

Trivial questions

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Abstract

We compare two recent analyses of so-called factive islands in wh-questions, put forward in Oshima (2007) and Abrusán (2011, 2014). Oshima (2007) proposes that perceived uninterpretability in factive islands is due to the necessary infelicity of the question. The central felicity constraint under this account is an answerability condition that relates the felicity of a question to the felicity of the answers defined by the question's semantic content. The answerability condition requires that at least one of these answers be felicitous. In contrast, without postulating felicity conditions particular to questions, Abrusán (2011, 2014) credits factive islands to contradictory presuppositions. The two analyses coincide in their effects on canonical factive island cases. This means that such cases fail to provide an argument for either analysis. For each analysis, we therefore discuss data that might provide independent evidence in its support. We find compelling independent evidence in support for Oshima's analysis, hence for the answerability condition on questions, coming from the so-called referential islands effect (Simonenko 2015) and from a non-uniqueness condition on wh-restrictors. Independent evidence for Abrusán's analysis is more difficult to find. In fact, the analysis is in need of elaboration to be rendered consistent with the observation that the factive island effect is not attested in assertions parallel to factive island questions. We provide such an elaboration. We then identify a test case for the contradiction analysis. While speakers are divided with regard to their intuitions about the relevant data, the judgments of some speakers support the assumptions of the contradiction analysis. Given that the sets of assumptions underlying the two analyses are compatible with each other, we conclude that both are needed in a complete account of factive islands and question triviality.

Keywords: factive islands, questions, uninterpretability, triviality and grammar, felicity conditions, presuppositions

1 Introduction

An idea that linguistic theory owes to Barwise and Cooper (1981) is that under certain conditions, triviality of meaning can lead to judgments of uninterpretability, unacceptability judgments that are similar to judgments of ungrammaticality elicited by syntactic ill-formedness, and markedly different from judgments that are typical of mere pragmatic infelicity. A central question that arises in this school of thought, addressed prominently in Gajewski (2002) and Abrusán (2014), is how to precisely characterize the relevant notion of meaning triviality or the conditions under which such triviality leads to uninterpretability. A particularly interesting instance of this question has emerged in the literature on questions. A consensus seems to have been reached that meaning triviality is the cause of so-called factive islands in *wh*-questions (Szabolcsi and Zwarts 1993; Oshima 2007; Abrusán 2011, 2014), but there is no agreement on the precise characterization of this triviality. We will compare (reformulated and amend versions of) the two proposals put forward in Oshima (2007) and Abrusán (2011, 2014), which we call *answerability analysis* and *contradiction analysis*, respectively. Oshima (2007) proposes that uninterpretability in factive islands is due to the necessary infelicity of the question. The central felicity constraint under (our rendition of) this account is an answerability condition that relates the felicity of a question to the felicity of the answers defined by the question’s semantic content. The answerability condition requires that at least one of these answers be felicitous. In contrast, without postulating felicity conditions particular to questions, Abrusán (2011, 2014) credits factive islands to contradictory presuppositions.

Questions that we consider canonical instances of the factive island effect were first described in Szabolcsi and Zwarts (1993). Those questions feature overt *wh*-movement that leaves a gap within the complement of a factive predicate. The factive island effect is a judgment of uninterpretability elicited by cases where the gapped complement clause denotes uniquely, describing a property that cannot hold of more than one entity. The phenomenon is illustrated by Szabolcsi and Zwarts’s example (1a) and Oshima’s (2007) example (1b).

- (1) a. *From whom do you regret having gotten this letter?
- b. *Who does Max know that Alice got married to on June 1st?

In (1a), the complement clause is embedded under factive *regret* and denotes uniquely because there can only be one individual that a given letter is from; in (1b), the complement clause is embedded under factive *know* and denotes uniquely in virtue of the assumption that Alice got married to at most one individual on any given day.

To demonstrate that the factive island effect is indeed dependent on uniqueness, Szabolcsi and Zwarts (1993) contrast (1a) with the acceptable question in (2a), where the gapped complement clause does not denote uniquely; likewise Oshima (2007) contrasts (1b) with the acceptable question in (2b), where again uniqueness is not guaranteed.

- (2) a. To whom do you regret having shown this letter?
- b. Who does Max know that Alice sent a Christmas card to?

To complete the paradigm, (3) presents examples where the factive embedding verbs *regret* and *know* in (1) are replaced with non-factive verbs. These questions are fully acceptable as well, confirming that the factive island effect is dependent on the factivity of the embedding predicate.

- (3) a. From whom do you suspect having gotten this letter?
- b. Who does Max think that Alice got married to on June 1st?

Both Oshima’s (2007) answerability analysis and Abrusán’s (2011) contradiction analysis capture the contrast between canonical factive island cases like those in (1) and the controls in (2) and (3). But this means that by themselves, factive island questions like those in (1) cannot serve as an argument for the assumptions underlying either account. In this paper, we therefore search for independent evidence from neighbouring phenomena for the assumptions underlying the two proposals. Importantly, the sets of assumptions underlying the two analyses are compatible with each other. Therefore, an argument for one of the two analyses does not in general amount to an argument against the other. It is conceivable that the assumptions underlying both analyses are needed. In fact, this is the conclusion that we will arrive at, based on our finding that each analysis has some level of independent support.

With regard to the assumptions underlying the answerability analysis, this independent support comes from certain questions other than factive island cases that we argue to be unanswerable but not contradictory. These are questions that feature *wh*-extraction from a directly referential expression (cases of a sort discussed in Simonenko 2015) and questions whose *wh*-restrictor denotes uniquely (which we seem to be the first to analyze). We observe that those questions share the uninterpretability of factive island questions like those in (1). With regard to the assumptions underlying the answerability analysis, independent evidence in their support is harder to find. In fact, the analysis is in need of elaboration in order to be reconciled with the observation that the factive island effect is limited to questions, and not attested in otherwise parallel assertions. We provide such an elaboration. We then identify a critical test case for the contradiction analysis. We find that speakers are divided with regard to intuitions about the relevant data. However, the judgments of some speakers support the assumptions of the contradiction analysis. Given that the sets

of assumptions underlying the two analyses are compatible with each other, we conclude that both are needed in a comprehensive account of question triviality that is consistent with the range of judgments we observe.

We believe that our arguments for the answerability analysis and the contradiction analysis of factive islands are the first non-confounded arguments of their kind. On the one hand, Oshima (2007), while proposing the answerability analysis, does not consider the contradiction analysis, and we agree with Abrusán (2011, 2014) that the data Oshima discusses can also be captured under the contradiction analysis. On the other hand, we judge the data discussed by Abrusán to be within the scope of Oshima’s answerability analysis.

With regard to the latter point, we are in disagreement with Abrusán, who suggests that an argument for the contradiction analysis can be based on certain factive island data other than canonical cases of the sort illustrated in (1) above. Like Oshima (2007), Abrusán takes the factive island phenomenon to include certain uninterpretable cases of degree questions, *why*-questions, and *how*-questions, such as the examples in (4) (where (a) is from Abrusán 2011, and (b) and (c) are from Oshima 2007).

- (4) a. *How tall do you regret that you are?
- b. *Why does Max know that Alice insulted Pat?
- c. *?How does Max know that Alice went to San Francisco?

In fact, it is such cases that first gave rise to the observation that factive predicates can induce island effects (e.g., Rizzi 1990, Cinque 1990, Rooryck 1992). Abrusán argues that the factive island effect in *how*-questions is not captured under the answerability analysis. An anonymous reviewer extends this point to degree questions. We scrutinize these claims in an appendix A. There we conclude that degree questions, *why*-questions, and *how*-questions do not in fact support an argument for or against either of the two analysis. To make this case, we bolster Oshima’s argument that in *why*-questions and *how*-questions, the gapped complement of the factive predicate denotes uniquely, and we dispel Abrusán’s argument against that assumption for *how*-questions. Moreover, we present evidence for uniquely denoting gapped complements in degree questions. If these arguments are valid, one cannot hope to learn more from those questions than from canonical factive island cases like those in (1). In both types of cases, uniqueness ensures that the answerability analysis and the contradiction analysis have the same effect. In the main text, we therefore focus on individual questions, that is, questions introduced by *wh*-phrases with *who*, *what*, or *which*.

As a final preliminary remark, we note that, just like the discussion in Oshima (2007) and Abrusán (2011, 2014), our study focuses on matrix questions. However, as an anonymous reviewer points out, judgments of uninterpretability persist when factive island questions are embedded. In the reviewer’s example (5a), for example,

Szabolcsi and Zwarts’s (1993) factive island question in (1a) above is embedded under *know*. The reviewer notes that the uninterpretability of the embedded question extends to (5a) as a whole. As another illustration, (5b) shows that the same effect is observable with embedding under *wonder*.

- (5) a. *Kim knows from whom you regret having gotten this letter.
- b. *Kim wonders from whom you regret having gotten this letter.

Such embedded factive island questions present a potential test for analyses of factive islands. In appendix B, we therefore outline possible ways of extending the contradiction analysis and the answerability analysis to cover embedded questions. We conclude that question embedding does not in fact provide conclusive evidence for or against either of the two analyses examined in this paper. Our discussion in the main text therefore confines attention to matrix questions.

The presentation proceeds as follows. Sections 2 and 3 present the answerability analysis and the contradiction analysis, respectively; section 4 discusses some limitations and amendments required under both analyses; section 5 identifies independent evidence for the answerability analysis; section 6 examines potential independent evidence for the contradiction analysis; section 7 concludes. Appendix A discusses factive islands in degree questions, *why*-questions, and *how*-questions, and Appendix B considers embedded factive island questions.

2 The answerability analysis

This section introduces the answerability analysis, which we attribute to Oshima (2007). We note at the outset, however, that Oshima’s exposition is very brief. Our presentation of the answerability analysis is considerably more detailed and superficially very different than Oshima’s.

2.1 Question semantics

Our rendition of the answerability analysis is embedded in the so-called Hamblin/Karttunen semantics for *wh*-questions, which combines elements of the approaches in Hamblin (1973) and Karttunen (1977). Under the Hamblin/Karttunen semantics, a question extension is a set of propositions. This set can be thought of as a family of possible answers to the question, the so-called Hamblin/Karttunen answers. For example, the extension of (6) contains, for any member *x*, the proposition that *x* resigned.

- (6) Which member resigned?

We will be exclusively concerned with wh-question of the form illustrated by this example, that is, examples of the form $[wh\ R]\ S$, where wh is the lone wh-word, the predicate R is the wh-word's property denoting *restrictor*, $[wh\ R]$ is the wh-phrase, and the predicate S is the wh-phrase's property denoting *scope*. We construe propositions as functions from possible worlds to truth values, and properties as functions from individuals to propositions. We take the denotation of a question to be its intension, a function that maps any possible world to the extension of the question in that world. So the question $[wh\ R]\ S$ denotes the function in (7), where \mathbf{R} and \mathbf{S} are the denotations of R and S , respectively. The values of \mathbf{R} and \mathbf{S} in the example in (6) are given in (8).¹

$$(7) \quad \text{Hamblin/Karttunen semantics} \\ \lambda w. \{ \mathbf{S}(x) \mid \mathbf{R}(x)(w) \}$$

$$(8) \quad \mathbf{R} = \lambda x. \lambda w. \text{ x is a member in } w \\ \mathbf{S} = \lambda x. \lambda w. \text{ x resigned in } w$$

We assume that the propositions that properties map individuals to are partial functions, functions whose domain may comprise only those possible worlds that meet certain conditions. Under the Frege/Strawson notion of semantic presupposition, adopted here for concreteness, this provides a way of encoding the presuppositional content contributed by a presupposition trigger in the scope of the wh-phrase. For example, taking gender marking to trigger a presupposition (Cooper 1983), the property denoted by *nominated herself* will map any individual to a proposition whose domain is limited to worlds where that individual is female. To simplify reference to presuppositional content, let \mathbf{P} be a property such that for any individual x , $\mathbf{P}(x)$ characterizes the domain of $\mathbf{S}(x)$. So, if \mathbf{S} is the property denoted by *nominated herself*, then \mathbf{P} is the property of being female. For the question in (9) (which in the relevant respects is just like the cases in (2)), the values for \mathbf{R} , \mathbf{P} , \mathbf{S} are then as catalogued in (10). (To make partiality explicit, we employ the colon notation introduced in Heim and Kratzer 1998). With reference to \mathbf{R} , \mathbf{P} , and \mathbf{S} , we can rewrite the Hamblin/Karttunen denotation in (7) as in (11).

$$(9) \quad \text{Which member nominated herself?}$$

$$(10) \quad \mathbf{R} = \lambda x. \lambda w. \text{ x is a member in } w \\ \mathbf{P} = \lambda x. \lambda w. \text{ x is female in } w \\ \mathbf{S} = \lambda x. \lambda w. \text{ x is female in } w. \text{ x nominated herself in } w$$

¹Here and below, for any proposition p and possible world w , we write “ $p(w)$ ” as shorthand for “ $p(w)=T$ ”. Hence in (7), “ $\mathbf{R}(x)(w)$ ” abbreviates “ $\mathbf{R}(x)(w)=T$ ”.

- (11) Hamblin/Karttunen semantics
 $\lambda w. \{ \lambda v: \mathbf{P}(x)(v). \mathbf{S}(x)(v) | \mathbf{R}(x)(w) \}$

We note that in the absence of a presupposition trigger in the wh-phrase's scope, \mathbf{P} is the trivial property, the property that applies to every individual in every possible world. The garden variety question in (6) is a case in point (as are the examples in (3)). In (12), the list of values given in (8) above is updated accordingly.

- (12) $\mathbf{R} = \lambda x. \lambda w. x \text{ is a member in } w$
 $\mathbf{P} = \lambda x. \lambda w. w = w$
 $\mathbf{S} = \lambda x. \lambda w. x \text{ resigned in } w$

2.2 The answerability condition

We are now prepared to introduce the key ingredient of the answerability analysis, a felicity condition on question use that we refer to as *answerability condition*. We read Oshima (2007) as tacitly assuming such a condition.

We construe felicity conditions as restricting the permissible relations between context sets and possible sentence denotations. We assume Stalnaker's (1978) notion of context set as a set of possible worlds that represents common knowledge, that is, the interlocutors prior common beliefs. The answerability condition on questions, then, relates context sets to possible Hamblin/Karttunen question denotations. The answerability condition defines the felicity of a Hamblin/Karttunen denotation in terms of felicity conditions on the Hamblin/Karttunen answers that this denotation determines. For any possible sentence denotation X and context set c , we write $c \succ X$ to indicate that X is felicitous relative to c . Employing this notation, we state the answerability condition as in (13).

- (13) Answerability condition
 $c \succ Q \text{ only if } \exists p[\exists w[w \in c \ \& \ p \in Q(w)] \ \& \ c \succ p]$

The answerability condition states that a question denotation is felicitous relative to a context set only if there is a context set world where the question extension contains a proposition that is felicitous relative to the context set. In a nutshell, the condition requires that the context set be consistent with the question having a felicitous answer. The answerability condition, then, amounts to a test for the existence of a possible felicitous answer in an idealized question-answer dialogue where the possible answers are those enshrined in the Hamblin/Karttunen denotation.

Note that the question extension may in principle vary from one context set world to another. The answerability condition must therefore specify in what, or how many, context set worlds a felicitous answer is required to be a member of the question extension. According to (13), there must be a felicitous answer that is in the question

extension in at least one context set world. In section 5, we will see reasons for strengthening this requirement. However, we temporarily adopt the version in (13), as it is sufficient for the specific purpose of analyzing factive islands.²

In order to actually apply the answerability condition, it is necessary to first give content to the conjunct $c \succ p$, so as to establish the felicity conditions that Hamblin/Karttunen answers are subject to. Here we will assume two relevant constraints on the \succ relation. These constraints are adaptations of two conditions on assertions proposed in Stalnaker (1978). Linking semantic and pragmatic notions of presupposition, Stalnaker proposed that in felicitous discourse, a semantic presupposition encoded as a partial proposition's domain must be entailed by the context set. This condition, which von Stechow (2008) dubbed *Stalnaker's Bridge*, is stated in (14). As well, Stalnaker posited that the proposition expressed by a felicitous assertion must be informative in the context set, that is, there must be a context set world where the assertion is false, and there must be one where the assertion is true. Our version of this condition, we call it *informativity condition*, is stated in (15).³

- (14) Stalnaker's Bridge
 $c \succ p$ only if $c \subseteq \text{dom}(p)$

- (15) Informativity condition
 $c \succ p$ only if $c \not\subseteq p$ & $c \cap p \neq \emptyset$

Putting everything together, the answerability condition then reads as in (16). In a nutshell, the condition states that for a question to be felicitous, the context set must be consistent with the question having an informative answer whose presupposition is met.⁴

- (16) Answerability condition
 $c \succ Q$ only if $\exists p [\exists w [w \in c \text{ \& } p \in Q(w)] \text{ \& } c \subseteq \text{dom}(p) \text{ \& } c \not\subseteq p \text{ \& } c \cap p \neq \emptyset]$

We note that, in positing the answerability condition, we take the use of questions as requests for information as primary. We do so, however, without denying that

²Here we elaborate on Oshima (2007), who does not actually consider the possibility of the question extension varying from one context set world to another. Looking ahead, aligned with Oshima's exposition, we introduce in section 5.2.4 below the hypothesis that the extension of the wh-restrictor, and hence the extension of the question, remains constant within the context set. This hypothesis is, however, not needed for the proposed analysis of factive islands.

³For any context set c and partial proposition p , we write " $c \subseteq p$ " and " $c \not\subseteq p$ " as shorthand for " $\forall w \in c [p(w) = T]$ " and " $\exists w \in c [p(w) = F]$ ", respectively; likewise, " $c \cap p = \emptyset$ " and " $c \cap p \neq \emptyset$ " abbreviate " $\forall w \in c [p(w) = F]$ " and " $\exists w \in c [p(w) = T]$ ", respectively.

⁴The answerability condition is very close to Guerzoni's (2003) (p.41) *Question Bridge Principle*, which states that "A question question is felicitous in c ONLY IF it can be felicitously answered in c (I.e. if at least one of its answers is defined in c)."

questions allow for other uses in conversation (see, e.g., Hudson 1975), including uses as so-called rhetorical questions, which will encounter in section 5.

As an illustration, we apply the answerability condition to the question in (9) and the values listed in (10), assuming the question semantics in (11). According to (16), in order for (9) to be felicitous relative to a given context set, there must be an individual that (i) the context set does not entail to be a non-member, (ii) that the context set entails to be female, and (iii) that the context set does not entail to be a female who nominated herself and does not entail not to be a female who nominated herself.⁵ Suppose now that the interlocutors agree, hence the context set entails, that the members are Alex, Berti, and Chris. The question in (9) will then meet the condition in (16) if for at least one of those three members, the interlocutors' prior common beliefs entail that member to be a female, but do not entail either that she nominated herself nor that she didn't. Accordingly, (9) will violate the condition in (16) if for each of the three members Alex, Berti, and Chris, the interlocutors' prior shared beliefs either do not entail that member to be a female or do entail that member (not) to be a female who nominated herself. For example, the interlocutors might agree that each of the three members Alex, Berti, and Chris is a female who nominated herself; or the interlocutors' common beliefs might not settle the sex of any of Alex, Berti, and Chris; or those common beliefs might entail that Alex is not a female who nominated herself while failing to settle the sex of Berti or Chris.

2.3 Factive islands and answerability

Returning now to factive islands, we introduce (17) as our running example to be used for illustration below. (17) is a factive island case parallel to those in (1), featuring *wh*-movement from the complement of a factive predicate, here *know*, as well as uniqueness, as it is impossible for two different girls to be the tallest member of our team.

(17) *Which of the girls does Fred know is the tallest member of our team?

The values that the properties **R**, **P**, and **S** take on in this example are listed in (18). What sets factive island cases like (17) apart from acceptable examples like those in (3) or (9) is, of course, uniqueness. In the present format, the fact that the embedding predicate is factive plus the fact that its gapped complement denotes uniquely guarantees that **P** relates to the context set as shown in (19).

(18) **R** = $\lambda x.\lambda w.$ *x* is one of the girls in *w*
P = $\lambda x.\lambda w.$ *x* is the tallest member of our team in *w*

⁵Under the strengthened version of the answerability condition introduced in section 5.2.2, the clause in (i) would be replaced with the stronger statement that the context set entails the relevant individual to be a member.

$S = \lambda x. \lambda w$: x is the tallest member of our team in w . Fred knows in w that x is the tallest member of our team

- (19) Factivity plus uniqueness
 $c \subseteq \{w: |\{x: \mathbf{P}(x)(w)\}| \leq 1\}$

According to (19), the context set entails that \mathbf{P} holds of at most one individual. For the case of (17), this amounts to the context set having the entailment that there is at most one girl that is the tallest member of our team. Note that, under the Hamblin/Karttunen semantics in (11), factivity plus uniqueness ensures that in every context set world, there is at most one proposition in the question extension whose presupposition is true. That is, (19) has the consequence in (20).

- (20) Factivity plus uniqueness
 $c \subseteq \{w: |\{p: p \in Q(w) \ \& \ w \in \text{dom}(p)\}| \leq 1\}$

The observation at the heart of the answerability analysis is that given factivity plus uniqueness, the answerability condition is in conflict with another felicity condition on questions. According to a prevalent intuition, which Oshima (2007) takes at face value, a *wh*-question carries the presupposition that there is an individual who has both the restrictor and scope properties (e.g. Horn 1972; Karttunen 1977; Dayal 1996; Fox and Hackl 2006; Abusch 2010; Abrusán and Spector 2011; Mayr 2013; Abrusán 2011). For example, the question in (6) (*Which member resigned?*) is taken to presuppose that some member resigned, and (9) (*Which member nominated herself?*) is taken to presuppose that some member is female and nominated herself. Under the Hamblin/Karttunen semantics, we can say that a question presupposes that at least one of the Hamblin/Karttunen answers is true. Without encoding this existence presupposition in the denotation of the question, we propose the felicity condition in (21) so as to directly describe its pragmatic effect.⁶

- (21) Existence presupposition
 $c \succ Q$ only if $c \subseteq \{w: \exists p[p \in Q(w) \ \& \ p(w)]\}$

It can be shown that under the Hamblin/Karttunen semantics, assuming factivity plus uniqueness, the answerability condition and the existence presupposition are inconsistent, that is, there are no logically possible context sets that meet both conditions.

Before establishing the general result, it will be useful to consider a pair of toy context sets that illustrate the conflict between the answerability condition and the existence presupposition, given factivity plus uniqueness. To aid this illustration, we

⁶Oshima (2007, 152) writes: “It is generally believed that a *wh*-interrogative presupposes that it has at least one true resolution; I too take this view, although it can be a matter of debate.”

introduce a bit of convenient notation. For any sets X , Y , Z , and given a question denotation defined by properties \mathbf{R} , \mathbf{P} , and \mathbf{S} , let $w_{X,Y,Z}$ be some possible world w such that $\{x: \mathbf{R}(x)(w)\} = X$, $\{x: \mathbf{P}(x)(w)\} = Y$, and $\{x: \mathbf{S}(x)(w)\} = Z$. Consider now the toy context sets in (22) and (23), where a and b are individuals.

$$(22) \quad \text{a.} \quad c = \left\{ \begin{array}{l} w_{\{a, b\}, \{a\}, \{a\}} \\ w_{\{a, b\}, \{b\}, \{b\}} \end{array} \right\}$$

$$\text{b.} \quad c = \left\{ w_{\{a, b\}, \{a\}, \{a\}} \right\}$$

$$(23) \quad c = \left\{ \begin{array}{l} w_{\{a, b\}, \{a\}, \emptyset} \\ w_{\{a, b\}, \{a\}, \{a\}} \end{array} \right\}$$

Both context sets in (22) respect uniqueness plus factivity, as both entail that only one individual (a or b) has property \mathbf{P} . Also, both context sets meet the existence presupposition, since the three sets determined by \mathbf{R} , \mathbf{P} , and \mathbf{S} overlap in every context set world (with a or b as a common member). However, neither context set in (22) meets the answerability condition. In (22a), this is because the context set does not entail any individual to have the property \mathbf{P} , hence it fails to entail the presupposition of any Hamblin/Karttunen answer. The context set in (22b) entails that $\mathbf{P}(a)$, so it meets the presupposition of the Hamblin/Karttunen answer $\mathbf{S}(a)$; however the context set also entails $\mathbf{S}(a)$ itself, so that this Hamblin/Karttunen answer is not informative relative to this context set.

In contrast, the context set in (23), which also respects uniqueness plus factivity, meets the answerability condition, since it entails $\mathbf{P}(a)$ without also entailing the proposition $\mathbf{S}(a)$ or its negation. However, this context set does not meet the existence presupposition, since in one of the context worlds the sets determined by \mathbf{R} , \mathbf{P} , and \mathbf{S} fail to overlap.

We now turn to establishing the general result that, assuming factivity plus uniqueness, the answerability condition and the existence presupposition are inconsistent. To show this, consider first the conjunction of factivity plus uniqueness in (20) and the existence presupposition in (21). If in every context set world the question extension contains at most one proposition with a true presupposition (factivity plus uniqueness) and contains at least one proposition that is true (existence presupposition), then in every context set world, *the* proposition in the question extension with a true presupposition is true.

$$(24) \quad \text{from factivity plus uniqueness, existence presupposition} \\ c \subseteq \{w: [\iota p. p \in Q(w) \ \& \ w \in \text{dom}(p)](w)\}$$

On the other hand, according to the answerability condition in (16), the question extension in some context set world contains a proposition whose presupposition

is true in every context set world and that is informative in the context set. In terms of the Hamblin/Karttunen semantics in (11), that proposition is $\mathbf{S}(x)$, for some individual x , where the domain of $\mathbf{S}(x)$ is characterized by $\mathbf{P}(x)$. Since every Hamblin/Karttunen answer equals $\mathbf{S}(y)$ for some individual y , factivity plus uniqueness in (19) and the fact that $\mathbf{P}(x)$ holds in every context set world ensure that $\mathbf{S}(x)$ is the only proposition with a true presupposition that can be in the question extension in any context set world. Suppose now that it holds in every context set world that there is a unique proposition in the question extension with a true presupposition and that that proposition is true. This would require that the context set entails $\mathbf{S}(x)$, which would imply that $\mathbf{S}(x)$ is not informative in the context set, hence that the answerability condition is violated. We conclude, therefore, that it cannot be that in every context set world, the unique proposition in the question extension with a true presupposition is true, a conclusion stated in (25).

- (25) from factivity plus uniqueness, answerability condition
 $c \not\subseteq \{w: [\iota p. p \in Q(w) \ \& \ w \in \text{dom}(p)](w)\}$

The statements in (24) and (25) are, of course, contradictory. Under the proposed analysis, then, the factive island questions are questions that, given uniqueness, necessarily violate some felicity condition or other. Any logically possible context set that meets the existence presupposition carried by such a question is bound to violate the answerability condition (and vice versa). It is this necessary infelicity that Oshima (2007) proposes to hold responsible for the uninterpretability of factive island questions.⁷

For future reference, we state in (26) the general principle underlying this analysis, which we call the *uninterpretability principle*.

- (26) Uninterpretability principle
 A question with denotation Q is uninterpretable if
 there is no c such that $c \succ Q$

According to the uninterpretability principle, a question is uninterpretable if its denotation Q is not felicitous relative to any proposition c .

⁷With reference to example (1b) (**Who does Max know that Alice got married to on June 1st?*) Oshima (2007, 153) writes: “[...] what [(1b)] asks 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?’”. This results in pragmatic oddity for an obvious reason. In a quotidian context, it is natural to assume that a single person would not get married twice (to different persons) on the same day. If there is only one x such that it is known to the speaker that Alice got married to x on June 1st, the speaker should know the answer to his question before asking it. [...] This means that the speaker should expect the answer to be already known to him, and at the same time expect this expectation not to be fulfilled, which is possible only with an irrational mind.” See section 4 for further discussion of this particular example.

For completeness, we confirm that the answerability analysis successfully discriminates between factive island cases like (17) and acceptable cases that lack uniqueness or factivity. Consider the acceptable questions in (27). Example (27a) lacks the uniqueness ingredient (just like the cases in (2) and (9)) while (27b) lacks factivity (just like the cases in (3)). The values of **R**, **P**, and **S** for (27a) and (27b) are shown in (28a) and (28b), respectively.

- (27) a. Which of these girls does Fred know scored a goal?
b. Which of these girls does Fred think is the tallest member of our team?
- (28) a. **R** = $\lambda x.\lambda w.$ x is one of the girls in w
P = $\lambda x.\lambda w.$ x scored a goal in w
S = $\lambda x.\lambda w.$ x scored a goal in w. Fred knows in w that x scored a goal
- b. **R** = $\lambda x.\lambda w.$ x is one of the girls in w
P = $\lambda x.\lambda w.$ w = w
S = $\lambda x.\lambda w.$ Fred thinks in w that x is the tallest member of our team

To confirm that no uninterpretability is predicted for the questions in (27) under the answerability analysis, we must demonstrate that for the values in (28), the existence presupposition and the answerability condition are consistent. Consider now the toy context set in (29), where a, b, and c are again individuals, say Alex, Berti, and Chris.

$$(29) \quad c = \left\{ \begin{array}{l} W_{\{a, b, c\}, \{a, b, c\}, \{a\}} \\ W_{\{a, b, c\}, \{a, b, c\}, \{a, b\}} \end{array} \right\}$$

Applied to example (27a), the context set in (29) entails that Alex, Berti, and Chris are the girls and that all three of them scored a goal. It meets the existence presupposition in (21) because the three sets overlap in both worlds, so in both worlds there is an individual, viz. Alex and/or Berti, who has each of the properties **R**, **P**, and **S**. At the same time, this context set also satisfies the answerability condition in (16). This is established by the existence of an individual, viz. Berti, who has property **P** in both worlds, but has property **S** in only one of the worlds, so that the context set entails that Berti scored a goal without entailing that Fred knows that she did or entailing that he does not know. For the question in (27a), then, the context set in (29) proves the existence of a context set that meets both of the felicity conditions under consideration, establishing that, as intended, (27a) is not predicted to suffer from necessary infelicity and hence uninterpretability. The reader is moreover invited to verify that the context set in (29) serves to make the same point for (27b), provided that Alex, Berti, and Chris are taken to exhaust the domain of possible individuals, hence to exhaust the set of individuals that the trivial property applies to. The answerability analysis, then, correctly predicts both factivity and uniqueness to

be required ingredients of necessary infelicity and hence uninterpretability in factive islands.

2.4 Accidental versus necessary infelicity

We conclude this section with a comment regarding the link between necessary infelicity and the perception of uninterpretability that it is proposed to give rise to. Echoing Oshima (2007), we emphasize that judgments of uninterpretability differ in quality from judgments of infelicity due to merely accidental violations of a felicity condition. To clearly illustrate this difference, let us return to the example in (9), repeated here as (30), and let us compare judgments on (30) to the uninterpretability of our factive island example in (17).

(30) Which member nominated herself?

Suppose for concreteness that the interlocutors agree, hence that the context set entails, that the members are Alex, Berti, and Chris. Suppose that the interlocutors also agree that this group of three includes a female who nominated herself, so that the existence presupposition is satisfied. But now suppose that the speaker's beliefs (and hence the interlocutors' common beliefs) do not actually settle the sex of any of Alex, Berti, and Chris, hence fail to entail that Alex is female, and likewise for Berti and Chris; and suppose, for good measure, that the listener is aware of this gap in the speaker's knowledge. In this scenario, the context set does not satisfy the presupposition of any of the three Hamblin/Karttunen answers in the extension of (30). Therefore, in such a context set the question in (30) violates the answerability condition.

We take it that in such a scenario, the question (30) is still usable for the speaker, and clearly will not be judged uninterpretable by either the speaker or the listener. The question may be used, for example, as a reply to the listener's statement that some female member nominated herself. The usability of the question in our scenario is in fact unsurprising, given the familiar phenomenon of (global) presupposition accommodation (e.g. von Stechow 2008). Despite the lack of prior knowledge of Alex's sex, for example, the speaker could interpret the answer *Alex nominated herself* upon accommodating the presupposition that Alex is female. The speaker can in effect get away with violating the answerability condition by anticipating her ability to accommodate the presupposition carried by the answer.

Consider now an analogous scenario for our factive island question in (17), repeated once again in (31).

(31) *Which of the girls does Fred know is the tallest member of our team?

Suppose the interlocutors agree that the girls are Alex, Berti, and Chris; suppose they also agree that there is one among the three who is the tallest member of our team and who Fred knows is the tallest member of our team; and suppose that the speaker's beliefs (and hence the interlocutors' common beliefs) do not actually entail for any of Alex, Berti, and Chris that she is the tallest member of our team; suppose, finally, that the listener is aware of this gap in the speaker's knowledge. In this scenario for (31), the existence presupposition is satisfied while the answerability condition is violated, once again because the presupposition of none of the Hamblin/Karttunen answers in the question extension is satisfied by the context set.

In this scenario, (31) violates the same felicity condition, and in the same way, as (30) does in the corresponding scenario above. As expected (under the characterization of factive islands assumed here and in the literature), embedding (31) in this scenario has no effect on its perceived acceptability. That is, the factive island effect, a judgment of uninterpretability, persists unaltered.

The comparison of (30) and (31), then, indicates that judgments of uninterpretability arising from infelicity in all possible contexts cannot be reduced to judgments of infelicity caused by the specific violation in the actual context. In cases of the necessary violation of a felicity condition, the perceived deficiency of an utterance is independent of the nature of the actual violation. Irrespective of the actual violation, the utterance is perceived as uninterpretable. In contrast, a merely accidental violation of a felicity condition need not cause uninterpretability, and need not prevent communication from proceeding successfully.⁸

A methodological point emerging from these considerations is that judgments of uninterpretability are more stable indicators of the violation of felicity conditions than judgments of mere infelicity, which can be preempted by repair mechanisms such as presupposition accommodation. Judgments of uninterpretability can therefore be considered a useful guide in establishing the inventory of felicity conditions. In the case at hand, the answerability analysis of the factive island effect amounts to an argument that this inventory includes the answerability condition and existence presupposition.

The central question that remains is why necessary infelicity contrasts with accidental infelicity in giving rise to judgments of uninterpretability. Oshima (2007) leaves this question open, and we will likewise not offer a conclusive answer. A partial answer is suggested by the observation that accidental violations of felicity condition are subject to repair mechanisms such as presupposition accommodation. It is conceivable that in the absence of such repairs, accidental infelicity, too, would give rise to uninterpretability. The uninterpretability of factive island questions like (31) could then be understood as irreparable infelicity in all possible context sets. Of course, the hypothesis that necessary infelicity obviates the application of repair

⁸Oshima (2007, 159) illustrates the latter point with the accidental failure of the presupposition carried by an assertion such as e.g., *John stopped smoking*, which presupposes that John used to smoke.

mechanisms calls itself for an explanation. But we must leave further investigation of this issue to future work.⁹

3 The contradiction analysis

Abrusán (2011, 2014) proposes an analysis of factive islands, we call it the *contradiction analysis*, that does not rely on an answerability condition. In section 3.1, we outline this analysis in much the form presented by Abrusán. In section 3.2 we further elaborate on the analysis, spelling out certain details omitted in Abrusán’s exposition.

3.1 Uniqueness and universal presupposition projection

The key ingredient of Abrusán’s analysis is the proposal that presuppositions in *wh*-questions project universally, as was suggested independently in Schlenker (2008, 2009). According to this proposal, a presupposition triggered in the scope of the *wh*-phrase must hold for every entity described by the *wh*-phrase’s restrictor. As evidence for universal projection, Abrusán reports that the question in (32), which features the factive verb *regret*, presupposes that Bill invited each of these ten people. The questions in (27a) and (30), repeated below as (33) and (34), make the same point if (33) presupposes that each of the girls scored a goal and if (34) presupposes that every member is female.¹⁰

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

(33) Which of these girls does Fred know scored a goal?

(34) Which member nominated herself?

For the factive island case in (31), repeated again below as (35), universal projection yields a contradiction, viz. the proposition that each of these girls is the tallest member of our team. Subscribing to Barwise and Cooper’s (1981) view that contradictory meanings can be the source of uninterpretability, Abrusán (2011) proposes to credit the factive island effect to a contradictory presupposition.

⁹In a related proposal, Abrusán (2014, ch. 6) suggests that a contradictory sentence is ungrammatical just in case it resists a non-contradictory reinterpretation.

¹⁰We should assume, of course, that universally projected presuppositions can often be accommodated by an addressee. Even so, however, the universal projection assumption is *prima facie* inconsistent with a judgment about (34) reported in section 2.4. (Parallel consideration apply to (32) and (33).) We presented a scenario where (34) is usable despite violating the answerability condition, as the *speaker’s* epistemic state fails to entail the presupposition of any of the Hamblin/Karttunen answers. We will return to this issue at the end of the paper, in section 6.2.3.

(35) *Which of the girls does Fred know is the tallest member of our team?

Employing the vocabulary we have introduced above, universal projection in wh-questions can be encoded in terms of the felicity condition in (36). This condition directly encodes the pragmatic effect of this presupposition by relating the context set to the properties **R** and **P**.

(36) Universal projection
 $c \succ Q$ only if $c \subseteq \{w: \forall x[\mathbf{R}(x)(w) \rightarrow \mathbf{P}(x)(w)]\}$

In this rendition of the contradiction analysis, the felicity condition in (36) ensures that (35) is infelicitous in all logically possible context sets except for the contradictory context set, that is, the empty set.¹¹

3.2 Restrictor plurality

Assuming universal presupposition projection in wh-questions, the ingredients of factive islands that Abrusán identifies are the factive embedding predicate and the uniquely denoting gapped embedded clause. In our rendition, these ingredients guarantee that the context set relates to **P** as stated in (19) above, repeated here as (37).

(37) Factivity plus uniqueness
 $c \subseteq \{w: |\{x: \mathbf{P}(x)(w)\}| \leq 1\}$

The contradiction analysis accordingly accounts straightforwardly for the acceptability of examples like those in (27), repeated here in (38).

(38) a. Which of these girls does Fred know scored a goal?
b. Which of these girls does Fred think is the tallest member of our team?

These cases lack uniqueness or factivity, so that (37) fails to hold in either case. No contradictory presupposition arises from (36), and no uninterpretability is predicted, as intended. For (38a), the universal presupposition (36) is not contradictory, merely entailing that each of the girls scored a goal, while in (38b) no factive presupposition is triggered in the first place, trivializing the condition in (36). Likewise the examples

¹¹If we demand that no felicitous discourse reduces the context set to the empty set (Stalnaker 1978), a contradictory presupposition causes necessary infelicity. So, even though Abrusán (2011, 2014) does not portray the contradiction analysis in this way, it could be construed as agreeing with the answerability analysis on the underlying assumption that uninterpretability results from necessary infelicity. Aligned with this view, we will propose in section 6.1 that universal presupposition projection in questions is a consequence of a pair of felicity conditions that are jointly inconsistent with factivity plus uniqueness.

in (2), (3), and (9) above, too, come out as non-contradictory, and, as intended, are also not predicted to be uninterpretable.

However, expanding on Abrusán’s exposition, we note that for the universal projection in (36) to be contradictory, it is not sufficient for factivity plus uniqueness to hold, that is, for **P** to apply to at most one entity. It is also necessary to assume restrictor plurality, that is, to assume that **R** applies to more than one entity. In other words, the propositions that (36) and (37) relate to the context set are consistent – a contradiction only arises if they are conjoined with the proposition that is related to the context set in (39). Assuming universal presupposition projection, then, the contradiction analysis isolates factivity plus uniqueness and restrictor plurality as the key features of factive islands.

- (39) Restrictor plurality
 $c \subseteq \{w: |\{x: \mathbf{R}(x)(w)\}| > 1\}$

In example (35), restrictor plurality is guaranteed by the partitive form of the wh-phrase’s restrictor *of the girls*. The property denoted by this restrictor is guaranteed to hold of more than one individual (whenever the partitive structure is felicitous). However, we have already seen examples of factive islands that do not share this feature. In the cases in (1) presented in section 1, repeated in (40), the wh-phrase is bare *who(m)*, which does not morphologically encode plurality.

- (40) a. *From whom do you regret having gotten this letter?
 b. *Who does Max know that Alice got married to on June 1st?

In those cases, one might want to attribute restrictor plurality to world knowledge (which plausibly entails that there is more than one person). We note, however, that the factive island effect persists even when neither grammar nor world knowledge guarantees restrictor plurality. The variant of example (17) shown in (41) is designed to illustrate this.

- (41) #Which girl in Group A does Fred know is the tallest member of our team?

In the absence of independently established information about Group A referred to in this question, it is surely conceivable for that group to include no more than one girl. Even so, (41) is perceived to suffer from the same uninterpretability as our running example (35). Without further assumptions this judgment remains unexplained.

There is independent evidence, however, that plurality of **R** as stated in (39) is a general condition on the felicitous use of a wh-question. The question in (42) serves to illustrate this. Sincere use of (42) is intuited to require the speaker’s assumption that there is more than one girl in Group A; correspondingly, a bystander overhearing

(42) with no previous knowledge about Group A will most likely infer that Group A includes more than one girl.

(42) Which girl in Group A scored a goal?

This suggests that restrictor plurality stated in (39) can be taken for granted in the analysis of factive islands, as given by a general, independently motivated, felicity condition on the use of *wh*-questions. Updating (39), we state this felicity condition in (43).

(43) Restrictor plurality
 $c \succ Q$ only if $c \subseteq \{w: |\{x: \mathbf{R}(x)(w)\}| > 1\}$

The plurality inference associated with questions like (42) can then be understood as arising through presupposition accommodation. And under a straightforward elaboration of Abrusán’s (2011) contradiction analysis, factive island cases are uninterpretable by virtue of carrying contradictory presuppositions whenever they are otherwise felicitous.

4 Limitations, amendments, comments

Before focusing on the differences between the answerability analysis and the contradiction analysis in sections 5 and 6, we first comment on a range of issues that arise under both analyses alike, some of which call for parallel amendments. First, we note that the two analyses depend on certain assumptions about the availability of so-called local accommodation and the analysis of factivity. Second, we comment on data indicating that the notion of triviality at play in factive islands is not logical triviality. Third, we note that, as stated, the two analyses overgenerate in similar ways, in the sense that they derive uninterpretability effects that are not actually attested, and we discuss possible amendments. Finally, we note that both analyses capture so-called obviation effects, the observation that factive island cases can be rescued by inserting a possibility operator, or other existential quantifier, in the scope of the factive predicate.

4.1 Factivity and local accommodation

Heim (1983) and much subsequent literature posit a process of so-called local accommodation of presuppositions. Accommodation converts presuppositional content into asserted content. This conversion is said to apply locally in cases where the converted content enters semantic composition *in situ*, in the position where the presupposition is triggered, and within the scope of a higher operator in the sentence. Heim con-

ceived of local accommodation as an interpretational strategy that can apply under pragmatic duress.

Under both the answerability analysis and the contradiction analysis, it must be assumed that local accommodation of the factive presupposition in the *wh*-phrase's scope is unavailable in factive island questions. If local accommodation of the factive presupposition were available in such cases, the denotation of our running example (17), repeated below as (44), would be given by the values listed in (45).

(44) *Which of the girls does Fred know is the tallest member of our team?

(45) $\mathbf{R} = \lambda x.\lambda w. x$ is one of the girls in w
 $\mathbf{P} = \lambda x.\lambda w. w = w$
 $\mathbf{S} = \lambda x.\lambda w. x$ is the tallest member of our team in w & Fred knows in w that x is the tallest member of our team

The effect of hypothetical local accommodation encoded in (45) is that the Hamblin/Karttunen answers do not carry any presupposition, and instead entail the truth of the complement of *know* in virtue of their asserted content. Under the contradiction analysis, this local accommodation straightforwardly preempts the projection of a contradictory universal presupposition (as there is no presupposition to project); under the answerability analysis, in virtue of eliminating the presuppositions of the Hamblin/Karttunen answers, it renders the answerability condition consistent with the existence presupposition (as the reader is invited to verify). Assuming local accommodation, then, the account of the uninterpretability of (44) is lost under both analyses. Therefore, local accommodation must be assumed to be unavailable.¹² The reasons for the unavailability of local accommodation are not clear to us. After all, local accommodation would prevent question triviality (under both analyses), hence should be sanctioned by pragmatic pressure to prevent triviality. We have to leave this question unanswered.¹³

¹²The conclusion that local accommodation in (44) must be excluded is supported by the acceptability of the question in (i).

(i) Which of these girls does Fred correctly believe to be the tallest member of our team?

In (i), *correctly believe* replicates the meaning contribution of *know*, except that the truth of the complement is conveyed by the asserted, rather than presuppositional, content. Hence (i) is a question with the denotation given by (45). The fact that (i) is acceptable confirms our tacit assumption in the main text that there would be no independent reason for (44) to be uninterpretable if local accommodation were available.

¹³If the literature is correct in assuming that all factive predicates participate in the factive island phenomenon, the unavailability of local accommodation must hold for all factive predicates. This is notable because it is known that not all factives are alike in terms of local accommodation. Karttunen (1971) distinguished between (true) *factives*, which do not easily allow for local accommodation of the factive presupposition, and *semi-factives*, where local accommodation is much easier to demonstrate.

We note, however, that the particular formulation of the question just raised rests on an assumption that we have adopted in this paper (see section 2.1) but that has recently come under attack: the assumption that factive predicates trigger the factive presupposition in virtue of their conventional semantic meaning. Building on Abusch (2010) and Simons (2001), among others, Simons et al. (2016) propose that the conventional semantic meaning determines the factive implication to be asserted, rather than semantically presupposed, content. Simons et al. credit the pragmatic properties and projection behavior of the factive implication to listener’s reasoning in discourse. Naturally, this approach is motivated by the sort of observation that motivates local accommodation in the traditional approach, that is, by the observation that under certain conditions, the factive implication behaves much like asserted content. In this view, the question why accommodation of the the factive presupposition is unavailable in factive island cases turns into the question why in factive island cases the factive presupposition obligatorily arises and projects in the first place. This version of the question, too, we must leave unanswered.

In the remainder of this paper, we will continue to operate under the assumption that factive presuppositions are triggered in virtue of the embedding predicate’s conventional semantic meaning, and we leave open the question how the account could be reformulated under the alternative approach of Simons et al. (2016).

4.2 Triviality in plausible contexts and uninterpretability

We have said that the answerability analysis identifies uniqueness as a crucial ingredient of the factive island effect. In our running example in (17), repeated here again as (46), uniqueness is guaranteed by the semantic content of the factive verb’s complement. However, not all cases that have been presented to illustrate the factive island effect share this feature. Consider again the example in (1b) (from Oshima 2007), repeated here as (47).

(46) *Which of the girls does Fred know is the tallest member of our team?

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

It is surely natural to assume that no more than one person has the property denoted by the complement of *know* in (47). However, this uniqueness assumption is not guaranteed by the semantic content of this complement alone, as it depends on certain logically contingent assumptions about marriages and Alice. In this case, then, the uniqueness assumption in (19) is not semantically guaranteed. As a consequence,

The former group is exemplified by *regret*, the latter by *discover*. The predicate *know* seems to pattern with the semi-factives, which makes it all the more interesting that local accommodation is unavailable in factive island cases with *know*, such as most of the factive island questions that we discuss in this paper.

the answerability condition and the existence presupposition can both be satisfied, viz. by suitable context sets that fail to entail that Alice got married to at most one person on June 1st. And yet, Oshima reports that (47) is judged uninterpretable.

Under the answerability analysis, this finding calls for a weakening of the condition we have so far held responsible for the perceived uninterpretability of a sentence. We cannot require the absence of any *logically possible* context set in which the sentence meets every felicity condition, as stated in the uninterpretability principle (26), repeated here as (142).

- (48) Uninterpretability principle
 A question with denotation Q is uninterpretable if
 there is no c such that $c \succ Q$

To accommodate cases like (47), we must give up on the assumption that uninterpretability is a context-independent notion. We will now say that for uninterpretability to arise, it is sufficient for the sentence to be infelicitous in all logically possible context sets that are *accesssible from the actual context*. A context set is considered accessible in virtue of entailing certain entrenched background assumptions that are also entailed by the actual context set. In the assessment of (47), the relevant background assumption is that no one gets married to two different people on the same day, and the sentence is assumed to be excluded as uninterpretable by virtue of being infelicitous in any context set that entails this background assumption. The revised uninterpretability principle is stated in (49).

- (49) Uninterpretability principle
 A question with denotation Q is uninterpretable relative to c if
 there is no c' such that c' is accessible from c & $c' \succ Q$

Much the same comments apply under the contradiction analysis. The contradiction analysis, too, must be weakened in order to accommodate cases like (47). The contradiction analysis must construe contradictions as relative to certain background assumptions entailed by the actual context set. For a question to be uninterpretable, it is not necessary for the universally projected presupposition to be logically contradictory, but it is sufficient for this presupposition to contradict any context set that is accessible in the relevant sense. In the case of (47), the background assumption required for accessibility is again the entailment that no one gets married to two different people on the same day, which contradicts the universal presupposition that everyone got married to Alice on June 1st.

The notion of accessibility appealed to in these amendments of the two analyses certainly remains to be characterized in more detail. However, since our focus will be on the differences between the two analyses rather than amendments they both require, we will limit ourselves to a couple of remarks. First, the accessibility relation

is reflexive, as the actual context set shares all the background assumptions with itself. As a consequence, we expect uninterpretability to be obviated in a scenario that explicitly denies the relevant uniqueness assumption. For example, embedded in the discourse in (50), the question in (47) is expectedly interpretable.

- (50) A: I can tell you that Alice got married to Alan, Bill, and Carl, all on the same day, viz. June 1st of this year.
 B: That's an important piece of information. But of those three men, who does Max know that Alice got married to on June 1st?

Second, the content of the accessibility relation between context sets is itself context dependent. Even if the actual context entails that Alice did not marry more than one person that day, this assumption might in some contexts not be sufficiently entrenched to be carried over to all accessible context sets. Some listeners might find it rather unremarkable for someone to get married twice on the same day, and might therefore be willing to let go of the relevant assumption about Alice. In that case, context sets consistent with such multiple marriages will be accessible, hence (47) is predicted to be judged as interpretable by such interlocutors. Similarly, it is expected that, confronted with an utterance of (47), pressure to preserve interpretability might lead some listeners to revise their background assumptions on the fly by giving up the prior assumption that no one gets married to more than one person on the same day. Instead of a judgment of uninterpretability, (47) would then be predicted to merely give rise to a perception of oddness, caused by the pressure to abandon an entrenched background assumption. It seems clear enough that these expectations are correct in that such context dependency of the uninterpretability of (47) is indeed attested. As announced, however, we leave further investigation of the notion of accessibility for the purposes of uninterpretability to future work.

4.3 Interpretable triviality

Both the answerability analysis and the contradiction analysis as spelled out in Osima (2007), Abrusán (2011, 2014), and above suffer from incorrectly excluding certain questions that are predicted to be trivial in meaning, but that are also judged to be merely trivial, rather than uninterpretable. Consider, for example, the question in (51).

- (51) Which girl is as tall as herself?

In this case any Hamblin/Karttunen answer is the proposition that x is as tall as x , for some individual x . Since any such proposition is tautologous, any Hamblin/Karttunen answer is entailed by any logically possible context set. Therefore, (51) violates the answerability condition in any logically possible context set. Under the unadorned

answerability analysis, then, (51) is predicted to be uninterpretable. This prediction is clearly incorrect. (51) is judged to be easily interpretable, viz. as a trivial question whose answers are bound to be true. This is a case, then, where the necessary violation of a felicity condition does not result in uninterpretability.

A similar issue arises under the contradiction analysis, as illustrated by the question in (52). In this case, any Hamblin/Karttunen answer carries the contradictory factive presupposition that x is faster than x , for some individual x . Accordingly, the presupposition that arises from the hypothesized universal projection will of course be contradictory, too. Hence, the contradiction analysis predicts (52) to be uninterpretable.

(52) Which of these girls does Fred know is faster than herself?

This prediction, too, is clearly incorrect. In parallel to (51), (52) is judged to be easily interpretable, viz. as a trivial question whose answers carry presuppositions that are bound to be false.

The issues raised by the examples in (51) and (52) are instances of a general problem that arises under the view underlying the analyses examined here, viz. Barwise and Cooper's (1981) hypothesis that triviality of meaning can cause judgments of uninterpretability. Since it is evident that triviality does not always result in uninterpretability (e.g., Keenan 1987, Heim 1991) a central question under this hypothesis is how to set apart the class of cases where triviality results in uninterpretability from those where it does not. Possible answers to this question are discussed in Gajewski (2002) and Abrusán (2014, ch. 6). However, as far as we can see, none of the solutions that have been proposed apply to the particular instances of the problem presented here.

We will not attempt a solution under either analysis of factive islands considered here, but we will articulate two obvious possible generalizations invited by the data considered so far. Under the answerability analysis, what sets (51) apart from factive island cases is that (51) violates the same felicity condition in all possible context sets, viz. the answerability condition, while factive island cases violate only the answerability condition in some context sets and only the existence presupposition in others. This suggests the possible generalization that necessary infelicity causes uninterpretability only if due to the inconsistency of two or more felicity conditions. Under the contradiction analysis, (52) differs from factive island cases in that contradictoriness of the presupposition is not dependent on universal presupposition. Given that any Hamblin/Karttunen answer to (52) is itself contradictory, existential projection would be sufficient to derive a contradictory presupposition of the question. This suggests the possible generalization that only contradictions that arises through universal projection causes uninterpretability.¹⁴

¹⁴However, this generalization is too narrow to accommodate all the cases in the literature where contradictory presuppositions have been held responsible for uninterpretability. In particular, the

Looking ahead, the phenomena to be examined in section 5 and 6 turn out to be consistent with the above speculations, as in the relevant cases uninterpretability correlates with necessary infelicity caused by the conspiracy of two felicity conditions and/or by a contradiction that arises from universal projection.

4.4 Obviation effects

When we introduced the factive island effect in section 1, we identified uniqueness as an ingredient of the effect by presenting acceptable controls where uniqueness is absent. We now draw attention to a general method for turning factive island examples featuring uniqueness into acceptable examples without uniqueness: the addition of an existential operator in the scope of the factive predicate. This is illustrated by the contrast in (53) (where (a) again repeats Oshima’s 2007 factive island example in (1b)).

- (53) a. *Who does Max know that Alice got married to on June 1st?
 b. Who does Max know that Alice was allowed to get married to on June 1st?

Example (53b) features the deontic possibility modal *allowed* within the embedded clause. This possibility modal, an existential operator, effectively breaks uniqueness by distributing the relevant implication over different possible worlds. Even if we assume there is only one person that Alice got married to on June 1st, and that the same is true for any given permissible world, there may well be more than one individual such that Alice married that individual in *some* permissible world.

Adopting terminology of Fox and Hackl (2006), Abrusán (2011, 2014) refers to this phenomenon as *modal obviation*. Note that the modal obviation effect in factive islands is straightforwardly accounted for under both the answerability analysis and the contradiction analysis: by removing uniqueness, a possibility modal allows for the existence presupposition and the answerability condition to be consistent; likewise it allows for the conjunction of the presuppositions of all the Hamblin/Karttunen answers in the question extension to be non-contradictory. However, it is important to be aware of the effect in the study of factive islands, as we will illustrate in section 7.¹⁵

We also note that the obviation effect can be demonstrated for existential quantification in general, not just for existential quantification over possible worlds con-

generalization is not consistent with the proposal in Krifka (1995), Lahiri (1998), and Crnič (2011) that judgments of uninterpretability associated with the scalar particle *even* in certain configurations can be credited to contradictory presuppositions.

¹⁵We read Abrusán (2011) as claiming that the modal obviation effect remains unaccounted for under the answerability analysis (Abrusán 2011, p. 269; Abrusán 2014, p. 33). However, Abrusán does not substantiate this claim.

tributed by possibility modals. This is illustrated by the contrast in (54) (where (a) repeat’s Szabolcsi and Zwarts’s 1993 example (1a)).

- (54) a. *From whom do you regret having gotten this letter?
 b. From whom do you regret having gotten a letter?

Example (54b) features the existential indefinite *a letter* instead of the referential demonstrative *this letter* in (54a). Even if it is assumed that for any given letter, there is a unique individual who sent it, there can be more than one individual such that there is *some* letter which that individual sent. Hence the existential quantification contributed by the indefinite in (54b) breaks uniqueness and (54b) is expectedly acceptable under both the answerability analysis and the contradiction analysis.

In this section, we have surveyed a number of issues that arise in both of the analyses of factive islands that we investigate in this paper. We now turn to the question whether or how these analyses can be differentiated. In section 5 and 6, we search for independent evidence in support of the two analyses.

5 Evidence for the answerability condition

As noted at the outset, when comparing and evaluating the two analyses of factive islands introduced above, it is important to realize that they might both be correct. That is, factive island questions might well be afflicted by two independent sources of uninterpretability. Factivity and uniqueness may conspire to give rise to a contradictory universally projected presupposition, as the contradiction analysis has it, and at the same time render the question’s existence presupposition inconsistent with the answerability condition, as under the answerability analysis.

This means that canonical instantiations of the factive island effect are actually ill-suited to support arguments for the assumptions underlying either analysis. The possible conflict between the answerability condition and the existence presupposition constitutes a confound for an argument that uninterpretability can arise from contradictory presupposition; likewise, the possibility of a contradictory presupposition presents a confound for an argument in favor of the answerability condition as an ingredient of uninterpretability. In search of independent support for the ingredients of either account, we will therefore now turn to investigations of phenomena other than (canonical instances of) factive islands, where the confounds described above are avoided. In this section, we discuss constraints on questions that we interpret as independent evidence for the answerability condition as an ingredient of uninterpretability; section 6 then examines possible independent evidence for uninterpretability arising from a contradictory presupposition due to universal projection.

5.1 Referential islands

We take so-called referential DP-islands to provide independent motivation for the answerability condition. We identify the answerability condition as the central ingredient of Simonenko’s (2015) analysis of this effect. Below we briefly introduce the phenomenon and outline Simonenko’s analysis, slightly simplified and couched in the format introduced above.

Starting with Ross (1967), it has been observed that certain determiner phrases (DPs) are islands for *wh*-subextraction in question formation. In particular, English DPs headed by demonstratives typically ban *wh*-subextraction. This island effect is illustrated by (55), whose unacceptability is due to *wh*-subextraction from a DP headed by the demonstrative determiner *that*.

(55) *Which team did they arrest that violent fan of?

Simonenko (2015) proposes that the property of demonstrative DPs that prevents *wh*-phrases to subextract from them is that they are directly referential in the sense of Kaplan (1989). By virtue of being directly referential, a demonstrative DP picks out a fixed, contextually determined, individual as its denotation.¹⁶ So analyzed, the denotation of a demonstrative DP cannot vary with the interpretation of a variable that it might contain. The denotation of the demonstrative DP *that violent fan of* in (55) is a fixed individual, call it *r*, and is accordingly independent of the semantic value of the *wh*-trace in the complement position of *of*.

Consider again the Hamblin/Karttunen semantics in (7), repeated in (56). The question in (55), where **R** and **S** take on the values in (57), has the denotation in (58).

(56) Hamblin/Karttunen semantics
 $\lambda w. \{ \mathbf{S}(x) \mid \mathbf{R}(x)(w) \}$

(57) **R** = $\lambda x. \lambda w. x$ is a team in *w*
S = $\lambda x. \lambda w. \text{they arrested } r \text{ in } w$

(58) $\lambda w. \{ \lambda v. \text{they arrested } r \text{ in } v \mid x \text{ is a team in } w \}$

Note that the property **S** in (57) is a constant function. It maps any input individual to the same proposition, viz. the proposition that they arrested *r*. That proposition is the only one that will be in the question extension in any context set world. So the direct referentiality of the DP in which the *wh*-movement originates ensures that

¹⁶In those contexts where demonstratives have been argued to demonstrate quantificational behaviour (King 2001, a.o.), Simonenko (2014) shows that they allow for *wh*-subextraction, which confirms that the immediate culprit of the DP-island effect is direct referentiality.

relative to the context set, the extension of the question is *rigid* in the sense stated in (59).

$$(59) \quad \text{extension rigidity} \\ |\{p: \exists w[w \in c \ \& \ p \in Q(w)]\}| \leq 1$$

Given extension rigidity, it can be shown that, once again, the answerability condition is inconsistent with the existence presupposition. The two felicity conditions are listed in (60) and (61), repeated from (16) and (21) above.

$$(60) \quad \text{Answerability condition} \\ c \succ Q \text{ only if } \exists p[\exists w[w \in c \ \& \ p \in Q(w)] \ \& \ c \subseteq \text{dom}(p) \ \& \ c \not\subseteq p \ \& \ c \cap p \neq \emptyset]$$

$$(61) \quad \text{Existence presupposition} \\ c \succ Q \text{ only if } c \subseteq \{w: \exists p[p \in Q(w) \ \& \ p(w)]\}$$

We note first that, if there is at most one proposition that is a member of any question extension in the context set (extension rigidity) and in every context set world there is a proposition in the question extension that is true (existence presupposition), then in every context world, *the* proposition that is a member of a question extension in the context set is true. This consequence is stated in (62).

$$(62) \quad \text{from extension rigidity, existence presupposition} \\ c \subseteq \iota p[\exists w[w \in c \ \& \ p \in Q(w)]]$$

Second, if there is at most one proposition that is a member of any question extension in the context set (extension rigidity) and in some context set world there is a proposition in the question extension that the context set does not entail (answerability condition), then in some context world, *the* proposition that is a member of a question extension in the context set is false. This consequence is stated in (63).

$$(63) \quad \text{from factivity plus uniqueness, answerability condition} \\ c \not\subseteq \iota p[\exists w[w \in c \ \& \ p \in Q(w)]]$$

Given the inconsistency of the consequences in (62) and (63), extension rigidity guarantees that referential island question necessary violate some or other felicity conditions. Simonenko accordingly analyzes referential island questions as uninterpretable by virtue of being necessarily infelicitous. In this account of referential islands, then, answerability plays much the same role that it does under the answerability analysis of factive islands.

In contrast, assuming the question denotation in (58), the contradiction analysis does not have the intended effect for (55). This follows immediately from the fact that

(58) does not assign presuppositional content to the Hamblin/Karttunen answers. Of course, it is conceivable that (58) is not the correct question meaning. As suggested by an anonymous reviewer, it is conceivable in particular that instead of (58), the correct meaning for (55) is as in (64).

$$(64) \quad \lambda w. \{ \lambda v: \{ y: r \text{ is a fan of } y \text{ in } v \} = x. \text{ they arrested } r \text{ in } v \mid \\ x \text{ is a team in } w \}$$

According to (64), each Hamblin/Karttunen answer presupposes, for some individual x , that r is a fan of x and of nothing else. To be sure, assuming this denotation, universal projection (in conjunction with restrictor plurality) would derive a contradictory presupposition. However, in order for such an analysis to be a real contender, there would need to be some independent motivation for positing such a uniqueness presupposition for the Hamblin/Karttunen answers for (55). Since we are not aware of such independent motivation, we conclude that the contradiction analysis does not predict the referential island effect. This effect therefore furnishes independent motivation for the answerability condition and hence lends support to the answerability analysis of factive islands.¹⁷

5.2 Restrictor uniqueness

We now turn to yet another effect in wh-questions that we propose the answerability condition can help us understand, an effect that does not seem to have been analyzed previously.

¹⁷Actually, Simonenko (2015) does assume that the Hamblin/Karttunen answers (55) carry a presupposition, a complication we have omitted in our simplified report in the main text. Applying Schwarz's (2009) analysis of so-called strong definites, Simonenko is led to posit an analysis under which the intension of (55) is (i), rather than (58).

$$(i) \quad \lambda w. \{ \lambda v: r \text{ is a fan of } x. \text{ they arrested } r \text{ in } v \mid x \text{ is a team in } w \}$$

However, the answer presupposition in (i) is evidently weaker than the answer presupposition in (64), given that only the former encodes uniqueness, hence only the former could derive a contradictory presupposition. Refining our assessment in the main text, then, there are reasons for assuming that the relevant Hamblin/Karttunen answers carry a presupposition, but we are not aware of evidence for the uniqueness presupposition encoded in (64). Moreover, just like (58), (i) necessarily violates either the existence presupposition or the answerability condition. (We invite readers to verify this for themselves or to consult Simonenko 2015.) This means that our simplification in the main text is indeed harmless for the purposes at hand.

5.2.1 The restrictor uniqueness effect

Wh-questions do not allow for the wh-restrictor to denote uniquely, describing a property that cannot hold of more than one individual. This generalization, we will call it the *restrictor uniqueness* effect, is illustrated by the examples in (65). The perceived deviance of these examples correlates with the fact that the predicates *weight of our bag*, *fact that Emma smokes*, and *oldest member of our team* denote uniquely.

- (65) a. *Which weight of our bag is over 10kg?
 b. *Which fact that Emma smokes was unexpected?
 c. *Which oldest member of our team resigned?

By virtue of necessarily having extensions that contain no more than one individual, uniquely denoting wh-restrictors relate to the context set as stated in (66).

- (66) Restrictor uniqueness
 $c \subseteq \{w: |\{x: \mathbf{R}(x)(w)\}| \leq 1\}$

The restrictor uniqueness effect accordingly invites one to stipulate the felicity condition on wh-questions in (67), which excludes uniquely denoting restrictors as infelicitous. As desired, this felicity condition would ensure that wh-questions with uniquely denoting wh-restrictors are necessarily infelicitous.

- (67) Restrictor non-uniqueness
 $c \succ Q$ only if $c \not\subseteq \{w: |\{x: \mathbf{R}(x)(w)\}| \leq 1\}$

We have already encountered a felicity condition that entails the restrictor non-uniqueness condition in (67). In spelling out the contradiction analysis in section 3 above, we noted that it relies on the restrictor plurality condition in (43), repeated here as (68).

- (68) Restrictor plurality
 $c \succ Q$ only if $c \subseteq \{w: |\{x: \mathbf{R}(x)(w)\}| > 1\}$

Note that (68) is a stronger condition than (67). While (67) is met as long as the restrictor's extension has more than one element in *some* context world, (68) requires that it have more than one element in *all* context worlds.

What (67) and (68) have in common is that they are unlikely to be theoretical primitives, but should presumably be consequences of more general constraints on the use of questions. We will now show that, assuming (a version of) the answerability condition, this is possible for the non-uniqueness condition in (67), and with an additional assumption, for the stronger plurality condition in (68).

5.2.2 Strengthening the answerability condition

The version of the answerability condition in (16), repeated here again as (69), requires that the extension of a question contain a proposition that can serve as a felicitous answer. More precisely, the answerability condition requires the existence of a felicitous answer that belongs to the question extension in *some* context set world.

- (69) Answerability condition
 $c \succ Q$ only if $\exists p[\exists w[w \in c \ \& \ p \in Q(w)] \ \& \ c \subseteq \text{dom}(p) \ \& \ c \not\subseteq p \ \& \ c \cap p \neq \emptyset]$

As foreshadowed in section 2, we will now strengthen the answerability condition. We now require the existence of a felicitous answer that is in the question extension in *all* context set worlds. That is, we will replace (69) with the strengthened version in (70). We note that the strengthened answerability condition will still support our analysis of factive islands in section 2 and the analysis of the referential island effect in 5.1, as the reader is invited to verify.

- (70) Answerability condition
 $c \succ Q$ only if $\exists p[\forall w[w \in c \rightarrow p \in Q(w)] \ \& \ c \subseteq \text{dom}(p) \ \& \ c \not\subseteq p \ \& \ c \cap p \neq \emptyset]$

We will demonstrate shortly that the strengthened answerability condition in (70) supports a straightforward account of the restrictor uniqueness effect. But first we note that the move from (69) to (70) is independently motivated. We have said that the answerability condition can be thought of as tracing idealized question-answer exchanges. This invites us to evaluate the answerability condition in relation to intuitions about actual, linguistically realized, question-answer dialogues. Consider, for example, the dialogue in (71), from Krifka (2011).

- (71) a. Which novel by Tolstoy did Bill read?
 b. Bill read *Crime and Punishment*.

Krifka reports that the statement in (71b) is judged infelicitous as an answer to the question in (71a), given that *Crime and Punishment* is not a novel by Tolstoy. Restating Krifka's description, the dialogue in (71) is judged infelicitous relative to a context set that (correctly) entails *Crime and Punishment* to be a novel by Dostoyevsky, rather than Tolstoy. Expanding on this observation, we note that a literarily uneducated bystander overhearing the dialogue in (71) would naturally draw the (incorrect) inference that *Crime and Punishment* is a novel by Tolstoy. Taken together, these observations suggest that as an answer to (71a), the statement in (71b) presupposes that *Crime and Punishment* is a novel by Tolstoy. If it is not satisfied, this

presupposition can give rise to a judgment of infelicity, if the context set is taken to be inconsistent with it, or else it can be accommodated.¹⁸

In general terms, the presupposition perceived in (71) is that the wh-phrase's correlate in the answer (here *Crime and Punishment*) has the property denoted by the wh-phrase's restrictor (here *novel by Tolstoy*). Put differently, the answer carries the presupposition that it is an element of the question's Hamblin/Karttunen extension. This is precisely the condition imposed on felicitous answers in the strengthened answerability condition in (70). We therefore conclude that this condition is motivated by considerations that are independent of the restrictor uniqueness effect, hence that the strengthening of the answerability condition proposed here incurs no additional theoretical cost.

5.2.3 Deriving the restrictor uniqueness effect

Assuming the strengthened answerability condition, the restrictor non-uniqueness condition in (67) can now be derived, thereby accounting for the restrictor uniqueness effect. The derivation is transparently parallel to the reasoning under the answerability analysis of factive and referential islands. It assumes, once again, that questions carry an existence presupposition, hence that questions are subject to the felicity condition in (21), repeated here again as (72).

$$(72) \quad \begin{array}{l} \text{Existence presupposition} \\ c \succ Q \text{ only if } c \subseteq \{w: \exists p[p \in Q(w) \ \& \ p(w)]\} \end{array}$$

Restrictor uniqueness stated in (66) guarantees (73), that is, it guarantees that in every context set world, there is at most one proposition in the question extension.

$$(73) \quad \begin{array}{l} \text{Restrictor uniqueness} \\ c \subseteq \{w: |\{p: p \in Q(w)\}| \leq 1\} \end{array}$$

Restrictor uniqueness in (73) can be shown to guarantee that the question either violates the strengthened answerability condition (70) or that the existence presupposition is not met, so that (72) is violated. This will establish restrictor non-uniqueness as a necessary condition on the felicity of the question, deriving the condition in (67).

¹⁸Weir (2014) and Jacobson (2016) observe that linguistic answers like (71b) do not always carry the presupposition identified here. Jacobson reports that such non-presuppositional interpretations are facilitated by a fall-rise contour (Ward and Hirschberg 1985) in the pronunciation of the answer. On the other hand, Weir and Jacobson observe that so-called fragment answers, such as bare *Crime and Punishment* in response to (71a), always carry the presupposition in question. Aligned with views expressed in Krifka (2011), Weir (2014) and Jacobson (2016), we assume here that the linguistic answers where the relevant presupposition is attested should be considered as the basic case in a theory of questions and question-answer dialogues.

To show this, we first note that if in every context set world there is no more than one proposition in the question extension (restrictor uniqueness) and at least one proposition that is true (existence presupposition), then in every context world, *the* proposition in the question extension is true.

- (74) from restrictor uniqueness, existence presupposition
 $c \subseteq \{w: [\iota p. p \in Q(w)](w)\}$

On the other hand, if in every context set world there is no more than one proposition in the question extension (restrictor uniqueness), and there is a proposition that is in the question extension in every context set world and that is false in some context set world (answerability condition), then there is some context set world where *the* proposition in the question extension is false.

- (75) from restrictor uniqueness, answerability condition
 $c \not\subseteq \{w: [\iota p. p \in Q(w)](w)\}$

Since the consequences in (74) and (75) are contradictory, we have derived the felicity condition in (67), thereby accounting for the restrictor uniqueness effect as another case of uninterpretability due to necessary infelicity. The role of the answerability condition in this derivation is fully parallel to its role in the answerability analysis of factive and referential islands.

On the other hand, the contradiction analysis is not equipped to capture the restrictor uniqueness effect. After all, the Hamblin/Karttunen answers in such cases need not carry presuppositions to begin with, let alone presuppositions that would feed into universal projection to derive a contradiction. (In fact, we can be sure that there are no cases of the restrictor uniqueness effect where universal projection has this effect, precisely because the restrictor denotes uniquely in these cases.) Therefore, the restrictor uniqueness effect adds independent evidence for the utility of the answerability condition employed in the analysis of factive islands.

5.2.4 Deriving restrictor plurality?

We conclude this section with a proposal regarding the relation between the restrictor non-uniqueness condition in (67), repeated in (76), and the stronger restrictor plurality condition in (68), repeated once more in (77).

- (76) Restrictor non-uniqueness
 $c \succ Q$ only if $c \not\subseteq \{w: |\{x: \mathbf{R}(x)(w)\}| \leq 1\}$

- (77) Restrictor plurality
 $c \succ Q$ only if $c \subseteq \{w: |\{x: \mathbf{R}(x)(w)\}| > 1\}$

So far, we have merely derived the weaker condition. We saw in section 3, however, that intuitions about the interpretation of *wh*-questions seem to support the stronger condition. We observed that (42), repeated below as (78), gives rise to the inference that Group A contains more than one girl.

(78) Which girl in Group A scored a goal?

Given (77), this plurality inference could be understood as a case of presupposition accommodation. One would therefore hope to be able to motivate an additional premise about the interpretation of questions which would allow us to strengthen restrictor non-uniqueness into restrictor plurality.

We will present such an additional premise shortly. First, though, we draw attention to a data point in support of the analysis as developed so far, specifically the assumption that restrictor plurality is dependent on the satisfaction of the answerability condition. While we have presented the answerability condition as a condition on questions in general, it appears that questions allow for uses where this condition is systematically violated. So-called rhetorical questions are a case in point. Following Caponigro and Sprouse (2007), we view rhetorical questions as questions that are used in context sets that settle all of the Hamblin/Karttunen answers in the question extension. In the cases that are most prominent in the literature, the context set entails all the answers to be false, as in Caponigro and Sprouse’s example *After all, who lifted a finger to help Luca?*. But Caponigro and Sprouse point out that this is not a necessary feature of a rhetorical question. For example, we can easily imagine a use of the question in (79) where the speaker and listener share the assumption that (only) the speaker did all of the dishes the previous evening.

(79) Stop saying that I’m not doing my share! After all, which member of this family did all of the dishes last night?

Rhetorical questions therefore, by their very nature, routinely violate the answerability condition. We predict, therefore, that in rhetorical *wh*-questions restrictor plurality inferences may be absent.

This prediction appears to be correct. The rhetorical question (80) differs from (79) in featuring a *wh*-restrictor that in virtue of its semantic content could apply to just one person, as there could well be just one overworked female family member. The relevant observation is that the interpretation of the question in fact fails to invite the inference that there is more than one such family member. As predicted, then, in this rhetorical questions the plurality inference is absent.

(80) Stop saying that I’m not doing my share! After all, which overworked female member of this family did all of the dishes last night?

Returning now to the desired strengthening of restrictor non-uniqueness to restrictor plurality, we note that the weakest premise with the intended effect is the “excluded middle” assumption stated in (81), according to which the restrictor extension has at most one member in all context set worlds or has more than one member in all context set worlds. Assuming that the excluded middle assumption holds, restrictor non-uniqueness and restrictor plurality collapse into the same condition.

$$(81) \quad \text{Excluded middle assumption} \\ c \subseteq \{w: |\{x: \mathbf{R}(x)(w)\}| \leq 1\} \vee c \subseteq \{w: |\{x: \mathbf{R}(x)(w)\}| > 1\}$$

We propose that the excluded middle assumption is the consequence of a stronger requirement imposed by yet another felicity condition on wh-questions, which we will refer to as *restrictor homogeneity*. According to this condition, for a wh-question to be used felicitously, the context set must completely settle the extension of the restrictor, that is, the restrictor must pick out the same set of individuals in every context set world. Couched in the familiar format, the homogeneity condition reads as in (82).

$$(82) \quad \text{Restrictor homogeneity} \\ c \succ Q \text{ only if } \forall w, w' \in c [\mathbf{R}(w) = \mathbf{R}(w')]$$

Restrictor homogeneity entails that the wh-restrictor’s extension has the same cardinality in all context set worlds, and hence entails the excluded middle assumption.¹⁹

Restrictor homogeneity amounts to the requirement that the interlocutors agree on the membership of the set described by the wh-restrictor, that is, they agree on the (complete) membership of a set of individuals that the question is about. This entails that they agree on the set of Hamblin/Karttunen answers to the question from which the true answers are drawn. This appears to be a reasonable condition to impose on the use of a question. For example, a successful use of (78) indeed seems to require that the speaker and the listener agree on who the girls in Group A are.

Note also that (82) might help explain why wh-phrases must often be understood as being subject to tacit domain restriction, a phenomenon more familiar from the study of quantificational determiners (e.g. Westerståhl 1985; von Stechow 1994; Stanley and Szabó 2000). Consider, for example, the garden-variety wh-question in (83). At first sight, restrictor homogeneity is unlikely to be satisfiable in this case, since it is hard or impossible in realistic scenarios for the speaker and hearer to agree on the full extension of the bare noun *girl*.

¹⁹Note that restrictor homogeneity ensures that the question extension is constant across the context set worlds. Therefore, assuming restrictor homogeneity, the weak and strong versions of the answerability condition in (69) and (70) collapse. So, assuming (82), we could return to the weaker in version (69) without a change in predictions.

(83) Which girl scored a goal?

However, the *wh*-phrase in (83) can be understood as tacitly restricted, referring to a particular set of girls (such as the set of girls in Group A), a set that must have been raised to salience in the context where (83) is used. Given this tacit domain restriction, for satisfaction of restrictor homogeneity it is then sufficient for the interlocutors to agree on the membership of that salient set. The intuition that tacit domain restriction is required in questions like (83) can accordingly be analyzed as a consequence of restrictor homogeneity.²⁰

We propose, then, that it is restrictor homogeneity that strengthens restrictor non-uniqueness to restrictor plurality. We leave a comprehensive assessment of this proposal to future research. But we would like to point to one observation that we take to support it. Consider the question in (84), whose content easily allows one to imagine it being used in a quiz show.

(84) Which Italian mathematician who won the Fields Medal in 1981 died yesterday at the age of 79?

Note that, in the quiz show context, (84) is surely appropriate without the quizmaster and the candidate agreeing on the membership of the set of Italian mathematician who won the Fields Medal in 1981. The use of the question does not require any prior reference to this set or its membership, and it is quite possible for an unfortunate candidate to have to accommodate the question's existence presupposition by inferring that the set is not empty. Such quiz show questions, then, routinely violate the restrictor homogeneity condition, an observation that we will here just take as a given. The relevant observation is now that (84) does not support a restrictor plurality inference, either. The question certainly does not encourage the candidate or the audience to infer that there is more than one Italian mathematician who won the Fields Medal in 1981. This observation supports the proposed derivation of the restrictor plurality condition, under which (77) is dependent on the satisfaction of the homogeneity requirement.²¹

²⁰This recalls Pesetsky's (1987) notion of *D-linking* with *which*-questions: "[...] *which*-phrases are *discourse linked* (*D-linked*) [...]. When a speaker asks a question like *which book did you read?*, the range of felicitous answers is limited by a set of books both speaker and hearer have in mind. If the hearer is ignorant of the context assumed by the speaker, a *which*-question is odd". We speculate that D-linking can be understood as domain restriction driven by the pressure to meet the homogeneity requirement. The question left open here is why D-linking would be restricted to *which*-questions, as Pesetsky proposed.

²¹Aligned with this observation, it seems to us that (84) can receive the close paraphrase *Which Italian mathematician won the Fields Medal in 1981 and died yesterday at the age of 79?*, where part of the restrictor has been moved to become part of the scope. It appears as though in this type of question the syntactic division between restrictor and scope does not have semantic significance. Material in the restrictor is not actually interpreted as the restrictor, but is interpreted as though it was part of the scope. Note that garden-variety information seeking questions are clearly different

To summarize this section, we have presented two phenomena independent of the factive island effect, viz. referential islands and the restrictor non-uniqueness effect, that the answerability condition can help us understand. We have also argued that an analysis in terms of contradictory universal presuppositions does not have the intended effect in these cases, at least not without additional stipulations. In the absence of alternative analyses, we conclude that the answerability condition, and hence the answerability analysis of factive islands, has considerable independent support. Moreover, given that the restrictor plurality condition is a required premise under the contradiction analysis of factive islands, if our derivation of this condition is correct, the answerability condition is needed even under the contradiction analysis of factive islands. We accordingly need to qualify our earlier claim (at the start of this section) that canonical instances of factive islands cannot be used to argue for the assumptions underlying either the answerability or the contradiction analysis. In the absence of an alternative account of restrictor plurality, even canonical factive island examples furnish an argument for the answerability condition. This is of course fully consistent with the assumptions underlying the contradiction analysis being correct as well. In the next section, we examine possible independent evidence for these assumptions.

6 Evidence for the contradiction analysis

Having presented evidence for the answerability condition that is independent of factive islands, we will now consider analogous potential arguments for the contradiction analysis. We will look for evidence other than canonical factive island cases for the assumption that universal projection of presupposition can give rise to contradictory presuppositions that result in uninterpretability. To this effect, we will consider two variants of factive island questions. In these variants, the answerability analysis is not applicable or predicts contingent felicity, so that attested uninterpretability in these cases would support the contradiction analysis of factive islands. In section 6.1, we examine the effect of contradictory presuppositions that project universally from under quantificational expressions in statements, rather than questions; in section 6.2, we consider wh-questions which generalize the conflict between plurality and uniqueness held responsible for factive islands under the contradiction analysis. Even though speaker judgments on some of the central data points are difficult, we interpret the findings as furnishing limited independent evidence for the assumptions underlying the contradiction analysis of factive islands.

in this respect. For example, we take it that *Which girl is in Group A and scored a goal?* is not a good paraphrase of *Which girl in Group A scored a goal?*, precisely because the two questions invite different plurality inferences.

6.1 No factive islands without questions

In contrast to the answerability analysis, the contradiction analysis, as developed in Abrusán (2011, 2014) and in section 3, does not posit any assumptions that are specific to questions. Universal projection of presuppositions is indeed not limited to questions. Starting with Heim (1983), presuppositions have been observed to project universally from under certain quantificational determiner phrases (DPs) in statements. Chemla (2009) reports, in particular, that presupposition reliably project universally from under determiner phrases headed by the determiner *no*. For example, Chemla observes that (85), where *his* is to be read as bound by *none of these ten students*, presupposes that the father of each of these 10 students is going to receive a congratulation letter.

- (85) None of these 10 students knows that his father is going to receive a congratulation letter.

We can describe the projection facts with *no* as shown in (86), adapting (36) above. Applied to (85), the restrictor property **R** is the property of being one of these ten students and **P** is the property of having a father who will receive a congratulation letter.

- (86) Universal projection
 $c \succ no \ R \ S$ only if $c \subseteq \{w: \forall x[\mathbf{R}(x)(w) \rightarrow \mathbf{P}(x)(w)]\}$

Under the contradiction analysis, therefore, the expectation might be that the uninterpretability attested in factive island can be reproduced in quantificational statements with *no*. If such cases were uninterpretable, they would furnish a compelling argument for the contradiction analysis, given that the answerability analysis makes no predictions about such statements.²²

The required ingredients are factivity plus uniqueness as well as restrictor plurality shown in (87), which repeats (37) and (39). To construct a test case with the relevant profile, we can modify our running factive island example (17), repeated again in (88), substituting the determiner *no* for the wh-word *which*, which leads us to an example like (89).

- (87) a. Factivity plus uniqueness
 $c \subseteq \{w: |\{x: \mathbf{P}(x)(w)\}| \leq 1\}$

²²Note that in contrast to the wh-phrase in factive islands, the quantificational determiner phrase *none of these ten students* has not moved from the complement in the factive verb, and hence does not bind a trace left by movement from that complement. Instead, the quantificational determiner phrase serves as the factive predicate's subject and the variable it binds takes the form of the pronoun *his*. However, the contradiction analysis of factive islands does not actually make reference to such syntactic details, which are therefore not expected to affect judgments.

- b. Restrictor plurality
 $c \subseteq \{w: |\{x: \mathbf{R}(x)(w)\}| > 1\}$

(88) *Which of the girls does Fred know is the tallest member of our team?

(89) None of these girls knows that she is the tallest member of our team.

Universal projection is predicted to result in (89) carrying the contradictory presupposition that each of these girls is the tallest member of our team. Speaker intuitions bear out this prediction. That is, sentence (89) is indeed judged to carry this contradictory presupposition. Unsurprisingly, this judgment amounts to (89) being perceived as pragmatically deficient. But this deficiency is of a rather different nature than the uninterpretability attested in factive island cases like (88). While the uninterpretability of factive island has been likened to cases of ungrammaticality due to violations of syntactic principles, it seems clear that (89) cannot be so characterized. Unlike (88), (89) is judged as contradictory, but not as ungrammatical or uninterpretable.

So while the study of presupposition projection data in assertions offers a straightforward potential argument for the assumption that a universally projected contradictory presupposition yields a judgment of uninterpretability, the data do not actually support such an argument. Instead, the data present a challenge to the contradiction analysis. They call for an elaboration of the contradiction analysis that provides a rationale for the observation that universally projected contradictory presuppositions yield ungrammaticality in *wh*-questions but not in parallel assertions.

We will now propose such an elaboration. An implicit premise of the argument attempted in this section was that presupposition projection in questions and presupposition projection in statements form a natural class in the sense that they are subject to a unified explanation. While this view is reasonable, and explicitly advanced in Schlenker (2008, 2009), we suggest that it is not necessary. Whatever the explanation for projection at the propositional level might be (see Beaver and Geurts 2014 for a survey), we submit that it need not extend to questions. This is because presupposition projection in questions might be a consequence of felicity conditions that are specific to questions.

Consider again our characterization of universal projection in questions in (36), repeated below as (90). Apart from being a mere description, note that this characterization is non-compositional in the sense that it makes reference to the properties \mathbf{R} and \mathbf{P} , rather than solely to the question intension Q itself.

- (90) Universal projection
 $c \succ Q$ only if $c \subseteq \{w: \forall x[\mathbf{R}(x)(w) \rightarrow \mathbf{P}(x)(w)]\}$

We will now reformulate this condition. We note first that, the condition of restrictor homogeneity (82) above has the consequence in (91). That is, it ensures that the question extension remains constant across context set worlds. Assuming restrictor homogeneity, we can restate universal projection in questions in a compositional way, viz. as the condition stated in (92).

- (91) Restrictor homogeneity
 $c \succ Q$ only if $\forall w, w' \in c [Q(w) = Q(w')]$
- (92) Universal projection
 $c \succ Q$ only if $\forall p [c \subseteq \{w: p \in Q(w)\} \rightarrow c \subseteq \text{dom}(p)]$

According to (92), felicity of a question denotation requires that the context set satisfy the presupposition of every proposition that is in the question's extension in the context set worlds.

To clearly demonstrate the effect of (92), consider again our Hamblin/Karttunen question semantics, in (93), repeated from (11). We can show that, given (93) and assuming restrictor homogeneity, (92) entails (90).

- (93) Hamblin/Karttunen semantics
 $\lambda w. \{ \lambda v: \mathbf{P}(x)(v). \mathbf{S}(x)(v) \mid \mathbf{R}(x)(w) \}$

Let w be an arbitrary world in c and let x be an individual such that $\mathbf{R}(x)(w)$. We have to show that under (92) and assuming restrictor homogeneity, it follows that $\mathbf{P}(x)(w)$. We first observe that, given restrictor homogeneity, $\mathbf{R}(x)(w')$ must hold for every context set world w' . Given our Hamblin/Karttunen semantics in (93), it follows that $\mathbf{S}(x)$ is in the question extension in every context world. From (92), it now follows that c entails the domain of $\mathbf{S}(x)$, that is, $\mathbf{P}(x)(w')$ must hold for every context set world w' . In particular, we have $\mathbf{P}(x)(w)$, which establishes the claim.

We now propose that (92) need not be a theoretical primitive, either, but could be a consequence of two more basic conditions. These are *restrictor economy* and the *no accommodation* condition in (94) and (95) below.

- (94) Restrictor economy
 $c \succ Q$ only if $\forall p [c \subseteq \{w: p \in Q(w)\} \rightarrow c \cap \text{dom}(p) \neq \emptyset]$
- (95) No accommodation condition
 $c \succ Q$ only if $\forall p [c \subseteq \{w: p \in Q(w)\} \rightarrow c \subseteq \text{dom}(p) \vee c \cap \text{dom}(p) = \emptyset]$

The conjunction of these two conditions is equivalent to the version of the universal projection condition in (96). (96) entails (92), as intended. In addition, (96) requires

that the context set be compatible with Hamblin/Karttunen answers, hence that the context set be non-empty whenever there are such answers.

- (96) Universal projection (derived)
 $c \succ Q$ only if $\forall p [c \subseteq \{w: p \in Q(w)\} \rightarrow c \subseteq \text{dom}(p) \ \& \ c \cap \text{dom}(p) \neq \emptyset]$

To further motivate this proposal, we suggest that each of the two conditions in (94) and (95) can be grounded in a pragmatic rationale. With regard to restrictor economy, it seems rationale for a cooperative speaker to exclude from the question extension any propositions that are already known not to be true, in virtue of having presuppositions that are already known to be false. After all, such propositions are expected to never be offered as answers by the addressee.²³ With regard to the no accommodation condition, a speaker who complies with this condition ensures that the presuppositions of all the Hamblin/Karttunen answers in the question extension that the addressee might ever provide is met, thereby preempting the need for accommodating the presupposition of any Hamblin/Karttunen answer.

Note now that, given the features listed in (87), our factive island question in (88) is bound to violate one of the conditions in (94) and (95) – and hence our derived universal projection condition in (96) – relative to every logically possible context set. In short, this is because it is impossible for a non-empty context set to satisfy the mutually incompatible presuppositions of two or more Hamblin/Karttunen answers. On this elaboration of the contradiction analysis, then, it has the very same architecture as the answerability analysis in that uninterpretability is derived from pair of felicity conditions and the uninterpretability principle in (49), repeated in (97).

- (97) Uninterpretability principle
 A question with denotation Q is uninterpretable relative to c if
 there is no c' such that c' is accessible from c & $c' \succ Q$

We note, moreover, that either of the two conditions on its own is consistent with the features in (87). Restrictor economy can be met because it is possible for a context set to be compatible with all of the mutually compatible presuppositions of the Hamblin/Karttunen answers; and the no accommodation condition can be met because it is possible for a context set to entail one of the mutually exclusive Hamblin/Karttunen answers while being incompatible with all the others.

Under this elaboration, the contradiction analysis no longer leads us to incorrectly expect that the factive island effect extends to statements, as its predictions are now confined to questions. While judgments on universal projection in statements do not

²³Similarly, Simons et al. (2016) propose that in reconstructing the question under discussion in the sense of Roberts (1996/2012), speakers exclude answers that the interlocutors already know to be false.

provide an argument for the contradiction analysis, they have now been rendered consistent with that analysis.

6.2 Factive islands without uniqueness?

We now turn to another potential argument for the contradiction analysis, an argument based exclusively on wh-question data. The argument focuses on questions that do not instantiate the uniqueness property that characterizes canonical factive island cases, but that nevertheless predict universal projection of the factive presupposition to yield a contradiction. For ease of exposition, we will temporarily revert to the formulation of universal projection in (90). However, in order to interpret the observations that we report, we will eventually, in section 6.2.3, return to our proposal that universal projection in questions derives from the felicity conditions in (94) and (95).

6.2.1 Uniqueness and plurality generalized

We focus once more on the two features of factive island questions that under the contradiction analysis result in a contradictory presupposition, viz. factivity plus uniqueness and restrictor plurality, as catalogued in (87) above. Note now that we can generalize this pair of properties by replacing the cardinality 1 with an arbitrary cardinality n greater than or equal to 1. This amounts to the substitution of *n-boundedness* and *n-plurality* in (98) for uniqueness and plurality.

- (98) a. Factivity plus n -boundedness
 $c \subseteq \{w: |\{x: \mathbf{P}(x)(w)\}| \leq n\}$
 b. Restrictor n -plurality
 $c \subseteq \{w: |\{x: \mathbf{R}(x)(w)\}| > n\}$

Suppose now that a given wh-question Q of the form *wh R S* has this *generalized uniqueness* profile, that is, suppose that the semantic content of Q guarantees the truth of the statements in (98) (for some $n \geq 2$). Universal projection in (99), which repeats (90), will then derive for Q the presupposition that the presupposition property \mathbf{P} applies to each of the more than n individuals that the restrictor property \mathbf{R} applies to, which is contradictory given that \mathbf{P} applies to no more than n individuals. The contradiction analysis, then, excludes generalized uniqueness cases as uninterpretable in the same way it excludes factive island cases.

- (99) Universal projection
 $c \succ Q$ only if $c \subseteq \{w: \forall x[\mathbf{R}(x)(w) \rightarrow \mathbf{P}(x)(w)]\}$

This sets the contradiction analysis apart from the answerability analysis, as there the prediction is different. We can show that under the answerability analysis, gen-

eralized uniqueness cases do not come out as necessarily infelicitous. A concrete example in the form a toy context set can establish this point. Given an arbitrary question denotation defined by **R**, **P**, and **S**, we again let $w_{X,Y,Z}$ be a possible world w such that $\{x: \mathbf{R}(x)(w)\} = X$, $\{x: \mathbf{P}(x)(w)\} = Y$, and $\{x: \mathbf{S}(x)(w)\} = Z$. Consider now the toy context set in (100).

$$(100) \quad c = \left\{ \begin{array}{l} w_{\{a, b, c, d\}, \{a, b, c\}, \{a, c\}} \\ w_{\{a, b, c, d\}, \{a, b, d\}, \{b, d\}} \end{array} \right\}$$

This context sets meet the conditions in (98) for $n=3$: it entails that **R** applies to more than 3 individuals (in fact, exactly 4); and it entails that **P** applies to no more than 3 individuals (in fact, exactly 3). As well, it satisfies the existence presupposition of **Q**, since the sets determined by **R**, **P** and **S** overlap in each context set world; and the answerability condition is satisfied as well, as **P**(*a*) is true in each context set world, but **S**(*a*) is true in only one of them (and likewise for *b*). Under the answerability analysis, then, generalized uniqueness cases are different from canonical factive island cases: generalized uniqueness does not result in the necessary violation of a felicity condition, and is therefore not predicted to result in uninterpretability.

Generalized uniqueness cases therefore represent a natural test case for the contradiction analysis. If such cases indeed elicit the same judgment of uninterpretability as canonical factive island cases, they will support a compelling argument for the assumption that uninterpretability can arise from a contradictory presupposition due to universal projection from under a *wh*-phrase.

Below, we therefore juxtapose the canonical factive island case in (101) with a minimally modified question in (102) that fits the generalized uniqueness profile described above. With the values of **R** and **P** in (103), (102) instantiates restrictor 3-plurality and 3-boundedness.

(101) *Which of these four girls does Fred know finished first?

(102) %Which of these four girls does Fred know finished in the top three?

(103) **R** = $\lambda x. \lambda w. x$ is one of these 4 girls
P = $\lambda x. \lambda w. x$ finished in the top 3 in w
S = $\lambda x. \lambda w. \text{Fred knows in } w \text{ that } x \text{ finished in the top 3}$

Interestingly, as the percent sign is meant to signal, we found that speakers are divided in their judgments of (102). As expected under the contradiction analysis, some speakers, let's call them the *strict* speakers, indeed report that they do not perceive a contrast between canonical factive island cases like (101) and generalized uniqueness cases like (102), judging both to be deficient in much the same way. However, other speakers, let's call them the *lenient* speakers, report that they do perceive

a contrast between the two types of cases, and more specifically, that they consider generalized uniqueness to be interpretable, or at least more easily interpretable than canonical factive island cases. Interestingly, moreover, while we saw in section 6.1 that a sentence could be judged interpretable and contradictory at the same time, lenient speakers do not report perceiving generalized uniqueness cases as being contradictory.²⁴

Strict speakers' judgments on generalized uniqueness cases finally present us with a non-confounded argument for the assumptions underlying the contradiction analysis. Since strict speakers' judgments follow from the assumption that universal projection of a contradictory presupposition can result in uninterpretability, but do not follow from the assumptions underlying the answerability analysis, strict speakers' judgments make a case – the only case we know of – that the contradiction analysis is needed.

Lenient speakers' judgments are remarkable as well – because they are unexpected under our current assumptions. When introducing the contradiction analysis in section 3.1, we saw independent evidence for the assumption that presuppositions in *wh*-questions project universally. How can it be, then, that some speakers judge generalized uniqueness cases as interpretable and non-contradictory? This is the question we will address in the remainder of this paper.

6.2.2 Tacit domain restriction?

One conceivable approach to the interpretability of generalized uniqueness cases, and to the absence of contradiction, assumes that the content of a universally projected presupposition can sometimes be weakened as a consequence of tacit restriction of the domain of the *wh*-phrase. Tacit domain restriction is most familiar from the study of quantificational determiners (see, e.g., Westerstahl 1985; von Stechow 1994; Stanley and Szabó 2000). For example, *Every student speaks English* need not convey that every student in the world speaks English, but can be used to make the more modest claim that, say, every student enrolled in a given course speaks English. It has been suggested in particular that a determiner's domain of quantification can be subject to tacit restriction by presupposed content (e.g. van der Sandt 1992; Geurts 1999; Geurts and van der Sandt 1999; Beaver 2001). Tacit domain restriction with *wh*-phrases, while less prominent as a topic in the literature, is attested as well, as already noted in section 5.2.4. As another illustration, *Which students speak English?*

²⁴Among the seven English speakers we consulted, one is a strict speaker and six are lenient speakers. One of the two anonymous reviewers also seems to be a strict speaker. The six lenient speakers among our English consultant varied in terms of how obvious they found the contrast between canonical factive islands and generalized uniqueness cases. While two of those lenient speakers perceived a crisp contrast, the others judged generalized uniqueness cases to be degraded, despite contrasting with canonical factive island cases. Our discussion in the text will focus on the judgments of those lenient speakers who perceive a crisp contrast, and we do not offer an explanation for the variation in judgments within the group of lenient speakers.

can be interpreted as a question about a limited set of students, such as the students in a particular course.

As has been argued for quantificational determiners, wh-phrases might in particular be subject to tacit domain restriction by presupposed content. If so, then rather than denoting the property of being one of these five girls, lenient speakers might take the wh-restrictor in (102) to denote the stronger property of being one of these four girls and having placed in the top three. That is, the value of **R** in (103) would be replaced with the value in (104).

$$(104) \quad \begin{aligned} \mathbf{R} &= \lambda x. \lambda w. x \text{ one of these 4 girls in } w \ \& \ \mathbf{P}(x)(w) \\ \mathbf{P} &= \lambda x. \lambda w. x \text{ placed in the top 3 in } w \end{aligned}$$

The property **R** in (104) no longer instantiates 3-plurality, since the set of those among the five girls who finished in the top three need not (in fact, cannot) have a cardinality greater than 3. Hence tacit domain restriction might be appealed to as an explanation for the non-contradictory interpretation of (102), even while maintaining obligatory universal projection.²⁵

To be sure, the question that immediately arises is whether tacit domain restriction correctly differentiates between generalized uniqueness cases like (102) and canonical factive island cases like (101). That is, the question is why domain restriction would not obviate contradiction, and hence the factive island effect, in the case of (101) as well. In (105) below, **R** need not (in fact, cannot) apply to more than one person, hence no longer instantiates (1-)plurality, preempting contradiction. What excludes this option?

$$(105) \quad \begin{aligned} \mathbf{R} &= \lambda x. \lambda w. x \text{ is one of these 5 girls} \ \& \ \mathbf{P}(x)(w) \\ \mathbf{P} &= \lambda x. \lambda w. x \text{ finished first in } w \end{aligned}$$

At first sight, this question may appear to have an obvious answer. By virtue of preventing **R** from instantiating (1-)plurality, the domain restriction in (105) guarantees that **R** instantiates uniqueness (1-boundedness). But this violates the non-uniqueness condition in (76), repeated here as (106), which in section 5.2 we proposed as a (derived) felicity condition on the use of a wh-question.

²⁵In van der Sandt (1992), Geurts (1999), and Geurts and van der Sandt (1999) it is proposed that tacit domain restriction by presupposed content, dubbed *intermediate accommodation* in this work, is derived through the presupposition projection algorithm itself. In this view, rather than weakening the effect of universal projection, tacit domain restriction preempts the application of universal projection. Beaver (2001) argues against this view and maintains that domains restriction is independent of the presupposition projection algorithm. As far as we can see, the issues under discussion here are independent of this debate. For expository reasons, we opt to portray tacit domain restriction with presupposed content as independent of the theory of presupposition itself.

- (106) Restrictor non-uniqueness
 $c \succ Q$ only if $c \not\subseteq \{w: |\{x: \mathbf{R}(x)(w)\}| \leq 1\}$

So, assuming that tacit domain restriction is constrained by the non-uniqueness condition on the restrictor of the wh-phrase, there is initial hope that the contradiction account can indeed capture the contrast between factive island cases like (101) and generalized uniqueness cases like (102).

However, a closer look at tacit domain restriction in wh-questions leads us to conclude that such domain restriction is after all not the source of lenient speakers' judgments on generalized uniqueness cases. In view of findings in previous literature, it is actually not expected for the requisite domain restriction to be available in the critical case in (102). The reason is that in (102) the wh-phrase restrictor of *these four girls* takes the shape that Geurts and van Tiel (2015) refer to as a *DN-partitive*, featuring a complex demonstrative whose noun phrase is modified by a bare numeral. Chemla (2009) proposed that restrictors of this shape in examples like *Each of these 10 students knows that he is lucky* do not allow for tacit domain restriction by presupposed content. He found that in judging the validity of inferences, subjects overwhelmingly took such sentences to carry strong entailments of the sort predicted by universal projection in the absence of tacit domain restriction. In the same vein, Geurts and van Tiel (2015) report on an experiment where sentences with DN-partitives are overwhelmingly rejected as false in contexts where their truth would require tacit domain restriction by presupposed content.²⁶

Consistent with these findings, the sentence in (107), in a reading where *she* is interpreted as anaphoric to the quantificational subject, is clearly contradictory, conveying that each of the four girls placed in the top three. (This observation is aligned with the judgment on example (89) discussed in section 6.1 above.)

- (107) None of these four girls knew that she placed in the top three.

Apparently, then, the resistance of DN-partitives to tacit domain restriction can persist even when such domain restriction would be required for non-contradictory interpretation. If this resistance is moreover due to the grammatical make-up and interpretation of DN-partitives, as both Chemla (2009) and Geurts and van Tiel (2015) assume, then there is after all no reason to expect the potential domain restriction in (105) to actually be available in (102).

In fact, we can offer even more direct evidence against the proposal that the acceptability of (102) depends on the domain restriction posited in (105). We note that in uncontroversial cases of tacit domain restriction, the tacitly restricted content of a wh-phrase can be taken up anaphorically. For example, the answer in (108)B can

²⁶That said, Geurts and van Tiel (2015) also found that the acceptance rate increased considerably under certain manipulations of the pictures that represent scenarios in which the truth values of the experimental sentences were to be judged.

quantify over whichever contextually determined set of students the question (108)A might be about.

- (108) A: Which students speak English?
B: All of them. / All but Alex.

That is, if (108)A is interpreted as asking which students in this class speak English, then the answer in (108)B can likewise be understood as conveying that all of the students in this class, or all of them except Alex, speak English.

This observation suggests a natural experiment to investigate the presence of tacit domain restriction in the interpretation generalized uniqueness cases. Under the hypothesis presently entertained, the *wh*-restrictor in (109)A must be interpreted as describing a set containing only those among these five girls who placed in the top three, that is a subset of the five that has at most three members.

- (109) A: Which of these five girls does Fred know placed in the top three?
B: All of them. / All but Alex.

Accordingly, in analogy to (109), it should be possible for the answers in (109)B to make reference to that same set, yielding the contingent meaning that all of its members, or all but Alex, are such that Fred knows that they placed in the top three. However, such an interpretation of (109)B is clearly unavailable. Instead, the answers only have contradictory interpretations, implying that all of the five girls, or all but Alex, placed in the top three. We conclude from these observations that the *wh*-phrase domain in (109)A cannot actually be restricted in the way posited in (105).

More generally, we conclude that tacit domain restriction cannot be appealed to in order to reconcile the interpretability and non-contradictoriness of missing contradiction cases for lenient speakers with the assumption that in general presuppositions in *wh*-questions project universally.

6.2.3 A felicity condition suspended

We have dismissed the idea that lenient speakers' judgments on generalized uniqueness cases are due to the effect of universal projection being weakened by tacit domain restriction. By elimination, we are led to the conclusion that in those cases, universal projection does not take place at all.

Recall now that in our elaboration of the contradiction analysis in section 6.1, we proposed that universal projection is the consequence of a pair of felicity conditions on questions, viz. restrictor economy in (94) and the no accommodation condition in (95), repeated below as (110) and (111).

- (110) Restrictor economy
 $c \succ Q$ only if $\forall p [c \subseteq \{w: p \in Q(w)\} \rightarrow c \cap \text{dom}(p) \neq \emptyset]$
- (111) No accommodation condition
 $c \succ Q$ only if $\forall p [c \subseteq \{w: p \in Q(w)\} \rightarrow c \subseteq \text{dom}(p) \vee c \cap \text{dom}(p) = \emptyset]$

Under this reconstruction of the contradiction analysis, the proposal that universal projection can fail to take place amounts to the proposal that at least one of the conditions in (110) and (111) can fail to be in effect.

More specifically, to understand why (110) and (111) can fail to render general uniqueness cases uninterpretable, we must assume that at least one of the two conditions is *suspendable*, in the sense that it does not enter the calculation of necessary infelicity. In other words, we must assume that at least one of the two conditions does not constrain the felicity relation \succ referred to in the uninterpretability principle (49), repeated once again in (112).

- (112) Uninterpretability principle
 A question with denotation Q is uninterpretable relative to c if
 there is no c' such that c' is accessible from c & $c' \succ Q$

This raises the obvious question why some felicity conditions would be suspendable while others are not. To be sure, we must maintain that the felicity conditions assumed under the answerability analysis, the existence presupposition and the answerability analysis, are *not* suspendable. Otherwise, we would lose our account of lenient speakers' judgments on canonical factive islands, and also the proposed accounts of referential islands in section 5.1 and the restrictor non-uniqueness effect in section 5.2.

We cannot offer a theory of suspendability. However, we would like to put forward a hypothesis that constrains suspendability. We hypothesize that a felicity condition is suspendable, that is, can be omitted in the calculation of *necessary* infelicity, only if it allows for acceptable *accidental* violations by interpretable questions. We refer to this proposed constraint on suspendability as the *suspension hypothesis*.

Since we have posited that either restrictor economy or the no accommodation condition is suspendable, the suspension hypothesis demands that either restrictor economy or the no accommodation condition allows for accidental violations. With regard to the no accommodation condition in (111), we can show that this demand is met by extending the discussion in section 2.4 of the interpretable question in (9), repeated here as (113).

- (113) Which member nominated herself?

Extending a context outlined in 2.4, consider the following scenario. The interlocutors agree, hence the context set entails, that the members are Alex, Berti, and Chris; the interlocutors also agree that this group of three includes a woman who nominated herself; but while the speaker believes that Alex is a woman, the speaker's beliefs (and hence the interlocutors' common beliefs) do not settle the sex of either Berti or Chris, hence fail to entail that Berti is, or is not, a woman, and likewise for Chris; finally, the listener is aware of this gap in the speaker's knowledge, and moreover believes that only Alex and Berti are women.

Relative to the context set given by this scenario, the use of (113) is in violation of the no accommodation condition, since the speaker's beliefs, and hence common belief, only settle the presuppositions of one of the three Hamblin/Karttunen answers in the question extension (triggered by the feminine pronoun *herself*). Yet we take it that (113) is nevertheless usable in such a scenario. For example, a speaker may use this question as a reply to the listener's statement that some female member nominated herself. Therefore, aligned with our suspension hypothesis, we conclude that the no accommodation condition allows for accidental violations.

This finding may actually not be so surprising. After all, while in the above scenario, the speaker using (113) runs the risk of having to accommodate that Berti or Chris is a woman, this potential inconvenience might well be compensated by the utility of the information that the speaker would gain from the relevant Hamblin/Karttunen answers. Use of a question that violates the no accommodation condition, then, may well be a rationale choice for a speaker to make.

We now turn to the restrictor economy condition in (110). We begin with a case of an interpretable question where an accidental violation of restrictor economy is *not* judged to be felicitous.

- (114) a. Of Ann, Bill, and Chris, only Ann and Bill passed the final exam.
 b. #Which of those three students does Fred know passed the final?

The oddness of the questions in (114b) can be attributed to restrictor economy. In virtue of including Chris in the wh-restrictor, the question extension contains a Hamblin/Karttunen answer with the presupposition that Chris passed the final exam, which is incompatible with the common belief established by (114a).

Does restrictor economy ever allow for acceptable accidental violations? We think that it might. For example, in the context of (115a), the question (115b) appears to violate restrictor economy. If the wh-restrictor refers to the set of all LING 200 students (which includes Alan), then the question extension will contain a Hamblin/Karttunen answer with the presupposition that Alan is a woman (triggered by the feminine pronoun *her*), which is again incompatible with common knowledge.

- (115) a. Of the 100 students in LING 200, Alan is the only man.
 b. Which of the LING 200 students complained about her final grade?

How can we understand the contrast in perceived felicity between (114b) and (115b)? In one possible interpretation, the contrast reflects the available choices of alternative questions that the speaker could have asked instead of (114b) or (115b). An obvious competitor to (114b) is the question *Which of those two students does Fred know passed the final?*, where the wh-restrictor picks out the two students who are known to have passed the final exam. In virtue its wh-restrictor excluding Chris, this question would have satisfied restrictor economy. It is moreover hard to see a valid rationale for a speaker's choice of (114b), which violates restrictor economy, over the alternative, which satisfies it. This, we suggest, explains the oddness of (114b).

The case of (115b) is different. A violation of restrictor economy could have been avoided by asking a question whose wh-restrictor excludes Alan, for example *Which of the female LING 200 students complained about her final grade?* or *Setting aside Alan, which of the LING 200 students complained about her final grade?*. However, those alternative questions would have been syntactically more complex. Aligned with Katzir's (2007) proposal that syntactic complexity constrains the set of alternatives that pragmatic reasoning refers to, we suggest that this added complexity could serve as a rationale for a speaker's violation of restrictor economy, and that the availability of this rationale renders the violation permissible.

However, the acceptability contrast between (114b) and (115b) also allows for an alternative interpretation, suggested by our discussion in section 6.2.2. The acceptability contrast could also be attributed to a contrast in the availability of tacit domain restriction. It is conceivable that, due to tacit domain restriction, the wh-restrictor in (115b) can exclude Alan and pick out only the female students in LING 200. In contrast, parallel domain restriction in (114b) is expected to be unavailable, since the wh-restrictor takes the form of a DN-partitive (see section 6.2.2). Under this interpretation, (115b) does not actually illustrate a violation of restrictor economy.

We will not attempt to adjudicate between the two possible accounts of the contrast between (114) and (115). While we have not seen conclusive evidence that accidental violations of restrictor economy are permitted, it is sufficient for our purposes to have seen that the no accommodation condition allows for such accidental violations. The latter finding renders our suspension hypothesis consistent with the assumption that the no accommodation condition is suspendable. This is sufficient to capture our finding that, for lenient speakers, generalized uniqueness cases are not judged to be uninterpretable.²⁷

²⁷The proposed account of the *interpretability* of generalized uniqueness cases leaves open the question in what contexts lenient speakers judge such cases to actually be *felicitous*. These would have to be contexts where the relevant generalized uniqueness question accidentally violates either restrictor economy or the no accommodation condition. For the particular case in (102) (% *Which of these four girls does Fred know finished in the top three?*), given our analysis of (114), we might expect an acceptable violation of restrictor economy to be excluded by the availability of an alternative like *Which of these two girls does Fred know finished in the top three?*. Indeed, some of the lenient speakers among our consultants judged (102) infelicitous in contexts where the question violates restrictor economy but felicitous in contexts where only the no accommodation is violated. Curiously,

To conclude our discussion of generalized uniqueness cases, we identify a notable consequence of the proposed analysis of lenient speakers’ judgments. If indeed lenient speakers can suspend restrictor economy or the no accommodation condition, then their judgement on canonical factive island cases, too, cannot be derived from a necessary conflict between those two conditions. For lenient speaker, therefore, the uninterpretability of canonical factive islands can only be attributed to the necessary violation of either the existence presupposition or the answerability analysis, as envisioned under the answerability analysis of factive islands. In this regard, lenient speakers contrast with strict speakers, for whom there are two pairs of felicity conditions, one for the contradiction analysis and one for the answerability analysis, which will yield necessary infelicity in the interpretation of canonical factive island cases.

7 Conclusions

Based on the Hamblin/Karttunen semantics for questions, we have identified arguments for a felicity condition on question that we called *answerability condition*. Elaborating on Oshima (2007), we have proposed that the answerability condition contributes to questions with factive islands necessarily violating a felicity condition, and that this necessary infelicity can be held responsible for the uninterpretability of factive islands. We have presented independent evidence for the assumptions underlying this analysis, based on effects in questions that are superficially unrelated to factive islands, viz. questions the exhibit the referential island effect (Simonenko 2015) and questions with uniquely denoting restrictors.

Additional evidence for these assumptions comes from what we called “generalized uniqueness” cases, variants of canonical factive islands which are expected to carry contradictory presuppositions without being predicted to be necessary infelicitous under the assumptions of the answerability analysis. We reported that in “lenient” speakers’ judgments, generalized uniqueness cases are interpretable, or at least more easily interpretable than canonical factive island cases. We argued that those speakers suspend universal projection when this yields a contradiction, and hence that for those speakers, the canonical factive island effect must be derived as assumed under the answerability analysis.

We also found a limited amount of evidence for the assumptions underlying the contradiction account of factive islands, proposed in Abrusán (2011, 2014). This evidence consists in the judgments of “strict” speakers, speakers who judge generalized uniqueness cases to be no more interpretable than canonical factive island cases. We therefore conclude that, in the end, a comprehensive account of trivial questions must make reference to both the assumptions underlying the answerability analysis and the assumptions underlying the contradiction analysis.

however, some lenient speakers reported the opposite intuition. At present, we have no explanation for this variation of judgments within the group of lenient speakers.

In the course of making these arguments, we also proposed an analysis of the plurality condition in *wh*-restrictors, for which we proposed a derivation that relies on the assumptions of the answerability condition. We also observed exceptions to the restrictor plurality condition, which we interpreted as evidence for this derivation.

Furthermore, in our attempt to keep the contradiction analysis from deriving unattested factive island effects in statements, we proposed that universal presupposition projection in *wh*-questions is a consequence of a pair of felicity conditions on the use of questions.

Along the way, we had to leave a number of important questions for future research. Of those, we wish to highlight a question at the very heart of our investigations in this paper, viz. the proper characterization of triviality. In section 4.3, we saw that both the answerability analysis and the contradiction analysis must be further constrained in order for them to become consistent with questions that are judged to be trivial but interpretable. We suggested some descriptive generalizations that might discriminate between interpretable and uninterpretable trivialities. However, whether or not these are descriptively adequate, they surely do not provide an explanation for the observed division between interpretable and uninterpretable trivialities. We hope to inspire future work to advance our understanding of these issues.

A. Evidence from degree questions, *why*-questions, *how*-questions?

As noted in section 1, it was degree and adjunct questions such as those in (116) (repeated from (4) above), that in the syntactic literature first gave rise to the observation that factive predicates can induce island effects (e.g. Rizzi 1990, Cinque 1990, Rooryck 1992). Island effects in individual questions of the sort we have focused on here are a later discovery (Szabolcsi and Zwarts 1993, Oshima 2007, Abrusán 2011, 2014).

- (116) a. *How tall do you regret that you are?
 b. *Why does Max know that Alice insulted Pat?
 c. *?How does Max know that Alice went to San Francisco?

Below we briefly discuss the application of the the answerability analysis and the contradiction analysis to cases like those in (116). The central question is whether such cases might provide further evidence for (or against) either of the two analyses under consideration. Naturally, in order to present these cases as furnishing additional evidence, it would have to be demonstrated that they are *not* parallel to canonical factive island in the relevant respects. That is, it would have to be demonstrated that those do not feature both restrictor plurality and uniqueness. Otherwise, the island

effects in those cases, too, would be captured under both the answerability and the contradiction analysis.

Oshima (2007) argues that *why*-questions and *how*-questions indeed instantiate uniqueness. In contrast, Abrusán (2011, 2014) proposes that *how*-questions like (127b) do not instantiate uniqueness, and an anonymous reviewer makes the same proposal for degree questions. Under those proposals, *how*-questions and degree questions, at least, could support potential arguments for the contradiction analysis.

Below we review the evidence in support of the proposal that degree questions, *why*-questions, *how*-questions do not feature uniqueness. We will argue that the evidence that those questions do not instantiate uniqueness is inconclusive, and we will provide new data suggesting that they *do* instantiate uniqueness. If so, since they all instantiate restrictor plurality, degree questions, *why*-questions, *how*-questions cannot support additional evidence for or against the answerability analysis or the contradiction analysis, as both analyses exclude those questions as uninterpretable.

Subsection A1 attends to degree questions like (116a), and subsection A2 discusses adjunct questions like (127a) and (127b).

A1. Degree questions

The semantics assigned to degree questions depends centrally on assumptions about gradable predicates like *long*. In a classic approach (e.g., Cresswell 1976, von Stechow 1984, Heim 2000), *long* relates an individual to a degree of length, the so-called standard of comparison, requiring that the individual’s length is greater than or equal to the standard. In (117a), the standard of comparison is given by the measure phrase *2 meters*, and the sentence expresses (117b), the proposition that the rope’s length is greater than or equal to 2m.

- (117) a. The rope is 2 meters long.
 b. λw . the rope’s length \geq 2m in w

These truth conditions are consistent with the rope being longer than 2m. To be sure, in many contexts the actually perceived interpretation of (117a) is that the rope’s length *equals* 2m, expressing the stronger proposition in (118). However, in the classic approach, the inference that the rope is no more than 2m long is due to Gricean pragmatic reasoning (Grice 1967, Horn 1972), and the semantic meaning of (117a) is indeed taken to be exhausted by the weaker proposition in (117b).²⁸

²⁸The assumption that gradable predicates have an “at least” semantics supporting weak meanings like (117b) is motivated by intuitions about cases that feature measure phrases in the scope of a necessity modals, such as *In the USA, one must be 18 years old in order to be allowed to vote* (from Spector 2013). The sentence can be judged true on the basis of the assumption that voters in the USA must be 18 years of age *or older*. The sentence would be false under the meaning derived by an “exactly” semantics for *old* under which the sentence would convey that voters in the USA must be *exactly* 18 years old.

(118) $\lambda w. \text{ the rope's length} = 2\text{m in } w$

Extrapolating from this analysis of (117) by abstracting over the position of the measure phrase, one is lead to a “standard” Hamblin/Karttunen semantics for degree questions (e.g., Beck and Rullmann 1999, Fox and Hackl 2006). For example, the semantics of the garden-variety degree question in (119) is given by the values of **R** and **S** in (120). So, for every degree of length d , the extension of (119) contains the proposition that the rope’s length is at least d .²⁹

(119) How long is the rope?

(120) **R** = $\lambda d. \lambda w. d \text{ is a degree of length}$
S = $\lambda d. \lambda w. \text{ the rope's length} \geq d \text{ in } w$

Likewise, the denotation of the factive island degree question in (121) is given by the values for **R**, **P**, and **S** in (122). So, for every degree of length d , the extension of (121) contains a proposition presupposing that the rope’s length is greater than or equal to d and asserting that Fred knows this.

(121) *How long does Fred know that the rope is?

(122) **R** = $\lambda d. \lambda w. d \text{ is a degree of length}$
P = $\lambda d. \lambda w. \text{ the rope's length} \geq d \text{ in } w$
S = $\lambda d. \lambda w. \text{ the rope's length} \geq d \text{ in } w. \text{ Fred knows in } w \text{ that the rope's length} \geq d$

To this question meaning, we can now apply the answerability analysis and the contradiction analysis in order to determine their predictions about (121). A central observation is that according to (122), the gapped complement of *know* in (121) does not denote uniquely. There may of course be more than one degree that is less than or equal to the rope’s length, so that **P** can truthfully apply to more than one degree. Under the answerability analysis, this ensures that for (122), the existence presupposition and the answerability condition are consistent (which we invite the reader to verify). Hence the answerability analysis fails to exclude (121) as necessarily infelicitous.

In contrast, the contradiction analysis assigns to (121) the universally projected presupposition that for every degree of length d , the rope’s length $\geq d$. This presupposition is not a logical contradiction. However, as Abrusán (2011, 2014) observes (for a parallel case), assuming that the set of length degrees has no upper bound, the

²⁹The first equality in (120) posits that the set of degrees is world independent, as implicitly assumed in previous literature (e.g. Beck and Rullmann 1999). As far as we are aware, nothing hinges on this assumption.

presupposition has the absurd implication that the rope is infinitely long, which conflicts with common knowledge in any realistic context. As Abrusán notes, therefore, this conflict could plausibly be held responsible for the factive island effect in cases like (121).

As matters stand, then, only the contradiction analysis might account for the factive island effect attested in (121). So factive islands in degree questions present a potential argument that the contradiction analysis is needed, and that the answerability analysis is insufficient.³⁰

However, we submit that one of the premises of this potential argument is likely to be incorrect, viz. the assumption that (121) allows for the denotation given by the values in (122). Note that under the analysis of gradable predicates, measure phrases, and degree questions outlined above, the proposition expressed by (117a), shown in (117b), is a Hamblin/Karttunen answer to the question in (119). Likewise, the partial proposition expected to be expressed by (123a) below, shown in (123b), would be a Hamblin/Karttunen answer to the factive island question in (121).

- (123) a. Fred knows that the rope is 2 meters long.
 b. λw : the rope's length $\geq 2m$ in w . Fred knows in w that the rope's length $\geq 2m$

But the partial proposition (123b) does not actually capture the intuited interpretation of (123a). While (123b) encodes the factive presupposition that the rope's length $\geq 2m$, the actually perceived presupposition is the stronger proposition that

³⁰That degree questions under the standard semantics outlined above present an argument for the contradiction analysis was suggested to us by an anonymous reviewer. In contrast, Abrusán (2014) (p.72) argues that under the standard semantics, the contradiction account, too, fails to derive certain instances of the factive island effect, viz. cases featuring so-called closed scale adjectives (Kennedy and McNally 2005). This leads Abrusán to favour a different semantics for gradable predicates, one that assumes that they relate individuals to *intervals* of degrees (Abrusán and Spector 2011). Under such an interval semantics, (122) is replaced by (i), where the variable I ranges over degree intervals.

- (i) **R** = $\lambda I.\lambda w$. I is an interval of degrees of length
 P = $\lambda I.\lambda w$. the rope's length $\in I$ in w
 S = $\lambda I.\lambda w$: the rope's length $\in I$ in w . Fred knows in w that the rope's length $\in I$

Under this semantics, too, the contradiction analysis at first sight makes better predictions about factive islands than the answerability analysis: in short, since **P** can apply truthfully to more than one interval, no necessary infelicity is derived under the answerability analysis; in contrast, Abrusán notes that under the contradiction analysis, universal projection will yield a contradiction, given that **P** can truthfully apply to at most one of two non-overlapping intervals. This observation constitutes a variant of the potential argument for the contradiction analysis just presented in the main text. However, as the reader is invited to verify, the interval-based variant is subject to much the same objection that we raise below in the context of the standard degree question semantics. To keep the exposition focused, we therefore limit attention to the standard semantics in the main text.

the rope's length *equals* 2m. This intuition is confirmed by the perceived oddness of A's answer to B's question in the discourse in (124).

- (124) A: I've now measured the rope: it's exactly 3 meters long.
 B: Do Fred and Bethany know?
 A: #Well, Fred knows that it is 2 meters long.

The infelicity is judged to be the result of a conflict between a common ground entailing that the rope's length is 3m (established by A's initial statement) and the factive presupposition carried by A's answer, viz. that the rope's length is 2m.

Apart from presupposing that the rope's length equals 2m, (123a) is also understood as implying that Fred knows that this is so. Hence the actual meaning of (123a) is not given by (123b), but by (125). In other words, instead of being given by the proposition in (117b), the content of the embedded clause in (123a) is given by the stronger proposition in (118).

- (125) λw : the rope's length = 2m in w . Fred believes in w that the rope's length = 2m

An important question is now how the embedded clause in (123a) comes to have the meaning in (118). As mentioned above, the fact that the unembedded sentence (117a) is in many contexts understood as expressing the stronger proposition in (118) rather than the weaker (117b), has been credited to Gricean reasoning. In (123a), however, (117a) appears in an embedded position. Chierchia (2004) and Chierchia et al. (2011), among others, have argued that embedded positions, such as the complement position of *know* in (123a), are inaccessible to strengthening by Gricean reasoning. These authors therefore propose that the effects of apparent pragmatic strengthening in embedded position are actually due to a grammatical mechanism of so-called exhaustification. In this view, the strengthening of (117b) to (118) is a matter of semantics, hence (125) is the semantic meaning of (123a).

But if exhaustification can and must apply to the complement of *know* in (123a) (as suggested by (124)), the same might reasonably be expected to hold for the complement of *know* in the factive island question in (121). If so, (121) will be assigned a semantics given by the values in (126), rather than those in (122).³¹

³¹One interesting challenge presented by (124) is that in this case the embedded exhaustification is *obligatory*. In contrast, Spector and Sudo (to appear) observe that in the discourse in (i) (which inspired our example (124)), embedded exhaustification of *some* in (B) is not required (in the available reading where *some* is interpreted as scoping within the embedded clause). This is evidenced by the felicity of B's reply (to be read with focus on *some*).

- (i) A: All of the students are smokers in this department! Do professors know this?
 B: Well, Prof. Jones is aware that some of the students smoke.

- (126) $\mathbf{R} = \lambda d. \lambda w. d$ is a degree of length
 $\mathbf{P} = \lambda d. \lambda w. \text{the rope's length} = d$ in w
 $\mathbf{S} = \lambda d. \lambda w. \text{the rope's length} = d$ in w . Fred knows in w that the rope's length = d

And if (126) describes the semantic meaning of (121), the factive island effect in this case is immediately predicted under both the answerability analysis and the contradiction analysis. According to (126), the gapped complement of *know* denotes uniquely, that is, \mathbf{P} can truthfully apply to at most one degree. Under both the answerability analysis and the contradiction analysis, therefore, degree questions like (121) are in the relevant respects no different from the factive islands in individual questions that this paper has focused on. If so, degree questions are not suited to support arguments for or against either of the two analyses.

This conclusion is of course dependent on the assumption that the semantic meaning of (121) is the one given by (126). (121) would support a case for the contradiction analysis if it could be argued that, after all, (121) has, or can have, the semantic meaning given by (122). This could be done by attempting to argue that the embedded strengthening observed in (123a) is not semantic and instead arises from Gricean reasoning, in which case, the argument for (121) having the semantics in (126) would lack a necessary premise; alternatively, one might attempt to argue that, even though the embedded strengthening in (123a) is semantic, such strengthening is for some reason not obligatory in the factive island question (121).

However, while replies of this sort possible in principle, we are not aware of any actual compelling arguments of either type. We submit, therefore, that the potential case for the contradiction analysis based on factive islands in degree questions remains inconclusive.

A2. *Why*- and *how*-questions

We now turn to *why*- and *how*-questions like (127a) and (127b), repeated below in (127).

- (127) a. *Why does Max know that Alice insulted Pat?
b. *?How does Max know that Alice went to San Francisco?

We start with *why*-questions. Oshima (2007) assumes that in a *why*-question, *why* ranges over propositions that constitute a reason for the proposition expressed by the

If embedded exhaustification had applied, the factive presupposition triggered by *aware* would be that only some of the students smoke, contradicting A's statement. It is not clear why embedded exhaustification in such cases would be obligatory for *2 meters* but not for *some*. This contrast is, however, aligned with the familiar observation that exhaustification applies to numerals more readily than to other scalar expressions (e.g. Spector 2013).

clause in the scope of *why*. Oshima assumes that reasons, too, are propositions. Hence the Hamblin/Karttunen answer to the question (127a) states for some proposition p , that p is a reason for the proposition that Alice went to San Francisco. The denotation of (127a) is accordingly given by the values in (128).

- (128) $\mathbf{R} = \lambda p.\lambda w. w = w$
 $\mathbf{P} = \lambda p.\lambda w. p$ is a reason in w for Alice going to San Francisco
 $\mathbf{S} = \lambda p.\lambda w. p$ is a reason in w for Alice going to San Francisco. Max knows in w that p is a reason for Alice going to San Francisco

Oshima proposes, in a nutshell, that a reason for a given proposition q is the unique most contextually relevant explanation for q . This entails that in any given context of utterance, there can be at most one reason for q . If so, the gapped complement of *know* in (127a) denotes uniquely in the sense that \mathbf{P} in (128) can apply to no more than one proposition. For the familiar reasons, this uniqueness ensures that both the answerability analysis and the contradiction analysis have the intended effect for *why*-questions like (127a).

As an interesting piece of evidence for the assumption that reasons are unique in the relevant sense, Oshima offers observations about the pairs of statements in (129) and (130).

- (129) a. Alice, among others, insulted Max.
 b. Alice insulted Max.
- (130) a. Alice insulted Max because she was on edge, among other reasons.
 b. Alice insulted Max because she was on edge.

Oshima reports that, while (a) is naturally read as entailing (b) in (129), in (130) the corresponding inference from (a) to (b) is judged to be invalid. Oshima suggests that in (130), uniqueness of reason forces *because she was on edge, among other reasons* to be interpreted as denoting one single reason for Alice's insulting Max, and by the same token ensures that the statement in (b) is judged not to be a consequence of (and to not even be compatible with) the statement in (a).

Inspired by Oshima argument with reference to (130), we propose that an additional argument in support of *why*-questions instantiating uniqueness comes from *wh*-questions introduced by a *wh*-phrase of the form *wh else*. To begin, the question in (131) is only felicitous if, for some person x , it has already been established that x insulted Max. That is, the question presupposes that a certain person has insulted Max. In addition, the question presupposes that someone else insulted Max, as expected if the question is assumed to carry an existence presupposition.

- (131) Who else insulted Max?

By extension, we expect (132) to presuppose that a certain person has killed Max and that someone else did, too. This expected contradictory presupposition is indeed attested and provides a straightforward explanation for the perceived oddness of (132a).

- (132) a. #Who else killed Max?
 b. Who else would have killed Max?

The source of the perceived contradiction in (132a) is that the gapped clause in the scope of *who else* denotes uniquely, as only one person can have the property of having killed Max. This uniqueness is obviated in (132b) due to the presence of the modal *would*: while there can be only one person who actually killed Max, there could be more than one who *would* have killed him. Hence (132b) is an expected case of modal obviation of oddness (analogous to modal obviation of factive island effects discussed in section 4.4).

It turns out that *why else*-questions give rise to much the same contrast as *who else*-questions with uniquely denoting predicates. This is explained immediately if, as proposed by Oshima (2007), *why*-questions instantiate uniqueness. In particular, the modal obviation effect in (133b) is expected: even if there can be only one reason for Alex having insulted Mary, there can be more than one reason why Alice *would* have insulted Max.

- (133) a. #?Why else did Alice insult Max?
 b. Why else would Alice have insulted Max?

If these arguments are accepted, then they present independent support for an analysis of *why*-questions under which, once again, the answerability analysis and the contradiction analysis make the same predictions. As matters stand, then, factive islands in *why*-questions, too, do not present an argument for or against either analysis.

This conclusion extends to *how*-questions such as (127b), if the analysis that Oshima (2007) proposes for such questions is accepted. Oshima construes manners, the type of semantic meanings that *how* ranges over, as properties of events. He moreover proposes that manners can be grouped into families of mutually exclusive event properties, and that in any given utterance context, the manners that enter the semantics of a *how*-question are drawn from the same contextually salient family. For example, Oshima suggests that the question in (134) might be interpreted relative to any one of the families given in (135) (where individual manners are named by the corresponding English predicates).

- (134) How did Alice teach Max French?

- (135) a. effectively, ineffectively
 b. with emphasis on pronunciation, listening comprehension, writing skills,
 ...
 c. by private lessons, by group lessons, in a large classroom setting, ...
 d. based on a contract through a major language school, through a private
 contract, on a volunteer basis, ...

The denotation of (134) is then given by the values for **P**, **R**, and **S** listed in (136). Note that here, aligned with Oshima’s (2007) and Abrusán’s (2011, 2014) discussion of *how*-questions, we take all the propositions in the question extension to be about a particular, contextually determined, event *e*. Mutually exclusive properties of events, such as those denoted by *effectively* and *ineffectively*, will then make incompatible demands on *e* and hence will give rise to contradictory Hamblin/Karttunen answers.

- (136) **R** = $\lambda f.\lambda w$. *f* is a member of the unique contextually salient family of manners
S = $\lambda f.\lambda w$. *e* is an event of Alice teaching Max French in *w* & *f* holds of *e* in *w*

Likewise, the denotation for (127b) under this analysis is given by the values for **P**, **R**, and **S** in (137). Given that the manners in the domain of *how* are once again taken to be drawn from the same family, the property **P** can truthfully apply to at most one of the manners in the domain of *how*.

- (137) **R** = $\lambda f.\lambda w$. *f* is a member of the unique contextually salient family of manners
P = $\lambda f.\lambda w$. *e* is an event of Alice going to San Francisco in *w* & *f* holds of *e* in *w*
S = $\lambda f.\lambda w$: *e* is an event of Alice San Francisco in *w* & *f* holds of *e* in *w*.
 Max knows in *w* that *e* is an event of San Francisco & *f* holds of *e*

Under this analysis of *how*-questions, then, the factive island effect in *how*-questions, too, is captured under both the answerability analysis and the contradiction analysis. If so, factive islands also fail to provide an argument for or against either analysis.

Of course, this conclusion depends on the assumption that the domain of *how* is necessarily formed by mutually exclusive properties of events. Oshima (2007) does not offer compelling independent evidence for this assumption. However, we are also not convinced by the argument *against* this assumption offered in Abrusán (2011, 2014). Abrusán notes that it is perfectly felicitous to respond to the question in (134) with the fragment answer in (138).

- (138) By private lessons and with emphasis on pronunciation and spelling.

Abrusán’s conclusion from this observation is that “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” (Abrusán 2014, p. 33). Abrusán’s suggestion seems to be based on the assumption that (138) names three manners from two different families: the manner denoted by *by private lessons*, drawn from one family, and the manners denoted by *with emphasis pronunciation* and *with emphasis on spelling*, drawn from another. However, this assumption presupposes the particular manner families in (135). It seems quite conceivable, and consistent with Oshima’s claims, that the inventory and membership of manner families are in part determined by the context of utterance. If so, the fragment answer to (134) in (138) may well be consistent with Oshima’s proposal, viz. under the assumption that the utterance context of (134) raises to salience the family of manners in (139).

- (139) by private lessons and with emphasis on pronunciation and spelling,
 by private lessons and with emphasis on pronunciation only,
 by private lessons and with emphasis on spelling only,
 by group lessons and with emphasis on pronunciation and spelling, ...

Hence we do not think that Oshima’s analysis of *how*-questions has been shown to be untenable. In fact, we can once again appeal to questions with *wh else* to provide independent support for the assumption that *how*-questions instantiate uniqueness. The contrast in (140) once again parallels the contrast in (132).

- (140) a. #?How else did the burglar enter the house?
 b. How else could the burglar have entered the house?

Under the assumption that *how*-questions instantiate uniqueness, this parallelism is immediately accounted for. If this arguments is accepted, then factive islands in *how*-questions, too, do not present an argument for or against either the answerability analysis or the contradiction analysis.

B. Notes on embedded factive islands

Like the discussion in Oshima (2007) and Abrusán (2011, 2014), our study of factive islands has so far confined attention to matrix questions. However, as an anonymous reviewer points out, judgments of uninterpretability persist when factive island questions are embedded. In (141a), our factive island question in (17) is embedded under *wonder*. The uninterpretability of the embedded question extends to (141a) as

a whole. Example (141b) shows that the same effect is observable with embedding under *know*.³²

- (141) a. *Kim wonders which of the girls Fred knows is the tallest member of our team.
 b. *Kim knows which of the girls Fred knows is the tallest member of our team.

In fact, as far as we can see, the factive island effect quite generally persists under embedding. That is, we are not aware of cases where the embedding context obviates the factive island effect. It is initially conceivable that this observation provides (additional) arguments for one or both of the two analyses that we have compared in this paper. One should therefore ask how these analyses might apply to embedded questions.

Beginning with the answerability analysis, we note that the answerability condition was motivated with a pragmatic rationale that refers to question-answer exchanges, hence to question speech acts. Nevertheless, we took the felicity relation \succ , which the answerability condition and the existence presupposition constrain, to relate context sets to question *denotations*, not to question speech acts. Accordingly, the uninterpretability principle too, was stated with reference to question denotations only, not question speech acts. Our original rendition of this principle in (26) is repeated in (142).

- (142) Uninterpretability principle
 A question with denotation Q is uninterpretable if
 there is no c such that $c \succ Q$

The benefit of this formulation is that, without any further assumptions, the uninterpretability principle applies to embedded questions in the same way it applies to matrix questions. In particular, the analysis determines the embedded questions in (141) to be uninterpretable. To capture the judgments on the statements in (141) as a whole, all that needs to be added is that a structure that contains an uninterpretable question is itself uninterpretable.

Under our elaboration of the contradiction analysis in section 6.1, much the same comments apply to the contradiction analysis. We proposed that universal projection is derived from a pair of felicity conditions, restrictor economy and the no accommodation condition. On this analysis, projection of a contradictory universal presupposition, too, amounts to necessary infelicity. Moreover, while we motivated restrictor economy and the no accommodation condition with rationales referring to question

³²The examples in (141) might actually have grammatical parses, viz. parses where the string *Fred knows* is parsed as a restrictive relative clause modifying *girls* (much like *who Fred knows*). These parses are of course not relevant in the present context and are to be ignored.

speech acts, we nevertheless construed those conditions as relating context sets to question denotations. Once again, therefore, uninterpretability of both matrix questions and embedding cases like those in (141) is derived under the uninterpretability condition in (142). So, just like the answerability analysis, our rendition of the contradiction analysis applies to embedded questions like those in (141) without further assumptions.

However, as discussed in section 4.2, the embedded factive island question in the particular cases in (141) is not representative. While in (141), uniqueness is a matter of a semantics, we saw that in other factive island cases, uniqueness is merely given by entrenched background assumptions. We illustrated this with Oshima's (2007) example (1b) (*Who does Max know that Alice got married to on June 1st?*). In (143), this question appears embedded under *know* and *wonder*. In those cases, too, the factive island effect persists under embedding.

- (143) a. *Kim wonders who Max knows that Alice got married to on June 1st.
b. *Kim knows who Max knows that Alice got married to on June 1st.

Moreover, in such cases the the entrenched background assumptions establishing uniqueness are assumptions about the subject's knowledge or belief state. The text in (144) illustrates this point with embedding under *wonder*. The first sentence establishes that Kim's beliefs entail that the gapped complement of *know* does not denote uniquely. This is sufficient to remove the factive island effect in the variant of (143a) that appears as the second sentence of the text.

- (144) Kim believes that on June 1st, Alice got married to three men, viz. Alan, Bill, and Carl. She wonders which of them Max knows that Alice got married to that day.

Since it is the embedding predicate whose semantics refers to the subject's knowledge or belief state, this observation suggests that the embedding predicate's semantics is an ingredient of the factive island effect in embedded questions. We propose, therefore, that *wonder* and question embedding *know* trigger presuppositions that impose requirements similar to those that the relevant felicity conditions impose on matrix questions. To extend the contradiction analysis in this way, consider again the two felicity constraints we have held responsible for universal projection in matrix questions, reprinted in (145).

- (145) a. Restrictor economy
 $c \succ Q$ only if $\forall p[c \subseteq \{w: p \in Q(w)\} \rightarrow c \cap \text{dom}(p) \neq \emptyset]$
b. No accommodation condition
 $c \succ Q$ only if $\forall p[c \subseteq \{w: p \in Q(w)\} \rightarrow c \subseteq \text{dom}(p) \vee c \cap \text{dom}(p) = \emptyset]$

In (146), these felicity conditions are adapted to serve as presuppositions triggered by *wonder*, by replacing the context set variable c with $\text{bel}_w(x)$, the set of worlds compatible with what the subject believes in the world of evaluation. In (147), which states presuppositions triggered by question embedding *know*, c is instead replaced by $\{w\}$, the singleton set containing the world of evaluation, and $\text{epi}_w(x)$, the set of worlds compatible with what the subject knows in the world of evaluation.

- (146) $\llbracket \text{wonder} \rrbracket(Q)(x)(w)$ is defined only if
- a. $\forall p[\text{bel}_w(x) \subseteq \{v: p \in Q(v)\} \rightarrow \text{bel}_w(x) \cap \text{dom}(p) \neq \emptyset]$
 - b. $\forall p[\text{bel}_w(x) \subseteq \{v: p \in Q(v)\} \rightarrow \text{bel}_w(x) \subseteq \text{dom}(p) \vee \text{bel}_w(x) \cap \text{dom}(p) = \emptyset]$
- (147) $\llbracket \text{know} \rrbracket(Q)(x)(w)$ is defined only if
- a. $\forall p[p \in Q(w) \rightarrow \text{epi}_w(x) \cap \text{dom}(p) \neq \emptyset]$
 - b. $\forall p[p \in Q(w) \rightarrow \text{epi}_w(x) \subseteq \text{dom}(p) \vee \text{epi}_w(x) \cap \text{dom}(p) = \emptyset]$

These presuppositions derive universal presupposition projection for *wh*-questions embedded under *wonder* and *know*, respectively. (148) embeds Abrusán's (2011, 2014) example in (32) above under *wonder* and *know*.

- (148) a. Kim wonders who among these ten people Mary regrets that Bill invited.
b. Kim knows who among these ten people Mary regrets that Bill invited.

For these examples, (146) derives universal presuppositions that we consider adequate. For (148a), (146) derives the presupposition that for each person (who Kim believes to be) among these ten people, Kim believes that Bill invited that person; similarly, for (148b), (146) derives the presupposition that for each person among these ten people, Kim knows that Bill invited that person.

As intended, moreover, the universally projected presupposition will be contradictory in cases where the factive predicate's complement denotes uniquely in the subject's belief or knowledge worlds. In that case, it is impossible for the set of belief or knowledge worlds to also meet the two presuppositions triggered by the embedding predicate. The embedding cases in (141) wind up carrying the contradictory presupposition that each person (who Kim believes to be among) these ten people is the tallest member of our team. We propose that this contradiction can be held responsible for their perceived uninterpretability. Similarly, the cases in (143) can be excluded as uninterpretable in virtue of carrying a presupposition that is false in all accessible context sets, as the predicted presupposition will be false in any context set entailing that Kim believes or knows that Alice married only one person on June 1st. The example in (144) is now captured as well, since there the actual context set

is one where Kim's beliefs entail non-uniqueness of the relevant property, rather than uniqueness.

We conclude, then, that the contradiction analysis of factive islands can be extended to embedded questions. We now turn to the answerability analysis. In (149), we reprint the two relevant felicity conditions, the existence presupposition and the answerability condition.

- (149) a. Existence presupposition
 $c \succ Q$ only if $c \subseteq \{w: \exists p[p \in Q(w) \ \& \ p(w)]\}$
 b. Answerability condition
 $c \succ Q$ only if $\exists p[c \subseteq \{v: p \in Q(v)\} \ \& \ c \subseteq \text{dom}(p) \ \& \ c \not\subseteq p \ \& \ c \cap p \neq \emptyset]$

In (150), these felicity conditions are converted into presuppositions triggered by *wonder*, replacing c with $\text{bel}_w(x)$ throughout.

- (150) $\llbracket \text{wonder} \rrbracket(Q)(x)(w)$ is defined only if
 a. $\text{bel}_w(x) \subseteq \{v: \exists p[p \in Q(v) \ \& \ p(v)]\}$
 b. $\exists p[\text{bel}_w(x) \subseteq \{v: p \in Q(v)\} \ \& \ \text{bel}_w(x) \subseteq \text{dom}(p) \ \& \ \text{bel}_w(x) \not\subseteq p \ \& \ \text{bel}_w(x) \cap p \neq \emptyset]$

Consider now the case of the factive island embedded under *wonder* in (141a). Given that there the factive predicate's gapped complement necessarily denotes uniquely, we know from the results established in section 2.3 that there is no logically possible set of belief worlds $\text{bel}_w(x)$ that meets the presuppositions encoded in (150). This amounts once again to (141a) carrying a contradictory presupposition, which we can hold responsible for the observed uninterpretability. Similarly, the uninterpretability of (143a) can be credited to the fact that its presupposition fails to be met in any accessible context set.

We now turn to the case of *know*, which in the context of the answerability analysis is interestingly different from the case *wonder*. In (151), the adaptation of the felicity conditions (149) involves replacing c with $\text{epi}_w(x)$, as seen before. However, in the presupposition that corresponds to the answerability condition, stated in (151b), we now omit the conjuncts that amount the informativity condition on assertions (see (15) in section 2.2).

- (151) $\llbracket \text{know} \rrbracket(Q)(x)(w)$ is defined only if
 a. $\text{epi}_w(x) \subseteq \{v: \exists p[p \in Q(v) \ \& \ p(v)]\}$
 b. $\exists p[\text{epi}_w(x) \subseteq \{v: p \in Q(v)\} \ \& \ \text{epi}_w(x) \subseteq \text{dom}(p)]$

The informativity condition $\text{epi}_w(x) \not\subseteq p \ \& \ \text{epi}_w(x) \cap p \neq \emptyset$, if it were to be added to (151b), would be blatantly inadequate as a part of the presuppositional content of question embedding *know*. A garden-variety statement like *John knows who called*

does evidently not presuppose that there is a Hamblin/Karttunen to the question who called whose truth value John’s state of knowledge fails to settle. In fact, the asserted content of the sentence is likely judged to be inconsistent with such a presupposition.³³

Let us now consider how (151), as stated, applies to the embedding example in (141b). According to (151a), the sentence presupposes that Kim knows that there is some girl *x* who is the tallest member of our team and who Fred knows to be the tallest member of our team; according to (151b), the sentence also presupposes that for some individual *y* who Kim knows to be one of the girls, Kim also knows *y* to be the tallest member of the team. But given the uniqueness assumption, the assumption that only one person can be the tallest member of our team, it follows that *x* and *y* are the same individual. The two presuppositions in (151) taken together therefore entail that for the unique person who is the tallest member of our team, Kim knows that she is, and also knows that Fred knows that she is. Hence (141b) is predicted to presuppose that Kim knows the complete answer to the embedded question. But if so, then (141b) presupposes what it entails. The sentence is true in any context set where its presupposition is met, a type of triviality that we propose to hold responsible for the perceived uninterpretability of the sentence. Much the same carries over to (143b), which we can determine to be true in any accessible context where its presupposition is met.³⁴

We take the presuppositions posited in (150) and (151) to be plausible. For *wonder*, the existence presupposition in (150a) is independently supported by intuitions about garden-variety question like *Betty wonders who called*, which indeed seems to take it for granted that Betty believes that someone called; and answerability presupposition in (150b) is very similar to a “non-triviality” presupposition for *wonder* that Uegaki (2015) posits for independent reasons. For *know*, an existence presupposition much like (151a), is also posited in Uegaki (2015) (who, however, takes the presupposition to the subject’s belief state, rather than state of knowledge); and the weakened answerability condition in (151b) is weak enough to be no less plausible than the presupposition posited for *know* in (147b), given that (147b) entails (151b) (as long as it is assumed that there is at least one proposition that the subject knows to be in the question extension).

The presuppositions in (150) and (151) are moreover motivated by data independent of the factive island effect. In sections 5.1 and 5.2, we studied the referential island effect in matrix questions like (55) (**Which team did they arrest that violent fan of?*) and questions like (65a) (**Which weight of our bag is over 10kg?*), which we said was uninterpretable due to its uniquely denoting restrictor. (152) and (153) illustrate that embedding such questions under *wonder* and *know* preserves uninterpretability. As we invite the reader to verify, this is predicted under the presuppositions in (150)

³³We thank an anonymous reviewer for alerting us to this point.

³⁴The idea that uninterpretability can result from a statement’s entailing its asserted content was first promoted in Barwise and Cooper (1981), who applied it to certain cases of the definiteness effect, such as **There are both students with a GPA of 4.0*.

and (151), which once again assign presuppositions to these examples that are either contradictory (for *wonder*) or entail their asserted content (for *know*).

- (152) a. *Kim wonders which team they arrested that violent fan of.
b. *Kim knows which team they arrested that violent fan of.
- (153) a. *Kim wonders which weight of our bag is over 10kg
b. *Kim knows which weight of our bag is over 10kg.

We are led to conclude that based on the cases examined here, the study of embedded factive islands, while interesting in its own right, does not furnish additional evidence for (or against) either of the two approaches to factive islands in matrix questions. All of the presuppositions posited in (146)/(147) and (150)/(151) are plausible and enjoy independent support. Since they are compatible with each other, they might all be correct. But if so, then such embedding cases don't provide additional evidence for one or another pair of felicity conditions being a source of uninterpretability in matrix questions. This verdict might well change if a broader range of embedding predicates is considered, but we will stop here and leave further exploration of this issue to future research.

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