On *Wh*-Islands

Márta Abrusán
Institut Jean Nicod
ENS, EHESS, CNRS

marta.abrusan@gmail.com

Abstract

This paper argues that *wh*-islands are unacceptable because they cannot be given a complete (exhaustive) answer. In the case of degree questions, the complete answer expresses a contradiction given the assumption that degree questions range over intervals. In the case of manner questions the problem arose from the fact that a complete answer to these questions is equivalent to a sentence with an embedded declarative, which is either a violation of the principle of Maximize Presupposition!, as in the case of question embedding predicates such as *know,* or simply incompatible with the meaning of the question embedding predicate, which is argued to be the case with predicates such as *wonder*.

1 Introduction

An interrogative complement clause creates an environment of which *wh*-words ranging over individuals can move out[1], but not *wh*-words ranging over degree or manners:

(1) a. ?Which problem do you wonder how to solve?
b. *How do you know which problem to solve?
c. *How high do you wonder who to lift?

(2) a. ?Which problem do you know whether to solve?
b. *How do you wonder whether to solve the problem?
c. *How tall do you know whether to be?

[1] There is significant crosslinguistic variation with respect to these facts: E.g. in English and Hungarian extraction of *wh*-words over individuals is indeed markedly better from their degree and manner counterparts, French e.g. however prohibits the extraction of wh-words ranging over individuals as well. I will not address this cross-linguistic difference.

The contrasts exemplified above represent some of the core cases of so called *weak-island* violations and have been a major topic in the *syntactic* literature in the last 20 years or so (cf. Rizzi 1990, Cinque 1990 and subsequent literature). Other examples of paradigmatic *weak-island* violations include negative islands, factive islands, islands created by certain quantifiers, to name but a few. Interestingly enough, the existing *semantic* accounts of weak islands, such as Szabolcsi and Zwarts (1993, 1997), Honcoop (1996), Rullmann (1995), Fox and Hackl (2007) concentrate their attention on one or more of these latter types of islands, offering at best a promissory note about the cases of the type of island violations exemplified above. The exception is Cresti (1995), who offers a syntactico-semantic account for *wh*-islands that arise with degree extraction. This paper presents a new, purely semantic/pragmatic account to *wh*-islands.

Dayal (1996) has argued that a question presupposes that there is a single most informative true proposition in the Karttunen denotation of the question, i.e. a proposition that entails all the other true answers to the question. This principle has been shown to explain the unacceptability of negative degree islands in Fox and Hackl (2007) and Abrusán and Spector (2008), and also to explain a number of other types of weak islands in Abrusán (2007). In this paper I argue that in the case of *wh*-islands that are formed by an extraction of a *degree-wh* phrase, Dayal's (1996) presupposition can also never be met. As a consequence, any complete answer to these questions will amount to the statement of a contradiction. The reason is that for any proposition p in the question domain, there will be at least two alternatives to p that cannot be denied at the same time. I argue that this maximization failure is predicted if we assume an interval-based semantics of degree constructions (cf. Schwarzschild and Wilkinson 2002, Heim 2006). In the case of manner questions the situation will be slightly different: Although these do have a most informative true answer, however, this answer will always be contextually equivalent to its counterpart with an embedded declarative. Since the answer with the embedded interrogative comes with a vacuous presupposition, while the answer with the embedded declarative has a contentful presupposition, any answer to a question such as the b-examples above will be a violation of the principle of Maximize Presupposition (cf. Heim (1991), Sauerland (2003), Percus (2006), Schlenker (2008)). Thus according to this proposal the compositional semantics and pragmatics of questions supplies everything we need for the explanation of *wh*-islands in questions, without invoking any further special rules.

A disclaimer is in order at this point: one aspect that I will not discuss in this paper is the role of tense, in other words why is it that the presence of overt tense marking turns these islands into strong islands in many languages[2]. I will assume that this is a consequence of an independent factor that creates strong-islands. Therefore the only thing that I will be concerned with here is the difference that I predict between questions about individuals on the one hand, and questions about manners and degrees on the other hand, independently of the contribution of tense.

[2] The data on tensed constituent *wh*-complements seems to show a lot of cross-linguistic and cross-speaker variation. E.g. Szabolcsi (2006) reports sentences such as (i) below to be acceptable in Hungarian, but not in English or Dutch for most speakers.

(i) ???Which men did John ask whether Bill invited?

2 Embedded Questions and Exhaustivity

While Groenendijk and Stokhof (1982, 1984) have famously proposed that embedded questions in general should be understood as strongly exhaustive, Heim (1994) and following her Beck and Rullmann (1999), Guerzoni and Sharvit (2004) have argued for a theory that has more flexibility, namely allows for at least some embedded questions to be understood as weakly exhaustive. In this respect, a three-way classification is sometimes assumed (cf. e.g. Guerzoni and Sharvit 2004, Sharvit 1997) according to which predicates such as *wonder* are always strongly exhaustive[3], predicates belonging to the *know*-class can be understood as both strongly and weakly exhaustive, while predicates such as *be surprised* or *predict* only allow weakly exhaustive readings. At the same time, the weakly exhaustive reading of the verbs belonging to the know-class is rather controversial (cf. Sharvit 1997 for an overview) and therefore in the following discussion I will only use their strongly exhaustive readings.

Which types of question embedding predicates create *wh*-islands? It seems that *wh*-islands arise with both the *wonder*- and the *know*-type of question embedding predicates.

(3) *Wonder class* predicates (e.g. *Wonder, ask, want to know, inquire…)*

a. ?Who does Mary wonder whether to invite?
b. *How is Mary wondering whether to behave?
c. *How tall is the magician wondering whether to be?

d. ?Which problem do you wonder how to solve?
e. *How do you wonder which problem to solve?
f. *How high do you wonder who to lift?

(4) *Know*-class predicates (*Know, find out, remember, be certain…)*

a. ?Who does Mary know whether to invite?[4]
b. *How does Mary know whether to behave?
c. *How tall does Mary know whether to be?

d. ?Which problem do you know how to solve?
e. *How do you know which problem to solve?
f. *How high do you know who to lift?

How about predicates belonging to the *surprise* class, i.e. the class of weakly exhaustive predicates? Unfortunately, these examples do not offer a good testing ground for *wh*-islands, because the meaning of these seems to be incompatible with an

[3] But note that this claim is not uncontroversial, cf. discussion e.g. in Sharvit (1997).

[4] The acceptability of this example shows speaker variation, and also variation across languages. Its French counterpart I am told seems to be consistently unacceptable, while its Hungarian counterpart is acceptable.

embedded infinitival clause. However, since tense in the embedded complement turns weak islands into strong islands, we cannot find weak-islands created by such weakly exhaustive predicates. Therefore, all the examples that we find with *wh*-islands are in fact cases where the question embedding verb requires a strongly exhaustive reading.

3 Wh-Islands that Arise with Degree Questions

This section looks at *wh*-islands that arise with degree questions. The first part is concerned with embedded *whether* questions, discussing examples with the question embedding predicates *know* and *wonder.* It is assumed that the explanation given for these two verbs will carry over to all the other question embedding predicates in their class. In the second half of the section I discuss the case of embedded constituent questions and show that the problem they pose can in fact be reduced to the same problem that made embedded *whether* questions unacceptable in the first place.

3.1 Embedded Whether Questions

***Know*-class predicates** I follow Heim (1994) and Beck and Rullmann (1999) in assuming that the exhaustivity of embedded complements is encoded in the lexical meaning of the question embedding verb[5]. Given this, let's represent the lexical semantics of the strongly exhaustive question embedding verb *know* as follows, using a Hintikka-style semantics for attitude verbs. ($Q_H(w)$ stands for the Hamblin-denotation of an interrogative).

(5) **know** (w) (x, Q_H(w)) is true iff $\forall p \in Q_H(w)$, x knows whether p is true in w
where, 'x *knows whether p is true in w* ' is true in w iff for $\forall w' \in Dox_x(w)$,
if p(w)=1, p in w' and if p(w)=0, $\neg$p in w'
,*where* $Dox_x(w) = \{w' \in W$: x's beliefs in w are satisfied in w'$\}$

Embedded whether questions with *know*-predicates about individuals Let's look at an example of movement out of a *whether*-clause, and its Hamblin denotation:

(6) a. Who does Mary know whether she should invite?
b. $\lambda q.\exists x$ [person(x)$\wedge$ q=λw. knows (Mary, λp.[p=λw'. she$_m$ should invite x in w' $\vee$ p=λw'. she$_m$ should not invite x in w']) in w

Assuming that the domain of individuals in the discourse is {Bill, John, Fred}, the set of propositions that (6)b describes is {that Mary knows whether to invite Bill, that

[5] But note that this assumption is not in fact crucial for our analysis.

Mary knows whether to invite John, that Mary knows whether to invite Fred}[6]. More precisely we might represent this set of propositions as:

(7) $\{\forall w' \in Dox_M(w)$, (if *invB* in w, *invB in w')* $\wedge$ *(* if $\neg$*invB in w*, $\neg$*invB in w'),*
$\forall w' \in Dox_M(w)$, (if *invJ* in w, *invJ in w')* $\wedge$ *(* if $\neg$*invJ in w*, $\neg$*invJ* in w'),
$\forall w' \in Dox_M(w)$, (if *invF in w*, *invF in w')* $\wedge$ *(*if $\neg$*invF* in w, $\neg$*invF in w')}*
,where *invX* in w is a notational shorthand for *Mary should invite X in w*

A complete answer to a question Q is the assertion of some proposition in Q together with the negation of all the remaining alternatives in Q. For (6), the meaning we would get if we negated one of the propositions in its denotation is shown below:

(8) Mary does not know whether to invite John

$\neg[\forall w' \in Dox_M(w)$, (if *invJ* in w, *invJ in w')* $\wedge$ *(* if $\neg$*invJ in w*, $\neg$*invJ* in w')]

$= \exists w' \in Dox_M(w)$, (*invJ* in w $\wedge$ $\neg$*invJ in w')* $\vee$ *(*$\neg$*invJ* in w $\wedge$ *invJ* in w')

Suppose that we assert *Mary knows whether she should invite Bill* as an answer to the question in (6). The statement that this answer is the complete answer means that we in fact assert that the rest of the alternative propositions in Q are false: i.e. we assert that Mary knows whether she should invite Bill and that she does not know whether she should invite John and that she does not know whether she should invite Fred:

(9) *Mary knows whether she should invite Bill*
$\forall w' \in Dox_M(w)$, if *invB in w*, *invB in w'* $\wedge$ if $\neg$*invB* in w, $\neg$*invB in w'*
and $\exists w' \in Dox_M(w)$, (*invJ* in w $\wedge$ $\neg$*invJ in w')* $\vee$ *(*$\neg$*invJ* in w $\wedge$ *invJ* in w'),
and $\exists w' \in Dox_M(w)$,(*invF in w* $\wedge$ $\neg$*invF in w')* $\vee$ *(*$\neg$*invF in w* $\wedge$ *invF in w')*

In the case of questions about individuals thus no problem arises with complete answers: the meaning expressed above is coherent. This is because the alternatives in the question denotation are independent from each other: whether or not Bill is invited in the actual world is independent from whether or not Fred is invited etc.

Embedded *whether* questions with *know* about degrees Following the analyses of Schwarzschild and Wilkinson (2002), Heim (2006) and Abrusán and Spector (2008), I will assume that degree adjectives establish a relation between individuals and intervals:

(10) a. ▪ tall□=$\lambda I_{<d,t>}. \lambda x_e$. x's height $\in I$
b ▪ John is I-tall□=1 iff John's height $\in I$; *where I is an interval:*

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[6] I restrict my attention to singular alternatives in the discussion. The reader can verify that adding plural alternatives would not change the facts.

c. A set of degrees D is an <u>interval</u> iff
For all d, d', d'': if $d \in D$ & $d'' \in D$ & $d \leq d' \leq d''$, then $d' \in D$

In the case of a positive degree question the alternative propositions in the question denotation range over different intervals that could be the argument of the adjective:

(11) ▪ How tall is John?$\square^{w}$ = $\lambda p.\exists I\, [I \in D_I \wedge p = \lambda w'.$ John's height $\in I$ in $w']$
'For what interval I, John's height is in that interval?'

Given this, the Hamblin denotation of a question with movement of the degree expression out of the embedded question will be as shown below:

(12) a. *How tall does Mary know whether to be?
b. $\lambda q.\exists I\, [I \in D_I \wedge\ q = \lambda w.$ knows (Mary, $\lambda p.[p = \lambda w'.$ her_m height be in I in w' $\vee$ $p = \lambda w'.\ \neg$ her_m height be in I in w']) in w

We might represent this set informally, as {that Mary knows whether her height be in I_1, that Mary knows whether her height be in I_2, that Mary knows whether her height be in I_3 …etc, for all intervals in D_I }, or more precisely as follows: (Notice that if one knows that her height is not in an interval I equals knowing that her height is in the complement of interval I in a given domain of degrees, which I represent as $\neg$I.)

(13) $\{\forall w' \in Dox_M(w)$, [if $I_1(w)=1$, $I_1(w')=1$] $\wedge$ [if $\neg I_1(w)=1$, $\neg I_1(w')=1$]
$\forall w' \in Dox_M(w)$, [if $I_2(w)=1$, $I_2(w')=1$] $\wedge$ [if $\neg I_2(w)=1$, $\neg I_2(w')=1$]
$\forall w' \in Dox_M(w)$, [if $I_3(w)=1$, $I_3(w')=1$] $\wedge$ [if $\neg I_3(w)=1$, $\neg I_3(w')=1$] $\}$
,where I_n (w) is a notational shorthand for *Mary's height should be in I_n in w.*

Imagine now that we were to state *Mary knows whether her height should be in I_1* as a complete answer. A complete answer equals to the assertion of the most informative true answer together with the negation of all the alternatives that are not entailed by the most informative true answer. Now let's take 3 intervals: interval 1, interval 2 which is fully contained in 1 and interval 3 which is fully contained in the complement of 1:

(14)
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|__1__________________|_____¬1_____________________|
|_____2_____|__¬2__________________________________|
|______¬3_________________________|_____3__________|
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The propositions that Mary knows whether her height is in I_1 and that Mary knows whether her height is in I_2 and that Mary knows whether her height is in I_3 do not entail each other. Thus, asserting that *Mary knows whether her height be in I_1* as a complete answer would amount to asserting the conjunction that she knows whether her height should be in I_1 and that she does not know whether her height should be in I_2 or I_3:

(15) $\underline{\forall w' \in \text{Dox } M(w),\ [\text{if } I_1(w)=1, I_1(w')=1]} \wedge [\text{ if} \neg I_1(w)=1, \neg I_1(w')=1]$
and $\exists w' \in \text{Dox}_M(w), (I_2(w)=1 \wedge \neg I_2(w')=1) \vee (\neg I_2(w)=1 \wedge I_2(w')=1)$
and $\exists w' \in \text{Dox}_M(w), (I_3(w)=1 \wedge \neg I_3(w')=1) \vee \underline{(\neg I_3(w)=1 \wedge I_3(w')=1)}$

However, the problem is that the meaning expressed by this tentative complete answer above is not coherent. Suppose first that Mary's height is in I_1. The complete answer states that Mary does not know that her height is in $\neg I_3$, i.e. in the complement of interval I_3. From this it follows that for any interval contained in $\neg I_3$, Mary does not know that her height is in it. Interval I_1 is contained in interval $\neg I_3$. But now we have derived that the complete answer states a contradiction: this is because it states that Mary knows that her height is in I_1 **and** that she does not know that her height is in $\neg I_3$, which is a contradiction. We might illustrate the contradiction that arises with the following:

(16) #Mary knows whether her height is btw 0 and 5 or between 5 and 10
but She does not know whether her height is btw 0 and 3 or between 3 and 10
and She does not know whether her height is btw 0 and 7 or between 7 and 10

It is easy to see that if Mary's height had to be in the complement of interval I_1 the same problem is recreated, but this time with interval I_2.

Embedded whether questions with *wonder*–type predicates about degrees As a first pass, let's assume (cf. e.g. Lahiri (2002), Guerzoni and Sharvit (2004)), that the lexical semantics of *wonder* is the following:

(17) **wonder** (w) (x, $Q_H(w)$) is defined iff $\neg\forall p \in Q_H(w)$, x believe p
if defined, **wonder** (w) (x, $Q_H(w)$) is true iff
$\forall p \in Q_H(w)$, x wants-to-know whether p in w

Let's spell out what it means if *x wants to know whether p*. Using a Hintikka-style semantics for attitude verbs such a meaning could be expressed as follows:

(18) 'x ***wants-to-know*** whether p in w ' is **true** in w iff
for $\forall w' \in Bul_x(w)$, if p(w)=1, x knows p in w'
and if p(w)=0, x knows $\neg$p in w'
,where $Bul_x(w) = \{w' \in W$: x's desires in w are satisfied in w'$\}$
'in every world in which x's desires are satisfied, if p, x knows that p
and if not p, x knows that not p'

Given this meaning, the meaning of question where a degree phrase moves out from the complement of *wonder* will be as follows:

(19) a. *How tall does Mary wonder whether to be?

b. $\lambda q.\exists I\ [I \in D_I \wedge\ q=\lambda w.$ wonders (Mary, $\lambda p.[p=\lambda w'.$ her$_m$ height be in I in w' $\vee$ $p=\lambda w'.\ \neg$ her$_m$ height be in I in w']) in w

Informally, we might represent the set described above as {that Mary wonders whether her height should be in I_1, that Mary wonders whether her height should be in I_2, that Mary wonders whether her height should be in I_3, etc, for all intervals in D_I}. Somewhat more precisely we might represent it as below: (Notice that if one wonders whether her height is not in an interval I equals her wondering about her height being in the complement of that interval in a given domain, which I represent as $\neg$I.)

(20) {$\forall w' \in Bul_M(w)$, if I_{1w}, M knows I_1 *in w'* $\wedge$ if $\neg I_{1w}$, M knows $\neg I_1$ *in w',*
$\forall w' \in Bul_M(w)$, if I_{2w}, M knows I_2 *in w'* $\wedge$ if $\neg I_{2w}$, M knows $\neg I_2$ *in w',*
$\forall w' \in Bul_M(w)$, if I_{3w}, M knows I_3 *in w'* $\wedge$ if $\neg I_{3w}$, M knows $\neg I_3$ *in w',*
etc. for all intervals in D_I}
,where I_{nw} is a notational shorthand for *Mary's height should be in I_n in w*.

Imagine now that we were to state *Mary wonders whether her height should be in I_1* as a complete answer. Now let's again take 3 intervals as follows: interval 1, interval 2 which is fully contained in 1 and interval 3 which is fully contained in the complement of interval 1:

(21) |__**1**________________|____¬1___________________|
|_____**2**_____|__¬2_________________________________|
|______¬3_______________________|_____**3**__________|

Asserting that *Mary wonders whether her height should be in I_1* as a complete answer would amount to asserting the conjunction that she wonders whether her height should be in I_1 and that she does not wonder whether her height should be in I_2 or I_3:

(22) $\forall w' \in Bul_M(w)$, if I_{1w}, M knows I_1 *in w'* $\wedge$ if $\neg I_{1w}$, M knows $\neg I_1$ *in w',*
and $\exists w' \in Bul_M(w)$, ($I_{2w} \wedge$ M $\neg$know I_2 *in w')* $\vee$ *($\neg I_{2w} \wedge$* M $\neg$know $\neg I_2$ *in w')*
and $\exists w' \in Bul_M(w)$, ($I_{3w} \wedge$ M $\neg$know I_3 *in w')* $\vee$ *($\neg I_{3w} \wedge$* M $\neg$know $\neg I_3$ *in w')*

However, again the meaning expressed by the tentative complete answer above is not coherent. Suppose first that Mary's height has to be in I_1. Then the complete answer states that in her desire worlds, Mary does not know that her height is in $\neg I_3$, i.e. the complement of interval I_3. From this it follows, that for any interval contained in $\neg I_3$, Mary does not know that her height is in it. Interval I_1 is contained in interval $\neg I_3$. But now we have derived that the complete answer states a contradiction: this is because it states that in her desire worlds, Mary knows that her height is in I_1 **and** that she does not know that her height is in $\neg I_3$, which is a contradiction. Finally, it is easy to see that if Mary's height had to be in the complement of interval I_1, the same problem would be recreated, but this time with interval I_2. We might again illustrate the contradiction that arises with the following:

(23) #Mary wants to know whether her height is btw 0 and 5 or between 5 and 10
but She doesn't want to know whether her height is btw 0 and 3 or btw 3 and 10
and She doesn't want to know whether her height is btw 0 and 7 or btw 7 and 10

Interestingly, for both false alternatives, it would have been consistent with the meaning of p to exclude them, but trying to exclude them both at the same time leads to contradiction. Notice that this property connects in a straightforward way to the generalization made in Fox (2007) about non-exhaustifiable sets of alternatives.

3.2 Embedded Constituent Questions

Not only embedded whether-constituents, but also embedded constituent questions are *wh*-islands, as the examples below show:

(24) a. ?Which problem does Mary know how to solve?
b. *How tall does Mary know who should be?

The unacceptability of (24)b and similar questions can be reduced to the problem that lead to the unacceptability of embedded *whether* questions in the previous section. First, observe that the Hamblin-denotation of (24)b is as below:

(25) $\lambda q.\exists I\ [I\in D_I\ \wedge q=\lambda w.$ knows (Mary, $\lambda p.\exists x\ [p=\lambda w'.$ x's height should be in I in w']) in w

Informally, the meaning above might be schematized as below:

(26) {that Mary knows about Q_1, that Mary knows about Q_2}

Imagine that there are 3 individuals in the domain A, B and C, and 3 intervals: interval 1, interval 2 which is fully contained in 1 and interval 3 which is fully contained in the complement of 1, exactly as was assumed in (21) above. Then the informal representation of the denotation of the question above could be as follows:

(27) {that Mary knows (for which $x\in\{A,B,C\}$, x's height is in I_1)
that Mary knows (for which $x\in\{A,B,C\}$, x's height is in I_2)
that Mary knows (for which $x\in\{A,B,C\}$, x's height is in I_3) }

Recall that the strongly exhaustive meaning for the question embedding predicate *know* places a constraint on the true as well as the false alternatives. Given this, our question denotation equals the following set of propositions:

(28) {that M.knows{whetherA's height $\in I_1$;
whether B's height $\in I_1$;
whether C's height $\in I_1$ },
that M.knows {whether A's height $\in I_2$;
whether B's height $\in I_2$;
whether C's height $\in I_2$ },
that M.knows {whether A's height $\in I_3$;
whether B's height $\in I_3$;
whether C's height$\in I_3$}}

Before we proceed, let me insert here a note about negation: It has been already observed that the negation of a strongly exhaustive predicate is stronger than expected: e.g. *John does not know who came* seems to suggest that for no individual does John know whether they came. This is surprising because by simple negation we would only expect a much weaker meaning, according to which John does not know for everyone whether they came. In other words, the question below in (29)a seems to have the stonger meaning shown in (29)b instead of the predicted weaker (29)c:

(29) a. John does not know who came
b. $\forall p \in Q_H(w)$, John does not know whether p
c. $\neg\forall p \in Q_H(w)$, John knows whether p

In the discussion that follows I will take this fact at face value, without providing an explanation. Given this, the complete answer conjoins the most informative true answer with the strengthened negation of the false alternatives. Now, a complete answer *Mary knows who should be I_1-tall* will state:

(30) **that M. knows whether A's height $\in \mathbf{I_1}$**
& that M knows whether B's height $\in I_1$
& that M knows C's height $\in I_1$,
& **that M. $\neg$know whether A's height $\in \mathbf{I_2}$**
& that M $\neg$ know whether B's height $\in I_2$
& that M $\neg$ know whether C's height $\in I_2$,
& **that M $\neg$know whether A's height $\in \mathbf{I_3}$**
& that M $\neg$know whether B's height $\in I_3$
& that M $\neg$ know whether C's height $\in I_3$

Looking more closely at the set of propositions above, we can observe that exactly the same problem that arose with the embedded *whether* questions is recreated, but multiply! Observe that each boxed part below corresponds to an embedded contradictory *whether* question:

(31)

that M knows if A's height $\in I_1$ **& that M$\neg$know if A's height$\in I_2$** **& that M$\neg$know if A's height$\in I_3$**	& & &	that M knows if B's height $\in I_1$ that M $\neg$know if B's height $\in I_2$ that M $\neg$know if B's height $\in I_3$	& & &	*that M knows if C's height $\in I_1$* *that M $\neg$know if C's height $\in I_2$* *that M$\neg$ know if C's height$\in I_3$*

Thus the problem of embedded constituent questions simply reduces to the problem of embedded *whether* questions, which have been argued to always lead to a contradiction in the previous section.

4 Questions about Manners

I will assume following Abrusán (2007) that the domain of manners contains *contraries* as described below:

(32) Manners denote functions from events to truth values. The set of manners (D_M) in a context C is a subset of $[\{f \mid E\rightarrow\{1,0\}\}=\wp(E)]$ such that for each predicate of manners $P\in D_M$, there is at least one contrary predicate of manners $P'\in D_M$, such that P and P' do not overlap: $P\cap P'=\varnothing$.

Second, although the context might implicitly restrict the domain of manners, just as the domain of individuals, but for any manner predicate P, its contrary predicates will be alternatives to it in any context, e.g. *wisely, unwisely*. Finally, we might observe that the law of excluded middle does not hold for manners: for each pair (P, P'), where P is a manner predicate and P'is a contrary of P, and $P\in D_M$ and $P'\in D_M$, there is a set of events $P^M \in D_M$, such that for every event e in $P^M \in D_M$ $[e\notin P \in D_M \ \& \ e\notin P'\in D_M]$.

Let's first observe that unfortunately the account proposed for degree questions above does not go through in a straightforward way for manner questions. In analogy with the intervals that we have used for degrees, we might think of contrary manner predicates as exclusive sets of events. Suppose now that the domain of manners contains three exclusive sets of events, i.e. three contrary predicates, e.g. the *politely, impolitely,* and *neither politely and impolitely,* which I represent as *med-politely* below. Now, the sets of events that are *politely*-events, the sets of events that are *impolitely*-events and the sets of events that are *med-politely*-events and the events that are in the complement set of these can be represented as follows:

(33)
$\neg$med.politely	*med.pol*	*$\neg$med.politely*
politely	*$\neg$ politely*
$\neg$impolitely	*impolitely*

Take now an example of a *wh*-island that arises if we attempt to move the manner-expression out of the embedded interrogative:

(34) a. *How does Mary know whether to behave?

b. $\lambda q.\exists\alpha$ [manner(α)$\wedge$ q=λw. knows (Mary, λp.[p=λw'. she$_m$ behave in α in w' $\vee$ p=λw'. she$_m$ not behave in α in w']) in w

Assuming that our domain of manners is {*politely, impolitely med-politely*}, we might informally represent the Hamblin denotation of this question as {that Mary knows whether to behave *politely*, that Mary knows whether to behave *impolitely*, that Mary knows whether to behave *med-politely* , …}. A word of caution is in order. Notice that given this small domain, the set of alternatives is **not** the singular set {that Mary knows whether to (behave *politely,* behave *impolitely*, behave *med-politely)*}. This is because given the regular meaning of *whether*, this is simply not what we get compositionally. Given some proposition p, *whether p*, as defined in the previous section, gives us the set consisting of p and its complement proposition ¬p: i.e. {p,¬p}. *Whether p* cannot denote the set of propositions that we would get by replacing a manner predicate m that p contains by all the contraries to m in the domain, which is what the second option would amount to in this case. Of course, the set we derive seems a little bit strange, but that is part of the point being made here. By the rules of semantic composition we only get this strange set.

Suppose we tried to assert *Mary knows whether to behave politely* as a complete answer. If Mary has to behave politely, than her behavior will also be not impolite and not medium polite, therefore in her belief worlds if the event was a politely-event Mary will know that it was not an impolitely-event and not a med-politely event, in other words it would be inconsistent for Mary to know that the event was polite, but not to know that it was also not-impolite and not-medium polite. As a consequence, it is not consistent with the complete answer that the event be polite. However, if the event in question is not a polite one, this is still consistent with it not being impolite (as it might be medium polite) and with it not being medium polite (as it might be impolite). Therefore, it will be coherent for Mary to know that the event was not polite, but not to know whether it was impolite or medium polite. Therefore, unlike what we have seen above in connection with manner questions, the complete answer above does not state a contradiction. However, we still might observe something unusual. While this complete answer is not contradictory, it is nevertheless contextually equivalent to its counterpart with an embedded declarative:

(35) Mary knows that she should not behave impolitely.

This is because, as we have seen above, polite behavior would have resulted in an inconsistent state of beliefs, but impolite behavior would not have. It is easy to see, that given our earlier assumptions about the domain of contraries this observation generalizes to any complete answer to the question. However, now we might say that the problem with the question is that all of its complete answers are contextually equivalent to sentences which have a stronger presupposition, and therefore the question itself will be ruled out as violation of the principle of Maximize

Presupposition![7]. Notice that a complete answer such as (36)a stands with a vacuous presupposition, but its counterpart with an embedded declarative in (36)b stands with a contentful presupposition:

(36) a. Mary knows whether to behave politely. (vacuous presupp.: $p \vee \neg p$)
b. Mary knows that she should not behave politely (presupposition: $\neg p$)

Roughly speaking, the principle of Maximize Presupposition! requires that if we have two alternatives which are contextually equivalent, but one of them comes with a stronger presupposition, we are required to use the one with the stronger presupposition. (But cf. Heim (1991), Sauerland (2003), Percus (2006), Schlenker (2008) for a number of different ways of spelling out this principle in a more precise fashion.) Given this principle, any complete answer to our question will be ruled out in a systematic way as a violation of the principle of Maximize Presupposition. Finally, for any question, if we are in a position to know in advance that every complete answer to it will be ruled out then the question is infelicitous.

In the case of question embedding predicates such as *wonder*, the situation is again a bit different. This is because question embedding predicates such as *wonder* cannot in fact embed a declarative clause, as it is shown in the example below:

(37) *How do you wonder whether to solve the problem?
a. I wonder whether you should solve this problem fast
b. #I wonder that you should solve this problem fast

Therefore, although the meaning of the complete answer is still predicted to be contextually equivalent to a sentence with an embedded declarative, the embedded declarative is independently unacceptable and the explanation for the unacceptability of the question in (37) cannot rely on the principle of Maximize Presupposition. However, I would like to suggest that now the problem with the complete answer is in fact the same that makes it impossible for question-embedding predicates such as *wonder* to take declarative complements: Since it is the essential part of the lexical meaning of *wonder*-type verbs that they express a mental questioning act, a declarative complement (or a complement that is contextually equivalent to declarative one) is simply incompatible with the lexical meaning of *wonder*. It is for this reason then, that that both the embedded declarative, as well any complete answer to (37) above is unacceptable.

5 Conclusion

In this paper I have argued that *wh*-islands are unacceptable because they cannot have a complete (exhaustive) answer. In the case of degree questions, the complete answer was shown to express a contradiction, given the assumption that degree questions

[7] I am indebted to E. Chemla (pc) for this suggestion.

range over intervals. In the case of manner questions the problem arose from the fact that a complete answer to these questions was predicted to be equivalent to a sentence with an embedded declarative, which was either a violation of the principle of Maximize Presupposition!, as in the case of question embedding predicates such as *know,* or simply incompatible with the meaning of the question embedding predicate, which was argued to be the case with predicates such as *wonder*.

Acknowledgements

This paper grew out of a chapter in my MIT Ph.D. dissertation: Special thanks to my thesis advisor Danny Fox, and my thesis committee: Gennaro Chierchia, Irene Heim, David Pesetsky. I would like to thank also Klaus Abels, Emmanuel Chemla, Paul Egré, Danny Fox, Winnie Lechner, Øystein Nilsen, Philippe Schlenker and the audience at the EGG Summerschool in Debrecen for comments, questions and suggestions. I would also like to acknowledge financial support (in part) by the European Science Foundation (Euryi project "Presupposition: a formal pragmatic approach").

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