Presuppositional and negative islands: a semantic account

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Abstract
This paper proposes a new explanation for the oddness of presuppositional and negative islands, as well as the puzzling observation that these islands can be obviated by certain quantificational elements. The proposal rests on two independently motivated assumptions: (i) the idea that the domain of manners contains contraries and (ii) the notion that degree expressions range over intervals (cf. Schwarzschild and Wilkinson 2002). It is argued that, given these natural assumptions, presuppositional and negative islands are predicted to lead to a presupposition failure in any context.

Keywords
Weak islands; negative islands; presuppositional islands; interval-based semantics for degrees; contradiction.

1 Introduction

It is well known that *wh*-words that range over individuals can escape weak islands, such as the factive and negative islands illustrated below, while *wh*-words ranging over manners or degrees cannot:

(1) a. *How do you regret that John behaved? *Factive island*
    b. Who do you regret that John invited?
(2) a. *How many children don't you have? *Negative island*
    b. Who didn't you invite?

What is less well known is that weak island violations like the ones in (1) and (2) can be ameliorated by certain well-placed quantificational elements such as modals and attitude verbs. Fox and Hackl (2007), partly based on Kuno and Takami (1997), have shown that negative degree islands such as (2) above become perfectly acceptable if we place an existential modal in the scope of the negation, or a universal modal above the negation:

(3) a. How many children are you not allowed to have?
    b. How many children are you required not to have?

Fox and Hackl (2007) only discuss the case of modals in negative degree questions, but we might observe that the same pattern obtains with negative manner questions if we place an existential modal in the scope of negation (cf. (4)). Further, attitude verbs above negation can obviate the island effect as well, as shown in (4):

(4) a. How was John not allowed to behave?
    b. How fast do you hope that Bill did not drive?

For most speakers, factive islands as well can be significantly ameliorated by placing an existential modal in the scope of a factive verb:

(5)   a.   ?How do you regret that John was allowed to behave?

        b.   ?How fast did you discover that John was allowed to drive on this highway?

These facts pose a serious challenge for any account that argues that the intervention is caused by some syntactic property of negation or factive verbs (cf. the Relativised Minimality of Rizzi 1990 and much subsequent work), because it is rather unclear why adding an extra structural element such as a modal or an attitude verb should be able to obviate whatever syntactic intervention creating property negation and factives might have. We also need an explanation as to why precisely these modals and attitude verbs, but not others, create the obviation effects. For example, universal modals in the scope of negation do not create obviation, as shown below (cf. also Fox and Hackl 2007):

(6)   *How fast is John not required to drive?

It seems then that a semantic account for the island effects created by factives and negation is simply inevitable.

Interestingly enough, despite a number of semantic proposals for weak islands, no coherent account for the different types of factive and negative islands as well as their obviation facts has been available so far. While Szabolcsi and Zwarts (1993, 1997) offer a very elaborate account for intervention created by quantifiers and negation, their proposal for factive islands remains somewhat tentative. Neither do they notice or address the obviation facts discussed above. Honcoop's (1998) proposal is tailored to the Germanic *what-for* split; it is not clear that it is extendable to classic islands or the obviation facts. At the same time, negative degree islands have enjoyed a great deal of specialized attention, e.g. in Rullmann (1995) and Fox and Hackl (2007); the latter of these offers an ingenious solution for the obviation problem in the case of negative degree questions as well. Yet it has remained unclear whether these accounts can be extended to negative islands that arise with other extractees -- e.g. islands created by manners -- or to other types of islands -- e.g. islands created by factives. Indeed, Rullmann (1995) expresses skepticism that such a unified account is possible. Fox (2007) lays out a blueprint for the conditions that an analysis of negative islands created by manner questions would have to fulfill, but himself does not provide such an analysis, nor does he discuss the case of factive islands. Finally, we might mention Oshima (2006), who proposes a partial account for certain cases of factive islands, yet does not extend it to factive islands with degree questions, nor to negative islands or the obviation facts.

The present paper proposes a new semantic account for factive and other presuppositional islands that is easily extendable to negative islands as well. My central claim is that these islands arise because they are predicted to lead to a contradiction at some level. We observe factive islands because manner and degree questions—but not questions about individuals—come with a presupposition that is contradictory. As no context can entail a contradictory set of propositions, these questions always lead to presupposition failure. In the case of negative island questions a contradiction arises in a different manner: here it is the condition according to which questions must have a unique most informative answer (cf. Dayal 1996, Fox and Hackl 2007) which cannot be met. Therefore, any complete (exhaustive) answer to such questions is bound to state a contradiction. My argument as to why a contradiction arises in the case of manner and degree islands is based on two independently motivated assumptions about the domain of manners and degrees. The first is that the domain of manners contains contraries. The second is that degree predicates relate individuals to intervals (cf. Schwarzschild and Wilkinson 2002, Heim 2006). Thus the compositional semantics of questions supplies everything we need for the explanation of presuppositional and negative questions, without invoking any further special rules.

Besides addressing the above-mentioned new examples of modal obviation, the paper makes a couple of further novel empirical claims as well. I propose that the account for factive islands can be extended to other islands created by presuppositional items: specifically, extraposition islands, certain adverbial interveners, and islands created by *only*. Further, a correlation can be observed between presupposition strength and the strength of islandhood. The case in point here are extraposition islands and adverbial interveners. Finally, I will note that *when* and *where* questions are also sometimes sensitive to negative islands and show that this follows naturally from the present proposal.

As mentioned above, the proposal rests on the claim that the ungrammaticality of weak islands follows from the fact that they generate a contradiction at some level. But why does this fact lead to ungrammaticality? A number of researchers have argued recently that grammar needs to be sensitive to certain logical properties (Chierchia 1984, Fox 2000, Gajewski 2002, Fox and Hackl 2007). My proposal falls within this general research program. In particular, I follow Gajewski (2002), who argues that we need to distinguish between contradictions that result from the non-logical vocabulary and contradictions that result from the logical constants alone. Gajewski claims that the latter play an important role in natural language generally: sentences that express a contradiction or tautology by virtue of their logical constants alone are ungrammatical. Thus, presuppositional and negative islands are ungrammatical because – given certain constraints – they lead to a contradiction independently of the choice of the non-logical words.

The paper is organized as follows: Sect. 2 presents a brief overview of the most important previous proposals and points out their shortcomings. Sect. 3 starts with the presentation of a new approach to factive islands; here I lay out my argument that these islands result from the fact that degree and manner questions are predicted to stand with a contradictory presupposition. This analysis is then extended in Sect. 3.4 to islands created by extraposition and adverbials, as well as *only* NPs. I also give evidence which shows that the strength of the factive inference generated by a certain intervener correlates with the strength of the island that it creates. Sect. 4 proposes an account for negative islands, which covers cases of manner and degree extraction as well as certain instances of islands created by *when* and *where* adverbials. Sect. 5 discusses the issue of contradiction in grammar; Sect. 6 concludes the paper.

2. Previous proposals
2.1 Szabolcsi and Zwarts (1993, 1997)
The very first paper to propose that weak island intervention facts should follow from semantic properties was Szabolcsi and Zwarts (1990). This paper offered a theory which was based on the idea that downward entailing (DE) operators cause intervention.[1] This first theory was then substantially revised in Szabolcsi and Zwarts (1993, 1997) (henceforth Sz&Z). The revisions were mainly motivated by papers of H. de Swart and K. É. Kiss that have appeared in the meantime (de Swart 1992, É. Kiss 1993). These papers argued that weak island intervention should be thought of as a scope phenomenon, and also challenged the view that only DE operators create intervention. Sz&Z attempted, therefore, to draw a new demarcation line between the scope-taking expressions that create intervention and those that do not.

Below I briefly present Sz&Z's proposal, concentrating on the case of negative and factive islands.[2] They propose that each scopal expression (e.g. negation or quantifiers) can be

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[1] Downward entailing functions are those functions f for which for all X, Y in the domain of f, if X⊆Y, then f(Y) entails f(X).

[2] The biggest success of Sz&Z's proposal is the treatment of intervention caused by various quantifiers. As the present paper does not cover intervention caused by quantifiers, it does not aim at replacing Sz&Z in its entirety,

thought of as a Boolean operation on a certain domain. More precisely, each scopal element in conjunction with a distributive verbal predicate can be interpreted as a Boolean combination of singular predications. (7) below illustrates this idea with some examples. Assume for the sake of this example that the domain of students is composed of John, Bill, and Mary:

(7)

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

These observations can be generalized by saying that negation corresponds to taking the Boolean *complement,* universal quantification corresponds to taking Boolean *meet,* etc. 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. In example (8) the *wh*-word and therefore the variable in the segment *John likes t* range over individuals:

(8) Who_1 doesn't John like t_1 ?

To arrive at the meaning of the question in (8), first the denotation of the segment *John likes t* needs to be computed. *John likes t* denotes the set of individuals that John likes. Since the slot abstracted over is filled by an atomic individual, we end up with sets of individuals as denotations for predicates over individuals. As negation corresponds to taking the Boolean complement, *John does not like t* is expected to denote the complement of this set, the set of individuals that John does not like. All Boolean operations can be performed on sets of individuals, because the power set of any set of individuals forms a Boolean algebra. This is why negative questions about individuals are grammatical.

Why are negative manner and degree questions ungrammatical? Let's first look at the case of manners.

(9)   a. How_1 did John behave t_1?
        b.   *How_1 didn't John behave t_1 ?

Sz&Z argue that manner predicates are collective. For this reason, the segment *John behaved in t* should not be thought of as a set of individual manners that characterized John's behavior. Rather, it denotes the unique collective manner in which John behaved, which we might write as ια [j behaved in α]. The question in (9) then asks which (collective) manner is identical to this unique individual sum. In the case of the negative question, we should be wondering which collective manner (i-sum) corresponds to the complement of the ways in which John behaved. However, the complement of the collective manner in which John behaved is not guaranteed to be itself an i-sum. This is why the negative question is bad: it asks for the unique manner in which John did not behave: however, it is possible that there is no single manner that corresponds to the complement set of the ways in which John behaved.

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but rather to propose an alternative to only some parts of their proposal. (But see Abrusán (2007b) for a treatment of *wh*-islands and a discussion of quantificational intervention.)

More precisely, Sz&Z propose that the denotation domain of manners is a free join semilattice. Free join semilattices are structures that resemble Boolean algebras, but lack a bottom (zero) element. The fact that these structures are not closed under complementation means that it is not the case that for all items in the structure their complement is also a member of the structure. Sz&Z propose that amounts and numbers denote in structures that are even poorer than a free join semilattice, namely (non-free) join semilattice and lattices, respectively. As these structures are also not closed under complementation, negation is predicted to cause intervention in the case of questions about amounts and manners as well. Notice an interesting aspect of Sz&Z's approach: the reason why a particular utterance of a negative island violation is bad is not because we know that, given the context, the complement of a particular collective manner or amount is not in the domain of manners, but because it is not the case that for every context, the complement can be defined.

How do Sz&Z treat the case of intervention caused by factive verbs? They argue that these verbs contain a Boolean operation in their meanings, namely conjunction, that makes them interveners for certain *wh*-phrases. Following Dukes (1992), they propose that a sentence with a factive matrix predicate can be paraphrased as follows:

(10)   I regret that John left.
            regret(I) (that John left) & fact (that John left)

The important point here, they argue, is that the paraphrase denotes conjunction, viz. intersection. The reason why factive verbs cause intervention is that join semilattices or lattices are not closed under conjunction. Take the example of manners, i.e. a free join semilattice: as this structure does not contain the zero element, the conjunction of any two distinct sets, the zero element, is not an element of the domain of manners. Thus, factives cause intervention because it can be the case that the conjunction required by the factive verb leads out of the structure in which manners denote.

(11)   How do you regret that John left?
            a.   regret(you) (that John left__) & fact (how John left __)
            b.   For which manner γ,
                    $\gamma = \iota\alpha$ [you regret that John left in α] $\cap \iota\beta$ [it is a fact that John left in β] ?

Sz&Z argue that the same idea can be extended to response stance predicates such as *deny*, which also cause intervention (cf. Cattell 1978, Hegarty 1992). At the same time they argue that non-intervening verbs, that is, the class of volunteered stance verbs (e.g. *think*), are not plausibly analysed as conjunctions.

Sz&Z's account is based on the important 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 paper, as well as by Fox and Hackl (2007), in yet another way.[3] Further, as far as the analysis of

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[3] Another related proposal is that of Honcoop (1998), who formulates a very interesting dynamic semantic account for *what-for* split constructions in Germanic languages, which are often taken to be sensitive to the same range of interveners as weak islands, and are therefore treated as similar to weak islands. However, there are also a number of differences that cast doubt on the claim that the *what-for* split construction should indeed be subsumed under weak island violations. First, the range of elements that create intervention in the case of the *what-for* split: items such as *exactly 3,* or *at most 3,* which do not create weak islands, seem to be strong interveners in the case of the *what-for* split. Second, and more importantly, the *what-for* split does not seem to show the effect of modal obviation: the examples below illustrate the case of German (judgments courtesy of Michael Wagner, p.c.).

negative islands is concerned, the account advanced in this paper (as well as that of Fox and Hackl (2007) for negative degree questions) shares the idea in some form or another[4] that negative islands result from the fact that for some reason, complementation is not defined for the domain of manners and degrees. However, the account in Sz&Z also faces certain serious problems:

i.   Sz&Z's theory does not seem to be able to explain the modal obviation effects discovered by Fox and Hackl (2007). It is rather implausible that adding a modal should turn the partially ordered domain of manners or degrees into sets, such that now the required algebraic operation could be performed.[5]

ii.   Sz&Z's account of factive verbs overgenerates: while they claim that their account correctly predicts that volunteered stance verbs do not cause intervention because they do not have conjunctive part in their meanings, there are a number of verbs that can be plausibly analyzed as having a conjunction in their meaning but are not interveners. One such verb is *sell*: it is fairly plausible to analyze *John sold the car to Bill* as the conjunction of 'John gave Bill the car' and 'Bill gave John the money' (cf. Abusch 2002). Why is *sell* is not an intervener then? The same question might apply to change of state verbs, which are standardly analyzed as involving a conjunctive element in their meaning. For example, *John opened the door* is said to involve the conjunction of 'The door was closed' and 'John caused the door to be open'. Why is *open* (or any other change of state verb) not an intervener then? These observations render dubious the notion that it is simply the conjunction in the meaning of factive verbs that makes them interveners.

iii.   If manners are indeed collective it is predicted that an utterance such as *John behaved politely and respectfully* should not straightforwardly entail that John behaved politely and that John behaved respectfully. Indeed, Sz&Z bite the bullet and say: "Intuitively the sum of any two behaviors seems like a candidate for a more complex behavior, possibly including contradictory cases like kindly and unkindly" (1997, p.245). This move, however, seems counterintuitive to me, since typically conjunctions of manners do seem to entail their parts, contrary to what Sz&Z claim. This suggests that the idea that weak islands with manners result from manners being obligatorily collective might be on the wrong track, after all.

(i)   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?'
(ii)   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?'
(iii)   a.   *Was ist Jan sicher für ein Buch nicht lesen zu wollen?
          c.   *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?'

However, note that interestingly, the French *combien*-split does improve; cf. the discussion in Spector (2005). Therefore I will assume that the French *combien*-split—but not the *what-for* split—belongs to the classic weak island cases.

[4] As we will see, while for Sz&Z the complement was not defined in every context, for our account the problem will stem from the fact that the complement cannot be defined in *any* context.

[5] Anna Szabolcsi (p.c.) suggests that an account for modal obviation similar in spirit to that offered in this paper might be possible to formulate in the framework of Sz&Z as well. The details of how such an analysis could work remain to be seen, however.

iv. Sz&Z treat the different readings of *how-many* questions as resulting from a pragmatic individuation of the domain of amounts. Since then, however, it has become standardly accepted that the two readings result from a scope ambiguity (cf. Cresti 1995, Rullmann 1995, Romero 1998, among others). An account that can treat the two readings in this later fashion might therefore be argued to be preferable.

2.2. Negative degree islands: Rullmann (1995) and Fox and Hackl (2007)
2.2.1 Rullmann (1995)

Rullmann (1995), inspired by von Stechow's (1984) explanation for the negative island effects in comparative clauses, has argued that the negative island effects in questions can be explained if the negative degree question is analyzed as asking for a maximal degree. To derive such a meaning for degree questions, he adapts Jacobson's (1995) theory of free relatives to degrees. He proposes that degree questions receive the following interpretation:

(12)   How tall is John?
      a.   What is the maximal degree d such that John is d-tall?
      b.   For what d, d is the max(λd[John is d-tall])
      c.   Max(D)=ιd[d$\in$D $\wedge$ $\forall$d'$\in$D[d' $\leq$ d]

If John's height is 6 feet, the expression *λd[John is d-tall]* denotes the set of all heights smaller or equal to 6 feet. The maximum operator picks the largest degree in this set, in this case 6 feet. In the case of a negative degree question, the set of degrees in the scope of the maximum operator is the set of degrees such that John is not that tall:

(13)   *How tall isn't John?
      a.   What is the maximal degree d such that John is not d-tall?
      b.   For what d, d is the <u>max(λd[John is not d-tall]</u>)

But this set lacks a maximum (i.e., a "largest element"), and therefore the underlined part of the expression above is always undefined.[6] In fact, for Rullmann (1995), a similar problem will always arise as long as the sentence contains a downward entailing element. Somewhat counter-intuitively perhaps, the effect of the DE operator is that the predicate of degrees *P* *(λd[John is not   d-tall)* is upward entailing with respect to its degree argument. More precisely, with d<d', it licenses the inference from P(d) to P(d'):

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[6] Rullmann (1995) in fact assumes an exact semantics for scalar predicates, but the explanation goes through as well: λd[Bill's height is d] denotes a singleton set, the complement of which (all degrees greater or smaller than Bill's exact height) cannot have a maximum either.

[8] As for *wh-the hell* expressions, I (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 counterparts. As for a felicitous use of a *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: W*ho the hell saw his mother?"* Szabolcsi and Zwarts (1993) argue that the example shows that the use of the *wh-the-hell* expression here 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, the examples with *wh-the-hell* expressions that involve negation improve as well. For example, 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: W*ho-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 one of scope, rather than D-linking.

(14) a.   5 feet < 6 feet
      b.   John is not 5 feet tall => John is not 6 feet tall

I will call such predicates upward-scalar predicates. More generally, then, one might say that in Rullmann's (1995) system an upward scalar predicate of degree P should be incompatible with degree questions; that is, questions of the form 'For what d, d is the maximal degree in P(d)?' should be unacceptable with such a predicate.

 However, as Beck and Rullmann (1999) note, this approach predicts the wrong outcome for questions such as the one below:

(15)   How tall is it sufficient to be (in order to play basketball)?

Suppose it is necessary and sufficient to be 7 feet tall. Then it is *a fortiori* sufficient to be 8 feet tall. Hence *λd. it is sufficient to be d-tall* is, in first approximation, upward-scalar. Therefore, (15) is predicted to be unacceptable by Rullmann's (1995) theory. However, it seems perfectly acceptable. Notice that even if the context could restrict the domain of degrees somehow, making sure that there could be a maximum, this theory would still predict the wrong meaning for the sentence, because intuitively the sentence is felt to be asking for the *minimal* degree.

 The second problem for Rullmann's (1995) theory is the already-mentioned observation made by Fox and Hackl (2007) (partly building on work by Kuno and Takami 1997), according to which an existential modal under negation renders the negative degree question acceptable:

(16)   How fast are we not allowed to drive?

The predicate *λd. we are not allowed to be d-fast* is still upward-scalar, hence predicted to be unacceptable by Rullmann's (1995) system, contrary to fact.

 To remedy the problem with the questions involving *sufficient*, Beck and Rullmann (1999) propose to replace Rullmann's (1995) concept of a 'maximal answer' with the concept of the 'maximally informative answer'; this maximally informative answer is the conjunction of all true propositions in the question extension. Now the meaning of a degree question can be informally paraphrased as below:

(17) $\text{How}_d\ \varphi(d)$? = What is the degree d that yields the most informative among the true propositions of the form $\varphi(d)$?

Beck and Rullmann (1999) show that this predicts the right results for questions involving *sufficient,* such as (15): this is because now the question asks for the smallest degree sufficient to be a basketball player.

 However, as the authors themselves notice, while the account of Beck and Rullmann (1999) predicts the right results for the data in (15) and (16), now the basic explanation for the negative island effect is lost:

(18)   a. How tall isn't John?
       b. For what d, John isn't d-tall
       c. For what d, John is less than d-tall

Suppose that John's height is just below 6 feet. Then the set of true answers is:

(19)   {John isn't 6 feet tall, John isn't 6½ feet tall, John isn't 7 feet tall,…}

Clearly *John isn't 6 feet tall* is the most informative answer. Yet the question seems unacceptable.

2.2.2.   Fox and Hackl (2007)'s account: dense scales

To remedy this situation, Fox and Hackl (2007) (henceforth F&H) propose the following hypothesis about degree scales:

(20)   *The Universal Density of Measurement (UDM)*:
          Measurement Scales that are needed for natural language semantics are always dense. (F&H, p. 542)

They argue that, on the assumption that the set of degrees is dense, there is no minimal degree that gives a maximally informative true proposition. Inspired by Dayal (1996) and Beck and Rullmann (1999), they assume that any question presupposes the existence of a maximally informative true answer – that is, a true answer that logically entails all the other true answers. Let's call this assumption the *Maximal Informativity Principle (MIP)*. Given the MIP, negative degree questions always result in a presupposition failure. Imagine that in the case of (18) above John is exactly 6 feet tall. Then the set of all true propositions of the form 'John is not d-tall' is the following:

(21)   {…,John is not 6,000001 feet tall, …, John is not 6,05 feet tall, …., John is not 6,1 feet tall,….}

The problem, according to Fox and Hackl's proposal, is that there is no *minimal* degree d such that John is not d-tall. This is simply because for any d > 6 feet, there is a d' such that d > d' > 6 feet. Therefore the MIP cannot be met.

      F&H's proposal can neatly explain the modal obviation facts as well. Further examples are provided below:

(22)   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?

Suppose the law states that we are allowed to expose our workers to less than 100 millisievert/year of radiation and says nothing more. It follows that the set of worlds compatible with the law is {w: the radiation is lower than 100 millisievert/year}. So for any degree d of radiation below 100 millisievert/year, there is a permissible world in which the radiation is d. Hence for any degree of radiation smaller than 100 millisievert/year, we are allowed to expose our workers to that amount of radiation. On the other hand, we are not allowed to expose our workers to 100 millisievert/year. Therefore, 100 millisievert/year is the smallest degree such that we are not allowed to expose our workers to d. As a consequence, Dayal's condition can be met. More generally, predicates of the form $\lambda d. \neg \diamondsuit(P(d))$ or $\lambda d. \square(\neg P(d))$ *can* denote closed intervals, and therefore can obviate weak islands.

      The account in F&H makes the extremely important observation about modal obviation and proposes an ingenious account to explain this pattern. Yet we might ask some questions about this analysis:

i. F&H must extend their account even to cases where the domain of degrees is not "intuitively" dense, such as cardinality measures:

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

Suppose Jack has exactly 3 children. Then he does not have 4 children, but he also does not have 3.5 children, or 3.00001 children…. Naturally, this objection is addressed by F&H, who in fact take it to be an argument for a very strong modularity assumption. According to them, the knowledge that the number of children someone has is an integer is a form of lexical/encyclopedic knowledge. However, F&H claim that the MIP is computed only on the basis of the purely logical meaning of the question, i.e. it is blind to contextual, encyclopedic, or lexical information. While F&H do provide some intriguing arguments for this view (some of which are completely independent of degree questions), I believe it is still worthwhile to investigate an alternative.

ii. Second, we might wonder whether this approach can be extended to weak island extractees other than degrees. This question is also addressed in Fox (2007). He proposes that although the UDM itself cannot be responsible for types of extraction other than questions about degrees, a broader generalization about non-exhaustifiable sets of alternatives can subsume both the cases accounted for by the UDM and other examples of non-exhaustifiability.

(24) *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.

Fox conjectures that any account for negative manner questions should fall under this generalization. He does not, however, himself propose such an account.

iii. Third, we might wonder whether this analysis can be extended to weak island creating interveners other than negation. This question is hard to answer, but it seems that the account does not apply to presuppositional islands in any straightforward way (cf. Sect. 3.2.2).

2.3 Oshima (2006)

In a brief paper Oshima (2006) provided a partial account for certain factive islands, namely the ones that arise with manner and *why* questions. His starting point is the observation that questions are pragmatically infelicitous if it is part of the common ground that they only have a unique possible answer. In the case of the question in (25) it follows from our common knowledge that Alice got married to only one person.

(25) *Who does Max know that Alice got married to on June 1st?

This question can be paraphrased as 'Of the *x*'s such that it is in the common ground that Alice got married to *x* on June 1st, who is such that Max knows that Alice got married to him on June 1st?', which results in a pragmatic oddity since the speaker should know the answer to his question before asking it.

Oshima (2006) then goes on to argue that *why* and manner questions give rise to weak islands in factive contexts because such questions are interpreted as unique interrogatives.

Namely, he argues that propositions have only one reason in a given context, and also that context provides unique salient manners to actions. Therefore it follows that questions of the form '*Why/How p?*' that include a factive verb should be infelicitous, because they already presuppose their answer.

The proposal by Oshima offers a plausible pragmatic reasoning that could be behind the oddness of factive islands. However, I think it is fair to say that the claim that *why* and manner questions have a singleton unique answer in context, similarly to (25), is dubious: in fact it seems that in most contexts they have multiple felicitous true answers. Oshima says the following to support his case:

> [(i)] How did Alice teach Max French?
> [(ii)] Alice taught Max French
>   a. effectively
>   b. with emphasis on pronunciation
>   c. by private lessons
>   d. based on a contract through a major language school

> When [(ii.a)] is provided as an answer, for example, the utterer of [(i)] may be satisfied with it, but may as well want to continue his inquiry by saying: "Well, that's not what I'm asking. Did she teach him by private lessons, or by group lessons?" It thus appears that typically a HOW-question solicits an answer concerning *a particular semantic aspect* of the relevant event. Crucially, a single event usually cannot be modified by more than one manner that belongs to the same semantic domain. (Oshima 2007, p. 12)

Yet it seems to be perfectly felicitous to answer the above question with "By private lessons and with emphasis on pronunciation and spelling." Thus not only can several dimensions of manners be salient in a given context, but also within one dimension several modifiers may be truthfully applied to a given event, as long as these do not exclude each other. Interestingly, the strongest support for Oshima's idea would come from the case he does not discuss, the case of degree questions. But even here the phenomenon of modal obviation would remain unaccounted for.

2.4 Syntactic alternatives
2.4.1 Relativised Minimality: Rizzi (1990), Cinque (1990), and newer developments
The basic idea behind the most popular syntactic approach to 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 (26) to (28) spell out how Rizzi (1990) implements this idea. However, his insight (which builds on Obenauer 1984) is not so much the technical implementation of the above idea, but 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'.

(26)   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.

(27)   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.

(28)   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 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 similar A-bar phrases. Let's look at an example:

(29)   a.   *How didn't John behave?
       b.   ?Which man didn't John invite?

The reason why (29) is unacceptable in Rizzi's (1990) system is that the *wh*-adverb (an A-bar phrase) needs to be connected to its trace via an antecedent government chain. However, negation 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 (29), on the other hand, is referential and thus 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*[8] seem to be sensitive to weak islands, despite the fact that they receive a referential theta-role according to Rizzi's (1990) theory:

(30)   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 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's (2001) theory of locality.

However, syntactic accounts face a number of non-trivial problems. (cf. also further discussions in Szabolcsi and Zwarts 1993, 1997, Rullmann 1995, Honcoop 1998, Szabolcsi 2006):

i.   As Szabolcsi (2006) points out, negation can be crosslinguistically expressed as a head or a specifier or an adjunct, yet the island-creating behavior of negation does not vary crosslinguistically. This fact casts doubt on the idea that it is some syntactic property of negation that is the culprit for weak island creation.

ii.   It is not clear what the syntactic difference might be between factive and response stance verbs, on the one hand, and other attitude verbs, on the other. Following Kiparsky and Kiparsky's (1971) classic proposal, it has been traditionally assumed (cf. Cinque 1990) that the sentential complements of factive verbs have an extra layer of structure. While the exact technical details of the various implementations of Kiparsky and Kiparsky's (1971) idea differ, these proposals share the notion that it is this extra piece of structure that makes factives act as barriers for movement. It has also been proposed, however (cf. Haegeman 2006, de Cuba 2007, among others), that complements of factive verbs have less structure than those of non-factive predicates:

the reason why non-factives are not interveners is because the extra syntactic layer can serve as an 'escape hatch' for movement. As complements of factive verbs under these proposals have less structure, the 'escape hatch' strategy is not available for them, and they are doomed to be interveners. I take this disagreement in the syntactic literature to show that no clear evidence exists as yet for a crosslinguistically stable syntactic difference between the complements of factive and non-factive verbs.

iii.   Most difficult, however, are the obviation facts for modals discussed by Fox and Hackl (2007) and in the introduction of this paper. As we have seen, universal modals above negation or existential modals under negation save negative degree questions:

(31)   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?

We have also seen that similar facts arise with certain attitude verbs. 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 or an attitude verb should not be able to change this fact.

iv.   The effect called 'D-linking' (or 'specificity' under some approaches) is presented as a unitary phenomenon that is able, on its own, to ameliorate the island effects. I will argue, however, that the various examples that have been evoked to demonstrate the effects of so-called D-linking do not in fact belong under the same hat: the so-called D-linked interpretation of *how many* questions is just the wide scope reading of the indefinite (following Rullmann 1995, Romero 1998, Fox 2000, among others), whereas other so-called D-linking effects follow from reinterpreting the question as an identity question or as the question being able to range over a restricted set of alternatives or multiple events.

iv.   Finally, the argument in favor of a semantic account also draws support from Occam's razor: if there is independent evidence for a limitation on the meaning of sentences that show island violations, this limitation will remain in place even if such sentences could also be excluded in syntactic terms. In other words, if we can reduce the explanation of these violations to the semantics of the sentences involved, that will make it simply redundant to postulate a separate syntactic machinery as well.

2.4.2   Intervention effects: Beck (1996)

A somewhat different structuring of the domain from that assumed by most approaches to weak islands is proposed by Beck (1996) who offers an analysis for a class of phenomena she calls *intervention effects*. Intervention effects occur when a *wh*-item would have to cross a quantifier at LF. Typical cases of this phenomenon are examples of ungrammatical scope-marking constructions in German.

(32)   *Was   glaubt   Hans nicht, wer da   war?
         What   believes Hans not,   who there was
        'Who does Hans believe was not there?'

It is assumed that the embedded *wh*-word *wer* 'who' has to move to the position of the scope marker *was* at LF. But intervening negation and other quantifiers seem to block this movement. Beck (1996) proposes that examples such as (32) are ruled out by a constraint that prevents LF movement across an intervening quantifier.

One feature that distinguishes these cases from examples of weak island violations is that they are not selective, i.e. they arise with questions about individuals as well.

Nevertheless, Beck (1996) argues that some cases of weak islands, namely the ones caused by negation, quantifiers, and focus sensitive operators such as *only,* could be handled by the same constraint. This is possible, once we assume that these examples involve reconstruction at LF.

An interesting aspect of Beck's (1996) approach is that it connects some of the weak island phenomena to a larger class of problems. However, the modal obviation phenomena pose a serious challenge for this approach as well. First, it seems that modal obviation does not have the same effect on the cases of intervention discussed by Beck. Second, it is not clear how the constraint proposed by Beck could be modified to predict modal obviation with some but not all intervention effects. Even if such a move were possible, it would likely be rather ad hoc.[9]

2.5   An alternative theory

In what follows I present an alternative semantic theory that can explain both factive and negative islands, certain other islands created by presuppositional items, as well as the obviation phenomena introduced at the beginning of this paper. I first examine islands that arise with factive verbs and argue that based on certain natural assumptions about the domain of manners and degrees these questions are predicted to stand with a contradictory presupposition. I extend this analysis to other types of islands that arise with presuppositional elements, e.g. extraposition islands. It will also be observed that there is a correlation between the strength of islandhood and the strength of presupposition, as manifested by adverbial interveners. I further show that the reason why *only* NPs cause intervention can be related to their presupposition as well. The second part of the paper looks at negative islands. The assumption that the domain of manners contains contraries and that degree predicates range over intervals is shown to provide a neat explanation of the negative island effect, including modal obviation. A similar explanation is available for certain examples in which *wh*-words such as *when* and *where* manifest an island-sensitive behavior.

The paper also discusses how the present account connects to some of the previous analyses reviewed above. The proposal shares the idea first introduced in Sz&Z according to which the difference between the island-sensitive and the non-island-sensitive elements is to be found in the nature of their quantificational domain—even if the idea as to what exactly this difference is, is entirely different in the present paper. The proposal for negative islands shares certain aspects both with Sz&Z and F&H. Sz&Z argued that negative islands arise because the complement is not defined in every context. For my account the problem will stem from the fact that the complement cannot be defined in *any* context. On the other hand, the present account follows F&H's proposal in that negative islands arise in cases where the presupposition posited by Dayal (1996), that there be a most informative true answer, cannot be met. This paper concentrates on questions, but I also show that the proposal can be extended to certain island effects in other structures, e.g. relative clauses with a definite head.[10]

3.   Presuppositional Islands

This section looks at islands created by presuppositional items, such as factive verbs and extraposition, as well as islands created by adverbs of quantification and *only*, which I argue belong to the same group. I show that the reason for the unacceptability of these questions is that they lead to a contradiction which arises at the level of presuppositions. For easier reference, let's list the group of interveners discussed in this section here:

Factive verbs:
(33) 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?

Extraposition (it-clefts):
(34) 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:
(35) 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:
(36) 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?

What the above interveners have in common is that they presuppose (that someone believes) the truth of their complement. As I will argue, questions that contain a variable (a *wh*-trace) in the scope of the presuppositional item come with a set of presuppositions: the presuppositions of all the propositional alternatives in the Hamblin (1973)/Karttunen (1977) (henceforth H/K) denotation. However, this set of presuppositions turns out to be contradictory in the case of certain manner and degree questions. A set of contradictory presuppositions has the 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 would this set be contradictory? The problem is that there will always be two alternatives that are mutually incompatible, and yet will both have to be part of the set of presuppositions of the question. 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.[11] The exception to this generalization are the so-called D-linked readings of manner questions, as well as wide scope readings of *how-many* questions, which are not predicted to lead to a contradiction. This is a welcome result since these examples are famous (or notorious) for being acceptable, despite the factive/presuppositional context. In the case of questions about individuals, as the alternative propositions are independent from each other, no problem arises, and these questions are correctly predicted to be acceptable.

The section proceeds as follows. In Sect. 3.1 I show that the presuppositions of questions that contain a variable in the domain of a factive verb project in a universal manner. Sect. 3.2 discusses the cases of factive islands with manner and degree questions, including the cases of modal obviation already mentioned in the introduction of this paper. Sect. 3.3 extends the analysis to islands created by extraposition, *only* NPs, and certain weak triggers, such as adverbs.

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[11] Similar reasoning about contradictory presuppositions leading to ungrammaticality was proposed in Heim (1984), Krifka (1995), Zucchi (1995), Lahiri (1998), Guerzoni (2003), Abels (2004), Abrusán (2007a).

3.1 Presuppositions of questions

The sentence in (37) triggers the presupposition that Bill is lucky:

(37)   John knows that Bill is lucky.

This means that the utterance of (37) requires that the context (the set of possible worlds in which the propositions that are taken to be true by the participants of the conversation are indeed true) entail that Bill is lucky. I will assume as usual that the presupposition of the sentence above is triggered by the factive verb *know*. Technically, I will treat the presupposition as a definedness condition on the hosting sentence, similarly to Frege's treatment of the definite determiner (cf. discussion and modern implementation in Heim and Kratzer 1998), although nothing crucial depends on this particular choice. On this approach, the predicate *know* denotes a partial function, as shown in the lexical entry below:

(38) $[\![know]\!] = \lambda P.\lambda x.\lambda w: \underline{P(w)=1}.\ knows(x)(P)(w)$

The compositional rules (cf. Heim and Kratzer 1998, Guerzoni 2003)[12] ensure that the definedness condition in the lexical entry (underlined above) projects to become the definedness condition of the whole sentence.

(39) $[\![John\ knows\ that\ Bill\ is\ lucky]\!] =$
         $\lambda w: \underline{Bill\ is\ lucky\ in\ w}.\ John\ knows\ that\ Bill\ is\ lucky\ in\ w$

What happens if we form a question based on a sentence that contains a presupposition trigger such as *know*? Now the H/K denotation of the question contains a set of partial propositions, as shown below.

(40) $[\![Who\ knows\ that\ Bill\ is\ lucky?]\!]^w =$
         $\lambda p.\exists x[person(x)\ \&\ p=\lambda w': \underline{Bill\ is\ lucky\ in\ w'}.\ x\ knows\ that\ Bill\ is\ lucky\ in\ w']$

Empirically it seems clear that the question retains the presupposition of its declarative counterparts: in other words, (40) presupposes that Bill is lucky. In fact the persistence of presuppositions in questions is usually taken to be one of the most reliable diagnostics for determining whether the meaning of an expression is presuppositional. What happens if the question contains a variable in the scope of a factive verb? In the next section I show that in the case of such questions the empirical fact seems to be that the projection pattern is universal. In the rest of the paper then I take this fact at face value, remaining agnostic about which projection theory in particular makes the correct predictions (e.g. Heim 1983, Beaver

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[12] As discussed in Guerzoni (2003), what we need is a lightly revised version of Heim and Kratzer's (1998) Intensional Function Application Rule (cf. Guerzoni 2003, p. 228):

(i)Intensional Function Application, revised (IFA*):
         If α is a branching node and $\{\beta,\gamma\}$ the set of its daughters, then for any possible word w and assignment function g, $\alpha \in dom([\![\ ]\!]^{w,g})$ if $\beta \in dom([\![\ ]\!]^{w,g})$ and if $[\![\beta]\!]^{w,g}$ is a function whose domain contains $\lambda w':\gamma \in dom([\![\ ]\!]^{w',g}).[\![\gamma]\!]^{w',g}$, then $[\![\alpha]\!]^{w,g} = [\![\beta]\!]^{w,g}(\lambda w':\gamma \in dom([\![\ ]\!]^{w',g}).[\![\gamma]\!]^{w',g})$.

Guerzoni (2003) notes that the output of this rule will inherit the definedness condition of the intensional functor, but not necessarily of its argument. Whether or not the definedness conditions of the argument will be inherited depends on the semantics of the functor itself.

2001, Guerzoni 2003, 8, Chemla 2008). Rather, the argument will go as follows: whatever the projection facts are for questions about individuals that contain a factive verb, this pattern can be expected to carry over to similar questions about manners and degrees. As projection turns out to be universal in the case of questions about individuals, it will be reasonable to assume that it is universal in the case of manner and degree questions as well.

3.1.1 Questions about individuals: universal projection

Let's start by examining questions about individuals containing a variable in the scope of a factive verb such as *regret*:

(41)   Who among these ten people does Mary regret that Bill invited?

I will assume that the factive verb *regret* triggers the following presupposition:[13]

(42)   *x regrets that p*
        Presupposes: x believes that p

In other words, the presupposition of *regret* requires that every belief world of the subject is such that it entails p. Given this, the denotation of the question above will look as follows:

(43) $[[(41)]]^w = \lambda p.\exists x \; [x \in \{$these ten people$\}$ & p= $\lambda w'$: <u>Mary believes that Bill invited x in w'</u>. Mary regrets that Bill invited x in w']

Now we might ask, what does the question in (41) presuppose? Empirically, it seems that it presupposes that for every x in the given domain, Mary believes that Bill invited x:

(44)   *Presupposition of (41):* $\forall x \in \{$these ten people$\}$: Mary believes that Bill invited x

We observe then that the projection pattern with factive verbs is universal.[14] In the case of a question about individuals the context can easily satisfy the set of presuppositions of the question: the presuppositions of the alternatives are independent from each other. Similar data about universal projection in constituent questions were observed in Guerzoni (2003).[15]

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[13] This presupposition is weaker than what is often assumed in connection with factives, namely that the matrix context has to entail p. But it was argued by various authors (cf. Klein 1975, Egré 2008, Schlenker 2003) that a plain factive presupposition is too strong for emotive factive verbs such as *regret* and that the above weaker presupposition is needed. Notice, however, that were it to turn out that the stronger, factive presupposition is the correct one after all, such a stronger presupposition would equally derive the contradiction exhibited by manner and degree islands, just in an even stronger way. This paper thus simply follows the logic of generalizing to the worst case scenario.

[14] As Anna Szabolcsi (p.c.) pointed out to me, we find weaker presupposition projection pattern with certain predicates, such as *stop smoking*:

   (i)   Which of your friends has stopped smoking?

However, we might observe that predicates such as *stop smoking* are independently known to be weak triggers:

   (ii)   I notice you are chewing on your pencil. Have you recently stopped smoking? (example due to
             B. Geurts)

[15] In chapter 3 of her dissertation, Guerzoni (2003) discusses the effects of minimizers and focus particles such as *even* in constituent questions. The latter are ambiguous between a biased and a neutral reading:

   (i)a.   Who will lift a finger to help us?

I believe that universal projection is at the heart of the contrast discovered in Szabolcsi and Zwarts (1993, 1996) between questions about individuals involving a predicate that can be iterated vs. questions containing one-time-only predicates:

(45) a. To whom do you regret having shown this letter?
      b.   *From whom do you regret having gotten this letter?

The difference between the two questions above can easily be explained under the assumption that the projection pattern of the presuppositions is indeed universal. The example in (45) presupposes that you have shown the letter to a number of people—which is an unproblematic presupposition. According to the universal projection pattern, the example in (45) will likewise presuppose that you have gotten the letter from a number of people. This condition, however, is impossible to meet, since *get* is a one-time-only predicate, and (on the distributive reading that we are after here) it is only possible to get a letter from a single sender. In other words, the problem with (45) stems from the fact that it comes with a presupposition that is impossible to satisfy for any context. In Sect. 3.2 I argue that essentially the same problem is at the heart of presuppositional islands created by manner and degree extraction: these questions also come with a presupposition that is contradictory, and therefore cannot be satisfied in any context.

3.1.2 Identity questions
Before we move on to the analysis of presuppositional islands, the following fact is worth pointing out in connection with examples that contain a one-time-only predicate.[16] Interestingly, in certain cases it is possible to obviate the above effect, as shown by the example below:

(46) Who is the one that you regret having gotten this letter from?

This example is grammatical, despite the one-time-only predicate contained in the question. Why should that be? I believe that what is going on in this case is the following. First observe that the question above is understood as an identity question; in other words, it is concerned about the identity of a particular individual, one that is already salient in the context.

(47) a. $\lambda p.\exists x \; [p= \lambda w'. \; x= \iota y. \; \text{you regret that you got the letter from y in w']}$
      b. 'For what individual x, x= ιy such that you regret you got the letter from y?'

Since the identity question contains a definite description, now in fact we have two presuppositions embedded in each other: the uniqueness presupposition of the definite description and the factive presupposition triggered by *regret*:

(48) Who is [$_{\text{uniqueness pres}}$ **the one** that you [$_{\text{factive pres}}$ **regret** having gotten this letter from]]?

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       b. Who even solved Problem 2?

On the neutral reading, the question in 0 seems to carry a "universal hard" presupposition, while on the biased reading it seems to have a "universal easy" presupposition, as described below:

(ii)a. '∀ *hard' presupposition:* For every contextually relevant person, having
         solved Problem 2 is LESS likely than solving any other problem.
    b. '∀ *easy' presupposition:* For every contextually relevant person, having
         solved Problem 2 is MORE likely than solving any other problem.

[16] Thanks to Philippe Schlenker for helpful discussion on this issue.

Moreover, we might observe that the factive presupposition trigger is in the restrictor of the definite description, as shown below:

(49)   **the one** [that you ~factive pres~ **regret** having gotten this letter from] is Bill

However, it is an independently known fact that presuppositions embedded in restrictors of quantifiers project weakly or not at all (cf. Schlenker 2008). This can be observed in examples such as (50) below, which does not stand with the inference that all of these ten boys are incompetent:

(50)   (among these 10 boys) No one [who is **aware** that he is incompetent] applied

What seems to happen in the case of (46) is that the factive presupposition that is embedded in the restrictor of the definite description fails to project; and it is only the uniqueness presupposition of the definite description that projects. However, this presupposition is invariant for all the propositions in the question:

(51)   Presupposition of (46):
         There is a unique y st. you regret that you got the letter from y

Since the uniqueness presupposition is invariant, the question itself will only presuppose that there is a unique individual which you regret having gotten the letter from. This presupposition in turn can be easily satisfied in any context, and hence the question is acceptable.

3.2   Presuppositional islands with factive verbs

In the previous section we have seen that questions that contain a bound variable in the scope of a presupposition trigger show a universal projection pattern. This property of questions led to a problem in the case of one-time-only predicates, because it predicted a presupposition that no context could satisfy. However, the problem was obviated in the case of an identity question, because the factive presupposition got trapped in the restrictor of the definite description.
       This is a very interesting observation from the perspective of weak island violations with manners and degrees. The reason is that it is well known that weak islands improve if the context provides a salient "referent" – if the *wh*-phrases in question can be understood as 'D-linked' in the sense of Pesetsky (1987). In this section I will show how such a pattern can be predicted. The problem is that in the case of manner and degree questions that contain certain presuppositional elements a universal projection pattern leads to a set of contradictory presuppositions. However, if the context provides a particular salient manner and therefore the manner question can be understood as an "identity question," the projected presupposition will be invariant and a contradiction can be avoided. In the case of degree questions and the narrow scope reading of numeral questions a universal projection pattern will derive a contradiction, but under the wide scope reading of numeral questions no such contradiction will be predicted to arise.

3.2.1   Questions about manners
♦   **About manner predicates and contraries**

Let's assume that manner predicates denote a function from events (e) to truth values (t), or equivalently, a set of events:

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

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

(53) $[\![$ 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 the domain commonly assumed for individuals (cf. Link 1983 and subsequent work). Let's pause for a second and think about how a plural manner such as (53) 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 (54), we also want our semantics to predict that the running event in question was both fast and careless.

(54)   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, I will postulate an operator D that applies to plural manner predicates, much in the fashion of the distributive operator commonly assumed for individuals:

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

Let's look at an example of a positive question about manners. The H/K-denotation of the question will contain a set of propositions such as (56). 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 assume that a question such as (56) talks about a contextually given event, which I represent here by (e*). In other words, the question in (56) is interpreted as 'How was John's running?'.

(56)   a.   How did John run?
         b. $\lambda p. \exists q_{\text{manner}} \, [p = \lambda w'. \, \text{run} \, (w')(e^*)(\text{John}) \wedge q_{\text{manner}} \, (w')(e^*)]$
         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.

The crucial assumption 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 (2002) for a more recent discussion of the linguistic significance of contrariety). Contrariety is the 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 cannot be simultaneously false either. Natural language negation is usually taken to yield contradictory statements (cf. e.g. Horn 1989).

(57)   a.   Two statements are *contraries* if they cannot be simultaneously true.

        b.   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 (58). Other examples of contrary statements include pairs of contrary predicates such as the sentences in (59): it is impossible for a single individual to be both short and tall. 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* in (60).

(58)   a.   Every man is mortal.

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

(59)   a.   John is short.

        b.   John is tall.

(60)   a.   John is wise.

        b.   John is unwise.

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

      Similarly to other predicates, 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). (61) summarizes this condition on the domain of manners:

(61)   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 condition:

        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: $P \cap P' = \varnothing$.

I will assume that the context might implicitly restrict the domain of manners, just as it restricts the domain of individuals, but for any manner, its contrary manner(s) are alternatives to it in any context. Some examples of contraries P and P' are shown below:

(62)   a.   P: wisely; fast; by bus

        b.   P': unwisely; slowly; by car

♦   **Manner questions**

Given the simple and rather natural assumption that the domain of manners always contains contraries, manner questions that contain a factive verb are predicted to presuppose a contradiction. Let's look at the example below:

(63)   *How does Mary regret that John fixed the car?

Since the alternative propositions in the H/K denotation of the question will always range over a set of manners that contains contraries, a universal projection pattern for the presupposition embedded in the scope of the question will project a set of propositions that are contradictory:

(64)   [[How does Mary regret that John fixed the car?]]^w
                = λp.$\exists\alpha$ [$\alpha\in D_M$ & p=λw': <u>Mary believes that John fixed the car in α in w'</u>.
                                            Mary regrets that John fixed the car in α in w']

(65)   *Projected presupposition of the question in (63):*
                $\rightarrow$ For every manner $\alpha\in D_M$: Mary believes that John fixed the car in α
                 = For every manner $\alpha\in D_M$: Mary believes that John's car fixing event e* was in α

Since manner questions are understood as asking about a particular event, the proposition embedded under the attitude verb is understood as describing a particular event e*. However, it is not possible for a single event to be an element of all the manners in a given domain of manners, because these domains always contain contraries, as was argued above. Therefore it is not possible for John to have fixed the car in all the ways given in the context, and as a consequence the question in (63) will always presuppose that Mary has an incoherent set of beliefs.[17]

♦   **Obviation phenomena**
Interestingly, the island violations above can be improved in several ways. The first of these is shown by the examples below:

(66)   What is the manner in which John regrets that Mary fixed the car?

Such examples are often described as involving D-linking, which tends to improve the acceptability of weak islands. What I would like to suggest is that in these cases again we are dealing with identity questions, the denotation of which can be represented as below:[18]

(67) λp.$\exists\alpha$ [$\alpha\in D_M$ & p=λw': α = $\iota\beta$ s.t. Mary regrets that John fixed the car in β in w']
                'For what manner α, α= $\iota\beta$ such that Mary regrets that John fixed the car in β?'

The factive presupposition is again embedded in the restrictor of the definite description:

*(68)   **the manner** [such that Mary **regrets** that John fixed the car that way]   is α*

Since the projection pattern from the restrictors of quantifiers is very weak, as discussed e.g. in Schlenker (2008), the embedded factive presupposition will not project; only the

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[17] An anonymous reviewer notes that a further argument showing that contrary manners have an effect on factive islands might come from alternative questions. It seems that example (i.a), which does not involve contrary manners, is acceptable, unlike (i.b), in accordance with the predictions of this paper.

            (i)   a. Does Mary regret that John fixed the car slowly or sloppily?
                         b. ??Does Mary regret that John fixed the car slowly or quickly?
[18] Note that this explanation for the D-linking effect is dependent on there being a syntactic difference between the D-linked and the non-D-linked questions, i.e. it depends on the presence of the definite description at LF. I am therefore led to assume that the LF representation even of the examples (if they indeed exist) in which a D-linking effect can be observed without an overt definite description is in fact similar to that in (67): in other words, that they contain a covert definite description.

presupposition of the definite description, which is invariant, will. Therefore the presupposition of the question is not contradictory.

(69)   *Presupposition* of (66): There is a unique β such that Mary regrets that John fixed the car in β.

Finally, note that the explanation for the above example remains the same for an analogous question with a resumptive NP, such as the one below:

(70)   What is the manner such that John has fixed the car that way?

The second way of ameliorating factive island violations is by existential modals: as was mentioned in the introduction of this paper, for most speakers, factive islands can be significantly ameliorated by placing an existential modal in the scope of a factive verb.[19]

(71)   ?How do you regret that John was allowed to behave?

Indeed, the present approach predicts that a modal in the scope of a factive should ameliorate factive islands. The reason is that now the projected presuppositions are not contradictory. Consider the question in (71) above:

(72) $[\![(71)]\!]^w$
        $= \lambda p. \exists \alpha \; [\alpha \in D_M \; \& \; p = \lambda w': \underline{\text{you believe that John was allowed to behave in } \alpha \text{ in } w'}.$
                                    you regret that John was allowed to behave in α in w']

This question only stands with the presupposition that for every manner, John was allowed to behave in that manner, which is not a contradictory set of propositions.

(73)   Projected presupposition of (71):
        → For every manner $\alpha \in D_M$: you believe that John was allowed to behave in α

 Since the set of propositions presupposed by the question is not contradictory, the context can easily satisfy it and therefore the question is acceptable.[20]

3.2.2   Degree questions

This section examines first why degree questions that contain a factive predicate are unacceptable.[21] The next section will show that an analogous restriction can be found with certain readings of *how-many* questions. The crucial tenet on which the explanation for the

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[19] The exact choice of the modal is important: some epistemic modals, such as *might*, are PPIs and therefore are independently excluded from appearing under factive verbs that license NPIs, e.g. *regret.*

[20] Øystein Nilsen (p.c.) has pointed out to me that embedding factive islands under presupposition "plugs" such as *believe* should also ameliorate factive islands; that, however, does not seem to be the case. The solution to this problem might lie in observing that even in this case the question would presuppose that someone believes someone else to necessarily have a contradictory set of beliefs, which might on its own be an infelicitous context for asking a question. An anonymous reviewer notes, though, that if the problematic presupposition is filtered out factive islands seem to improve, in accordance with what is predicted by the present theory:

(i)   How did John fix the car and Mary regret that he did <fix the car t>?

[21] The idea to use the interval semantics for degrees was originally suggested to me by Benjamin Spector (p.c.) in the context of negative islands; cf. also Sect. 4.2 below and Abrusán and Spector (2010).

island sensitivity of degree islands rests is the idea that degree questions range over intervals. In other words, following the proposals advanced in Schwarzschild and Wilkinson (2002), Schwarzschild (2004), and Heim (2006), I will assume that degree predicates denote relations between individuals and intervals (sets of degrees), as shown in (74). Given this, the denotation of a degree question will be as in (75):

(74) $[\![\text{tall}]\!]=\lambda I_{<d,t>}.\ \lambda x_e.\ \text{x's height} \in I$

(75) $[\![\text{How tall is John?}]\!]^w\quad = \lambda p.\exists I\ [I\in D_I \wedge p=\lambda w'.\ \text{John's height} \in I \text{ in } w']$
　　　　　　　　　　　　　　　 'For what interval I, John's height is in I?'

Now the denotation of a degree question that contains a factive predicate can be represented as follows:

(76)　　　　　$[\![\text{*How tall do you regret that you are?}]\!]^w$
　　　　　　　$= \lambda p.\ \exists I\in D_I\ [p= \lambda w'.\ \textbf{regret}\ (\lambda w''.\ \text{your height}\in I\ \text{ in } w'')\ (w')]$
　　　　　　　'For what interval I, you regret that your height is in I'

Observe that any domain of degrees that has at least two degrees in it[22] will contain two non-overlapping intervals, which can be pictured as follows.

(77)   **---------[---------]₁-------------[----------]₂---------------**

Given the universal projection pattern, the question will stand with the following presupposition:

(78)   *Presupposition of (76):*
　　　　$\forall I\in D_I$: you believe ($\lambda w'$ your height$\in I$ in w') (w)
　　　　'You believe your height to be contained in every interval.'

However, since the domain of degrees always contains two non-overlapping intervals, this presupposition amounts to requiring that the subject have a contradictory set of beliefs, because it is not possible that someone's height be contained in two non-overlapping intervals. Since the question stands with a contradictory presupposition, it is infelicitous in any context and hence unacceptable.
　　　　Would it have been possible to derive the same prediction using the classical semantics for degrees, without resorting to intervals? Up to a point. Under a classical approach to degree questions (e.g. von Stechow 1984), a question such as (75) has the interpretation 'For what degree d, John's height is at least d?'. In this case a universal presupposition projection pattern would predict that (76) should presuppose that you are infinitely tall. Quite generally, degree questions of the form '?d, $\varphi_p(d)$', where $\varphi_p(d)$ is an expression presupposing p(d), would be predicted to presuppose that p(d) holds to the maximal degree on the scale required by the degree adjective. This is clearly an unnatural prediction if the degree expression in question stands with an open scale, and could therefore lead to infelicity. However, in the case of closed scale degree expressions, no infelicity would be predicted, contrary to fact. The question in (79), for example, would be predicted to presuppose that the account is empty to a maximal degree, i.e. completely empty.

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[22] I assume that if a domain of degrees only has a single degree in it, the question will be infelicitous since it will always denote a tautology. Cf. also the discussion in Sect. 5.

(79)   *How empty did John discover that his account was?

But this presupposition is not one that should lead to problems. Observe on the other hand that the interval account would predict (79) to stand with a contradictory presupposition, just like (76). Therefore it seems that the classical approach to degree questions cannot fully reproduce the results in this paper.[23]

3.2.3 *How-many* questions: scope ambiguity

As is well known, an existential noun phrase such as *n-many books* can take wide scope, e.g. scope over *want* in (80), or narrow reconstructed scope, e.g. under the attitude verb in (80):

(80)   How many books do you want to buy?

a.   Wide scope reading:
        'For what interval I, there is a set of (particular) books X, $|X| \in I$,

                                                such that you **want** to buy X'
        $\lambda p. \exists I \in D_I [p= \lambda w'. \exists X [book(X)(w') \& |X| \in I \& \textbf{want}$

                                                $(\lambda w''. buy (you)(X)(w''))(w')]]$

b.   *Narrow scope (reconstructed) reading:*
        'For what interval I, you **want** there to be a set of books X, $|X| \in I$, such that you

                                        buy X' (i.e., 'What amount of books do you want to buy?')
        $\lambda p. \exists I \in D_I [p= \lambda w'. \textbf{want} (\lambda w''. \exists X [book(X)(w'') \& |X| \in I \&$

                                        $buy (you)(X)(w'')]) (w')$

The two readings have been extensively discussed, (cf. e.g. Rullmann 1995, Cresti 1995, Beck 1996, Romero 1998, Fox 2000). The first reading is somewhat reminiscent of the de re/de dicto ambiguity (though see Rullmann (1995) for a list of important differences). In the syntactic tradition, the first reading is also often called the 'D-linked', or 'referential', reading, even though the latter terminology is rather misleading, as from a semantic point of view degree questions cannot be said to be 'referential' in any sense. It has been long observed that the two readings behave differently in the context of weak island inducers (cf. Longobardi

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[23] Under a more elaborate version of the interval theory described in Abrusán and Spector (to appear), interval questions are ambiguous between the interval and the classical reading. In this case the interval reading is derived by a point-to-interval operator (Π, cf. Schwarzschild 2004) taking narrow scope. The degree reading, however, is still available if the Π operator has wide scope. If this is correct, there is still the question of why the classical degree reading is not available in the context of factive islands. One reason for this might be that the Π operator is generally prevented from scoping above attitude verbs. Support for this comes from the observation that in comparatives as well, we only find the reading corresponding to the one where Π would have to scope below the attitude verb (i.e., the interval reading), but not the one in which it would have to scope above the attitude verb (the classical reading). Imagine that John believes that his speed is somewhere between 40 and 50 mph:

(i)   a.   John drove faster than he thought he did.
        b.   'John's speed exceeded the maximum speed of the interval that he thought his
                speed to be included in.'
        c.   #'John's speed exceeded the minimum speed of the interval that he thought his
                speed to be included in.'

Yet the exact nature and reasons for this restriction on the scope of Π still have to be understood.

1987, Rizzi 1990, Cresti 1995, Rullmann 1995): the narrow scope reading is sensitive to weak islands, but the wide scope reading is not. This is also true in the case of factive islands, as the example below shows:

(81)   How many books do you regret that you bought?

a.   *Wide scope reading:*
        'For what interval I, there is a set of (particular) books X, $|X| \in I$, such that you regret that you bought X'
        $\lambda p. \exists I \in D_I [p= \lambda w'.\exists X [book(X)(w') \& |X| \in I \& \mathbf{regret} (\lambda w''. buy (you)(X)(w''))(w')]]$

b.   *#Narrow scope (reconstructed) reading:*
        'For what interval I, you regret that the number of books that you bought is in I.'
        $\lambda p. \exists I \in D_I [p= \lambda w'. \mathbf{regret} (\lambda w''. \exists X [book(X)(w'') \& |X| \in I \& buy (you)(X)(w''))])(w')$

The well-known observation in the literature is that in the case of (81), only reading (a) exists, but reading (b) does not. This fact receives a straightforward explanation under the present approach. Notice that in the case of the wide scope reading the variable I is not in the scope of *regret*. Therefore the presupposition of each alternative in the H/K denotation of the question under the wide scope reading will be invariant, and the inherited presupposition of the question will be as shown below:

(82)   *Presupposition of the wide scope reading:*
        $\forall X \in D_{books}.$ you believe $(\lambda w'. bought (you)(X)(w'))(w)$
        'You believe you bought all the books in the domain.'

The presupposition of the wide scope reading of the question says that for every set of books (in a given, contextually restricted domain) you believe you bought that set of books. This presupposition can be satisfied if you bought all the books in a given domain. However, in the case of the narrow scope reading the situation is different. As the variable I is in the scope of the factive verb *regret*, the presuppositions of the alternatives in the H/K denotation of the question under the narrow scope reading will be different. A universal pattern of presupposition projection will predict the following presupposition for the question:

(83)   Presupposition of the narrow scope reading:
        $\forall I \in D_I:$ you believe $(\lambda w'.\exists X [book(X)(w') \& |X| \in I \& buy (you)(X)(w')])(w)$
        'For every interval, you believe that the number of books you bought is in that interval.'

However, this presupposition is a contradiction. This is because it is not possible that the number of books that you bought is a member of every interval, as the set of intervals in any domain will contain many non-overlapping intervals. In fact, as soon as the domain of degrees has as many 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 $\{d_2\}$. Therefore the narrow scope reading of question (81) is predicted to stand with a set of contradictory presuppositions as soon as our domain contains two degrees. (If the domain only contains a single degree the question will denote a tautology.) As before, a set of contradictory presuppositions means that the question cannot be stated in any context.

3.3   Extensions
This section extends the reasoning presented above for factive verbs to certain islands created by extraposition (Sect. 3.3.1) and certain adverbial interveners as well as some quasi-factive verbs (part-time triggers; Sect. 3.3.2). I will also point out a problem that arises in connection with response stance predicates (Sect. 3.3.3), and finally I discuss the case of intervention by *only* (Sect. 3.3.4).

3.3.1   Extraposition islands
A well-known group of weak island inducers are the islands created by extraposition, such as *it*-clefts (e.g. (85) below). This group of island inducers is usually handled separately from factive islands in the literature. However, as was already observed by Honcoop (1998), extraposition and factives should belong to the same class of interveners. This is because whether or not extraposition creates weak islands depends on the factivity of the verb/noun involved in the construction. In other words, it is not so much the syntactic properties of extraposition that play a role in their island-creating behavior, but rather the factive inference they may stand with. When the extraposition is based on a noun/adjective that triggers a factive inference, the extraposition creates a weak island context. By contrast, when extraposition is not based on an adjective that has a factive inference, it does not give rise to weak islands either.[24] Illustrating the first case, (84) below clearly stands with a factive inference that (the speaker believes that) p:

(84)   It was a surprise that John behaved politely
            Presupposes: (The speaker believes that) John behaved politely.

Accordingly, the question based on this extraposition structure is predicted to be an island violation, which is indeed the case, as shown by the example below:

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

The reasoning of course is the same as the one presented for factive verbs in the previous section: the question is predicted to presuppose the conjunction of the presuppositions of the alternatives in the H/K denotation. However, this set will always contain propositions that are mutually incompatible. Hence this set of presuppositions is always incoherent, and therefore the question cannot be asked in any context.
        In contrast, observe that certain other structures that can be classified syntactically as belonging to the class of extrapositions do not stand with a factive inference:

(86)   a.   It is possible that John behaved politely.
                    →does *not* presuppose that John behaved politely
            b.   It is dangerous for youngsters to drink wine at the party.
                    →does *not* presuppose that youngsters drink wine at the party

Correspondingly, as one can observe by looking at the examples in (87) below, such extrapositions do not induce weak islands either.

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[24] The one exception in the literature to the above claim is the example from Cinque (1990):

        (i)   *How is it time to behave?

I do not have an explanation for this fact. Also, modal obviation seems for some reason to be harder in the case of extraposition islands, cf. e.g. *???How was it a surprise that John was allowed to behave?*

(87)   a.   How is it possible that John behaved?
          b.   How much wine is it dangerous to drink at a party?
                     (example (b) due to P. Postal, cited in Szabolcsi 2006)

The questions above are acceptable, as predicted by the present theory, because they do not come with any conflicting presuppositions.[25]

3.3.2. Weak triggers

If the intervention by factive verbs and (factive) extraposition islands is indeed the result of the factive inference, we should find cases where the presence or absence of this inference correlates with the island-creating behavior of the intervener. In this section I suggest that we indeed observe such examples in the case of certain adverbial interveners which can trigger a factive-like inference in some but not other contexts. When the lexical content together with the context suggests a factive inference, we observe island-inducing behavior, but not otherwise.

      Pertinent examples are provided by adverbial interveners such as *fast* or *twice*. In these cases the presence or absence of the factive inference correlates with the island-creating behavior of the intervener. Thus, on my proposal adverbial interveners belong to the group of presuppositional islands. This is in contrast with most (indeed, all) of the literature on this topic, which claims that the behavior of (quantificational) adverbial interveners argues 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 (2008), note that adverbs give rise to "quasi-presuppositions"; that is, in some circumstances they create inferences that project in a presupposition-like fashion:

(88)   Bill ran fast.
       → *Inference:* Bill ran.

The projection properties of this inference seem to pattern with those of real presuppositions, at least in some circumstances, which argues that the inference is indeed a presupposition (cf. Chemla 2009):

(89)   None of these ten boys ran fast.
       → *Inference:* All of these ten boys ran.

(90)   None of these ten boys solved the exercise twice.
       → *Inference:* All of these ten boys solved the exercise.

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[25] In some cases we might observe that the extraposition comes with a presupposition that is somewhat weaker than typical factive inferences; e.g. (i) below presupposes that *someone* believes or has proposed the truth of the complement. It seems that in these cases as well, we might observe an island-inducing behavior; cf. (ii).

        (i)   It is true that Bill behaved politely.
              →*Presupposes*: Someone believes that Bill behaved politely.
        (ii)   *How is it true that Bill behaved?

However, this is not a peculiarity of extraposition islands. It has been observed that verbs accompanied by a presupposition, e.g. *admit* (a.k.a. response stance predicates), in fact give rise to weak islands as well, as discussed in Sect. 3.3.3.

However, not all adverbs seem to behave in the same way: the adverb *carefully*, for example, seems to project rather weakly, if at all:

(91)   None of these ten boys searched the bags carefully.
        ???→ Everyone searched the bags.

The curious fact that we can observe now is that these projection facts seem to correlate with the island-inducing behavior of the adverbs above. In particular, quantificational adverbs such as *twice* and adverbs such as *fast*, which seemed to stand with a factive presupposition above, are also robust interveners in French split constructions (cf. de Swart 1992).

(92)   a.   *Combien as-tu beaucoup/souvent/peu/rarement consulté de livres?   [French]
                'How many have you a lot/often/a little/rarely consulted of books?'
        b.   *Combien Marie a-t-elle vite mangé de gateaux?
                'How many Marie has-she fast eaten of cakes?'

However, the adverb *carefully*, for instance, which seemed to show a weak presuppositional behavior, has been reported not to induce a weak island effect:

(93)   ?Combien le douanier a-t-il soigneusement fouillé de valises?
        'How-many the customs-officer has-he carefully searched the suitcases?'
                                                                (cf. Obenauer 1984)

Non-split constructions also seem to be sensitive to adverbial interveners. However, the effect is said to be somewhat weaker than the one we see in split constructions (cf. also den Dikken and Szabolcsi 2002):

(94)   a.   ???How much milk did John spill on his shirt often?
        b.   ???How much milk did John spill on his shirt quickly?
        c.   ?How much milk did John spill on his shirt carefully?

What we can observe then is that quantificational 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 presuppositihon in the same fashion. Consequently, the former but not the latter seem to provoke intervention. The difference that we can observe between the various adverbs is probably triggered not so much by the particular adverbs themselves, but rather by the interaction of the context with the content of the whole sentence. And while such "quasi-presuppositions" are not yet well understood, given their (quasi-) factive inference, the explanation 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 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 is a welcome result, because even quantificational adverbs do not seem to be particularly robust interveners in general (except in the French *combien*-split constructions).[26]

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[26] An anonymous reviewer asks whether the presupposition of intervening adverbs and thus their intervention-creating potential could be due to them having to be focused. I believe that this is entirely possible, indeed very likely. If this is the case, the explanation for these facts might be entirely similar to the one proposed for *only* in

3.3.3 Response stance predicates

It has been argued that the class of verbs that create weak islands also includes *response stance verbs* (cf. Cattell 1978, Hegarty 1992, Szabolcsi and Zwarts 1993, Honcoop 1998). 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:

(95)   *Response stance verbs*: 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).

(96)   *x denied that p*
        Presupposes: It is assumed by someone that p

As the example below shows, response stance predicates induce weak islands as well:

(97)   *How did Bill deny/admit/verify that John fixed the car?

Can the reasoning above as for why factive verbs create weak islands be extended to response stance verbs? It could, if their presupposition were anaphoric, relative to a single contextually salient individual whose assumptions are being presupposed. Is this indeed the case? Consider the following example:

(98)   *Context:* Peter, Fred and Mark and their wives. Each of Peter, Fred, and Mark believe that John slept with their wives (and only their wives).

        Which of these three women did Bill deny/admit that John slept with?

Unfortunately, it seems to me that the sentence can be uttered in the above context. This shows that the existential presupposition of the alternative answers can be satisfied by different individuals in the context. But then the unacceptability of (97) is not predicted by the present account because, similarly to the cases of existential modals discussed in Sect. 3.3., the existential quantifier should obviate the island effect—or more precisely, it should not lead to an island effect in the first place. Example (97) should be acceptable because the presuppositions of the various alternatives could all be true with respect to different individuals; no contradiction would arise. At the moment I do not understand why the existential quantifier in the presupposition of response stance predicates fails to obviate the weak island effect. I suspect that the problem has to do with the notoriously complex and often problematic interaction of presupposition projection with existential quantification over individuals. Yet a detailed analysis of this issue will have to wait for another occasion.

3.3.4 Islands created by *only*

Questions that contain an *only*-NP also create weak island contexts. In this section I argue that this is also due to such questions standing with contradictory presuppositions. Before we can get to the argument, however, it is necessary to briefly review some key assumptions about

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Sect. 3.3.4. However, a detailed analysis of the question whether quasi-presupposition creating adverbs have to be focused is beyond the scope of this paper.

the semantics and pragmatics of *only*. It is well known that a sentence of the form '*only φ*' conveys that φ is true. Thus sentence (99) conveys (99b), i.e. that Muriel voted for Hubert:

(99) a. Only Muriel voted for Hubert.
    b. Muriel voted for Hubert.

It is equally well known that deciding on the correct characterization of the relationship between statements like (99) and (99) has proven rather difficult. There are least three different types of approaches to this question: Atlas (1993,1996) has proposed that the relationship is one of entailment; McCawley (1993) and van Rooij and Schulz (2005) have argued that the relationship is one of implicature; while a number of other proposals have been put forth arguing that this relationship is one of presupposition (e.g. Horn 1969, Horn 1996, Rooth 1985, Geurts and van der Sandt 2004, Beaver 2004, Roberts 2006, Ippolito 2006, among others). The presuppositional analyses come in at least three variants: the strong presuppositional analysis (e.g. Horn 1969, Rooth 1985), the weak presuppositional analysis (Horn 1996, Geurts and van der Sandt 2004, Beaver 2004), and the conditional presuppositional analysis (Ippolito 2006). In this paper I restrict my attention to the presuppositional approaches to *only*, which seem to be the most promising (cf. Ippolito 2006 for a detailed review of all types of approaches).

   According to the strong presuppositional approach (Horn 1969, Rooth 1985), *only φ* presupposes the truth of φ (a.k.a the prejacent). Given this strong presupposition, the reasoning based on contradictory presuppositions can be easily extended to the intervention created by *only*: manner and degree questions that contain *only* are predicted to presuppose a contradiction. This is because if, as was argued earlier in this paper, presupposition projection from the alternative answers is universal, then any manner or degree question would be predicted to stand with a set of contradictory presuppositions. Take, for instance, a question such as (100). In this case the manner alternatives might be restricted, yet any set will contain contraries. For example, if our context is restricted to the dimension of politeness, the set of propositions in the H/K denotation of the question might look as in (101):

(100) *How did only John behave?
(101) ⟦*How did only John behave?⟧^{w}
    ={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 a contradictory presupposition. It is easy to see that 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.[27]

   One potential objection to this explanation might come from arguments that seem to show that the strong presupposition for *only* is too strong. In the Appendix to this paper I discuss what the predictions of some other versions of the presuppositional analyses are for

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[27] An anonymous reviewer asks whether this explanation could be extended to intervention effects discussed by Beck (1996, 2006). Since in most cases intervention effects occur with questions about individuals as well, which in the present system are not predicted to lead to contradiction, it seems to me that such an extension is not easily available.

the questions that we are interested in. It is shown that in fact under all three presuppositional approaches to *only*, manner and degree questions are predicted to be unacceptable.

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

(102)   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 needs to be taken into account other 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 (102) shows, this is a welcome prediction.

3.4 Section summary

In this section I have argued that the presuppositions of propositional alternatives in the H/K denotation project in a universal manner. This has derived the basic facts of manner and degree weak islands created by factive verbs. The main idea was that in these cases a universal presupposition pattern gives rise to a contradictory set of presuppositions—clearly not a felicitous situation for asking a question. There is no context in which such a question can be felicitously asked, and hence it will be ungrammatical. I have also argued that a question that has a variable in the scope of a factive verb might stand with a singleton presupposition if it is understood as an identity question. Precisely in these cases (which coincide with the cases of so-called D-linking) the island effect in manner questions disappears, which is in accordance with the prediction made in this paper. Similarly, in the case of *how-many* questions, the analysis predicts that while the wide scope reading should be acceptable, the narrow scope reading should not be, as the latter comes with a set of contradictory presuppositions. I have also shown that an existential modal in the scope of a factive verb might obviate the island effect. I then extended the analysis to islands created by extraposition and certain less stable triggers such as adverbs, where it was shown that the strength of the presupposition triggering correlates with the island-creating potential of the item. Finally, I have argued that intervention caused by *only* belongs to the group of presuppositional phenomena as well.

4.   Negative islands

This section proposes an explanation for the oddness of negative islands, such as (103) and (103)b. These examples stand in contrast with the one in (103)c, which shows that a *wh*-word ranging over individuals can escape negation without problems.

(103)   a.   *How didn't John behave at the party?
        b.   *How many children doesn't John have?
        c.   Who didn't John invite to the party?

I propose that the reason for the unacceptability of (103) is that they cannot have a maximally informative true answer. As discussed in Sect. 2.2.2, Dayal (1996) argued that a question presupposes that there is a single most informative true proposition in the Karttunen denotation of the question, that is, a proposition that entails all the other true answers to the question. Fox and Hackl (2007) have argued that it is this presupposition—the MIP—that underlies the unacceptability of negative degree islands. In this paper I show that in the case

of negative manner questions, the MIP can also never be met. Further, I argue that the reason why negative degree islands cannot have a most informative true answer is not rooted in the UDM, according to which measurement scales needed for natural language are always dense (cf. Sect. 2.2.2), but rather follows from degree questions ranging over intervals (cf. also Abrusán and Spector 2010).

In the case of manner questions the intuitive idea as for why these questions are bad is very simple: the domain of manners contains contrary predicates, such as *fast*, *slow*, with *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 the case of negative questions it will turn out to be impossible to select any proposition in the denotation of negative manner questions as the most informative true proposition. In the case of negative degree questions I argue that the maximization failure is predicted if we assume an interval-based semantics of degree constructions.

An account for negative islands, however, not only has to cover the odd examples above: it is also necessary to explain why in some cases these examples can be rescued. In the main there are two rescue scenarios.[28] The first case falls under the important empirical observation made in Fox and Hackl (2007) (partly building on work by Kuno and Takami 1997) according to which universal modals above negation, or equivalently, existential modals under negation, save negative degree questions:

(104) 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?

This pattern was noted for negative degree questions, but in fact it seems to be a general property of negative islands: (105) provides an example of a negative question about manners.

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

We might add that attitude verbs above negation such as (106) seem to obviate negative islands as well:

(106) How do you hope that John did not behave?

The second way to improve negative islands was discussed by Kroch (1989), who showed that examples like (103) become acceptable if the context specifies a list of options, as exemplified in (107).

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

In this section I show that both of these cases receive a simple and intuitive account under the present proposal. Sect. 4.1 introduces the proposal for negative manner questions, whereas Sect. 4.2 addresses negative degree questions. In Sect. 4.3 I discuss some other instances of

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[28] The third case is the fact that stressing *not* also seems to ameliorate negative islands, as Szabolcsi and Zwarts (1993) point out (crediting Edwin Williams for the observation):

(i) How did John NOT fix the car?

I am not aware of any proposal in the literature that can account of this fact, including my own.

unacceptable negative questions, such as questions with adjectives, as well as certain temporal and spacial modifiers.

4.1 Negative islands created by manner adverbials
4.1.1 About manner predicates

This section introduces three points of refinement in connection with the interpretation of manner predicates introduced in Sect. 3. First, recall that in Sect. 3 it was observed that the domain of manners always contains contraries; that is, every manner predicate has at least one contrary in the domain of manners. As I have argued, although the context might implicitly restrict the domain of manners, just as it restricts the domain of individuals, for any manner predicate P its contrary predicates will be alternatives to it in any context. For example, any domain of manners that includes *properly* will always include its contrary *improperly*. That these items are contraries means that they cannot be simultaneously true, but they can be simultaneously false: for any pair of contraries, there will always be a set of events that do not belong to either. We might now further propose that this set of events is itself a manner predicate. In other words, 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 nor P' are in P^M. (108) summarizes the full conditions on the domain of manners:

(108)   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 $P^M \in D_M$ $[e \notin P \in D_M$ & $e \notin P' \in D_M]$.

The context might implicitly restrict the domain of manners, just like 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:

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

Second, observe that negating a sentence that includes plural event modifiers gives rise to all-or-nothing effects in the unmarked case.[29] Thus (110) receives the paraphrase in (110). However, the formula in (110) only means that there is no event of running by John that was both fast and careless.

(110)   a.   John didn't run fast and carelessly.
    b.   'John run neither fast nor carelessly.'
    c. $\lambda w. \neg \exists e$ [run(w)(e)(John) $\wedge$ fast+carelessly (w)(e)]

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[29] 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 (p.c.) for pointing this out to me.

A similar effect has been observed in the case of predication over plural individuals (cf. e.g. Löbner 1985, Schwarzschild 1994, Beck 2001, Gajewski 2005). This fact is often treated by postulating a homogeneity presupposition on the distributive operator. Similarly, we will postulate a homogeneity presupposition on the D-operator introduced in Sect. 3:

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

Third, observe the following surprising fact: the sentences in (112) below are odd. This is unexpected. If the conjunction of two predicates is interpreted as forming a plural manner, and homogeneity applies, (112) should mean that John ran neither fast nor slowly. Similarly, (112) 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 (112) be odd?

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

I propose that when plural manner predicates $\{p_1,p_2\}$ are formed, they come with the presupposition that $p_1 \cap p_2 \neq 0$. It is for this reason that the sentences in (112) are unacceptable; for example, 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 this plural manner cannot be formed. This condition might be connected to a more general requirement that a plurality should be possible.[30] Spector (2007), who defends the view according to which the extension of plural common nouns contains both singularities and pluralities, notes that the oddness of sentences like (113) is unexpected under this view: (113) 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 be possible. In the case at hand, the presupposition requires that it should be at least possible to have more than one father.

(113)   #Jack doesn't have fathers.

Somewhat similarly, Szabolcsi and Haddican (2004) conclude that conjunctions, especially negated ones with homogeneity, have an 'expected both' presupposition. It seems then that the restriction on forming incoherent plural manners might be part of a more general requirement on forming pluralities.

4.1.2   Negative islands with manner questions: the proposal

We finally have everything in place to spell out our account of negative manner questions. We will say that the reason for the ungrammaticality of questions like (103), in contrast to (103c), is that there cannot be a maximally informative true answer to a negative question about manners. Why? The reason is rooted in the fact that the domain of manners contains contraries.

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 H/K set. Suppose that the context restricts the domain of manners to the dimension of wisdom. Now the H/K-denotation of (114) will contain at least the propositions in (114):

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

(114) 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 H/K 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 (where *med-wise* stands for *neither wise nor unwise*):

(115)   __e*____   _____   _____
            wise   med-wise   unwise

Since in this case *John behaved wisely* is the only true proposition, it will at the same time be the most informative true answer. Note that if we had more propositions in the Hamblin set, e.g. *wisely*, *politely*, and their contraries 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 way.

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

(116) a.   *How didn't John behave?
      b. $\lambda p. \exists q_{manner} [p=\lambda w'. \text{behave}(w')(e^*)(\text{John}) \wedge \neg q_{manner}(w')(e^*)]$
      c.   {that John did not behave wisely, that John did not behave unwisely,
             that John did not behave neither wisely nor unwisely}

Suppose that *John did not behave wisely* was the most informative true 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 a member of the set of events denoted by *neither wisely nor unwisely* (in short, *med-wisely*). This situation is graphically represented below:

(117) a.   John did not behave wisely.
      b.   _____   ____e*____   ___e*_____
           wisely   med-wisely   unwisely

We now see that (117a) cannot be true, because it violates the condition stated in (108ii) above: these two sets are exclusive by definition, and no event can be a member of both of them. Therefore (117) cannot be the most informative true answer to (116). What about an answer such as (118) below?

(118) 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 cannot form a plural manner. (As mentioned above, this is also the reason why sentence (118a) itself is odd.) Therefore the proposition that John did not behave wisely and unwisely is not in the set of alternatives; (118) cannot be the most informative true answer either. But now we have run out of options: if neither (117) nor (118) 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 from 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 that can be given. Notice that no similar problem arises with questions about individuals, and therefore there is no obstacle to maximal answers to these questions. For this reason, we predict the question in (103)c above, *Who didn't John invite to the party?*, to be acceptable.

It should be noted that given the similarity of selecting a complete answer to constructing definite descriptions, the above account predicts that definite descriptions such as (119) should also be unacceptable:

(119)   #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.

4.1.3   Blindness

One might wonder why in cases such as (120A) certain pragmatically sensible partial answers do not make a negative manner question grammatical:[31]

(120)   A: *How didn't John behave?
           B: Politely, for example.
           B'   Not politely.

In other words, there are contexts by which an incomplete or mention-some answer can be forced, suggested, or at least made possible. The marker *for example* explicitly signals that the answer is incomplete, and as such the answer in (120) should be contradiction-free. If so, we might expect that the existence of this answer should make the question itself grammatical. Negative term answers like (120) are usually also not interpreted as complete answers, as can be seen in exchanges such as *Who came? Not John.* [32] 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 answers, 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 a larger issue: the impenetrability of the linguistic system for non-linguistic reasoning, or reasoning based on

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[31] (120) was pointed out to me by Irene Heim and David Pesetsky (p.c.), while (120) was brought to my attention by Emmanuel Chemla (p.c.).

[32] Although von Stechow and Zimmermann (1984) report somewhat different judgments from mine and Spector (2003). On the other hand, if a negative term answer were to be interpreted exhaustively, then if we only have three alternatives, {*politely, impolitely, mid-politely*}, we should infer from the answer in (120) that John behaved politely and in no other way, which is not a contradiction in itself.

common knowledge. As the requirement of the linguistic system is that there be a most informative true answer to the 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), Fox and Hackl (2007), Gajewski (2002), and Magri (2009). I contend then that the observed impossibility of scaling down 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.

4.1.4 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 was discovered by Fox and Hackl (2007) (partly based on Kuno and Takami 1997): negative islands become perfectly acceptable if an existential modal appears under negation. This section shows that both of these facts are predicted by the present account in a straightforward manner.

♦ **Modals**

Recall the observation of Fox and Hackl (2007), who 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.

(121) a.   How is John not allowed to behave?
       b.   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; instead the event is existentially quantified over. The existential quantification is presumably provided by the existential modal.

(122) $[\![$How is John not allowed to behave?$]\!]^w$
       $=\lambda p.\ \exists q_{manner}\ [p=\lambda w'.\neg\exists w''_{Acc(w',w'')}.\exists e[behave(w'')(e)(John) \wedge q_{manner}\ (w'')(e)]]$

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

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

       b.   __◇∃e____   ____◇∃e____   ____¬◇∃e___
              politely   med-politely   impolitely

There is no obstacle in this case for choosing a most informative answer, e.g. (123) 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 manner 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, this same reasoning holds for (121)b as

well.[33] Further, the same reasoning can be extended to the fact that attitude verbs above negation also obviate negative islands, since attitude verbs are standardly analyzed as involving universal quantification over possible worlds.

On the other hand, we predict manner questions where universal modals or attitude verbs 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. I illustrate this with the case of modals. (Notice that, assuming as before that the universal modal quantifies over worlds and events, the event variable is now universally quantified over.)

(124) a.   *How is John not required to behave?
       b. $[[\text{How is John not required to behave?}]]^w = \lambda p.\exists q_{manner} \ [p=\lambda w'.\neg \forall w''_{Acc(w',w'')}$
             $\forall e \ [\text{behave } (w'')(e)(\text{John}) \wedge q_{manner} \ (w'')(e)]]$

Why is the sentence in (125) below unacceptable as a maximal answer?

(125) a.   #John is not required to behave impolitely.
       b. $\underline{\quad \Box \forall e \quad}$ $\underline{\quad \quad \Box \forall e \quad \quad}$ $\underline{\quad \quad \neg \Box \forall e \quad \quad}$
             politely   med-politely   impolitely

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, since 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.

♦   **Explicit domains**

As was observed by Kroch (1989), negative islands improve if we list potential answers, as shown in the example below:

(126)   ?How did you not play chess? A: Blindfolded   B: Drunk   C: In a bathing suit

In this case the set of possible answers is provided by 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). Why does this ameliorate the negative island? The reason is that by explicitly providing a domain which does not contain contraries it is now possible to choose a most informative answer among the given alternatives. Support for this reasoning comes from cases where the

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[33] However, notice that ability modals seem to be more complicated than the existential modals above:

(i)   a.*How can't you photograph the house? (cf. Kuno and Takami 1997)
       b.   *How are you not able to eat a mango?

But interestingly, in these cases even the corresponding positive questions don't seem to be good:

(ii)   a.   ??How can you photograph the house?
       b.   ??How are you able to eat a mango?

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

explicit alternatives are drawn from a set of alternatives that contains contraries: here the question still remains odd, despite a contextually restricted domain:

(127)   *How do you not speak French?   A: Very well B: So-so   C: Badly

Thus the explanation of the Kroch examples is not simply that there is a contextual domain restriction or a specific or D-linked reading of the manner question. Rather, what is important is that the explicit alternatives allow a contradiction-free maximally true answer to be found.

4.2 Negative islands with degree questions

This section looks at negative degree questions. The basic contrast to be explained is the one exemplified below: whereas the positive degree questions in (128) are perfectly acceptable, their negative counterparts in (129) are not:

(128)   a.   How tall is John?
        b.   How much milk did John spill on his shirt?
(129)   a.   *How tall isn't John?
        b.   *How much milk didn't John spill on his shirt?

A similar contrast can be observed in the case of grammatical *how-many* questions, albeit with a twist. As was discussed in Sect. 3, certain questions that contain the existential noun phrase *how many NP* have two different readings (cf. Longobardi 1987, Kroch 1989, Cinque 1990, Cresti 1995, Rullmann 1995, among others). It has also long been observed that the two readings behave differently in the context of weak island inducers: the narrow scope reading is sensitive to weak islands, but the wide scope reading is not. Example (130) shows that this is indeed the case with negative islands as well: the question is only felicitous if it asks about a particular set of books, i.e. on the wide scope reading.

(130)   How many books didn't you buy?
        a.   *Wide scope reading:* 'For what number n, n is the cardinality of the set of books that you did not buy?'
             $\lambda p.\exists n \in N^+ [p= \lambda w'.\exists X [book(X)(w') \wedge |X|=n \wedge \neg you\ bought(X)(w')]$

        b.   #*Narrow scope reading:* 'For what number n, you did not buy n-many books?'
             $\#\lambda p.\exists n \in N^+ [p= \lambda w'.\neg\exists X [book(X)(w') \wedge |X|=n \wedge you\ bought(X)(w')]$

In the case of certain *how-many* questions, the wide scope reading is not possible and the question becomes unacceptable altogether, as can be seen below:

(131)   *How many children don't you have?

In degree questions such as those in (129) there is no existential quantifier over individuals, and hence they only have the reading analogous to the narrow scope reading. Similarly to the above example then, these questions are also unacceptable, as shown below:

(132) $[[$*How tall isn't John? $]]^w=$
             $=\lambda p.\exists d [d \in D_d \wedge p= \lambda w'. \neg John\ is\ d\text{-}tall\ in\ w']$
             'For what degree d, John is not d-tall?'

So the question that arises in the context of negative islands is what rules out degree questions and the narrow scope reading of *how-many* questions. It seems that the disappearance of the narrow scope reading in negative island contexts should be due to exactly the same reasons that render the questions in (129) unacceptable. I will present an account of negative degree and numeral questions along these lines: it predicts that degree questions and narrow scope existential readings of *how-many* questions should be unavailable because they lead to contradiction. In the case of the wide scope reading of *how-many* questions a contradiction is not generated in negative island contexts; hence the questions that can have a wide scope reading are acceptable, but only on this reading.

4.2.1. The proposed solution

The solution in this section is based on a suggestion made by Benjamin Spector (p.c.), namely, to use a degree semantics based on intervals. (Cf. also Abrusán and Spector 2010 for a more detailed presentation of this proposal.) Such an account of degree constructions was originally proposed in Schwarzschild and Wilkinson (2002) and was also adopted (with some modifications) by Heim (2006).

♦ **Positive degree questions**

First let's look at a positive degree question, such as (133) 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:

(133) $[\![$How tall is John?$]\!]^w$
    $= \lambda p.\exists I\,[I\in D_I \wedge p=\lambda w'.$ John's height $\in I$ in w'$]$
    'For what interval I, John's height is in 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.

(134) An interval I is covered by interval K iff for all d: $d\in I$ then $d\in K$.

(135) ----- $\langle$--(----{----[d_j]$_{I1}$--------$\rangle$$_{I2}$-------}$_{I3}$-----)$_{I4}$--------------

Therefore the most informative answer will give the interval {John's height}. This is illustrated in the picture above where John's height is represented by d_j. 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. I take it to be a fact of the world that John has some height, therefore there will always be a most informative proposition among the true propositions: namely, that 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.

(136) $[\![$*How tall isn't John?$]\!]^w=$
        $= \lambda p.\exists I\ [I\in D_I \land p=\lambda w'.\ \neg John's\ height \in I\ in\ w']$
        'For what interval I, John's height is not in I?'

The reason why there cannot be such an interval is because intervals are always convex.[34] The intuitive idea can be illustrated as follows: In the diagram in (138) below, 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 smaller intervals but does not cover d_j.

(137) An interval I is wholly below d iff for all d': $d'\in I\ \ d'\leq d$

(138) ---[----------------------] $_{I2}$--**d$_j$** --{-------------}$_{I3}$---

More precisely, we reason as follows: Let John's height be any non-zero degree d. The set of all intervals that do not include John's height (=N) contains exactly two exclusive sets of intervals: all the intervals wholly below d, contained in [0, d) (=A) and all the intervals wholly above d, contained in (d, ∞) (=B).[35] For any interval I included in A, the (true) proposition that John's height is not in I does not entail that John's height is not in B, and vice versa. Hence, there is no interval I in N such that the true proposition that John's height is not in I entails all the true propositions of the same form in N. Therefore, Dayal's (1996) condition (i.e., the MIP) cannot be met, and we predict a presupposition failure.

      As long as John has any height in the actual world this situation is in fact unavoidable. Indeed it seems to be a presupposition of degree questions that the answer is non-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 the rather odd "#Zero."[36]

      Notice that for this reasoning 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 three degrees. In other words, whether the scale is dense (as in the case of heights, etc.) or discreet (as in the case of children), the ungrammaticality of negative degree questions is equally predicted. This is in contrast with Fox and Hackl's (2007) account, which must assume that scales are universally dense.

4.2.2. Modal obviation
♦   **Case 1: ¬>∃, ∀>¬**
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 most informative true answer. Let's take a question such as (139) below:

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[34] This assumption, strictly speaking, is more restrictive than Heim (2006) or even Schwarzschild and Wilkinson (2002), for whom intervals could be simply sets of degrees, not necessarily convex ones.
[35] Notation: Square brackets indicate the inclusion of the endpoint in an interval, and round brackets indicate the exclusion of the endpoint.
[36] In Abrusán and Spector (2010) we employ instead a context-sensitive version of the Maximal Informativity Principle.

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

The fact that this question should be grammatical is straightforwardly predicted by the present account: while with respect to (129), *How tall isn't John?*, it was a fact about the world that John's height is a single degree, the degrees of radiation that we allow our workers to be exposed to might correspond to an interval, e.g. (0, d]. Then any interval I wholly above d is such that it is not allowed that the amount of radiation we expose our workers to be in I. The strongest true proposition of this form is obtained by taking I= (d, ∞). Therefore Dayal's (1996) condition can be met. Another scenario in which the question might have a most informative answer is one in which the degrees of radiation we allow our workers to be exposed to correspond to the intervals (0, d_1) and (d_2, ∞), with $d_1 < d_2$. Then there will be a most informative true proposition in the H/K denotation: namely that we are not allowed to expose our workers to I=[d_1,d_2] radiation.[37]

♦   **Case 2: Lack of modal obviation with ¬>∀, ∃>¬**

(140)   a.   # How fast are we allowed not to drive?
        b.   For what I, it is allowed that our speed be not in I?
(141)   a.   # How fast are we not required to drive?
        b.   For what I, it is not required that our speed be in I?

Suppose we have *some* obligations as to what our speed should be. Call S the set of all the speeds such that our speed should be one of them. Then for any proper subset of S, it is allowed that our speed is not in it. Also, for any subset of the complement of S, it is allowed that our speed is not in it. The interval which covers all the intervals such that our speed is allowed not to be in it is therefore (0,∞). However, this interval cannot be the most informative true answer, because it will also cover the interval (or sets of intervals[38]) for which it is required that our speed be in it. The only way in which a maximally informative answer could be given would be if our speed had to correspond exactly to zero. However, as before, this case independently leads to a presupposition failure. Let's illustrate this reasoning intuitively with the following example:

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[37] An anonymous reviewer notes that it seems to be possible to give felicitous answers that do not involve convex intervals:

(i)   Q: How many people can play this game?
        A: 4, 6, and 8 people can play this game.

In this context Dayal's presupposition is not met, yet the answer is still felicitous. Similar examples can be constructed with manner questions too, as noted by a (different) anonymous reviewer. However, there is a difference between this case and negative islands: whereas in the case of negative islands there was no context compatible with common knowledge that would not lead to a presupposition failure, in the case of modal questions it is possible to find contexts in which Dayal's presupposition can be met. The question in (i) is predicted to be acceptable—despite its actual answer refuting a presupposition—because there are contexts in which it can receive a most informative answer that is based on a convex interval. It is thus not simply presupposition failure in some context that leads to the oddness of negative islands, but the unavailability of any contexts which do not lead to a presupposition failure. Note that the availability of answers that provide a non-convex interval is not in itself a problem for the present account, since these cases might be analyzed as answers that are not themselves in the H/K denotation of the question, but rather indirectly related to it, as part of the Boolean closure of the H/K set. (But cf. Sauerland (2007) for pointing out problems for the interval account of comparatives and Fox (2010) for problems for the interval account for negative islands.)

[38] But notice that if the set S is not a convex interval, then the questions should be infelicitous independently, because that would entail that there is a degree d such that our speed is required to be both below and above it, which is impossible.

(142) $[\![$ *How tall are you not required to be (to be a basketball player)? $]\!]^w$
= $\lambda p.\exists I$ $[I \in D_I \wedge p = \lambda w'.\neg\forall w''_{Acc(w',w'')}$ [your height $\in$ I in w'']]
'For what interval I, your height is not required to be in that interval?'

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

(143) $--\langle\{---------\}_{I1}$-------**[d$_{180cm}$**--------(--------------$\infty)_{I2}]_K\rangle_N$

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. Notice that a similar reasoning would apply in a context where the height of basketball players had to correspond to some exact degree d, e.g. 180 cm, because in that case the complement of this interval would necessarily contain non-overlapping intervals such that an interval covering both would also have to cover d. Again, similarly to the basic cases, we run into a situation such that among the set of true answers there cannot be a most informative one that does not lead to a presupposition failure.[39]

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

(144)   Among the following, how many points did Iverson not score?
A: 20   B: 30   C: 40

If we only had two alternatives, the contradiction could be avoided simply by the fact that the domain is restricted to two intervals composed of a single degree. But notice that with three possible answers, *A: 20, B: 30,* and *C: 40,* selecting "B" should still lead to a contradiction. The reason why the question might nevertheless be felicitous is because the presentation of explicit alternatives facilitates invoking different events: the question is now taken to imply that there were many events of Iverson scoring and suggests that among the alternatives given, B is the only one to which no scoring event corresponds. 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. When different alternative events are not easily available, even a restricted question of the sort shown above seems to be odd:

(145)   #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.

4.3 Negative island-like phenomena based on the same logic

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[39] As D. Fox (p.c.) observes, the account as it stands above makes too crude predictions for certain examples of universal modals in questions, e.g. *How fast must you drive?*. This objection and certain further points are addressed in detail in Abrusán and Spector (2010).

In this section, I discuss examples of *when-* and *which*-questions, the oddness of which can be explained by the same reasoning as we have seen for manner questions.

4.3.1 *When*

As (146a,b) show, we observe marked ungrammaticality with final punctual eventive verbs (e.g. *die*), but not with statives (e.g. *be happy*).

(146) a. *When did Mary not die?
       b.   When didn't you feel happy?

It also seems that there is a scale of acceptability judgments between these two extremes. These facts can be explained by the same logic as we have seen above: given that dying is a point-like event, there are infinite points in time (or intervals) such that it is true that Mary did not die at these times. However, these true propositions are not ordered by entailment and therefore there is no maximally informative alternative among them. With statives, on the other hand, it is possible to construct a scenario such that there is, e.g. in the case of (146b), one maximal interval at which you did not feel happy.

4.3.2. *Where*

A very similar pattern can be seen with questions formed by *where.* The first example below 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 maximal answer to this question would require.

(147) a. *Where aren't you at the moment?
       b.   Where hasn't Bill looked for the keys?

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 given 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 (147). 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.

4.4.   Summary and comparison with previous accounts

In this section I first argued that the felicity condition on asking a question according to which the speaker should be able to assume that the hearer might know the most informative answer can never be met in the case of negative manner questions. This was because the domain of manners contains atoms that are not independent from each other: the domain of manners contains contraries. Therefore the truth of an (atomic) proposition in the H/K denotation of such questions has consequences for the truth of other atomic propositions. This state of affairs resulted in a situation in which it was not possible to select a maximal answer. In the second part of this section I showed 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. Finally, it was argued that certain examples of illicit extraction of *where-* and *when*-questions can be explained based on similar principles as those invoked for manner and degree questions.

This explanation for negative and degree manner islands relates in an interesting way to the proposal in Szabolcsi and Zwarts (1993). The fact that there is no unique most

informative answer to such negative questions could also be expressed by saying that complementation is not defined on these domains. In the case of degree questions, the assumption about intervals means that for an interval in a given domain of degrees, the complement set of degrees to that interval is not necessarily an interval itself. Let's take the interval [4,6], for instance. In the domain ˙(0,∞), the complement of this interval is not an interval itself, but a conjunction of two intervals, the intervals ˙(0,4), and (6,∞). But notice an interesting difference with the proposal in Szabolcsi and Zwarts (1993). While for them negative islands arose because *in some contexts* the complement was not defined, in the present proposal negative degree questions are unacceptable because the complement can *never* be defined. For example, in the case of a question such as *How tall isn't John?*, since heights are necessarily non-zero and point-like, i.e. denote a singular interval, the complement of such singular intervals will never be an interval itself, but a conjunction of two intervals. Observe now the domain of manners. The idea that the domain of manners always contains (at least) three mutually exclusive contrary predicates means that the domain of events is fully covered by these contrary predicates:

(148)   [----wisely---------][-------neither wisely nor unwisely-------][---unwisely---]

The complement of any of these predicates, however, is not an element of the domain of manners itself. This was not because conjunction was not defined on the domain of manners, since as we saw conjunction itself does not lead out of the domain of manners. What caused a problem was that a conjunction of two mutually exclusive sets, i.e. sets that do not have an overlap leads to a presupposition violation. In other words, asserting that an event is a member of two mutually exclusive sets of events is equivalent to stating that an event is a member of the empty set of events, which is a contradiction. Since conjunction on the domain of manners is restricted by the presupposition that the plural manner should not denote the empty set, the complement of any predicate of manners will not be a member of the domain of manners, given the mutual exclusivity assumption about the contraries. In this sense, we might say that the present proposal shares with that of Szabolcsi and Zwarts (1993) that negative islands arise when the domain of the *wh*-word is such that complementation is not defined on it. There are two important differences, however: first, as noted above, in our case complementation is never defined, while for Szabolcsi and Zwarts (1993) it was just a logical fact about the domain that complementation was sometimes not defined; for example, in the case of amounts, it was only the maximal element whose complement, the minimal element, was not a member of the domain of manners. Second, our analysis of the domain of manners and degrees is radically different from Szabolcsi and Zwarts's, and independently motivated.

Meanwhile, the proposal in this section has in common with that of Fox and Hackl (2007) that negative islands arise because no most informative answer can be given to them. Fox (2007) proposes the following generalization about the cases where such exhaustification is not possible:

(149)   Fox's (2007) generalization about non-exhaustifiability
Let p be a proposition and A a set of propositions. p is *non-exhaustifiable given A* if the denial of all alternatives in A that are not entailed by p is inconsistent with p. (after Fox 2007, p. 18)

Fox's (2007) generalization about non-exhaustifiable sets of propositions covers the cases of negative islands mentioned in this paper as well. But in light of our analysis of negative islands it seems that they also warrant a somewhat more restrictive generalization, which I will call the *Symmetry Generalization*:

(150)   Symmetry Generalization

Let p be a proposition and A a set of propositions. p is non-exhaustifiable given A if there are two 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.

Let's illustrate this idea informally. Recall the basic case of a negative manner question and assume for the sake of simplicity that the context restricts the domain to the dimension of wisdom:

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

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

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

Each alternative to any proposition p in the H/K denotation of the question above can be denied consistently with p. Let p be the proposition that John did not behave wisely. Then it is possible that John did not behave wisely, but behaved unwisely. It is also possible that John did not behave wisely, but behaved neither wisely nor unwisely. However, the simultaneous denial of these two alternatives to p leads to a contradiction because it is not possible that John's behavior be both unwise and neither wise nor unwise. Observe now how symmetry is manifested in the case of the interval-based analysis of negative degree questions such as (152):

(152)   *How many apples didn't John eat?

Suppose there was an answer to (152), the proposition that the number of apples John ate is not in the interval $[3,\infty)$, call it K. Exhaustifying this answer would imply that for all the intervals that are not subintervals of K, the (exact) number of apples John ate is contained in those intervals. The intervals $[0,1]$ and $[2,\infty)$ would be examples of such intervals. However, they do not overlap, and therefore it is impossible that the exact number of apples John has eaten be contained in both of them. In other words, the simultaneous denial of the two alternatives 'The number of apples John ate is $\notin [0,1]$' and 'The number of apples that John ate is $\notin [2,\infty)$' is inconsistent. A similar situation will always arise as long as John ate any apples, which in turn seems to be a presupposition of the question, as was discussed above.

The analysis of negative islands in this paper is thus compatible with a stronger generalization than that of Fox (2007). It remains to be seen, however, whether the Symmetry Generalization can capture all cases of non-exhaustifiability that Fox's (2007) generalization was designed to capture.[40]

5 On contradiction and grammaticality

I have argued in the previous sections that presuppositional and negative islands are unacceptable because they lead to a presupposition failure in any context. In the case of a presuppositional island, the question that contains it is predicted to come with a set of contradictory presuppositions; however, a set of contradictory presuppositions cannot be satisfied in any context. Negative islands were shown to lead to a violation of the HIP

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[40] Cf. Spector (2005) for an account of some of the data discussed by Fox and Hackl (2007) that is compatible with the Symmetry Generalization.

regardless of the chosen context. This claim was shown to be equivalent to the statement that in these cases the complete answer, i.e. the most informative true answer conjoined with the negation of the false answers, expresses a contradiction. But why does the fact that a question produces a presupposition failure in any context, or the fact that the complete answer expresses a contradiction in any context, lead to ungrammaticality? We are, after all, perfectly capable of expressing contradictions that are not ungrammatical, as illustrated by (153) below:

(153) 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 accounts 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. Barwise and Cooper (1981) proposed that an explanation for 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's (1993) analysis of the ungrammaticality of exceptives with non-universal quantifiers, and Fox and Hackl's (2007) account of negative degree islands and certain implicatures (cf. also Ladusaw 1986 and Gajewski 2002 for an overview). How can these proposals be reconciled with the fact that elsewhere natural language is quite capable of expressing tautologies and contradictions?

Gajewski (2002) argues that we need to distinguish between analyticity that results from the logical constants alone, and analyticity that is the result of the non-logical vocabulary. He argues that it is only the former that plays a firmly restrictive role for natural language: 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. 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 with their *given* non-logical arguments, 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, p. 14f.) further proposes that the kind of analyticity that induces ungrammaticality in natural language is *L-analyticity*.

(154) 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.

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

Gajewski (2002) shows that (155) can correctly distinguish sentences like (153) from well-known examples of ungrammatical analytic sentences, such as the tautologies proposed in Barwise and Cooper's (1981) explanation of the ungrammaticality of strong quantifiers in

existential *there*-constructions and the contradictions in von Fintel's (1993) analysis of the ungrammaticality of exceptives with non-universal quantifiers.

Fox and Hackl (2007) have argued that negative degree questions are unacceptable because they are L-analytical in Gajewski's (2002) sense. I will extend this claim and propose that all presuppositional and negative islands are L-analytical, in the sense that complete answers to them remain contradictory under any interpretations of their non-logical vocabulary. However, this condition is only met with certain provisos. Observe first the case of factive islands:

(156) *How do you regret that John behaved? / *How tall do you regret that John is?
     a.   Logical skeleton of the question: $\{NP_1 \ V_2 \ NP_3 \ V_4 \ \alpha \mid \alpha \in D_{wh}\}$
     b.   Logical skeleton of the presupposition of the question:
         NP_3 is $V_4 \ \alpha_1$ [and NP_3 is $V_4 \ \alpha_2$ and [NP_3 is $V_4 \ \alpha_3$…etc…

Since for any predicate of manners p its alternatives in the question domain always contain contraries, and for any non-trivial domain of intervals of degrees there are non-overlapping intervals, the presupposition of these islands is predicted to be contradictory independently of the value of the non-logical words in the sentence, provided that (a) we hold the expressions in the alternative answers constant except for the one corresponding to the question word and (b) V_2 is factive.

Similarly, in the case of negative islands the failure to find a most informative answer will be independent from the particular choice of value for the non-logical items, as long as the facts assumed about the domain of manners and the semantics of degree expressions hold.

(157) *How didn't John behave? / *How tall isn't John?
     Logical skeleton of the question: $\{NP_1 \ pred_2 \ \alpha \mid \alpha \in D_{wh}\}$

Thus no matter which predicates and noun phrases appear in the question, and what predicates /degrees our domain of manners/degrees contains, the Hamblin set corresponding to the question will have the property of being non-exhaustifiable (assuming again that the values for NP_1 and $pred_2$ are held constant across the question alternatives).

6. Conclusion

This paper has argued for a new semantic approach to certain weak islands—an approach that can explain the modal obviation phenomena which arise with negative and presuppositional islands, as well as the gradability phenomena that we can observe with adverbial interveners. It was shown that all these effects can be explained by two independently motivated assumptions: namely, that the domain of manners contains contraries, and that degree expressions range over intervals. These properties of the domain of manner and degree questions result in the fact that unlike questions about individuals, manner and degree questions inevitably lead to a contradiction at some level: presuppositional islands were shown to arise because such questions come with a contradictory presupposition, while in the case of negative degree questions the Maximal Informativity Principle can never be met and, therefore, an exhaustive answer necessarily expresses a contradiction. It was also argued that unlike what is typically assumed in the syntactic literature, there is no single phenomenon of 'D-linking' that can ameliorate island effects. Instead, D-linking can only be understood as a cover term for a number of unrelated phenomena: (a) selection of non-contradictory alternatives (cf. Kroch's examples of a salient checklist), (b) scope phenomena (cf. the two readings of *how-many* questions), and (c) identity questions (cf. Sect. 3.2). Finally, it was shown that—given certain provisos—the nature of the contradiction that leads to

unacceptability falls under Gajewski's (2002) generalization according to which contradictions that arise in virtue of their logical form are ungrammatical.

Appendix: Islands created by *only* and the weak presuppositional analysis for *only*

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

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

The second problem, also observed by Horn (1996) is manifested by the fact that question-answer exchanges such as the one in (159) below are felicitous. This is a problem because if the truth of the prejacent was indeed presupposed in the context of the conversation, the question should have been infelicitous in the first place. However, it is perfectly acceptable.

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

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

(160) Only [Muriel]$_F$ voted for Hubert.
        Presupposes: Someone voted for Hubert.
        Asserts: No one other than Muriel voted for Hubert.
        → *Inference:* Muriel voted for Hubert.

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 now is that this weaker

presupposition is not strong enough to derive a contradiction. Take a look at (101) again, repeated here as (161)-(162):

(161)   *How did only John behave?
(162)   ⟦*How did only John behave?⟧^{w}
                ={that only John behaved politely,
                    that only John behaved impolitely,
                     that only John behaved neither politely nor impolitely}.

If each alternative in the Hamblin set only presupposes that *someone* behaved in α, then in this example, restricted to the dimension of politeness, 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.

However, as is well known, this counterargument is not without counterarguments of its own. Ippolito (2006) argues convincingly that the weak-presuppositional analysis does not predict the correct inference for a sentence such as (163) below:

(163)   Only John and Mary ate cookies.

The problem is that in a context where it is known that only John ate cookies, the above sentence is predicted to be true by the weak-presuppositional analysis, contrary to fact.

Secondly, as pointed out by many, in negative sentences the presupposition seems to be stronger, as if *Only AB* indeed presupposed the truth of *AB,* as was originally proposed in Horn (1969).[42]

(164)   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 the example below:

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

To remedy the problems that plague the earlier types of analyses for *only,* Ippolito (2006, p. 82) proposes that *only* stands with a conditional presupposition of the form below:

(166)   *Presupposition of only ϕ:* If some proposition among the focus alternatives of *only* is true, then ϕ is true.

This presupposition also predicts that a question such as (100) should be unacceptable, though the argument is admittedly more involved. Suppose that, as before, we restrict our attention to a single domain of manners, e.g. the domain of politeness. The alternative propositions in the

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[42] Beaver (2004) argues 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, the problematic example is correctly predicted to presuppose that *Muriel voted for Hubert.*

H/K denotation of the question, together with their presuppositions predicted by Ippolito (2006), will be as follows:

(167) $[\![$ *How did only John behave? $]\!]^w=$
          {that only John behaved politely,
                  (presupposes: if someone behaved politely, John did)
            that only John behaved impolitely,
                  (presupposes: if someone behaved impolitely, John did)
            that only John behaved neither politely nor impolitely
                  (presupposes: if someone behaved neither politely nor impolitely, John did)}

Suppose now that the set of contextually salient individuals includes John and Bill. Notice that the three manners in (167) above are not only mutually exclusive, but in fact cover the "logical space" of behaving events: any behaving event will have to be a member of one of the three sets of events described by these predicates. Given this there are two possibilities. Suppose first that John and Bill have behaved in the same manner α. In this case the answer that only John behaved in manner α should be infelicitous, because the exclusive component of *only* contradicts the background assumption. The other possibility is that John and Bill have behaved in different manners, e.g. α and β. In this case, for the propositional alternatives based on α and β, the antecedent of the conditional presupposition, namely that someone behaved in α and that someone behaved in β, is satisfied. Therefore the presupposition of the alternatives based on α and β will be that John behaved in manner α and that John behaved in manner β. Given a universal projection pattern for the presuppositions of the question alternatives, the question is now predicted to presuppose that John behaved in two mutually incompatible ways, which is a contradiction. Thus we derive that the question can never be answered felicitously, because any answer is predicted to lead to a contradiction: either the exclusive meaning of only contradicts the background assumption, or the question presupposes a contradiction. The above argument generalizes to situations where the context contains more individuals and manners, given the assumption defended in this paper that for any manner its contraries will always be among the question alternatives. Since in any domain of degrees, there will be non-overlapping intervals that jointly cover the domain, the above reasoning can be straightforwardly extended to degree questions as well.

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