make an appropriate focus semantic value available at the top of the tree (because of (8c)). But we would need to make use of a focus semantic value at the top of the tree in order to predict question-answer congruence (i.e., that (15c) is not a felicitous answer to (15a)). The focus semantic value of δ^1 in (9) is the singleton set in (16):

- (16) $[[\delta^1]]^f = \{\text{John only invited Mary for dinner}\}$

The set of propositions denoted by (15a) is not a subset of (16); thus, it would be useless to insert another \sim -operator at the top of the tree to capture question-answer congruence.

This is where von Fintel becomes important: he reminds us that the argumental variable of C and the focus anaphor are just that, anaphors: restricting their antecedent is not the same thing as identifying it. Once we find it, however, the problem presented by (15) disappears. If we make the question in (15a) the antecedent of the focus anaphor and the argumental variable of C in (9), we can predict the felicity of (15b) and the lack of felicity of (15c): the denotation of (15a) is a subset of (10), whereas (15a) is not a subset of the FSV of the δ^3 in (15c), in (17):

- (17) $[[\delta^3]]^f = \{\text{John invited Mary for dinner, John invited Mary for lunch, John invited Mary for breakfast, ...}\}$

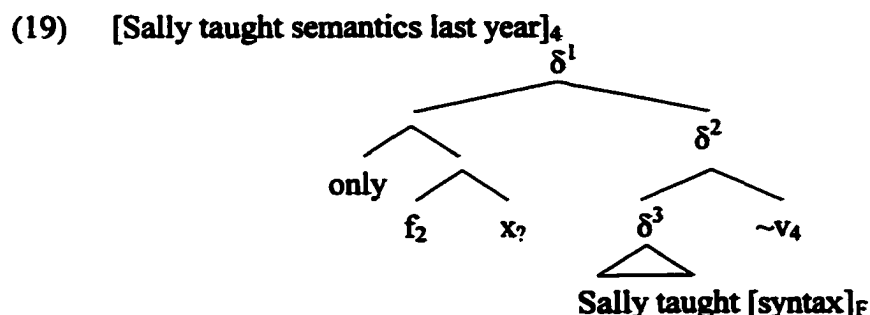
I argue that von Fintel's solution is not general enough: finding the right antecedent is not always possible in this system. Consider (18)⁸:

- (18) a. A: Sally taught semantics last year
 b. B: No, Sally only taught [syntax]_F last year
 c. #B: No, Sally only [taught]_F syntax last year

We want to predict that focus associates with *only* in (18b) and that focus has to be on *syntax*, not on *taught*. The problem is that the argumental variable of C does not get a

⁸ Based on Schwarzschild (1997), though he draws different conclusions from the example.

value. Suppose we want to account for the need of focus on *syntax* (as opposed to *taught*):



That (18b) is a felicitous denial is accounted for if (18a) is the antecedent of the focus anaphor, since (18a) is a member of (20) (via (8aii)):

- (20) $[[\delta^3]]^f = \{\text{Sally taught syntax last year, Sally taught acquisition last year, Sally taught semantics last year, Sally taught phonology last year, ...}\}$

(18a) is not a member of the focus semantic value of the δ^3 of (18c), shown in (21):

- (21) $[[\delta^3]]^f = \{\text{Sally taught syntax last year, Sally studied syntax last year, ...}\}$

Here is the problem: the antecedent for the argumental variable of C cannot be (18a), since that variable is a set of propositions and (18a) is a set of worlds. But what is its antecedent? The FIP doesn't tell us, its job is done. What we would want to be able to say is that its antecedent is the (implicit) question *what did Sally teach last year?*, of course, as this is the only way to predict association with focus in (18b). Since there is no way of doing that, however, the conclusion is that focus is not predicted to associate here.

We also encounter a problem if we start the other way around, by accounting for association. Association in (18b) is accounted for if the argumental variable of C and the focus anaphor are coindexed and we make use of (8ai). They are both restricted to be a subset of the FSV of δ^3 ((20)). Thus, the FIP tells us that an implicit question like *what did Sally teach last year?* is the antecedent of the two anaphors. That is it. The problem is that we are not mentioning (18a), but without mentioning (18a) we can't predict which denial is or isn't felicitous with respect to it.

Within Rooth's system, then, there is a need to construct questions related to sentences with focus that is completely independent of the FIP. This is exactly what the system I propose in this dissertation is designed to do: construct the right questions, the questions that, as antecedents for the argumental variable of C, give rise to the association-with-focus readings, and without the FIP.

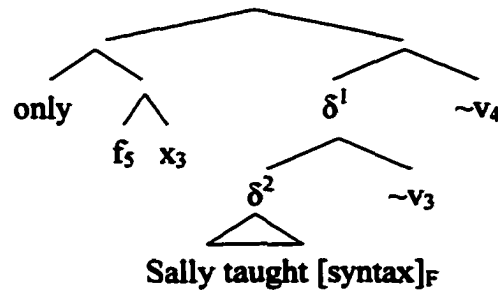
Is it possible to maintain the FIP and supplement it with an alternative way to construct questions for sentences with focus? This is in principle possible, but, as I will show in §3.4, the system that functions without the FIP can handle the examples that Rooth handles *and* the problematic one in (18). So supplementing the FIP with the system I propose would make the FIP superfluous.

3.2.2 Can the FIP be saved?

Let us try to give the FIP another chance before giving it up completely: is there some other way to save the FIP? Do we really need an independent system like the one I will propose here? This section considers one such way and argues that it has unwanted consequences.

Dropping the assumption in (8c) would enable Rooth/von Stechow to account for (18). (8c) says that focus does not induce alternatives above the \sim -operator. Suppose that (8c) was not part of the FIP. We can then introduce two \sim -operators into the LF of (18b); the lower operator will not “eat up” alternatives:

(22) [Sally taught semantics last year]₄



(23) $[[\delta^2]]^f = \{\text{that Sally taught syntax, that Sally taught phonology, that Sally taught semantics, ...}\}$

In this analysis, the argumental variable of the C of *only* is coindexed with one of the \sim -operators, and (18a) is coindexed with the other one. Thus, the argumental variable of C is restricted to be a subset of the FSV of δ^2 , in (56). We can then assume that the implicit question *what did Sally teach?* is part of the discourse and serves as the antecedent for the argumental variable of C. (18a) is a member of the FSV of δ^1 , which, because we have lifted (8c), still contains alternatives to *syntax*:

(24) $[[\delta^1]]^f = \{\text{that Sally taught syntax, that Sally taught phonology, that Sally taught semantics, ...}\}$

So abandoning (8c) would solve the problem in (18)⁹.

Abandoning (8c) has unwanted consequences elsewhere, however. In particular, there are cases which, as opposed to those in (18), call for a disappearance of the effects of focus above the focus operator. To see this we need to consider *because*-clauses, so before going into the crucial example I will digress a bit about how they interact with focus.

First consider a simple example. I assume that *because* is translated as CAUSE, where CAUSE has the meaning in (25) (see Lewis (1973)):

(25) A CAUSES B in w iff: (i) A(w)=1, and (ii) B(w)=1, and (iii) $\forall w': w'Rw$
 $[\neg A(w') \rightarrow \neg B(w')]$

(26) Luisa left because she was tired

That is, CAUSE takes two propositional arguments. The two propositions have to be true, and an implicational relation holds between their negations. The example in (26) then means: (i) Luisa was tired in w, and (ii) Luisa left in w, and (iii) in all possible worlds w' accessible from w, if she wasn't tired in w', she would not have left in w'. In other words: Luisa was tired, she left, and if she hadn't been tired, she would not have left. These truth-conditions are adequate for the example in (26).

⁹ Krifka (1991) discusses examples with two focus-sensitive elements, like (i), that could also receive an analysis in terms of the FIP but without (8c):

(i) At yesterday's party, people stayed with their first choice of drink. Bill only drank [wine]_F, Sue only drank [beer]_F, and John even_C only_K drank [water]_F

Significantly for us, Geilfuss (1994) analyzes *because* as a focus-sensitive element. More specifically, he proposes that, in (25), the first negation is sensitive to focus in A, and the second negation is sensitive to focus in B. Here is what it means for negation to be focus-sensitive (from Jacobs (1982); see his work for arguments in favor of (27)):

- (27) $[[\neg_C D]]$ is true in world w iff $[[D]]$ is not true in w and there is a proposition $p \in [[C]]$ such that p is true in w

Geilfuss proposes to analyze the sentences in (28)-(29)¹⁰ (from Dretske (1972)) by using (25), (27) and the FIP:

(28) John leased [a Jaguar]_F because he is a great Jaguar fan

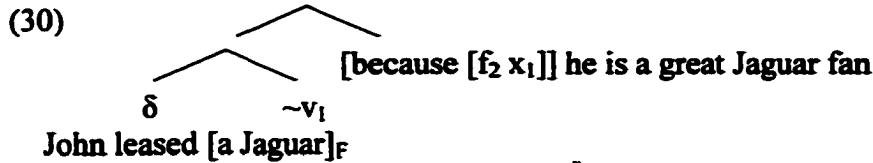
(29) John [leased]_F a Jaguar because his business is declining

In (28), John leased a Jaguar, and not something else, because he is a great Jaguar fan. In (29), John leased a Jaguar, as opposed to e.g., buying it, because his business is declining. Thus, focus has a truth-conditional in sentences with *because*. Let me exemplify with (28) how its meaning is obtained:

¹⁰ His analysis is really for the corresponding *why*-questions in (i) and (ii), but it carries over straightforwardly to (28)-(29):

- (i) Why did John lease [a Jaguar]_F?
 (ii) Why did John [lease]_F a Jaguar?

The point below could also be made with *why*-questions, but I think these make the picture more complicated.



We get the following truth-conditions for (28):

- (31) (i) John is a great Jaguar fan in w , and (ii) John leased a Jaguar in w , and (iii) $\forall w': w'Rw [\neg (\text{John is a great Jaguar fan in } w') \rightarrow \neg_x (\text{John leased a Jaguar in } w')]$
 =
 (i) John is a great Jaguar fan in w , and (ii) John leased a Jaguar in w , and (iii) $\forall w': w'Rw [\neg (\text{John is a great Jaguar fan in } w') \rightarrow (\neg (\text{John leased a Jaguar in } w') \& \text{ there is a proposition } p \in x \text{ such that } p \text{ is true in } w')]$

The argumental variable of *because* is coindexed with the focus anaphor and therefore that variable must be a subset ((8ai)) of the FSV of δ :

- (32) $[[\delta]]^f = \{\text{that John leased a Jaguar, that John leased a Lincoln, ...}\}$

In other words: (28) means that John is a great Jaguar fan, he leased a Jaguar, and if he hadn't been a great Jaguar fan, he would not have leased a Jaguar but e.g., a Lincoln (that is, a proposition from (32) other than the proposition that John leased a Jaguar is true). The analysis works similarly for (29), modulo the different placement of focus, of course.

The example that shows that (8c) is needed as part of the FIP is also an example with a *because*-clause, but with the difference that there is also an *only* that, of course, is sensitive to focus. This is another example where, as in (18), there is work for two \sim operators (one per focus-sensitive item) when (8c) is abandoned. However, this example

is unlike (18) in that, if that happens, overgeneration results. We predict a reading for (33) that doesn't exist:

- (33) [John is visiting a company for an interview. The company likes to conduct one-on-one interviews with candidates, who can choose Bill Bauer, or Sue Stevenson, or both, as interviewers. John is very shy and under no circumstances will he go through more than one interview. Sue is influential in the company but John knows her and she hates him; an interview with her would be fatal. Bill has less power, but is a very nice man]
A: John [only [f_2 x_1]] talked to [Bill]_F [because [k_3 y_4]] Sue hates him

First, the reading. (33A) does not have the reading in (34)¹¹:

- (34) (i) John [only [f_2 x_1]] talked to Bill in w , and (ii) Sue hates John in w , and (iii) $\forall w'$: $w'Rw$ [\neg (Sue hates John in w') \rightarrow \neg_y (John [only [f_2 x_1]] talked to Bill in w')], where $x \subseteq$ {that John talked to Bill, that John talked to Sue, ...} and $y \subseteq$ {that John talked to only Bill, that John talked to only Sue, ...}

That is: (i) John talked to Bill and nobody else, and (ii) Sue hates John, and (iii) if Sue hadn't hated him, John wouldn't have talked to Bill and nobody else, but to Sue and nobody else".

Speakers routinely point out that (34) is too strong, even though the context that precedes (33A), because of its emphasis on the fact that John will have no more than one interview, favors an interpretation where he has one interview only. A more appropriate paraphrase is (35):

¹¹ I am only considering readings where the *because*-clause takes scope over *only*. Readings with the reverse scope do not show anything about the point I want to make here. (i) is a reading of (33A); this reading is not salient in the context provided there, but it is in principle available for the sentence:

- (i) Talk to Bill because Sue hates him is the only thing that John did; he didn't, for example, talk to Sue because Sue hates him.

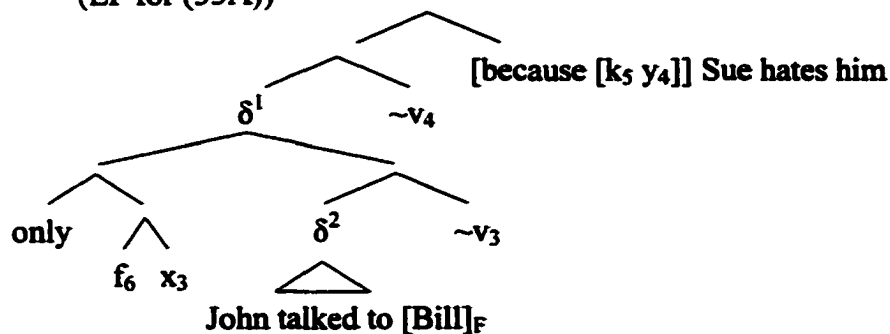
- (35) (i) John [only [f_2 x_1]] talked to Bill in w , and (ii) Sue hates John in w , and (iii) $\forall w': w'Rw [\neg (\text{Sue hates John in } w') \rightarrow \neg_y (\text{John [only [f_2 x_1]] talked to Bill in } w')]$, where $x \subseteq \{\text{that John talked to Bill, that John talked to Sue, ...}\}$ and $y \subseteq \{\text{that John talked to Bill, that John talked to Sue, ...}\}$

The difference between (34) and (35) is in the value of the argumental variable of the contextual variable of *because*: different from that of *only* in the former, the same in the later. Intuitively, it seems that if Sue didn't hate John, then there is reason to suppose that John would have talked with her. But this is not enough reason to suppose that John would have talked only to her.

Having (8c) in Rooth's system allows us to not generate (34): only one \sim -operator is meaningful (since focus is "used up" after it encounters the first operator), and one \sim -operator cannot restrict two coindexed anaphors to be subsets of different sets.

But now suppose we abandon (8c). Nothing prevents an analysis like (36) then:

- (36) [Who did John talk to?]₃
[Which person is such that John only_{C_g} talked to that person?]_i
(LF for (33A))



- (37) $[[\delta^2]]^f = \{\text{that John talked to Bill, that John talked to Sue, ...}\}$

- (38) $[[\delta^1]]^f = \{\text{that John talked to only Bill, that John only talked to only Sue, ...}\}$

In (36), the domain of *only* is provided by the lower \sim -operator; the argumental variable of its C is restricted to be a subset of the FSV of δ^2 , in (37)¹². The argumental variable of *because* is restricted by the other operator to be a subset of the FSV of δ^1 , in (38)¹³. This gives rise exactly to (34).

I think that, in general, giving up (8c) is not a strategy that an advocate of Rooth (1992) wants to pursue. The purpose of introducing a focus operator into LF representations seems to be to mark the scope of the focus. If we get rid of (8c), then the FIP no longer does that, the scope of the focused item is not determined by the focus operator. In other words, keeping the FIP but doing without (8c) seems to undermine the reasons for introducing the FIP in the first place.

(33) will be taken up again after I have made my proposal about association with focus (§3.4.3). I will show that its properties receive an explanation in the new framework.

¹² The antecedent of the argumental variable of the C of *only* in the question *which person is such that John only talked to that person?* is the same as that of the argumental variable of the C of *only* in (33A).

¹³ Because the antecedent of the argumental variable of the C of *only* in (33A) is the question *who did John talk to?*, the propositions that are members of the FSV of δ^1 are the propositions that John talked to only Bill, the proposition that John talked to only Sue, ... I took the liberty of indicating this as in (38), but the better characterization is as follows. δ^1 contains an *only* whose argumental variable receives a particular value. When the FSV of δ^1 is calculated, the propositions that are members of that set will be of the "form" *John only talked to x*, with the argumental variable of their *only* receiving that value. So, for example, a member of this set is the set of worlds where John talked to Bill and nobody else.

3.2.3 Conceptual issues

We can furthermore argue on conceptual grounds that Rooth (1992)/von Fintel (1994/1995) are not really more compatible with my hypothesis that the argumental variable of C is a pronoun than Rooth (1985). Rooth (1992)/von Fintel (1994, 1995) avoid the problem with the argumental variable of C, since their system imposes no direct restriction on it; focus-sensitive readings arise via “accidental” coindexation. However, the other free variable in Rooth’s (1992) system, the focus anaphor, is still restricted in unpronoun-like ways, just as the argumental variable of C was in Rooth (1985). After all, (8ai) is the descendant of (3). This analysis, then, still forces a departure from the attractive hypothesis that free variables can only have certain kinds of restrictions (i.e., those effected via lexical features, like gender). However, it is true that focus has a single role in this theory (the FIP is all there is to focus here), and it is true that it serves a discourse-regulating purpose, in the sense of §3.1.

3.2.4 Summary of §3.2.

The FIP in Rooth (1992)/von Fintel (1994, 1995) has an empirical problem that can only be solved by adding machinery to the system (not by simply modifying the principle). In addition, the FIP still imposes requirements on free variables that force a departure from the hypothesis that the argumental variable of C is a pronoun, though the problem is less severe than in Rooth (1985).

3.3 Maximal informativity

There are two main aspects to the analysis of association with focus that I propose here. One has to do with what the antecedent of the argumental variable of C is. The other has to do with how that antecedent comes about.

If the argumental variable of C is a pronoun, then, when free, it must be subject to the principle in (39), which we assumed in Chapter 1:

(39) The value of a free index is a salient object

In this sense, the argumental variable of C is no different from *she* in (40):

(40) Mary arrived early at the party. *She* stayed until very late.

The only difference between *she* and C is that, while the value for a pronoun like *she* in (40) is *Mary*, which denotes an individual, the antecedent for the argumental variable of C must be an object that denotes a set of propositions. Recall the lexical entry for *only* we are assuming here:

(41) $[[\text{only}]]^g = \lambda C \lambda p: p(w). \forall q [q \in C \ \& \ q(w) \rightarrow p=q]$ (=(2))

This difference in the semantic type of the antecedent of a pronominal expression plays an important role in Chapter 4. This restriction does not constitute a departure from the

hypothesis that the argumental variable of C is a pronoun, since pronouns have this restriction too.

If we assume questions to be objects that denote sets of propositions, as in the tradition of Hamblin (1973) and Karttunen (1977), then the antecedent for the argumental variable of C is a question. An extremely simple analysis of cases like (42) results (recall (15)):

- (42) a. Speaker A: Who did John invite for dinner?
b. Speaker B: He only invited [Mary]_F for dinner

The antecedent for the argumental variable of the C of *only* in (42b) is simply (42a), the only question that belongs to the context of (42b). The meaning that is predicted for (42b) is the correct one: John invited only Mary for dinner (more appropriately, “if a proposition from the set of propositions {that John invited Mary for dinner, that John invited Sue for dinner, that John invited Peter for dinner,...} is true, it’s the proposition that John invited Mary for dinner”, with the presupposition that John invited Mary for dinner).

There is an important problem that such a simple analysis must face: discourses do not *have* to have questions in them. Consider (43) and (44):

- (43) a. Speaker A: I think Peter likes Selma. He invited her for dinner on Thursday.
b. Speaker B: No, *he only invited [Susan]_F for dinner on Thursday*. Selma got invited for Monday.
- (44) Max’s mother is a wonderful cook. Last night, she spent hours in the kitchen preparing lots of great food, but it was all wasted on him: *he only ate [French fries]_F* (example based on one by Roberts (1995))

The discourses in (43) and (44) contain no appropriate antecedents for the argumental variables of C. Yet, focus associates in the italicized sentences in (43b) and (44). How come?

I propose to keep the simple analysis. Here is how I deal with the problem (43b) and (44) pose: I assume that the questions that we need in order to predict the right readings are in fact part of the contexts in (43) and (44), only not part of them *explicitly*. Below, I devise a system where the implicit questions *who did John invite for dinner on Thursday?* and *what did Max eat?* are implicit questions in the contexts in (43) and (44), respectively. Of course, important questions arise, the most important one of which is this: why are these questions implicit, and not some others?

In other words: there must be something special about the question *who did John invite for dinner on Thursday?* in (43), and about the question *what did Max eat?* in (44). Why should these questions form part of the context (implicitly) of (43) and (44), and not others? Why not *what did John do?* in (43), or *what happened?* in (44)? If these other questions were implicit in (43) and (44), respectively, they would be the antecedent for the argumental variable of the C of *only* in the *only*-sentences in these examples, and the wrong readings would be predicted. For example, the italicized material in (43) would be predicted to mean “if a proposition from the set of propositions {that John invited Selma for dinner on Thursday, that John invited Susan for dinner on Thursday, that John went to the opera, that John worked until late,...} is true, it’s the proposition that John invited Susan for dinner on Thursday” (with the presupposition that John invited Susan for dinner on Thursday); that is, the *only*-sentence would exclude John having gone to the

opera. This is not what this *only*-sentence is intuitively perceived to do. Similarly for (44).

I propose that what is special about *who did John invite for dinner on Thursday?* in (43) is that, no matter how the *only*-sentence is interpreted, the *only*-sentence always provides maximal information about who John invited for dinner on Thursday. Providing an explicit version of the principle that I have in mind here involves considering a theory of discourse first. This is what I do in §3.4, but, for now, I want to keep it at an informal level and give the reader a sense for what the idea is.

The first thing to note is that, having removed focus-determined constraints on variables from the grammar, nothing restricts what the value for the argumental variable of the C of *only* in the italicized sentence in (43) is. Before that sentence is part of a discourse in which an antecedent for it is available, there is no reason for assuming the variable to have one antecedent over another. The idea then is that no matter which value gets assigned to it, the *only*-sentence in (43) always provides maximal information about who John invited for dinner on Thursday. Let us consider two possible values for the argumental variable of C, and let us see how much information the *only*-sentence provides about this question.

Suppose the argumental variable of C is a subset of the set of propositions {that John invited Susan for dinner on Thursday, that John invited Selma for dinner on Thursday, that John invited Peter for dinner on Thursday,...}. If so, the meaning of the *only*-sentence in (43) is “if a proposition from the set of propositions {that John invited Susan for dinner on Thursday, that John invited Selma for dinner on Thursday, that John invited Peter for dinner on Thursday,...} is true, it’s the proposition that John invited

Susan for dinner on Thursday” (with the presupposition that John invited Susan for dinner on Thursday). In other words, the only person John invited for dinner on Thursday is Susan. This is indeed a lot of information about the question *who did John invite for dinner on Thursday?*, since we know the list of people that John invited for dinner that day (which includes Susan and only her), as well as the list of people John didn’t invite for dinner that day (anybody who is not Susan is in this other list). We have complete information about the answer to the question. I will provide a more formal definition of complete answerhood in §3.4.

We also have complete information about the answer to this question if the value for the argumental variable of *C* is different. Suppose it is a subset of the set of propositions {that John invited Susan for dinner, that John invited Selma for dinner, that John went to the opera, that John worked until late, ...}. The meaning of the *only*-sentence in (43) is then that John invited Susan for dinner and did none of these other things (he didn’t invite Selma, he didn’t go to the opera, he didn’t work until late...). We have complete information about who John invited for dinner in this case as well: Susan, and only Susan.

Importantly, it is not true that no matter how the *only*-sentence in (43) is interpreted, we invariably have maximal information about other questions. We do not have maximal information about the question *what did John do on Thursday?* on any interpretation of the *only*-sentence. If we take the *only*-sentence in (43) to mean that John invited Susan and only Susan for dinner that day, we do not have complete information about the question *what did John do on Thursday?* We don’t know, for example, if he went to the opera or not. We do have complete information about this question on *some*

interpretations of the *only*-sentence in (43) (e.g., if the argumental variable of C is a subset of the set of propositions {that John invited Susan for dinner, that John invited Selma for dinner, that John went to the opera, that John worked until late, ...}), but not all interpretations do that.

This is what is special, I propose, about the question *who did John invite for dinner on Thursday?* in (43). This question and the *only*-sentence bear the relation that this question is the one for which we invariably have a complete answer on the basis of the *only*-sentence.

The attentive reader surely has noticed that while it is clear that there is a difference between the questions *who did John invite for dinner on Thursday?* and *what did John do on Thursday?* in (43), it is not entirely true that the *only*-sentence in this example provides complete information about the former on any interpretation of the *only*-sentence. In particular, there is one possible interpretation of this sentence that does not provide us with a complete list of the people that John invited for dinner that day: that which arises when the argumental variable of the C of *only* is a subset of the set of propositions {that John invited Susan for dinner, that John invited Susan for lunch, that John invited Susan for breakfast...}. The *only*-sentence ends up meaning that John invited Susan for dinner and nothing else in that case, but this does not constitute complete information about who John invited for dinner (i.e., did he invite Selma? Peter?).

This problem is reminiscent of another problem that the elegant and simple account we proposed above for (42) must face. Consider (45):

- (45) a. Speaker A: What did John invite Mary for?
 b.# Speaker B: He only invited [Mary]_F for dinner

Why is (45) not felicitous? One way of articulating this question is to ask why the argumental variable of the C of *only* in (45b) cannot have (45a) as its antecedent. Notice that there is nothing wrong with the meaning that (45b) would get in that case (“if a proposition from the set of propositions {that John invited Mary for dinner, that John invited Mary for breakfast, that John invited Mary for lunch...} is true, it’s the proposition that John invited Mary for dinner”, with the presupposition that John invited Mary for dinner), and that (45b) would in fact answer the question posed in (45a). Another possible way to articulate the question, of course, is to ask why (45b) cannot be an answer to (45a), in which case what is at stake does not necessarily have to be the value of the argumental variable of C.

Let us raise more questions about this analysis. Some important ones are those in

(46):

- (46) a. Is there any reason to suppose that something like maximal informativity matters? That is, are there other phenomena that can be analyzed in terms of something like maximal informativity, or is association with focus the only phenomenon of natural language in which it matters?
 b. Is there any independent reason to assume that there are such things as implicit questions to begin with? Does this have to be stipulated?
 c. Nothing in the story I have just told makes reference to focus. But the phenomenon we are trying to explain is crucially connected with focus. Where does focus figure in this analysis?

I answer (46b) and (46c) by couching maximal informativity within an explicit theory of discourse, that in Roberts (1996/1998). So I come back to them when I have

introduced her system, which I will do in §3.4.1. I answer these questions in ways that I think are satisfactory, but there is more: an easy solution to the problem posed by (45) and by the value of the argumental variable of C in (43) when it is a subset of the set of propositions {that John invited Susan for dinner, that John invited Susan for breakfast, that John invited Susan for lunch...} is available to us once (46b) and (46c) are answered. The analysis I develop below will enable us to treat (45) as a case where something is wrong with (45a) being the antecedent for the variable of (45b), and as a rather simple case of that. Another job we have ahead of us is to make the idea behind maximal informativity more precise, as remarked above. This I also do after I have introduced Roberts' system.

As for (46a), I offer some thoughts now, by way of closing this section. So: is maximal informativity relevant only in association with focus? Something like it (though not in the specific form presented here) is part of the analysis of certain properties of questions. For example, Beck and Rullmann (1999) argue that an analysis of degree questions (e.g., *how many books did John read?* or *how high can John jump?*) in terms of weakly exhaustive answers (a form of maximal informativity) is superior to analyses which refer to numerical maxima (cf. Rullmann 1995). Groenendijk and Stokhof (1984) and Heim (1994) argue that strong answers, which are the most informative kind of answers, are necessary in order to explain certain general properties of questions (exhaustivity, de re/de dicto readings). And, of course, something like maximal informativity is part of Grice's (1975) principle of cooperation. So the idea that maximal informativity plays a role in the analysis of natural language phenomena is not new; what

the present analysis suggests is that maximal informativity is also relevant in association with focus. This can be seen as one of the contributions of the present chapter.

3.4 Reconstruction and information structure

The organization of this section is as follows. In §3.4.1, I introduce the basics of Roberts' (1996/1998) theory of discourse. In §3.4.2 I make the principle of maximal informativity precise, and show how it works. In §3.4.3 I go back to the questions left unanswered in the previous section. In §3.4.4 I go back to the examples that were problematic for the Rooth/von Fintel approach, and to the examples with *because*-clauses. In §3.4.5 I go back to the point raised by von Fintel (see §3.2) and look at it from the perspective offered by the present system. §3.4.6 is the conclusion to the section.

3.4.1 Roberts (1996/1998)

Roberts, following the work of Carlson (1983) and building also on ideas from Stalnaker (1979), conceives of discourse as a structure of questions and answers. The (idealized) goal of discourse is to find out what our world looks like, and that is achieved by asking questions and incorporating their answers into the participants' knowledge store¹⁴. There is a partially ordered set of questions, the question-under-discussion stack (QUD), and a set of propositions, Stalnaker's Common Ground (CG). As assertions (i.e.,

¹⁴ There are, of course, purposes other than information seeking that discourse can have. For example, another purpose can be to influence others to perform some action (imperatives). I will take information

answers to questions in the QUD) are added to the CG, we come closer to knowing what the actual world looks like: fewer and fewer worlds are compatible with all of the propositions in the CG. The set of possible worlds that are candidates for the actual world (i.e., the generalized intersection of the CG), shrinks as the conversation progresses, taking us closer to fulfilling our goal as conversation participants^{15, 16}.

Consider (47) in this light:

- (47) a. Speaker A: Who did John invite for dinner?
b. Speaker B: John invited Mary for dinner

The dialog in (47) is felicitous¹⁷. The conversation A and B maintain is structured by the question asked by A in (47a) and the answer provided by B in (47b). A's question is added to the QUD, and B's answer is added to the CG. Thus the CS, the set of possible worlds that are candidates for the actual world, shrinks; now it contains only those worlds where John invited Mary for dinner. Those worlds where John didn't invite Mary for dinner are kicked out.

seeking to be basic, as is common practice (see, e.g., Grice (1975) and Stalnaker (1979)), and ignore other purposes.

¹⁵ I use CG as a set of propositions, and CS as the set of worlds (or situations) that results from the generalized intersection of the CG, as in Stalnaker (1979). Other authors (e.g., Büring 1995, 1997), use CG to refer to the set of worlds, though.

¹⁶ Matters are more complicated here too. For example, Stalnaker (1979) suggests that we need to assume a (possibly different) knowledge store per individual participating in the conversation, and that, as the conversation progresses, the knowledge stores become more and more similar (or, communication fails). In the text, I will ignore complications such as these

¹⁷ For this example, I am ignoring matters of focus; see discussion below for a fuller consideration of the details of an exchange like (47).

The theory of discourse must be supplemented with constraints that filter out infelicitous discourses. Notice, for example, that not any shrinking of the CS will do:

- (48) a. Speaker A: Who did John invite for dinner?
b. #Speaker B: The sun rose at 5:45am today

B's contribution in (48b) also takes us closer to our goal of finding out what the actual world looks like, since we know that those worlds where the sun didn't rise at 5:45am today are not candidates for the actual world. And yet, there is something wrong with this exchange. The constraint that would take care of (48) would say something like this: answers to questions have to be related to the question somehow; that is, they have to provide information *about* the question.

Constraints on discourse must include constraints on sequences of questions as well. Consider (49):

- (49) a. Speaker A: Who owns a pet?
b. Speaker B: Well, let's see: who owns a cat?
c. #Speaker B: Well, let's see: who owns a lamp?

Intuitively, only answers to (49b) provide us with some information about the first question asked, (49a). Answering (49c) tells us nothing about (49a). So some constraint on discourse must be able to relate (49a) and (49b) in a way that does not relate (49a) and (49c).

Finally, note that the placement of intonational prominence (i.e., focus) also plays a role in discourse well-formedness. Consider (50) (recall (5)):

- (50) a. Speaker A: Who did John invite for dinner?
 b. Speaker B: He invited [Mary]_F for dinner
 c. #Speaker B: He invited Mary for [dinner]_F

Roberts formalizes the constraints we have informally reviewed here. Two relations between moves in a discourse (questions and assertions) are fundamental in her system¹⁸:

- (51) Every move in a discourse must be relevant to the last question under discussion (last(QUD))
 (52) Every assertion containing focus must be congruent to last(QUD)

Relevance and congruence are formalized in (53) and (54):

- (53) **Relevance**
 An move α is relevant to a question Q iff α is a subquestion of Q (α is a question) or α is a partial answer to Q (α is an assertion)
 (54) **Congruence**
 An assertion α is congruent to a question Q iff $[[\alpha]]^f = [[Q]]^o$

Additional definitions are needed; these, which have to do with the subquestion relation and the notion of answerhood, are given in (55)¹⁹. The assumption throughout is that the

¹⁸ Roberts' congruence is actually stronger: every *move* (i.e., also questions) must be congruent to last(QUD). I have avoided this complication here.

¹⁹ See the appendix to this chapter for an alternative definition of complete answerhood..

denotation of a question (i.e., its extension) is a Hamblin/Karttunen-style (Hamblin (1973); Karttunen (1977)) set of propositions²⁰. Some illustration follows:

- (55)
- a. Q' is a subquestion of Q iff the complete answer to Q' contextually entails a partial answer to Q
 - b. A partial answer to a question Q is a proposition which contextually entails the evaluation –either true or false – of at least one element of [the denotation of Q , LM].
 - c. A complete answer to a question Q is a proposition which contextually entails an evaluation for each element of [the denotation of Q , LM]
 - d. A proposition p contextually entails a proposition p' in a discourse with common ground c iff $p \cup c$ entails p' (based on Roberts' (1996/1998: 98) notion of contextual entailment between questions)
 - e. $\text{last}(QUD)$ is the question-denotation at the top of the question-under-discussion stack, a set of questions ordered by the subquestion relation

Let us see how the constraints work with the examples we considered above. Let us start with example (50), repeated here:

- (56)
- a. Speaker A: Who did John invite for dinner?
 - b. Speaker B: John invited [Mary]_F for dinner
 - c. #Speaker B: John invited Mary for [dinner]_F

Suppose that John cooked dinner for friends yesterday. He invited Mary, Peter and Tony, and he invited nobody else. The complete answer is that Mary, Peter and Tony were John's only guests (i.e., only the propositions *that John invited Mary for dinner*, *that John invited Peter for dinner* and *that John invited Tony for dinner* from the set of propositions denoted by (56a) (see (57a)) are true). A partial answer to this question would be, e.g., the proposition that John invited Mary for dinner (i.e., the proposition *that*

John invited Mary for dinner is true from among those contained in the set in (57a)). Thus, (56b) is relevant to the last question under discussion, (56a), and hence the exchange (56a)-(56b) is well-formed. -

Because relevance does not mention focus, the same considerations apply to (56a)-(56c), so it is congruence that must filter out this exchange. (56b) is congruent to (56a) because the FSV of (56b), in (57b), is a subset of the ordinary semantic value of the question (56a), in (57a):

- (57) a. $[[[(56a)]]]^o = \{p: p = \lambda w. \text{John invited } x \text{ for dinner in } w \mid x \in D_e\}$
 b. $[[[(56b)]]]^f = \{p: p = \lambda w. \text{John invited } x \text{ for dinner in } w \mid x \in D_e\}$
 c. $[[[(56c)]]]^f = \{p: p = \lambda w. \text{John invited Mary for } x \text{ in } w \mid x \in D_e\}$

The FSV of (56c), in (57c), however, is not the same as the ordinary semantic value of (56a), again in (57a). (56a)-(56b) violates neither relevance nor congruence, whereas (56a)-(56c) violates congruence. Thus, only (56a)-(56b) is felicitous.

Of course, (48) is not a well-formed discourse because it violates relevance: (48b) is not a partial answer to (48a), hence not relevant to it. As for (49), note that a complete answer to (49b) is a partial answer to (49a); hence, (49b) is a subquestion of (49a), satisfying relevance. (49c), on the other hand, is not relevant to (49a), because a complete answer to (49c) is not a partial answer to (49a).

What we have to say about the order in which the questions in (49) are to be answered is that an appropriate assertion is one that address the last question under discussion in the QUD. Once a question is answered satisfactorily (i.e., presumably, by providing a complete answer to it), it is removed from the stack (i.e., it is no longer under

²⁰ And its intension is a function from possible worlds to sets of propositions.

discussion). The question that used to be the next-to-last becomes the last question under discussion, and so forth.

It is important to discuss congruence ((54)) in the light of the discussion on focus from §3.1. There I argued that the minimal assumption is that focus has a discourse-regulating role in the grammar, but exactly how this role is carried out was not specified. Congruence is what we are looking for.

A further assumption is that focus is only used in (54), and in no other discourse-regulating rule. Though, strictly speaking, this last assumption is not necessary from the point of view of the discussion in §3.1, a system where focus semantic values figure in (54), and only there, would be very restrictive, and this very attractive. It turns out that within this theory of discourse it is possible to maintain this assumption, as I show in the next two subsections.

This is the summary of the two principles of information structure that I borrow from Roberts (1996/1998). In the next two subsections, I show that a principle of maximal informativity is also involved in the analysis. The plot is as follows: principles of information structure such as these are key in the reconstruction of implicit contexts for sentences. It is in these implicit contexts that the appropriate antecedent for the argumental variable of C is found. Thus, there is no need to restrict the variable via a principle like (3).

3.4.2 Maximal informativity and context reconstruction

In this subsection I make the analysis of association with focus and the principle of maximal informativity more precise. I show in detail how the implicit context in an example like (43) and (44) is reconstructed. These examples are repeated here for convenience:

- (58) a. Speaker A: I think Peter likes Selma. He invited her for dinner on Thursday.
 b. Speaker B: No, *he only invited [Mary]_F for dinner on Thursday*. Selma got invited for Monday.
- (59) Max's mother is a wonderful cook. Last night, she spent hours in the kitchen preparing lots of great food, but it was all wasted on him: *he only ate [French fries]_F*

In what follows I exemplify with the italicized sentence in (58b), repeated as (60):

- (60) John only invited [Mary]_F for dinner

The principles of information structure from §3.4.1 establish certain requirements between questions and assertions (and between questions) in a discourse. So, in constructing a context for (60), the question to ask is what question is related to (60), and what other question this question is in turn related to, via the principles in (53) and (54). We will go through three stages of context reconstruction, roughly characterized as follows: (i) the question (60) is relevant and congruent to is not a good antecedent for the argumental variable of C because, among other things, the resulting truth-conditions for (60) are problematic; (ii) there are a few questions the congruent and relevant question is

itself relevant to, all of which lead to acceptable truth-conditions; (iii) one of these questions is chosen as the antecedent for the argumental variable of C. It is maximal informativity that allows us to make the choice in (iii).

The idea then is that the antecedent for the free contextual variable of *only* in sentences like (60) is a question that belongs to its implicit context (i.e., an implicit question in its QUD). Or, to put it differently: the implicit context for (60) is a context where it is under discussion who John invited for dinner because only a context that contains this question complies with the principles of information structure *and* contains an appropriate antecedent for the argumental variable for the C of *only*.

3.4.2.1 The question (60) is relevant and congruent to

(60) must be relevant (i.e., a partial answer) and congruent to some question, which becomes the last question under discussion (or last(QUD)). (61) is the focus semantic value of (60); the last(QUD) must be a subset of that ((62); see Roberts (1996/1998: 116-7)):

(61) $[[[(60)]]^f = \{p: p = \lambda w'. \text{John only invited } x \text{ for dinner in } w' \mid x \in D_e\}$
 $(\approx \{\text{John only invited Mary for dinner, John only invited Peter for dinner, John only invited Sue for dinner, ...}\})$

(62) Which person is such that John only invited that person for dinner?

(60) is congruent to (62) because its FSV, in (61), is a subset of the ordinary semantic value of (62). Furthermore, (60) is relevant to (62), since it is a partial answer to it; if it is

the case that John only invited Mary for dinner (whatever the domain of *only*), then we know something about (62), e.g., that John only invited Mary for dinner (again, whatever the domain of *only*). (62) is thus the last(QUD) for (60).

Having reconstructed a minimal context for (60), we now ask whether (62) is a good antecedent for the argumental variable of the C of *only* in (60). We have to ask this, given the principle in (39), which says that the antecedent for a variable is an object in the context; furthermore, (62) is of the right semantic type.

In fact, (62) is not a good antecedent for the argumental variable of the C of *only* in (60). The reason is that there are problems with the resulting truth-conditions for (60). One problem with the resulting truth-conditions is this: the antecedent of the variable (i.e., (62)) contains itself another free variable, whose value now has to be determined as well. By using (62) as the antecedent for the argumental variable of C, we have not solved the problem we started out with: there is still a “hole” in the meaning of (60)²¹.

Another problem is this: it is impossible to find the proposition in the set in (61) that corresponds to the sister of *only*, the proposition that John invited Mary for dinner. This is so because the proposition that John invited Mary for dinner is not a member of (61). To get an idea of what is wrong with this, consider the following examples:

- (63) #Peter said yesterday that he would arrive late to the dinner, that Mary would too, and that their son Steve would be in charge of taking the lasagna to Mark's. The only one of these that turned out to be true is that Peter parked his car in the garage in the corner

²¹ Echoing the following quote from von Stechow 1994: 35; 1995: “These free variables are holes in the semantic structures which will be filled by the pragmatics”.

- (64) #Out of all of Mary's siblings, the only one she can't stand anymore is Sarah, who is not her sibling

In (64), for example, something is wrong with the fact that Sarah is not a member of the group that the speaker says he is drawing a member from. Let us take a close look at the truth-conditions that would result:

- (65) a. $\forall q [q \in C \ \& \ q(w) \rightarrow q = \lambda w'. \text{ John invited Mary for dinner in } w']$, where $C \subseteq \{p: p = \lambda w'. \text{ John only invited } x \text{ for dinner in } w' \mid x \in D_e\}$
 b. $= \forall q [q \in C \ \& \ \neg q(w) \vee q \notin C \ \& \ q(w) \vee q \notin C \ \& \ \neg q(w)]$, for $C \subseteq \{p: p = \lambda w'. \text{ John only invited } x \text{ for dinner in } w' \mid x \in D_e\}$
 c. $= \forall q [q \notin C \vee \neg q(w)]$, for $C \subseteq \{p: p = \lambda w'. \text{ John only invited } x \text{ for dinner in } w' \mid x \in D_e\}$

The proposition *John invited Mary for dinner* is not a member of the set of propositions of the form *John only invited x to Bill*. The consequent of the implication in (65a) is thus always false; the proposition chosen from C and the proposition *John invited Mary for dinner* can never be equivalent. The only way for the implication to be true now is if the antecedent is also false. In other words, it must be the case that all propositions are either in C and false, not in C and true, or neither in C nor true ((65b)), or, more conspicuously, it must be the case that all propositions are either not members of C or false ((65c)). So, if a proposition is a member of C , it is false. That is, (60) is true iff all the members of C are false. Thus, *John only invited Mary for dinner* must be false. One possibility now is to say that this is incompatible with the very assertion in (60), in which case (60) can never be true. Another possibility is to say that there is something wrong with all the members

of a question being false (all the members of the denotation of (62) must be false in order for (60) to be true)²².

We can then assume that, if choosing a particular antecedent gives rise to truth-conditions that are odd in this sense, then other antecedents are preferred, those that give rise to truth-conditions that are not odd.

3.4.2.2 The questions (62) is relevant to

Back now to the main line of argumentation. The first attempt at finding an antecedent for C in the reconstructed context has failed. But we can reconstruct more context, since (62) must be relevant to some question. If we can find a question (62) is relevant to that, at the same time, is a good antecedent for C, the job is done.

There are a number of questions (62) is relevant to that are good antecedents for C. Let us start out by considering those in (66):

- (66) a. Who did John invite for dinner?
b. What did John do?

(62) is relevant to all of these questions because a complete answer to (62) provides at least a partial answer to all of the questions in (66). Let us see how this comes about.

What does a complete answer to (62) look like? It is important now to remember that (62) has an *only* and the argumental variable of its C can, in principle, vary (see

²² Thanks to Klaus Abels for discussing this with me, and to Ede Zimmermann for insisting that I make this precise.

§3.4). Since we have no reason to presuppose a particular antecedent for this variable, we should consider a few possibilities. For the moment, we consider just those in (67):

- (67) a. $\{p: p = \lambda w'. \text{John invited } x \text{ for dinner in } w' \mid x \in D_e\}$
 b. $\{p: p = \lambda w'. \text{John R-ed in } w' \mid R \in D_{\langle e, t \rangle}\}$

The following then are two possible meanings for the question in (62) (ignoring presuppositions):

- (68) a. Which person is such that if a proposition from the set $\{p: p = \lambda w'. \text{John invited } x \text{ for dinner in } w' \mid x \in D_e\}$ is true, it is the proposition that John invited that person for dinner? (\approx {that John invited only Mary for dinner, that John invited only Bill for dinner, that John invited only Peter for dinner...})
 b. Which person is such that if a proposition from the set $\{p: p = \lambda w'. \text{John R-ed in } w' \mid R \in D_{\langle e, t \rangle}\}$ is true, it is the proposition that John invited that person for dinner? (\approx {that John invited Mary for dinner and did nothing else, that John invited Bill for dinner and did nothing else, that John invited Peter for dinner and did nothing else...})

And here are two complete answers to (62), one corresponding to (68a) and another one corresponding to (68b):

- (69) a. John invited Mary and nobody else for dinner
 b. John invited Mary for dinner, and he did nothing else

In (69a), I have taken the proposition that John invited only Mary for dinner to be true, and all the other members in (68a) of the question to be false; this constitutes a complete answer to (68a). This couldn't be otherwise: if John invited only Mary for dinner, then it must be false that he invited only Peter for dinner (i.e., he cannot have

invited Peter)²³. In (69b), I have taken the proposition that John invited Mary for dinner and did nothing else to be true, and all the other members in (68b) to be false. Again, this couldn't be otherwise: if John invited Mary for dinner and did nothing else, it must be false that he invited Peter for dinner and did nothing else (i.e., he cannot have invited Peter).

(62) is relevant to both (66a) and (66b) because a complete answer to (62) (e.g., (69a) or (69b)) is a partial answer to both (66a) and (66b). The chart in Figure 1 summarizes this:

	(66a)	(66b)
(69a)	Yes	Yes
(69b)	Yes	Yes

Figure 1: Partial answers (*only*)

This is how you read the table: is the answer in the first column a partial answer to the question in the first row? For example, (69a) is a partial answer to (66a): if you know that John invited Mary and nobody else for dinner, then you know a partial answer to the question *who did John invite for dinner?*²⁴ (i.e., he invited Mary (and only Mary) for dinner). Another example: (69b) is at least a partial answer to (66b): if you know that John invited Mary for dinner and he did nothing else, then you know a partial answer to the question *what did John do?* (i.e., he invited Mary for dinner (and, in fact, he did

²³ It must be false that John invited only Peter for dinner. This can be false either if (a) John invited Peter for dinner but Peter was not the only guest or (b) John didn't invite Peter for dinner at all. Only (b) is compatible with the truth of the proposition that John invited only Mary for dinner. Note that it is possible to drop the information that John invited Peter for dinner in cases like (i) (cf. Horn (1996), among others):

(i) John invited only Peter for dinner, and maybe not even him

²⁴ In fact, you know a complete answer to it. Recall that complete answers are also partial answers.

nothing else)). And so on. For relevance to be satisfied, it is enough that one complete answer to (62) (i.e., one of (69)) is a partial answer to a question. Relevance is satisfied.

3.4.2.3 Choosing (66a)

Let us understand what is at stake with the questions in (66). (66a) is the question that must be chosen as part of the implicit context for (60). It is only then that we predict the right truth-condition for (60): the antecedent for the argumental variable of C would be (66a), and the truth-conditions would be “if a proposition from the set denoted by (66a) is true, then it is the proposition that John invited Mary for dinner” (i.e., he invited Mary and nobody else for dinner).

It must not be the case that (66b) is part of the implicit context. If that was the case, (60) would be predicted to mean “if a proposition from the set denoted by (66b) is true, then it is the proposition that John invited Mary for dinner” (i.e., he invited Mary for dinner and did nothing else). But this is not what (60) means.

We need, then, to claim that not all of the questions in (66) can provide a implicit antecedent for (60); in fact, the claim must be that there is only one implicit context for this sentence, and that is the one that contains (66a) (and (62)). The meaning of (60) would follow from the fact that only one suitable antecedent is available for the argumental variable of C in the implicit context.

Can this claim be made in a principled way? In other words: is there a principled way to choose (66a) from among the questions in (66)? I propose that maximal informativity allows us to choose this question. Here is a better statement of maximal informativity than the one we had in §3.3:

- (70) **Maximal informativity:** given two questions Q_1 and Q_2 , Q_1 is part of the reconstructed context of Q_2 iff any complete answer to Q_2 is a complete answer to Q_1

Let us go back to Figure 1 and ask whether the complete answers in the first column are complete answers to the questions in the first row as well. Figure 2 summarizes the results:

	(66a)	(66b)
(69a)	Yes	No
(69b)	Yes	yes

Figure 2: Complete answers (*only*)

If John invited only Mary for dinner ((69a)), then we have a complete answer to (66a) (*Who did John invite for dinner?*) though not to (66b) (*what did John do?*): John might have also driven Mary to her house after dinner, for example. If John invited Mary for dinner and did nothing else ((69b)), we do have a complete answer for both (66a) and (66b). No matter which complete answer from the first column we choose, we always obtain a complete answer to (66a). Furthermore, this is the case for (66a) only; whether we have a complete answer to (66b) depends on which of the answers in (69) we choose.

Let us go back to the question we raised in (46b). There, we asked whether there was any reason why one would assume implicit questions to be part of the contexts of sentences to begin with. The answer is simple: once we implement maximal informativity within Roberts' system, implicit questions come to us for free. Questions, whether implicit or explicit, are part of the fundamental architecture of discourse in this theory, so making reference to them comes at no cost for us.

A related question is this: why do we choose one question from the set of questions that (62) is relevant to? The theory of discourse described in §3.4.1 actually

forces us to make a choice. At the point of reconstruction in which the question in (62) is already part of the discourse structure, the task is to find out which question is the last(QUD) with respect to (62). But the last(QUD) is, by definition, a single question (i.e., it is the last one in an ordered set). So we are required to have one such question, not more²⁵.

The incarnation of maximal informativity in (70) is specific to our analysis though. So we should ask: what is the scope of the principle in (70)? I will ask this question twice, once here and once in §3.4.5. (70) does more work for us because there are other questions, apart from (66b), that can be excluded as belonging to the implicit context of (60) via the principle in (70). Some of these are in (71):

- (71) a. Who did John invite for what?
b. Who did John invite for something?

(69a) is not a complete answer for either (71a) or (71b): if John invited only Mary for dinner, it is still possible that John invited Sue for breakfast ((71a)), or that John invited

²⁵ Let me clarify one potential source of confusion. For Roberts, the QUD is a totally ordered set (see Partee et al. 1993: 47-51). The total order is brought about by the precedence relation (signaled with the symbol '<'). It makes sense to speak of the last member in this set: that would be the greatest (in the mathematical sense) element in QUD. A further requirement is that, if a question *q* follows another question *q'*, then *q* has to be a subquestion of *q'*.

Now, we know that a single question can be a subquestion of a number of questions. To give a very simple example: the question *who owns a brown cat?* is a subquestion of both *who owns a cat?* and *who owns a brown animal?*. Does this mean that there are two last(QUD) for *who owns a brown cat?* No, though there are two *potential* last(QUD). The last(QUD) for this question is whatever question precedes it (i.e., was asked before it) (it has to be a subquestion of it, of course, so, in this case, it will be one of the two just mentioned). In other words: the QUD is not a collection of all the possible subquestions of a given question, but only of those that are part of a particular discourse. What this means is that the assumption that one question is chosen from the set of potential last(QUD) in (66) is justified.

Peter for something ((71b)). So (66a) still wins. Here is what the situation now looks like in chart form:

	(66a)	(66b)	(71a)	(71b)
(69a)	Yes	No	No	No
(69b)	Yes	Yes	Yes	Yes

Figure 3: Complete answers (*only*)

Completing Figure 3 with the complete answer in (72) we arrive at Figure 4:

(72) John invited Mary and nobody else for dinner and nothing else

	(66a)	(66b)	(71a)	(71b)
(69a)	Yes	No	No	No
(69b)	Yes	Yes	Yes	Yes
(72)	Yes	No	Yes	Yes

Figure 4: Complete answers (*only*)

Finally, let us go back to the question we asked in (46c). There, we asked what the maximal informativity idea had to do with focus. Once that idea is implemented within a theory of discourse like Roberts', it is easy to see one way in which focus matters: focus of course plays a role in the principle of congruence, and so it necessarily plays a role in the reconstruction of context that plays such a crucial role for us.

But there is more that focus does in this story. In particular, there is more work that the question we determine on the basis of focus, (62), does. Recall a problem we mentioned at the end of §3.3: it wasn't really true that no matter how the *only*-sentence (see (60)) is interpreted it is always a complete answer to the question *who did John*

invite for dinner? ((66a)). If the value for the argumental variable of C in (60) is as in (73), we do not have a complete answer to this question:

(73) $\{p: p=\lambda w'. \text{John invited Mary for } x \text{ in } w' \mid x \in \{\text{breakfast, lunch, dinner...}\}\}$

In other words: I didn't consider (73) in our initial calculations in Figure 2-Figure 4, why not? I argue that we don't have to, because having (73) as the antecedent for the argumental variable of C in (62) gives rise to an odd question:

(74) Which person is such that if a proposition from the set in (73) is true, it is the proposition that John invited that person for dinner?

One of the members of (74) is the proposition that if a proposition of the form *John invited Mary for x* is true, it's the proposition that he invited Mary for dinner:

(75) $\forall q [q \in C \ \& \ q(w) \rightarrow q = \lambda w'. \text{John invited Mary for dinner in } w'], \text{ for } C \subseteq \{\text{John invited Mary for dinner, John invited Mary for breakfast, John invited Mary for lunch, ...}\}$

Another one is the proposition that if a proposition of the form *John invited Mary for x* is true, it's the proposition that he invited Peter for dinner:

(76) $\forall q [q \in C \ \& \ q(w) \rightarrow q = \lambda w'. \text{John invited Peter for dinner in } w'], \text{ for } C \subseteq \{\text{John invited Mary for dinner, John invited Mary for breakfast, John invited Mary for lunch, ...}\}$

The proposition that John invited Peter for dinner is not a member of C, since that set contains propositions that are of the form *John invited Mary for x*; this problem is already familiar to us from §3.4.2.1 (recall examples (63) and (64)). (76), and all other members of (74) which are not (75), are then odd. We can assume, quite naturally I think, that questions which have such odd propositions as their members are themselves odd²⁶.

Another question we can answer now is the one we raised about (45), repeated here:

- (77) a. Speaker A: What did John invite Mary for? (= (45))
 b. # Speaker B: He only_C invited [Mary]_F for dinner

The reason why (77) is odd is that the question (77b) is congruent to ((62)) would receive interpretation (74), since the C of *only* in both (62) and (77b) would be anaphoric to (77a).

Let us close this section by noting that one of the attractive features of this analysis is that it allows us to account for the anaphoric properties of the argumental variable of C in the same way we account for the anaphoric properties of other free variables, such as the pronoun *he* in (78):

- (78) John said hello to Mary. *He* was wearing red pants.

²⁶ More specifically: all the members of the denotation of the question in (62) which are not (75) are false except in the case where all the members of C are false (i.e., except when John invited nobody for dinner). But this would be incompatible with the assertion in (60). The idea is that questions which have contradictions as members of their denotation are ill-formed.

- (81) What did Sally do with syntax last year? (\approx {that Sally taught syntax last year, that Sally studied syntax last year...})

If a previous answer to (80) is not satisfactory, the previous answer must be of a member of the denotation of (80), and (79a) is. However, (79a) is not a member of (81). Hence, (79a)-(79c) do not constitute a felicitous exchange.

Now consider (18), repeated here too:

- (82) a. A: Sally taught semantics last year (=(18))
 b. B: No, Sally only taught [syntax]_F last year
 c. #B: No, Sally only [taught]_F syntax last year

The association with focus in (82b) receives the same explanation provided above for (60), with C anaphoric to the (implicit) question in (80). Furthermore, (82b) is a felicitous denial for (82a) because (82a) is a member of (80). (82c) is not a felicitous denial for (82a) because (82a) is not a member of the question we reconstruct for the domain of *only*, (81).

Sentences with *only* and a *because*-clause were used to argue that the FIP must be kept as is, if one is to keep it at all; abandoning part of the FIP ((8c)) creates an overgeneration problem in these cases. What is their analysis in the present framework?

These cases are interesting because they present us with a logical possibility within our analysis that we haven't considered so far: there might be more than one question for which we always have a complete answer. Our system forces us to have just one last(QUD), so one of these must be chosen. Ideally, this choice should not have to involve any stipulation.

Recall (33A), repeated here:

(83) John only talked to [Bill]_F because Sue hates him (= (33A))

This sentence has a reading which can be paraphrased as “Sue hates John, John talked to Bill and nobody else, and if Sue hadn’t hated John, John would have talked to Sue”. Importantly, it doesn’t have a reading such as “Sue hates John, John talked to Bill and nobody else, and if Sue hadn’t hated John, John would have talked to Sue and nobody else”.

The question (83) is congruent to is in (84):

(84) Who is the person such that John only talked to that person because Sue hates him?²⁷

Now, there are at least three questions such that all complete answers to (84) are complete answers (and, of course, partial answers) to them as well:

- (85)
- a. Who did John talk to?
 - b. Who is the person such that John only talked to that person?
 - c. Who did John talk to because Sue hates him?

For example, a complete answer to (84), such as that John talked to Bill and nobody else, and the reason for this was that Sue hates him, is a complete answer to all of (85). If it is the case that John talked to Bill and nobody else, then, no matter what the reason for this

behavior, we know a complete answer to (85a): John talked to Bill and nobody else. Such an answer is also a complete answer to (85b) (again, independently of what the reason was for John's behavior, John talked to Bill and to nobody else) and to (85c). Other complete answers to (84) yield the same results.

In the system that I have developed so far, there is no special provision as to what to do when there is more than one question for which we always have a complete answer. We have to choose one of them as there can be only one last(QUD), but, how do we choose it? I think there is no need to propose anything special: only one of (85) leads to contingent truth-conditions, and that is (85a). Notice that having (85a) as the antecedent for the contextual variable of both *only* and *because* in (83) leads to the truth-conditions we are after.

Suppose we chose (85b) as the implicit question and therefore as the antecedent for both contextual variables. As we know, a question like (85b), with an *only*, does not make a good antecedent for the C of another *only*: the sentence in (83) would only be true just in case all the members of the antecedent of the argumental variable of C were false, but this would be incompatible with the assertion that John only talked to Bill because Sue hates him.

Suppose we chose (85c). We would have the same problem: the proposition that *only* takes as its argument, that John talked to Bill, is not a member of the antecedent for C, (85c). So (83) would only be true if all the members of (85c) are false, which is, again, incompatible with the assertion that John only talked to Bill because Sue hates him.

Why can't we choose one of (85), e.g., (85a), as the antecedent for the argumental variable of C of *only*, and another one of those questions, e.g., (85b), for the antecedent

²⁷ Recall that we are interested in readings in which the *because*-clause takes scope over *only*.

In the Rooth/von Fintel framework, this role is due to the fact that the focus and domain variables must find an antecedent in the discourse. Since that antecedent is restricted by the \sim -operator, not any preceding discourse will do. Is this virtue of the analysis in Rooth/von Fintel a virtue of the present analysis as well?

(86a)-(86b), as we know, receives a straightforward analysis here. (86a)-(86c) is also explained. The context for (86c) contains the following implicit question:

(87) What thing/meal is such that John only invited Mary for that thing/meal?

(86a) must now be the antecedent for the argumental variable of C of *only* in (87) and (86c). But (87) would be odd with that antecedent:

(88) What thing/meal is such that, if a member of the set of propositions of the form *John invited x for dinner* is true, it's the proposition that John invited Mary for that thing/meal?

One member of the set is the proposition that if a proposition of the form *John invited someone for dinner* is true, it's the proposition that he invited Mary for dinner. More specifically:

(89) $\forall q [q \in C \ \& \ q(w) \rightarrow q = \lambda w'. \text{John invited Mary for dinner in } w']$, for $C \subseteq \{\text{John invited Mary for dinner, John invited Bill for dinner, John invited Sue for dinner, ...}\}$

Another one is the proposition that if a proposition of the form *John invited someone for dinner* is true, it's the proposition that he invited Mary for lunch:

- (90) $\forall q [q \in C \ \& \ q(w) \rightarrow q = \lambda w'. \text{John invited Mary for lunch in } w']$, for $C \subseteq \{\text{John invited Mary for dinner, John invited Bill for dinner, John invited Sue for dinner, ...}\}$

The proposition that John invited Mary for lunch is not a member of C , since that set contains propositions that are of the form *John invited x for dinner* (recall §3.4.2).

In this section I want to consider further the issue of objects that are already part of the discourse (that is, explicit questions). I argue that Rooth's (1992) improvement with respect to (86) cannot be maintained once we look at such cases.

As we have seen, this framework allows us to say that the antecedent for the argumental variable of the C of *only* is an object in the preceding discourse. This is as it should be, given the anaphoric properties of the variable. One of the results of adopting this theory is that *only* is not an item that obligatorily associates with focus. We get that impression from the examples that we have looked at so far because in those cases the reconstructed question that ended up anteceding the argumental variable of C was very much related, in a sense, to the question reconstructed with the help of focus (that is, congruence)²⁸. So we should now look at examples where a question in the context is not so related to the question we determine on the basis of focus. Consider the following example (adapted from Roberts (1996/1998); I have numbered the three occurrences of *only* in this example for ease of reference)²⁹:

²⁸ That is, the questions *who did John invite for dinner?* and *which person is such that John only invited that person for dinner?* are very similar.

²⁹ The example is attributed to Nirit Kadmon (p.c.). A similar argument is made in Roberts (1995).

- (91) [Speakers A and B are talking about the things they were afraid John might have done yesterday: stain the tablecloth during lunch, smoke before dinner, invite Lyn for dinner and invite Bill for dinner]
 A: John wasn't so bad after all. Of all the things we were afraid he might do, he only₁ [invited Lyn for dinner]_F -
 B: You've got the wrong person: he only₂ invited [Bill]_F for dinner. But it's true that he only₃ did one of those terrible things we were afraid he might do.

What is crucial in (91) is the value of the argumental variable associated with *only*₂. Roberts claims that *only*₂ does not associate with the focus on *Bill*; rather, the meaning of the sentence containing *only*₂ is that if a proposition from the set {John stained the tablecloth during lunch, John smoked before dinner, John invited Lyn for dinner and John invited Bill for dinner} is true, then it's the proposition that John invited Bill for dinner (with the presupposition that John invited Bill for dinner) (i.e., John invited Bill for dinner and did nothing else; notice that this is also the domain of *only*₁). Crucially, if *only*₂ associated with focus, the value for the argumental variable of its C would be a subset of the set of propositions of the form *John invited x for dinner*. But this does not result in a reading for the sentence containing *only*₂.

In the proposal I have made here, this follows straightforwardly: the question *what did John do?* (i.e., the set of propositions containing *John stained the tablecloth during lunch, John smoked before dinner, John invited Lyn for dinner and John invited Bill for dinner*) is an object in the preceding discourse³⁰. The argumental variable of C is a pronoun, and it behaves as such.

³⁰ I take it that mentioning the members of the denotation of a question counts as having that question as part of the context. The question could also be asked explicitly, as in the following modification of (91):

- (i) D: What did John do yesterday? I am so afraid he might have smoked during dinner, or that he might have invited Bill for dinner, or Lyn. Or, worse still, he might have stained the tablecloth during lunch!

But we should ask and answer a number of questions about (91) before we take it to show this³¹. First: can we be sure that the focus in the sentence containing *only*₂ is really just on *Bill*? Given the rules of focus projection (cf. Selkirk (1996) and references cited there; see also Schwarzschild (1999, §1)), it is possible that the feature F of *Bill* projects all the way up to the VP (i.e., the focus feature can project from the internal argument of V to V, and from V to VP). But if it is VP that gets interpreted in the semantics as focus, then *only*₂ does associate with focus after all. If so, (91) doesn't show that salient questions are special.

Secondly, can we be sure that the interpretation of the sentence containing *only*₂ is what Roberts suggests, provided above? Notice in this respect the function of the last sentence in B's contribution (the one that contains *only*₃): it is compatible with the interpretation of the sentence containing *only*₂ suggested above (because John did only one of the four things they were afraid he might do). We should take this as an indication that the interpretation for the sentence containing *only*₂ suggested above is possible. However, in order to be sure, it should be the case that B's continuation is compatible with no other interpretation for the *only*₂-sentence. This is not the case: if the *only*₂-sentence was interpreted with the antecedent of the argumental variable of the C of *only*₂ being the set containing just the propositions *John invited Lyn for dinner* and *John invited Bill for dinner*, B's continuation would still be appropriate (because John did only one of these two things).

A: Don't worry: he wasn't so bad afterall. Of all the things we were afraid he might do, he only₁ [invited Lyn for dinner]_F

B: You've got the wrong person: he only₂ invited [Bill]_F for dinner. But it's true that he only₃ did one of those terrible things we were afraid he might do.

³¹ Thanks to Daniel Büring (p.c.) for pointing out some of these problems to me.

One way to change the example so that it is not subject to the first of these criticisms is to put focus on an item from which it is clear that it cannot project. Consider (92):

- (92) [Speakers A and B are talking about the things they were afraid John might have done yesterday: stain the tablecloth during lunch, smoke before dinner, invite Peter's older brother for dinner and invite Peter's younger brother for dinner]
 A: John wasn't so bad after all. Of all the things we were afraid he might do, he only₁ [invited Peter's older brother for dinner]_F
 B: You've got the wrong person: he only₂ invited Peter's [younger]_F brother for dinner. But it's true that he only₃ did one of those terrible things we were afraid he might do.

Focus cannot project from the prenominal adjective *younger* to nodes higher than the AP containing it. Thus, we control for the interfering factor that focus might project up to the VP *invited Peter's younger brother for dinner*. Crucially, the value for the argumental variable of the C of *only*₂ is still the question *what did John do?* (i.e., the meaning of the *only*₂-sentence in (92) is "if a proposition from the set of propositions {John stained the tablecloth during lunch, John smoked before dinner, John invited Peter's older brother for dinner and John invited Peter's younger brother for dinner} is true, then it's the proposition that John invited Peter's younger brother for dinner" (with the presupposition that John invited Peter's younger brother for dinner); so: John invited Peter's younger brother and did nothing else).

In order to address the second worry, let us modify (92) slightly. The modification involves making the last sentence in B's contribution such that it is only compatible with the wrong interpretation for the *only*₂-sentence (i.e., "if a proposition from the set {John invited Peter's older brother for dinner, John invited Peter's younger brother for dinner}

is true, then it's the proposition that John invited Peter's younger brother for dinner"). In this case, the example should not be felicitous. And it isn't³²:

- (93) [Speakers A and B are talking about the things they were afraid John might have done yesterday: stain the tablecloth during lunch, smoke before dinner, invite Peter's older brother for dinner and invite Peter's younger brother for dinner]
 A: John wasn't so bad after all. Of all the things we were afraid he might do, he only₁ [invited Peter's older brother for dinner]_F
 #B: You've got the wrong person: he only₂ invited Peter's [younger]_F brother for dinner. *But I'm so glad that he ended up doing only₃ half of these things. Inviting two people would have been too much.*

Notice that it should be possible to refer back to the members of the set that serves as the value of C with *these things*, just as it is possible to do so with *those terrible things we were afraid he might do* in (91). If the value for the argumental variable of the C of *only*₂ could be the set containing the propositions *John invited Peter's older brother for dinner* and *John invited Peter's younger brother for dinner* only, then B's continuation ("I'm so glad that he ended up doing only₃ half of these things. Inviting two people would have been too much.") would be felicitous: out of those two things, it is true he did only half (i.e., one).

If, on the other hand, the argumental variable of the C of *only*₂ gets the set containing the propositions *John stained the tablecloth during lunch*, *John smoked before dinner*, *John invited Lyn for dinner* and *John invited Bill for dinner* as its value, then we can explain that the B continuation in (93) is not felicitous: John didn't do one out of two things (i.e., half), but one out of four, which is not half.

³² Thanks to Klaus Abels and Yael Sharvit for discussing this example at length with me.

Finally, let us modify (92) so that B's continuation is only compatible with the right meaning of the *only*₂-sentence. The resulting discourse should be felicitous, which it is:

- (94) [Speakers A and B are talking about the things they were afraid John might have done yesterday: stain the tablecloth during lunch, smoke before dinner, invite Peter's older brother for dinner and invite Peter's younger brother for dinner]
 A: John wasn't so bad after all. Of all the things we were afraid he might do, he *only*₁ [invited Peter's older brother for dinner]_F
 B: You've got the wrong person: he *only*₂ invited Peter's [younger]_F brother for dinner. *But it's true that he only*₃ *did one of those four terrible things we were afraid he might do.*

Thus, examples like (91), modified in the manner we have done here, do suggest that the theory presented here is on the right track³³.

Notice the difficulty that this example poses for an account of association with focus that relies on something like (3) (e.g., Rooth (1985)): that account predicts

³³ Partee (1991) and Rooth (1996) deal with examples that pose problems similar to that in (92) by claiming that there is an additional, secondary focus in the sentence in question. For example:

- (i) a. Speaker A: Eva *only* gave xerox copies to [the graduate students]_F
 b. Speaker B: (No.) [Petr]_F *only* gave xerox copies to the graduate students

In (ib), focus is on *Petr*, which is outside the scope of *only*; yet, (ib) means that Petr (and not Eva) gave xerox copies to the graduate students and to nobody else. The idea is that the conclusion that the domain of *only* can be established independently of focus (i.e., independently of (3)) is not warranted: if there is secondary focus on *the graduate students* in (ib), then the domain of *only* can still be determined by something like (3) (see von Stechow (1994: 43-8) for further discussion of cases like these).

Notice that (92) is different from (i). A Partee-Rooth analysis of this example would look as follows:

- (ii) ...he *only*₂ [invited Peter's [younger]_{F1} brother for dinner]_{F2}...,

where primary focus is indicated with 'F1' and secondary focus with 'F2'. For their solution to work in this case, the postulated secondary focus inside the VP (in *brother*, or in *dinner*) would have to project to include the primary focus on *younger*. We know that it is possible to have multiple foci, but, is it possible to embed a primary focus in a secondary focus? On top of that, this solution would have to say that in cases like (ii), *only* associates with the secondary focus, and crucially not with the primary one.

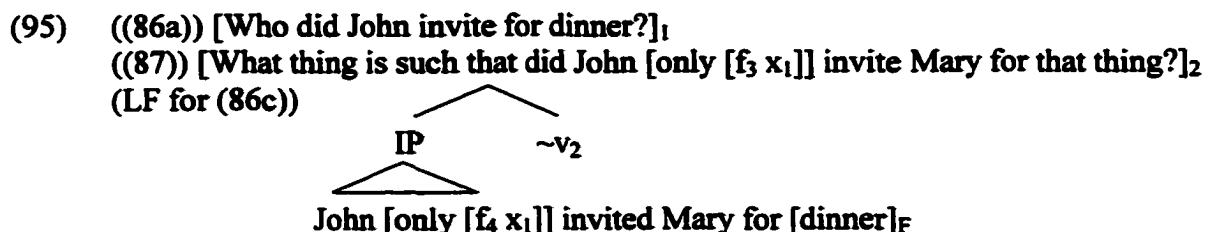
association of focus with *only* to be obligatory, even in (91). Such accounts both undergenerate and overgenerate in (91), since they do not predict a reading that exists and at the same time they predict a reading that does not exist.

Rooth (1992)/von Stechow (1994, 1995), in order to make the right predictions about the example, has to block the derivation in which the argumental variable of the C of *only*₂ and the focus anaphor are not coindexed. If the two anaphors were coindexed, then the reading that would be predicted is the non-existent one. For the existent reading to be predicted, they have to be able to find different antecedents. This is not difficult to state in this framework: the right predictions are made if the antecedent for the argumental variable of C is a salient object in the preceding discourse (so: an explicit object in the context takes precedence over the FIP-determined antecedent). Something like this is, of course, what we have been saying here all along. This does not, in itself, suggest that Rooth/von Stechow is wrong, but this is another instance in which something must be added to their theory that in the framework presented here actually does (part of) the work that the FIP does.

But here is a deeper concern: Rooth/von Stechow now has a problem with (86a)-(86c). Because in order to account for (92)-(94), Rooth/von Stechow must say that an explicit question takes precedence over the FIP, the explanation of (86a)-(86c) must be different. Recall that Rooth/von Stechow explained the infelicitous (86a)-(86c) as a violation of the FIP: the denotation of the question in (86a) has to be a subset of the focus semantic value of *John invited Mary for [dinner]_F* (from (86c)), and it isn't. However, if Rooth/von Stechow need the claim that the antecedent for the argumental variable of the C of *only* in (92)-(94) is the explicit question, why can't that same claim be made here? In

that case, just as above, the question in (86a) would be the antecedent for the argumental variable of the C of *only* in (86c). There must be another explanation of the infelicity of (86a)-(86c).

Rooth/von Fintel can also use (87) to explain the oddness of (86a)-(86c). Suppose the \sim -operator is attached high:



The antecedent for the two argumental variables is the same, the question in (86a). This is because (86a) is an explicitly mentioned question, and these take precedence over the FIP as antecedents for contextual variables. The FIP is satisfied because the focus variable is coindexed with the question in (87). The explanation for the oddness can be the same one defended for our framework: there is something wrong with the meaning (87) gets here (i.e., (88)).

Notice, however, that a crucial ingredient in this explanation is the high attachment of the \sim -operator; it is because of this that we can use the question in (87) as the source of infelicity. Since in this framework, the \sim -operator can be attached anywhere, there must be reasons why attachments other than the one in (95) are disallowed. That is, other attachments will not allow us to use the question in (87), so something else must rule them out. So, while Rooth/von Fintel can use the same explanation that I have proposed above, it must be accompanied by auxiliary

explanations³⁴. In our framework, however, it is enough with one. We can take this as an argument that the freedom of attachment of the \sim -operator has unwanted consequences.

3.4.5 Remaining issues

I consider two kinds of problems in this section. The first one is related to the use that the present proposal makes of implicit questions. I suggest that one way to solve this problem (at least, partially) is to let maximal informativity do more than it does so far. So I raise the question of how broad the scope of the principle is for a second time (recall §3.4.2.3). Since maximal informativity is allowed to do more work than we have put it to so far, we can say that maximal informativity is not needed only in the account of association with focus. The second problem is related to a class of examples that are problematic not only for the present proposal but for Roberts' theory as a whole. I will discuss a possible line of solution but I will not reach definitive conclusions.

Consider (5a)-(5c) again, repeated here:

³⁴ Suppose the \sim -operator is attached below *only*. What rules the exchange out? Here is a solution that will not work (based on a remark by Nirit Kadmon (p.c.)). The antecedent for the argumental variable of C is the previously mentioned question in (86a). The question *what did John invite Mary for?* can be used to satisfy the FIP. What is wrong with the example is that there is a violation of the maxim of Quantity, since (86c) (which is interpreted as "John invited Mary and nobody else for dinner") provides too much information about the question *what did John invite Mary for?* The problem is that this explanation predicts that, if it is clear that the additional information is welcome, (86a)-(86c) should improve, but this is not the case:

- (i)
 - a. Speaker A: Who did John invite for dinner?
 - b. #Speaker B: John is not such a nice guy: he only invited Mary for [dinner]_F, leaving Peter and John without a decent meal

In (i), the extra information helps to understand why speaker B thinks that John is not such a nice guy.

- (96) A: Who did John invite for dinner?
 #B: He invited Mary for [dinner]_F

(96) is a problem for our proposal, in that there is an analysis of this example in which none of the principles we have so far is violated, and hence the exchange is predicted to be well-formed. Let us first consider a derivation in which (96A) is the last(QUD). If that is so, then congruence is violated. But if we allow implicit questions, as we have in the analysis of association with focus, then we also have to consider a derivation in which (96A) is actually *not* last(QUD), but, for example, next-to-last(QUD). Suppose that, in this derivation, last(QUD) is *what did John invite Mary for?* Congruence is then not violated because the ordinary semantic value of this question is a subset of the focus semantic value of (96B). Furthermore, *what did John invite Mary for?* is relevant to (96A). What blocks this derivation?

I propose that a simple change in what we understand “reconstructed context” to be can do the work of blocking this problematic derivation. Suppose that we understand a reconstructed context to be that non-explicit context which either precedes or follows a move in the discourse (up to now, we have understood it to be non-explicit context preceding assertions). If we do that, maximal informativity ((70)) can prevent the problematic derivation. The principle is repeated here for convenience:

- (97) (= (70)) Maximal informativity: given two questions Q_1 and Q_2 , Q_1 is part of the reconstructed context of Q_2 iff any complete answer to Q_2 is a complete answer to Q_1

We take Q_1 to be the question *what did John invite Mary for?* and Q_2 to be the question in (96A). Then the question *what did John invite Mary for?* is not part of the reconstructed context of (96A) because not any complete answer to (96A) is a complete answer to it: e.g., John invited Mary and nobody else for dinner is not a complete answer to it (i.e., we still wouldn't know if John invited Mary for lunch). So the problematic derivation of (96) is blocked because the question that it makes use of (*what did John invite Mary for?*) cannot be made use of: it does not belong to the reconstructed context of (96A).

We should now ask: do (86a)-(86b), repeated here, still comply with maximal informativity?

- (98) a. Speaker A: Who did John invite for dinner?
 b. Speaker B: John only invited [Mary]_F for dinner

More specifically, is maximal informativity observed when Q_1 is (98a) and Q_2 is the *only-question* (*which person is such that John only invited that person for dinner?*). A complete answer to (98a) could be the proposition that John invited Mary and nobody else for dinner. This is a complete answer to *which person is such that John only invited that person for dinner?*, no matter how the domain of the *only* in this question is understood. Consider another complete answer to (98a), such as the proposition that John invited Mary, Peter and nobody else for dinner; this also constitutes a complete answer to the *only-question*, on any interpretation.

But let us consider the following example:

- (99) A: What did John drive last year?
 #B: He drove Mary's [blue]_F convertible

Maximal informativity, even when "reconstructed context" is understood more broadly, predicts (99) to be felicitous. Any complete answer to (99A) is a complete answer to *which one of Mary's convertibles did John drive last year?*, the question (99B) is congruent to. Thus, this question can be part of the reconstructed context of (99A). In order to see what is needed, consider (100), an example from Schwarzschild (1999):

- (100) A: John drove Mary's red convertible. What did he drive before that?
 B: He drove Mary's [blue]_F convertible

(100) suggests that explicit context plays a role in licensing implicit questions. It seems that (something about, where I remain vague about exactly what this means) the implicit question must have been considered in prior explicit discourse. This is what goes wrong in (99); while the exchange satisfies maximal informativity, even when it is understood as a complete requirement, nothing about the implicit question *which one of Mary's convertibles did John drive last year?* has been considered in prior explicit discourse. The new constraint should, I think, be a reformulation of Schwarzschild's (1999) GIVENNESS constraint, but I leave specific details about it for future research.

So the picture that emerges is this. A constraint, maximal informativity, rules out (96). (99) and (100) both comply with this constraint, but only in (100) is something about the implicit question considered in prior explicit discourse. (98) abides by maximal

informativity. Notice that we are justified in using two different constraints to deal with (96) and (99)/(100); explicit context is of no help in (96):

- (101) A: John invited Mary for lunch. Who did he invite for dinner?
 #B: He invited Mary for [dinner]_F

Maximal informativity correctly predicts (101) to be infelicitous.

It is clear that further research on the licensing of implicit questions is needed. While I do not pursue this line further here, I hope to have convinced the reader that there are important and interesting questions to be dealt with in this area.

On to the second problem. Examples such as (102) are potential problems for the proposal I have made here, and for Roberts' proposal as a whole (though, they follow naturally in the Rooth/von Stechow framework). Capitals indicating phonological prominence:

- (102) a. An AMERICAN farmer was talking to a CANADIAN farmer...
 b. An [American]_F farmer was talking to a [Canadian]_F farmer...

Here is what Roberts (1996/1998) thinks the problem is. The property of (102a) that we want to account for is that it doesn't seem to require anything in particular from the context, that is, it doesn't presuppose any particular question. In Rooth/von Stechow, the focus is interpreted internally to the clause. The antecedent for the focus variable of *American* is found in the NP *a Canadian farmer*, and the antecedent for the focus variable of *Canadian* is found in the NP *an American farmer*. The focus variables don't

have to find an antecedent in any preceding context; thus, correctly, nothing is required of the context. In Roberts' framework and hence in mine, given congruence and (102b), the example is predicted to presuppose the following question:

(103) What kind of farmer was talking with what kind of farmer?

Roberts (1996/1998: 126) suggests that the "crude impressionistic transcription" in (102a) and the analysis in (102b) are incorrect; the first *farmer* and *talking* are also accented. (104) is the more appropriate transcription:

(104) An AMERICAN FARMER was TALKING to a CANADIAN farmer...

(105) is a better rendering than (102b) then; (105) is congruent to (106):

(105) [An American farmer]_F was [talking to a Canadian farmer]_F ...

(106) Who was doing what?

The idea is that (105) still makes demands in the context, but the demands that it makes are very general: it is an answer to a question as broad as (106). Roberts suggests that this is the source of the intuition that the sentence does not presuppose anything. Note that the analysis in (102b) is possible, but the sentence has to then be understood as an answer to a question like (103). I am not sure this accounts for all the properties of the example,

however: where does the perceived contrast between *American* and *Canadian* come from? I think that (102) is still a problem.

3.4.6 Summary of §3.4

In this section I have proposed a way to reconstruct questions for sentences with focus. I have suggested that *only* associates with focus in many cases because the antecedent for the argumental variable of its C is a focus-related reconstructed question. Because the antecedent for this variable is whatever is salient, there are cases where *only* does not associate with focus. The analysis makes crucial use of a principle of maximal informativity.

I have argued that there are two problems in the Rooth/von Fintel framework that are solved in the present analysis. First, the right predictions are made with respect to denial exchanges where the denial contains an *only*. I argued that it is possible to supplement the FIP with the machinery that allows us to explain the properties of the examples but that this makes the FIP superfluous. Second, example (86) receives a natural explanation in the present framework. We considered examples that show that von Fintel's explanation of the infelicity of (86a)-(86c) is no longer tenable. In fact, while the FIP can be supplemented with it in order to make the right predictions, Rooth/von Fintel now need ways to rule out derivations where the \sim -operator is attached low.

3.5 Presuppositional effects of focus

In this section I propose an analysis of the effects that focus has on the presuppositions of *even* and *also*. The analysis provided for *only* in the previous section mostly carries through for *even* and *also*, but it is necessary to discuss these cases for two reasons. First, the analysis of focus effects in the previous section, if it is to have any generality at all, should be extendable (ideally, without having to introduce stipulations) to other focus-sensitive particles. Second, while this is possible, there are some differences that deserve mentioning. Here are some assumptions^{35, 36}:

(107) John even invited [Mary]_F for dinner

(108) $[[\text{even}]]^g = \lambda C \lambda p: \exists q [q \in C \ \& \ q \neq p \ \& \ q(w)] \ \& \ \forall r [r \in C \ \& \ r \neq p] \rightarrow r \text{ is more likely than } p.$

(109) John also invited [Mary]_F for dinner

(110) $[[\text{also}]]^g = \lambda C \lambda p: \exists q [q \in C \ \& \ q \neq p \ \& \ q(w)]. p$

Even and *also* do not affect the truth-conditions of the sentence, but they add presuppositions. These presuppositions are affected by focus. For example, (107) asserts that John invited Mary for dinner and presupposes that there is another person that John

³⁵ I am following Karttunen and Peters (1979), von Stechow (1994: 134, 1995), Rooth (1985: 120, 1996), Wilkinson (1996), among others, in that *even* does not affect truth-conditions but merely induces a presupposition/conventional implicature. Klaus Abels (p.c.) points out that Krifka (1995: 227) seems to have something else in mind: for him, what I call the presuppositions of *even* are part of the assertion (i.e., induced by an assertion operator).

invited for dinner, and that Mary is the least likely person to be invited by John for dinner. C in (108) is part of the presuppositional meaning of *even*, and is of course the key to the focus effect (as before with *only*). *Also* is like *even* in that the truth-conditions of the sentence are not affected, so that the truth-conditions of (109) are the same as those of (107). (109) presupposes that somebody other than Mary was invited for dinner by John.

In this section I illustrate the workings of the theory proposed here with *also*; the results carry over to *even* (where we have to consider additional presuppositions, of course).

The question (109) is congruent to is (111):

(111) Who is the person such that John also invited that person for dinner?

We need to ask whether the question in (111) is an acceptable antecedent for the argumental variable of the C of *also* in (109). The problem with this, as we know, is that the search for an antecedent would not be over then: another argumental variable, the one that comes with the C of *also* in (111), needs to find an antecedent now. This time, however, there is nothing wrong with the meaning we would obtain for (109). (112) is the presupposition we would obtain for (109):

(112) $\exists q[q \in C \ \& \ q \neq \text{John invited Mary for dinner} \ \& \ q(w)]$, for $C \subseteq \{\text{that John also invited Mary for dinner, that John also invited Peter for dinner, that John also invited Tom for dinner...}\}$

³⁶ For remarks on *also*, see Rooth (1996). For both *also* and *even*, I assume that they take propositional

That is: there is a proposition from the set of propositions of the form *John also invited x for dinner* which is not the proposition that John invited Mary for dinner and which is true. Such a proposition is easy to find; for example, the proposition that John also invited Peter for dinner. The lesson that we learn is this: it might not always be possible to reject the congruent question as the antecedent for C on the grounds of non-contingent truth-conditions/presuppositions, but the problem of finding an antecedent for the argumental variable of the second C (i.e., the C in the congruent question), is always there.

So, again, we keep searching for an antecedent and we look at the questions the congruent question is relevant to. These are in (113) (recall (66)):

- (113) a. Who did John invite for dinner?
 b. What did John invite Mary for?
 c. What did John do?

Using the principle of maximal informativity ((70), (97)), the question that gets selected as implicit is (113a). How this comes about is very similar to the earlier case of *only*. Some complete answers for (111) are in (114); they vary on what the antecedent for the argumental variable of the C of *also* is:

- (114) a. John invited Peter, Mary and nobody else for dinner (presupposition: John invited someone other than Peter, Mary, etc. for dinner)
 b. John invited Peter, Mary and nobody else for dinner (presupposition: John invited Mary for something other than dinner)
 c. John invited Peter, Mary and nobody else for dinner (presupposition: John did something other than invite people for dinner)

arguments, just as for *only*.

Taking the value for the argumental variable of *C* to be the set of propositions of the form *John invited x for dinner*, a possible complete answer is (114a). In this answer, it is true that John also invited Mary for dinner (with the presupposition that someone other than Mary was invited), and it is true that John also invited Peter for dinner (with the presupposition that someone other than Peter was invited). No other member of the denotation of the question is true. In sum: John invited Peter, Mary and nobody else for dinner, with the presupposition that Mary was not the only one and Peter was not the only one (i.e., there was more than one guest).

With the value of the argumental variable of *C* set to be the set of propositions of the form *John invited Mary for something*, a possible complete answer is (114b). Here it is true that John also invited Mary for dinner (with the presupposition that John invited Mary for something other than dinner) and that John also invited Peter for dinner (with the presupposition that John invited Mary for something). No other member of the denotation of the question is true.

Finally, in (114c), the value for the argumental variable of *C* is the set of propositions of the form *John X-ed*. Here, it is true that John also invited Mary for dinner (with the presupposition that John did something other than invite Mary for dinner) and that John also invited Peter for dinner (with the presupposition that John did something other than invite Peter for dinner). No other member of the denotation of the question is true.

Notice that if, for example, it is true that John also invited Mary for dinner, then there must be a proposition in *C* that is different from the proposition that John invited Mary for dinner that is also true. If it is false that John also invited Sue for dinner, then

John didn't invite Sue for dinner, and it is presupposed that a proposition different from the proposition that John invited Sue for dinner is true³⁷.

How much information do we have about the questions in (113)? Figure 5 summarizes the answer this question:

	(113a)	(113b)	(113c)
(114a)	Yes	No	No
(114b)	Yes	No	No
(114c)	Yes	No	No

Figure 5: Complete answers (*also*)

Figure 5 is more dramatic than Figure 2, Figure 3 or Figure 4: in the case of *also*, the only question there is ever a complete answer to is (113a). The principle of maximal informativity then chooses this question as the implicit question for the context of (109), and hence that is also the antecedent for the argumental variable of the C of *also* (in both (109) and (111)). The right presupposition is derived^{38, 39}.

Given this, consider (115):

³⁷ I am here following Heim (1983) in that there is a preference for global accommodation of presuppositions. If so, then negating a sentence with *also*, by assumption, negates only its truth-conditions.

³⁸ Even though none of (114) are complete answers to (113b) or (113c), all of (114) partial answers to them.

³⁹ The following issue arises. There is nothing truly wrong with the meaning that we obtain for (109) if (111) is the antecedent for the argumental variable of its C; what happens is that the variable of (111) needs an antecedent. Now, is it possible to have (111) as the antecedent for the argumental variable of the C of (109) and (113a) as the antecedent for the variable of (111)? This is indeed a possibility. I think that, probably, the meaning that results for (109) in this derivation is equivalent to the meaning obtained in the derivation in which (113a) is the antecedent for the argumental variable of both Cs.

- (115) a. (= (113a)) A: Who did John invite for dinner?
 b. B: #John also/even invited [Mary]_F for dinner

Putting together the question we reconstruct as part of the implicit context for (109), (113a), and (109) results in (115). Why is (115) odd? Is this a problem for the analysis?

I suggest that (115) is not felicitous because speaker B violates the Gricean Maxim of Quantity, in fact s/he does so explicitly. *Also* (and *even*) presupposes that some other proposition in addition to the proposition it takes as its argument (in this case, that John invited Mary for dinner) is true. B in (115) then implies that this is the case, and so it is fair to assume that B knows what other proposition is true. However, s/he is not informing A of what that other proposition is, so s/he is not providing as much information as s/he can, violating the principle of cooperation. If, on the other hand, B provides that additional information, as in (116), or clarifies that s/he knows that someone other than Mary was invited but s/he doesn't know who, as in (117), the exchange between A and B becomes felicitous:

- (116) a. Speaker A: Who did John invite for dinner?
 b. Speaker B: He invited [Peter]_F for dinner. Ah, and he also invited [Mary]_F for dinner
- (117) a. Speaker A: Who did John invite for dinner?
 b. Speaker B: I know that he invited [someone from his sports club]_F but I don't know who, and that he even invited [Mary]_F for dinner

So, in all of (115), (116) and (117), the value of the argumental variable of the C of *also* is the A question because that is what is salient in the discourse, and (115) is not felicitous because B is explicitly withholding information, thus being uncooperative.

What does this mean? It means that it is possible to maintain that the question in (113a) is part of the implicit context of (109) (and (107)). When speakers reconstruct implicit contexts with *also* and *even*, they reconstruct (113a) as part of the implicit context; in addition, the implicit context must be otherwise felicitous. “Otherwise” in this particular case means that the implicit context must make certain additional information available.

3.6 Review of other analyses I

In this section I discuss two other analyses of association with focus which share with the one presented their heavy pragmatic basis. I ask where these analyses stand with respect to the conceptual problems discussed in relation to the constraint in (3), whether they predict obligatory association of *only* with focus in the right cases, and whether they have other empirical/conceptual problems. Rooth (1992)/von Stechow (1994, 1995), though also pragmatically-based (to a lesser extent than ours or the ones discussed in this section), is not discussed again here. §4.4 in the next chapter continues the critical evaluation of other proposals that I start here.

3.6.1 Schwarzschild (1997)

Schwarzschild proposes an analysis of the fact that *only* associates with focus in (82a)-(82b) that is easily extendable to association in (86a)-(86b) (cf. Kadmon (2001)). The examples are repeated here:

- (118) a. Speaker A: Sally taught semantics last year
 b. Speaker B: No, Sally only taught [syntax]_F last year
- (119) a. Speaker A: Who did John invite for dinner?
 b. Speaker B: John only invited [Mary]_F for dinner

The analysis, however, comes at the cost of introducing a stipulation about the content of focus semantic values.

Schwarzschild suggests that the FSV of (118b) contains not only propositions of the form *Sally only taught x last year*, but also propositions of the form *Sally taught x last year*; likewise, the FSV of (119b) contains not only propositions of the form *John only invited x for dinner*, but also propositions of the form *John invited x for dinner*. The denotation of (118a) is a member of the former set, the denotation of the question in (119a) is a subset of the latter set. Thus, the two discourses would comply with principles of information structure: a principle accounting for target-denial pairs, which says that a target of denial must be a member of the FSV of the denial ((118)), and congruence ((119)).

Let me illustrate how this works with (119). The FSV of (119b) contains propositions of the form *John invited x for dinner only if association with focus happens in (119b)*, FSVs are closed under disjunction, and the domain of individuals contains groups as well as atomic individuals. So only if that is the domain of *only* (and the other two assumptions hold) can congruence be satisfied.

A set is closed under disjunction when, for any two members a, b of the set, there is a third element in the set c such that $a \vee b = c$ (Partee et al. (1993: 247)). That is, the result of applying the operation of disjunction to two members of the set is also in the set.

Let us look at the standard FSV of (119b), in (120)⁴⁰:

- (120) $[[[(119b)]]]^f = \{\text{John only invited Mary for dinner, John only invited Tom for dinner, John only invited Mary and Tom for dinner, ...}\}$

Schwarzschild's idea is that only if the domain of *only* is the set of propositions of the form *John invited x for dinner* can propositions like *John invited Mary for dinner* be members of the closed-under-disjunction-version of (120). Here is why. If (120) is closed under disjunction, it means that the following is also a member of it:

- (121) John only invited Mary for dinner \vee John only invited Mary and Tom for dinner

If the domain of *only* here is the set of propositions of the form *John invited x for dinner*, then (121) is equivalent to (122):

- (122) John invited Mary and nobody else for dinner \vee John invited Mary and Tom and nobody else for dinner

(122) is equivalent to *John invited Mary for dinner*. This is because (122) entails that John invited Mary for dinner (if (122) is true, then it must be true that John invited Mary for dinner) and that John invited Mary for dinner entails (122) (if John invited Mary for dinner, then he invited her by herself or along with other people).

⁴⁰ I don't think that the assumption that the domain of individuals contains groups as well as atomic individuals is problematic; that is why I have adopted it in calculating (120).

What would happen if the domain of *only* in (121) was different, for example, the set of propositions of the form *John X-ed?* (121) would be equivalent to (123) in that case:

(123) John invited Mary for dinner and did nothing else \vee John invited Mary and Tom for dinner and did nothing else

(123) entails that John invited Mary for dinner (if (123) is true, then it follows that John invited Mary for dinner), but is not entailed by it. Suppose that, in addition to either inviting Mary for dinner or inviting Mary and Tom for dinner, the only other relevant thing for John to do was to provide rides for them. If John invited Mary for dinner, it doesn't follow that he either invited her by herself and didn't provide the rides or invited her along with others and didn't provide the rides.

Notice that no mention of constraints on the value of contextual variables is made in this analysis. In fact, the anaphoric properties of contextual variables themselves do not play a role in it. Schwarzschild thus manages to avoid the two conceptual problems that other theories run into. Furthermore, obligatory association with focus is indeed predicted in cases like (118) and (119).

A problem arises, however, with *also* and *even* in question-answer exchanges ((116), (117)). (124) and (125) are not equivalent, not even if the domain of *also* is the set of propositions of the form *John invited x for dinner*:

(124) John also invited Mary for dinner \vee John also invited Mary and Peter for dinner

(125) John invited Mary for dinner

(124) entails (125), but (125) does not entail (124). If (125) is not a member of the FSV of *John also invited [Mary]_F for dinner* in (116b) or *he even invited [Mary]_F for dinner* in (117b), congruence can never be satisfied:

(126) is also a problem for this proposal:

- (126) a. Speaker A: John invited Bill for dinner
 b. Speaker B: ...and he also/even invited [Mary]_F for dinner
 c. #Speaker B: ...and he also/even invited Mary for [dinner]_F

For the same reasons as above, the denotation of (126a) will never be a member of the FSV of (126b) (I assume that adding information in this fashion is subject to the same constraint denials are). Thus, Schwarzschild cannot distinguish between (126b) and (126c), and cannot predict the meaning that (126b) has. In my framework, however, the analysis of (126) is entirely parallel to that in (82).

The theory presented in this dissertation has more empirical coverage, then. And, although Schwarzschild does not run into the conceptual problems that have worried me, he still has to introduce the stipulation that FSVs are closed under disjunction. As opposed to this, some independent justification can be found for maximal informativity.

3.6.2 Roberts (1996/1998)

The account presented here shares with Roberts (and with Schwarzschild) its radical pragmatic approach. Of course, the principles of relevance and congruence I have used above I borrowed directly from Roberts, so the analysis presented here owes a lot to her work. And, in fact, she doesn't use anything like the principle in (3), so the advantage is that it avoids the conceptual problems that have worried us here, just like Schwarzschild. Yet, Roberts cannot predict the fact that association of *only* with focus is obligatory in (118) (which she does not discuss) or (119)⁴¹.

Let us start with (119). Roberts suggests that the question in (127) is relevant to the question in (119a) only if *only* associates with focus in (119b):

(127) Which person is such that John only invited that person for dinner? (= (62))

Recall that (127) is the question (119a) is congruent to. So the idea is that only if (119b) is interpreted as "John invited Mary and nobody else for dinner" (the focus-associated reading) are the principles of information structure, in particular, relevance, satisfied.

We know, however, that this is not true. Complete answers other than the one in which C is a subset of the set of propositions of the form *John invited x for dinner* are partial answers to (119a) (recall Figure 1 from §2.4.1). Furthermore, it is not true that only if (119b) is interpreted as "John invited Mary and nobody else for dinner" do we

⁴¹ Kadmon (2001: 349) also points out that Roberts' account of association of *only* does not predict its obligatory nature in (119).

have a complete answer to (119a) either (a possibility Roberts could consider): other interpretations for (119b) also yield complete answers to it.

What of (118)? Even if the analysis of (119) worked, Roberts would have a problem with (118), because the pragmatic relations she has in her system, congruence and relevance, are not operative in the desired way here. (118b) is congruent to the question in (128):

(128) What thing is such that Sally only taught that thing last year?

(128) must of course be relevant to some other question, and, as we know, there are a few questions it is relevant to (e.g., *what did Sally teach last year?*, *when did Sally teach syntax?*, *what did Sally do?*). (118a) would have to bear the relevance relation to that question too. But with several candidates for it, Roberts cannot predict the fact that association of *only* with focus is obligatory in (118b). She would need a way to ensure that the question *what did Sally teach last year?* is the chosen question, but unless she does something like what is proposed here, there is no way to choose to it.

Another possibility for Roberts would be to adopt Schwarzschild's (1997) explanation of association in (118). This would result, undesirably, in a different analysis for (118) and (119), with Schwarzschild's additional stipulations added to Roberts's system⁴².

In addition to (119), Roberts wants to account for the fact that a sentence like (119b) cannot be uttered out of the blue. She takes it to be the case that a sentence can be

uttered out of the blue when it does not impose requirements on the preceding discourse; that is, if a sentence can be an answer to as broad a question as *what happened?*, then we say that it doesn't require the preceding discourse to have any special properties. For (119b) to be uttered out of the blue, it would have to be an answer to this general question. But then, she says, (119b) would always be false, because it would end up meaning that John did nothing other than invite Mary for dinner (i.e., the domain of *only* would be the set of all propositions).

As opposed to this, in my framework, sentences like (119b) cannot be uttered out of the blue because their implicit contexts are too specific; that of (119b) demands that the issue of who John invited for dinner be under discussion. This explanation is couched within the view that only those sentences that do not make too specific demands on the context can be uttered out of the blue, a view Roberts herself spouses⁴³.

3.7 Conclusion to Chapter 3

In this chapter I have provided an analysis of association of particles like *only*, *even* and *also* with focus. The two basic questions the chapter addresses is what value the argumental variables of C in the lexical entries of these items have, and, more

⁴² Note that Roberts has these problems with *also* and *even* as well.

⁴³ Sentences like (119b) could be uttered out of the blue if there was a reason for assuming that such a question is under discussion. For example, suppose that speakers A and B have been having an ongoing discussion, stretching over several weeks, about who John invited for dinner on June 24th. I think it would then be possible for B to come into the room and say to A:

(i) You won't believe it: John *only* invited [Mary]_F for dinner

importantly, how they get the values that they get. The proposal accounted for both truth-conditional and presuppositional effects of focus.

It was important to not restrict the value of these variables via focus-determined constraints, for reasons that have to do both with the theory of anaphora and the theory of focus. The basis of the analysis is that their value is determined in the same way the value of other free variables is. In other words, the antecedent of the argumental variable of C is whatever is salient in the context. There are some constraints on what the antecedent of this variable is that come to us for free: for example, the antecedent has to be of the same semantic type as the argumental variable of C. Such a constraint is operative in the case of other free variables, such as pronouns. Also, the antecedent has to give rise to contingent truth-conditions; the assumption is that there is a preference in natural language for non-contradictory and non-tautological (i.e., informative) truth-conditions.

Much of the proposal has to do with building implicit contexts. This is where maximal informativity became relevant. With maximal informativity a single implicit QUD is identified. It is this implicit question that serves as the antecedent for the argumental variable of C.

The analysis presented here was compared with three others with which it shares much: Roberts (1996/1998), Rooth (1992)/von Stechow (1994, 1995), and Schwarzschild (1997). The four works rely heavily on pragmatic mechanisms (some more than others). The basic problem that we saw in Rooth/von Stechow is that the FIP must be supplemented with a proposal that does what mine does, but once that happens, the FIP becomes superfluous. Roberts can't explain obligatory association, and, while Schwarzschild can

This is expected: the demands of (i) are indeed fulfilled by the context on the ongoing discussion between A and B.

in some cases, it is only at the cost of adding a stipulation about the contents of focus semantic values.

Chapter 4 continues the discussion of free contextual variables and focus, but considers sentences with adverbs of quantification like *always*. Sentences with adverbs of quantification like *always* have a wider range of interpretations than do sentences with *only*, as shown by Cohen (1999) and Beaver and Clark (2001, 2002a, b). The framework of association with focus developed so far can account for this phenomenon.

Appendix: Strong and weak answers

In this appendix, I provide the definitions of strong and weak answer in Heim (1994), partial answer in Groenendijk and Stokhof (1984), and the subquestion relation built on them. The reason for doing this is that this alternative way of defining complete answerhood (Roberts' complete answers are Heim's strong answers) makes more explicit the role of world variables. Nothing deep is missed if this appendix is skipped.

Some definitions are in (129):

- (129) a. Question Q' is a subquestion of question Q iff $\exists w' \exists p [\text{Ans-Strg}(Q')(w') \rightarrow p \ \& \ p \text{ is a partial answer to } Q]$ (from Beck and Sharvit (2002))
 b. $\text{Ans-strg}(Q)(w) = \lambda w'. \text{Ans-wk}(Q)(w') = \text{Ans-wk}(Q)(w)$
 c. $\text{Ans-wk}(Q)(w) = \lambda w' \forall p [Q(w)(p) \ \& \ p(w) \rightarrow p(w')] = \lambda w'. w' \in \cap \{p: Q(w)(p) \ \& \ p(w)\}$
 (from Heim 1994; cf. Dayal 1996; Groenendijk and Stokhof 1984; Lahiri 1991)
 d. A proposition p is a partial answer to a question Q iff $\exists w' [\text{Ans-strg}(Q)(w') \cap p = \emptyset]$ (from Groenendijk and Stokhof 1984)

A subquestion is a question whose strongly exhaustive (ans-strg) answer provides a partial answer to some other question. The notion of strongly exhaustive answer is based on that of the weakly exhaustive answer (ans-wk). A weakly exhaustive answer is the conjunction of all true Hamblin answers (i.e., the intuitive complete answer). The strongly exhaustive answer is the complete answer plus the information that that is the complete answer to the question. A proposition is a partial answer to a question if it eliminates some uncertainty regarding the strongly exhaustive answer to the question⁴⁴.

Let us see how these definitions work with (56), repeated here:

- (130) a. Speaker A: Who did John invite for dinner? (=56))
 b. Speaker B: John invited [Mary]_F for dinner
 c. #Speaker B: John invited Mary for [dinner]_F

Suppose that John cooked dinner for friends yesterday. He invited Mary, Peter and Tony, and he invited nobody else. The weakly exhaustive answer in this case is that Mary, Peter and Tony were John's guests (i.e., the conjunction of all the true Hamblin answers). The strongly exhaustive answer is that Mary, Peter and Tony were John's only guests (i.e., the set of worlds in which the weakly exhaustive answer is what it is in the actual world). A partial answer to this question would be, e.g., the proposition that he invited Mary for dinner. This is because there is at least one world such that the strong answer to the question in that world (for example, John invited Peter and Tony, and nobody else) intersected with the set of worlds in which he invited Mary results in the empty set. That is, the proposition that John invited Mary for dinner eliminates some uncertainty about the strong answer to the question because the strong answer now cannot be that John invited Peter and Tony and nobody else for dinner. The proposition that (56b) denotes is precisely that John invited Mary for dinner. Thus, (56b) is relevant to the last question under discussion, (56a), and hence (56a)-(56b) is well-formed.

One respect in which Roberts' system is better than (129) is in that (55) includes the notion of contextual entailment. It is this notion that allows Roberts to account for the fact that, under the right circumstances, discourses like (48) can be felicitous. This notion would have to be incorporated to the system in (129).

⁴⁴ Notice that weakly and strongly exhaustive answers are themselves partial answers.

Chapter 4 Free Contextual Variables II

This chapter deals with sentences containing an adverb of quantification like *always* and a focus. Beaver and Clark (2001, 2002a and 2002b) and Cohen (1999) observe that the range of interpretation for sentences containing an adverb of quantification and a focus is wide. Roughly speaking, sentences with *always* have a presuppositional reading in addition to a focus reading. The question that I ask now is this: can the framework developed in Chapter 3 successfully account for how adverbs like *always* associate with focus?

It is in fact possible to account for the behavior of *always* in my framework. The focus reading of a sentence with an adverb of quantification follows for the most part in the same way it follows in a sentence with *only*: a QUD is reconstructed with the help of information-structure-related principles, where, as we know, focus plays an important role. An operation of generalized union on sets of propositions is assumed to be available, following Rooth (1985) and von Stechow (1994, 1995); this gives rise to a QUD-related set of situations or events. Thus, the antecedent for the argumental variable for the C of *always* is also a salient object. The focus-unrelated meaning is a reading where the restriction of these adverbs is a set of salient situations that are nevertheless unrelated to the focus-related QUD. Thus, the focus-unrelated meaning is also a meaning where the argumental variable for the C of *always* is anaphoric to a salient object. The goal of the chapter is to account for the facts while maintaining the theory of anaphora assumed in Chapter 1 as intact as possible. This is what needs to be done once one pursues the hypothesis that the argumental variable of C is a pronoun.

An important observation by Beaver and Clark (2001, 2002a, 2002b) is that *only* differs in a crucial respect from *always*: non-focus-related readings are not available for *only*. In the previous chapter I have proposed a theory where some room is left for items like *only* to associate with something other than focus (though we only predict *only* not to associate with focus in a very restricted set of cases, a prediction that seems to be right). While we do not agree with Beaver and Clark's description of the facts completely, we do agree with them in that sentences with *only* have less freedom of interpretation than sentences with *always*. In our framework, this difference between *always* and *only* follows from the semantic type of the argumental variable of their Cs: the variable of *only* is of the type of a set of propositions, and so it cannot be anaphoric to a set of situations. The variable of *always*, on the other hand, is assumed to be of the type of a set of situations. This means that the argumental variables of their Cs differ in what objects they can have as their value.

The consideration of how adverbs of quantification associate with focus thus serves to extend the system proposed in Chapter 3. This chapter can also be considered an answer to Beaver and Clark, who suggest that only a theory that differentiates *only* and *always* lexically, by making *only* lexically sensitive to focus and *always* lexically insensitive to focus, can account for the differences between *only* and *always*. I should say from the start, though, that there are differences between *only* and *always* other than the one discussed above that Beaver and Clark point out but that I will not be able to address; the goal here is to show that there are other, non-lexical theories that can hope to achieve the empirical coverage that theirs achieves.

Because certain properties of *only*-sentences are considered here and not in Chapter 3, Chapters 3 and 4 should be seen as a unit.

The organization of the chapter is as follows. §4.1 is the introduction. The goal of the chapter as well as the way we will reach it are discussed here; basic facts from Beaver and Clark (2001, 2002), as well as some others, are presented. §4.2 is the analysis of the facts related to adverbs of quantification. §4.3 explains why *only* is different from these other adverbs. §4.4 compares this analysis with other analyses in the literature, such as Beaver and Clark (2001, 2002), von Stechow (1994, 1995) and Rooth (1985). The theory in Geurts and van der Sandt (1997) is discussed here as well, as its goal is to account for the focus effects observed with *only* in terms of presupposition and we will be talking about presupposition in this chapter. §4.5 is the conclusion.

4.1 Introduction

In this section I introduce some basic data and provide a first approximation to the kind of analysis that I envision for them. Some other issues that are developed in more detail later, like a comparison between the analysis to be proposed here and other analyses, are briefly introduced as well.

As before, the issue we will be concentrating on is the domain of quantification of some item, in this case, *always*. There are at least three factors that can affect it. First, we have good evidence that adverbs of quantification are context-sensitive. Consider the following examples:

- (1) On sunny days, Ali worked in the garden. Jessie *generally* ran in the park
(Roberts (1995))
- (2) Most monkeys flee when leopards approach. Baboons *usually* form a protective circle with males on the outside - (Schubert and Pelletier 1989: 215)
- (3) [In a discussion about dogs at a pound]
Technically, if they're not claimed within seven days, then they should be put to sleep, but we *always* manage to get them rehomed
(Beaver and Clark 2001, 2002a)
- (4) Every Friday Sandy goes to town. She *always* realizes that the Harley Davidson she's riding there is going to attract a lot of attention.
(Beaver and Clark 2001, 2002a)
- (5) John is an excellent marksman. He *rarely* misses (Schubert and Pelletier (1989))

It is generally on sunny days that Jessie ran in the park ((1)). Baboons form a protective circle with males on the outside when leopards approach ((2)). Whenever dogs are at a pound, we manage to get them rehomed ((3)). Sandy's realization happens whenever she goes to town ((4)). Few cases¹ in which John fires a gun at something are cases in which he misses ((5)). These are readings in which the domain of quantification of the adverbs in question is affected by material presented in previous context.

In addition to being influenced by contextual factors as in (1)-(5), the domain of quantification of these adverbs can be affected by the presuppositions induced by items in the sentence. Consider the famous example by Schubert and Pelletier (1989)², where *land* induces the presupposition that cats are falling, and this information serves to restrict the

¹ In §4.2 I introduce quantification over situations for the adverbs, but for now I will keep the vaguer term "cases".

² One could also consider the example in (5) as a case where presuppositions induced by a lexical item, in this case *miss*, affect the domain of the adverb.

domain of quantification of *always* (the sentence means something like, “whenever cats fall, they land on their feet”):

- (6) Cats always land on their feet

Finally, the domain of adverbs of quantification can, of course, be affected by a focus in the sentence. Schubert and Pelletier note the example in (7), with focus on *trees*. A prominent reading of this sentence is that most cases in which leopards attack monkeys somewhere are cases in which they attack monkeys on trees:

- (7) Leopards usually attack monkeys in [trees]_F

Rooth (1985, 1996) and von Stechow (1994, 1995) discuss the examples in (8), where focus is claimed to have truth-conditional effects:

- (8) a. In Saint Petersburg, [officers]_F always escorted ballerinas
b. In Saint Petersburg, officers always escorted [ballerinas]_F

If opera singers escorted ballerinas in Saint Petersburg, (8a) is false but (8b) can still be true (as long as officers escorted ballerinas and nobody else). On the other hand, if officers escorted painters in Saint Petersburg, it is (8b) that is false, whereas (8a) can still be true (as long as ballerinas get escorted by officers and nobody else).

From a conceptual perspective, and from the perspective of language acquisition (recall discussion in §2.2.2), it would be best to account for these effects by using a

single, unifying principle (which might interact with other principles, of course). My claim is that this principle is (9):

- (9) The value of a free index is a salient object³

Notice that (9) is the same principle that I assumed in Chapters 1, 2 and 3 for the argumental variable of the C of items like *only*, *also* and *even*, as well as for the argumental variable of the C of items like *every* (for variables in general). In this chapter I extend its use to the argumental variable of the C of adverbs of quantification. The principle was motivated by observations about the behavior of other variables, such as pronouns:

- (10) John came into the room. *He* was wearing red pants.

Assuming a principle like (9) provides us with an immediate understanding of the examples in (1)-(5). For example, in (2), the idea is that the first sentence makes salient a set of cases in which leopards approach (by means of the *when*-clause, *when leopards approach*), and the argumental variable of the C of the adverb in the next sentence is anaphoric to this object, by (9). In (3), we can presume that the preceding context has made salient a set of cases in which dogs are at a pound, and the argumental variable of *always* in the last sentence is anaphoric to this object, by (9) as well. However, something

³ For certain cases I will also have to make use of an additional principle, the one whereby explicit objects are preferred over implicit or reconstructed ones. I used this principle to account for examples like (108) from Chapter 3.

must be added in order to account for the facts in (6)-(8), since there doesn't seem to be any contextual object to which C can be anaphoric in these other cases.

The crucial aspect of examples like (6), as pointed out above, is that the domain of the adverb of quantification is determined via the presupposition induced by the verb *land* (that is, one must be have fallen if one landed). If we follow Karttunen (1974); Stalnaker (1974) in that presuppositions are requirements on the context (i.e., P is a presupposition of a sentence S iff S can be uttered felicitously only in contexts that guarantee P), then the fact that the domain of *always* in (6) is affected by presupposition can also be made to follow from (9). The idea is as follows. If that is what we take presuppositions to be, then the only contexts in which a sentence like (6) is felicitous are contexts in which it is the case that cats are falling. In the absence of other contextual clues, this is all the information we have about the contexts where (6) is felicitous. In this situation, we take the set of cases in which cats are falling to be an object in the context for the purposes of (9). So, given standard assumptions about presupposition, facts like (6) can be taken to be of the same kind as (1)-(5). This is, in fact, the kind of explanation pursued in Beaver and Clark (2001, 2002a) and von Stechow (1994, 1995).

This analysis is presented in §4.2.1. The analysis should remind us of the analysis in Chapter 3 for *only*, etc., since there I also took certain properties of sentences as indicators of the kinds of contexts in which sentences are felicitous, and I used those contexts as the source for the antecedent of the argumental variable of C. That this is so is a welcome result, not only because then we can claim that the principle in (9) covers both examples like (6) and *only*-sentences, but because it also covers (8).

The analysis of examples like (8) will make use of a procedure whereby a context for the sentence is reconstructed, partly with the help of focus; this is the same procedure we used in Chapter 3. I then use the principle in (9) to determine the antecedent of the argumental variable of *C*. I will need an operation of generalized union over sets of propositions, proposed in Rooth (1985) and used in von Stechow (1994, 1995) in order to arrive at the object of the right semantic type for the argumental variable of *always*. So, again, given certain assumptions about information structure and an auxiliary assumption that is shared with other works, (8) is of the same kind as (1)-(5). The analysis is laid out in detail in §4.2.2.

An observation about the behavior of adverbs of quantification that will be important is this: sentences which contain an adverb of quantification and a focus are ambiguous between a focus-induced reading, as discussed above for (7) and (8), and a focus-independent reading, an observation due to B&C⁴ and Cohen (1999). For example, B&C suggest that (3) can be read with focus on *rehomed*; yet, the meaning of the sentence can still be, roughly, that whenever dogs are at a pound, we manage to get them rehomed. Presumably, all of (1)-(5) and (6) can be read with prominence at the end of the sentence, as is typical for English; yet, the domains of the adverbs of quantification can still be what we indicated above (i.e., non-focus related). Likewise, the sentences in (7) and (8) (or sentences similar to them) can be put in contexts where they do not receive a focus-related meaning. Consider (11), for example:

⁴ I refer to Beaver and Clark (2001, 2002a, b) as B&C unless a distinction is necessary.

- (11) Whenever they get a day off, opera singers escort ballerinas to the opera. But [officers]_F always escort ballerinas to the opera, whether it's their day off or not

The last sentence in (11) clearly cannot have a focus-related meaning, for on that reading it would be incompatible with the preceding context; yet, the text in (11) is felicitous.

Two questions arise at this point. The first is this: can the theory based on the principle in (9) that I develop in the coming sections account for the ambiguity of sentences with adverbs of quantification and focus? Secondly, can the theory explain why *only* behaves differently? B&C claim that *only* is different from *always*, etc., since sentences containing *only* and a focus are unambiguous in that they get only a focus-induced interpretation. Recall that, while I don't fully agree with this claim (see Chapter 3), I do agree with the claim that sentences with *only* have a more restricted range of interpretation. Consider the difference between (12) and (13), from B&C:

- (12) Mary always managed to complete [her exams]_F

- (13) Mary only managed to complete [her exams]_F

The sentence in (12) is ambiguous: in one of its readings, it says that all cases in which Mary took exams are cases in which she completed them (focus-independent reading); the other reading says that all cases in which Mary managed to complete something were cases in which she managed to complete her exams (the focus-affected reading)⁵. (13), on the other hand, only seems to have the focus-affected reading; no parallel focus-

independent reading is available for it⁶. Notice that the readings of (12) are truth-conditionally distinct: a situation in which Mary took an exam and didn't complete it makes the first reading false, but the second one can still be true (nothing requires her to complete all the exams that she takes; it's that whenever she completed something, it was an exam). A situation in which Mary managed to complete an assignment makes the second reading false, but the first reading can be true (the first reading says nothing about the cases in which Mary takes things other than exams)⁷.

We will see that the theory we develop here is indeed capable of explaining why those sentences that contain *always* and a focus receive a wider range of interpretations than sentences containing *only* and a focus. The crucial part of the theory that does this is assumptions about the semantic type of the argumental variable of C in each case: a set of situations for the variable of the C of adverbs of quantification, and a set of propositions for variable of the C of *only*. More objects of the type of a set of situations are available in a given discourse than objects of the type of a set of propositions. Thus, the difference between *only* and *always* will be similar in this theory to the difference between *he* in (10) above and *he* in (14):

(14) John said hello to Peter. *He* was wearing red pants.

⁵ B&C (p. 12 in the 2002a paper) suggest that the first reading is more prominent than the second one. I haven't been able to reproduce this fact in my experiments.

⁶ In this reading, the domain of *only* would be determined by the presuppositions of the verb *manage*. B&C paraphrase it as "what Mary did when taking exams was complete them and do nothing else".

The first sentence in (10) makes available only one suitable antecedent for the pronoun in the second sentence, *John*, and that is its antecedent. The first sentence in (14), however, makes available two suitable antecedents, *John* and *Peter*. Thus, the second sentence is ambiguous: it could be either John or Peter that is wearing red pants. This material is discussed in §4.3.

B&C and von Fintel (1994, 1995) (see also Schubert and Pelletier (1989)) propose analyses that are similar in certain respects to what I advocate here. Though a detailed comparison between their analysis and the one presented here is delayed until §4.4, it is possible to say now that the general picture of the theory that emerges from their and this work is very different.

B&C argue that only a theory that distinguishes *only* and *always* lexically in terms of their focus-sensitivity can account for this and other differences, to be discussed in §4.4.1. They propose to make *only* lexically sensitive to focus, and *always* lexically insensitive to it. From a conceptual perspective, this is the weakest position one could take: it's not only that the argumental variable of C is restricted in unwanted ways, it's that only the argumental variable of the C of *only* is. No prediction is made as to whether the next item (in English, in another language) that has a contextual variable is or is not focus-sensitive. Not only is the theory of optional and obligatory association proposed in this dissertation much more restrictive than this, it is moreover capable of explaining at least some of the differences between *only* and *always*, as we will see. So, fortunately, the

⁷ Cf. (8) above.

conclusion that only a weak theory can handle the facts is not warranted. The details of B&C's theory are given in §4.4.1⁸.

The theory that von Fintel envisages is also quite different from ours: this theory still has the FIP, we don't. So his analysis of adverbs of quantification suffers, at least, from the problems we already pointed out for the FIP in Chapter 3. See §4.4.2.

4.2 The readings of sentences with adverbs of quantification

In this section I provide a semantics for adverbs of quantification (a simplified version of the system in von Fintel (1994, 1995)). Then I look at how the readings of sentences with adverbs of quantification that we presented in §4.1 are to be derived within the system presented in Chapter 3.

4.2.1 A semantics for adverbs of quantification

I borrow my semantics for the adverbs of quantification from that in von Fintel (1994, 1995). I use a simplified version of this semantics throughout, shown in §4.2.1. The full, official version of this semantics is provided in Appendix I to this chapter. The points I make in later sections do not hinge on the refinements in this appendix.

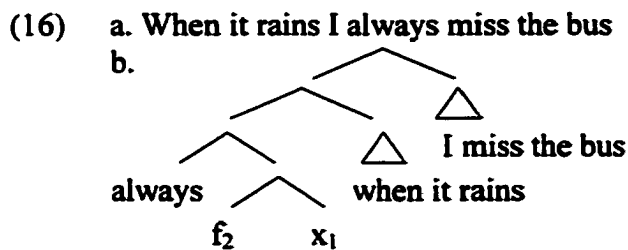
⁸ As Sigrid Beck (p.c.) points out, it is very much worth investigating the behavior of *only* vs. *always* in other languages. B&C predict that we should be able to find languages in which (i) both *only* and *always* associate obligatorily with focus, (ii) *only* associates obligatorily and *always* optionally (English), (iii) *always* associates obligatorily and *only* optionally, and (iv) both *only* and *always* associate optionally (though I am not sure they are aware of this). In the more restrictive theory developed here, only type (ii) languages are expected. I suspect that one does not find the range of variation B&C predict.

In this system, adverbs of quantification are generalized quantifiers (see also Schwarzschild (1989), Swart (1991)). Following Berman (1987) and Heim (1990), they quantify over situations, or parts of possible worlds (see Kratzer (1989)); so the sets that serve as arguments for the adverbs are sets of situations⁹.

Our simplified semantics for *always* is in (15):

$$(15) \quad [[\text{always}]]^g = \lambda C \in D_{\langle s, \iota \rangle} . \lambda p \in D_{\langle s, \iota \rangle} . \lambda q \in D_{\langle s, \iota \rangle} . \{s: p(s)=1 \ \& \ C(s)=1\} \subseteq \{s: q(s)=1\}^{10}$$

Here is how this works with the example in (16):



Assume that a structure like (16b) is available to us at some level of representation. In this structure, the *when*-clause is the first argument of the quantifier (the set of situations in which it rains). “I always miss the bus” is the second argument (the set of situations in which I miss the bus):

⁹ Rooth (1985) and Stump (1981) have the adverbs quantify over times instead of situations.

¹⁰ von Stechow's (1994: 13) ontology has the domain of expressions of type $\langle \iota \rangle$ be the power set of S , the set of possible situations. So, following his ontology to the letter, C , p and q in (15) would be of type $\langle \iota \rangle$. I find the way of expressing this that I use in (15) clearer, and I will stick to it throughout.

$$(17) \quad [[[(16)]]]^g = 1 \text{ iff } \{s: \text{it_rains}(s)=1 \text{ and } (g(1))(s)=1\} \subseteq \{s: \text{I_miss_the_bus}(s)=1\}$$

One characteristic of adverbs of quantification that distinguishes them from nominal quantifiers like *every* is that the first argument need not be explicit. Thus, (18) is also possible:

$$(18) \quad \text{I always miss the bus}$$

It is easy to change the semantics of the adverb to accommodate these cases:

$$(19) \quad [[[\text{always}]]]^g = \lambda C \in D_{\langle s, D \rangle} . \lambda q \in D_{\langle s, D \rangle} . \{s: C(s)=1\} \subseteq \{s: q(s)=1\}$$

The resulting truth-conditions are in (20):

$$(20) \quad [[[(18)]]]^g = 1 \text{ iff } \{s: (g(1))(s)=1\} \subseteq \{s: \text{I_miss_the_bus}(s)=1\}$$

Notice that the choice of the domain of quantification has an effect in whether the resulting truth-conditions are exhaustive or not. Consider first (20). These truth-conditions say that the sentence in (18) is true iff the set of salient situations is a subset of the set of situations in which I miss the bus. Suppose that the set of situations in which it rains is salient in previous discourse. The claim is then that the set of situations in which it rains is a subset of the set of situations in which I miss the bus. It does not follow from this claim that the bus is the only thing that I ever miss. The reason why this doesn't

follow is that the restriction on the adverb is in this case composed of situations in which it rains, some of which are situations in which I miss the subway in addition to the bus and some which are situations in which I only miss the bus. If the domain of quantification was different, exhaustivity could be implied. Consider the case where the set of situations in which I miss some mode of transportation is salient. Then the truth-conditions of the sentence in (18) would say that the sentence is true iff the set of situations in which I miss some mode of transportation is a subset of the set of situations in which I miss the bus. This *does* imply that the bus is the only mode of transportation that I miss, since any situation in which I miss some mode of transportation is in the restriction. That exhaustivity follows on some choice of domains (i.e., the argumental variable of C) and not on others is what we exploit below to account for the properties of sentences with *always*.

For completeness, lexical entries for other adverbs of quantification are provided in (21) and (22):

$$(21) \quad [[\text{usually}]]^g = \lambda C \in D_{\langle s, t \rangle} . \lambda p \in D_{\langle s, t \rangle} . \lambda q \in D_{\langle s, t \rangle} . |\{s: p(s)=1 \ \& \ C(s)=1\} \cap \{s: q(s)=1\}| > |\{s: p(s)=1 \ \& \ C(s)=1\} - \{s: q(s)=1\}|$$

$$(22) \quad [[\text{never}]]^g = \lambda C \in D_{\langle s, t \rangle} . \lambda p \in D_{\langle s, t \rangle} . \lambda q \in D_{\langle s, t \rangle} . \{s: p(s)=1 \ \& \ C(s)=1\} \cap \{s: q(s)=1\} = \emptyset$$

4.2.2 Focus-unrelated readings

In this section I discuss how sentences with adverbs of quantification get focus-unrelated meanings. The first thing we do is provide some arguments, following B&C,

that these focus-unrelated meanings do exist. We then discuss the nature of the focus-independent readings. Finally, we provide the analysis of these readings. The ideas in this section are imported from B&C and von Fintel, so no new proposal is advanced here. I have added some new facts, though, and I do entertain a slightly different descriptive generalization from the one they have, as already pointed out in §4.1.

Consider (23) and (24), which we discussed in §4.1:

(23) (= (12)) Mary always managed to complete her [exams]_F

(24) (= (13)) Mary only managed to complete her [exams]_F

An important difference between these two sentences is that the range of interpretations for (23) is broader than for (24). Both (23) and (24) are true in a situation in which Mary managed to complete her exams and she managed to complete nothing else. However, (23), though not (24), can also be true in situations in which Mary managed to complete things other than her exams as well (say, her homework assignments). That is, (23) can, but does not have to, receive an exhaustive interpretation, to use the term used by B&C, whereas (24) must receive an exhaustive interpretation. This difference is brought out clearly in (25) and (26), from B&C, where possible continuations for the examples in (23) and (24) are considered:

(25) *Mary only managed to complete her [exams]_F, and she only managed to complete her [assignments]_F

(26) Mary always managed to complete her [exams]_F, and she always managed to complete her [assignments]_F

(25) is ungrammatical. A plausible reason for its ungrammaticality is this: the first conjunct contradicts the second conjunct: it can't be that the only thing Mary managed to complete was her exams and at the same time that the only thing that she managed to complete was her assignments. The ungrammaticality of the example is predicted if *only*-sentences are unambiguous, and the only interpretation they receive is an exhaustive one¹¹. (26), on the other hand, is fine. This means that there must be a reading for *always*-sentences that is independent of the focus reading, since on the focus reading (26) would be as contradictory as (25)¹². Of course, this focus-independent reading must be non-exhaustive; (26) receives the interpretation that whenever Mary took an exam, she completed it, and whenever she did an assignment, she completed it.

That sentences with adverbs of quantification must have focus-independent readings was also pointed out by Fintel (1995: 180); he credits the point to Roger Schwarzschild), with the following example:

- (27) John always takes two children to the zoo. He almost always takes Bill. Twice he took Rina. He rarely takes Paul. He never takes Mary

¹¹ Recall that in Chapter 3 I argued that it is possible to find contexts in which *only*-sentences receive a focus-independent interpretation. Still, in those cases the interpretation was exhaustive (i.e., the C of *only* was a set of propositions bigger than the set of propositions that could be determined on the basis of focus). As long as the C of *only* in the two conjuncts receives the same value, our theory predicts the ungrammaticality of (25).

¹² The truth-conditions of each of the conjuncts in (26) on the focus reading would be as in (i) and (ii). (i) and (ii) cannot both be true:

- (i) {s: Mary managed to complete something in s} \subseteq {s: Mary managed to complete her exams in s}
- (ii) {s: Mary managed to complete something in s} \subseteq {s: Mary managed to complete her assignments in s}

von Fintel writes: "Here all of the sentences (except possibly the first one) are interpreted non-exhaustively. For example, *He rarely takes Paul* does not mean that he rarely takes only Paul and nobody else. That would be particularly strange since the first sentence asserts that he never takes only one child". On a focus-reading, where presumably *Paul* is focused, *He rarely takes Paul* means, roughly, that the intersection between the set of situations in which he takes someone to the zoo and the set of situations in which he takes Paul to the zoo yields a reduced number of situations (according to some standard). It would be odd if the sentence had this meaning in (27) because the first sentence in the text already establishes that when John goes to the zoo, it is always two children, not less, that he takes there. The sentence would not add new information. Yet, the text is felicitous, so some other reading must be available for *He rarely takes Paul*.

So far we have established that sentences with *always* and a focus have non-focus-interpretations readily available to them. Now we discuss what exactly is involved in those readings.

Let start by looking at examples where the presuppositions of some item in the sentence play a role in domain restriction. The examples are in (28)-(30); (29) repeats (4) and (30) repeats (3):

- (28) Kim always beats Sandy at [ping-pong]_F
- (29) (=4)) Every Friday Sandy goes to town. *She always realizes that the Harley Davidson she's riding there is going to attract a lot of attention.*
- (30) (=3)) [In a discussion about dogs at a pound]
Technically, if they are not claimed within seven days, then they should be put to sleep, but *we always manage to get them rehomed*

In our understanding of presupposition, we follow Karttunen (1974); Stalnaker (1974) in that presuppositions are requirements on the context (i.e., P is a presupposition of a sentence S iff S can be uttered felicitously only in contexts that guarantee P). For example, a sentence like (28) demands a context that guarantees that Kim play ping-pong with Sandy.

It is tempting, on the basis of examples like (23) or (28) (recall also our earlier (6)), to describe the focus-independent readings of these sentences as readings where the adverb associates with presupposition; that is, as readings where the domain of the adverb is determined on the basis of the presuppositions induced by items like *manage* or *beat* (or *land*). In the case of, e.g., (28), the focus-independent reading of the sentence is something like, “whenever Kim plays Sandy at ping-pong, Kim beats Sandy at ping-pong”; a presupposition-related meaning is also available for (23), as discussed above.

But there are good reasons to suppose that presupposition cannot effect all domain restriction, as argued for in Beaver and Clark (2002a) and von Stechow (1994). Compare (23) and (28) with (30). Salient in the context of (30) is a set of situations in which dogs are at our pound. The claim that the italicized sentence makes is that all situations in which dogs are at a pound are situations in which a dog gets rehomed. The claim is not that all situations in which we try/make an effort to get a dog rehomed are situations in which it gets rehomed (though the sentence presupposes that we try or that it is effortful to get dogs rehomed, because of *managed*). Beaver and Clark (2002a: 15) claim that the sentence is about “all instances of dogs requiring rehoming, not just the difficult cases”.

In the case of (29), the first sentence makes salient the set of situations in which Sandy goes to town on Fridays. The second sentence means that all such situations are

situations where she realizes that the Harley Davidson she's riding there is going to attract a lot of attention. Notice that there are two presupposition inducers in the second sentence in (29): *the* and *realize*. If we took adverbs to associate with presuppositions in all cases, the second sentence should mean that all situations in which Sandy is riding a Harley Davidson and it attracts a lot of attention are situations in which she realizes that it is attracting a lot of attention. But that is not what the sentence means¹³.

It doesn't even do to claim that the domain of *always* in (29) is determined by a combination of presuppositions and sets of situations which are salient in the discourse. This would predict that the last sentence in this example means that all situations in which Sandy rides her Harley to town on Friday and it attracts a lot of attention are situations in which she realizes that it attracts a lot of attention. This is not what that sentence means; we can see this from the problematic (31) (from B&C):

- (31) ? Every Friday Sandy goes to town. She always realizes that the Harley Davidson she's riding there is going to attract a lot of attention. So she mostly goes by bus.

If the second sentence in (31) had that meaning, there would be no incompatibility with the third sentence. But the discourse is odd.

B&C suggest that the best way to characterize the readings that sentences like those in (23) and (28)-(30) get is by claiming that, in our terms, the argumental variable of the C of the adverbs of quantification is anaphoric to a contextually salient set of

¹³ See also von Stechow (1994: 72-73).

situations (this is our principle in (9))¹⁴. Presuppositions like the ones that *manage* or *beat* induce do not determine the set of situations that serve as the domain of these adverbs, but if there are such presuppositions, the domain of the adverbs must satisfy them. So, for example, the situations in the set of situations to which the argumental variable of C is anaphoric in a case like (29) are situations in which there is a unique Harley Davidson that Sandy rides and in which it attracts a lot of attention. But not all situations in which there is a unique Harley Davidson that Sandy rides and it attracts a lot of attention are in the set of situations to which the C of *always* in the second sentence is anaphoric. In other words, presuppositions do not serve to further restrict the domain of quantification in this case, but all the situations in the domain of the quantifier guarantee the presupposition¹⁵.

Still, there are cases like (6), (23) or (28) in which it *does* seem that presuppositions serve in fact to restrict quantification domains. The idea is that in the absence of an appropriate antecedent, presuppositions are used to narrow down the domain of quantification¹⁶. Confronted with a sentence like (23), for example, speakers will resort to whatever information about potential previous contexts there is. *Manage* in this example induces the presupposition that Mary took exams (or that it was difficult for Mary to take exams). All contexts in which the sentence in (23) is felicitous are contexts

¹⁴ In von Fintel's (1994: 74) terms, "the examples of a quantifier restriction seemingly derived by locally accommodating presuppositions of the nuclear scope are really cases where the domain is identified with some discourse topic".

¹⁵ This analysis raises the question of what the correct analysis of the quantificational variability effects observed by Berman (1991) is. von Fintel (1994: 74-76) extends his analysis, based on the relationship between presuppositions and discourse topics, to Berman's examples.

in which Mary took exams (or where it was difficult for Mary to take exams). So the kinds of context sets (CS) that are assumed for such sentences are sets of situations in which Mary took exams.

I am assuming in this explanation (though B&C and von Stechow do not seem to do so) that a principle that places a preference on explicit vs. implicit objects is active in the grammar (recall Chapter 3):

(32) Explicit objects in the context are preferred over reconstructed/implicit ones

It is with this assumption that the right predictions are made for (29) and (31): even though the presuppositions induced by *the* and *realize* are of course available, they are not used as the antecedent for C, because (32) establishes a preference for explicitly available antecedents.

That the argumental variable of the C of *always* is anaphoric to a presuppositionally-induced set in the absence of other contextually salient set of situations puts sentences such as (23) in the same bag as *only*-sentences. This process of restriction by presupposition might be thought of in the same terms as the process of context reconstruction that we advanced in Chapter 3, since in both of them we use information derived from a sentence to determine the kinds of contexts in which that sentence is felicitous, and on the basis on properties of those contexts we determine what the antecedent for our contextual variable is. The difference is that in cases such as (23) we don't use focus but presuppositions.

¹⁶ I am not sure that B&C and von Stechow would agree completely with this claim, but it is the claim I

The analysis of non-focus-related readings of adverbs of quantification then says that the argumental variable of the C of these adverbs is anaphoric to an object in the context. The prime candidate for an antecedent for this variable is an object made salient explicitly. In the absence of an explicit, salient set of situations, presuppositions induced by items in the sentence can be the antecedent for it.

This explains the fact that sentences that contain adverbs of quantification can be assigned readings in which the antecedent for the variable is a focus-unrelated, salient set of situations. The next section shows how focus-related readings are obtained.

4.2.2 Focus readings

In this section I account for focus-affected readings for sentences with *always*. Much of what I do here is a direct extension of the system I proposed in Chapter 2. So this section serves to show that the empirical scope of that theory is broader than shown so far.

(33) and (34) are cases where context reconstruction with the help of information-structure related principles (among them, a focus principle), is needed:

- (33) a. Speaker A: Sandy feeds Fido Nutrapup
 b. Speaker B: No, *she always feeds [Butch]_F Nutrapup*
 (based on an example by Schwarzschild 1997)
- (34) Max's mother is an expert in nutrition and she is worried about the fact that *he always eats [McDonald's]_F hamburgers*. Curiously, she is not worried about the fact that he also eats Burger King fries.
 (loosely based on an example by Roberts (1995))

espouse here.

The reading that the relevant sentences in the examples in (33)-(34) get is a focus-related one; these readings are paraphrased in (35) and (36), respectively:

- (35) the set of situations in which Sandy feeds someone Nutrapup is a subset of the set of situations in which she feeds Butch Nutrapup
- (36) the set of situations in which Max eats some kind of hamburger is a subset of the set of situations in which he eats McDonald's hamburgers

Notice that in examples like (33), the relevant sentence cannot have a focus-unrelated interpretation, since on such an interpretation (33B) would not deny the claim made by (33A). Suppose the sentence had a focus-independent interpretation, e.g., that the set of situations in which Sandy arrives late from work is a subset of the set of situations in which Sandy feeds Butch Nutrapup. Then there would be no incompatibility with the statement in (33A); i.e., Sandy feeding Fido Nutrapup would be perfectly compatible with Sandy feeding Butch Nutrapup whenever she arrives late from work.

We might wonder whether there is any need to actually generate a reading like (35) with the machinery of Chapter 3. The reason is this: if only on this reading is (33B) a denial of (33A)¹⁷, then we might want to claim that the procedure for assigning the meaning in (35) to (33B) involves a search in which a domain for the adverb that satisfies the requirement that (33B) be true and (33A) be false is chosen. No context-reconstruction or use of the principle in (9) would be in effect here. This alternative analysis, however, is not tenable in view of the fact that it is not true that (33B) is a denial of (33A) only on the reading in (35). Consider the reading in (37):

- (37) the set of situations in which Sandy feeds someone something is a subset of the set of situations in which she feeds Butch Nutrapup

(33B) would still deny the truth of (33A) if it had the reading in (37): if (37) was true, it would follow that it is false that Sandy feeds Fido Nutrapup. So we need to be able to generate the reading in (35), and only that reading.

About (34), notice that the intended reading is the focus-affected one, in (36). Max's mother is not worried about what her son eats in general, but about the fact that whenever he eats hamburgers, it is hamburgers from McDonald's. This is clearly a focus-dependent reading.

The analysis of the focus readings of sentences like those in (33) and (34) and others involves reconstructing a question as part of the their contexts, just as we did in Chapter 3 for the particles *only*, *even* and *also*. Before going into the details of how that is done, there is an important question to ask: how can a question (reconstructed or not) serve as the antecedent for the argumental variable of the C of adverbs of quantification, if this variable is a set of situations but a question is a set of propositions?

As suggested above, Rooth (1985) and von Stechow (1994, 1995) deal with this problem by postulating that an operation of generalized union over sets of propositions is available in the grammar. The generalized union of a set of propositions (i.e., a set of sets of situations/worlds) is a proposition (i.e., a set of situations/worlds), which is of the type we need. While I adopt this technical solution here, it is necessary to point out, as Rooth (1999)¹⁸ does, that a system in which such a stipulation is not made is superior

¹⁷ I.e., if only on this reading is (33B) true and (33A) false.

conceptually to a system that makes use of it. Unfortunately, I do not know what can be done to avoid it, so we will have to live with it in our system¹⁹.

Let me illustrate how the system works with the example in (23), repeated here (this explanation holds for the other examples involving *always* and a focus):

(38) (= (12), (23)) Mary always manages to complete [her exams]_F

(38) must be congruent to the last(QUD). The question (39) is congruent to (38). Congruence, from Chapter 3, is repeated in (40):

(39) What thing is such that Mary always manages to complete that thing?

(40) Congruence: An assertion A is congruent to a question Q iff $[[Q]]^o = [[A]]^f$

Notice that (the generalized union of the denotation of) (39) is not what we are looking for as the antecedent for the argumental variable of the C of *always* in (38). One of the reasons we adduced in the cases of *only*, *even* and *also* applies here as well: there is still a “hole” that hasn’t been filled in the semantic “tissue”, since now the variable of *always* in (39) needs an antecedent. Since (39) must be relevant to some question, by relevance, we

¹⁸ In a manuscript that serves as the basis of the published Rooth (1999), he expresses concern about this operation. In the published version, however, he seems to be more comfortable with it (see p. 243), but then he makes slightly different assumptions about how it is available.

¹⁹ von Stechow (1995: 164) reports an observation by Roger Schwarzschild about (i):

(i) Speaker A: How does Tai eat?
Speaker B: He always eats [with chopsticks]_F

now consider questions it is relevant to. Some candidates are in (41). Relevance, also from Chapter 3, is in (42):

- (41) a. What did Mary manage to complete?
b. Who managed to complete her exams?
c. What did Mary do?
- (42) Relevance: A question Q_1 is relevant to a question Q_2 iff Q_1 is a subquestion of Q_2 ,

where the subquestion relation was defined as follows:

- (43) Subquestion relation:
A question Q_1 is a subquestion of a question Q_2 iff a complete answer to Q_1 is a partial answer to Q_2

The principle of maximal informativity proposed in Chapter 3 is repeated here as well:

- (44) Maximal Informativity: Given two questions Q_1 and Q_2 , Q_1 is part of the reconstructed context of Q_2 iff any complete answer to Q_2 is a complete answer to Q_1

Recall that this principle is a constraint on reconstructed, implicit questions, and that its effect is that it makes us consider those questions for which complete answers are guaranteed. The procedure with an adverb like *always* is as it was for *only*, *also* and *even*. First we will consider different possible values for the argumental variable of the C of *always* in (39), since we must consider all complete answers to this question and these answers can change according to what the value for the argumental variable of C is

Schwarzschild observes that the question in (iA) “already seems to involve reference to a generality of situations, it asks about Tai’s eating habits”. Arguably, then, one could do without the operation of

(recall that we have no reason for presupposing any one value in particular). Once we have complete answers for (39), we see which question from (41) we have a complete answer to in each case. Doing this will allow us to choose (41a), as desired.

Let us try out the following values for the argumental variable of C:

- (45) a. $\cup\{p: p = \lambda s. \text{Mary managed to complete } x \text{ in } s \mid x \in \{\text{her exams, her assignments, her papers, etc.}\}\}$
 b. $\cup\{p: p = \lambda s. x \text{ managed to complete her exams in } s \mid x \in D_e\}$
 c. $\cup\{p: p = \lambda s. \text{Mary R-ed in } s \mid R \in D_{\langle e, \langle s, t \rangle \rangle}\}$

(45a) gives rise to the following as sample members of the denotation of (39):

- (46) a. the set of situations in which Mary managed to complete something is a subset of the set of situations in which she managed to complete her exams
 b. the set of situations in which Mary managed to complete something is a subset of the set of situations in which she managed to complete her assignments
 c. the set of situations in which Mary managed to complete something is a subset of the set of situations in which she managed to complete her papers

In the complete answer to (39), with members as in (46), I take (46a) to be true, and all other members of the denotation of the question ((46b), (46c), and all others) to be false.

If the only member of the denotation of (39) that is true is (46a), then Mary managed to complete no assignments ever, and she managed to complete no papers ever, etc. Figure 1 displays whether this complete answer, which I abbreviate in the table as “(46)”, constitutes a complete answer to each of the questions in (41):

generalized union of a set of propositions, but I will not explore this alternative here.

	(41a)	(41b)	(41c)
(46)	Yes	No	No

Figure 1: Complete answers (I) (*always*)

If whenever Mary managed to complete something she completed her exams, then we can answer (41a) completely (she managed to complete her exams, though not her assignments, papers, etc.), but we can only answer (41b) and (41c) partially. We know that one of the people who managed to complete her exams was Mary, but there might or might not be others who did ((41b)), and we know that one of the things Mary did was manage to complete her exams, but we do not know whether she also did her grocery shopping that evening or not ((41c)).

Let us look at (45b). As in the analysis of *only*, we encounter an ill-formed question if we use this value for the argumental variable of C. (47) lists some of the members of the denotation of (39):

- (47)
- a. the set of situations in which someone managed to complete her exams is a subset of the set of situations in which Mary managed to complete her exams
 - b. the set of situations in which someone managed to complete her exams is a subset of the set of situations in which Mary managed to complete her assignments
 - c. the set of situations in which someone managed to complete her exams is a subset of the set of situations in which Mary managed to complete her papers

A situation in which someone managed to complete her exams cannot be a situation in which Mary managed to complete her assignments ((47b)), or a situation in which Mary managed to complete her papers ((47c)). So all members of the denotation of (39) that are not (47a) are necessarily false. I take this to give rise to ill-formedness, as we did in Chapter 3 for *only*, on the grounds that a question should have more than one potentially

true proposition as part of its denotation. (45b) is thus a value for the argumental variable of C in (39) (and hence in (38)) that we can rule out independently.

Notice that, if the question that was part of the reconstructed context of (39) was (41b), (39) would be predicted, by (9), to have the propositions in (47) as its members, and would thus be an ill-formed question. We thus rule out (41b) as a potential question for the reconstructed context of (39) on the same grounds we rule out (45b) as a potential value for C in (39). Figure 1 reduces to Figure 2:

	(41a)	(41c)
(46)	Yes	No

Figure 2: Complete answers (II) (*always*)

Let us look at (45c). Members of (39) are then as follows:

- (48)
- a. the set of situations in which Mary did something is a subset of the set of situations in which Mary managed to complete her exams
 - b. the set of situations in which Mary did something is a subset of the set of situations in which Mary managed to complete her assignments
 - c. the set of situations in which Mary did something is a subset of the set of situations in which Mary managed to complete her papers

We are taking (48a) to be true, and all the other members of the question ((48b), (48c), and all others) to be false. If this is the case, then there is no situation in which Mary managed to complete her assignments, and there is no situation in which she managed to complete her papers. In fact, there is no situation in which she completed anything other than her exams. Figure 3 adds to Figure 2 by telling us whether this complete answer, which I refer to as “(48)” in the table, is a complete answer to (41a) and (41c):

	(41a)	(41c)
(46)	Yes	No
(48)	Yes	Yes

Figure 3: Complete answers (3) (*always*)

If whenever Mary did something, she managed to complete her exams, then we can answer (41a) completely: she cannot have managed to complete anything other than exams. We can also answer (41c) completely: she managed to complete her exams, and she didn't do anything else.

Maximal informativity ((44)) now allows us to choose (41a) as part of the reconstructed context for (39), since it is the question we have a complete answer for on any interpretation of (39).

The generalized union of the denotation of (41a) is the set of situations in which Mary managed to complete her exams or her assignments or her papers..., i.e., the set of situations in which Mary managed to complete something. C can now be a subset of this, the set of minimal situations in which Mary managed to complete something.

When discussing examples like (30), we required that lexical presuppositions be satisfied. For that example, that meant that the situations that serve as the antecedent for the argumental variable of C, the set of situations in which dogs are at our pound, have to be situations in which we try hard to get dogs rehomed (but, there will be situations in which we try hard to get dogs rehomed that are not in this set, since there are situations in which we try hard to get dogs rehomed which are not situations in which there are dogs are at our pound). The lexical presuppositions of the sentence in (38) must be satisfied in the focus reading as well. That is, the set of situations in which Mary managed to complete something have to be situations in which she took exams. But the situations in

which Mary took exams do not serve to restrict the adverb: there are situations in which Mary took exams but in which she managed to complete nothing at all. This is in agreement with B&C and von Fintel's suggestion that, while lexical presuppositions do not necessarily serve to restrict domains of quantification, they nevertheless have to be satisfied.

The idea, then, is that the focus reading of a sentence like (38) is derived in the same manner the reading of a sentence with *only* is derived, namely, by making use of the principle in (9) and by generating the object that that principle is sensitive to via the same principles of information structure we assumed for the case of *only*. The only difference is that, in the case of *always*, the generalized union of the focus-related QUD, and not the focus-affected QUD itself, is the object in the context for the purposes of (9). Because there are other means for reconstructing an object in the context in the case of (38) (i.e., via the information provided by the presupposition induced by *manage*), (38) is ambiguous between a focus-related meaning and a focus-unrelated (or, presupposition-related) meaning. The same analysis applies to cases such as (28).

Let us now go back to some of the other examples we discussed earlier. These are repeated in (49)-(51):

- (49) (= (33)) a. Speaker A: Sandy feeds Fido Nutrapup
b. Speaker B: No, *she always feeds [Butch]_F Nutrapup*
- (50) (= (7)) Leopards usually attack monkeys in [trees]_F
- (51) (= (8)) a. In Saint Petersburg, [officers]_F always escorted ballerinas
b. In Saint Petersburg, officers always escorted [ballerinas]_F

The focus reading of these examples is arrived at in the same manner the focus reading of (38) was arrived at. The reason why it is usually not suggested that sentences like (50) and (51) are ambiguous is that they are usually considered in out of the blue contexts; in these contexts, our framework makes the right predictions. As suggested in §4.1, it is possible for these sentences to get other readings, specially if a preceding context makes salient a set of situations for the argumental variable of the C of *always* to be anaphoric to. Consider again (11) in this regard, repeated here:

- (52) (= (11)) Whenever they get a day off, opera singers escort ballerinas to the opera.
But [*officers*]_F *always escort ballerinas to the opera*, whether it's their day off or not

The italicized sentence in (52) means something like that whenever officers have a chance (i.e., whether it's their day off or not), they escort ballerinas to the opera; the focus on *officers* is used to establish some kind of contrast with *opera singers* in the preceding sentence but does not seem to restrict the quantification. This reading is analyzed here as a case of cataphoric reference, of the kind exemplified for pronouns in (53), where the antecedent for the pronoun comes at a later point in the sentence:

- (53) Whenever *he* could, Peter helped people in need

Our framework should also explain why it is that the italicized sentence in (52) is not ambiguous; that is, why the focus-affected reading is not available. For this particular example we could argue that the sentence does not receive one of its possible readings because this reading is incompatible with the information provided by the surrounding

context, as discussed in §4.1 (on the focus reading, the sentence is false if both officers and opera singer escort ballerinas). This answer will not work as a general strategy, though, since the focus-affected reading is not incompatible with the information provided in the surrounding context in other cases, such as (3)/(30), repeated here:

- (54) (= (3), (30)) [In a discussion about dogs at a pound]
 Technically, if they are not claimed within seven days, then they should be put to sleep, but *we always manage to get them rehomed*

Recall that in (54), even when focus is placed on *rehomed*, the italicized sentence means that whenever dogs are at our pound, we manage to get them rehomed. A focus reading with focus on *rehomed* would be that whenever we manage to do something to the dogs, we manage to get them rehomed (so, to use B&C's example, we don't manage to treat them to a new hairstyle at the local grooming parlor). Even though this reading is compatible with the information provided in the preceding discourse, it is not available in (54). Here we should be reminded of our explanation of example (108) from Chapter 3, and which we made us of in §4.2.2:

- (55) (= (32)) Explicit objects in the context are preferred over reconstructed/implicit ones

In both (52) and (54), then, the principle in (55) allows to choose the non-focus reading over the focus one, as desired.

At this point, we should wonder about the following question. Given the principle in (55), and the discussion of examples like (108) from Chapter 3, should we be able to find examples where *only* actually associates with presuppositions, just as *always* does in

examples like (6) or (12)/(23)/(38)? This should be possible if the right question is explicitly asked. This is not what we find, but there is no need to change anything in our system: the semantics we have assumed for *only* takes care of the problem. Consider (56):

- (56) a. Speaker A: What exams did Mary take?
 b. Speaker B: I think that she *only*₁ took her [Linguistics]_F exams
 c. Speaker C: But she *only*₂ managed to complete her [Syntax]_F exams

What is at stake is the interpretation of (56c). The sentence means that she (i.e., Mary) managed to complete nothing other than her Syntax exams (not her Semantics exams, or her Sociolinguistics exams). Given the explicit question in (56a), though, should that question be the antecedent for the C of *only*₂? If this was possible, the reading that the sentence would get would come very close to the presuppositional readings of sentences like (6) or (12)/(23)/(38). Recall our semantics for *only* from Chapter 3, repeated here:

$$(57) \quad [[\text{only}]]^{\mathcal{E}} = \lambda C \lambda p: p(w). \forall q[q \in C \ \& \ q(w) \rightarrow q=p]$$

The meaning of (56c) in which the argumental variable of the C of *only* takes (56a) as its antecedent is in (58):

- (58) $\forall q[q \in \{\text{that Mary took her Linguistics exams, that Mary took her Biology exams, that Mary took her Chemistry exams...}\} \ \& \ q(w) \rightarrow q = \text{that Mary managed to complete her Syntax exams}]$

For (58) to be true, it must be that Mary didn't take any exams. But this is in conflict with the presupposition that Mary managed to complete her Syntax exams. Since the object that is preferred results in conflicting truth-conditions, the dispreferred object, i.e., the focus-related QUD, can be used, giving rise to the correct reading for (56c)²⁰. Notice that nothing is being added to the framework for this to follow.

This finishes our discussion of how the different readings of sentences with adverbs of quantification are generated. We now turn to the important question of how the differences between *only* and these adverbs that I discussed in §4.1 are to be derived in the present system.

4.3 Why are *only* and *always* different?

I have talked about an important difference between *only* and *always*: the former does not lead to presuppositional readings, while the latter does in the absence of any other contextual clues. The former leads to sentences that are for the most part unambiguous, the latter can lead to ambiguity. Why?

In this framework the answer is very simple: the argumental variable of the C of *only* is anaphoric to a set of propositions, whereas the argumental variable of the C of *always* is anaphoric to a set of situations. It is easy for a set of situations to be salient in

²⁰ Notice that the question *what kind of exam did Mary manage to complete?* is a subquestion of (56a). Examples such as (56), though, suggest that the extension of maximal informativity we entertained in §3.4.5, is either wrong or more complicated, since no complete answer to (56a) is a complete answer to the question *what kind of exam did Mary manage to complete?*

the preceding discourse (cf. (1)-(5), for example). Furthermore, lexical presuppositions are sets of situations, so, in the absence of any other set of situations, they too can serve as the antecedent of C (cf. (6), or (12)). So these objects are of the right type for the argumental variable of the C of *always*. However, since the variable of *only* is incompatible type-wise with them, sentences with *only* lack the kinds of readings that they give rise to. Because the variable of *only* is a set of propositions, only questions can be antecedents for it. In many cases, as we saw in Chapter 3, the question that is part of the context preceding the *only*-sentence is a focus-related one; when, under the appropriate circumstances, a focus-unrelated one is available, then, by the principle in (9), that question can serve as the antecedent for the argumental variable of C. The difference thus follows simply from a difference in semantic type.

I assumed above that it is possible to apply the generalized union operation to a reconstructed question and that way lower the type of the object that serves as antecedent for the argumental variable of the C of adverbs of quantification from a set of propositions to a set of situations. Couldn't we do something to a set of situations to raise its type to a set of propositions? I know of no operation that does that. What set of propositions would we form on the basis of the proposition that Mary took exams?²¹

Having explained how this difference between *only* and the adverbs of quantification is derived, let us now turn to a critical review of other analyses of the same and similar facts.

²¹ One possibility would be the singleton set containing the proposition that Mary took exams. We can rule out this independently, by stipulating that the antecedent of the argumental variable of C has to contain more than one member. Rooth (1992) (recall §3.2) has a similar stipulation.

4.4 Review of other analyses II

The discussion in this section closes the critical review of the literature that I started in Chapter 3.

4.4.1 B&C

B&C argue for a theory in which both *only* and *always* quantify over events. *Only*, though not *always* (or any other adverb of quantification, presumably) has a lexical entry that makes direct reference to focus. The truth-conditions for sentences of the form “NP always VP” and “NP only VP” are as follows:

$$(59) \quad [[\text{NP always VP}]] = 1 \text{ iff } \forall e \pi(e) \rightarrow \exists e'. \phi(e, e') \& q(e')$$

$$(60) \quad [[\text{NP only VP}]] = 1 \text{ iff } \forall e p(e) \rightarrow q(e)$$

The variable π in (59) is the equivalent of out C here, and its value is determined contextually. The relation ϕ is also determined contextually and maps eventualities to eventualities²². The variables e and e' in both (59) and (60) range over eventualities. The variable q represents the ordinary meaning of “NP VP”. In (60), the variable p represents the meaning of “NP VP”, where the content of anything in the sentence that is focused

²² I'm not sure why B&C need to introduce another variable, ϕ . They claim (2002: 25) that it plays little role in the analysis.

has been taken away (sometimes, B&C refer to this meaning as the VP-defocussed meaning)²³. Let us quickly look at two examples to see how this works. Consider (61) and (62) (recall §4.1):

(61) Sandy always feeds [Fido]_F Nutrapup

(62) Sandy only feeds [Fido]_F Nutrapup

The truth-conditions that I obtain for the sentence in (61) are in (63), and those for (62) are in (64)²⁴:

(63) $\forall e \pi(e) \rightarrow \exists e' \phi(e, e') \& \text{feeding}(e') \& \text{AGENT}(e') = \text{Sandy} \& \text{GOAL}(e') = \text{Fido} \& \text{THEME}(e') = \text{Nutrapup}$

(64) $\forall e (\text{feeding}(e) \& \text{AGENT}(e) = \text{Sandy} \& \text{THEME}(e) = \text{Nutrapup}) \rightarrow \text{GOAL}(e) = \text{Fido}$

The crucial difference between (63) and (64) is that (63) contains a free variable π whose value is to be set by the context, the equivalent of our C, whereas such a variable is lacking in (64).

Given this difference between the lexical entries of *only* and *always*, it is easy to see how to derive the differences between them observed in §4.1: *only* is predicted to always induce focus-affected reading, whereas *always* does not do that.

²³ In B&C (2001), they propose to arrive at this defocussed meaning in a system that uses structured propositions. I have decided not to discuss their system in as much detail as they do in the 2001 paper and simply go by the less detailed version in 2002. This suffices for our purposes, I think.

In fact, the hypotheses in (59) and (60) allow B&C to account for more differences between *only* and *always* than I have discussed here. Since, in the interest of fairness, it is also appropriate to discuss these other differences, let us first present them and then go on to some criticisms of B&C's system.

An additional difference between *only* and the adverbs of quantification: the extraction (via *wh*-movement, for example), of the focus of *only* is impossible, whereas the extraction of the focus of the adverbs of quantification is possible. Consider (65) and (66):

(65) What do you think Kim always/rarely/sometimes gives his mother?

(66) *What do you think Kim only gives his mother?/What do you think Kim only gives [his mother]_F?

(65) can have two readings: one in which *always* associates with the trace left by *what* ("what is the thing such that Kim gives that thing and nothing else to his mother?"), and one in which it associates with *his mother* ("what do you think Kim gives his mother and noone else?"). (66), on the other hand, is ungrammatical without any prominence in the VP. And, if there is prominence, for example on *his mother*, then the only reading available is "what do you think Kim gives his mother and noone else?" (where *only* associates with focus), the other one is not available. If we assume that traces cannot bear the focus feature (contrary to Selkirk (1996: 561)), then this pattern is the same one we encountered above: there must be prosodically prominent material in the VP of *only*, and

²⁴ This presumes, as is common in neo-Davidsonian approaches, that thematic roles are partial functions which map events onto entities. See, e.g., Krifka (1990). See B&C for details about (63) and (64).

only associates with it. Neither of these two requirements is applicable to the adverbs of quantification.

My main objection against B&C's theory is conceptual. As an indication of what is wrong with it, consider what Rooth (1992: 107) has to say about the kind of position that B&C take with respect to *only*:

"This theory [Rooth's; LM] can be contrasted with one which merely supplies focus-sensitive semantic objects and leaves it to particular lexical items or semantic interpretive rules to say how focus is used semantically. For instance, we might use focus semantic values as defined in alternative semantics and include construction-specific rules [...] in the grammar and pragmatics. According to this view, the specification of focus semantic values is all there is to say in general about the semantics and pragmatics of focus. Focus semantic values are semantic objects which, like other semantic objects (i.e., ordinary semantic values) are manipulated by semantic and pragmatic rules. When we encounter a new focus-sensitive phenomenon, our task as theorists is to state a rule using focus semantic values which deals with these facts.

From several points of view, this is a weak position. As a component of a theory, a list of construction-specific rules makes limited predictions, predictions covering at best a few specific empirical domains. The list does not say anything about how focus might be used in another empirical domain. In fact, the only general consequence derivable from a theory of this form is that focus is used in ways which can be characterized by rules stated in terms of focus semantic values. Although this is perhaps not a trivial consequence, the theory remains radically unrestricted. In the usual way, a reflex of theoretical weakness is the need to propose a burdensome task for the language learner. In learning how focus works in English, one would have to learn a lot of separate things, keyed to specific constructions, lexical items, and discourse configurations.

We might call the theory just outlined the *weak theory* of alternative semantics. It can hardly be considered an explanatory theory of focus. It does not go far enough beyond correspondence with linguistic fact."

B&C take a weak position with respect to *only* but a strong position with respect to the adverbs of quantification, since their semantics does not make reference to focus (see (59)). Their position is a conceptually sound one from our perspective because there is no need to impose restrictions on the contextual variables associated with these adverbs. The most important problem though, as Rooth explains in the above quote, is

that it leaves the theory of association of *only* with focus without any predictive power: we have no reasons to expect the next item (from English, from another language) we analyze to be focus-sensitive or not.

As I have shown here, there is in principle no need to take the weak position with respect to *only*. At least some of the facts that they use to argue for the weak position can in fact be accounted for in a theory that is stronger from a conceptual point of view, like the one developed here. Our theory *does* make predictions as what we find in the next item we look at, in English or in a different language: if the item can be argued to have a contextual variable in its lexical entry, and if this variable is of the appropriate type, then the item in question can be focus sensitive. Given that I take focus to have a contextual effect only (focus only figures in congruence in our theory), only items that leave some work for the pragmatics will be able to be affected by it. And, in our terms, one way pragmatics affects truth-conditions is by filling “holes” in semantic representations, that is, via contextual variables. With congruence I can make sets of propositions available, and with the generalized union operation on these sets sets of situations/worlds are also available. So only those items for which it can be argued that their contextual variables are of the type of questions or of propositions can be focus sensitive. From both a conceptual and an empirical perspective, this is a very good state of affairs to be in.

Are there any empirical problems with B&C? Consider again the following example, from Chapter 3 (example (108)):

- (67) [Speakers A and B are talking about the things they were afraid John might have done yesterday: stain the tablecloth during lunch, smoke before dinner, invite Peter’s older brother for dinner and invite Peter’s younger brother for dinner]

A: John wasn't so bad after all. Of all the things we were afraid he might do, he only₁ [invited Peter's older brother for dinner]_F

B: You've got the wrong person: he only₂ invited Peter's [younger]_F brother for dinner. But it's true that he only₃ did one of those four terrible things we were afraid he might do.

B&C cannot explain the fact that in this example, focus does not associate with *only*₂; that is, there are examples in which the domain of *only* is not determined via focus. I can account for this because my theory contemplates ways other than focus to construct objects in the context (e.g., via explicit mentioning). (60) makes the opposite prediction. Here, B&C undergenerate and overgenerate.

Their theory overgenerates in other cases as well. Consider again our example (33)/(49), repeated here:

- (68) (= (33), (49)) a. Speaker A: Sandy feeds Fido Nutrapup
b. Speaker B: No, she always feeds [Butch]_F Nutrapup

Recall that I used this example to argue that a system that can predict a focus-affected reading for (68B) is needed. But, with (59), there is no guarantee that we generate the appropriate reading. We might want to argue that all that is needed is that we generate a reading that guarantees the denial, but recall from §3.2.2 that this is not enough. In other words, there is no procedure in B&C for generating focus readings for sentences with *always*; yet, such a procedure is needed in cases like (68).

It remains to be seen how facts such as (66) and others are to be accounted for in our framework. Notice that we should have no problem predicting the behavior of adverbs of quantification, since our assumptions about their semantics are basically the

same as those in B&C. What we need to find is a way of accounting for the differing behavior of *only*.

4.4.2 Rooth (1992)/von Fintel (1994, 1995)

Because of our points of similarity, the system in Rooth (1992) and von Fintel (1994, 1995) is as capable as I am of expressing the differences between *only* and *always* that have worried us here. They would proceed in the same fashion I have proceeded here, except, of course, that focus-readings are obtained via the \sim -operator instead of via context reconstruction and maximal informativity. The conceptual worries that we had about their system in Chapter 3 (see §3.2) still hold in the case of adverbs of quantification, so I refer the reader back to that chapter for criticism.

4.4.3 Association with focus as association with presupposition

In this section I would like to consider an alternative theory of association with focus that hinges on presupposition. Geurts and van der Sandt (1997, 1999) come closest to a development of such a theory, though I will not comment on it in their terms, given the very different framework in which they work (Discourse Representation Theory). The criticism that I offer at the end of this section is to be viewed as a critique of the basic idea behind their work, not of the particular implementation that they arrive at.

Geurts and van der Sandt (1997, 1999) assume the following principle (in the spirit of, e.g., Jackendoff (1972); see also Chomsky (1971)):

- (69) **The Background/Presupposition Rule (BPR)**
 Whenever ϕ is backgrounded, the presupposition is triggered that ϕ^* holds, where ϕ^* is the existential instantiation of ϕ

The assumption is that the role of focus is to divide a sentence into two parts: the focus and the background (i.e., the non-focus). Thus, the focus in (70) is “Fred”. and the background is “robbed the bank”:

- (70) [Fred]_F robbed the bank

Given the principle in (69), (70) is taken to presuppose that someone robbed the bank.

Here is what an analysis of a sentence with *only* would look like. Let us use (71) as an example:

- (71) John only invited [Mary]_F for dinner

Given (69) and ignoring *only*, (71) presupposes that John invited someone for dinner.

Suppose we take (72) to be the meaning of a sentence with *only*²⁵:

- (72) $[[NP \text{ only } VP]] = 1 \text{ iff } p \rightarrow q,$

²⁵ Geurts and van der Sandt actually don't discuss long-distance association, just short-distance association. The proposal in the text is, I think, a natural extension of their ideas.

where p is NP-VP*, the existential instantiation of NP-VP when NP-VP is backgrounded, and q is NP-VP. Then, the sentence in (71) is true iff, if John invited someone for dinner, he invited Mary for dinner. The sentence has, additionally, the presupposition that John invited someone for dinner, a piece of information that we also want to have²⁶. We could in fact assume the same meaning for sentences with *always*, and thereby also get the focus-affected reading of sentences such as (73):

(73) (= (8a), (51a)) In Saint Petersburg, [officers]_F always escorted ballerinas

There are two main reasons why one does not want to pursue a theory where association with focus reduced to association with presupposition, despite the fact that, conceptually, this is a desirable position to take. The first reason has to do with the generalizations put forth by B&C, and the second one is an argument from Rooth (1996, 1999).

As B&C already point out, given the behavior observed above for *only* and *always*, the best theory of association with focus is one that can express the differences in the way these two items behave with respect to focus. However, if association with focus reduces to association with presupposition, then uniform behavior is predicted for *only* and *always*. In particular, given that presuppositions can form part of the restriction of *only*, given the analysis in (72), it follows that presuppositions other than those induced by focus should be able to influence the meaning of sentences containing *only*. The

prediction is that a sentence like (74), which repeats (13), should have a reading like that in (75), contrary to fact:

(74) (= (13)) Mary only managed to complete [her exams]_F

(75) if Mary took exams, she managed to complete them

If we wanted to prevent this undesirable result by stipulating that *only* does not associate with presupposition, we wouldn't predict readings that *only*-sentences have, since this stipulation would prevent us from using the existential instantiation of NP-VP (i.e., that John invited someone for dinner in the case of (71)).

In order for this analysis of association to work, it must be that the contribution of focus is understood as a contribution about presupposition. That is, what focus does in a sentence like (71) is make the presupposition that John invited someone for dinner available. Rooth (1996, 1999) has provided arguments against this move that do not have to do with association. Consider (72) and (73) (p. 241 in the 1999 paper; see pp.292-3 in the 1996 paper):

- (76) a. Speaker A: Did someone borrow my badminton racket?
b. Speaker B: I don't know. If [John]_F borrowed it, you can forget about getting it back in one piece

²⁶ Recall that there is controversy as to whether this piece of information should be classified as a presupposition, as discussed in Horn (1996). We could take this already to be a problem with the hypothesis that we are entertaining. Let us abstract away from it though.

- (77) a. Speaker A: Did anyone win the football pool this week?
 b. Speaker B: Probably not, because it's unlikely that [Mary]_F won it, and she's the only person who ever wins
 c. #Speaker B: Probably not, because it's unlikely that it's [Mary]_F who won it, and she's the only person who ever wins

If focus induced an existential presupposition, as predicted by system in Geurts and van der Sandt, B's answer in (76b) would be predicted to be ill-formed, due to an incompatibility of the first part of his or her response (*I don't know (whether someone borrowed your badminton racket)*) and the presupposition that someone did, which projects through the conditional. As for (77), we are to imagine that "in my department, a football pool is held each week, and people bet on the outcomes of games. It is set up so that at most one person can win; if nobody wins, the prize money is carried over to the next week.[...] Speaker B knew that Mary had made a silly bet, and since in the past nobody else ever won, B finds it unlikely that anyone won" (p. 241). Note that (77c), with a cleft, is not an appropriate answer, whereas (77b), without the cleft though still with focus, is fine. If focus induced an existential presupposition, however, we would not expect this difference. On the plausible assumption that the cleft in (77c) induces the existential presupposition that someone won the football pool this week, we can understand the oddness of the response to reside in the incompatibility of this presupposition with the first part of B's response (*probably not*). However, this means that we should not assume that focus in (77b) also induces an existential presupposition, since then we would predict (77b) to be as odd as (77c).

So, while from a conceptual point of view it is reasonable to envisage a theory where focus reduces to presupposition, this position is not tenable on empirical grounds.

4.4.4 Roberts (1996/1998) and Schwarzschild (1997)

Neither Roberts nor Schwarzschild consider extending their system to *always* (though see Calcagno (1996) for some remarks). However, it is possible to say the following. The system in Roberts and Schwarzschild does not make use of a principle like (9), since their systems do not take advantage of the anaphoric properties of the argumental variable of C (see §§3.6.1-2). However, in order to account for non-focus-related readings for adverbs of quantification, they would have to admit a principle like (9). It is clear that this position is conceptually inferior to the position we have taken here: the two kinds of readings that adverbs of quantification get would follow from two separate and entirely different sets of principles. Another conceivable position they could take is to say that their systems do not in fact extend to the adverbs. But this would result in theories in which the focus meaning of *only*-sentences and the focus meaning of *always*-sentences result from entirely different sets of principles, again an unwanted position to take. I think it is a virtue of the framework developed here that the anaphoric properties of the argumental variable of C are taken so much advantage of.

4.4.5. Herburger (2000).

Following earlier work by e.g., Davidson (1967) and Parsons (1990), Herburger assumes that sentences are descriptions of events. In other words, the denotation of the sentence in (78) is as in (79):

(78) John loves Mary

(79) $\exists e [C(e) \ \& \ \text{love}(e) \ \& \ \text{EXPERIENCER}(e, \text{John}) \ \& \ \text{THEME}(e, \text{Mary})]$

All sentences have a syntactically represented adverbial quantifier, which is often tacit, as in (78), but need not be, as in the case of adverbial quantifiers. These quantificational expressions also come restricted with a contextual variable *C*, here a predicate of events, just as, by the way, verbs (i.e., *love*).

Her thesis is that focus affects quantification over events via the principle in (80):

(80) **Structured Davidsonian Decomposition**
All the nonfocused material inside the scope of the event quantifier *Q* also restricts *Q*

Focus on *Mary* in (78), as in (81), would result, by (80), in (82):

(81) John loves [Mary]_F

(82) $\exists e [C(e) \ \& \ \text{love}(e) \ \& \ \text{EXPERIENCER}(e, \text{John})] \ \text{THEME}(e, \text{Mary}) \ \& \ \text{love}(e) \ \& \ \text{EXPERIENCER}(e, \text{John})$

While in a case like (81), this might not have important consequences (though see her remarks in pp. 19-21), when the quantifier over events is our *always*, association with focus results (see her chapter 3). (83a) and (83b) are predicted to have the truth-conditions in (84a) and (84b), respectively:

- (83) a. Louise always said hi [to Albert]_F
 b. [Louise]_F always said hi to Albert
- (84) a. $\forall e [C(e) \ \& \ \text{say_hi}(e) \ \& \ \text{PAST}(e) \ \& \ \text{AGENT}(e, \text{Louise})] \text{to}(e, \text{Albert}) \ \& \ \text{say_hi}(e) \ \& \ \text{PAST}(e) \ \& \ \text{AGENT}(e, \text{Louise})$
 b. $\forall e [C(e) \ \& \ \text{say_hi}(e) \ \& \ \text{PAST}(e) \ \& \ \text{to}(e, \text{Albert})] \ \text{AGENT}(e, \text{Louise}) \ \& \ \text{to}(e, \text{Albert}) \ \& \ \text{say_hi}(e) \ \& \ \text{PAST}(e)$

Taking adverbs of quantification like *always* to be quantifiers over events, a straightforward way of capturing the focus readings of sentences such as (83) ensues.

The problem, of course, is that this makes adverbs of quantification associate with focus obligatorily; but, as B&C's facts amply demonstrate, this is not the kind of theory we want to have. Herburger's analysis of *only* is also as a quantifier over events and is very similar to that proposed in Bonomi and Casalegno (1993); her analysis also makes use of the principle in (80), which makes for a uniform analysis. Unfortunately, the analysis is uniform in the "wrong" way, so to speak, by linking focus directly to the quantificational structure that they introduce. As opposed to this, the framework that we have developed in this dissertation links focus, both in the case of *always* and in the case of *only*, indirectly, thus making the necessary room for explaining (some of) the differences between them.

4.5 Conclusion to Chapter 4

In this chapter I have provided an analysis of the readings of sentences with *always* and a focus. The proposal is a direct application of the system we already advanced in Chapter 3, where the principle that the antecedent of the argumental variable of C is a salient object ((9) in this chapter) played a crucial role. I have suggested a theory where the meanings of sentences with *always* follow from this assumption. In particular, in the framework developed here, sentences with *always* and a focus have the freedom of interpretation that they do because different kinds of objects can be made available in the context (presuppositions, (the generalized union of) focus-related QUDs, explicitly-mentioned situations), and the argumental variable of the C of *always* is of the right semantic type to have these objects as antecedents. The fact that the range of interpretation for *only* is more restricted, so that the argumental variable of the C of *only* cannot be anaphoric to some of these objects (presuppositions, explicitly-mentioned situations), follows from the assumption that the argumental variable of the C of *only* is of the wrong semantic type: being a set of propositions, it can only have questions as antecedent. The contribution of the present chapter is thus that this difference between *only* and *always* follows naturally once a framework like ours is in place.

The proposal here and in Chapter 3 allows us to maintain the hypothesis that the argumental variable of C is a pronoun, because it does not add to the assumptions about the theory of anaphora that we laid out in Chapter 1 (§1.2.1). Crucially, my analysis of association with focus does not place constraints on contextual variables that are not the kinds of constraints pronouns are known to have.

I also continued the review of alternative approaches to association with focus; the discussion centered around the proposal in B&C and the association with focus as association with presupposition proposal. I suggested that it is not necessary to take the weak conceptual position that B&C take, at least not in view of the difference between *only* and *always* alluded to above. To be fair, I noted that there are other differences between these two items that are not dealt with here, though the possibility that the present framework be capable of accounting for them is not unreasonable. The facts that B&C themselves present argue against a theory in which association with focus is reduced to a case of association with presupposition.

Appendix I The official semantics for adverbs of quantification

von Fintel suggests five important modifications to the semantics sketched in the text (§4.2.1). First, note that according to (15), the denotation of a sentence with *always* will not be a set of situations but a truth-value. What is left after the arguments of the adverbs have been λ -converted is simply the statement that a certain set of situations is a subset of another set of situations, as indicated in (17) for the sentence in (16a) with structure (16b). This is not what we want; we want sentences to denote sets of situations, not truth-values (in Kratzer's semantics, propositions are viewed as sets of situations). In order to fix this problem, von Fintel amends the semantics for *always* as in (85):

$$(85) \quad [[\text{always}]]^{\mathcal{E}} = \lambda C \in D_{\langle s, t \rangle} . \lambda p \in D_{\langle s, t \rangle} . \lambda q \in D_{\langle s, t \rangle} . \lambda s. \{s' : p(s')=1 \ \& \ C(s')=1 \ \& \ s' \in S(w_s)\} \subseteq \{s' : q(s')=1\}$$

For any world w , $S(w)$ is the set of situations that are part of that world. $S(w_s)$ is then the set of situations that are part of the world of s .

Another amendment has to do with the kinds of situations that are quantified over. A notion of minimality is needed (cf. Berman (1987), Heim (1990)):

$$(86) \quad \min(S) = \{s \in S : \forall s' \in S (s' \leq s \rightarrow s' = s)\},$$

where ' \leq ' is the part-of relation for situations. This notion is used as in (87):

$$(87) \quad [[\text{always}]]^{\mathfrak{g}} = \lambda C \in D_{\langle s, D \rangle} . \lambda p \in D_{\langle s, D \rangle} . \lambda q \in D_{\langle s, D \rangle} . \lambda s . \min\{s' : p(s')=1 \ \& \ C(s')=1 \ \& \ s' \in S(w_s)\} \subseteq \{s' : q(s')=1\}$$

The use of minimal situations is justified by the need to understand the kinds of entities that we are counting. Unless make use of this notion, it is unclear what we are counting. For example, suppose that two cats were fed last night. How many situations of a cat being fed last night are there? We could say that there is one per cat, but we could also say that there is an additional one in that the situation in which the two cats are fed last night also counts as a situation of a cat being fed last night. And the situation containing all the cat feedings last night in the city of Willimantic also counts. And the situation containing all the cat feedings last night in the state of Connecticut, etc. The problem is that there probably is infinitely many situations containing a cat being fed last night. This makes it difficult to count them and to compare the cardinalities of two sets of situations, something that is nevertheless required by the semantics of these adverbs.

As it is, however, the semantics of *always* predicts that sentences with *always* can never be true, because a minimal situation in which *p* can hardly be a a situation in which *q*. (88) improves on this situation:

$$(88) \quad [[\text{always}]]^{\mathfrak{g}} = \lambda C \in D_{\langle s, D \rangle} . \lambda p \in D_{\langle s, D \rangle} . \lambda q \in D_{\langle s, D \rangle} . \lambda s . \min\{s' : p(s')=1 \ \& \ C(s')=1 \ \& \ s' \in S(w_s)\} \subseteq \{s' : \exists s'' (s' \leq s'' \ \& \ q(s'')=1)\}$$

The modification is this: instead of requiring some set to be a subset of the set of situations in which *q*, we require some set to be a subset of the set of situations that are *extendable* into situations in which *q*.

Another change is prompted by the need to guarantee exhaustivity with focus²⁷.

Recall our examples from (8), repeated here:

- (89) (= (8)) a. In Saint Petersburg, [officers]_F always escorted ballerinas
 b. In Saint Petersburg, officers always escorted [ballerinas]_F

In its focus reading, (89a) is false in a situation in which people other than officers escorted ballerinas in Saint Petersburg. In order to guarantee this, what must hold is that the set of minimal situations in which someone escorted ballerinas is a subset of the set of situations that are extendable into the set of *minimal* situations in which officers escorted ballerinas. Minimal situations in which officers escorted ballerinas cannot contain people other than officers escorting them. Thus, we have (90):

$$(90) \quad [[\text{always}]]^{\mathbf{g}} = \lambda C \in D_{\langle s, D \rangle} . \lambda p \in D_{\langle s, D \rangle} . \lambda q \in D_{\langle s, D \rangle} . \lambda s . \min\{s' : p(s')=1 \ \& \ C(s')=1 \ \& \ s' \in S(w_s)\} \subseteq \{s' : \exists s'' (s' \leq s'' \ \& \ (\min(q))(s'')=1)\}$$

This means that a sentence with *always* is true in a situation *s* iff all minimal situations in which *p* that are contextually salient are part of a minimal situation in which *q*.

The last refinement is prompted by the fact that the truth-conditions of a sentence with *always* are unfulfillable according to the semantics in (90): a minimal situation in which *p* cannot possibly be part of a *minimal* situation in which *q* (see von Stechow (1995: 179)). The final lexical entry for *always* is in (91):

²⁷ And avoid the so-called problem of requantification, but I will not discuss that here.

$$(91) \quad [[\text{always}]]^s = \lambda C \in D_{\langle s, D \rangle} . \lambda p \in D_{\langle s, D \rangle} . \lambda q \in D_{\langle s, D \rangle} . \lambda s . \min\{s' : p(s')=1 \ \& \ C(s')=1 \ \& \ s' \in S(w_s)\} \subseteq \{s' : \exists s'' (s' \leq s'' \ \& \ (\min(\{s''' : p(s''')=1 \ \& \ C(s''')=1 \ \& \ q(s''')=1\}))(s'')=1)\}$$

A sentence of the form “when p, always q” comes out true in a situation s iff all minimal salient situations in which p in the world of s are part of a minimal salient situation in which p and q. The final semantics for our example (16) are in (92):

$$(92) \quad [[(16)]]^s(s) = \lambda s . \min\{s' : \text{it_rains}(s')=1 \ \& \ (g(1))=1 \ \& \ s \in S(w_s)\} \subseteq \{s' : \exists s'' (s' \leq s'' \ \& \ (\min(\{s''' : \text{it_rains}(s''')=1 \ \& \ (g(1))(s''')=1 \ \& \ \text{I_miss_the_bus}(s''')=1\}))(s'')=1)\}$$

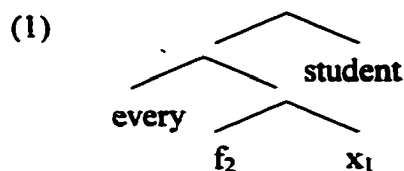
In other words, (16) is true in a situation s iff all minimal salient situations in which it rains are part of a minimal salient situation in which it rains and I miss the bus.

Chapter 5 Conclusion

5.1 Summary of the dissertation

In this dissertation I have argued that contextual variables of the kind standardly assumed for quantifiers like *every* or *only* are pronouns. One major advantage of taking this position has to do with the fact that if the behavior of contextual variables is regulated by principles that we need independently for pronouns such as *he*, the task of language acquisition is made easier for the child. This turned out to be particularly important because we found that the behavior of *C* varies cross-linguistically.

I suggested that *C* is decomposed into a functor variable and an argument variable, following ideas in von Stechow (1994, 1995). (1) is the representation for the quantificational expression *every student* proposed here:



The more fine-grained version of the hypothesis pursued here is that the argumental variable of *C* is a pronoun. I assumed that the functor variable of *C* is a pronoun as well, but did not investigate its properties here. The hypothesis predicts that we should observe pronoun-like behavior with *C*. I tested this prediction in a number of ways.

First, I showed that the argumental variable of the C of quantificational expressions like *every* or *no* can be bound and in fact is subject to the kinds of constraints that bound pronouns are known to be subject to. In particular, this variable is subject to WCO. I used data from English, Chinese and Spanish to support this claim. Significantly, I showed in addition that whenever we find exceptions to WCO with pronouns in English, we find the same exceptions with C. Also, the distribution of Chinese bound pronouns is more constrained than in English, and we found that the distribution of C is also more constrained, and in the same way.

I discussed arguments provided by Partee (1989) against the assumption that contextual variables are present in the syntax (cf. (1)). I argued that Partee's data do not necessarily argue for a system in which contextual variables are not represented in the syntax and proposed an alternative analysis where what is at stake is the internal structure (or lack thereof) of the variables involved.

Then I turned to the study of free instances of the argumental variable of C. I argued against analyses of association with focus that postulate non-pronoun-like constraints on the argumental variable of C on the grounds that such analyses force us to depart from the attractive hypothesis that the argumental variable of C is a pronoun. I proposed an alternative analysis of association with focus phenomena that does not postulate unwanted constraints on this variable. In the alternative analysis, nothing is added to the theory of anaphora that we have reasons to assume on the basis of the behavior of pronouns like *he*. The burden of explanation is shifted to constraints on discourse structure, where a principle of maximal informativity played a particularly important role. These constraints narrow down the kinds of contexts where sentences are

felicitous. I argued that it is because of properties of the contexts in which sentences with *only* are felicitous that association-with-focus readings obtain: they contain only one suitable antecedent for the argumental variable of the C of *only* (i.e., they contain only one object of the right semantic type, $\langle\langle s, t \rangle, t \rangle$, that leads to truth-conditions that can be fulfilled). The same principles that are used in the analysis of association of *only* with focus are used in the analysis of association of *even*, *also* and *always* with focus. Furthermore, the principle of maximal informativity finds additional support from the fact that it helps to resolve an association-independent problem that arises in the system in Roberts (1996/1998), which we took as our starting theory of discourse structure.

Additional arguments were presented against other analyses of association with focus. I argued against the analysis in Rooth (1992) on both empirical and conceptual grounds. The empirical grounds had to do with denials, where Rooth's system either predicts association with focus or predicts discourse appropriateness of the denial, but not both. The conceptual criticism was that, even though the 1992 system, as opposed to the 1985 one, does not place constraints on the argumental variable of C unwanted from the perspective of the theory of anaphora assumed for pronouns, unwanted constraints are still placed on variables (i.e., on the focus variable). Other works reviewed here included Roberts' own proposal and Schwarzschild (1997).

Finally, I showed that the analysis of association with focus proposed here naturally accommodates the behavior of adverbs of quantification, such as *always*. An important observation, due to Beaver and Clark (2001, 2002a, b) and Cohen (1999) is that sentences that contain *always* and a focus have a wider range of interpretations than normally assumed. In my proposal, this follows from the assumption that the semantic

type of the argumental variable of the C of *always* ($\langle s, t \rangle$) is such that more than one antecedent can be found in the contexts in which sentences with *always* and a focus are felicitous. One of these antecedents is focus-related and obtains in the same way the antecedent for the argumental variable of the C of *only* obtains (with the additional assumption, shared with other works, that we can obtain a set of situations from a set of propositions, something that is easily achieved via the generalized union on the set of propositions). Because the argumental variable of C is a pronoun, it can be anaphoric to other objects provided they are of the right semantic type, and objects of type $\langle s, t \rangle$ are available independently of focus. This gives rise to readings in which the argumental variable of the C of *always* is anaphoric to a set of situations that is made salient in previous discourse as well as to readings in which *always* “associates with presupposition” (i.e., in which the variable of *always* is anaphoric to a set of situations made available via the presuppositions of items in the sentence).

The system I developed is also equipped to deal with another observation about association: the range of interpretations of sentences with *only* is more restricted than the range of interpretations of sentences with *always*. In particular, *only*-sentences do not give rise to association-with-presupposition readings. The solution to this problem in our system hinges again on the type of the argumental variable of the C of the quantifier in question: since the variable of *only* is a set of propositions, it cannot be anaphoric to a set of situations made salient via presupposition. I suggested that the observation that Beaver and Clark take to be the hallmark of *only*, however, is not quite correct, since *only*-sentences can sometimes have readings where *only* does not associate with focus. The analysis of association proposed here makes the right predictions in these cases as well.

5.2 Prospects for future research

Several interesting directions for future research emerge from the present work. Some of these are pointed out and commented on in this section.

I have shown in this dissertation that the hypothesis that the argumental variable of C is a pronoun is not only attractive from the perspective of language acquisition but sustainable. I showed that bound and free instances of this variable can be treated in the same way bound and free instances of pronouns like *he* are treated.

With Partee (1989), I suggest that it is important to look for evidence from a wide range of languages in our study of the behavior of contextual variables. It seems that Chinese lacks an item that behaves like English *local*. Whereas *dangdi* seems to have a contextual variable associated with it, since the perspective from which it is understood can vary from context to context, it seems that this contextual variable cannot be bound. I think that the study of such cases can shed interesting light on our theories about contextual variables, as can, by the way, the study of the contextual parameters associated with adjectives like *small* or *tall* (cf. Heim and Kratzer (1998: 71)).

Roberts (1995: 661-2) notes that examples such as those in (2) can be understood as further cases where the domain of a quantifier is affected by what is salient in the preceding discourse:

- (2) a. I hope to earn enough money next summer to purchase some plants for the garden. If so, I will definitely, order some dwarf apple trees. *I might buy a Reine des Violettes rose from that place in California, too.*
 b. Alice called Gertrude to dinner shortly after dusk. *Gertrude gladly put aside her papers and left her desk* -

Notice that the italicized sentence in (2a) can be paraphrased as “if I can afford to buy plants, I might buy a Reine des Violettes rose bush”. The quantification that the modal *might* introduces is affected by information from the previous sentence, so that it is restricted to those worlds or situations in which the speaker has enough money to buy plants. Likewise, the italicized sentence in (2b) can be paraphrased as “when Alice called her to dinner, Gertrude gladly put aside her papers and left her desk”. Here Roberts suggests that one can view the reference time established in the first sentence of (2b), the time when Alice called Gertrude to dinner, to restrict an operator over times or events. We would want to treat these examples as cases where a contextual variable is anaphoric to some contextually-given object, just like we treated *every*, *only* or *always*. An important task that we have ahead of us is to develop an analysis of these cases that allows us to maintain the null hypothesis that contextual variables are pronouns.

Finally, one further project worth pursuing is concerned with the behavior of quantificational determiners like *every* or *no*. First, it has been suggested in the literature (see e.g., Eckardt (1999); Geilfuss (1993); Herburger (2000)) that quantificational determiners also associate with focus. One obvious question that a framework like the one I have developed in Chapters 3 and 4 is whether the analysis can be extended to these other quantifiers as well. Then, given the observations in Beaver and Clark (2001, 2002a, b), it should be determined whether quantificational determiners behave like *always* or like *only* in the range of interpretations that sentences containing them allow and with

respect to other differences pointed out in their work. This should provide us, at the very least, with a further test ground for the theories discussed in Chapters 3 and 4.

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