Contradiction and Grammar:
The Case of Weak Islands

by

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Abstract

This thesis is about weak islands. Weak islands are contexts that are transparent to some but not all operator-variable dependencies. For this reason, they are also sometimes called selective islands. Some paradigmatic cases of weak island violations include the ungrammatical examples involving manner and degree extraction in (1)a and (2)a, as opposed to the acceptable questions about individuals in (1)b and (2)b:

(1) a. *How does John regret that he fixed the car?
    b. Who does John regret that he invited to the party?

(2) a. *How much milk haven't you spilled on your shirt?
    b. Which girl haven't you introduced to Mary?

The main questions that an account of weak islands should address are the following:

- What contexts create weak islands and why?
- Which expressions are sensitive to weak islands and why?
- Why do weak islands sometimes improve?

This thesis develops a semantic account for weak islands, whose core idea can be summarized as follows. What sets apart the expressions that are sensitive to weak islands from the ones that are not is that in the case of the former the domain of quantification is such that its elements stand in a particular logical relationship with each other. The island creating contexts are those in which this property of the island-sensitive expressions leads to a problem, namely a contradiction. This contradiction might manifest itself in one of two forms: In some cases, the question will presuppose that that a number of mutually incompatible alternatives is true at the same time, therefore it will necessarily lead to a presupposition failure in any context. In other cases, the presupposition that there be a complete answer will not be met in any context, because the domain of question alternatives will always contain at least two alternatives that have to—but cannot—be ruled out at the same time.

The present proposal therefore fits in the family of proposals (most importantly Szabolcsi and Zwarts (1993), Honcoop (1998), Rullmann (1995), Fox and Hackl (2005)) which argue that it is independently necessary principles of semantic composition that lead to the oddness of weak islands, rather than abstract syntactic locality constraints. As such, it provides a further piece of evidence against the view which holds that principles governing the well-formedness of sentences necessarily belong to the realm of syntax as we know it. However, when we will examine the nature of the contradiction that arises in the cases of weak island violations, we will observe that it is only a special type of contradiction—identified by Gajewski (2002) as L-analytic—which leads to ungrammaticality: namely one that results from the logical constants of the sentence alone. In this sense the violation that can be observed might be argued to be "syntactic": it can be read from the logical form of the sentences.

Thesis Supervisor: Danny Fox
Title: Professor of Linguistics

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In this trade we have an idea every now and then, and the rest of the time we work. I am incredibly grateful to my thesis advisor Danny Fox, for inspiring ideas and for patiently trying to teach me how to do the work. His contribution to this thesis has been invaluable, and I can hardly believe how much I have learned since I have started to work with Danny little more than a year ago, including all the things I now know that I still don't know. He was always supportive, critical and constructive at the same time, and so there was no appointment, good or bad, after which I did not feel inspired to think more. It was always interesting and encouraging to meet with Danny, and I feel very lucky to have had such a wonderful advisor as him.

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I am indebted to the almost-member of my committee Benjamin Spector, for a number of interesting and very helpful meetings, and especially for the idea to use an interval-based semantics for degrees for negative degree questions, discussed in Chapter 3 of this thesis. I am looking forward with anticipation to our future joint work on this topic. Emmanuel Chemla and Giorgio Magri have read and commented extensively with express speed on a number of drafts at different stages of writing, for which I will be indebted forever. I am also very grateful to Roni Katzir who was kind enough to read my defense draft in one piece, and offered very helpful notes and suggestions as well as Jon Gajewski for reading and discussing some earlier drafts.

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<u>A note to the reader</u>: The present version of thesis was written at a rather hasty speed and is therefore rough and sketchy at points. An updated and corrected version of it will appear in MITWPL as well as on the author's website a few months from now. Needless to say, none of the many shortcomings of the present document are the fault of any of the above mentioned people.

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Chapter 1

Weak Islands and Contradiction

1. Introduction

The central claim of this thesis is that weak islands are unacceptable because they lead to a contradiction. This can come about in one of two ways:

i. The constraint that questions have a unique most informative answer is not met: therefore any complete answer is bound to state a contradiction.
ii. The question presupposes a set of propositions that are contradictory.

In more intuitive terms we might say that it is a felicity condition on asking a question that the speaker might assume that the hearer is in a position to know *the complete answer*. But when there cannot be a maximal answer to a question, any potential complete answer amounts to the statement of a contradiction. Therefore, no hearer can be in the position to know the complete answer, and as a consequence the question cannot be asked. When the question presupposes a contradiction, it cannot be asked in any context.

1.1. The Maximal Informativeness Hypothesis

The first type of problem finds its antecedents in the proposals of Dayal (1996), Beck and Rullmann (1999), Fox and Hackl (2005). Dayal (1996) in particular has argued that a question presupposes that a member of its Karttunen-denotation entails all other members, in other words, that there is a single most informative true member among the true alternative answers in the Hamblin-denotation. This condition is similar to the more familiar condition on the use of a definite description, which is only possible if the extension of the common noun that the definite article combines with has a maximal element. Fox and Hackl (2005) argue in turn that the maximality condition that Dayal (1996) proposes is never met in the case of negative degree questions. This for them follows from the hypothesis that the set of degrees relevant for the semantics of degree constructions is always dense (UDM). Given then that these questions can never have a most informative true answer, (i.e. they can never have a maximal true answer that entails all the other true answers) they will be unacceptable as a presupposition failure.

What I will adopt from the above proposals is that questions are unacceptable if they do not have a most informative answer, i.e. no true answer entails all the other true ones. I will call this condition of Dayal (1996)'s the *Maximal Informativeness Hypothesis*. If there is no maximal element in the Karttunen denotation of a question, then for any element in the Karttunen denotation, the assertion that it is the complete true answer will be a contradiction. I will use these two ways of stating the problem interchangeably.

1.2. Contradictory presuppositions

The second reason why weak islands might lead to a contradiction is that they might stand with a set of presuppositions that are incoherent. As no context can entail a contradictory set of presuppositions, potential complete answers to such questions will be doomed to be presupposition failures. Therefore, such questions will be judged as ungrammatical. Similar reasoning about contradictory presuppositions leading to ungrammaticality was proposed e.g. in Heim (1984), Krifka (1995), Zucchi (1995), Lahiri (1998), Guerzoni (2003), Abrusan (2007). In our case, the contradictory presuppositions arise because the relevant questions contain a presupposition trigger of a certain form: one that presupposes the truth of its complement. Given the observation that presuppositions embedded in questions project in a universal fashion, such questions will presuppose a set of propositions. In the case of weak island-sensitive extractees, I will argue, this set will necessarily be incoherent.

1.3. Extractees and interveners

I will further argue that the felicity condition on asking a question that there be a complete answer has the power to predict which elements will be bad extractees, as well as which contexts create weak island intervention in the following way:

i. The contexts that constitute weak islands are those in the case of which we run into a contradiction with some but not other extractees.

ii. The difference between the good and the bad extractees in the weak island creating environments is that in the case of bad extractees, the complete answer is always incoherent. This is not true however in the case of good extractees.

As will become evident in the course of the discussion, the above two conditions are but two sides of the same coin. The extractees that are sensitive to weak islands are special in that their domain is such that it contains atoms that are not independent of each other. As a consequence, the truth of an (atomic) proposition in the Hamblin-denotation has consequences for the truth of other atomic propositions in the Hamblin-denotation. This property however will, in some contexts, lead to a situation in which no complete answer can be found. These contexts are the contexts that create weak islands.

1.4 On contradiction

I have proposed above that the reason for the ungrammaticality of weak islands follows from the fact that all of their possible complete answers express a contradiction. But why does this fact lead to ungrammaticality? We are after all perfectly capable of expressing contradictory or nonsensical sentences, without them being ungrammatical: this was in fact the point behind Chomsky's famous example *Colorless green ideas sleep furiously.* However, it seems that we need to distinguish between contradiction that results from non-logical arguments, from a contradiction that results from the logical constants alone. Gajewski (2002) argues that the second in fact plays an important role for natural language: he argues that sentences that express a contradiction or tautology by virtue of their logical constants are ungrammatical. The present proposal falls under Gajewski

(2002)'s generalization in that it proposes that the weak island violations lead to a contradiction independently of the particular choice of variables.

1.5. Preview of this chapter

In the remainder of this chapter I will introduce the concepts discussed above in much greater detail. In Section 2 I discuss the semantics of questions about plural individuals, introducing Dayal (1996)'s *Maximal Informativeness Hypothesis* along the way. Section 3 spells out the assumptions about the nature of projection of presuppositional items embedded in questions. Section 4 discusses Gajewski (2002)'s condition about analytical sentences in further detail. Section 5 introduces the puzzle of weak islands in greater detail, listing the basic examples for easier further reference, as well as providing a preview of the chapters that will follow.

2 Questions about (plural) individuals

In this section I first briefly review the semantics of plurals and plural definite descriptions along with some concepts that will be useful later in this dissertation, and then turn to the explication of the semantics of positive and negative questions about plural individuals.

2.1 Plurals: An ordering and a designated element: the maximum

2.1.1 An ordering

Following the work of Link (1983) and many others it is commonly assumed that the domain of quantification over individuals is not simply a set of atomic individuals, but a set of individuals with a partial ordering: the domain of individuals is ordered by a part-of relation. Plural individuals are those that have other individuals as parts, singular individuals have only themselves as parts. A plural NP such as *John and Mary* denotes the plural individual that is the sum of the singular individuals *John* and *Mary*.

(1) $\mathcal{D}=\wp^*(\mathrm{At})$, for some set At

i. For every set X, let $\wp(X)$ be the collection of all subsets of X

ii. $\wp^*(X)=\wp(X)\setminus\{\emptyset\}$

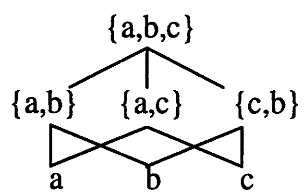
(2) Singular individuals denote atoms, plural individuals denote sums of atoms

(3) The proper part relation ($\subseteq$) and sum ($\cup$) are defined as usual

(4) We will simplify assuming that $\{a\}=a$ (this is known as "Quine's innovation")[1]

The structure that we thus arrive at is now a *free i-join semilattice.* These structures can be visualized as follows:

(5)



Where:

i. $\{a, b\} \subseteq \{a, b, c\}$

ii. $a \subseteq \{a, b\}$

2.1.2 Singular and plural NPs

How are singular and plural NPs represented in this structure? A singular NP denotes the set of *atomic individuals* that are in the extension of the NP. A plural NP can in principle be represented in two ways, and in fact both of these options have been proposed in the literature. We could say that plural common count nouns like *boys* are true of pluralities, i.e. non-singular sets of boys (this is e.g. the position assumed by Chierchia (1998)) Now, if, in a given model, the extension of the singular noun *boy* is $\{a, b, c\}$, then that of *boys* is $\{\{a,b\}, \{a,c\}, \{b,c\}, \{a,b,c\}\}$.

(6) $[\![\text{boys}]\!] = \wp^*[\![\text{boy}]\!] \setminus At$

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[1] cf. Schwarzschild (1996) e.g. on this point.

The second approach to plurals in this framework assumes that plural common count nouns like *boys* are true of pluralities and singularities. That is, if the extension of *boy* is {a, b, c}, then that of *boys* is {a, b, c, {a,b}, {a,c}, {b,c}, {a,b,c}}. (cf, Landman (1989) Landman (1991), Krifka (1989) and Schwarzschild (1996) Spector (2007)) In other words, *Boy* denotes a set of atoms, and *boys* denotes the i-join semilattice generated by $[\![\text{boy}]\!]$.

(7) $[\![\text{boys}]\!] = \wp{*}[\![\text{boy}]\!]$

(8) the extension of the predicate is indicated by x-es below:

For the sake of concreteness, it is this second position that I will be assuming throughout this chapter; though as far as I can see it does not have any significant bearing on our issues.

2.1.3 The maximum

Above we have said that *boy* denotes a set of atoms, and *boys* denotes the i-join semilattice generated by $[\![\text{boy}]\!]$. It seems however that natural language also makes reference to a special element in this structure: the maximum. Sharvy (1980) proposes that *the boys* denotes precisely this special element: the maximal element of the set of all boys. The iota operator can be used to interpret the definite article: when it applies to the extension of a plural noun like *boys*, it refers to the largest plurality in that extension.

(9) $[\![\iota x.\ P(x)]\!] = \cup[\![P]\!]$ if $\cup[\![P]\!] \in [\![P]\!]$; undefined otherwise

i.e. $\iota x.\ P(x)$ is only defined if $[\![P]\!]$ forms itself an i-join semilattice, and then $\iota x.\ P(x)$ is the maximal element of $[\![P]\!]$.

(10) $[\![\text{the boys}]\!] = \iota x\ [\ x \in [\![\text{boys}]\!]]$

When the iota operator applies to a set of singularities there are two things that can happen: if a singular predicate has more than one object in its extension, the maximum will not be defined. If, on the other hand, the singular predicate has only one element in its extension, the iota operator picks out this object. This is how the singularity presupposition of the definite determiner is accounted for.

2.1.4 Distributivity

In the framework introduced above, singular and plural individuals are treated in the same way: There is no ontological difference between denotations of singular terms like *the boy* and a plural term like *the boy*s. The reason for this is that Link (1983) wanted to provide an analysis to collective and distributive readings of plurals, but keeping a common representation for definite plurals. The solution was to assign them groups as denotation. (Following Schwarzschild (1996), among others, I have been representing groups as sets). Now, if e.g. the sum of John and Bill is an individual on its own right, this plural individual can be in the extension of a predicate like *meet*, without it being the case that the individuals making up the plural individual would be necessarily in the extension of the predicate as well. Thus, it does not follow from the truth of *Bill and John met* that *#Bill met* or that *#John met.* Similarly, a sentence such as *The lamp and the box are heavy* might be true in a context, even if neither the lamp nor the box themselves are heavy.

The question that arises though is how can we deal with distributive predicates, i.e. predicates that seem to be true of the individuals that make up the plurality in question, e.g. *blond* or *intelligent.* The solution of Link (1983) is to apply a distributive operator to a predicate:

(11) Dist (P)(x)=1 iff P(x)=1 or $\forall y\, [y \in x \rightarrow P(y)=1]$

Now, even though a predicate such as *intelligent* might be undefined for a plurality, it can still be true for a plurality under a distributive operator:

(12) a. $[\![\text{intelligent}]\!]$ ({Bill, Mary}) is undefined

b. $[\![\text{intelligent}]\!]$ ({Bill}) =1; $[\![\text{intelligent}]\!]$ ({Mary}) =1

c. Dist ($[\![\text{intelligent}]\!]$) ({Bill, Mary}) =1

2.1.5 Homogeneity

It has been noted since Fodor (1970) that definite plurals give rise to "all or nothing" effects: e.g. an utterance such as *I didn't see the boys* gives rise to an inference that I did not see *any* of the boys. This is shown e.g. by the oddness of continuations such as below. Notice the contrast with the universal quantifier:

(13) I didn't see the boys. #But I did see some of them

(14) I didn't see all the boys. But I did see some of them.

(15) Are the boys we met orphans? #No, some of them are.

(16) Are all the boys we met orphans? No, some of them are.

Fodor (1970) therefore proposes that definite plurals trigger an all or none presupposition. Löbner (1985, (2000) extends this view to propose that the all-or-none presupposition is a presupposition that holds of all predications, including examples such as *John painted the table*, where we seem to infer that John painted the whole table:

(17) Presupposition of Indivisibility :

Whenever a predicate is applied to one of its arguments, it is true or false of the argument as a whole.

Löbner, in effect, incorporates this presupposition (a.k.a. the Homogeneity presupposition) into the meaning of the distributive operator:

(18) $\text{Dist}(P)=\lambda x: [\forall y\in x\ \ P(y)] \text{ or } [\forall y\in x\ \ \neg P(y)].\ \forall y\in x\ \ P(y)$

Given this new distributive operator, a sentence such as *I didn't see the boys* interpreted distributively will presuppose that I either saw all the boys or I did not see any of them, and it will assert that it is false that I saw each of the boys. The combination of the presupposition and the assertion results in the inference that I did not see any of the boys. In other words, via the homogeneity presupposition, $\neg(A \wedge B)$ is strengthened into $(\neg A \wedge \neg B)$. Since Löbner (1985) the homogeneity presupposition is widely assumed to be an important aspect of the distributivity operator, cf. e.g. the work of [Schwarzschild, 1993 #62], Beck (2001), Gajewski (2005), among others.

2.2. Questions about (Plural) Individuals

We have seen above that the domain of individuals is commonly assumed to be a partially ordered set. Expressions in natural language such as singular and plural common nouns, and definite noun phrases denote different elements/parts of this structure. Now I will turn to denotations of questions about individuals, and show that there is a sense in which we can think of the denotation of questions as denoting an ordered set.

2.2.1 Hamblin and plurals: an ordering

According to Hamblin (1973) questions denote sets of propositions, namely the set of possible answers. A question about individuals such as (19)a has the denotation as in (19)b, informally represented in (19)c:

(19) a. Which man came?

b. $\lambda p\exists x\ [\text{man}(x)(w) \wedge p=\lambda w.\ \text{came}\ (w)(x)]$

c. {that John came, that Bill came, that Fred came..}

The above example is singular. However we could also allow the wh-word to range over both singular and plural individuals, as shown in (20):

(20) a. Which men came?

b. $\lambda p \exists x\, [\text{man}^*(x)(w) \wedge p=\lambda w.\ \text{came}\ (w)(x)]$

c. {that John came, that Bill came, that Fred came, that John &Bill came, that John& Fred came… etc}

Recall now that in a system like that of Link (1983) a plural individual is an individual on its own right. Therefore the question alternatives denote distinct propositions, and are not ordered by entailment. (This can be easily seen e.g. in the case if the predicate was collective.) Still, if the predicates that apply to the plural individuals are interpreted distributively, we get an ordering of the propositions (by entailment) in the Hamblin denotation: this is because *John and Bill came,* understood distributively, means that John came and Bill came. Therefore a proposition such as John & Bill came$_D$ (where the subscript $_D$ signals that the predicate is to be understood distributively) entails the propositions that John came, and that Bill came. Because of distributivity then, the propositions in the Hamblin set of (20) are ordered by set inclusion. This will give us the same structure for the propositions in the question's Hamblin-denotation that we saw above for the individuals: a free join semilattice.

2.2.2 Karttunen

We can also define sub-lattices in our ordered Hamblin denotation. E.g. we could define the set of true answers: This gives us Karttunen (1977)'s question denotation. Karttunen (1977) has observed that (21)b entails that for every man who came, John knows that they came. If the question denotes the set of true propositions, this inference follows as a consequence from the question denotation itself.

(21) a. Which men came?

b. John knows which man came

c. $[\![\text{which man came}]\!] = \lambda p \exists x\, [(p(w) \wedge man(w)(x) \wedge p{=}\lambda w\ came\ (w)(x)]$

While the above meaning has been famously shown to be too weak in the complement of *know* by Groenendijk and Stokhof (1984), Heim (1994) and Beck and Rullmann (1999) defend it for certain other predicates (e.g. *surprise*, *predict*).

2.2.3 The maximal answer: Dayal (1996), Jacobson (1995)

Given the sub-lattice of true answers to a question about plural individuals, we can define the maximal element among these true propositions. Dayal (1996) and Jacobson (1995) have proposed exactly this. More precisely, Dayal (1996) has proposed to distinguish a question (which is a set of possible answers) from the Answer, which is the maximal true proposition. The answer operator (Ans) in Dayal (1996)'s system has a very similar function to a definite determiner; it picks the maximum of the true answers under entailment:[2]

(22) $Ans\ (Q) = \iota p[p \in Q \wedge p(w)]$

Since the Answer operator outputs a single proposition, this view of question-meaning is compatible with the proposal of Groenendijk and Stokhof (1984) according to which questions denote propositions, instead of sets of propositions.

What we have seen in the previous sections is that given a partially ordered set of potential answers to a question about (singular and plural) individuals (=the Hamblin (1973) denotation of the question) we can define a sub-lattice of the true answers (=the Karttunen (1977) denotation of the question) and take the maximum of this set (=the most informative true answer by Dayal (1996) and Jacobson (1995)). This view of question meanings follows the footsteps of Heim (1994) and Beck and Rullmann (1999)

[2] Jacobson (1995) proposes that questions do not have to denote sets of propositions, rather, the embedded question can denote the unique proposition such that there exists some entity X such that p is true and the denotation of the wh-constituent is true of X:

(1) a. $WH \rightarrow Q$

b. $Q' = \iota p\ [\exists X(p(w) \wedge p{=}WH(w)(X)]$

in assuming that natural language allows a certain flexibility as to which parts of the Hamblin-structure are used in various contexts.

2.2.4 The complete answer

Groenendijk and Stokhof (1984) have famously argued that Karttunen (1977)'s semantics for questions makes too weak predictions in embedded contexts. The Karttunen denotation of a question is the collection of all the true answers. [Alternatively a maximal answer in the sense of Dayal (1996), Jacobson (1995) is the unique answer that is true and entails all the other true answers]. The question meaning that Groenendijk and Stokhof (1984) have argued for is a strengthened version of a maximal answer: It stands with the inference that the alternatives that are not entailed are false.

- Maximal answer (≈*the*)

  (equivalent to a *weakly* exhaustive answer, or *Ans1* of Heim (1994))

(23) $\text{Ans}\ (Q)(w){=}\iota p[p{\in}Q \wedge p(w)]$

- Complete answer (≈*only*)

  (equivalent to a *strongly* exhaustive answer, or *Ans2* of Heim (1994))

(24) $\text{Exh}\ (Q)(w) = \iota p\ [p(w)\ \&\ \forall p'{\in}Q\ [p{\not\subseteq}p' \rightarrow \neg p'(w)]]$

In the case of matrix questions, when we assert a maximal answer, it is strengthened into a complete answer. For the sake of concreteness, I will assume here (extending Fox (2006)) that this strengthening is done by an operator in the syntax (although I believe whether it is done in the syntax or in the semantics is ultimately immaterial to the present proposal). [However, following Heim (1994) and Beck and Rullmann (1999) I will assume that certain verbs that embed questions can select for the first type of answer lexically.]

2.2.5 An example: positive and negative questions about individuals

Let's look at examples of a positive and a negative question about (plural) individuals. The first example is that of a positive question about plural individuals. The Hamblin-denotation of the question in (25) is the set of alternative propositions that might be the answers to the question.

(25) a. Who/Which men came?

b. $\lambda p \exists x\, [man^*(w)(x) \wedge p = \lambda w.\ came\ (w)(x)]$

c. {John came, Bill came, John+Bill came, Roger came…}

The set of possible answers contains propositions about both singular and plural individuals. If the predicate is understood distributively, the alternatives will be partially ordered. If e.g. it is the case that John and Bill came, the maximal true answer is the proposition that John+Bill came, and the propositions that John came and that Bill came are entailed by it.

Since it will be important for the chapter on negative islands, let's look at an example of a negative question about plural individuals in some detail as well:

(26) ||Who did you not invite?||

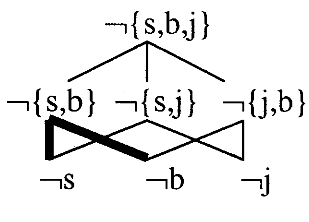
$= \lambda p \exists x\, [man^*(w)(x) \wedge p = \lambda w.\ you\ did\ not\ invite\ (w)(x)]$

={that you did not invite Bill; that you did not invite Bill+Sue; that you did not invite Mary +Sue; etc. }

Notice that in this case the alternatives can contain both plural and singular individuals. What kind of entailment relationships exist among these propositions? Recall that predication over plurals seems to give rise to "all-or-nothing" effects: *John did not invite the girls* has the reading that he invited none of the girls, and, importantly, lacks the reading that he invited some but not all the girls. As we have above, this pattern is standardly derived by equipping the distributivity operator with a homogeneity presupposition. (cf. e.g. Löbner (1985), Schwarzschild (1993), Beck (2001), Gajewski (2005)) Because of the homogeneity presupposition then, a negative proposition that predicates over a plural individual X in the answer set in (26) will entail all the negative propositions over the singularities $x \in X$. E.g. the proposition that you did not invite Bill+Sue will entail that you did not invite Bill and that you did not invite Sue.

Suppose now that our domain includes three individuals: Bill, Sue and John, and we indeed select *that you did not invite Bill+Sue* as our most informative true answer to (26). Now we know that no other proposition in the Hamblin set is true. Let's represent the Hamblin set with the following diagram:

(27)



Since we know that the proposition that you did not invite John is not true in w, and we know that John exists in w and is part of our relevant domain, we will infer that indeed you did invite John. Similarly, take the proposition that you did not invite Sue and John. By the homogeneity presupposition, this will entail that you invited neither of Sue or John—which we now know to be not true in the world. But we also know that you indeed did not invite Sue, therefore this conjunction can only be false if you did in fact invite John. This is how we derive the positive inference of a complete answer to a negative question, namely the inference that other than Sue and Bill, you invited everyone in a given domain.

2.3. The Maximal Informativeness Hypothesis

Let's now turn to he following example discussed by Dayal (1996):

(28) a. Which man came?

b. $\lambda p \exists x\ [\text{man}(x)(w) \wedge p = \lambda w.\ \text{came}\ (x)\ \text{in}\ w]$

c. {John came, Bill came, Peter came…}

In the above example *which man* is a singular noun phrase, and therefore it restricts the domain of quantification to atomic men. Therefore the question in (28) denotes a set of atomic propositions. Of course, in principle many of these alternative propositions could be true. However, the answer operator is looking for a maximally true proposition in this set. If there are more true singular propositions, their maximum is not defined and therefore the answer operator will not be defined either. The answer operator will only give an answer if the set of possible answers only contains one true answer: this will be at the same time the maximal true answer. This is how Dayal (1996) derives the uniqueness presupposition on individuals with singular Wh-words.

Thus we have seen a nice example of the *Maximal Informativeness Hypothesis* at work. Another approach that uses this condition is Fox and Hackl (2005), which will be reviewed in the next chapter. The present proposal follows this trait inasmuch as it claims that the oddness of certain weak islands is to be explained as an instance of violating the presupposition that there be a maximally informative answer. I will argue that in the case of extractees that create weak islands there will always be at least two alternatives among the set of alternatives that need to be ruled out given the strong exhaustive reading of the answer, yet cannot be ruled out at the same time.

3 On contradictory presuppositions

As I have stated in the introduction of the present chapter, the reason why there can be no complete answer to a question containing certain presuppositional items is that any potential complete answer will carry a set of presuppositions that are incoherent. As no context can entail a contradictory set of presuppositions, potential complete answers to such questions will not be assertable in any context. Therefore, such questions will be judged as ungrammatical. (For other approaches that proposed that contradictory presuppositions leading to ungrammaticality cf. Heim (1984), Krifka (1995), Zucchi (1995), Lahiri (1998), Guerzoni (2003), Abels (2004), Abrusan (2007))

3.1 Presuppositions embedded in questions project universally

Heim (1983) and more recently Schlenker (2006a) and Schlenker (2007) have argued that quantified sentences trigger a universal presupposition (29).[3] In the case of a quantifier such as *no one*, e.g. this prediction indeed seems to be borne out: (30):

[3] But cf. Beaver (1994) for different view on the projection of presuppositions from quantified sentences, as well as Chemla (2007) for a discussion of empirical differences among various quantifiers.

(29) Quantified sentence: $[Q{:}R(x)]S_p(x)$

presupposition: $[\forall x{:}\ R(x)]\ p(x)$

(30) None of these ten people knows that his mother is a spy

presupposition: all of these 10 people's mother is a spy

As questions are quantificational structures, this approach predicts that presuppositions should project from questions in a universal fashion as well. It seems that indeed this prediction is indeed born out: the following examples show that the projection behavior of presuppositional items is universal:

(31) Which of his three wives has John stopped beating?

Inference: John was beating all of his three wives

(32) Which of your three friends went to Paris again?

Inference: all three of your friends went to Paris before

(33) Which of these ten boys does Mary regret that Bill invited?

Inference: Mary believes that Bill invited each of these ten boys

Based on such examples I will assume that we should follow Heim (1992) in assuming that presuppositions project out of questions in a universal fashion in general. (For a recent discussion of presupposition projection from questions see also Guerzoni (2003), who builds on Heim (2001).)

3.2. Contradictory presuppositions and complete answers

Can we connect the problem of incoherent presuppositions of questions to the impossibility of having a complete answer? In this section I will suggest that the generalization that complete answers are contradictory in the case of weak islands in fact can be thought of as subsuming also the cases where the contradiction arises out of incoherent presuppositions.

Recall that we have been operating with two distinct but related notions as regarding the notion of answers: maximal answer and complete answer. A maximal answer is the unique answer that is true and entails all the other true answers (Dayal (1996), Jacobson (1995)). A complete answer is a strengthened version of a maximal answer: it asserts that the alternatives that are not entailed are false. How do presuppositions project out of a complete answer?

Let's take a look first at the following sentence:

(34) (Among John, Bill and Mary) Only John knows that his mother is a spy

a. 'John's mother is known to be a spy only by John'

b. 'John is the only one such that x's mother is known to be a spy by x'

The example in (34)b suggests that *only* patterns with generalized quantifiers in its projection behavior: the sentence in (34) indeed seems to give rise to the inference that everyone's mother is a spy.

(35) *Inference of* (34) : everyone's mother is a spy

I will assume therefore that quite generally presuppositions in the scope of *only* project in a universal fashion:

(36) Only (Alt) (p) $=\lambda w$: $p(w)=1$. $\forall p' \in$ Alt $[p \not\subseteq p' \rightarrow p'(w)=0]$

(37) Only (Alt) (p_{pres})(w)

Projected Presupposition: $\forall q \in$ Alt: pres(w)=1

Given that the exhaustive operator that we have been assuming is for all intents and purposes equivalent to *only* (modulo the fact that it asserts, rather than presupposes the truth of the prejacent), it is reasonable to assume that it will behave in a similar fashion to *only* with respect to presupposition projection (38). Indeed, this prediction seems to be confirmed by our intuition about a sentence such as the one in (31):

(38) Exh (Q) (p_{pr}) (w)

Presupposition: $\forall q \in$ Alt: pr(w)=1

A complete answer to a question including a presuppositional item will therefore come with a set of presuppositions: the presuppositions of all the propositional alternatives.

3.3 A set of contradictory presuppositions

However, as I will show this set of presuppositions turns out to be contradictory in the case of manner and degree questions. A set of contradictory presuppositions has the unpleasant consequence that the sentence is unassertable in any context: this is because there is no context in which all the presuppositions can be satisfied. Why will this set be contradictory? The problem is that there will always be (at least) two alternatives that are mutually incompatible, and yet will both have to be part of the set of presuppositions of a complete answer. But since no context can entail two mutually exclusive propositions, there will never be a context in which an answer to manner or degree questions containing the above mentioned presuppositional items can be asserted. In the case of questions about individuals however the (atomic) alternatives are independent from each other and hence no problem will arise.

4 Contradiction and grammaticality

I have proposed above that the reason for the ungrammaticality of weak islands should follow from the fact that all of their possible complete answers express a contradiction. But why exactly does this fact lead to ungrammaticality? We are, after all, perfectly capable of expressing contradictions that are not ungrammatical, cf. the example below:

(39) The table is red and not red.

What is the difference between the two types of contradiction and why does one, but not the other lead to ungrammaticality? This section addresses this concern.

The earliest examples of analyses that that resort to analyticity were proposed by Dowty (1979) and Barwise and Cooper (1981). Dowty (1979) argued that combining accomplishment verbs with durative adverbials leads to a contradiction and that this contradiction is the source of unacceptability, while Barwise and Cooper (1981) proposed that an explanation of the ungrammaticality of strong quantifiers in existential *there*-constructions follows from the fact that these would express a tautology. Later examples of such reasoning include Chierchia (1984), von Fintel (1993)'s analysis of the ungrammaticality of exceptives with non-universal quantifiers and Fox and Hackl (2005). (cf. also Ladusaw (1986) and Gajewski (2002) for an overview). How can these proposals be reconciled with the fact that natural language is capable to express tautologies and contradictions, otherwise?

Gajewski (2002) argues that we need to distinguish between analyticity that results from the logical constants alone, from analyticity that is the result of the non-logical vocabulary. He argues that it is the former that plays an important role for natural language: he argues that sentences that express a contradiction or tautology by virtue of their logical constants are ungrammatical. He follows van Benthem (1989) and others in defining logical constants as those notions that are permutation invariant.[4] Thus linguistic representations that have the same semantic value under any permutation of the domain are ungrammatical. More precisely Gajewski (2002) proposes to distinguish two types of analytic sentences: (ordinary) analytic sentences and L(ogical)-analytic sentences. While (ordinary) analytic sentences are true in every model, L-analytic sentences are true in every model with every possible combination of non-logical arguments. In other words, L-analytic sentences are not only true in every model, but remain true under rewriting of their non-logical parts. Gajewski (2002) further proposes that the kind of analycity that induces ungrammaticality in natural language is L-analyticity.

(40) DEFINITION. An LF constituent α of type t is *L-analytic* iff α's logical skeleton receives the denotation 1 (or 0) under every variable assignment.

[4] This way of defining what counts as a logical constant and what is part of the non-logical vocabulary might turn out to be too ambitious: e.g. predicates such as *(self-)identical* might turn out to be part of the non-logical vocabulary, while being permutation invariant at the same time. It is possible therefore that we

(41) A sentence is ungrammatical if its Logical Form contains an L-analytic constituent

Gajewski (2002) shows that (41) can correctly distinguish sentences like (39) from well-known examples of ungrammatical analytic sentences, such as tautologies proposed in Barwise and Cooper (1981)'s explanation of the ungrammaticality of strong quantifiers in existential *there*-constructions and contradictions in von Fintel (1993)'s analysis of the ungrammaticality of exceptives with non-universal quantifiers.

I will adopt Gajewski (2002)'s proposal that it is L-analyticity that leads to ungrammaticality. What will have to be shown then is that complete answers to weak islands are L-analytical. In other words, what we are looking for is to show that a complete answer to weak islands remain ungrammatical under any variable assignment. As we will see, this is indeed the case.

5 Extractees and interveners

5.1 The facts

Let's include here a list of the extractees that are sensitive to weak islands, as well as a list of contexts that constitute weak islands for easier future reference. (cf. Szabolcsi (2006) e.g. for a more detailed overview):

- **Extractees that are sensitive to weak islands**

The main examples of extractees that are sensitive to weak island contexts are the following:

<u>*Questions about manners*</u>

(42) *How did John regret that he behaved at the party?

should be content with a less ambitious proposal, in which logical constants are simply stipulated as being such, as in any logical system. (thanks to D. Fox for pointing this issue out to me)

Questions about degrees

(43) *How many children doesn't John have?

Questions involving when, where--in some cases

(44) a. *Where aren't you now?

b. Where haven't you looked for the keys?

Questions about individuals with one-time only predicates

(45) *Who has't destroyed Rome?

Split constructions

(46) *Combien as-tu beaucoup/souvent/peu/rarement consulté de livres? [*French*]

how many have you a lot/often/a little/ rarely consulted of books

'How many books have you consulted a lot/often/a little/ rarely ?

(47) *Wat heb je veel/twee keer voor boeken gelesen? [*Dutch*]

what have you a lot/twice for books read?

'What kind of books have you read a lot/twice?'

examples (46)-(47) from de Swart (1992)

- **Contexts that create weak islands**

i. Negative Islands

(48) a. Who did Bill not invite to the party?

b. *How many children doesn't John have?

ii. Presuppositional Islands

Factive verbs:

(49) a. Who did John regret that he invited to the party?

b. *How did John regret that he behaved at the party?

Response stance verbs

(50) a. Who did John deny that he invited to the party?

b. *How much wine has John denied that he spilled at the party?

Extraposition:

(51) a. Who was it scandalous that John invited to the party?

b. *How was it scandalous that John behaved at the party?

Adverbs of quantification:

(52) a. Who did you invite a lot?

b. *How did you behave a lot?

Only NP:

(53) a. Who did only John invite to the party?

b. ??How did only John behave at the party?

iii. Weak Islands created by certain quantifiers

(54) a. Who did few girls invite to the party?

b. ???How did few/less than 3 girls behave at the party?

c. How did at most 3 girls behave at the party?

iv. Weak Islands created by (tenseless) Wh-Islands

(55) a. Which man are you wondering whether to invite _?

b. *How are you wondering whether to behave_?

c. *How many books are they wondering whether to write next year_?

5.2 The proposal in a nutshell

In the next chapters of this dissertation I will show that the domain of weak island inducers is special in that it leads to the following problems:

i. In the case of Negative islands, Quantificational interveners, Tenseless *whether-islands*: the statement for any proposition that it is the complete answer is a contradiction.

ii. In the case of presuppositional islands: the set of presuppositions that the question stands with always contains at least two mutually incompatible propositions.

5.3 Preview of the following chapters

Chapter 2 contains an overview of the previous literature on this subject. Chapter 3 examines negative islands. I first discuss negative islands with manners, and propose that the reason why a complete answer is not possible in these cases is that the domain of manners always contains contraries. Second, I look at negative islands created by degree constructions, and argue that these facts can be captured by an interval-based approach to the semantics of degree constructions. After that, I will briefly look at other island-sensitive extractees such as *when* and *where* and show that a similar approach to the one presented for manner and degree questions can be extended to them as well. Building on the results of the chapter on negative islands, Chapter 4 examines islands created by presuppositional items in detail. I propose that an approach based on contrary manners/an interval semantics of degrees can be extended in a straightforward fashion to explain the oddness of these as well. Finally in Chapter 5 I look at islands created by quantificational interveners, as well as islands created by tenseless *whether*-islands.

Chapter 2

Previous proposals

1. Introduction

This chapter is tribute to the predecessors, as well as an explanation as for why the search for new explanations is still necessary. In my brief review of the previous proposals, I will depart slightly from chronological order and group the various proposals according to the similarity in the content of their proposals. It should be also borne in mind that the different proposals often focus on a somewhat different range of facts. The discussion here will be rather succinct, for a more detailed overview of most of the accounts discussed below cf. Szabolcsi (2006) and den Dikken and Szabolcsi (2002).

2. **Syntactic proposals**: Rizzi (1990), Cinque (1990)

The basic idea behind all syntactic accounts of weak islands is the following: the contexts that create weak islands are roadblocks for movement. However, items that possess a special permit might still be able to go through. The points in (1) to (3) spell out how Rizzi (1990) implements this idea. The main insight in Rizzi (1990) (which builds on Obenauer (1984)) however is not so much the technical implementation of the above idea, rather, an understanding of what constitutes roadblocks: roadblocks are items that are sufficiently similar to the moved item. This is in fact the central idea of 'Relativised minimality'.

(1) i. Referential A-bar phrases have indices (where "referential" is to be understood as having a "referential" theta-role)

ii. Non-referential A-bar phrases do not have indices

(2) i. Binding requires identity of referential indices

ii. Referential A-bar, but not non-referential A-bar phrases can be connected to their trace by binding

(3) i. Non-referential A-bar phrases need to be connected to their traces by antecedent governed chain.

ii. An antecedent-chain is broken by intervening A-bar specifiers, or if the clause from which the non-referential A-bar phrase is extracted is not properly head governed by a verbal head

In other words, an antecedent chain is highly sensitive to intervention. However, referential A-bar phrases have a special property (the index) which allows them to resort to binding, instead of antecedent-government, to connect to their trace. Binding is an arbitrarily long-distance relation that is not subject to interveners, therefore referential A-bar phrases will not be subject to the same locality conditions as the non-referential A-bar phrases. The idea of "Relativised Minimality" is manifested above by the fact that A-bar specifiers are interveners for the movement of the like A-bar phrases. Let's look at an example:

(4) *How are you wondering whether to behave?

(5) ?Which man are you wondering whether to invite?

The reason why (4) is unacceptable in Rizzi (1990)'s system is that the *wh*-adverb (an A-bar phrase) needs to be connected to it's trace via an antecedent government chain. However the complementiser *whether* is in an A-bar position (the spec of CP) therefore it will intervene for the movement of another A-bar element. The *wh*-word in (5) however is referential, and therefore it can connect to its trace via binding.

Cinque (1990) (drawing on Comorovski (1989) and Kroch (1989)) adds to the above theory that referential items need to be also D-linked in the sense of Pesetsky

(1987) to be able to connect to their trace via binding. He motivates this by the observation that *wh*-phrases such as *how many dollars* or *who-the-hell*[5] seem to be sensitive to weak islands, despite the fact that they receive a referential theta-role according to Rizzi (1990)'s theory:

(6) a. *How many dollars did you regret that I have spent?

b. *Who the hell are you wondering whether to invite?

The basic idea of Rizzi (1990) and Cinque (1990) have been implemented since then in various different forms, most importantly in the form of the *Minimal Link Condition* of Chomsky (1995) and its revision in Manzini (1998); and in a feature-based format in Starke (2001)'s theory of locality.

The main problems for these syntactic accounts that have been pointed out in the literature (most importantly Szabolcsi and Zwarts (1993), Honcoop (1998), Rullmann (1995), Szabolcsi (2006)) are the following:

i. It is unclear why certain quantifiers, but not others should occupy an A-bar position.

ii. It is not clear that there is a syntactic difference between factive and response stance verbs on the one hand, and other attitude verbs on the other hand.

[5] D-linking will not pay a role in this thesis. As for *wh*-the hell expressions, I will (partly) follow Szabolcsi and Zwarts (1993) who point out that D-linking does not seem to be the minimal difference between *wh*-the-hell expressions and their plain counterpart. As for a felicitous use of an wh-the-hell expression, they cite the following example (attributed to Bruce Hayes): " If we know that whenever someone sees his mother, God sends purple rain, then upon seeing purple rain, I can ask: *Who the hell saw his mother?"* Szabolcsi and Zwarts (1993) argue that the example shows that the use of wh-the-hell expression requires unquestionable evidence that someone saw his mother. I believe, however, that what the example shows is rather the property of wh-the-hell expressions noted in den Dikken and Giannakidou (2002) that they induce obligatory domain-widening. In the example above, the salient domain of individuals is everyone in the world. Once we have such a wide domain in mind, some of the weak-island examples improve as well: e.g. if we change the above scenario a bit, such that God sends purple rain whenever someone does *not* call his mother on her birthday, then, upon seeing purple rain, the following negative question becomes perfectly acceptable: *Who-the-hell didn't call his mother?* As for *how-many* phrases, I will follow Rullmann (1995) who argues that the difference in the acceptability of such examples is that of scope, rather than D-linking.

iii. Negation can be cross-linguistically expressed as a head or a specifier or an adjunct, yet the island-creating behavior of negation does not vary cross-linguistically.

iv. The theory claims to be syntactic, yet the characterization of the good vs. bad extractees seems to be semantic in nature. This calls for further explanation.

To the above list of well-known complaints we might add the following problem, which in fact is probably the most troubling:

v. Fox and Hackl (2005) have argued that certain quantifiers can rescue negative islands: more precisely, universal modals above negation or existential modals under negation save negative degree questions:

(7) a. How much radiation are we not allowed to expose our workers to?
b. How much are you sure that this vessel won't weigh?

It is highly unlikely that a syntactic account could be extended to explain these facts: if negation is an A-bar intervener, the addition of a modal should not be able to change this fact.

3. **General Semantic Accounts**: Szabolcsi and Zwarts (1993), and its extensions in Honcoop (1998)

The very first paper to propose that the weak island intervention facts should follow from semantic properties was Szabolcsi and Zwarts (1990). This first theory was then substantially revised in Szabolcsi and Zwarts (1993). The revisions were mainly motivated by a paper by de Swart that has appeared in the meantime (de Swart (1992)). The important contribution of de Swart (1992) was that it challenged the prevailing view that it is only DE operators that create intervention. She argued, based on split constructions, that in fact all scopal elements cause intervention. The real difference between DE and UE quantifiers is that for independent reasons, a wide scope (pair-list) reading is not available for DE quantifiers in questions (cf. Groenendijk and Stokhof

(1984)). Thus, while the question below is grammatical, importantly it does not have the reading in (25)b:

(8) How many pounds does every boy weigh?

(a) 'For every boy x, how many pounds does x weigh?'

(b) '#For what n, every boy weighs at least n?'

(c) 'What is the unique degree such that every boy weighs (exactly) that much?'

Downward entailing quantifiers on the other hand do not have the possibility for the wide scope (pair-list) reading, therefore they appear ungrammatical. Szabolcsi and Zwarts (1993) point out however that the proposal in de Swart (1992) according to which scopal items thus always create intervention seems to be too strong: they argue that e.g. indefinites and (non-factive) attitude verbs do not seem to cause intervention[6]:

(9) ?How did a boy behave?

(10) How do you want me to behave?

3.1 An algebraic semantic account: Szabolcsi and Zwarts (1993)

Szabolcsi and Zwarts (1993) attempt therefore at drawing a principled demarcation line between the scopal expressions that create intervention, and those that do not. Their explanation, based on algebraic semantics, proceeeds in the following steps, as summarized in (11) to(13)[7]. The first step in their proposal is the following:

(11) Each scopal element is associated with certain Boolean operations.

This claim should be understood that each scopal element in conjunction with a distributive verbal predicate can be interpreted as a Boolean combination of singular predications (assuming that the domain of students is given):

[6] As regards indefinites however the facts are not that clear: cf. discussion in Honcoop (1998) and in Chapter 5 of this thesis.

[7] This presentation draws also on Honcoop (1998)'s explication of Szabolcsi and Zwarts (1993)'s theory, which is more explicit than the authors themselves.

i.	John walked	$=W(j)$
ii.	John did not walk	$=\neg(W(j))$
iii.	No student walked	$=\neg(W(j)\vee W(b)\vee W(m))$
iv.	Less than two students walked	
		$=\neg((W(j)\wedge W(b))\vee(W(j)\wedge W(m))\vee(W(m)\wedge W(b))$
v.	Every student walked	$=W(j)\wedge W(b)\wedge W(m)$
vi.	A student walked	$=W(j)\vee W(b)\vee W(m)$

These observations can be generalized in the following way:

i. Negation corresponds to taking Boolean *complement*

ii. Universal quantification corresponds to taking Boolean *meet*

iii. Existential quantification corresponds to taking Boolean *join*

iv. Numerical quantification corresponds to a combination of at least Boolean *meet* and *join* (and, in the case of DE operators, complement)

The second step in the proposal can be stated as follows:

(12) For a *wh*-phrase to take scope over a scopal element means that the operations associated with the scopal element need to be performed in the *wh*-phrase's denotation domain.

This means the following. To answer the question in (i) below, we need to construct the set of people that John likes: (the set of individuals is indicated by :=; L stands for *likes'*)

i. Who does John like? $:=\{a: \langle j,a\rangle\in [\![L]\!]\}$

To answer the question in (ii) below, we need to construct the set of people that John likes, and then take its complement (where D stands for the domain of discourse):

ii. Who doesn't John like? $:= D \setminus \{a: \langle j,a\rangle \in [\![L]\!]\}$

To answer the question in (iii) on the non-pair list reading, we construct for each student s the set of people liked by s, and then intersect these sets:

iii. Who does every student like?

$$=\cap\{\{a: \langle j,a\rangle \in [\![L]\!]\},\{a: \langle b,a\rangle \in [\![L]\!]\},\{a: \langle m,a\rangle \in [\![L]\!]\}\}$$

And so on. The last piece of the explanation is the following:

(13) If the *wh*-phrase denotes in a domain for which the requisite operation is not defined, it cannot scope over SE.

In the examples above, the wh-ranges over individuals. Individuals can be collected to unordered sets. All Boolean operations can be performed on sets of individuals, because the power set of any set of individuals forms a Boolean algebra. However, if the *wh*-phrase ranged over a partially ordered domain that was not closed under some Boolean operation, the scopal item corresponding to this Boolean operation should block the *wh*-phrase from scoping over the scopal element. Szabolcsi and Zwarts (1993) claim that manners range over a partially ordered domain (a free join-semilattice), where components of each (plural) manner do not form a set but a sum. Amounts form a join semilattice, while numbers form a chain (a special lattice). Complementation and/or meet cannot be performed on these structures, therefore the *wh*-elements that denote in these partially ordered domains will not be able to scope over the scopal elements that correspond to these operations. As e.g. universal quantification corresponds to meet, but existential quantification corresponds to join, universal but not existential quantifiers are predicted to be interveners. The bad extractees then are those which range over a domain that has a partial ordering defined on it, while the good extractees range over a domain of individuals.

Szabolcsi and Zwarts (1993)'s account is based on the very interesting idea that the difference between the good and the bad extractees is to be found in the properties of their domain. This idea, albeit in a completely different form, is also shared by the account that is developed in this thesis, as well as by Fox and Hackl (2005), in yet another way. However, the account in Szabolcsi and Zwarts (1993) faces certain serious problems:

i. As the authors themselves point out, their account is rather programmatic as far as presuppositional interveners and tenseless *whether*-islands are concerned: they do not offer any real account.

ii. It is unclear why individuals, but not manners can be collected into sets. To formulate the problem in a different way, they do not offer any strong arguments for the assumption that manners denote in a domain that is a free join semilattice, and therefore do not have a $\varnothing$ element, while the domain of individuals has the zero element and therefore denotes a Boolean algebra (cf. e.g. Landman (1989) for arguments that individuals should denote a free join semilattice, instead of a Boolean algebra)

iii. Finally, similarly to the syntactic accounts, Szabolcsi and Zwarts (1993)'s theory does not seem to be able to explain the modal obviation effects discovered by Fox and Hackl (2005) (cf. (4) above.) It is rather implausible that adding a modal should be able to turn the partially ordered domain of manners or degrees into sets, such that now the required algebraic operation could be performed. Interestingly, modal obviation is not restricted to negative islands, other quantificational interveners seem to be sensitive to it as well. In particular, the missing reading of example (25) can be recovered by adding a modal (this fact was pointed out to me by B. Spector, pc.)[8]:

(14) How many pounds are you sure that every boy weighs?

[8] A similar fact was also pointed out in Rullmann (1995), however he does not realize the significance of the example, he simply takes it as an argument against de Swart (1992)'s observation.

The modal obviation facts therefore seem to constitute a very serious problem for Szabolcsi and Zwarts (1993)'s account as well.

3.2 *What* for split and Dynamic Semantics: Honcoop (1998)

Honcoop (1998) formulates a dynamic semantic account for *what*-for split constructions in Germanic languages, which are usually taken to be sensitive to weak islands. His account is based on two very interesting observations. The first observation is that the interveners that make the *what-for* split impossible coincide with the class of expressions that create inaccesible domains for dynamic anaphora. This claim is based on the following facts:

(15) *{no student/exactly 3 students/ more than 3 students/ I wonder whether John } bought a book. It was expensive.

Such elements, he claims are the same as the ones that cause intervention in the case of the *what-for* split.

(16) Honcoop (1998)'s generalization

The class of expressions that induce weak islands coincides with the class of expressions that create inaccessible domains for dynamic anaphora.

Honcoop (1998)'s second interesting observation is that interveners for negative polarity licensing (as discussed originally by Linebarger (1981)) seem to be exactly the same class as the weak island interveners.

Honcoop accepts Szabolcsi and Zwarts (1993)'s explanation for weak islands in general, but he goes on to argue that neither the *what*-for split constructions nor the NPI intervention facts could be handled in terms of algebraic semantics. Instead, he argues, these cases should be handled in terms of dynamic semantics. In the version of dynamic semantics he assumes (Dekker (1993)), dynamic binding is made possible by the operation of existential disclosure. However, existential disclosure cannot be performed across negation and other elements that create inaccessible domains. Now the fact that the *what*-for split is sensitive to negation should be understood as follows. First, observe the ungrammatical example of a what-for split in (17)b:

(17) a. Wat$_j$ heeeft Jan voor een man$_j$ gezien?
What has Jan for a man seen?
'What kind of man did Jan see?'

b. *Wat$_j$ heeeft Jan niet voor een man$_j$ gezien?
What has Jan not for a man seen?
'What kind of man didn't Jan see?'

The indefinite *een man* is construed as a property restricting the range of the variable quantified over by *wat*. To get this, we need to apply existential disclosure to it in order to be able to dissolve the existential quantifier by means of which *een man* is interpreted. In other words, the property reading of *een man* is derived by existential disclosure. However, existential disclosure cannot apply if negation interveners, and for this reason the property reading of *een man* cannot be derived. However, now the question cannot be interpreted any more.

Honcoop (1998)'s account offers some very creative observations. However, the basic notion, that what-for split is completely analogous to other weak islands do seem to raise some questions:

i. While the class of interveners for the *what*-for split seems very similar to that of weak islands, it seems that the what-for split is more sensitive: quantifiers that are usually not taken to cause weak island effect (e.g. *at most* 3, *exactly* 3) seem to be strong interveners in the case of the *what*-for split[9].
ii. Another discrepancy between the *what*-for split and ordinary weak islands is that in the case of the former, modal obviation does not seem to happen. The examples below illustrate the case of German. (However, note that interestingly, the French *combien*-split does improve, cf. the discussion in Spector (2005)).

[9] This in fact, seems also be true of the French combien-split.

(18) a. *Was hat Jan nicht für ein Buch gelesen? [German]

b. *Was hat Jan für ein Buch nicht gelesen?

"what kind of book has Jan not read?"

(19) a. *Was darf Jan nicht für ein Buch lesen?

b. *Was darf Jan für ein Buch nicht lesen?

c. Was für ein Buch darf Jan nicht lesen?

"what kind of book is Jan not allowed to read?"

(20) a. *Was ist Jan sicher für ein Buch nicht lesen zu wollen?

b. *Was ist Jan für ein Buch sicher nicht lesen zu wollen?

c. Was für ein Buch ist Jan sicher nicht lesen zu wollen?

"What kind of book is Jan sure not to (want to) read?"

(judgements courtesy of Michael Wagner, pc.)

4 Negative degree islands: Rullmann (1995) and Fox and Hackl (2005)

In this section I turn to proposals that were proposed specifically to account for negative (and DE) degree islands. It is standardly assumed that a sentence such as (21) has the meaning that John has at least 3 children:

(21) John has 3 children = The degree d such that John has d children ≥ 3

Given this assumption, the propositions in the Hamblin denotation of a question such as the one below in will be strictly ordered by entailment, as shown in *Figure 1.* (The arrow indicates the direction of entailment.)

(22) How many children does John have?

***Figure 1**: Hamblin denotation of (22)*

John has 1 child
John has 2 children
John has 3 children
John has 4 children
John has 5 children
...
∞

If the fact of the matter in the actual world is that John has exactly 3 children, there will be 3 propositions in the Hamblin set that are true. Yet we need to account for the intuition that the question is asking for a "maximal answer" in some sense. Rullmann (1995) and Fox and Hackl (2005) have observed that this requirement of degree questions might be also employed to account for the negative island effect in degree questions. This section briefly reviews these proposals.

4.1 Rullmann (1995)

Building on work by von Stechow (1984), Rullmann (1995) proposed that degree questions ask for the largest degree that satisfies a certain property. In other words he proposes that degree questions have he following meaning:

(23) How many φ? = What is the maximal degree d such that φ(d)?

For example a positive degree question is understood as follows:

(24) How many children does John have?
What is the maximal degree d such that John has (at least) d children?

However when we try to interpret a negative question, we run into trouble:

(25) *How many children doesn't John have?

What is the maximal degree d such that John does not have (at least) d children?

The problem is that if e.g. John has exactly 3 children, than any degree above 3 is such that John does not have that many children. However, since degrees in this case are not contextually restricted, there is no maximal degree d, such that John does not have that many children. For this reason, the negative degree question in (25) is unacceptable. The figure below illustrates Rullmann (1995)'s reasoning, and at the same time foreshadows the reasoning in Fox and Hackl (2005).

Figure 2 *::* Scenario*: : John has 3 children*

POSITIVE QUESTION

John has 1 child
John has 2 children
John has 3 children
John has 4 children
John has 5 children
...
...
∞

Rullmann (1995)
Fox and Hackl(2005)

Rullmann (1995)

NEGATIVE QUESTION

John doesn't have 1 child
John doesn't have 2 children
John doesn't have 3 children
John *doesn't have* 4 children
John *doesn't have* 5 children
...
...
∞

Fox and Hackl (2005)

4.2. Fox and Hackl (2005)

Beck and Rullmann (1999) have proposed a theory of questions partly similar to Dayal (1996) and Jacobson (1995)'s, according to which questions ask for the most informative answer. As they themselves note, this proposal has an adverse side-effect: the original account of Rullmann (1995) cannot be maintained. The reason is as follows. To synchronize Rullmann (1995) with Beck and Rullmann (1999), Fox and Hackl (2005) suggest that the meaning of meaning of degree questions now should look as follows:

(26) How many φ? = What is the degree d that yields the most informative among the true propositions of the form φ(d)?

Given this new reasoning, in the scenario that was illustrated in *Figure 1* the answer *John does not have 4 children* should count as the most informative true answer: this is because the proposition that John does not have 4 children entails the proposition that John does not have 5 children and so on. However, now it seems that the explanation as to why a negative degree question should be unacceptable is lost.

To remedy this situation, Fox and Hackl (2005) propose that the following hypothesis about degree scales should be assumed:

(27) Measurement Scales that are needed for natural language semantics are always dense (*The Universal Density of Measurement* [UMD])

They argue that given the assumption that the set of degrees is now dense, there is no minimal degree that gives a maximally informative true proposition. Let's see why: Let's say it is a fact about the world that there is a cardinal number of children that John has. In other words we might say that the number of children that John has corresponds to a (right)-closed interval and the degree 3 is the endpoint (the closure) of this interval: (0,3]. But given the density assumption the complement of this interval will be a (left)-open interval that excludes the degree 3: $(3,\infty)$[10]. The negative question asks for the most informative answer among the propositions about the degrees in this left-open interval. Given the downward entailing pattern the most informative answer will be the smallest n such that John does not have that many children: in our pictures the leftmost degree. However, there is no leftmost degree, as the interval is left-open. The problem then is that questions ask for the most informative answer, but among the true answers to a negative degree question there never is a maximally informative element. These questions therefore cannot have a maximal answer and are ungrammatical. (In the drawings below, O represents that an interval is open, while • represents that the interval is closed)

(28) *How many children doesn't John have?
What is the most informative proposition among the propositions of the form *John does not have d children?*

(29) Has[0,3] $\neg$ has (3, ∞)

(right)-closed (left)-open

As noted above, Fox and Hackl (2005) make the very important observation that universal modals above negation, or alternatively existential modals below negation, have the capacity to save negative degree questions:

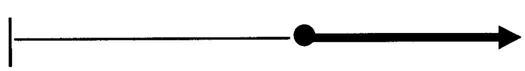
(30) If you live in China, how many children are you not allowed to have?

(31) How much radiation are we not allowed to expose our workers to?

(32) How much are you sure that this vessel won't weigh?

Their proposal can handle these facts. This is, they argue, because now, the set of true (negative) answers might correspond to a closed interval: For example the regulations might require that we do not expose our workers to a 100 millisievert/year or more. In this case the interval which corresponds to the amount that we are not allowed to expose our workers is a left-closed interval [100, ∞), while the interval that corresponds to the amount that we are allowed to expose our workers to is a right-open interval [0,100). Given that in a downward entailing context the propositions about the degrees "to the left" will entail the propositions about the degrees "to the right" of them, a left-closed interval will have a maximal element.

(33) Allowed [0,100) not allowed [100, ∞)



right-open left-closed

Fox and Hackl (2005) also show that their account predicts that existential modals above negation should not be able to save negative islands violations.

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[10] $(a,b)=\{x\in\mathbb{R} \mid a<x<b\}$; $(a,\infty)=\{x\in\mathbb{R} \mid a<x\}$; $[a,b]=\{x\in\mathbb{R} \mid a\leq x\leq b\}$; $[a,b)=\{x\in\mathbb{R} \mid a\leq x<b\}$ etc.

The account in Fox and Hackl (2005) makes the extremely important observation about modal obviation, and proposes a witty account to explain this pattern. Yet, we might ask some questions about the system that Fox and Hackl (2005) develop:

i. Can it be extended to weak island extractees other than degrees?

ii. Can it be extended to weak island creating interveners other than negation?

The first question is in fact addressed in Fox (2007). He proposes that although UDM itself cannot be responsible for other types of extraction than questions about degrees, a broader generalization about non-exhaustifiable sets of alternatives can subsume both the cases that can be accounted for by the UDM, and other examples of non-exhaustifiability.

(34) *Fox (2007)'s generalization*

Let p be a proposition and A a set of propositions. p is *non-exhaustifiable given A:* [NE (p)(A)] if the denial of all alternatives in A that are not entailed by p is inconsistent with p.

Further, he conjectures, that any account for negative manner questions should then fall under the generalization in (34) above.

The second question seems more problematic for Fox and Hackl (2005), as it is not clear that an account based on the UDM is extendable to other islands, e.g. presuppositional islands and tenseless *whether*-islands. For example, observe a presuppositional island such as the one below:

(35) *How many apples do you regret that John ate?

Suppose, as it was argued in Chapter 1, that the presupposition of *regret* projects out of the question in a universal fashion. The question then should come with the presupposition that John ate every apple in the domain. This might be implausible, but Fox and Hackl (2005)'s system is blind to this fact: as long as there is a maximal answer, i.e. we do not derive a formal contradiction, the question should be acceptable. However, it is not. It seems then that there are good reasons therefore to keep on looking for an account that can be extended to these other cases of islands as well.

In what follows, I will propose an account that adopts the insight of Fox and Hackl (2005) that negative island violations result from a maximization failure. However, the approach that will be developed in the next chapters differs from their account in crucial respects:

i. I will propose an interval-based account for negative degree questions that does not rely on the UDM. Rather, it will exemplify what might be called the symmetry generalization: Let p be a proposition and A a set of propositions: For any p, there are at least 2 alternatives in A such that each of them can be denied consistently with p, but the denial of both of these alternatives is inconsistent with p.

ii. The reasoning in terms of symmetric alternatives can itself cover the cases of manner islands as well.

iii. Further, the account can also explain the cases of presuppositional islands and whether islands, and make interesting predictions about certain cases of quantifier intervention.

Finally, I will also observe that while the symmetry generalization falls under Fox (2007)'s generalization, it is more restrictive than that, and makes different predictions about weak islands other than negation.

Chapter 3

Negative Islands*

1. Introduction

This chapter proposes an explanation for the oddness of negative islands, such as (1) and (2). These examples are in contrast with that in (3), which shows that individuals can escape negation without any problems.

(1) *How didn't John behave at the party?

(2) *How many children doesn't John have?

(3) Who didn't John invite to the party?

I will argue that the reason for the unacceptability of (1) and (2) is that they cannot have a maximally informative true answer. As a consequence, any complete answer to them will amount to the statement of a contradiction. The reason for this will be that for any proposition p in the question domain, there will be at least two alternatives to p that cannot be denied at the same time.

In the case of manner questions the intuitive idea is very simple: the domain of manners contains contrary predicates, such as fast, slow, medium speed, etc. However, as the domain of manners is structured in such a way that the predicates themselves are in opposition with each other, in some contexts it might turn out to be impossible to select

* I would like to express here my intellectual debt to Benjamin Spector, whose suggestion to use an interval semantics for degree constructions has improved the analysis that I eventually propose for the negative degree questions in this chapter greatly. Cf. Section 3 and in particular Section 3.2. for details.

any proposition in the denotation of manner questions as the most informative true proposition. In the case of negative degree questions I will argue that maximization failure is predicted if we assume an interval-based semantics of degree constructions. Given then that there can be no most informative true answer to such questions, any potential complete answer to such questions will amount to the statement of a contradiction.

An account for negative islands however not only has to apply for the odd examples above: it is also necessary to explain why in some cases the above examples can be rescued. There are two such cases in the literature: the cases of modal obviation observed by Fox and Hackl (2005), and the cases made famous by Kroch (1989), which show that providing an explicit list of options to choose from can improve the questions above.

Modal obviation The important empirical observation that was made in Fox and Hackl (2005) (partly building on work by Kuno and Takami (1997)) is that universal modals above negation, or equivalently, existential modals under negation save negative degree questions:

(4) How much radiation are we not allowed to expose our workers to?

(5) How much are you sure that this vessel won't weigh?

This pattern was noted for negative degree questions, but in fact it seems to be entirely general across all negative islands[11]: (6) provides an example of a negative question about manners.

(6) How is John not allowed to behave at the party?

Kroch-examples It is well known since Kroch (1989) that examples like (1) improve greatly if the context specifies a list of options (cf. (7))

[11] Except islands created by *why*, as noted by Fox (2007). However, islands created by *why* have a number of properties that make them distinct from other weak-island sensitive extractees, as noted in Szabolcsi and Zwarts (1993), Ko (2005) and Fox (2007), among others.

(7) How didn't John behave at the party: wisely or impolitely?

Explicit lists seem to improve negative degree questions to a great extent as well. This is exemplified in (8). However, notice that an answer "50" to be felicitous seems to require a context such that there be separate events of scoring 20, 30 and 40 respectively.

(8) Among the following, how many points did Iverson not score?
A. 20 B.30 C.40 D.50

This chapter is organized as follows: Section 2 introduces the proposal for negative manner questions while Section 3 addresses negative degree questions. In Section 4 I will discuss some other instances of unacceptable negative questions such as questions with adjectives, as well as temporal and spacial modifiers in certain environments cf. (9)-(11).

(9) *What isn't John like?
(10) *When didn't Jesus resurrect?
(11) *Where aren't you at the moment?

I will argue that these sentences can receive an explanation in a similar spirit as the examples with the manner and degree question. Finally in Section 5 I will discuss certain more general aspects of the present proposal and compare them to the generalization proposed in Fox (2007).

2. Negative islands created by manner adverbials

2.1 About manner predicates

2.1.1 Pluralities of manners

I will assume that manner predicates denote a function from events (e) to truth-values (t), or equivalently a set of events:

(12) $[\![\text{fast}]\!]=\{e \mid \text{fast } e\}$

Extending Landman (1989)'s version of Link (1983) to manner predicates, I will assume that we form plural manners as illustrated below:

(13) $[\![\text{fast+carelessly}]\!]= \{\{e \mid \text{fast } e\} ,\{e \mid \text{careless } e\}\}$

Given this way of forming plural manner predicates, we arrive at a structured domain, not unlike that of the domain of individuals that we have seen in the previous section. Given our assumptions based on Landman (1989), neither the domain of individuals nor the domain of manners will have a zero element—but this is a matter of convenience and naturalness, rather than an essential ingredient of our proposal. This is in contrast with Szabolcsi and Zwarts (1993)'s proposal, even though they too argue that the domain of manners should be thought of as a free join semilattice. However, crucially for them, the domain of individuals forms a Boolean algebra and thus has a zero element, but not the domain of manners. Here in contrast we do not need to adhere to this stipulation: the domain of manners as well as that of individuals might (as in Link (1983)) or might not (as in Landman (1989)) have a zero element—this issue is immaterial for the account to be developed below. For reasons of simplicity, I will assume that it does not contain a zero element.

Let's pause for a second and think about how a plural manner such as the one in (13) will be able to combine with a predicate of events. Since in this case we have sets of sets of events, predicate modification will not be able to apply in a simple fashion. Furthermore, if we look at an example such as the one below, we also want our semantics to predict that the running event in question was both fast and careless.

(14) a. John ran fast and carelessly

b. $\lambda w. \exists e \; [\text{run}(w)(e)(\text{John}) \wedge \text{fast+carelessly } (w)(e)]$

To resolve this type conflict and to derive the appropriate meaning, we will postulate an operator D that applies to plural manner predicates, much in the fashion of the distributive operator commonly assumed for individuals:

(15) $D(P_{PL})=\lambda e.\ \forall p\in P_{PL}\ \ p(e)$

Similarly to predication over plural individuals again, we might observe that talking about plural manners gives rise to all-or-nothing effects in the unmarked case.[12] However the formula in (16)c only means that there is no event of running by John that was both fast and careless.

(16) a. John didn't run fast and carelessly

b. 'John run neither fast nor carelessly'

c. $\lambda w.\ \neg\ \exists e\ \ [\text{run}(w)(e)(\text{John}) \wedge \text{fast+carelessly}\ (w)(e)]$

Therefore, again inspired by the treatment of homogeneity reviewed in Chapter 1[13], we will postulate a homogeneity presupposition on the D-operator introduced above:

(17) $D(P_{PL})=\lambda e$: $[\forall p\in P_{PL}\ \ p(e)]$ or $[\forall p\in P_{PL}\ \ \neg p(e)]$. $\forall p\in P_{PL}\ \ p(e)$.

Let's look at an example of a positive question about manners. The Hamblin-denotation of the question will contain a set of propositions such as {that John's running was in manner α, that John's running was in manner β, etc}. Given our assumption that the domain of manners contains both singular and plural manner predicates, the question word *how* will range over both singular and plural manner predicates as well. Notice that I will assume that a question such as (18) talks about a contextually given event, which I

[12] However, in some contexts it might be possible to understand such examples as if *and* was Boolean. To account for these cases we might say that *and* is in fact ambiguous between a Boolean and a plural-forming *and*. However, this will not change the reasoning because in the case of negative sentences the alternative that employs a Boolean *and* will not have a chance to be a maximally informative answer in any case. [thanks to Danny Fox (pc) for pointing this out to me.]

[13] The definition of the distributive operator for plural predicates over individuals was as follows:

(1) $\text{Dist}(P)=\lambda x$: $[\forall y\in x\ \ P(y)]$ or $[\forall y\in x\ \ \neg P(y)]$. $\forall y\in x\ \ P(y)$

will represent here by (e*). In other words the question in (18) is interpreted as 'How was John's running?'.

(18) a. How did John run?

b. $\lambda p. \exists q_{manner}$ [run (w)(e*)(John) $\wedge$ q_{manner} (w)(e*)]

c. {that John ran fast, that John run fast+carelessly, etc..}

Given the D operator introduced above, the proposition that John run fast+carelessly will entail that John run fast and that John run carelessly. If this proposition is indeed the maximal true answer, we will conclude that John's running was performed in a fast and careless manner, and in no other manner in particular.

2.1.2 Contraries and the ban on forming incoherent plural manners

The crucial assumption that I would like to introduce is that the domain of manners always contains contraries. The observation that predicates have contrary oppositions dates back to Aristotle's study of the square of opposition and the nature of logical relations. (cf. Horn (1989) for a historical survey and a comprehensive discussion of the distinction btw. contrary and contradictory oppositions, as well as Gajewski (2005) for a more recent discussion of the linguistic significance of contrariety). Contrariety is relation that holds between two statements that cannot be simultaneously true, though they may be simultaneously false. A special class of contraries are contradictories, which not only cannot be simultaneously true, but they cannot be simultaneously false either. Natural language negation is usually taken to yield contradictory statements (cf. e.g. Horn (1989)).

(19) Two statements are contraries if they cannot be simultaneously true

(20) Two statements are contradictories if they cannot be simultaneously true or false

A classic example of a pair of contrary statements is a universal statement and its inner negation (assuming that the universal quantifier comes with an existential presupposition) such as (21). Other examples of contrary statements include pairs of contrary predicates such as the sentences in (22) and (23), where it is impossible for a single individual to be both short and tall, or to be both completely red or blue. Contrary negation is also often manifested in English by the affixal negation *un-,* such as e.g. in the case of pairs of predicates like *wise* and *unwise* (24):

(21) a. Every man is mortal
     b. Every man is not mortal (=No man is mortal)

(22) a. John is short
     b. John is tall

(23) a. The table is blue
     b. The table is red

(24) a. John is wise
     b. John is unwise

What distinguishes then contrary predicates from contradictory predicates is that two contrary predicates may be simultaneously false: it is possible for a table to be neither red nor blue, for an individual to be neither tall or short, or neither wise or unwise. This is also shown by the fact that the negation of predicates is usually not synonymous with their antonyms: the statement that *John is not sad* e.g. does not imply that he is happy.

Similarly to other predicates then, the domain of manners also contains contraries. In fact I will claim that every manner predicate has at least one contrary in the domain of manners (which is not a contradictory). Moreover, we will say that for any pair of a predicate P and a contrary of it, P', there is a middle-predicate P^M such that at least some of the events that are neither in P or P' are in P^M. (25) summarizes the conditions on the domain of manners:

(25) Manners denote functions from events to truth values. The set of manners (D_M) in a context C is a subset of $[\{f \mid E \rightarrow \{1,0\}\} = \wp(E)]$ that satisfies the following conditions:

i. for each predicate of manners $P \in D_M$, there is at least one contrary predicate of manners $P' \in D_M$, such that P and P' do not overlap: $P \cap P' = \varnothing$.

ii. for each pair (P, P'), where P is a manner predicate and P'is a contrary of P, and $P \in D_M$ and $P' \in D_M$, there is a set of events $P^M \in D_M$, such that for every event e in $P^M \in D_M$ $[e \notin P \in D_M \;\&\; e \notin P' \in D_M]$.

I will assume that context might implicitly restrict the domain of manners, just as the domain of individuals, but for any member in the set $\{P, P', P^M\}$, the other two members are alternatives to it in any context. Some examples of such triplets are shown below:

(26)
a. P: wisely; fast; by bus
b. P': unwisely; slowly; by car
c. P^M: neither wisely nor unwisely; medium speed; neither by car or by bus

Given what we have said above it is somewhat surprising that the sentences below are odd: if the conjunction of two predicates is interpreted as forming a plural manner, and homogeneity applies, (27)a should mean that John ran neither fast nor slowly. Similarly, (27)b should simply mean that John's reply was neither wise nor unwise. We have just argued above that it is a property of contrary predicates that they might be simultaneously false. So why should the sentences in (27) be odd?

(27)
a. #John did not run <u>fast and slowly</u>
b. #John did not reply <u>wisely and unwisely</u>

I will say that it is the presupposition on forming plural manner predicates $\{p_1,p_2\}$ that $p_1 \cap p_2 \neq 0$. It is then for this reason that the sentences in (27) are unacceptable: e.g. the plural manner {fast, slow} is a presupposition failure since it is not possible for a running event to be both fast and slow at the same time, and therefore the plural manner cannot be formed.

I would like to suggest that this condition might be connected to a more general requirement that a plurality should be possible[14]. Spector (2007), who defends the view

[14] The connection with Spector's work was brought to my attention by Giorgio Magri (pc).

according to which the extension of plural common nouns contains both singularities and pluralities notes that the oddness of sentences like (28) is unexpected under this view: (28) should simply mean that John doesn't have a father, and hence should be acceptable. Spector (2007) claims that plural indefinites induce a modal presupposition according to which the 'at least two' reading of a plural noun should at least be possible. In the case at hand, the presupposition required that it should be at least possible to have more than one father.

(28) #Jack doesn't have fathers.

It seems then that our presupposition that gives the restriction on forming incoherent plural manners might be part of a more general requirement on forming pluralities.[15]

To sum up, in this section we have introduced a couple of assumptions about manner predicates that all seem to be motivated independently. Manner predicates have contraries, plus there is a predicate that denotes a set of events that belong to neither p nor its contrary. These three predicates are alternatives to each other in any context. The final assumption was that it is impossible to form incoherent plural predicates, which seemed to be again a general property of forming pluralities.

2.2 The proposal: Negative Islands with manner questions

We finally have everything in place to spell out the account of negative manner questions. We will say that the reason for the ungrammaticality of questions like (1), in contrast to (3) (repeated below as (29) and (30)) is that we cannot form a maximally informative true answer to a negative question about manners.

(29) *How didn't John behave at the party?

(30) Who didn't John invite to the party?

[15] Szabolcsi and Haddican (2004) also discuss examples where forming coherent pluralities seems to be an issue.

Why? The reason is rooted in the fact that the domain of manners contains contraries. Let's see how.

2.2.1 Positive and negative manner questions

Let's look first at positive questions about manners. As I have suggested above, in any given context, the domain of manners might be restricted, but for any predicate of events p, its contrary p' and the middle-predicate p^M will be among the alternatives in the Hamblin set. Suppose that the context restricts the domain of manners to the dimension of wisdom. Now the alternatives in the Hamblin-denotation of (31) will contain at least these (31)b:

(31) a: How did John behave?

b. {that John behaved wisely, that John behaved unwisely,
that John behaved neither wisely nor unwisely}

Suppose now that John indeed behaved wisely. Given that the three alternatives are exclusive (as contraries cannot be simultaneously true), if the Hamblin set contains only these three propositions, no other proposition will be true. In other words, the event in question (e*) is an element of the set of events denoted by *wisely*, and not an element of any other set. This is graphically represented below:

(32) __e*____ ________ ________

wise med-wise unwise

Since in this case this is the only true proposition, this will at the same time be the most informative true answer as well. This is in parallel with what we have seen with questions about singular individuals. Note that if we had more propositions in the Hamblin set, e.g. wisely, politely, and their conratraries respectively, as well as the plural manners that can be formed from these, the situation would be similar to questions that range over both singular and plural individuals. Suppose that John in fact behaved wisely and politely: given the distributive interpretation of plural predicates introduced above, this will entail that he behaved wisely and that he behaved politely, and imply that he did not behave in any other manner, i.e. he did not behave unwisely, impolitely, etc.

Let's look now at a negative question. First imagine, that our context restricts the domain to the dimension of wiseness.

(33) a: *How didn't John behave?

b. $\lambda p. \exists q_{manner}$ [behave (w)(e*)(John) $\wedge \neg q_{manner}$ (w)(e*)]

c. {that John did not behave wisely, that John did not behave unwisely, that John did not behave neither wisely nor unwisely}

Let's imagine first, that *John did not behave wisely* was a complete answer. This would mean that the only set of events among our alternatives which does not contain the event in question (e*) is the set of wise events. But this means that the event in question is both a member of the set of events denoted by *unwisely*, and the set of events denoted by *neither wisely not unwisely (in short: med-wisely).* This situation is graphically represented below:

(34) a. John did not behave wisely

b.

______	____e*____	___e*_____
wisely	med-wisely	unwisely

→this cannot be true because of ((25) ii)

Yet, this cannot be true, because these two sets are exclusive by definition, and no event can be a member of both of them. Therefore (34) cannot be complete answer to (33). What about an answer such as (35) below?

(35) a. #John did not behave wisely and unwisely

b.

______	___e*_____	________
wise	med-wise	unwise

This answer is ruled out by the presupposition that excludes the formation of incoherent plural manners. The predicates *wisely* and *unwisely* are contraries, and therefore they cannot form a plural manner. (As mentioned above, this is also the reason why the sentence itself in (35) is odd.) Therefore, the maximum of the two true predicates, namely that John did not behave wisely, and that john did not behave unwisely is not in the set of alternatives. Therefore (35) cannot be the most informative true answer either. But now we have run out of options, if neither (34) nor (35) can be a maximal answer, there is no maximal answer. It is easy to see that if we had more alternatives, e.g. the alternatives based on wiseness and politeness, (i.e. wisely, med-wisely, unwisely, politely, impolitely, med-politely and the acceptable pluralities that can be formed based on these) the situation would be similar: Any answer that contains only one member of each triplet leads to contradiction, and any answer that contains more than one member of each triplet is a presupposition failure. There is no way out, no maximal answer can be given.

It should be noted that given the similarity of selecting a complete answer to definite descriptions, the above account predicts that definite descriptions such as (36) should be also unacceptable:

(36) #the way in which John didn't behave.

This prediction is indeed borne out. The reason is of course that there is no maximum among the various manners in which John did not behave.

2.2.2 On contradiction and grammaticality

Recall that in Chapter 1 I have followed Gajewski (2002) in claiming that we need to distinguish between analyticity that results from the logical constants alone, from analyticity that is the result of the non-logical vocabulary. I have also adopted Gajewski's proposal according to which the former plays an important role for natural language: he argues that sentences that express a contradiction or tautology by virtue of their logical constants are ungrammatical. In other words he argues that it is L-analyticity, as opposed to plain contradiction, that leads to ungrammaticality. If it is correct that Gajewski (2002)'s proposal can be used to explain the ungrammaticality that we observe in the case of weak islands, then we should show that complete answers to negative manner questions are L-analytical. What we are looking for is to show that a complete answer to a negative manner question remains ungrammatical under any variable assignment. This is indeed the case. This is because for any predicate of manners p, the set of alternatives will always contain its contrary manner p' as well as a third manner predicate p^M that expresses that the event was neither p nor p'. This will have the consequence that the set of propositions that a complete answer to a negative manner question requires to be true is always incoherent. Thus complete answers to a negative manner question are L-analytic, and hence, predicted to be ungrammatical by Gajewski (2002)'s condition.

2.2.3 Blindness

One might wonder why it is that the examples below do not make the negative manner questions grammatical[16]:

(37) A: *How didn't John behave?

B: Politely, e.g.

B' Not politely.

(38) *Bill was surprised how John didn't behave.

In other words, there are contexts by which a non-complete or mention-some answer can be forced, suggested or at least made possible. The marker *e.g.* explicitly signals that the answer is non-complete (cf. e.g. Beck and Rullmann (1999) on discussion), and as such the answer in (37)B should be contradiction-free. If so, we might expect that the existence of this answer should make the question itself grammatical. Negative term answers as (37)B' are usually also not interpreted as complete answers, as can be seen in exchanges such as *Who came*? *Not John.* [17] Finally, some verbs that embed questions

[16] (37)B was pointed out to me by Irene Heim and David Pesetsky (pc), while (37)B' and (38) were brought to my attention by Emmanuel Chemla (pc)

[17] Although von Stechow and Zimmermann (1984) report somewhat different judgements from mine and Spector (2003). On the other hand, if a negative term answer were to be interpreted exhaustively, then if we

with their weak meaning, such as *surprise* or *predict* might in fact be true under a "very weak" meaning: one might be surprised by who came, if one expected only a subset of the people among those who came to come. (cf. Lahiri (1991), Lahiri (2002)). In these cases too, we might expect the sentences to improve, contrary to fact.[18] Why is it that these instances of partial answers do not make negative manner questions good? In other words, since grammar also allows for weaker than strongly exhaustive readings, why can the hearer not recalibrate the condition on complete answers into a weaker requirement, that of giving a partial answer?

I would like to argue that this apparent problem is in fact part of larger issue of the impenetrability of the linguistic system for non-linguistic reasoning, or reasoning based on common knowledge. As the requirement of the linguistic system is that a complete answer should be possible to a question, in the rare cases where this leads to a contradiction, we cannot access and recalibrate the rules for the felicity conditions on a question. Similar conclusions about the modularity of the various aspects of the linguistic systems were reached by Fox (2000) and Fox and Hackl (2005) about the nature of the Deductive System (DS) that he proposes, as well as in the above discussed Gajewski (2002). Similarly, Magri (2006) and subsequent work argues based on various examples that implicature computation should be blind to common knowledge. I contend then that the above observed impossibility of scaling down on our requirements based on contextual knowledge is part of a larger pattern of phenomena, where such adjustments to the core principles seem to be unavailable[19].

2.3 Ways to rescue Negative Islands

It was already mentioned briefly that explicit context restriction can rescue negative manner questions, as first observed by Kroch (1989). A second way to save negative island violations has been discovered by Fox and Hackl (2005) (partly based on Kuno and Takami (1997)): negative islands become perfectly acceptable if an existential modal

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only have three alternatives: {*politely*, *impolitely*, *mid-politely*} we should infer from the answer in (37)B' that John behaved politely, and in no other way, which is not a contradiction in itself.

[18] The examples with *predict* seem better, however on should be cautious: Given that *predict* selects for future tense, these examples are in fact parallel to the cases with modals, discussed in the next section. Their acceptability therefore should get the same explanation as that of the modals.

[19] Thanks to Giorgio Magri for discussion on this issue.

appears under negation. This section shows that both of these facts are predicted by the present account in a straightforward manner.

2.3.1 Modals

Fox and Hackl (2005) (partly based on observations by Kuno and Takami (1997)) have noted that certain modals can save negative island violations: more precisely negative islands can be saved by inserting existential modals below negation or by inserting universal modals above negation:

(39) How is John not allowed to behave?

(40) How did John certainly not behave?

The reason why these are predicted to be good in our system is that the contrary alternatives that are required to be true by exhaustive interpretation of the complete answer can be distributed over different possible worlds, hence the contradiction can be avoided: Notice that unlike before, we are not talking about a specific event any more, but the event is existentially quantified over. The existential quantification is presumably provided by the existential modal.

(41) $[\![$How is John not allowed to behave?$]\!]$

$$=\{\neg\exists w\ \exists e\ [\text{behave}\ (w)(e)(\text{John}) \wedge q_{manner}\ (w)(e)]\ |\ q_{manner} \in D_M\}$$

Imagine again a scenario, in which we have restricted the domain to the dimansion of politeness. As before, the set of alternatives will at least include three contrary predicates: *politely*, *impolitely* and *neither politely nor impolitely* (represented below as med-politely)

(42) a. John is not allowed to behave impolitely.

b. $\_\_\Diamond\exists e\_\_\_\_$ $\_\_\_\_\Diamond\exists e\_\_\_\_$ $\_\_\_\_\neg\Diamond\exists e\_\_\_$

politely med-politely impolitely

There is no obstacle in this case for choosing a complete answer, e.g. (42) above. This is because it might be the case that *impolitely* is indeed the only manner in which John is not allowed to behave, and in every other manners he is allowed to behave. In other words, it is allowed that there be an event of John behaving in a polite manner, and that there be another event of John behaving in a med-polite manner. The contradiction is resolved by distributing predicates over different worlds and events. Since universal modals above negation are equivalent to existential modals below negation, the same reasoning holds for (40) as well[20]. On the other hand we predict manner questions where universal modals can be found under negation to be unacceptable. This is because in this case, instead of distributing the mutually exclusive propositions over different worlds, we require them to be true in every possible world, which of course is impossible (Notice that assuming as before that the universal modal quantifies over worlds and events, the event variable is now universally quantified over)

(43) *How is John not required to behave?

(44) ⟦How is John not required to behave?⟧

$$=\{\neg\forall w\ \forall e\ [behave\ (w)(e)(John) \wedge q_{manner}\ (w)(e)] \mid q_{manner} \in D_M\}$$

Why is the sentence in (45) below not a good complete answer?

(45) a. #John is not required to behave impolitely.

b. $\_\_\Box\forall e\_\_\_\_$ $\_\_\_\_\Box\forall e\_\_\_\_$ $\_\_\_\_\neg\Box\forall e\_\_\_$

politely med-politely impolitely

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[20] However, notice that ability modals seem to be more complicated then the existential modals above

(1) *How can't you photograph the house? (cf Kuno and Takami (1997))

(2) *How are you not able to eat a mango?

But notice that in these cases also the corresponding positive questions don't seem to be good:

(3) ???how can you photograph the house?

(4) ???how are you able to eat a mango?

Though the positive cases improve with past tense:

(5) How could you solve the exercise

I have no explanation for these facts, however I suspect that the problem in these cases arises from the actuality entailment of ability modals in some contexts (cf. Hacquard (2006)).

The problem is that if *impolitely* is the unique manner such that John is not required to behave that way, then for the other two alternatives it must be the case that John is required to behave in that manner: However, this is again a contradiction as these manner predicates are exclusive. Furthermore, just as we have seen before in the case of non-modal negative manners, it is not possible to form incoherent plural manners, therefore an answer such as *#John is not required to behave politely and impolitely* will not be possible either. It should be noted here that Fox (2007)'s generalization of the problem of symmetrical alternatives and the cases discussed in Fox and Hackl (2005) extends to the above reasoning. I will return to this in Section 5 of this Chapter.

2.3.2 Explicit domains

If we restrict the set of possible answers in appropriate ways, we might get rid of the contradictions that cause problems. An example of this effect might be if we simply list the potential alternatives. The relevant observation goes back to Kroch (1989):

(46) How did you not behave: A-nicely, B-politely, C-kindly?

In this case the set of alternatives is restricted to the non-plural manners A,B,C, (and potentially the sets that can be formed of these, depending on the rules of the multiple choice test). As this set does not have to contain any contraries, the difficulties that lead to weak island violation does not arise here, and hence the sentence is predicted to be good. This is because by restricting the domain it becomes possible to choose a predicate among the alternatives such that it is a complete answer to the question, and it is does not lead to any contradiction. In fact in the above example there are no contraries at all, therefore any answer based on these alternatives can in principle be a good answer. Similarly, it is easy to see that in most explicitly listed domains it will be possible to select a complete answer, at least as long as the domain does not contain more than two mutually exclusive manner predicates per each dimension of manners. In fact we predict that if the list contained three predicates of manners that are mutually contraries to each other, the question should still be bad. I think that this prediction is indeed borne out:

(47) *How do you not speak French? A: very well B: so-so C: badly

The problem is that on the one hand a complete answer such as *I do not speak French [α+β]* violates the presupposition against forming incoherent manner predicates, but the complete answer *I speak French α* leads to a contradiction.

2.4 Interim summary

In this section I have argued that the felicity condition on asking a question according to which the speaker should be able to assume that the hearer might be able to know the most informative answer can never be met in the case of negative manner questions. This was because the domain of manners contained atoms that were not independent form each other: the domain of manners contained contraries. Therefore a truth of an (atomic) proposition in the Hamblin denotation of such questions had consequences for the truth of other atomic propositions. This state of affairs in the case of negative questions resulted in a situation in which it was not possible to select a maximal answer.

3 Negative islands with degree questions

This section looks at negative degree questions. The basic contrast to be explained is the one exemplified below: while the positive degree questions are perfectly acceptable (48), their negative counterparts in (49) are not:

(48) a. How many children does John have?
     b. How much milk did John spill on his shirt?

(49) a. *How many children doesn't John have?
     b. *How much milk didn't John spill on his shirt?

This chapter proposes a novel explanation as to where this difference might be stemming from.

An interesting observation about negative degree questions that is made in Fox and Hackl (2005) and Spector (2004) is useful to keep in mind. When the sentence is acceptable, for example because it contains an existential quantifier under negation, an answer to it can be interpreted in two ways:

(50) a. How much are you sure that this vessel won't weigh? (=(5))

b. 5 tons.

i. 'I am sure that this vessel will not weigh exactly 5 tons'

ii. 'I am sure that this vessel will not weigh 5 tons or more'

A second observation about the context-dependence of the second, 'at least' reading is that in fact it can be fairly easily turned into an 'at most' reading depending on world knowledge/context[21] (similar facts about context-reversability of the scales induced were noted e.g. in Horn (1992), Geurts (2006) and others):

(51) a. How much did no one score?

b. 10 points.

Suppose we are playing a game where what is hard is to score a lot of points: The answer seems to imply that 'No one scored ten or more points' on the other hand, imagine now that we are playing golf, where what is hard is to score 1 point, while scoring lots of points is easy: the answer seems to imply 'no one scored ten or less points'. Let's look at another example to illustrate the same point:

(52) a. How many children are we not allowed to have?

b. 2.

Most certainly, the answer "2" above can be interpreted as 'two or more' in a context where the problem seems to be overpopulation (E.g. China). Less easily perhaps, but conceivably the answer "2" can also be interpreted as 'two or less' if we are talking about a context where the problem is that not enough children are born (E.g. some orthodox neighborhoods).

[21] I believe this was brought to my attention by E. Chemla.

3.1 Towards an account

This section aims to show that the problem of negative degree questions can be reduced to the problem of having symmetrical alternatives. The section is composed of two parts: the first part (Section 3.1.) introduces a toy account that will pave the way for the actual account to be proposed in Section 3.2.

3.1.1 Exact meanings

Imagine that we wanted to keep the idea from Fox and Hackl (2005) that degree questions ask for the most informative answer, but without the density assumption. We have seen in Chapter 2 that this so far predicts that the negative degree questions should be good. Yet perhaps it is still possible to avoid this conclusion. Here is how we could start to reason: It seems that on the basis of the examples discussed in the previous section, we could draw the following empirical generalization:

(53) Empirical generalization about negative degree questions:

i. A degree question is bad if it is contradictory under the exact reading of the numeral

ii. When a degree question is grammatical, it is ambiguous between an *exact* and an *at least* /*at most* reading.

Why should this be? First we should observe that if numerals have exact readings in the basic degree questions, then any complete answer to a negative question will require that a number of mutually incompatible statements should hold at the same time.

(54) $[\![$How many apples didn't John eat?$]\!]$ = {John didn't eat exactly n apples | $n \in N^+$}

Clearly, if e.g. John ate 3 apples, there is no most informative answer among the true propositions in (54). If a modal expression of the right type intervenes however, there might be a most informative answer. This is because as soon as we distribute the mutually exclusive alternatives over different times/worlds/individuals, the contradiction disappears. [This is then a very similar reasoning to that found in Chierchia (2004), Menendez-Benito (2005) Fox (2006) for free choice and also Guerzoni (2003) for German *auch nur*]

(55) $[\![$How much radiation are we not allowed to expose our workers to?$]\!]$

$=\{$we are not allowed to expose our workers to n radiation $\mid n\in N^{+}\}$

$=\{\neg\exists w'_{Acc(w,w')}$ we expose our workers to exactly n radiation $\mid n\in N^{+}\}$

It is easy to see that in this case there might be a most informative answer. E.g. it might be the case that we are not allowed to expose our workers to exactly 76 millisievers/year, but more or less is acceptable. In this case "76" can in fact be the complete answer, and we do not run into contradiction. Similarly, an existential quantifiers over individuals can remedy the problem as well:

(56) $[\![$How much did no one score?$]\!]$ $=\{\neg\exists x.$ x scored exactly n $\mid n\in N^{+}\}$

If, for example 77 is the only amount such that no one scored that much, then "77" might in fact be the complete answer to the above question. What we can observe then is that while a plain negative question such as (54) will not have a maximally informative answer in any context, there are contexts that make (55) and (56) acceptable.

A universal modal under negation on the other hand do not dissolve the problem like the existential modal above did:

(57) $[\![$ How much radiation are we not required to expose our workers to ?$]\!]$

$=\{\neg\forall w'_{Acc(w,w')}$ we expose our workers to exactly amount n radiation$\mid n\in N^{+}\}$

In this case again there can be no most informative answer: a proposition of the form 'we are not required to expose our workers to d radiation' could only be a complete answer, if it was possible that the two propositions *that we are required to expose our workers to exactly d+1 radiation* and *that we are required to expose workers to exactly d+2 amount* *of radiation* be true in the same world. As these are contradictory however, there cannot be such world. Therefore, there cannot be a complete answer to such questions. We see then why the exact readings predict that the plain negative numeral questions should be ungrammatical, but that an existential quantifier under negation or a universal quantifier above negation should remedy the situation. Note that this reasoning about modal obviation in negative degree questions relates in a direct way to some analyses of the interaction of modals with polarity items: cf. e.g. Chierchia (2004), Menendez-Benito (2005) Fox (2006), Guerzoni (2003) for some related analyses of polarity items.

Thus we have seen that negative degree questions that contain an existential quantifier under negation have a non-contradictory complete answer assuming that the meaning of the numeral is 'exact' in questions. But we also know that when these questions are grammatical, they are in fact ambiguous between the exact and an 'at least'/ 'at most' readings. How should we derive this? We can observe first that even though the question alternatives are exclusive, and hence they are not ordered by entailment, they might be still ordered by likelihood/scale of difficulty etc. (for example by how hard it is to score, assumptions about laws, etc). Now suppose that we are in a context in which in fact many of the alternatives in the question denotation are true: E.g no one scored exactly 10, exactly 11, exactly 12.... ad infinitum) Now, the situation is very similar to a mention-some question: we have a number of alternatives that are true, and that do not entail each other, but are ordered in terms of some pragmatic consideration/likelihood/relevance etc. The complete answer should choose the most relevant answer.

How do we achieve this? Recall that so far we have been assuming that a complete answer yields the most informative true answer among the true propositions. Yet, as the existence of mention-some questions shows, this cannot be the only type of legitimate answer. We could therefore attempt at a broader generalization, one that encompasses the previous notion of a complete answer, as well as predicting the existence of mention-some questions [cf. van Rooy (2003), van Rooy and Schulz (2005) for a related proposal]: A complete answer then will say that p is the most relevant true answer among the question alternatives. Naturally, if the alternatives are ordered by entailment, then 'less relevant' will be interpreted as 'entailed'.

(58) *For Q, a set of alternative propositions to a Question, and* $||\alpha|| \in Q$

$$\text{Exh}(\alpha)=\alpha \;\&\; \bigwedge\{\neg\beta \mid \beta \in \text{Excl}(Q)\}$$

where

Excl(Q) is the set of excludable alternatives in Q, here the alternatives that are not less *relevant* than α.

In the case of a typical mention-some question, such as (59), an answer such as "two blocks from here" will imply that is the most relevant true answer, in other words there is no easier/less effortful/relevant way of getting an Italian newspaper. Of course, it does not imply that one cannot get an Italian newspaper in Rome, but unless we are in Rome that fact will not be relevant.

(59) Where can I get an Italian newspaper?

Similarly, a degree question then could invoke a mention-some answer. I will present this idea here only very impressionistically, for the reason that this is not the proposal that I will adopt. Take a question like the one below:

(60) How much can you score?

Intuitively, if we are in a context in which scoring a lot of points is hard, while scoring little is relatively easy, that maximal degree such that you can score exactly that much will be at the same time the most relevant answer. If we were in a context in which it was difficult to score few points, but easy to score a lot of points, then the minimal degree should be the most relevant at the same time. In the case of a negative question, on the other hand, if not scoring a lot is what is hard/expected, then not scoring less is more noteworthy than not scoring more. Therefore the proposition *that no one scored n* is more noteworthy than the proposition *that no one scored n+1.* Thus the complete answer to (61) "no one scored exactly 4" will mean that none of the more desirable/more relevant worlds are true, i.e. someone scored exactly 3 or less.

(61) How much did no one score?

3.1.2. The problem for this view

There is however a major problem for an attempt at explaining negative degree questions along the lines outlined in the previous section. The above view essentially proposes that numerals should have the exact reading as their basic meaning, while we can derive the 'at least' reading of answers via a pragmatic mechanism, in our case resorting to mention-some questions. However the view that numerals have exact readings only, cannot be maintained. There are at least 2 main problems for such accounts, listed below:

(62)

i. A sentence like *I have 3 children, in fact I have 5* should be a plain contradiction. But it is not.

ii. The 'at least' reading of sentences like *You must eat 5 apples* cannot be derived pragmatically, as pointed out in Geurts (2006). This is because if the semantic meaning of the numeral is the exact sense *(You must eat exactly 5 apples*), then the 'at least' reading cannot arise as a pragmatic inference, because such inference would contradict the assertion. However, implicatures can never overwrite the assertion on which they are based.

Of course one could still try to argue that numerals are *semantically* ambiguous between the 'exact' and the 'at least' sense, but for some reason in degree questions the 'at least' construal is blocked. (e.g. Spector (2004) presents an account approximately along these lines.) However, such a proposal unfortunately cannot be successfully argued either. This problem is exemplified with sentences of the type below[22]:

[22] As pointed out to me by Danny Fox.

(63) How tall are you required to be to be a basketball player?

The problem is that an answer to this question such as "180cm" seems to be compatible with the at least reading, in fact that is the most natural understanding of such an answer. However, this is in fact incompatible with what should be the semantic meaning of this question based on what has been said above. This is because if one is required to be exactly 180cm, tall to be a basketball player, that in fact excludes a situation where one is 181cm and one is a basketball player. This runs contrary to our intuitions in this case however.

One way of how to get out of this conundrum could be to assume that the question above in fact has some representation akin to the following:

(64) $[\![(63)]\!] = \{n \mid \text{if you are exactly } n \rightarrow \text{you can be a basketball player}\}$

However, it is not easy to see how this interpretation could be derived in a compositional fashion from (63). Luckily, we do not have to resort though to some *Deus ex Machina*: and this is because by changing one aspect of the above outlined theory this problem disappears. This is the topic of the next section.

3.2. The Solution Proposed

The solution in this section is based on a suggestion made by Benjamin Spector (pc) to use a degree semantics based on intervals to remedy the problem with *require*. Such an account of degree constructions was originally proposed in Schwarzschild and Wilkinson (2002), and was also adopted (with some modifications) by Heim (2006). As it turns out, adopting an interval based degree semantics results in a much more elegant theory overall than the one outlined in the previous section: while preserving all the good aspects of the previous version, it does not force us to adopt some of the more dubious aspects.

3.2.1. **Degree semantics based on intervals:** Schwarzschild and Wilkinson (2002), Heim (2006).

A long-standing problem in the domain of comparatives is the puzzle that is exemplified by sentences such as (65) below: (cf. Heim (2006) and references therein)

(65) John is taller than every girl is.

a. Actual meaning: 'for every girl x: John is taller than x'

b. Predicted meaning : 'John is taller than the degree d such that every girl is tall to that degree d. '

The puzzle is constituted by the fact that the universal quantifier appears to take scope over the comparative adjective, which given well-known (strong)-island constraints should be impossible. Moreover, the reading in (65) is not only possible, but in fact obligatory, which casts further doubt on an analysis that would try to account for this fact in terms of a scope ambiguity. (For further arguments and references cf. Schwarzschild and Wilkinson (2002)) The (only) two recent solutions to this problem, Schwarzschild and Wilkinson (2002) and Heim (2006) both[23] propose that adjectives denote relations between individuals and intervals (sets of degrees) (67), instead of the more traditional assumption according to which adjectives denote a relation between individuals and degrees (66):

(66) <u>More traditional analyses of adjectives</u> (cf. von Stechow (1984), Rullmann (1995), Kennedy (1997) and others)

$[\![\text{tall}]\!]=\lambda d_d.\ \lambda x_e.\ x\text{'s height} \geq d$ or $[\![\text{tall}]\!]=\lambda d_d.\ \lambda x_e.\ x\text{'s height} = d$

(67) <u>The analyses of Schwarzschild and Wilkinson (2002), Heim (2006)</u>:

$[\![\text{tall}]\!]=\lambda D_{<d,t>}.\ \lambda x_e.\ x\text{'s height} \in D$

[23] This is a simplification of the actual proposal in Heim (2006), as we will see.

I will adopt here the version according to which the sets of degrees in question in fact correspond to intervals. Now a sentence such as *John is tall* will denote the following [crucially, I will depart from Heim (2006) and follow Schwarzschild and Wilkinson (2002) in assuming that intervalhood (as opposed to mere sets of degrees) plays a role]:

(68) a. $[\![$John is I-tall$]\!]$=1 iff John's height $\in$ I ; *where I is an interval:*

b. A set of degrees D is an <u>interval</u> iff

For all d, d', d'': if d$\in$D & d''$\in$D & d$\leq$d'$\leq$d'', then d'$\in$D

I will assume that the natural language degree expression *5 feet* might denote two intervals: the interval [5,5] (which is just a singleton set of degrees) or the interval [5,∞). As a consequence, in a sentence such as *John is 5 feet tall* the degree argument of the adjective is bound either by the point-like interval that corresponds to *5 feet*, or by the open interval that corresponds to *5 feet*. These two possibilities derive the fact that the sentence *John is 5 feet tall* has two readings: the 'exact' and the 'at least' reading

3.2.2 The Analysis

Positive degree questions First let's look at a positive degree question, such as (69) below. Recall the assumption that we are looking for the most informative true proposition among the question alternatives. The alternative propositions in this case range over different intervals that could be the argument of the adjective:

(69) $[\![$How tall is John?$]\!]$= {John's height is $\in$I | I$\in$$D_I$}

Naturally, there are many intervals for which it is true that John's height (a point) is contained in them. These intervals overlap. I will say that an interval K covers interval I, if for every degree d that is an element of I, K contains that element. (In other words, I is a subset of K.) It is easy to see then that the truth of *John's height $\in$I,* will entail the truth of *John's height$\in$ K*, for every K that covers I.

(70) an interval I is covered by interval K iff

for all d: $d \in I$ then $d \in K$

(71) ----- ⟨--(----{----[d_j]$_{I1}$--------⟩$_{I2}$-------}$_{I3}$-----)$_{I4}$---------------

In the picture above in (71), John's height is represented by d. The truth of *John's height* $\in I_1$, entails the truth of *John's height* $\in I_2$ and so on. Now, when we are looking for the most informative answer among the true answers, this will be the smallest interval such that John's height is contained in it. Thus there will always be a most informative proposition among the true propositions: John's height $\in \{d_j\}$.

Negative degree questions In the case of a negative degree question the situation is different: we are now looking for the maximal interval among the intervals in which John's height is not contained. Given that the entailment pattern is reversed because of negation, if K covers I, the truth of *John's height* $\notin K$ will entail the truth of *Johns height* $\notin I$. We are then looking for the biggest interval such that John's height is not contained in it. The problem is that there is no such interval.

(72) ⟦*How tall isn't John?⟧= $\{\neg$John's height is $\in I \mid I \in D_I\}$

The reason why there cannot be such an interval is because intervals are continuous. Therefore, for any two intervals I and K, such as I is wholly below d, and K is wholly above K, there cannot be an interval which covers both I and K, but does not contain d. However, this is exactly what is required by the question.

(73) an interval I is wholly below d iff

for all d': $d' \in I$ $d' \leq d$

(74) ---[----------------------] $_{I2}$--$\mathbf{d_j}$ --{--------------}$_{I3}$---

In the picture above for example the interval I_2 is wholly below d_j, while the interval I_3 is wholly above d_j. There is no maximal interval that covers both of these intervals, but does not cover d_j. Therefore, there cannot be a most informative element among the true alternatives, and the question is predicted to be bad. Given that John's height in the actual world corresponds to a single point on the scale, this situation is in fact unavoidable, as long as John has any height. Indeed it seems to be a presupposition of degree questions that the answer is not-zero. In the case of asking about John's height this is a trivial fact about the world. In the case of a question such as *How many apples did you eat?* if no apples were eaten, then a natural answer is the refutation of the presupposition: "I did not eat any apples" instead of rather odd "#Zero". Notice also that for the reasoning outlined above contextually given levels of granularity do not make any difference: any level of granularity will lead to a contradiction, as long as the domain of degrees contains at least 3 degrees.

Quantifiers in the question As we have seen above, certain quantifiers can rescue negative degree questions. Why should this be? The reason is that now there can be scenarios in which it is possible to find a maximal interval. Let's take a question such as (75) below:

(75) ⟦How many books are you not allowed to read?⟧

$$= \{\neg\exists w'_{Acc(w,w')} [\text{ the number of books you read in } w' \text{ is in } I] \mid I \in D_I\}$$

Imagine that you are allowed to read any number of books below 5. Then there is a possible world in which you read 1 book, another in which you read 2 books etc. up till 4. This situation is depicted below:

(76) $\mathbf{d_{w1}\ d_{w2}\ d_{w3}\ d_{w4}}$ [--------{--⟨---------------}--⟩---]--------

The intervals which do not contain any degree such that you are allowed to read that number of books are all wholly above d_4. Therefore there will be a maximal interval such that it does not contain any number of books that you are allowed to read: namely the interval $[5, \infty)$.

Another scenario in which the question might have a most informative answer is a scenario in which one is allowed to read all numbers of books, except it so happens that reading exactly 5 books is prohibited: in this case the only interval for which it is true that you are not allowed to read that number of books is the interval which corresponds to the singleton set $\{d_5\}$, *exactly 5.*

(77) $\mathbf{d_{s1}\ d_{s2}\ d_{s3}\ d_{s4}}\ [d_5]\ \mathbf{d_{s6}\ d_{s7}\ d_{s8}\ d_{s9}\ldots}$

This reasoning derives then the ambiguity that was pointed out in the introduction of this section in connection with example (50).

In the case of universal modals under negation the situation is again different. But before we turn to that, let's look at positive degree questions that contain a universal modal, such as the question in (63) above. We have seen that for the earlier version of this analysis the questions with a universal modal such as *require* constituted a problem. However, now that problem disappears. Recall what the problematic question was:

(78) $[\![$How tall are you required to be (to be a basketball player)?$]\!]$

$$= \{\forall w'_{Acc(w,w')}\ [\text{your height is in I in } w'\ ] \mid I \in D_I\}$$

The problem was that it seemed possible to answer "at least 180cm", but this was predicted to be impossible by that proposal. Now however the situation is different: Suppose the fact is that you indeed have to be more than 180cm to be a basketball player. Then the smallest interval such that it is true that your height has to be in that interval, is the interval K: $[180, \infty)$. For any interval that is properly contained in this interval it is not true that your height has to be in that interval. For example for the interval $[185, \infty)$ it is not true that your height has to be in that interval to be a basketball player, since in fact you might as well be 183 and a happy basketball player. For any interval that properly contains K, it will be true that your height is required to be in that interval, but these will be less informative. Given that that the interval [180, ∞) is the smallest interval such that your height is required to be in it, the proposition that your height is required to be in the interval [180, ∞) will be the most informative proposition in this case.

(79) ---------{---------[$\mathbf{d_{180cm}}$-----------------------∞]$_K$}

In the case of a negative degree question that contains a universal quantifier under negation however the situation is different:

(80) ⟦*How tall are you not required to be (to be a basketball player)?⟧

$$= \{\neg \forall w'_{Acc(w,w')} \text{ [your height is in I in w']} \mid I \in D_I\}$$

Suppose that the actual situation in the world is the same, namely you are required to be at least 180cm to be a basketball player, let's name this interval K. Let's take two intervals, for which it is true that it is not the case that your height is required to be in that interval: I_1 and I_2, such that I_1 is wholly below K, while I_2 is covered by K:

(81) --⟨{---------}$_{I1}$-------[$\mathbf{d_{180cm}}$--------(--------------∞)$_{I2}$]$_K$⟩$_N$

An interval that covers both of these intervals (let's name it N) is not an interval for which it is not true that in every accessible world your height is contained in this interval. Quite the opposite, in fact in every accessible world, your height will be contained in N. Now again, similarly to the basic cases, we run into a situation such that among the set of true answers there is no maximally true one, one that would entail all and only the other true answers.

3.2.3. A potential problem?

Danny Fox (pc) has raised the following objection. Suppose you have to drive faster than 40m/h, but less than 70m/h. Now suppose someone asks:

(82) How fast must you drive?

It would seem that it is possible to answer: *(at least) 40m/h.* Why is it that we do not have to say "between 40 and 70 m/h"?

We could perhaps say that this objection could be addressed by saying that in fact all that is happening here is that domain restriction is at play[24]. If we assume that it is common ground that you are not allowed to drive faster than 70m/h, then it is possible to assume that the hearer takes this fact as natural domain restriction. Then given this domain restriction "at least 40" will be de facto interpreted as 'between 40 and 70'. One might still ask why is it that the answer "40" might mean 'at least 40', while in the same context, an answer such as "70" cannot be understood as "70 or less (up to 40)". One way to address this objection could be by resorting to the assumption that was introduced above, according to which numeral expressions might denote intervals such as [x,x] or [x,∞), but not intervals of the form (0,x]. Our opponent might still strike back pointing out that if we ask a question such as the one in (83), in the same context as was introduced above, the preferred reading of the answer "70" is in fact '70 or less', in other words the numeral in this case should be able to denote an interval of the form (0,x].

(83) How slow must you drive?

As it seems difficult to maneuver out of this corner, we might then try to address the objection in a different, more technical way. [This was suggested to me by Benjamin Spector (pc)]. This version would say that what we are observing in this case is that the Π-operator of Schwarzschild (2004) and Heim (2006) can take different scopes. But at this point we need to introduce some more background.

As we have said before, the above authors argue that degree adjectives should be thought of as relations between individuals and sets of degrees (intervals). But is this meaning basic or is it derived from something else? Schwarzschild (2004) and Heim (2006) argue that in fact it is derived by an invisible operator called the Π operator. More precisely, the meaning of a degree adjective such as *fast* is both (84) or (85), but the second one is more basic: we can derive (84) from (85) via composing the adjective root with an invisible Π operator:

(84) $[\![fast_1]\!]=\lambda D_{<d,t>}.\ \lambda x_e.$ x's speed $\in D$

(85) $[\![fast_2]\!]=\lambda d.\ \lambda x_e.$ x's speed $\geq d$

(86) $[\![\Pi]\!]=\lambda D_{<d,t>}.\ \lambda P_{<d,t>}.\ max(P)\in D$

It seems harmless to reverse the order of arguments of the Π operator: so let's do it: (I have also switched back to intervals from Heim (2006)'s formulation):

(87) $[\![\Pi]\!]=\lambda P_{<d,t>}.\ \lambda I_{<d,t>}.\ max(P)\in I$

Given this, now we can say that a question such as *How tall is John?* has the following meaning (crucially for the present account, the presence of the Π operator is not optional, but obligatory):

(88) [How fast is John?]

= 'for what I. I [Π. λd John is d-fast]?'

= {[Π. λd John is d-fast](I)| $I\in D_I$}

={max(λd. John is d-fast)$\in$I | $I\in D_I$}

Now, inspired by Heim (2006)'s treatment of examples such as *He is faster than he needs to be*, we can say that Π could scope above or below *require*. Suppose now that in fact John is required to be between 160 and 180 cm. Then we have the two possibilities as shown below:

[24] Thanks to Gennaro Chierchia for discussion on this.

(89) ⟦How fast is John required to be?⟧

(a)

= 'for what interval I is it required I [Π. λd John is d-fast]'

$=\{\text{it is required that } \underbrace{\max(\lambda d.\ \text{John is d-fast})}_{\textit{the speed of John}} \in I \mid I \in D_I\}$

or:

(b)

= 'for what interval I .D [Π. λd it is required that John is d-fast]'

$=\{ \underbrace{\max(\lambda d.\ \text{It is required that John is d-fast})}_{\textit{the speed that John is required to be at least that fast}} \in I \mid I \in D_I\}$

The construal on which the Π operator has narrow scope in ((89)a is equivalent to the type of reading that we have seen in (78) above. On the other hand, the construal on which the Π operator has wide scope in ((89)b corresponds to the reading that the example by Fox seems to have. This is because in this case now we are looking for the interval, which contains the height such that John is required to be at least that tall, and which is also the most informative such interval. In our case, this interval will be the singleton set {160}.

It seems that this proposal stands a better chance against the objection raised in connection with *slow* before in (83). This is because now one of the predicted readings of this sentence is as shown below:

(90) ⟦How slow are you required to drive?⟧

$=\{ \underbrace{\max(\lambda d.\ \text{It is required that you drive d-slow})}_{\textit{the speed that you are required to drive at least that slow}} \in I \mid I \in D_I\}$

This now in fact correctly picks out the upper end of interval [40,70].

One final issues should still be pointed out however. As it is, this proposal predicts a flat ambiguity. In the cases reviewed above this ambiguity seems to be needed. For example the question in (82) in the context described above, might indeed be saliently answered both by [40,70], or [40,∞). On the other hand, it is interesting to observe that sometimes it seems that it is not the case that both readings are equally available. Imagine the following scenario[25]: I am driving 120 m/h in my Ferrari, when a policeman stops me. I innocently ask:

(91) Why did you stop me? How fast must I drive?

It seems that the above question is funny. The reason for this is that it seems to suggest that the problem might be I was not driving fast enough. But this means that the reading of the type exemplified in (89)a is for some reason not easily available here. At present, I do not yet understand why this should be.

3.2.4. Kroch-examples

A nice aspect of the present proposal is that the granularity of the scales involved does not play any role: the scale might be dense (as in the case of heights, eg.) or discreet (as in the case of children), the ungrammaticality of negative degree questions is equally predicted. As a consequence, we do not need to impose any restrictions on how the context can interact with the module of grammar that is sensitive to contradictions. In fact the felicity condition on questions introduced in the previous chapter can simply apply at the level of truth conditions.

Let's return here briefly to some of the properties of negative degree questions that were introduced in the introductory section. Recall the examples based on Kroch (1989) that showed that an explicit choice of answers seemed to make the question acceptable:

(92) Among the following, how many points did Iverson not score?

A. 20 B.30 C.40 D.50

[25] This example is due to Giorgio Magri (pc).

Notice that a felicitous answer "B" seems to imply that there were many events of Iverson scoring. The Answer "b" suggests that among the alternatives given, B is the only one to which no scoring event corresponds. Thus what is happening in these examples is not so much that the quantificational domain gets restricted, but rather that the choice of alternatives invokes a number of different events. Once the scorings can be distributed over various events, the contradiction disappears, much in the same way as in the case of modals and other quantifiers. This example thus also points in the direction of the fact that was also observed with the examples where the presence of a quantifier seemed to obviate the weak island effect. A felicitous answer to these examples seemed to imply the truth of a range of alternatives. In fact if different alternative events are not easily available, even a restricted question of the sort shown above seems to be odd:

(93) #Among the following, how many children don't you have?
A. 2 B.3 C.4 D.5

This fact is straightforwardly predicted by the present account, but not by any other account.

3.3 Interim summary of negative degree questions

In this section I have shown that an interval-based semantics for degrees predicts that negative degree questions will not have a maximal answer. This was because in these cases there was no single interval that covered all and only the degrees for which the negative predicate was true. As a consequence, any complete answer to negative degree questions amounts to a statement of a contradiction.

4. Negative island-like phenomena based on the same logic:

In this section, I return to the examples mentioned in the introduction of this chapter, the oddness of which can be explained by the same reasoning as we have seen for the manner questions.

4.1 *When*

(94) *When did Mary not die?

(95) When didn't you feel happy?

As the above examples show, we observe marked ungrammaticality with final punctual eventive verbs (e.g. *die*), but not with statives (e.g. *be happy*). It also seems that there is a scale of acceptability judgements in between these two extremes. These facts can be explained by the same logic as we have seen above: given that dying (or the more optimistic resurrecting) is a pointlike event, there are infinite points in time such that it is true that Mary did not die at these times. However, these a propositions are not ordered by entailment. For this reason there is no maximally informative alternative among these true propositions. With statives on the other hand, it is possible to construct a scenario such that there is one maximal interval at which you did not feel happy.

4.2 *Where*

(96) *Where aren't you at the moment?

(97) Where hasn't Bill looked for the keys?

A very similar pattern can be seen with questions formed by *where*. The example in (96) is deviant because it is not possible given the normal laws of our world to be at more than one place at the same time: yet this is exactly what a complete answer to this question would require. Assuming that spacial locations are point-like, there is no entailment relationship between being at various places at any given time, in fact all these options are mutually exclusive. Given this, and that there are always infinite points in space where one is not at any given moment, there is no maximally informative answer to a question like (96) On the other hand, it is perfectly possible for someone to have searched for the keys at every salient place, except for one or two locations.

5. On symmetry

This last section of the present chapter proposes that the property of having symmetric alternatives might be extended as a generalization for all cases where exhaustification leads to contradiction. Let's first state the symmetry generalization:

(98) *Symmetry*

Let p be a proposition and A a set of propositions. For any p, there are at least 2 alternatives in A such that each of them can be denied consistently with p, but the denial of both of these alternatives is inconsistent with p.

5.1 Symmetry and negative islands

Let's see informally how symmetry is manifested in the case of the interval-based analysis of negative degree questions. Suppose there was an answer to (49)a, the interval K; [3,∞). Exhaustifying this answer would imply that for all the intervals that are not subintervals of K, the (exact) number of apples John has is contained in those intervals. The intervals [0,1] and the intervals [2,∞) are for example such intervals. However, they do not overlap, therefore it is impossible that the exact number of apples that John has be contained in both of these. In other words, the simultaneous denial of the two alternatives that *the number of apples John has is$\not\in$[0,1]* and that *The number of apples that John has is* $\not\in$[2,∞) is inconsistent. Such a situation will always arise as long as John has any apples, which in turn seems to be a presupposition of the question, as it was discussed above.

Now let's observe how symmetry is manifested in my proposal of negative manner questions. Recall the basic case of a negative manner question. Let's assume for the sake of simplicity that that the context restricts the domain to the dimension of politeness:

(99) a. *How didn't John behave?

b. $\lambda p. \exists q_{manner}$ [behave (w)(e*)(John) $\wedge \neg$ q_{manner} (w)(e*)]

c. {that John did not behave wisely,

that John did not behave unwisely,

that John did not behave neither wisely nor unwisely}

We can see that each alternative to any proposition p in the Hamblin denotation can be denied consistently with p. However, as we have seen above, the denial of any two alternatives at the same time leads to a contradiction.

5.2. Density vs. symmetry

Fox and Hackl (2005) propose that the account in terms of density that they offer for negative degree questions [reviewed in Chapter 2 of this thesis] also explains certain cases of missing implicatures such as the one below:

(100) John has more than 2 children

*Implicature: John has exactly 3 children

Without the density assumption, it seems that the implicature should be there: Among the scalar alternatives to (100) *John has more than* n_{card} *children,* the alternative that John has more than 3 children is the strongest. The negation of this alternative, together with the assertion of the sentence should convey that John has exactly 3 children. Given the density assumption, the predicted implicature is not present, because as a consequence of the density assumption, *more than 2* is a left-open interval, there can be no strongest alternative among the scalar alternatives to (100). Importantly, the pattern of modal obviation is exactly as it was observed with the cases of negative islands above. I refer the reader for the details of the explanation to their paper. It is important to note however, that Fox (2007) observes that the same pattern of behavior is observed with certain disjunctions as with the cases that Fox and Hackl (2005) explain with the UDM. As he notes, the account based on density does not extend to these examples:

(101) John has 3 or more children

*Implicature: John has exactly 3 children

Spector (2005) however agues that (101) is strengthened to:

(102) John has [exactly 3] or more children

Given this, the assertion in (101) together with its primary implicatures will look as follows to the hearer:

(103) $B_s(\text{Ex3} \vee \text{more})\ \&\ \neg B_s(\text{Ex3})\ \&\ \neg B_s(\text{more than 3})$

This however cannot be strengthened to (104), because that is a contradiction. Thus, secondary implicatures cannot be computed in this case, and the hearer cannot assume that the speaker is opinionated, hence the putative implicature will not arise

(104) # $B_s(\text{Ex3} \vee \text{more})\ \&\ B_s(\neg\text{Ex3})\ \&\ B_s(\neg\text{more than 3})$

Thus Spector (2005) shows that the case in (101) is an instance of what came to be known recently as the symmetry problem. (The problem itself goes back at least to Kroch (1972) and it was one of the main reasons for the postulation of Horn-scales. The name for the phenomenon is more recent and I believe that it was so named first in the lecture notes of Heim and von Fintel, cf. also Sauerland (2004) etc). More generally the symmetry problem arises when there are two alternatives to an assertion α that are both stronger than α and could be excluded independently, yet the exclusion of both leads to a contradiction. One such scenario is exemplified below:

(105)
$$\begin{tikzcd} & \alpha \mathbin{\&} \beta \\ \alpha \arrow[ur, dash] \arrow[dr, dash] & \\ & \alpha \mathbin{\&} \neg\beta \end{tikzcd}$$

In such situations, the assertion cannot be strengthened. Spector (2005) further goes on to argue that in fact the example in (100) can be also reduced to the Symmetry problem, if we assume that the alternatives to *more than* 2 should be {more than 3, exactly 3}.

Fox (2007) notes then that whatever the best explanation of (100) might be, it still seems that density is needed for the cases of negative island violations that we have seen above, while symmetry is at play in the case of (101). But given that these two sets of data seem to exhibit the same modal obviation patterns, he argues that a common generalization that subsumes both of these explanations is called for. He then indeed proceeds to provide such a generalization about the cases where exhaustification is not possible:

(106) *Fox (2007)'s generalization*

Let p be a proposition and A a set of propositions. p is *non-exhaustifiable given A:* [NE (p)(A)] if the denial of all alternatives in A that are not entailed by p is inconsistent with p.

(i) $[NE(p)(A)] \Leftrightarrow p \& \cap\{\neg q : q \in A \,\&\, \neg(p \Rightarrow q)\} = \varnothing$.

$$\Leftrightarrow \forall w MAx_{inf}(A)(w) \neq p$$

He proves that obviation by a universal, but not by existential quantification is a trivial logical property of such sets:

(107) A universal modal eliminates Non-exhaustifiability:

If p is consistent, $NE(\Box p, (\Box A))$ does not hold (even if $NE(p,A)$ holds)

(where $\Box A = \{\Box p : p \in A)\}$)

Proof: Let the modal base for $\Box$ in w^0 be $\{w : p(w)=1\}$. It is easy to see that for every $q \in A$, s.t., q is not entailed by p, there is a world in the modal base that falsifies q.

(108) An existential modal does not eliminate Non-Exhaustifiability:

if $NE(p,A)$ holds, so does $NE(\Diamond p, \Diamond A)$ (where $\Diamond A = \{\Diamond p : p \in A)\}$)

Proof: Assume otherwise, and let MB be the modal base that satisfies $\Diamond p$ but does not satisfy any of the propositions in $\Diamond A$ not entailed by $\Diamond p$ (i.e. any of the proposition $\Diamond q$ in $\Diamond A$ such that q is not entailed by p). Since $\Diamond p$ is true, $\exists w \in MB$, s.t. $p(w)=1$, w_p. For each $q \in A$, such that p does not entail q, $q(w_p)=0$ since $[\neg\Diamond q](w)=1$. But this means that all non-entailed members of A could be denied consistently, contrary to assumption.

The generalization about the NE sets of propositions subsumes both the cases of symmetry and the cases of density. Thus the observed pattern of modal obviation has a principled explanation in our system based on Fox (2007).

However, one question one might ask, whether we really need anything else than symmetry? If the analysis of *degree/manner* questions proposed in this chapter is on the right track then we might be able to retain a more restrictive generalization than that of Fox (2007), and reduce all cases of non-exhaustifiability to the property of having symmetric alternatives—modulo the problems cited in Fox (2007) for Spector (2005)'s account. An advantage of the treatment in terms of symmetrical alternatives is that it extends to presupposition islands, and other weak island violations—Which is the topic of the next chapters.

Chapter 4

Presuppositional Islands

1. Introduction

In the previous chapter we have seen that in the case of manner and degree questions that contained negation the statement for any answer that it is the most informative answer resulted in the statement of a contradiction. In this chapter we look at islands created by presuppositional items, such as islands created by factive verbs, response-stance predicates and extraposition. I will argue that islands created by adverbs of quantification and *only* belong to this group as well. What is common in these items is that they all presuppose their complement (or that the subject believes the complement to be true). I will argue that in the case of these presuppositional items a similar condition is at work to what we have seen in the case of negative islands: Albeit at a different level. In these cases the contradiction arises at the level of presuppositions. For easier reference, let's list the group of interveners here:

Factive verbs:

(1) a. Who did John regret that he invited to the party?

b. *How did John regret that he behaved at the party?

c. *How much milk does John regret that he spilled?

Response stance verbs

(2) a. Who did John deny that he invited to the party?

b. *How did John deny that he behaved at the party?

c. *How many children did John deny that he had?

Extraposition:

(3) a. Who was it scandalous that John invited to the party?

b. *How was it scandalous that John behaved at the party?

c. *How much milk was it a surprise that John spilled on his shirt?

Adverbs of quantification:

(4) a. Who did you invite a lot?

b. *How did you behave a lot?

c. *How much milk did you drink a lot?

Only NP:

(5) a. Who did only John invite to the party?

b. ??How did only John behave at the party?

c. *How much milk did only John spill?

All of the above interveners have been argued to presuppose (that someone believes) the truth of their complement. If, as I have argued in Chapter 1, presuppositions project from questions in a universal fashion, then the approach outlined in the previous chapter according to which the domain of manners and degrees always contains symmetric alternatives predicts that each of the unacceptable questions above should stand with a set of contradictory presuppositions. As no consistent context can entail a contraditory set of presuppositions, potential complete answers to such questions will not be assertable in any context. Therefore, such questions will be judged as ungrammatical. (Similar reasoning about contradictory presuppositions leading to ungrammaticality was proposed in Heim (1984), Krifka (1995), Zucchi (1995), Lahiri (1998), Guerzoni (2003), Abels (2004), Abrusan (2007).)

Recall from Chapter 1 that Heim (1983) and more recently Schlenker (2006a), Schlenker (2007) have argued that quantified sentences trigger a universal presupposition[26]. In the case of a quantifier such as *no one*, e.g. this prediction indeed seems to be borne out:

[26] But cf. Beaver (1994) for different view on the projection of presuppositions from quantified sentences, as well as Chemla (2007) for a discussion of empirical differences among various quantifiers.

(6) Quantified sentence: $[Q{:}R(x)]S_p(x)$

presupposition: $[\forall x{:}\ R(x)]\ p(x)$

(7) None of these ten people knows that his mother is a spy.

presupposition: all of these 10 people's mother is a spy

I have argued following Heim (2001) and Guerzoni (2003) that presuppositions project from questions in a universal fashion. The following examples illustrate this:

(8) Which of his three wives has John stopped beating?

Inference: John was beating all three of his wives

(9) Which of your three friends went to Paris again?

Inference: All of your three friends went to Paris at least once before

(10) Which of these ten boys do you regret that Bill invited?

Inference: You believe that Bill invited each of these ten boys

A question including a presuppositional item will therefore come with a set of presuppositions: the presuppositions of all the propositional alternatives. However, as I will show this set of presuppositions turns out to be contradictory in the case of manner and degree questions. A set of contradictory presuppositions has the unpleasant consequence that the sentence is unassertable in any context: this is because there is no context in which all the presuppositions can be satisfied. Why will this set be contradictory? In a sense the issue is the mirror image of the problem of symmetric alternatives that we have seen before. In the previous chapter it seemed that the problem was caused by the fact that there always were two alternatives among the set of alternatives that had to be ruled out, yet could not be ruled out at the same time. Now, there will always be two alternatives that are mutually incompatible, and yet will both have to be part of the set of presuppositions of a complete answer. But since no context can entail two mutually exclusive propositions, there will never be a context in which an answer to manner or degree questions containing the above mentioned presuppositional items can be asserted. In the case of questions about individuals however the alternatives are independent from each other and hence no problem will arise. Let's look now at these claims in more detail. In the next sections I show why factive verbs, response stance verbs, extraposition and adverbs cause intervention, one by one. In the final part of this chapter I will then show why certain contexts can in fact rescue presuppositional islands. In the discussion that follows, I will alternate between talking about degrees in some cases and about manners in others to avoid slowing down the discussion too much by explaining the same type of reasoning twice over and over again. Instead, I will simply indicate in each case how the other counterpart would work.

2. Factive Islands

The first part of this section looks at islands created by factive verbs. In the second part of this section I will tentatively suggest that we also sometimes find intervention with verbs such as *tell* that have been observed to be "part-time triggers" (cf. Schlenker (2006b)).

2.1. Islands created by true factive verbs

Let's start by examining questions about individuals containing a factive verb:

(11) $[\![$Who among these ten people do you regret that Bill invited?$]\!]$

$$=\{\ \lambda w.\ \text{you regret that Bill invited x in w} \mid x \in D_e\}$$

Recall that the verb *regret* triggers the following presupposition (Heim (1992), e.g.):

(12) *x regrets that p*

presupposes: x believes that p

Given the nature of the projection mechanism outlined above, the question in (11) will stand with the presupposition that for every x in a given domain, you believe that Bill invited x.

(13) *presupposition* of (11) : $\forall x \in D_e$: you regret that Bill invited x

Thus in the case of a question about individuals there is no obstacle to satisfying the set of presuppositions that the question has.

Let's turn now to manner and degree questions. The problem in these cases stems from the fact that the alternatives in the question's denotation are not independent from each other. The domain of manners contains contraries, therefore a universal presupposition in the case of manner questions such as (14) will always lead to a contradiction.

(14) a. *How does Mary regret that John fixed the car?

b. $[\![$How does Mary regret that John fixed the car?$]\!]$

$=\{\lambda w.$ Mary regrets that John fixed the car in α in w$|\ \alpha \in D_M \}$

c. presupposition of the question:

→ for every manner$\in D_M$: Mary believes that John fixed the car in that manner

As I have argued in Chapter 2, even though the domain of manners might be covertly restricted by the context, it will still always include pairs of contraries: for example any domain of manners that includes *properly* will always include its contrary, and an 'elsewhere' manner. Therefore the domain will at least contain the set of manners {*properly*, *improperly*, *neither properly nor improperly*}. However, it is not possible for a single event to be an element of all these manners, because these manners are all contraries. Therefore it is not possible for John to have fixed the car in all these ways, or indeed in any two ways out of these three at the same time. Therefore a complete answer to the question above will always presuppose that Mary has an incoherent set of beliefs.

In the case of a degree question such as (15) a complete answer will presuppose that John believes that his score is included in every interval in the domain, clearly an impossible state of affairs give that in any domain of degrees there will always be non-overlapping intervals:

(15) a. *How much does John regret having scored?

b. ⟦How much does John regret having scored?⟧

$=\{\lambda w.\ \text{John regrets that his score is} \in I \ \text{in } w \mid I \in D_I\}$

c. presupposition of the question:

$\rightarrow$for every interval in D_I: John believes that his score is in that interval

As soon as the domain of degrees has as much as two degrees in it, d_1 and d_2, the domain of intervals will contain at least two exclusive intervals (sets of degrees): $\{d_1\}$ and $\{d_2\}$. Already this much is enough for John's belief set to be incoherent. [I will assume that in domains which only contain a single degree, asking a degree question is infelicitous because an answer to such a question is a tautology.]

It seems then that a complete answer of a manner and degree question that contains a factive verb will always carry the presupposition that the subject has a contradictory set of beliefs. This clearly cannot be a felicitous situation for asking a question. Given this, there is no context in which the question can be felicitously asked, and hence it will be ungrammatical.

2.2. Islands created by part-time triggers?

Some verbs can invoke a factive-like inference in some contexts, but not others (eg. *tell, learn, cf.Schlenker (2006b))*. In this section I would like to tentatively suggest that some of these verbs, when they stand in a context that they trigger the inference in question, might also induce weak islands. The examples below illustrate the case of *learn:*

(16) How did you learn in school that France behaved during the Vichy regime?

(17) *How did you learn yesterday that Mary's leg hurts? (with intended interpretation: I learned yesterday that Mary's leg hurts badly, e.g.)

However, one might object that *learn* in the above examples actually translates to several different lexical items in many languages (eg. German, Hungarian), therefore it might be the case that we are simply dealing with a factive version of *learn* in the above case. Interestingly enough, in the case of *tell*, Hungarian might provide us with examples that might show that the island-inducing property of part-time triggers comes and goes with the unstable factive inference. It seems to me that in Hungarian whether or not *tell* stands with a factive inference correlates with the focus structure (or the nature of the alternatives) of the sentence. If the verb itself is focussed as in (18)b, or it stands with a perfective prefix (18)a, it tends to trigger a factive inference. If however, something else in the sentence than the verb is focussed, the inference disappears (19)[27]:

(18) factive implication:

a. Péter EL.mondta Jánosnak hogy Mari megevett öt almát. (Did he tell him?)
Peter PRF.told János that Mari ate five apples

b. Péter MONDTA Jánosnak hogy Mari megevett öt almát (Did he tell him?)
Peter TOLD János that Mari ate five apples

(19) *no factive implication:*

a. Péter AZT modta Jánosnak hogy Mari megevett öt almát (What did he tell him?)
Peter THAT told János that Mari ate five apples

b. PÉTER mondta Jánosnak hogy Mari megevett öt almát (Who told him that?)
PETER told János that Mari ate five apples

c. Péter JÁNOSNAK mondta hogy Mari megevett öt almát (Who did he tell it to?)
Peter TO-JANOS told that Mari ate five apples

[27] In the case of the perfective version of *tell* however (elmond), the inference remains regardless of the focus structure.

In the case of questions the focus structure is typically hijacked by wh-movement, as the wh-word moves into the focus position, but the presence of the perfective prefix still invokes a factive inference. Interestingly, if the particle is present, wh-movement of the degree phrase is not possible, however, it seems to be (nearly) acceptable if the particle is not present:

(20) a. ?Hány almát mondott Mari Péternek hogy Gábor megevett?
b. *Hány almát mondott **el** Mari Péternek hogy Gábor megevett?
How many apples told (prt) Mari to Peter that Gabor ate?

That the above is probably not simply an example of lexical ambiguity of *tell* correlating with the prefix might be shown by questions in which the verb is still focussed (which is possible in emphatic contexts):

(21) a. ?(Ertem, de,) Kit MONDOTT János Gábornak hogy Mari meghivott?
(I understand but) who TOLD Janos to-Gabor that Mari invited?
(ok, but I want to know:) Who did John TELL Gabor that Mari invited?
b. *(Ertem, de,)Hány almát MONDOTT János Gábornak hogy Mari megevett?
(I understand but) How many apples TOLD Janos to-Gabor that Mari ate?
(ok, but I want to know:) How many apples did John TELL Gabor that Mari ate?

Although the above discussion is extremely preliminary at this stage, but if it is on the right track, it might provide an interesting step towards showing that indeed the island-creating behavior of the interveners in question depends on nothing other than their factive inference[28].

[28] And, even more speculatively, that the factive inference and thus the intervention property of factive verbs might be ultimately reduced to focus itself...

3 Response stance predicates

We know from Cattell (1978) Hegarty (1992), Szabolcsi and Zwarts (1993),Honcoop (1998), that the class of verbs that create weak islands also includes *response stance verbs* (in Cattell's terminology). Though not factive, these verbs are normally uttered in response to something that is assumed to be part of the common ground or to something that someone proposed to update the common ground with:

(22) *How did Bill deny that John fixed the car?

(23) <u>response stance verbs</u>: deny, verify, admit, confirm, accept, acknowledge

These verbs are presuppositional in the sense that they "presuppose that their complements express assumptions or claims held by someone possibly other than the speaker which are part of the common ground" (Honcoop (1998) p.167) [A more suggestive --though perhaps also confusing-- way could be to say that in a sense the situation is as if p was in the *purgatory* of common ground: p was proposed but not accepted yet]:

(24) *x denied that p*

presupposes: it is assumed by someone that p

Can the reasoning above as for why factive verbs create weak islands be extended to response stance verbs? Observe first the behavior of a question about individuals as below:

(25) Which of these 3 terrorists did Nero deny/admit that he executed?

Inference: someone(we?) believes that they executed these 3 terrorists

Imagine a context in which John believes that Nero executed terrorist 1 and noone else, Bill believes that Nero executed terrorist 2 and noone else, and Mark believes that Nero executed terrorist 3 and noone else, and noone else, including the speaker, has any beliefs about the matter whatsoever. I believe that the above questions sounds rather odd in such a scenario, because it suggests something much stronger: namely that some people, perhaps including the speaker, believe that Nero executed all three terrorists. It seems then that the above question requires a contextually given (plural) individual whose assumptions are in question, in other words the individuals whose assumptions are in question do not vary with the propositions in the Hamblin denotation. While I am not entirely clear about how exactly this inference arises, I will take that it can be maintained that indeed the presupposition of the question above regards the beliefs of a single contextually salient body.

The alternatives in the Hamblin denotation of a question such as (22) will stand with the presupposition that refers to the beliefs of a discourse referent. Now, when we try to select a complete answer such as the one in (22) we will invariably derive that any answer presupposes that the discourse referent in question has contradictory beliefs.

(26) (22) *Presupposes:*

$\exists$x. for every manner α in the domain, x believes that John fixed the car in α

It is easy to see that in the case of degree questions with response-stance predicates a similar contradictory set of presuppositions will be created, much in the same way as we have seen above with factive predicates. Indeed, the whole situation that arises with response-stance predicates is very similar to that we have seen with factive verbs, the only difference is in the holder of the inconsistent beliefs. In both of these cases, we derive that a complete answer presupposes that there is an individual whose beliefs we know to be incoherent. Yet, this cannot be a felicitous context for asking a question.

4 Extraposition Islands

The third group of presupositional islands are islands created by extraposition, such as (27) below. Following a tradition in the literature, I discuss this group separately, but in fact they belong in the previous section: whether or not extraposition creates weak islands depends on the factivity of the verb/noun involved. (That extraposition and factives form the same class of interveners is also assumed e.g. in Honcoop (1998)) When the extraposition is based on a noun/adjective that triggers a factive inference, the extraposition creates a weak island context, as shown below:

(27) *How was it a surprise that John behaved?

(28) It was a surprise that John behaved politely

presupposes: (the speaker believes that) John behaved politely

On the occasions that extraposition is not based on an adjective that has a factive inference, it does not give rise to Weak Islands either[29]:

(29) a. How is it possible that John behaved?

b. How much wine is it dangerous to drink at a party?

example due to Postal, cited in Szabolcsi (2006)

In some cases, though not factive, the extraposition might stand with a presupposition akin to that of response-stance predicates, in that it presupposes that *someone* believes the truth of the complement. I believe that this is the case in (30) below: Therefore, the analysis offered for response-stance verbs should carry over to this case.

(30) *How is it true that Bill behaved?

(31) It is true that p:

presupposes: <u>*Someone believes p*</u>

asserts: p

A further similarity of this example to response-stance predicates will be pointed out shortly in Section 6, where I will note that an existential quantifier seems to improve islands created by response stance predicates. This seems to be true of the present example as well:

[29] One exception in the literature to the above claim is the example from Cinque (1990):

(1) *How is it time to behave?

I do not have an explanation for this fact.

(32) ?How might it be true that Bill behaved?

However, before we turn to examining why this should be the case, let's take a look at islands created by adverbs.

5 Adverbial interveners

In this section I would like to tentatively propose that adverbial interveners in fact belong to the group of presuppositional islands. This is in contrast with most (indeed, all) of the literature on this topic, who claim that (quantificational) adverbial interveners argue for treating weak island intervention in terms of scope (e.g. Kiss (1993), de Swart (1992), Szabolcsi and Zwarts (1993), Honcoop (1998)). However, I believe that rather than scope restrictions, the real culprit is again presuppositions. Linebarger (1981), and more recently Simons (2001) and Schlenker (2006a) note that adverbs give rise to "quasi-presuppositions", i.e. in some circumstances they create inferences that project in a presupposition-like fashion:

(33) Bill ran fast

→Inference: Bill ran

The projection properties of this inference seems to pattern with that of real presuppositions, at least in some circumstances:

(34) None of these ten boys ran fast

Inference: all of these ten boys ran

(35) None of these ten boys solved the exercise twice.

Inference: all of these ten boys solved the exercise

de Swart (1992) has noted that while weak island contexts are more typically created by DE quantifiers (cf. the next section of this chapter, as well as the section on "Scope

Islands" of Szabolcsi and Zwarts (1993)), with adverbs of quantification weak island phenomena arise regardless whether they are upwards or downwards monotonic[30]:

(36) *Combien as-tu beaucoup/souvent/peu/rarement consulté de livres? (*French*)
how many have you a lot/often/a little/ rarely consulted of books
'How many books have you consulted a lot/often/a little/ rarely ?'

Not only split constructions seem to be sensitive to adverbial interveners, as the example (37) from den Dikken and Szabolcsi (2002) shows. We might also add (38):

(37) ???How did you behave a lot?

(38) ???How much milk did John spill on his shirt often?

Non-quantification adverbs have been claimed by Obenauer (1984) to not give rise to intervention:

(39) ?Combien le douanier a-t-il soigneusement fouillé de valises?
How-many the customs-officer has-he carefully searched the suitcases?

However, it seems that not all adverbs behave in a uniform way with respect to the combien-split. (at least the Hungarian equivalent of) the example in (41) seems to be quite bad as well:

(40) *Combien Marie a-t-elle vite mangé de gateaux?[31]
How many Marie has-she fast ate of cakes

[30] Generic contexts however seem to rescue adverbial intervention: (data from de Swart (1992))

(1) Combien as-tu toujours voulu avoir d'enfants?
How many have you always wanterd to have children

(2) Combien prépares-tu généralement de toasts pour le petit déjeuner?

[31] But:

(3) Combien Marie a-t-elle mangé de pop tarts vite?

(41) ???How much milk did Mary spill unexpectedly?

If these facts are real, then they might in fact be rather problematic to any account that tries to explain them on the basis of scope or quantificationality. We might notice however that the difference in grammaticality of the various examples seems to correlate with how strongly they induce quasi-presuppositions:

(42) No one read the books twice
→everyone read the books

(43) No one ate the pop-tarts fast
→everyone ate pop-tarts

(44) No one searched the bags carefully
???→everyone searched the bags

It seems that quantification adverbs and some other adverbs like *late*, *fast*, etc are more prone to triggering a "quasi-presupposition" than other adverbs: e.g. *carefully* does not seem to trigger a presupposition in the same fashion. The difference is probably triggered not so much by the particular adverbs, but rather by the interaction of the context and the content of the whole sentence.

If this is on the right track, then in fact we might argue that the reason why adverbs seem to cause intervention is because they tend to trigger "quasi-presuppositions". And while such "quasi-presuppositons" are not yet well understood, we might expect any solution to them carry over to explain the weak island-causing behavior of some adverbs. Given this factive inference, the reason why wh-constructions that contain adverbs are sensitive to weak islands will be very similar to what we have seen above in the case of factive, response stance and extraposition islands. Further, as adverbs do not seem to be uniform in the strength of the quasi-presupposition they invoke, this analysis has the capacity to predict a certain amount of variation with respect to individual adverbs. This might be a welcome result, because even quantificational adverbs do not seem to be particularly robust interveners in general (except in split-constructions).

6 Islands created by *only*

This section examines islands created by only NPs. I will first provide a simple account based on the strong presupposition of *only*. In the following section I note that that this presupposition however is not without its problems, in particular it might be argued to be too strong. I will then proceed to show one particular way in which the basic account could be carried over, even if such a weaker presupposition to only were to be proved.

6.1 A first view: The strong presuppositional analysis of *only*

At first blush it might seem that the reasoning based on contradictory presuppositions might be easily extended to the intervention created by *only*: if, as was proposed by Horn (1969) *only AB* presupposed the truth of AB, we would easily derive a contradiction. This is because if, as was argued earlier in this chapter, presupposition projection from complete answers is universal, then any manner or degree question would be predicted to stand with a set of contradictory presuppositions. Take e.g. a question such as (45). In this case, as I have argued in chapter 2, the manner alternatives might be restricted, yet any set will al least contain 3 contraries, for example if our context is restricted to the dimension of politeness, our set of propositions in the Hamblin set might look as in (46):

(45) *How did only John behave?

(46) ⟦*How did only John behave?⟧

={that only John behaved politely,
that only John behaved impolitely,
that only John behaved neither politely nor impolitely},

If all of these alternatives presupposed the prejacent that only combines with (in our case *that John behaved politely, that John behaved impolitely, that John behaved neither politely nor impolitely*), then by universal projection we would derive that such a question should trigger contradictory presuppositions. As is easy to see, a similar reasoning could also be extended to questions about degrees, as in this case the alternative would be based on the various intervals that do not necessarily have to overlap.

6.2 A second view: the weak presuppositional analysis

One potential objection for the above outlined explanation as to why *only* creates intervention might come from the arguments that seem to show that the above proposed presupposition for *only* might too strong. The first problem, observed by Horn (1996), Geurts and van der Sandt (2004) is that the putative presupposition does not project in modalized sentences:

(47) It is possible that only the Red Sox can beet the Yankees, and maybe not even they can.

The second problem, also observed by Horn (1996) is manifested by the fact that the following question-answer exchange is felicitous:

(48) A: Who can beat the Yankees?
B: Only the Red Sox.

The above authors therefore have suggested a weak presuppositional analysis. The sentence such as *only Muriel voted for Hubert* triggers the inference that *Muriel voted for Hubert* is true. However, according to the above authors this inference comes about as a combination of the truth conditional meaning of *only* and an existential presupposition[32]. Thus:

(49) Only $[\text{Muriel}]_F$ voted for Hubert
presupposes: Someone voted for Hubert
Asserts: No one other than Muriel voted for Hubert
→inference: Muriel voted for Hubert

[32] This view, however, as e.g. Ippolito (2006) argues is also not without its problems: e.g. it does not predict the correct inference for a sentence such as *Only John and Mary ate cookies.* Cf. also the discussion in Roberts (2006).

Exactly what the source of the existential presupposition is, i.e. whether it is triggered by focus Geurts and van der Sandt (2004), or (also) by *only* itself Beaver (2004), or by the existential import of a universal quantification Horn (1996) is a matter of ongoing debate. Yet whatever the source of this presupposition might be, the problem we have now that this weaker presupposition is not strong enough to derive a contradiction. Take a look at (46) again: if each alternative in the Hamblin set only presupposes that *someone* behaved in α, then in the case of (46) by universal presupposition we derive that a complete answer should stand with the set of presuppositions: {*that someone behaved politely, that someone behaved impolitely, that someone behaved neither politely nor impolitely}*. In other words the offending contraries in this case would be distributed over various individuals, and therefore the contradiction would be avoided.

6.3 The presupposition of *only* in negative sentences

Interestingly, as Geurts and van der Sandt (2004) point out, in negative sentences like (50) the presupposition seems to be stronger, as if *only AB* indeed presupposed the truth of *AB,* as was originally proposed in Horn (1969).

(50) Not only Muriel voted for Hubert *presupposes*: Muriel voted for Hubert

The reason why this inference is not a conversational implicature is that it seems to project, as shown by (51):

(51) It is possible that not only Muriel voted for Hubert

Beaver (2004) shows that this stronger presupposition in the case of negative sentences can be derived if we assume that under negation the whole phrase *only Muriel* is focussed, and the focus alternatives of an *only NP* are itself and the NP without *only.* If focus stands with the presupposition that one of the focus-alternatives is true, (50) is correctly predicted to presuppose that *Muriel voted for Hubert.*

6.4 [Only NP] is focussed in questions

Should the weak-presuppositional analysis turn out to be correct for *only*, we could still adopt a similar analysis to *only NP's* in questions. But is the prediction that in questions we again see the stronger presupposition of *only* correct? Let's look at a question about individuals containing an *only NP* phrase:

(52) *Which exercise did only John solve?*

The presupposition in Horn (1996) predicts that a complete answer to the above question of the form *Only John solved Ex1* should be understood as (53)a, while the stronger presupposition according to Horn (1969) predicts the meaning of a complete answer together with its presuppositions as in (53)b:

(53)

(a) John and noone else solved Ex.1 and for all the other exercises in the given domain, some (other) people solved them.

(b) John and noone else solved Ex.1 and for all the other exercises in the given domain, John and other people solved them.

It seems to me that the reading that complete answer to the above question such as *Only John solved Ex1* gets is certainly much stronger than that in (53)a, in particular a complete answer stands with the inference that in fact John has solved many other excercises than Ex1. For this reason, I will assume that indeed in questions *Only NP* phrases tend to get focussed, similarly to what Beaver (2004) has suggested for negative sentences. Thus (54) is in fact understood as below, and a complete answer is exemplified in (55):

(54) Which exercise did [only John]$_F$ solve?

(55) $||\text{Exh}||^w$ $(||(52)||)(\lambda w.$ only John solved exercise 1 in w$)$

= Only John solved exercise 1 in w &

$\forall q \in \{\lambda w.$ [only John]$_F$ solved exercise x in w $\mid x \in \{D_e - \{\text{Ex } 1^*\}\}\}.\ q(w)=0$

presupposition: $\forall x \in D_e$. John solved x in w

assertion: no one other than John solved Ex 1 & $\forall x \in \{D_e - \{Ex\ 1^*\}$. someone other than John solved exercise x in w

With this background a manner and degree questions are again predicted to give rise to contradictory presuppositions, just as I have outlined it a few paragraphs above. E.g. a manner question such as the one in (45) above will be now understood as having focus on the constituent [only John] à la Beaver (2004). This way, we derive that in a situation such as in (46) a complete answer will presuppose that {*that John behaved politely, that John behaved impolitely, that John behaved neither politely nor impolitely}*. This is however a contradictory set of propositions, and as such, it cannot be satisfied in any context. Another example might be provided by (56) below:

(56) ok/*How has only John solved the exercise?

Suppose we are math teachers conversing and we agree that there are 4 different plausible solutions to the exercise under discussion. The question in (56) still sounds infelicitous, except if the assignment was in fact that everyone should try to solve the exercise in as many different ways they can. In this case however, the question is acceptable: and this is because the perfect tense makes it plausible that we might be talking about a number of different solving events. The importance of this example is that since it has a reading under which it is acceptable, we can now tap into the causes of what has been behind the unacceptability in other cases. Here we see that the question comes with the implication that John solved the exercise in many ways, which is an implausible assumption, unless in our very special context. However, once this very special context is in place, the question is good.

6.5 Exactly one

Contrast now the behavior of *only* with that of *exactly one*:

(57) How did exactly one girl think that you behaved?

Because *exactly one* is not presuppositional, for an answer such as *Exactly one girl thought you behaved politely* to be assertable as a complete answer, nothing else need to be taken into account than its assertive component. In this case this will be that exactly one girl thinks that you behaved politely, and for every manner in the domain other than politely, it is not true that exactly one girl thinks that you behaved that way. But this requirement is easily satisfied, even in a context where no one thinks anything except for the one girl who thought you behaved politely. Hence, quantifiers such as *exactly one* are not predicted to cause any intervention effects. As the acceptability of (57) shows, this is indeed the case.

7 How to rescue presuppositional islands

When we look at instances of weak island violations and contemplate the reasons for their unacceptability, it is equally instructive to look at contexts which might in fact remedy these violations. In this section I will show that presuppositional islands can be rescued by context restriction, or negation under the factive verb. Response stance verbs can also be saved by an existential modal.

7.1 Context restriction

Context restriction can come to the rescue of presuppositional islands, just as other weak islands, observe the example below:

(58) *Situation: We all know and agree that yesterday the president behaved irresponsibly and incompetently:*
How did they regret/deny that the president behaved: irresponsibly or incompetently?

The explanation of this fact is straightforward: by explicitly restricting the domain to a small set of manners, we can avoid the conclusion that someone holds contradictory beliefs. Observe however the choice of the domain does matter: if the domain we choose contains contrary predicates, we still predict ungrammaticality:

(59) *How do you regret that John fixed the car: quickly or slowly?

This is because this question requires from the addressee to believe that John fixed the car slowly and that he fixed the car quickly, regardless of the actual answer given. Thus domain restriction in the case of factive islands is only helpful as long as the domain of manners does not contain contrary predicates.

7.2 Modals and response stance verbs

It seems that weak islands with response stance predicates improve if they are embedded under an existential modal:

(60) *How did you verify that the president behaved_?

(61) How can you verify that the president behaved_?

(62) * How must you verify that the president behaved__?

(63) How are you allowed to admit that the president behaved?

Why should this be? I believe what is happening in this case is that the existential modal in fact acts as binder for the individual variable as well[33], and hence now the presuppositions of the propositional alternatives will not invoke a discourse referent any more.

(64) $||Exh||^{w}$ ($||(61)||$)($\lambda w.\ \exists w'_{Acc(w,w')}$ you verify that the president behaved properly in w')

presupposition: For every manner in the domain, $\exists w'_{Acc(w,w')}\ \exists x$. x believes that the president behaved properly in w'

[33] Thanks to Irene Heim for suggesting this solution.

In this case however the propositions that contain contraries are distributed over different individuals, and in this way we avoid the contradiction. Notice that with real factives of the *regret*-type of course the individual whose beliefs are in question is fixed to the subject: therefore we do not predict that inserting an existential modal should bring any improvement: This prediction is indeed borne out[34]:

(65) a. ???How might Bill regret that John behaved?

b. ???How might he realize that John behaved?

[34] E. Chemla (pc.) points out that according to my reasoning modals *under* negation should improve these sentences. It is not clear to me at this point what the facts are.

Chapter 5

Further Issues

1 Introduction

This chapter contains a couple of sketches of ideas about two main topics. The first part, (Section 2) is concerned with tenseless *whether*-complements. The second part (Section 3) discusses a number of interesting issues that the present account predicts for quantificational interveners.

2 Weak Islands created by tenseless *wh*-complements

In the previous chapters I have only been concerned with the property of the domain of manners and degrees that it contains contraries. Now, I will also turn to a second property of the proposal advanced in this thesis about the domain of manners and degrees, namely that these domains in a sense always fully "exhaust the logical space". Therefore it is not possible to be opinionated about all-but-one alternative, because the truth of any single alternative is determined by the truth /falsity of the other alternatives. This will be the main problem with weak islands created by tenseless *wh*-complements. In particular, in this part I will look at islands created by *whether*-complements of *wonder*. A disclaimer is in order at this point: one aspect that I will not discuss here is the role of tense, in other words why is it that the presence of overt tense marking turns these islands into strong islands in many languages[35]. I will assume that this is a consequence of an independent factor that creates strong-islands. However, what I will look at is the difference that I predict between questions about individuals on the one hand, and questions about manners and degrees on the other hand, independently of the contribution of tense. I will assume that this reasoning can be extended in a straightforward manner to the data with infinitival wh-complements. The basic pattern that I aim to explain in this section is that in (1) below:

(1) a. Which man are you wondering whether to invite _?
b. *How are you wondering whether to behave_?
c. *How many books are they wondering whether to write next year_?

The reasoning that I present below will go as follows: a complete answer to the above questions will state that *x wonders whether p* and will imply that for all the alternatives q to p, x is opinionated about q. This causes no problem in the case of individual questions, because in this case the alternatives are independent from each other. In other words the truth of any individual alternative does not have a consequence for the rest of the alternatives (modulo pluralities, of course). However, in the case of alternative propositions that are based on manners and degrees, the alternatives are not independent: the truth or falsity of one alternative might obligatorily imply the truth or falsity of another alternative (again, quite independently of the possibility of forming pluralities in the case of manners). This is because of what we know about the certain manner alternative being contraries to each other, or certain intervals not overlapping. I will show that therefore in the case of degrees and manners it is not possible to be opinionated about all-but-one alternatives, without being opinionated about all of the alternatives as well. This is because the truth or falsity of all the alternatives except one will uniquely determine the truth or falsity of the last alternative as well. Yet a complete answer to the unacceptable questions above will be predicted to state exactly this impossible state of

[35] The data on tensed constituent *wh*-complements seems to show a lot of cross-linguistic and cross-speaker variation. E.g. Szabolcsi (2006) reports sentences such as (1) below to be acceptable in Hungarian, but not in English or Dutch for most speakers.
(1) ???Which men did John ask whether Bill invited?

affairs: that the speaker is not opinionated about only one alternative in the Hamblin set, and opinionated about all the rest of the question alternatives.

Consider a basic case of an embedded yes-no question such as (2) below:

(2) John wonders whether it is raining

I will assume that a verb like *wonder* asserts that the speaker does not believe any of the alternatives of the embedded question:[36]

(3) x Wonders $\{p, \neg p\}$ (e.g., John wonders whether it's raining).

<u>*Asserts*</u>: $\neg$ x believes p $\wedge$ $\neg$ x believes ($\neg$p);

In other words: x is not opinionated about p.

We are now interested in looking at a situation where there is movement out of an embedded yes/no question. In the case of questions about individuals the Hamblin denotation will look as follows:

(4) ⟦Which man are you wondering whether to invite?⟧

= {you are wondering {invite Bill , $\neg$ invite Bill}

you are wondering {invite John , $\neg$ invite John}

you are wondering {invite Fred , $\neg$ invite Fred} }

Given the lexical meaning of wonder above, (4) is equivalent to (5) below:

(5) {$\neg$ you believe (you invite Bill) $\wedge$ $\neg$ you believe ($\neg$ you invite Bill)

$\neg$ you believe (you invite John) $\wedge$ $\neg$ you believe ($\neg$ you invite John)

$\neg$ you believe (you invite Fred) $\wedge$ $\neg$ you believe ($\neg$ you invite Fred) }

[36] I am basing the formulation of this entry on Chemla (2007), but I believe that this is fact a standard assumption about the lexical entry for *wonder*, cf. e.g. Lahiri (2002).

A complete answer to the above question such as "You are wondering whether to invite Bill", stands with the inference that the speaker is already opinionated about the rest of the alternatives[37]. This inference arises because of the equivalence in (6):

(6) $\neg[\neg$ you believe (you invite John) $\wedge \neg$ you believe ($\neg$ you invite John)]

$=$ you believe (you invite John) $\vee$ you believe ($\neg$ you invite John)

As a consequence, asserting a complete answer will state the following:

(7) $\neg$you believe (you invite Bill) $\wedge \neg$ you believe ($\neg$ you invite Bill)

$\wedge$ [you believe (you invite John) $\vee$ you believe ($\neg$ you invite John)]

$\wedge$ [you believe (you invite Fred) $\vee$ you believe ($\neg$ you invite Fred)]

In the case of individuals thus no problem arises as a consequence of the inference in (6). However, in the case of questions about manners and degrees, the situation is different. The problem arises from the fact that the alternatives to these questions are not independent from each other; in other words, they, in a sense "exhaust the logical space". Therefore it is not really possible to be opinionated about all-but-one alternative, because the truth of the leftover alternative is determined by the truth/falsity of the other alternatives:

Let's look at manner questions such as (8) first:

(8) *How are you wondering whether to behave?

= {you are wondering {behave politely , $\neg$ behave politely}

you are wondering {behave impolitely , $\neg$ behave impolitely}

you are wondering {behave neither way, $\neg$ behave neither way}

[37] Alternatively, this inference might be weakened to the inference that the speaker does not care about the rest of the alternatives. However, such weakening is not a coherent position in the case of manner and degree questions.

Given the lexical meaning of wonder this is again equivalent to the meaning represented below:

(9) $\{\neg$ you believe (you behave politely) $\wedge \neg$ you believe ($\neg$ you behave politely)

$\neg$ you believe (you behave impolitely) $\wedge \neg$ you believe ($\neg$ you behave impolitely)

$\neg$ you believe (you behave neither way) $\wedge \neg$ you believe ($\neg$ you behave neither way)$\}$

By a parallel reasoning to what we have seen in the discussion of questions about individuals above, asserting a complete answer such as *you are wondering whether to behave politely* will imply (10):

(10) $\neg$you believe (you behave politely) $\wedge \neg$ you believe ($\neg$ you behave politely)

$\wedge$ [you believe (you behave impolitely) $\vee$ you believe ($\neg$ you behave impolitely)]

$\wedge$ [you believe (you behave neither) $\vee$ you believe ($\neg$ you behave neither)]

This is because the by now very familiar assumption that any domain of manners will at least include contraries of each manner, as well as a "middle" (=neither, in some other way) manner. As a consequence, "the space of possibilities" is divided into 3 in the way illustrated below. However, as it will become immediately clear, as these manners are all exclusive (i.e. no event can fall under more than one of them), it is not possible to be opinionated about any two of these, without in fact being opinionated about the third:

(11) #____?_________|_______y/n_____________|_______y/n_______________

politely impolitely neither politely nor impolitely

Therefore, what any complete answer to a question such as (8) will state is not a possible state of mind, so to speak: Having an opinion about whether the event under discussion was *impolite* and/or *neither polite nor impolite* in fact completely determines whether it was *polite* or not.[38]

A moment of reflection shows that exactly the same issue arises in the case of questions about degrees, such as the one below:

(12) How many books are you wondering whether to write?

If we reason in terms of the interval semantics introduced in chapter 3, then the above question is predicted to mean the following:

(13) For which interval, you are wondering whether the number of books you write is in that interval?

Unfortunately however it is not a possible state of affairs for there to be one interval about which one can truly wonder whether the number of books you will write is in it, while being opinionated about all other intervals (more precisely about all the other intervals that are not contained in the target interval).

3. Quantifiers in questions

In this second part of the chapter, I will be looking at examples such as the ones below:

(14) How tall is every boy?

(15) ???How much did some girls score?

(16) How much milk have you **never** spilled on your shirt?

(17) How much did ***no one*** score?

(18) ???How did **few/less than 3 girls** behave at the party?

[38] Note that it is also not a coherent position however not to care about the alternatives *impolitely* or *neither* in this case. This is because the complement set of polite events will include the *impolite* and the *neither polite nor impolite* manners. Therefore, if one cares about the complement of the *polite* manners, (which is

(19) How did **only a few girls** behave at the party?

(20) How did **at most 3 girls** behave at the party?

Some of the above examples (e.g. (17), (18)) have been traditionally discussed as examples of weak island violations (e.g. Rizzi (1990)), who proposed that operators that license NPI's are interveners. (The terminology sometimes used in the literature after Klima (1964) is *affective* operators, the more current terminology would be (Strawson) DE operators.) It has been noted however, that not all DE operators cause intervention on the one hand, and on the other hand, that certain upward entailing quantifiers cause intervention as well.

Among the non-downward entailing quantifiers that cause intervention most prominent perhaps were the examples with universal quantifiers such as (14), made famous by Szabolcsi and Zwarts (1993) (cf. also de Swart (1992), Kiss (1993)). This question can be understood as a pair-list question, or asking for the unique number such that every boy read exactly that number. Yet there is a missing reading, with *everyone* taking narrow scope: The sentence cannot have the reading 'what is the height such that every boy is tall to at least that degree?'. A second set of data with upward entailing quantifiers consists of examples such as (21) and (22) below. These have been sometimes noted to cause intervention as well (e.g. in Honcoop (1998), and contra Szabolcsi and Zwarts (1993)), however, they were not grouped together with weak island creating environments, for the reason that questions about individuals seem to be sensitive to these environments as well, as shown by the examples from Honcoop (1998):

(21) ???How many children do **some women** have?

(22) ?How did **a man** behave?

(23) ?Which book did a student read?

(24) ?Which book did 3 students read?

asserted by the answer), then one necessarily cares about the *impolite* and neither *polite* nor *impolite* manners.

I will argue however that in fact the above examples belong to the present discussion as the oddness of even the examples with individuals might be argued to follow from maximalization failure.

As concerning the downward entailing quantifiers, while negative quantifiers such as *no one* are traditionally listed in the group of weak island creating operators, in fact in many contexts these seem to be perfectly acceptable. Similarly, Szabolcsi and Zwarts (1993) discusses the case of *at most* as in (20), noting that most people find it acceptable. Furthermore, it seems to me that there is also a marked difference btw. (18) and (19), the latter being acceptable for most people, even though they both involve DE interveners.

In this section I first look at the case of universal quantifiers in questions and point out an interesting connection that an interval semantics for degree expressions predicts to a scope puzzle that can be found in the domain of comparatives. Then turn to the case of DE operators such as *noone,* and show why the present analysis predicts these to be acceptable in fact. Finally in the last part I discuss the case of upward entailing operators such as *some* and other quantifiers like *few* vs. only a *few*.

3.1. The scope puzzle

de Swart (1992), Kiss (1993), Szabolcsi and Zwarts (1993) point out an unexpected property of degree questions that contain certain quantifiers. The interesting property of these questions is that they do not seem to have the reading in (25)b below, namely the reading where the universal quantifier takes scope under the wh-word. The readings the question seems to have are the pair list reading in (25)a, and what these authors call "independent scope", the reading that presupposes that everyone has the same height.

(25) How tall is every boy?

(d) 'For every boy x, how tall is every x ?'

(e) '#For what d, every boy is at least d-tall?'

(f) 'What is the uniform degree of height such that everyone is exactly that tall?'

The above authors take this fact to show that these intervening quantifiers in fact also create weak islands, as they prevent certain wh-words from taking scope above them. The missing reading is clearly predicted by the approaches that specify an 'at least' reading for numerals in degree expressions. An account that would take the exact readings to be basic would not predict this reading. Let's look at the interval-based account. At first sight, it could seem that the interval account might make exactly the right prediction:

(26) $[\![$How tall is every boy?$]\!]$=

= for what interval I. for every boy x, the height of $x \in I$

=$\{$for every x, the height of $x \in I \mid I \in D_I\}$

We are looking for the smallest interval that contains for every x, the height of x. If everyone is tall to the same degree d, then this interval will be the singleton set of degrees $\{d\}$. If however, various people have different heights, then we are looking for the smallest interval that contains these degrees. Let's take for example the case that some people are 5 feet tall, others 5.5 and yet others 6. In this case the smallest such interval will be [5,6] and the answer should be "between 5 and 6 feet":

(27) --------[5---5.5---6]----------------

I believe that this is also a possible reading (to the extent the pair-list reading is possible), though not always easy to get. It would seem then that the above approach does not predict the existence of the reading in (25)b.

However, if we assume the existence of the Π-operator as it was argued in chapter 3 that we probably should, we loose the above account. This is because if now the Π-operator can scope above *everyone*, then in fact the existence of the missing reading is predicted, after all:

(28) for what I .I [Π. λd everyone is d-tall]

=$\{ \underline{\max(\lambda d.\text{ everyone is d-tall})} \in I \mid I \in D_I\}$

the maximal degree such that everyone's height is at least that

At the same time, Benjamin Spector (pc.) points out that questions that contain universal modals like the one below seem to be able to get the 'at least' reading:

(29) How tall are you sure that every basketball player was?

This fact again might be explained by assuming that the Π-operator might take scope above the modal. If this is so, then an interesting generalization seems to emerge according to which the Π-operator can take wide scope above a modal to derive the 'at least' reading of (29) above, but not above a universal quantifier as in (25). While I have no explanation for this, the intriguing fact to observe is that Heim (2006) arrives at an identical restriction concerning the scope of the Π-operator in comparatives: it has to be able to take scope above a modal, but it cannot be allowed to take wide scope above a quantifier over individuals.[39]

(30) John is taller than every girl is.
   a. Actual meaning: 'for every girl x: John is taller than x'
   b. Missing reading : 'John is taller than the degree d such that every girl is tall to that degree d. '

(31) John is faster than he needs to be.
   a. Actual reading: 'John is faster than the degree d such that in every accessible world he is at least that fast"

Thus while the analysis based on intervals does not yet solve the problem at hand, at least it is able to offer an interesting connection to an already existing puzzle.

3.2 *No one*

In Chapter 3 I have shown that in the case of negative islands there was no context in which there was a maximally informative answer. At the same time, certain modals were able to obviate the negative island effect—this was the pattern noted in Fox and Hackl (2005). More precisely, what we have seen was that in the cases where modals were able to rescue the negative island violations, there was *at least one* world in which there was a most informative answer. For example, in the case of a question such as (32) below, there was a situation, in which this question could receive a complete answer. Suppose we had a scenario such as the one illustrated in (33): this is a situation where one is allowed to have 1,2,3,or 4 children, but not more. In this case the interval $[5,\infty)$ was the unique maximal interval, such that it did not contain any degree that would have corresponded to the number of children that you were allowed to have. (Recall that I was assuming that the scale of degrees could be either discreet or dense, as required by our world knowledge. This parameter did not make any difference for our reasoning. In this case, I assume the scale is discreet.)

(32) How many children are you not allowed to have?

(33) $\mathbf{d_{w1}}$ $\mathbf{d_{w2}}$ $\mathbf{d_{w3}}$ $\mathbf{d_{w4}}$ [--------{--⟨---------------}--⟩---]--------

But it is possible to imagine scenarios in which the question in (32) would not have a maximal answer in the interval-based system I was proposing. For example imagine that in the far away kingdom of Antiprimia, what is not allowed is having a prime number of children. Clearly in this case there will be no unique interval covering all and only the degrees that correspond to the number of children that one is not allowed to have. Still, I was arguing, the question is grammatical: Our reasoning based on Gajewski (2002) only predicted that a question will be ungrammatical if there is *no* context in which it can have a most informative answer. The question in (32) can have such a context, e.g. the one illustrated in (33), therefore it is grammatical.[40] In contrast, in the case of a simple negative question such as **How many children don't you have?* there was no scenario in which it could have a maximal answer.

[39] But cf. Takahashi (2006) on questions about the validity of this generalization

[40] How do I predict that it seems to be possible to answer: "Any prime number."? We might follow Fox and Hackl (2005) at this point, who propose that Dayal (1996)'s condition might have to be weakened to state that it is *possible* that the conjunction of all true propositions in Q is itself a member of Q.

Similarly to modals, certain quantifiers over individuals can also rescue negative degree questions if it is possible to find scenarios in which it is possible to find a maximal interval. Let's take a question such as (34) below:

(34) $[\![$How many books did none of the students read?$]\!]$

$$= \{\neg\exists x\ [\text{student}(x) \wedge x \text{ read I-many books}] \mid I \in D_I\}$$

Imagine a situation in which there are four students, and they read 1,2,3 and 4 books respectively. In this case indeed there can be a maximal interval that contains all the intervals that do no contain any degrees such that a student read that many books: the interval [5, ∞) i.e. *at least 5.* The picture below should serve as an illustration:

(35) $\mathbf{d_{s1}\ d_{s2}\ d_{s3}\ d_{s4}}$ [--------{--⟨------------}--⟩---]------

Another scenario in which the question might have a most informative answer is a scenario in which various students have read all numbers of books, except it so happens that no one read 5: in this case the only interval for which it is not true that someone read a number of books that is contained in this interval is the interval which corresponds to the singleton set $\{d_5\}$, *exactly 5.*

(36) $\mathbf{d_{s1}\ d_{s2}\ d_{s3}\ d_{s4}}$ $[d_5]$ $\mathbf{d_{s6}\ d_{s7}\ d_{s8}\ d_{s9}}$**...**

Let's look now at the case of manner questions such as the examples below:

(37) How has John never behaved at a party?

(38) a. How hasn't anyone solved the exercise?

b. ?How has no one solved the exercise?

An interesting aspect of these examples is that they are not only much better than the core cases of negative island violations with manners, but also we can observe that an answer to them seems to have a rather specific meaning. In particular, an answer to (38) '*by subtraction*' is acceptable if in a given contest, there are a number of ways of solving the exercise that we know about, and for all the other salient methods other than subtraction, at least one person solved the exercise in that way. Where does this requirement come from?

First observe what the explanation of these examples might be: I would like to propose that similarly to the case of modals above, what happens in these examples is that the mutually exclusive propositions get distributed over different times (in the case of yet, never) or they talk about different individuals (as in the case of *noone*). Lets look fort at the case of (37).[41] [Again, the existential quantification over events is presumably supplied by the temporal quantifier *never*]

(39) ⟦How has John never behaved at a party?⟧

$$=\{\neg\exists t\leq t_{now}\exists e\ [\text{behave}\ (t)(e)(\text{John}) \wedge q_{manner}\ (t)(e)]\ \mid\ q_{manner}\in D_M\}$$

A complete answer such as 'Politely' will state that politely is the most informative true answer, and as such it will imply that for all other alternative manners in the question denotation there was a time and event such that John behaved in that manner at that time. This then derives at the same time that the question should be non-contradictory and that it should have its implication. The reason why we avoid contradiction in this case is that now the offending contraries can hold at different times and events. The way we derive the implication is by the regular reasoning about the complete answer.

Similarly, in the case of an existential quantifier over individuals the different mutually exclusive manners are distributed over different individuals: this explains on the one hand why the contradiction is resolved, and on the other hand why we interpret a complete answer as implicating that for all the alternative manners of solving the exercise, someone solved it that way[42].

[41] I simplify the representation here by not representing the exact tense semantics of these examples.

(40) [[How hasn't anyone solved the exercise?]]

$$=\{\neg\exists x\ \exists e\ [\text{solve}\ (e)(x)(\text{the exercise}) \wedge q_{manner}\ (e)] \mid q_{manner} \in D_M\}$$

3.3 Some, few, only a few, at most.

It has been argued by Rizzi (1990), besides negation DE quantifiers such as *few*, *less than* 3 also seem to create weak island effects. Following Klima (1964) these are sometimes referred to as "affective" operators, more commonly though as (Strawson) DE operators. However, the generalization that affective operators create weak islands is too broad: *At most n* e.g. is downward entailing, licenses NPIs, yet still it does not create weak islands, as noted by Szabolcsi and Zwarts (1993). On the other hand, some upward entailing existential quantifiers cause intervention as well, is it is the case with *some*: the examples below are rather odd (similar judgements are reported in Honcoop (1998))

(41) ??How much did some men score?

In this section I observe that the reasoning based on maximal answers that has been argued for in this thesis partly explains this pattern: in fact it predicts that the upward entailing quantifiers should cause intervention, even in questions about individuals. On the other hand, what the present proposal struggles with at the moment is to predict the intervention caused by DE existential quantifiers such as *few:* it predicts that examples with *few* and *less than 3* intervening should be acceptable just like the examples that contain the quantifier *at most 3* are acceptable. Interestingly, as I will observe, there is a marked difference between *few* and *only a few*, where sentences containing the latter are markedly better, despite the fact that both of these are DE.

3.3.1. Some

Recall that I have been arguing in Chapter 3 that the semantics of degree questions should be captured by an interval based semantics of degree, advocated by Schwarzschild

[42] It seems that the judgements about the examples with *no one* are not completely uniform, and some people find them less than perfect. In fact in the literature sometimes such examples are represented with a star. I do not have any explanation for this variation at the moment.

and Wilkinson (2002) and Heim (2006). Under this view, the Hamblin-denotation of (51) above will look as follows:

(42) ???How much did some girls score?

(43) For what interval I, $\exists X$: $\forall x \in X$ x's score is in I?

$=\{\exists X: \forall x \in X$ x's score is in I$|$ $I \in D_I\}$

Given an upward entailing pattern, if an interval I covers interval K, the truth of *some girl's score* $\in$ *K* will entail the truth of *some girl's score*$\in$ *I*. We are then looking for the smallest interval such that some girl's score is contained in it. Unfortunately, there will not be a unique minimal (smallest) interval like that. This is because there will be many such intervals that contain some girl's scores, without any overlap[43].

3.3.2. Few and only a few

It has been argued in the literature that the operators *few/ less than 3* (but *not at most 3*) induce weak island effects:

(44) a. ?*How many points did few girls score?

b. ??How far did few girls jump?

c. *How did less than 3 girls behave at the party?

Interestingly enough, in Hungarian and in Italian[44], adding an *only* in front of *few* has an effect of improving greatly the above violations[45]:

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[43] Note that this reasoning in fact extends to questions about individuals as well in this case: these too will be such that a unique maximal answer is not contained in the Hamblin set: (unless we presuppose that only one person invited anyone, or that everyone invited exactly the same individuals—however, in either case the use of *someone* is not felicitous for independent reasons)

(1) ??Who did someone invite?

a. For which individual Y, $\exists x$: x invited Y?

b. {$\exists x$: x invited a;

$\exists x$: x invited b;

$\exists x$: x invited a+b}

[44] Italian judgements courtesy of Giorgio Magri (pc)

(45) A ???Hány pontot ért el kevés lány? [*Hungarian]*

How-many point reached PRT few girl

a. Hány pontot ért (csak) kevés lány el?

How-many point reached (only) few girl PRT?

'How many points did only few girls reach?'

(46) A. *Quanto poche ragazze hanno segnato? [*Italian*]

How much few girls have scored?

b. ?Quanto solo poche ragazze hanno segnato?

How much only few girls have scored?

(47) A. *Hogyan oldotta meg a feladatot kevés fiú? [*Hungarian*]

How solved PRT the exercise few boy

b. Hogyan oldotta meg (csak) kevés fiú a feladatot?

How solved PRT (only) few boy the exercise

'How did (only) few boys solve the exercise?'

The effect of *only* on the acceptability of these sentences has not yet been noted to my knowledge. However, what has been observed, most notably by Szabolcsi and Zwarts (1993) was that in certain languages (e.g. Hungarian) the violations with affective operators tend to be less strong, if present at all. I believe that the effect that Szabolcsi and Zwarts (1993) observe in Hungarian is in fact the same effect as that of adding an *only*. This is because Hungarian has a focus marking strategy that is strictly interpreted as exhaustive (cf. Szabolcsi (1981) and subsequent literature on Hungarian). As such, the effect of focussing an operator such as *few* NP in Hungarian might be expected to have the same effect as adding an *only*. In the examples that are judged as acceptable in Hungarian, few NP is invariably focussed. In a language like Italian, focussing does not replace an explicit *only*.

[45] in English, I am told, "only few" sounds odd, but sentences with "only a few" seem acceptable.(pc. Jon Gajewski)

3.3.3. A speculation about the explanation of this pattern

The above described pattern of data seems to be quite puzzling: this is because the semantics of *few* and *only a few* seems to be exactly the same. Further, for a downward entailing pattern the reasoning based on maximal answers does not in fact predict ungrammaticality. Observe the case of the question below:

(48) How much less than 3 gilrs score?

(49) For what I, $\neg\exists$X: $|X|\geq 3$ & $\forall x\in X$ x's score is in I?

$=\{\neg\exists X: |X|\geq 3 \ \&\ \forall x\in X$ x's score is in I$|\ I\in D_I\}$

In this case we can have a maximal answer: this is because it is not true that any interval that contains a score that someone scored will make for a true alternative. E.g. if the degrees 1,2,3 and 4 are the only degrees such that 3 or more people scored that much, the interval $[5,\infty)$ will emerge as the maximal interval such that not more than 2 people have scored that much. Of course it is easy to imagine many other configurations that make it possible for the question to have meaningful maximal answer[46].

Nevertheless, in this section I offer some (wild) speculations as to where a difference between *few* and *only a few* might be stemming from, still. The reasoning is as follows. First, one might point out that quantifiers such as *few* in Hungarian obligatorily have to move to the preverbal focus position. (This is following Kiss (2007) e.g., and unlike Szabolcsi (1995)[47]).

(50) a. *Mari evett kevés almát

Mari ate few apple

[46] *One might object at this point that this analysis should predict that even a sentence such as the one below should sound odd, this is because we should predict that every actress was insulted by some paparazzi:*
(1) Which actress did few paparazzi insult?
One difference is that while actresses may or may not be insulted by paparazzi, all girls would have to score something in $[0\infty)$, or behave somehow.

[47] The disagreement is not about the facts, but whether the PredOp position postulated by Szabolcsi (1995) which walks and talks like the Focus position, is in fact to be equated with the Focus position. Also, the focus position can only host one item, therefore, if there are more foci, (or more DE operators) all but one of them will have to be postverbal.

b. Mari evett egy kevés almát

Mari ate a few apple

Mari ate a few apples'

c. Mari [$_{FP}$kevés almát] evett

Mari few apple ate

'Mari ate few apples'

This fact I would take to indicate that the resulting DE meaning in Hungarian as a combination of an exhaustive operator (the focus) and an upward entailing quantifier akin to *a few*. In questions however the focus position is occupied by the question word, therefore *few* remains in a postverbal position, where it does not associate with focus easily at all, and tends to retain its UE meaning, unless it can combine with overt *only*. However, the UE meaning leads to a maximalization failure as we saw above. On the other hand, when we turn *few* into *only a few*, we can ask a meaningful question.

Suppose that in fact the Hungarian pattern might be generalized to other languages[48]. Then we might reason as follows. Let's first look at a degree question such as (51) below:

(51) *How much did less than 3 girls score?

Recall that I have been arguing in Chapter 3 that the semantics of degree questions should be captured by an interval based semantics of degree, advocated by Schwarzschild and Wilkinson (2002) and Heim (2006). Under this view, the Hamblin-denotation of (51) above will look as follows:

(52) For what interval I, $\exists X$: $|X|<3$ & $\forall x \in X$ x's score is in I?

$=\{\exists X: |X|<3 \ \&\ \forall x \in X \text{ x's score is in I} \mid I \in D_I\}$

Given an upward entailing pattern, if an interval I covers interval K, the truth of *(a) few girl's score $\in$ K* will entail the truth of (*a*) *few girl's score$\in$ I.* We are then looking for the smallest interval such that a few girl's (or less than 3 girls's) score is contained in it. Unfortuntaley, there will not be a unique minimal interval like that.

However, if we add *only*, the picture changes:

(53) Hány pontot ért el csak kevesebb mint 3 lány?
How many scores reached prt only less than 3 girl?

(54) For what I, $\neg\exists X$: $|X|\geq 3$ & $\forall x \in X$ x's score is in I?
$=\{\neg\exists X: |X|\geq 3 \;\&\; \forall x \in X$ x's score is in $I \mid I \in D_I\}$

This now can have a maximal answer: this is because it is not true any more that any interval that contains a score that someone scored will make for a true alternative. E.g. if the degrees 1,2,3 and 4 are the only degrees such that 3 or more people scored that much, the interval $[5,\infty)$ will emerge as the maximal interval such that not more than 2 people have scored that much. Of course it is easy to imagine many other configurations that make it possible for the question to have meaningful maximal answer[49].

(55) d_1 d_2 d_3 d_4 [--------{--⟨------------}--⟩---]------

Contrast now the behavior of *less than 3* with *at most 3.* Szabolcsi and Zwarts (1993) reports manner questions to be acceptable with *at most*, which is indeed what is predicted by the present account.

(56) How did at most 3 girls behave?

[48] How does *a few* behave in English? According to this reasoning it should cause intervention…

[49] *One might object at this point that this analysis should predict that even a sentence such as the one below should sound odd, this is because we should predict that every actress was insulted by some paparazzi:*
(2) Which actress did few paparazzi insult?
One difference is that while actresses may or may not be insulted by paparazzi, all girls would have to score something in $[0\infty)$, or behave somehow.

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