Intervention Effects

“How many books did you not read?”

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1 Intervention effects and the issues for semantic theory

1.1 Dependencies over a distance and their restrictions

Natural language allows for dependencies between linguistic expressions over a distance (see Chomsky 1957, among others). In the declarative sentence in (1a) all linguistic material occurs in its canonical position. In the wh-interrogative in (1b), however, the wh-word whom together with the preposition is fronted to the beginning of the clause. Now, the intuitive paraphrase of (1b) is something along the lines of 'Which x is such that you got this letter from x?' That is, at the level of logical form (LF; see “Levels of Analysis: LF vs Direct Compositionality”) there is a variable x in what corresponds to the canonical position of whom, indicated by the underscored blanks in (1). This variable is dependent on the wh-operator. Without a variable in the canonical position, it would not be clear at all how to capture our intuitions regarding the interpretation of (1b). In fact, we would get a nonsensical paraphrase like ‘Which x is such that you got this letter from?’

(1)

a. You got this letter from Mary.
b. From whom did you get this letter ___?
c. To whom did you show ___ this letter?

It is thus tempting to make the overt fronting of the wh-word crucial in establishing the dependency observed at logical form. Indeed, this is the standard approach to wh-movement and its interpretation going at least back to (Karttunen 1977). Parallel considerations apply to (1c), which can be paraphrased as ‘Which x is such that you showed this letter to x?’

The effects of locality restrictions can be described in the following way. Two expressions α and β in sentence S need to enter into a relation R. The presence of an element ω c-commanded by α and itself c-commanding β, however, blocks the establishment of R, whereby S is perceived to be degraded. Schematically, in (2a) α and β, on the one hand, undergo a successful relation, depicted by co-indexation and the checkmarks. A similar relation is, on the other hand, prohibited in (2b) – depicted by the crosses – by the presence of the intervening element ω. The result of this prohibited dependency is that the sentence is degraded.
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(2) a. \[ \ldots [\alpha_{\checkmark}, \ldots [\beta_{\checkmark}, \ldots ]] \] (dependency intact)

b. \[ \ldots [\alpha_{\checkmark}, \ldots [\omega \ldots [\beta_{\checkmark}, \ldots ]]] \] (dependency broken)

To clarify, \( \alpha \) in (1b) and (1c) would be the dislocated \textit{wh}-expression and \( \beta \) its canonical position. Here I tacitly assume that the canonical position is filled by a trace or copy of the fronted material (see Fox 2002; Sauerland 2004 for pertinent discussion). In other words, there is linguistic material in the positions marked by a blank. There is, however, no intervener \( \omega \) in these examples.

One well-known class of restrictions on dependencies is induced by so-called strong islands. Complex NPs such as \textit{the rumor that}, for instance, constitute strong islands as they block fronting of expressions from inside of the complex noun phrase to a position outside of it (Ross 1967). That is, in (3) \textit{the rumor that} would correspond to \( \omega \) in (2b).

(3) a. *From whom did Mary hear \textit{the rumor that} you got this letter ___?

b. *To whom did Mary hear \textit{the rumor that} you showed this letter ___?

There is consensus in the literature that restrictions such as the ones in (3) are to be explained by syntactic mechanisms. They are not the topic of this chapter.

1.2 Intervention effects

The degradedness caused by certain other restrictions on dependencies is referred to as intervention effects. On the one hand, intervention effects share with strong islands the general characteristics of restrictions on dependencies outlined above. On the other hand, they differ from them in that not all expressions of a class of potentially harmful interveners is harmful for all kinds of dependencies of a given class. That is, intervention effects are characterized by a certain degree of selectivity. Let me informally describe this situation as in (4).

(4) Intervention effect

Given classes of linguistic expressions \( A, B, \) and \( X \), an intervention effect occurs in sentence \( S \) if some but not all configurations of the form \[ S \ldots a \ldots [\omega \ldots [\beta, \ldots ]]] \]
are degraded, where \( a \in A, \beta \in B, \omega \in X \) and \( a \) and \( \beta \) need to enter into a relation, where the nature of the relation is left open.

Consider so-called weak islands as induced by factive predicates like \textit{regret}, which are therefore referred to as factive islands (e.g., Rizzi 1990 among others). As the examples in (5) show, \textit{regret} breaks the dependency for some but not all \textit{wh}-expressions.

(5) a. *From whom do you \textit{regret} having gotten this letter ___?

b. To whom do you \textit{regret} having shown this letter ___?

(Szabolcsi and Zwarts 1992, ex. 98)
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Given the difference between (5a) and (5b), one might think that it is actually the predicate in the embedded clause that causes the intervention effect. The examples in (6), however, show that this conclusion is not correct. Non-factive predicates like *think* allow a dependency regardless of the makeup of the embedded clause. Rather it seems that the semantics of the factive predicate *regret* causes an intervention effect if certain preconditions are fulfilled, that is, if the semantics of the embedded clause is of a certain kind. It is hard to see how a purely syntactic account could explain the data.\(^5\)

\[(6)\]
\[a. \text{ From whom do you } think \text{ you got this letter } ___? \]
\[b. \text{ To whom do you } think \text{ you showed this letter } ___? \]

Consider next so-called Beck effects (Beck 1996a; 1996b). Such effects are exhibited by languages that can leave at least one *wh*-phrase in situ, that is, languages where not all *wh*-phrases must undergo fronting to the beginning of the clause. German is one such case. As (7a) shows, in a multiple *wh*-interrogative one *wh*-phrase undergoes fronting and the other one stays in situ. However, the second *wh*-phrase cannot stay in situ if a negative quantifier intervenes, as (7b) shows.

\[(7)\]
\[a. \text{ Wen hat Hans } ___ \text{ wo gesehen?} \]
\[\text{whom has Hans where seen} \]
\[\text{‘Who did Hans see where?’} \]
\[b. \text{ *Wen hat niemand } ___ \text{ wo gesehen?} \]
\[\text{whom has nobody where seen} \]
\[(Beck 1996a, ex. 1b)\]

Now, the intuitive paraphrase of (7a) shows that even in situ *wh*-expressions undergo a dependency with a variable: ‘Which x and which y are such that Hans saw x at y?’\(^6\) Thus it is natural to conclude that the negative quantifier in (7b) prohibits this dependency. Why? Again, we are led to conclude that the answer is unlikely to be found solely in the syntax. After all, syntactically (7a) and (7b) are completely parallel as in both cases an NP or DP intervenes.\(^7\)

Another variant of intervention effects comprises certain cases where negative polarity items (NPIs) become unlicensed (Linebarger 1981; 1987; Chierchia 2004; 2013; Homer 2009). NPIs like *any* are dependent on the presence of a c-commanding negative expression, as the contrast in (8) shows. NPIs can therefore be dependent on *doubt* but not on *believe*.

\[(8)\]
\[a. \text{ *I believe that John ate any soup.} \]
\[b. \text{ I doubt that John ate any soup.} \]

As (9) shows, however, when a universal quantifier intervenes between *doubt* and the NPI, the necessary dependency cannot be established, and the example is degraded. In this chapter I only discuss intervention effects obtaining with
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wh-dependencies. See “Negative Polarity” for discussion of intervention in NPI-licensing.

(9) *I doubt that everyone ate any soup.

1.3 Why intervention effects are a nontrivial issue

As some of the citations above already indicate, the phenomena subsumed under the umbrella intervention effect are often taken to belong to the realm of syntax. That is, historically intervention effects were often assumed to be syntactic locality restrictions on grammatical dependencies. As such, what one would have to do is to formulate syntactic dependencies in such a way that they become sensitive to syntactic properties of intervening linguistic expressions and state the conditions under which these properties lead to a breakdown of the dependency under consideration. The problem such approaches face is that it is often not clear at all what the syntactic properties could be that cause one potentially harmful intervenor to be actually harmful and another to be harmless. The reason for this is that the interveners are to be characterized semantically rather than syntactically.

Competing approaches to intervention effects take the crucial difference between strong islands and intervention effects at face value: due to the unselective nature of the former, on the one hand, these approaches posit that they are real locality restrictions on grammatical dependencies. The latter, on the other hand, due to their selectivity are assumed to be non-syntactic and would therefore not really be classified as locality restrictions at all. Such approaches can come in a number of guises, but a widely shared intuition is that the causes of intervention effects are due to clashing semantic/pragmatic properties of the dependencies under consideration and the harmful interveners.

The issue for semantic accounts in a nutshell is as follows: run-of-the-mill compositional principles will deliver well-defined denotations for the examples above that are, moreover, potentially pragmatically useful. I want to make this clear by discussing one example in detail.

1.3.1 Interpreting an interrogative with a factive island

Consider the case of the factive island example from (5a) repeated in (10):

(10) *From whom do you regret having gotten this letter ___?

In the following, I assume the standard interpretive rules from Heim and Kratzer (1998). Any post-Montagovian compositional semantics will make reference to such rules in one form or another (see “Levels of Analysis: LF vs Direct Compositional Rules” and “Compositional Rules”).

(11) Function application

If \( \alpha \) is a node with immediate daughters \( \beta \) and \( \gamma \), then for any assignment \( \sigma \) \( \alpha \) is in the domain of \( \lfloor \beta \rfloor^\sigma \) if \( \beta \) and \( \gamma \) are in the domain of \( \lfloor \beta \rfloor^\sigma \) and \( \lfloor \beta \rfloor^\sigma \) is a function whose domain includes \( \lfloor \gamma \rfloor^\sigma \). If so, \( \lfloor \alpha \rfloor^\sigma \sigma = \lfloor \beta \rfloor^\sigma \sigma (\lfloor \gamma \rfloor^\sigma \sigma) \).
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(12) **Intensional function application** 
If $\alpha$ is a node with immediate daughters $\beta$ and $\gamma$, then for any assignment $g$ $\alpha$ is in the domain of $\llbracket \alpha \rrbracket_w^\varphi$ if $\beta$ and $\gamma$ are in the domain of $\llbracket \beta \rrbracket_w^\varphi$ and $\llbracket \gamma \rrbracket_w^\varphi$ is a function whose domain includes $\lambda w^\varphi. [\gamma]_w^\varphi$. If so, $\llbracket \alpha \rrbracket_w^\varphi = \llbracket \beta \rrbracket_w^\varphi (\lambda w^\varphi. [\gamma]_w^\varphi)$.

(13) **Predicate abstraction** 
If $\alpha$ is a node with immediate daughters $\beta$ and $\gamma$, where $\beta$ is a numerical index $i$, then for any assignment $g$, $\llbracket \alpha \rrbracket_w^\varphi = \llbracket \beta \rrbracket_w^\varphi [i \rightarrow x]$ (where $g[i \rightarrow x]$ is like $g$ except that it maps $i$ to $x$ if $g$ does not do so already).

Now, assume the rather standard LF for *wh*-interrogatives in (14), which quite closely resembles the pre-theoretical representation used above. Here the preposition is in its canonical position. The *wh*-expression is in its moved position having left a trace. The index of the moved *wh*-expression is adjoined to its sister node (Heim and Kratzer 1998). The trace bears the same index. Moreover, there is an interrogative operator $? \ldots$ present below the index. This operator can be thought of as corresponding to the interrogative complementizer in C in embedded interrogatives.

(14) $\left[ \text{CP whom } [1 \left[i \left[ \text{IP you regret having gotten this letter from } t_1 \right]\right]\right]$ 

For simplicity’s sake, I assume a semantics for *wh*-interrogatives following Karttunen (1977) in the following. In such a framework, an interrogative denotes a (characteristic function of a) set of propositions. Intuitively, these propositions correspond to their semantic answers. 

The crucial lexical entries are then as follows: the interrogative operator denotes a function from propositions to functions from propositions to truth values, as in (15a), establishing equivalence between the propositions. This creates what Karttunen terms a proto-question. The *wh*-expression is an existential quantifier as in (15b). It takes as argument a question denotation which was abstracted over and gives back such a denotation. The factive predicate is a function from propositions $p$ into functions from individuals to truth values. It presupposes that $p$ is true in the world of evaluation (Karttunen 1971; Kiparsky and Kiparsky 1971).

(15)  
a. $\llbracket ? \rrbracket = \lambda p_{st}. \lambda q_{st}. p = q$  
b. $\llbracket \text{whom} \rrbracket^w = \lambda f_{(s,t)}(x). \lambda p_{st}. \exists x [x \text{ is human in } w \land f(x)(p) = 1]$  
c. $\llbracket \text{regret} \rrbracket^w = \lambda p_{st}. \lambda x : p(w) = 1. x \text{ regrets } p \text{ in } w$

The compositional steps for the interpretation of the LF in (14) are then as follows. Here I gloss over details regarding the compositional build-up of the embedded clause, assuming that it is more or less transparent how this has to be spelled out. Crucially, IP denotes a defined truth value only if the addressee got this letter from individual $g(i)$ in the world of evaluation $w$. 
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(16) \[ \text{IP}^{w,g} = 1 \text{ iff you regret in } w \text{ having gotten this letter from } g(i) \text{ defined if you got this letter from } g(i) \text{ in } w \]

At the C'-level the proto-question is built by applying the interrogative operator using intensional function application to (16), as in (17). The result characterizes a singleton set of propositions, namely the set that contains the proposition that the addressee got this letter from \( g(i) \) in \( w \), where the proposition presupposes that the addressee did get the letter from \( g(i) \) in \( w \).

(17) \[ \text{C'}^{w,g} = \frac{\text{IP}^{w,g}(\text{IP}^{w,g})}{\lambda w. p = \lambda w : \text{you got this letter from } g(i) \text{ in } w \text{ having gotten this letter from } g(i)} \]

The index adjoined to \( C' \) has the consequence that the next higher constituent is interpreted by the predicate abstraction rule as in (18). In essence, we abstract over the variable in (17) \( g(i) \), thereby creating a function from individuals to question denotations.

(18) \[ \text{IC'}^{w,g} = \lambda x. \left[ \text{C'}^{w,g}(\text{IP}^{w,g}) \right] = \lambda x. \lambda p. p = \lambda w : \text{you got this letter from } x \text{ in } w \text{ you regret in } w \text{ having gotten this letter from } x \]

At the CP-level, the \( \text{wh} \)-expression applies to (18) as in (19). We get back a set of propositions. These are propositions that are of the form that the addressee regrets having gotten this letter from \( x \) where \( x \) is an individual and it is presupposed that the addressee did get the letter from \( x \).

(19) \[ \text{CP}^{w,g} = \left[ \text{whom} \right]^{w,g}(\text{IC'}^{w,g}) = \left[ \lambda y. \lambda p. p = \lambda w : \text{you got this letter from } y \text{ in } w \text{ you regret in } w \text{ having gotten this letter from } y \right] \text{ where } y \text{ is an individual and it is presupposed that the addressee did get the letter from } y \]

So, clearly there is nothing wrong with the factive island interrogative in (10) from a compositional perspective. In principle, we can arrive at a defined denotation.

1.3.2 Using an interrogative with a factive island

Maybe there is something wrong with the pragmatics of (10)? Maybe the denotation we got is not really usable? We can express the denotation in (19) less formally as the set in (20), assuming that the domain of individuals is Ann, Bea, and Cleo.
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(20) \[ [\text{CP}]^w = \{ \lambda w : \text{you got this letter from Ann in } w. \text{ you regret in } w \text{ having gotten this letter from Ann}, \]
\[ \lambda w : \text{you got this letter from Bea in } w. \text{ you regret in } w \text{ having gotten this letter from Bea}, \]
\[ \lambda w : \text{you got this letter from Cleo in } w. \text{ you regret in } w \text{ having gotten this letter from Cleo}\]

A speaker asking a direct interrogative is asking for information. We can therefore define a question speech act as in (21). In particular, what (21) requires is that the speaker at the least be told all the true propositions in the question denotation. Whether (21) captures all ingredients of a question speech act is somewhat tangential to the issue at hand. It is, however, the minimal requirement a question speech act must make it seems (Groenendijk and Stokhof 1984).

(21) **Question speech act**

A speaker uttering in world \( w \Phi \), where \([\Phi]^w \in D_{(l,t)}\), requests to be told the minimal proposition entailing the conjunction of all propositions \( q \in \{ r : [\Phi]^w(r) = 1 \} \) such that \( q \) is true in \( w \).

According to (21), by uttering an interrogative with the denotation in (20), the speaker requests to be told the minimal true proposition entailing all the true propositions in (20). This seems like a fine request for information and accords with intuitions.

1.4 The difficulty in accounting for intervention effects and its benefits

Considering the discussion in the preceding section, it appears that the standard interpretive component of natural language as it stands and as is often taught in introductions – admittedly, a very coarse picture of which was presented here – is too unconstrained in that it does not yield anything that one could safely assume to yield judgments of degradedness for the phenomena under discussion. As we will see it turns out that intervention effects require us to make nontrivial and sometimes controversial assumptions about the ontology, the compositional process, the pragmatics, or the interaction of the interpretive components involved. In particular, we will see that at the heart of the issue lies the question of how the interpretive component as a whole should be constrained so as to yield the correct empirical results. Such considerations can shed light on important architectural questions in the theory of natural language semantics and pragmatics.

In the following sections I will discuss the phenomena reviewed above along these general lines. Section 2 discusses weak island phenomena. Section 3 is devoted to Beck effects. In each case, I will attempt to give a comprehensive empirical overview and point to specific semantic/pragmatic accounts of the phenomenon under consideration. In section 4 I will conclude by tying together the findings from the various sections.
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2 Weak islands

In the following, I discuss the empirical landscape of the various weak islands and summarize the reasons for thinking that a semantic or pragmatic explanation is called for. After that I give an overview of existing proposals meeting that challenge. For other discussions of approaches to weak islands see Szabolcsi (2006) and Abrusán (2014).

2.1 Types of weak islands

We saw that in English *wh*-interrogatives one *wh*-phrase is fronted to the beginning of the clause in order to form an operator–variable dependency at LF. This is true for all kinds of *wh*-expressions including *wh*-adverbials like *how*, *why*, and *when*, and *wh*-phrases asking for degrees such as *how many cars* and *how fast*.

(22)

a. What did John fix ___?
b. Which car did John fix ___?
c. How did John fix the car ___?
d. How many cars did John fix ___?
e. How fast did John fix the car ___?
f. Why did John fix the car ___?
g. When did John fix the car ___?

2.1.1 Negative islands

With the exception of *why* (see below), all *wh*-expressions from (22) that do not ask for individuals are subject to intervention by negation. That is, an operator–variable dependency cannot be established across an intervening negation. This constraint is called the *negative island* constraint (Ross 1984; Rizzi 1990).

(23)

a. What didn’t John fix ___?
b. Which car didn’t John fix ___?
c. *How didn’t John fix the car ___?*
d. *How many cars didn’t John fix ___?*
e. *How fast didn’t John fix the car ___?*
f. Why didn’t John fix the car ___?
g. *When didn’t John fix the car ___?*

In fact, other negative expressions like *no one*, *few boys*, and *only John* cause similar problems for operator–variable dependencies (Rizzi 1990). Note that *only John* is negative in the sense that it states that no one other than John makes the predicate true. The following pairs illustrate this for *how*-interrogatives:

(24)

a. How did John fix the car ___?
b. *How did no one fix the car ___?*

(25)

a. How did a few boys fix the car ___?
b. *How did few boys fix the car ___?
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(26)  
a. How did John fix the car ___?  
b. *How did only John fix the car ___?

While these facts are more or less accepted, it is sometimes stated that the degree to which fronting across intervening factive predicates is possible varies with the fronted wh-expression (see, e.g., Cinque 1990; Rizzi 1990; Rooryck 1992). I do not engage in this discussion here as the facts are not entirely settled. To be on the safe side, the examples are marked as equally unacceptable. Similar comments are applicable to the weak islands discussed in the following sections. Clearly, obtaining more controlled judgments would be useful here and thus constitutes an avenue for future research. It might well be that different wh-expressions ultimately call for different treatments.

2.1.2 Factive islands

The situation is similar with respect to intervening factive predicates. All types of wh-phrases can undergo an operator–variable dependency across non-factive predicates like believe, as (27) shows, substantiating what we have already seen above.

(27)  
a. What does Mary believe John fixed ___?  
b. Which car does Mary believe John fixed ___?  
c. How does Mary believe John fixed the car ___?  
d. How many cars does Mary believe John fixed ___?  
e. How fast does Mary believe John fixed the car ___?  
f. Why does Mary believe John fixed the car ___?  
g. When does Mary believe John fixed the car ___?

If the predicate in question is factive, however, the result is degraded, unless the wh-expression asks for an individual as the examples in (28) show. In contrast to negative islands, however, even why seems to be subject to factive islands. This led Rizzi (1990) to conclude that why in cases like (22f) above is actually not fronted to but rather inserted in the clause-initial position (see also Ko 2005). Note that this option is not available in the case of (28f) where why must be fronted given that it is intended to be related to the predicate of the embedded clause.

(28)  
a. What does Mary know John fixed ___?  
b. Which car does Mary know John fixed ___?  
c. *How does Mary know John fixed the car ___?  
d. *How many cars does Mary know John fixed ___?  
e. *How fast does Mary know John fixed the car ___?  
f. *Why does Mary know John fixed the car ___?  
g. *When does Mary know John fix the car ___?

The list of predicates causing intervention might actually not only include factive ones such as know, regret, realize, and be surprised but also others such as so-called response-stance predicates including accept, deny, and verify (Hegarty 1992). Response-stance predicates do not presuppose their complement to be
true strictly speaking, but rather imply that its truth is under discussion. The ultimate list of predicates causing intervention in the sense of factive ones is still somewhat open for debate. In the following, I will nevertheless often refer to factive predicates when I should actually also include reference to response-stance predicates.

2.1.3 Wh-islands with whether
Finally, extraction of *wh*-expressions from embedded interrogatives is also restricted. Embedded *wh*-interrogatives are usually seen as strong islands, at least in English (Huang 1982).12 Embedded polar interrogatives that are either infinitival, subjunctive, or modal in nature, however, appear to be weak islands. As the following examples show, only *wh*-expressions asking for individuals can be easily fronted across an intervening *wh*-complementizer *whether*.

(29)

a. What does Mary know *whether John should fix ___?*
b. Which car does Mary know *whether John should fix ___?*
c. *How does Mary know *whether John should fix the car ___?*
d. *How many cars does Mary know *whether whether John should fix ___?*
e. *How fast does Mary know *whether whether John should fix the car ___?*
f. *Why does Mary know *whether John should fix the car ___?*
g. *When does Mary know *whether John should fix the car ___?*

(30)

a. What is Mary wondering *whether to fix ___?*
b. Which car is Mary wondering *whether to fix ___?*
c. *How is Mary wondering *whether to fix the car ___?*
d. *How many cars is Mary wondering *whether to fix ___?*
e. *How fast is Mary wondering *whether to fix the car ___?*
f. *Why is Mary wondering *whether to fix the car ___?*
g. *When is Mary wondering *whether to fix the car ___?*

Note that the responsive predicate *know* – that is, a predicate embedding both declarative and interrogative clauses (Lahiri 2002) – causes intervention when embedding a declarative, as discussed in section 2.1.2, but not when embedding a polar interrogative. With respect to the latter property, they thus pattern with interrogative predicates like *wonder* (Asher 1987; Lahiri 2002) – predicates that only embed interrogative clauses. From this one should conclude that it is not the factivity of *know* that causes the degraded status of the examples in (29). Note also that it is not immediately clear that factivity is even present with *know* embedding interrogative clauses (see Groenendijk and Stokhof 1982; 1984; but cf. Spector and Egré 2015; Maier 2017).

2.2 Why weak islands are semantic in nature
Historically, weak islands were taken to require a syntactic account. There are, however, at least three types of empirical arguments suggesting that a semantic account is preferable.
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2.2.1 The influence of the semantics of the predicate

First, Szabolcsi and Zwarts (1992) show that dependencies formed with \textit{wh}-expressions asking for individuals can be subject to weak islands. In particular, they are subject to intervention if there is a uniqueness implication present, as is necessary with the predicate \textit{to get this letter from} \textit{x} but not with the predicate \textit{to show this letter to} \textit{x}. A particular letter can only be from one individual, but it can be shown to multiple individuals. We have already seen the relevant difference for factive islands in section 1.2. I repeat the data here:

(31)  
a. *From whom do you \textit{regret} having gotten this letter ___?
b. To whom do you \textit{regret} having shown this letter ___?

(Szabolcsi and Zwarts 1992, ex. 98)

Recall that with non-factive predicates such as \textit{think}, both examples are acceptable. Negative islands show a similar picture. \textit{Whom} can be fronted across negation in (33b) without the uniqueness property, while it cannot be so in (32b) with the uniqueness property present.\footnote{13}

(32)  
a. From whom did you get this letter ___?
b. *From whom didn’t you get this letter ___?

(Szabolcsi and Zwarts 1992, ex. 96b)

(33)  
a. To whom did you show this letter ___?
b. To whom didn’t you show this letter ___?

(Szabolcsi and Zwarts 1992, ex. 96a)

Now, syntactic approaches to weak islands draw a strong distinction between \textit{wh}-expressions asking for individuals and those asking for degrees, manners, time points, and the like. The reason for this are, of course, the data reviewed in section 2.1. The data just discussed where \textit{wh}-expressions asking for individuals also seem to be subject to weak islands call such approaches into question then. Moreover, it is not clear how a syntactic account could differentiate between the \textit{wh}-expressions in, say, (32b) and (33b).

2.2.2 Contextual alleviation of weak islands

The second reason for assuming that weak islands are semantic in nature is due to the fact that they can be alleviated by context. The observation of this fact goes back to Kroch (1998), the original version of which was written in 1989. Kroch argues that the degree questions in (34) and (35) are acceptable in the kinds of contexts given. Note that \textit{whether} would be expected to instantiate a \textit{wh}-island as seen above. Note also that the examples in (34) and (35) are not infinitival or modal in nature. That is, one might even expect the embedded clause to constitute a strong \textit{wh}-island, if anything.

(34)  
a. From whom do you think this letter ___?
b. *From whom didn’t you think this letter ___?

(Szabolcsi and Zwarts 1992, ex. 96b)

(35)  
a. To whom do you think this letter ___?
b. To whom didn’t you think this letter ___?

(Szabolcsi and Zwarts 1992, ex. 96a)
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(34)  Context: There was a set of books for which Bill asked whether the company was interested in publishing them.
How many books did Bill ask whether the company was interested in publishing ___?
(Kroch 1998, ex. 19a)

(35)  Context: There are violations A, B, C, and D for the sport under discussion. For each violation the athlete gets a particular number of points deducted. I have not watched the whole event, but my friend has. So I ask him:
How many points are the judges arguing about whether to deduct ___?
(Kroch 1998, ex. 21a)

What these examples all have in common, intuitively speaking, is that the context restricts the domain of quantification for the wh-expression. Abrusán (2014) makes this explicit by giving examples listing salient answers as in (36), thereby showing that the observation extends to negative islands.

(36)  a. ?How didn’t John behave ___: quickly or responsively?
   (Abrusán 2014, 12, ex. 21)
   b. Among the following, how many points did Iverson not score ___?
      A: 20 B: 30
   (Abrusán 2014, 110, ex. 47)

These data taken together are problematic for syntactic accounts of weak island effects. It is not clear at all how contextual alleviation of the kind discussed could be incorporated in such an account in an explanatory way. After all islands are all-or-nothing phenomena on such a view.

2.2.3 Modal obviation phenomena

A third argument for a semantic treatment of weak island effects comes from so-called modal obviation phenomena. For instance, Fox and Hackl (2006) show following Kuno and Takami (1997) that the addition of an existential or a universal modal can affect the availability of negative island effects in degree questions. In particular, having an existential modal under negation, (37a), or a universal one above negation, (37b), obviates the weak island effect otherwise obtained with negation.

(37)  a. How much radiation is the company not allowed to expose its workers to ___?
   (Fox and Hackl 2006, ex. 28a)
   b. How much radiation is the company required not to expose its workers to ___?
   (Fox and Hackl 2006, ex. 29a)
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Crucially, in each case the reversal of the order of the modals and negation does not lead to an obviation effect:

(38)  a. ‘How much food is the company allowed not to give its workers ___?

(Fox and Hackl 2006, ex. 29b)

b. ‘How much food is the company not required to give its workers ___?

(Fox and Hackl 2006, ex. 28b)

Abrusán (2014) shows that factive islands can also be obviated by adding an existential modal below the factive predicate, at least for many speakers:

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

(Abrusán 2011, ex. 5)

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

(Abrusán 2011, ex. 5)

Finally, Abrusán (2014) adds to this picture that even wh-islands can be obviated by the addition of a universal modal in specific contexts, as the example in (40) shows:

(40)  Context: Cough syrup contains some steroids. For this reason, Olympic athletes need to inform the World Anti-Doping Agency (WADA) if they have to take more than a certain amount of it. But I forgot what this amount was, so I ask my friend, Michael Phelps:

?How much cough syrup does the WADA need to know whether you took ___?

(Abrusán 2014, 162, ex. 62)

Again, a syntactic account simply has nothing to say about why the addition of a modal should obviate a weak island effect.

2.3 Semantic accounts of negative islands

I now give a brief overview of existing semantic accounts of weak islands. In order to bring out parallels and differences between the different accounts, the discussion proceeds by island type rather than by account type. It might well be that one type of account works best for a particular type of weak island but not for another one. I will not do full justice to the individual accounts by presenting them in a literal fashion. Rather I will take the freedom to adopt them to the standard semantics and pragmatics discussed in section 1.3 above. This, I hope, will facilitate comparison.

2.3.1 Assumptions about denotation domains and maximality

Szabolcsi and Zwarts’s (1992) core idea is that at some point in the semantic composition of a wh-interrogative, a characteristic function of entities is generated and that this function is not necessarily defined for all possible argument types. If it is not defined for all possible argument types, unacceptability results. The authors do not give a precise semantics for their account (but cf. Honcoop’s 1998 dynamic implementation). I will therefore focus on two paradigmatic cases,
in an attempt to bring out their intuition. The compositional interpretation may, however, not reflect what the authors had in mind. I hope that the implementation will make it possible to relate the account to the ones discussed in the following section.

As the reader can verify, the standard Karttunen semantics discussed in section 1.3.1 when adopted for manner questions like (41) would not derive a characteristic function of manners at any point in the composition.

(41) *How didn’t John fix the car ___?

Let us therefore assume for a moment, in contrast to the standard picture reviewed in section 1.3.1, that a how-interrogative like (41) denotes a functions from manners to truth values directly. That is, to give an answer to (41) is to apply the function denoted by (41) to the maximal manner making the function true. For this assume the LF in (42). Notice that the predicate derived by fronting of how is separated from it by a maximality operator max. The derived predicate is interpreted by predicate abstraction and has the denotation in (43). \(^{15}\)

(42) \[
\text{CP} \text{ how } [x \text{ max } [1 \text{ IP not John fixed the car } t_m]]
\]

(43) \[
[1 \text{ IP}]^{w,g} = \lambda m. \text{John did not fix the car in manner } m \text{ in } w
\]

The maximality operator has the denotation in (44). The operator applied to a function from entities of any basic type \(r\) to truth values gives back the maximal entity making the function true, notated by \(x\). Applying (44) to (43) yields the maximal manner in (45) as denotation, if such a manner exists.

(44) \[
[\text{max}]^{w,g} = \lambda f(x,y) \text{ where } f(x) = 1
\]

(45) \[
[X]^{w,g} = \lambda m. \text{John did not fix the car in manner } m \text{ in } w
\]

The lexical entry of how denotes a relation between manners. The denotation of the interrogative then is the characteristic function of manners in (47). This function yields true for the manner corresponding to the maximal manner in which John did not fix the car. \(^{16}\)

(46) \[
[\text{how}^{w,g} = \lambda y_m \lambda x_m x = y
\]

(47) \[
[\text{CP}]^{w,g} = \lambda m. m = m'[\text{John did not fix the car in manner } m' \text{ in } w]
\]

Now, Szabolcsi and Zwarts assume that the domain of manners \(D_m\) is ordered. In particular, assuming that there are three manners, the characteristic function in (47) can be represented as the free join semi-lattice in (48). Note that there is no bottom element in (48). This means that in a situation in which John fixed the car in a quick, competent, and quiet manner, the function in (47) does not characterize any manner.
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As a consequence, there are situations in which the how-interrogative under discussion might not have an answer. This is the reason, the authors assume, why the interrogative is degraded.

The authors go on to suggest that such considerations lie at the heart of weak islands. For instance, degrees might have even poorer denotation domains than manners. Thus they will also be subject to intervention by negation. Individuals, on the other hand, are claimed to have richer, so-called Boolean denotation domains. In particular, they would have a bottom element where (48) does not have one corresponding to the empty set of individuals. As a consequence, (49) would be answerable even if John did not fix anything. Therefore it is not degraded.

(49) What didn’t John fix ___?

At this point we might ask whether there is any independent reason for why denotation domains differ in precisely the ways necessary for the account to work. As far as I am aware, a positive answer to this question does not exist. There are also other open issues. First, it is not clear what the account has to say about contextual alleviation and modal obviation of islands. Would these affect the denotation domains in a positive way? Second, the fact that no real compositional semantics is provided by the authors raises the question of whether their intuition can be implemented in a satisfying way. In particular, it is not immediately clear whether the approach can be combined with a more standard semantics for questions.

2.3.2 Absence of maximal answer

While some of the details of Szabolcsi and Zwarts’s (1992) approach are debatable, it is also clear that their idea of making maximality the culprit in negative islands has been very influential, in particular when it comes to degree questions. In the following, I briefly outline the history of various such implementations. As we will see, these are compatible with the compositional semantics from section 1.3.1.

2.3.2.1 Rullmann (1995)

Since von Stechow (1984) it has been standard to assume that natural language semantics makes use of degrees and that how-interrogatives such as (50) are questions for degrees. Rullmann suggests that (50a) asks for the maximal degree such that the addressee is tall to that degree. If the address is exactly 185 cm tall, then
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this is the relevant maximal degree the question is asking for. Similarly (50b) asks for the maximal degree to which the addressee is not tall. In the situation just mentioned, the addressee is not tall to 185.01 cm, and also not to 185.02 cm, and so on. In fact, there is no maximal degree to which the addressee is not tall. But if there is no maximal degree to which the addressee is not tall, then asking the interrogative does not make much sense. This would be the reason for the degradedness of (50b).

(50)  
  a. How tall are you ___?  
  b. *How tall aren’t you ___?

Beck and Rullmann (1999) notice that interrogatives like (51) constitute a problem for this reasoning. If, say, three eggs are sufficient for baking the cake, then four eggs will also be sufficient, and similarly for any larger quantity. That is, there is no maximal number of eggs that is sufficient to bake the cake, in parallel to the situation in (50b). Why then is (51) acceptable?

(51) How many eggs are sufficient (to bake this cake)?  

(Beck and Rullmann 1999, ex. 13)

2.3.2.2 Fox and Hackl (2006)

As a response to this puzzle, Fox and Hackl suggest that measurement scales used in natural language are universally dense. That is, for any two degrees \( d \) and \( d' \), where \( d < d' \), there is another degree \( d'' \), such that \( d < d'' < d' \). Moreover, they shift the problem from nonexistent maximal degrees to nonexistent maximal answers.

They assume following Dayal (1996) that there is an answer operator definable as in (52). This operator when applied to a question denotation gives the maximal true answer to the question, but with a twist. Specifically, it yields the unique true proposition in the question denotation entailing all other true propositions in the denotation. Moreover, it presupposes that there is such a maximal true proposition in the question denotation (\( \Rightarrow \) stands for entailment).

(52)  
\[
\text{[]}\text{Ans}\text{]}^w = \lambda Q(x,t) . \exists p[Q(p) = 1 \land p(w) = 1 \land \forall q[Q(q) = 1 \land q(w) = 1 \land q \Rightarrow p]] \\
\text{p}[Q(p) = 1 \land p(w) = 1 \land \forall q[Q(q) = 1 \land q(w) = 1 \land q \Rightarrow p]]
\]

For concreteness, assume as in (53a) that \( \text{tall} \) is a predicate of degrees \( d \) yielding true for an individual \( x \) if and only if \( x \) is \( d \)-tall (see, e.g., Heim 2000; but cf. Kennedy 1997 for a compatible alternative). Assume then that \( \text{how} \) has the denotation in (53b). That is, it is just like the \( \text{wh} \)-expression \( \text{whom} \) seen in (15b) except that it quantifies over degrees, where \( D_d \) is the domain of degrees.

(53)  
  a. \( \text{[]}\text{tall}\text{]}^w = \lambda d . \lambda x . x \text{ is } d \text{-tall in } w \\
  b. \( \text{[]}\text{how}\text{]} = \lambda f(\lambda d(x)) . \lambda p . \exists d[d \in D_d \land f(d)(p) = 1]

With the LFs in (54) for the examples in (50), all of this together means that the abstraction process must be over degrees as indicated by \( h_1 \). The denotations of the interrogatives in (50) are then as in (55).
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(54) a. \[ \text{[how \, [1 \, ? \, [\text{you are t}_1\text{-tall}]]]} \]
   b. \[ \text{[how \, [1 \, ? \, [\text{not you are t}_1\text{-tall}]]]} \]

(55) a. \[ \llbracket \text{([[54a]])} \rrbracket^w_g = \lambda p. \exists d \in D \lambda w. \text{the addressee is } d\text{-tall in } w \rrbracket \]
   b. \[ \llbracket \text{([[54b]])} \rrbracket^w_g = \lambda p. \exists d \in D \lambda w. \text{the addressee is not } d\text{-tall in } w \rrbracket \]

Moreover assume now that we modify the notion of a question speech act from (21) as in (56) by incorporating the answer operator into it. The speaker still asks for the minimal proposition entailing the conjunction of all true propositions in the denotation. In contrast to before, however, (56) has the effect that the speaker comes to presuppose that there is a unique true proposition in the question denotation entailing all other true propositions in it (Stalnaker 1974). This is, of course, the consequence of the presupposition contributed by the answer operator.

(56) Question speech act (modified)

A speaker uttering in world \( w \) \( \Phi \), where \( \llbracket \Phi \rrbracket^w_g \in D_{\lambda w} \), requests to be told \( \llbracket \text{Ans} \rrbracket^w_g (\llbracket \Phi \rrbracket^w_g) \).

What are the consequences of this for degree questions? By (56), a speaker asking (50a) wants to know the unique true proposition of the form \( \text{that the addressee is tall to degree } d \) entailing all other such true propositions. If the addressee is exactly 185 cm tall, then that proposition is \( \text{that the addressee is tall to degree } 185 \text{ cm} \). For (50b), however, the situation is different. In the same situation, the addressee is not tall to degree 185.01 cm, and the same for any larger degree, as seen above. Is 185.01 cm the relevant degree then? No, because under the assumption that measurement scales are dense, there is always a smaller degree between 185 cm and 185.01 cm, call it \( d \), such that the addressee is not tall to that degree. Moreover, there is another such degree between 185 cm and \( d \). And so on. Thus \( \llbracket \text{Ans} \rrbracket^w (\llbracket \text{([50b])} \rrbracket^w_g) \) is necessarily undefined. Clearly, this affects the question speech act negatively.

This approach can also deal with modal obviation phenomena. Consider (57) from (37b) again. Its denotation would be (58). Assume the law requires that the workers are not exposed to \( d' \)-amount of radiation. Then the proposition \( \text{that the company is required not to expose its workers to } d'\text{-amount of radiation} \) is the unique proposition entailing all other true propositions in the question denotation. For any \( d'' > d' \), this proposition entails \( \text{that the company is required not to expose its workers to } d''\text{-amount of radiation} \). This accounts for the acceptability of (57). Parallel reasoning extends to (37a) above as negation scoping over an existential modal is equivalent to negation scoping below a universal modal.

(57) How much radiation is the company \textbf{required} \textit{not} to expose its workers to ___?
   (Fox and Hackl 2006, ex. 29a)

(58) \[ \llbracket \text{([57])} \rrbracket^w_g = \lambda p. \exists d \in D \lambda w. \text{in all worlds } w' \text{ accessible from } w \text{ the company does not expose its workers to } d\text{-amount of radiation} \]
So Fox and Hackl’s (2006) approach deals both with negative island effects found with degree questions and modal obviation effects thereof without running into the problems discussed for Rullmann’s (1995) account. In order to deal with other cases of negative islands, however, the authors have to extend their use of dense scales to cases where such scales are normally not assumed. For instance, we saw that negative islands arise with interrogatives such as (59). It is, however, not clear what, say, 3.01 cars would amount to.

(59) *How many cars didn’t John fix ___?

As a consequence, my pragmatic rendition making use of (56) would probably not work for (59). Fox and Hackl, aware of this, suggest that the answer operator is directly attached to interrogatives in the representation and that there is a level of interpretation which is blind to contextual information and common knowledge and works with dense scales for all kinds of counting. This necessitates a strong version of modularity (see also Fox 2000; Gajewski 2002 for the related notion of a deductive system). The authors attempt to motivate their assumptions with other phenomena such as the implicatures of modified numerals (see also Nouwen 2008; but cf. Mayr 2013 for contrary arguments; see also “Modified Numerals”). Moreover, it is not immediately clear how to extend the density-based account to negative islands in non-degree questions such as (60) (but see Fox 2007).

(60) *How didn’t John fix the car ___?

2.3.2.3 Abrusán (2014)

Giving up universally dense scales, Abrusan retains Fox and Hackl’s suggestion that the answer operator in (52) is central to accounting for negative islands, but combines it with certain assumptions about denotation domains.

For degree questions such as those in (50), Abrusan suggests that they actually ask for an interval of degrees, that is, a set of degrees (Schwarzschild and Wilkinson 2002; Abrusán and Spector 2011). Accordingly, tall is a function from intervals I to functions from individuals x to truth values yielding true for x if and only if x’s height is a degree in I, as in (61a). How must also be adjusted, namely to a quantifier over intervals as in (61b).

(61) a. \[ \text{[tall]}_w = \lambda I. \lambda x. x\text{’}’s height is in } I \text{ in } w \]
   b. \[ \text{[how]}_w = \lambda f. (\lambda t. \lambda (st). \lambda p. \exists ! I [I \in D_{dt} \land f(I)(p) = 1]) \]

The LFs for the degree examples in (50) correspond to the ones in (54) with abstraction over interval denoting traces. The denotations are then as in (62).

(62) a. \[ \text{[50a]}_w = \lambda p. \exists ! I [I \in D_{dt} \land p = \lambda w. \text{the addressee’}’s height is in } I \text{ in } w] \]
   b. \[ \text{[50b]}_w = \lambda p. \exists ! I [I \in D_{dt} \land p = \lambda w. \text{the addressee’}’s height is not in } I \text{ in } w] \]

Given the definition of question speech act in (56), a speaker of (62a) asks for the unique true proposition of the form that the addressee’s height is in interval I entailing
all other such true propositions. If the addressee is exactly 185 cm, that proposition is that the addressee's height is in interval \([185 \text{ cm}, 185 \text{ cm}]\), which is equivalent to saying that the addressee is exactly 185 cm tall. With (62b), however, a problem arises again. There are at least two nonoverlapping intervals such that the addressee’s height is not in them: \([0, 184.9998 \text{ cm}]\) and \([185.0001 \text{ cm}, \infty]\). Now, the proposition that the addressee’s height is in \([0, 184.9998 \text{ cm}]\) does not entail that the addressee’s height is not in \([185.0001 \text{ cm}, \infty]\) and vice versa. Completely parallel considerations apply to smaller intervals based on the two mentioned. Thus there is no unique answer in the case of (50b) in the sense required by the answer operator. Thus again, the question speech act cannot be carried out.

Abrusán assumes that manner predicates like quickly are modifiers of eventualities. Therefore how in (60) quantifies over such modifiers in parallel to the quantification over intervals just seen. That is, the denotation of (60) is as in (63).

\[
(63) \quad \llbracket (m) \rrbracket^w = \lambda p. \exists m [m \in D_m \land p = \lambda w. \text{John did not fix the car in manner } m \text{ in } w]
\]

Crucially, Abrusán suggests that every set of manners must contain for each manner both its contrary and the middle between the two contraries, where two contraries contradict each other by definition. Assume that \(D_m\) in (63) is restricted contextually to manners of speed, then it contains quickly together with slowly and with regular speed. Assume now that John did not fix the car slowly. Would that John did not fix the car slowly be the unique true answer entailing all other true answers in (63)? No, if John actually fixed the car quickly, that John did not fix the car with regular speed would also be true. But the latter proposition is not entailed by the former one. And vice versa if John fixed the car with regular speed. Then that John did not fix the car quickly would be true, which is also not entailed. Therefore no unique true answer can be found and (60) is degraded. Of course, it remains to be seen how the assumption that sets of manners always contain contraries and middles can be substantiated. For now it must remain a stipulation.

Abrusán’s proposal can also deal with modal obviation facts and contextual alleviation. The logic of the argument is similar to that seen with Fox and Hackl’s (2006) proposal. I refer the reader to Abrusán (2014) for details.

I want to briefly return to discussion of the influence of the verbal predicate on negative islands. Abrusán suggests that given the punctual predicate die, (64a) is degraded because there are infinitely many time points where Mary did not die. Moreover, the time points and the resulting propositions are not ordered by entailment. Thus no unique answer can be found in parallel to what we saw above. With the stative predicate in (64b), on the other hand, maximal intervals where the addressee did not feel happy can be found, accounting for its acceptability.

\[
(64) \quad \begin{align*}
\text{a.} & \quad \text{When did Mary not die?} \\
\text{b.} & \quad \text{When didn’t you feel happy?}
\end{align*}
\]

(Abrusán 2014, 118, ex. 64)

But recall the data in (65) from above, which seem related to those in (64). Given the logic of the argument, then (65a) should be degraded because there are infinitely
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many individuals from whom the addressee did not get this letter. This is, however, not true given real world knowledge. There is a finite set of individuals, though maybe not listable. This suggests that even on Abrusán’s account one might need to resort to additional mechanisms. For instance, one might see (65) as evidence for dense scales for entities other than degrees, in particular for individuals. But this would bring the account closer to Fox and Hackl’s (2006) one, and in the end Abrusán’s criticism of universal dense scales might not hold up.

(65)  a. *From whom didn’t you get this letter ___?
      b. To whom didn’t you show this letter ___?
          (Szabolcsi and Zwarts 1992, ex. 96b)

2.4 Semantic accounts of factive and wh-islands

As far as I know only Abrusán (2014) attempts to account for wh-islands. Since the account is very close to her account of negative islands – the difference being that one needs to make reference to the strong exhaustive rather than the weak exhaustive answer (Heim 1994) – I do not discuss it in the interest of space. I therefore directly turn to factive islands. In general, they have been the focus of semantic research to a lesser degree than negative islands. I will keep the discussion to a minimum focusing on the differences to accounts of negative islands.18

2.4.1 Universal presupposition projection

As we have seen, wh-expressions are quantificational. Now, it is well known that a presupposition triggered by an expression embedded in the scope of a quantifier projects in the sense that it becomes a presupposition of at least one of the entities quantified over (Karttunen 1971). What is less clear is in what way the presupposition projects. Does it become a presupposition of all the entities under consideration or only of some?

On the basis of data such as (66), Abrusán (2011; 2014) concludes that presuppositions in the scope of wh-expressions project universally (Heim 1983; Schlenker 2009). The reason is that (66) suggests that Bill invited all of these 10 people. That is, the presupposition of Mary regrets that Bill invited x with a free variable x appears to become a presupposition of each of the 10 people.19

(66) Who among these 10 people does Mary regret that Bill invited ___?
      (Abrusán 2014, 61, ex. 9)

The assumption of universal projection immediately derives the difference between (67a) and (67b). The universal presupposition attributed to (67a) that the addressee got this letter from every individual quantified over by the wh-expression is contradictory, as the letter can only be from one person (but cf. the remarks in footnote 13 above). Such a universal presupposition is, however, not contradictory for (67b), as it says that the addressee showed the letter to every individual, which is indeed a possibility.20
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(67)  a. *From whom do you regret having gotten this letter ___?
     b. To whom do you regret having shown this letter ___?

(Szabolcsi and Zwarts 1992, ex. 98)

Factive islands in manner interrogatives such as (68) are also accounted for where how quantifies over a set of manners. Recall from section 2.3.2.3 that Abrusán assumes that every set of such manners must contain its contrary. If the set contains, say, politely it must also contain impolitely. Universal projection will thus derive the contradictory presupposition that John behaved politely and impolitely. No context can satisfy this presupposition.

(68) *How do you regret that John behaved ___?

This account can deal with modal obviation phenomena such as in (69). This interrogative, in contrast to the one in (68), will presuppose that for every manner John is allowed to behave in that manner. This, even though unlikely, can be satisfied by a context.

(69) *How do you regret that John was allowed to behave ___?

This approach also carries over to degree questions such as (70). Recall Abrusán’s assumption that how quantifies over intervals of height. If so, (70) presupposes that for every interval I Mary’s height is in I. Assume there are just two degrees, d and d’. Then there are two nonoverlapping intervals [d, d] and [d’, d’], and similarly for any more realistic set of degrees. But clearly Mary’s height cannot be in nonoverlapping intervals. Therefore the universal presupposition is contradictory.

(70) *How tall does Mary know that she is ___?

There is, however, a rather pressing issue for an account relying on universal projection: why is universal projection obligatory? It is well known that projection does not happen if an unsatisfiable presupposition would obtain (Heim 1983). For instance, in (71) the presupposition that John used to smoke triggered by stop does not project as it would contradict the because-clause. Rather the presupposition is locally accommodated under negation deriving the reading It is not the case that John used to smoke and stopped, which is compatible with the because-clause.

(71) John didn’t stop smoking, because he never did.

Moreover, it is not even necessary in the factive island cases for the presupposition to not project at all. Presuppositions in the scope of indefinites, for instance, seem to project existentially (see Beaver 2001; Fox 2013; Mayr and Sauerland 2016; among others). Clearly, (72) does not require that every fat man have a bicycle. It suffices if there is one and he pushes it. If indefinites and wh-expressions both
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denote existential quantifiers, as standardly assumed, then both should at least have the option of projecting presuppositions existentially.

(72) A fat man was pushing his bicycle.

(Heim 1983, ex. 25)

See the chapter “Projective Meanings” for further discussion.

2.4.2 Trivially answerable questions
Oshima (2007) suggests that the difference between (73a) and (73b), similar to the examples in (67), follows from independent pragmatic reasons.

(73) a. Who does Max know that Alice sent a Christmas card to ___?
    b. *Who does Max know that Alice got married to ___ on June 1st?

(Oshima 2007, ex. 5)

Oshima notes that for any context c some of the propositions in the denotation of (73a) and (73b) will be incompatible with c, namely the propositions about individuals for whom the factivity presupposition of know is known to not hold. In other words, the questions in (73) are effectively only about those individuals about whom it is a mutually shared belief that they satisfy the presupposition. As a consequence the question denotations essentially reduce to those in (74) where the wh-expression is restricted to those individuals for which the context does entail that they satisfy the presupposition.

(74) a. \(\text{⟦(73a)⟧}^{w, g} = \lambda p. \exists x [x \text{ is human in } w \land c \Rightarrow \{ \lambda w : \text{Alice sent a Christmas card to } x \text{ in } w \}] p = \lambda w : \text{Alice sent a Christmas card to } x \text{ in } w\]

b. \(\text{⟦(73b)⟧}^{w, g} = \lambda p. \exists x [x \text{ is human in } w \land c \Rightarrow \{ \lambda w : \text{Alice got married to } x \text{ on June 1st in } w \}] p = \lambda w : \text{Alice got married to } x \text{ on June 1st in } w\]

Now, notice that there is at most one proposition in the denotation in (74b) in any context where common knowledge holds that Alice cannot get married to more than one person on one day. Oshima assumes an existence requirement as in (75) requiring that in every world in the context at least one proposition in the question denotation be true. Here and in (74) I assume the context to be a set of worlds in Stalnaker’s (1978) sense. That is, I equate the context with the context set defined over it (see “Context and Conversation”).

(75) Existence requirement
An interrogative \(\Phi \in D_{\omega, c}\) is askable in context c only if for all worlds in c there is a proposition \(p \in \{ q : \text{⟦Φ⟧}^{w, g}(q) = 1 \}\) such that \(p(w) = 1\).

(75) together with the uniqueness property requires that in any context there is exactly one proposition in (74b). Now, if there is exactly one proposition in (74b),
then there is exactly one individual \( x \) such that it is a mutually shared belief that Alice got married to \( x \) on June 1st. But then, the speaker of (73b) cannot fail to know the answer to (73b), as it must be \( x \) who Max knows that Alice got married to on June 1st. Oshima thus holds that it is this pragmatic anomality that sets (73b) apart from (73a). Clearly, the question denotation in (74a) is not similarly restricted as the verbal predicate does not have the uniqueness property.

Oshima also holds that this can be extended to \textit{why}- and manner interrogatives. In particular, he argues that each proposition can have at most one reason, and each eventuality can be carried out in at most one manner. Together with the existence requirement negative interrogatives about reasons and manners therefore observe a uniqueness property similar to (74b). Note, however, that it is not at all intuitive that a proposition can have only one reason. At any rate, one might even extend Oshima’s approach to degree questions: the property of having a unique maximal degree together with the existence requirement would also yield the problematic uniqueness property. See also Simonenko (2016) for an application of Oshima’s analysis to so-called DP-islands.

3 Beck effects

I now turn to discussion of Beck effects. I first discuss what the source of their unacceptability is and why they are substantively different from the weak island effects seen in the preceding section. Unlike with the weak island effects, I will not summarize reasons for thinking why Beck effects might be semantic in nature. As will be seen, which empirical generalizations are seen to be the crucial ones varies with the nature of the semantic account proposed.

3.1 The nature of Beck effects

3.1.1 The unacceptability in Beck effects

Recall the data in (76) from (7) above. Following Beck (1996a) and others in the literature, I noted that a negative quantifier like \textit{niemand} in German creates an intervention effect in (76b) in contrast to the minimally different (76a).

\begin{align*}
(76) & \quad a. \text{Wen hat Hans ___ wo gesehen?} \\
& \quad \text{whom has Hans where seen} \\
& \quad \text{‘Who did Hans see where?’} \\
& \quad b. \text{Wen hat niemand ___ wo gesehen?} \\
& \quad \text{whom has nobody where seen}
\end{align*}

(Beck 1996a, ex. 1b)

What actually goes wrong in (76b)? To see this one must notice that a multiple \textit{wh}-interrogative such as (76a) can either be answered by a single-pair answer – that is, an answer specifying the unique pair making the relation denoted by the verb true – or by a multiple-pair answer – that is, an answer specifying all pairs
making that relation true. In other words, both A and A’ are possible answers to Q in (77).

(77) German
  Q: Wen hat Hans ___ wo gesehen?
     whom has Hans where seen
  A: Den Anton hat der Hans im Büro gesehen.
     the Anton has the Hans in the office seen
     ‘Hans saw Anton in the office.’
  A’:
     Den Anton hat der Hans im Büro gesehen, die Maria hat er
     the Anton has the Hans in the office seen, the Maria has he
     im Kino gesehen, und ...
     in the cinema seen, and ...

One might think, of course, that the single-pair answer is a special case of the multiple-pair answer. Beck effects, however, suggest otherwise (see also Dayal 2002 for independent reasons). It is sometimes noted in the literature that an interrogative such as (76b) is actually acceptable under a single-pair interpretation but not on a multiple-pair interpretation (e.g., Pesetsky 2000; Beck 2006; Kotek 2014). That is, it can be answered by A in (78) but not by A’. This state of affairs would be unexpected if single- and multiple-pair answers were due to the same interpretation of the multiple wh-interrogative.

(78) German
  Q: Wen hat niemand ___ wo gesehen?
     whom has nobody where seen
  A: Den Anton hat niemand im Büro gesehen.
     the Anton has nobody in the office seen
     ‘No one saw Anton in the office.’
  A’:
     #Den Anton hat niemand im Büro gesehen, die Maria hat niemand
     the Anton has nobody in the office seen, the Maria has nobody
     im Kino gesehen, und ...
     in the cinema seen, and ...

That is then, (76b) is judged degraded on its multiple- but not on its single-pair interpretation. Presumably, the former is more salient somehow. Otherwise, we should not judge (76b) degraded when presented on its own at all. Beck (2006) moreover notes that embedding a multiple wh-interrogative with an intervener under predicates like enumerate blocks the single-pair interpretation (see also Schwarz 1995). The degradedness then comes out clearly, as the contrast in (79), inspired by Beck’s (26), shows.

(79) German
  a. *Luise zählt auf, welchen Professor niemand ___ wohin eingeladen hat.
     Luise enumerates which professor nobody where to invited has
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b. Luise zählt auf, welchen Professor wohin niemand ___ eingeladen hat.
Luise enumerates which professor where to nobody invited has
‘Luise enumerates which professor x and which place y are such that no one invited x to y.’

3.1.2 Beck effects are about wh-in situ expressions and not weak islands

This raises the question whether (76b) is simply an instance of a negative island as discussed in section 2.1.1 above. Fronting of a wh-expression such as *wen across a negative quantifier, however, is in principle possible, as (80) shows. This is as expected given the data discussed above.

(80) German
Wen hat niemand ___ gesehen?
who has nobody seen
‘Who did no one see?’

But maybe negative islands for questions over individuals only become visible once we look at multiple wh-interrogatives? That is, maybe negative islands for questions over individuals manifest themselves by blocking the multiple-pair interpretation thereby disambiguating the questions. The fact that (76b) significantly improves if the non-fronted wh-expression is placed before the intervening negative quantifier, as in (81), strongly suggests otherwise. That is, (81) can have the multiple-pair interpretation and is thus answerable by A′ in (78).

(81) German
Wen hat wo niemand ___ gesehen?
who has where nobody seen
‘For which individual x and place y, no one saw x at y?’

But maybe negative islands for questions over individuals only become visible once we look at multiple wh-interrogatives? That is, maybe negative islands for questions over individuals manifest themselves by blocking the multiple-pair interpretation thereby disambiguating the questions. The fact that (76b) significantly improves if the non-fronted wh-expression is placed before the intervening negative quantifier, as in (81), strongly suggests otherwise. That is, (81) can have the multiple-pair interpretation and is thus answerable by A′ in (78).

That we are not dealing with an instance of a negative island is also suggested by the fact that, unlike with the latter, modal obviation does not seem to exist. Recall from section 2.2.3 that existential modals below negation obviate weak islands. This is not the case with Beck effects as the paradigm in (82) shows.

(82) German
a. Wen ist dem Hans erlaubt worden ___ wo zu treffen?
who is the Hans allowed become where to meet
‘Who was Hans allowed to meet where?’

b. *Wen ist niemandem erlaubt worden ___ wo zu treffen?
who is nobody allowed become where to meet

That we are not dealing with an instance of a negative island is also suggested by the fact that, unlike with the latter, modal obviation does not seem to exist. Recall from section 2.2.3 that existential modals below negation obviate weak islands. This is not the case with Beck effects as the paradigm in (82) shows.

b. *Wen ist niemandem erlaubt worden ___ wo zu treffen?
who is nobody allowed become where to meet

That we are not dealing with an instance of a negative island is also suggested by the fact that, unlike with the latter, modal obviation does not seem to exist. Recall from section 2.2.3 that existential modals below negation obviate weak islands. This is not the case with Beck effects as the paradigm in (82) shows.

c. Wen ist wo niemandem erlaubt worden ___ zu treffen?
who is where nobody allowed become to meet
‘Which person x and place y are such that no one was allowed to meet x at y?’
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Returning to (81), its acceptability suggests that it is a relationship between the non-fronted \textit{wh}-expression and some higher element that is prohibited. This is unlike what we know from negative islands. The generalization that Beck effects are about \textit{wh}-in-situ expressions – or \textit{wh}-expressions undergoing LF-movement – is also supported by cross-linguistic considerations. For instance, \textit{wh}-in-situ interrogatives in Japanese and Korean such as in (83) and (84) show behavior comparable to that of German multiple \textit{wh}-interrogatives (Hoji 1985; Beck and Kim 1997; Hagstrom 1998; Kim 2002; Tomioka 2007). A NPI like \textit{anyone} causes intervention when c-commanding a \textit{wh}-in-situ expression but not when the latter c-commands the former. Note that here issues about single- vs multiple-pair interpretations do not even arise.

(83) Japanese
\begin{itemize}
\item a. ?*Daremo nani-o yom-ana-katta-no
   \textit{anyone what-ACC read-NEG-PAST-Q}
\item b. Nani-o \textit{daremo} ___ yom-ana-katta-no
   \textit{what-ACC anyone read-NEG-PAST-Q}
\end{itemize}
(\textit{What did no one read?})

(Tomioka 2007, ex. 1a)

(84) Korean
\begin{itemize}
\item a. ?*amuto muôs-ûl sa-chi anh-ass-ni?
   \textit{anyone what-ACC buy-CHI not do-PAST-Q}
\item b. muôs-ûl \textit{amuto} ___ sa-chi anh-ass-ni?
   \textit{what-ACC anyone buy-CHI not do-PAST-Q}
\end{itemize}
(\textit{What did no one buy?})

(Kim 2002, ex. 10)

A prevalent intuition in the literature is that languages like German, Japanese, and Korean show Beck effects because they are so-called scrambling languages. In such languages the mutual scope between two expressions is largely determined by surface order (see in particular Mayr 2014). The degraded interrogatives seen above are degraded then because the scope of the \textit{wh}-in-situ expression is restricted to its surface position, while for semantic reasons it should take scope above the intervener.

Kotek (2014) shows that this intuition is also supported by facts from English. At first sight, it seems as if English does not show Beck effects given that Q in (85) is acceptable in contrast to the German example above. That is, the English multiple \textit{wh}-interrogative is acceptable both on a single- and a multiple-pair interpretation.

(85) \begin{itemize}
\item Q: \textit{Who did no one see where?}
\item A: \textit{No one saw Tony in the office.}
\item A\textsuperscript{′}: \textit{No one saw Tony in the office, no one saw Mary in the cinema, ...}
\end{itemize}

Pesetsky (2000) shows that intervention effects exist in English as well. In particular, in multiple \textit{which}-interrogatives the so-called superiority condition can
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be violated. That is, here it is not always the structurally highest \textit{wh}-phrase that must be fronted, as (86a) shows. Now, in such violations of superiority Beck effects emerge, as the degradedness of (86c) relative to (86b) shows. Kotek argues that this difference is due to the fact that in (86c) but not in (86b) the scope of the \textit{wh}-in-situ expression is restricted to its surface position.

(86) a. Which student did Mary give which book to ___?
   b. Which book did \textit{no one} give ___ to which student?
   c. \textit{?*}Which student did \textit{no one} give which book to ___?

(Pesetsky 2000, ex. 100)

In general, with regards to which languages show the kind of intervention effect under discussion, (Beck 2006, 6) lists the following: Dutch, English, German, French, Hindi/Urdu, Japanese, Korean, Malayalam, Mandarin, Passamaquoddy, Persian, Thai, and Turkish.\footnote{21}

3.1.3 Problematic interveners and affected \textit{wh}-expressions

Apart from negative quantifiers, what is the class of problematic interveners with regards to Beck effects? I cannot give an exhaustive list, both for reasons of space and because of the lack of an accepted crosslinguistic picture. But I want to give a few examples at least. See also the following sections.

Negation in general causes intervention. The same holds for other languages. In fact, all kinds of negative expressions such as \textit{few}, \textit{at most n}, and \textit{fewer than n} are interveners (Beck 1996a; Honcoop 1998; Mayr 2014).

Focus operators like \textit{only} and \textit{even} are also interveners, as (87) and (88) show:

(87) a. Which girl did \textit{only Mary} introduce ___ to which boy?
   b. \textit{?*}Which boy did \textit{only Mary} introduce which girl to ___?

(Pesetsky 2000, ex. 103)

(88) German
a. *\textit{Wen hat sogar der Hans ___ wann angerufen}?
who has even the Hans when called
b. \textit{Wen hat wann sogar der Hans ___ angerufen}?
who has when even the Hans called

‘Who did even Hans call when?’

(Mayr 2014, ex. 11)

Universal quantifiers are also problematic interveners. A superiority obeying multiple \textit{wh}-interrogative such as Q in (89) can be answered by both A and A'. Crucially, A corresponds to an interpretation of Q where the universal quantifier is scoped out of the interrogative (Groenendijk and Stokhof 1984; Engdahl 1986; Chierchia 1992b). On that interpretation it can be paraphrased as ‘For every \textit{x}, tell me which newspaper \textit{x} wrote to about which book?’. With A’, however, the universal quantifier is interpreted in its surface scope position, as is also apparent from the fact that it figures in the multiple-pair answer repeatedly. Now, the
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superiority violating $Q'$ can only be answered by A. That is, it only seems to have an interpretation where the universal quantifier is scoped out. The reason for this would be that on the other interpretation the universal would cause an intervention effect. This is also true for German (Beck 1996a).

(89) Q: Which newspaper did everyone write to ___ about which book?
   Q': Which book did everyone write to which newspaper about ___?

From this cursory look it seems that it is quantificational expressions that cause Beck effects. But this generalization has been called into question, as we will see once we turn to existing accounts.

Which dependencies with in-situ $wh$-expressions are affected negatively by interveners? The examples so far have shown that $wh$-expressions asking for individuals, places, and times are affected. In addition, expressions asking for degrees and manners are also affected as (90) and (91) show:

(90) German
   a. Wen hat wie niemand ___ getroffen?
      who has how nobody seen
      'Which x and which manner y are such that no one met x in y?'
   b. *Wen hat niemand ___ wie getroffen?
      who has nobody how seen

(91) German
   a. Wen hat wie oft niemand ___ getroffen?
      who has how often nobody seen
      'Which x and which degree d are such that no one met x to d?'
   b. *Wen hat niemand ___ wie oft getroffen?
      who has nobody how often seen

This differentiates Beck effects strongly from weak islands. They are unselective with regards to the kinds of $wh$-dependencies that are affected. This suggests that the explanation of the former does not lie in the differing natures of the bound variables as we have seen for the latter.

Finally, so-called $wh$-scope marking interrogative are also affected. As the acceptable (92a) shows, was marks the scope of wer which is itself in situ. Intervening negation blocks this dependency.
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(92) German
   a. Was glaubt Hans, wer da war?
      what believes Hans who there was
      ‘Who does Hans believe was there?’
   b. *Was glaubt Hans nicht, wer da war?
      what believes Hans not who there was
      (Beck 1996a, ex. 1a)

3.2 Existing accounts of Beck effects

3.2.1 Intervention by focus

Beck (2006) argues that crosslinguistically it is focus operators that cause degradedness more reliably than simple quantifiers such as no one, everyone, and so on. In this she follows Kim (2002). She thus draws the conclusion that it is not the quantificational nature of the interveners seen so far that cause degradedness, but rather the fact that they associate with focus. In particular, Beck argues that wh-expressions contribute alternatives to the interpretation in a manner similar to focus (Rooth 1985; 1992). Now, if there is a focus operator intervening between the wh-expression and the question operator, the alternatives contributed by the wh-expression are evaluated by the focus operator. Therefore the question operator will not have access to the alternatives as it should in order to create a question denotation (see also Beck and Kim 2006; Cable 2010; Kotek 2014).

Consider the Korean case of intervention by only in (93b) and the acceptable (93a) without intervention. Assume the LFs in (94) using English words for simplicity. Note that the use of Korean avoids having to deal with multiple wh-interrogatives.

(93) a. Suna-ka muōs-ūl sa-ss-ni?
   Suna-Nom what-ACC buy-PAST-Q
   ‘What did Suna buy?’

   b. *Minsu-man nuku-lûl manna-ss-ni?
   Minsu-only who-ACC meet-PAST-Q
   (Kim 2002, ex. 9a)

(94) a. \([_{cp} Q \left[_{ip} \text{Suna bought what}\right]]\)
   b. \([_{cp} Q \left[_{ip} \text{only}_{alt} \left[_{ip} \text{Minsu meet who}\right]\right]]\)

I will implement Beck’s ideas in a greatly simplified way in the following for reasons of space. Following Rooth (1985), any expression has both an ordinary and a focus value, \([\quad]^o\) and \([\quad]f\) respectively. The former is what we are used to and is composed along the principles laid out in section 1.3.1. The latter, however, corresponds to a set of meanings. The focus value of a lexical item (without a focus on it) is just the singleton set containing its ordinary value. The focus value of a complex expression with daughters \(a\) and \(b\) is composed by point-wise function application – that is, by applying each function in \(a\) to each argument in \(b\).22
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As noted above, Beck assumes that wh-expressions do not have defined ordinary values, but contribute to the focus value as given in (95). The focus value in the cases at hand is a set of individuals. We can think of wh-expressions as being inherently focused, that is, F-marked.

\[(95)\]

a. \(\left[\text{who}\right]^{o,w} = \text{undefined}\)
   b. \(\left[\text{who}\right]^{f,w} = \{x : x \in D, x \text{ is human in } w\}\)

\[(96)\]

a. \(\left[\text{QS}\right]^{o} = \left[\text{S}\right]^{f}\)
   b. \(\left[\text{QS}\right]^{f} = \left[\text{QS}\right]^{o}\)

Consider first the interpretation of (94a). Given that the wh-expression does not have a defined ordinary value, the IP constituent does not either, as in (97ai). The focus value is composed by point-wise function application. This gives (97aii). The question operator takes the latter value and makes it the ordinary value of the clause as in (97bi). Note that this value corresponds to the set of propositions characterized by the function that the interpretation procedure from section 1.3.1 would derive with syntactic scoping of the wh-expression. We thus arrive at an adequate meaning (see also Hamblin 1973). But the present system does so by interpreting the wh-expression in situ.

\[(97)\]

a. \(\left[\text{IP}\right]^{o,w} = \text{undefined}\)
   b. \(\left[\text{IP}\right]^{f,w} = \{p : \exists x \in D, x \text{ is nonhuman in } w \wedge p = \lambda w. \text{Suna bought } x \text{ in } w\}\)

\[(98)\]

As for only, assume the interpretation in (98). For its ordinary value it takes a set of alternatives and states that all propositions that are not entailed by the ordinary value of its sister constituent are false. That is the exclusive component of only. Moreover this ordinary value is only defined if that of the sister constituent is true. This is the familiar presupposition of only saying that the prejacent is true (Horn 1969; Rooth 1992; Coppock and Beaver 2014). It is also presupposed that the set of alternatives be a subset of the focus value of the sister constituent (Rooth 1992). The focus value corresponds to the singleton containing the ordinary value.

\[(98)\]

a. \(\left[\text{only}_{\text{Alt}} S\right]^{o,w} = 1 \text{ iff } \forall p \in \text{Alt}(p) 
   \Rightarrow p \rightarrow p(w) = 0\)
   defined only if \(\left[\text{S}\right]^{o,w} = 1 \wedge \text{Alt} \subseteq \left[\text{S}\right]^{f}\)
   b. \(\left[\text{only}_{\text{Alt}} S\right]^{f,w} = \left[\text{only}_{\text{Alt}} S\right]^{o,w}\)
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Consider now LF (94b). As before, the ordinary value of IP is undefined because of the undefined ordinary value of the wh-expression. Its focus value is again a set of propositions as in (99aii). Assuming with Heim and Kratzer (1998) that a constituent only has a defined value if its constituting constituents do, it follows that the ordinary value of IP′ is undefined, as stated in (99bi). This is so because the IP value is undefined. Since the focus value of IP′ depends on its ordinary value, given (98b), it is undefined as well, as given in (99bii). As a consequence, the ordinary value of the whole clause is also undefined. Recall that the question operator takes the focus value of its sister, that is IP′, and makes it the ordinary value. But the latter is undefined.

(99) a. (i) \([IP]^{o,w} = \text{undefined}\)
   (ii) \([IP]^{f,w} = \{ p : \exists x [x \in D_x \land x \text{ is human in } w \land p = \lambda w. \text{Minsu met } x \text{ in } w]\}\)

b. (i) \([IP′]^{o,w} = \text{undefined}\)
   (ii) \([IP′]^{f,w} = \{ [IP]^{o,w}\}\)
   = undefined

c. (i) \([CP]^{o,w} = [IP′]^{f,w}\)
   = undefined
   (ii) \([CP]^{f,w} = [CP]^{o,w}\)
   = undefined

Assuming that a question speech act requires that the interrogative used has a defined ordinary value, it follows that only (93a) can be used to perform one. An interrogative that cannot be used for a question speech act, such as (93b), will therefore be unacceptable. If the wh-expression in (93b) were to be fronted before the intervener, a defined question denotation could be derived. This is so because the undefinedness of the ordinary value of the wh-expression would now be contributed after the application of only. Therefore the focus value would remain intact. This account can be straightforwardly extended to multiple wh-interrogatives.

3.2.2 Intervention by quantification

So how then would no one cause intervention? It is well known that the truth conditions of sentences containing quantifiers can be altered by focus (Rooth 1992). However, it is also known that quantifiers need not associate with focus (see Beaver and Clark 2003; 2008; among others). Now, Beck actually assumes that it is a silent operator \(~\) that evaluates focus (Rooth 1992), contrary to the simplifying exposition above. Operators like only must make use of \(~\) – that is, they obligatorily associate with focus – whereas quantifiers like no one merely can do so – that is, they optionally associate with focus. Crucially, however, in German and English \(~\) is always present and thereby causes intervention along the lines discussed above. In languages like Korean \(~\) need not always be present with quantifiers such as most (Kim 2002). Therefore they do not reliably cause intervention. At this point it becomes crucial to understand why \(~\) seems to be crosslinguistically necessarily present with only.\(^{23}\)
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Such considerations highlight a problematic feature of Beck’s account. While it is technically elegant, its predictive power as to what counts as a problematic interverner and what does not is limited. At the end of the day, this property must be lexically stipulated. It has been noted in the literature, however, that potentially a different empirical generalization can be drawn, whereby problematic interveners share a feature other than association with focus with each other (Honcoop 1998; Haida 2007; Mayr 2014).

3.2.2.1 Mayr (2014)
It is argued that at least in German the class of problematic interveners is fully predictable. Mayr suggests that only those expressions that do not commute scopally with existential quantifiers cause a Beck effect. An expression \(a\) commutes scopally with an existential quantifier if and only if \(\exists x. a. \phi = a. \exists x. \phi\), that is, if the mutual scope of \(a\) and the existential quantifier does not matter for the truth conditions.

Mayr argues that this is the reason why upward monotonic expressions never cause intervention unlike downward monotonic ones. The following pairs illustrate:

(100) German
a. Wen haben mehr als drei Studenten ___ wann eingeladen?
   who have more than three students ___ when invited
   ‘Who did more than three students invite when?’

b. *Wen haben weniger als drei Studenten ___ wann eingeladen?
   who have fewer than three students ___ when invited
   (Mayr 2014, ex. 21)

(101) German
a. Wen haben einige Regisseure ___ in welchem Film gesehen?
   who have a few directors ___ in which film seen
   ‘Who did a few directors see in which film?’

b. *Wen haben wenige Regisseure ___ in welchem Film gesehen?
   who have few directors ___ in which film seen
   (Mayr 2014, ex. 22)

It is also easy to see why this should be so. Simplifying considerably, assume that upward monotonic indefinites denote existential quantifiers themselves and downward monotonic ones negative quantifiers. Then it is plain to see why by the monotonicity view discussed here the former are not expected to cause intervention but the latter are: \(\exists x. \exists y. \phi = \exists y. \exists x. \phi\), but \(\neg \exists x. \exists y. \phi = \exists y. \neg \exists x. \phi\). Now, Mayr shows that all of the problematic interveners seen so far do not scopally commute with existential quantifiers. That is, the focus operators only and even are also predicted to cause intervention.

As discussed by Haida and Repp (2013) additive focus operators like also would be crucial to distinguish between Beck’s proposal and Mayr’s. The reason is that they contribute a simple existential presupposition and thus would be classified as
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scopally commutative. Their experimental data actually go in this direction. That is, the German version of also, unlike the other focus operators, does not seem to cause intervention effects, which would not be predicted by Beck.

But why would scopal commutativity even be relevant? I again give a very simplistic implementation in the following. Following Beck, Mayr assumes that wh-expressions are interpreted in their surface scope position and contribute alternatives. Contrary to Beck’s approach, however, wh-expressions contribute existential quantification as their ordinary meaning here, that is, they have a defined ordinary value:

\[(102)\]

a. \[\llbracket \text{what} \rrbracket^w = \{x : x \in D_e, x \text{ is nonhuman in } w \land f(x) = 1\}\]

b. \[\llbracket \text{what} \rrbracket^f = \{x : x \in D_e, x \text{ is nonhuman in } w\}\]

Consider now the Korean examples in (103) repeated from above with intervention by a NPI. Assume the LFs in (103), where for simplicity the NPI is represented as a negative quantifier.

\[(103)\]

a. \[\text{*amuto muós-úl sa-chi anh-ass-ni?}
\text{anyone what-ACC buy-CHI not do-PAST-Q}\]

b. \[\text{muós-úl amuto ___ sa-chi anh-ass-ni?}
\text{what-ACC anyone buy-CHI not do-PAST-Q}
\text{‘What did no one buy?’}\]

(Kim 2002, ex. 10)

\[(104)\]

a. \[\text{[IP\ Q [IP_e no one bought what]]}\]

b. \[\text{[IP\ Q [IP_e what I no one bought t_i]]}\]

By the composition principles from section 3.2.1 we arrive at equivalent denotations for (104a) and (104b) as in (105). Note, however, that the ordinary values for the IP-constituents in (104) differ as (105b) and (105c) show.

\[(105)\]

a. \[\llbracket (104a) \rrbracket^{\llbracket (104b) \rrbracket} = \{ p : \exists x [x \in D_e, x \text{ is nonhuman in } w \land p = \lambda x_0 : \exists y [y \text{ is human in } w \land y \text{ bought } x \text{ in } w] \}\]\n
b. \[\llbracket IP_e \rrbracket^{\llbracket IP_e \rrbracket} = 1 \text{ iff } \exists y [y \text{ is human in } w \land \exists x [x \text{ is nonhuman in } w \land y \text{ bought } x \text{ in } w]\]

c. \[\llbracket IP_e \rrbracket^{\llbracket IP_e \rrbracket} = 1 \text{ iff } \exists x [x \text{ is nonhuman in } w \land \neg \exists y [y \text{ is nonhuman in } w \land y \text{ bought } x \text{ in } w]\]

Mayr now claims that the difference between (105b) and (105c) is at the heart of Beck effects. A wh-interrogative has an existential presupposition. This presupposition can in principle be derived in two ways: either by disjoining the question denotation in (105a), as suggested by (Abusch 2010), or by simply taking the ordinary value of the IP-constituent – that is, by considering the meaning of the clause before the meaning of the question operator is factored in. Mayr suggests that both ways are actually necessary in that the two ways of deriving the presupposition need to match. As can be easily verified, the disjunction of the propositions in (105a) matches (105c) making (103a) acceptable, but not (105b) making (103a)
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unacceptable. Essentially, a speaker of the latter would make two different presuppositions. This is to be avoided.

3.2.2.2 Honcoop (1998), Haida (2007)
The authors draw attention to the fact that intervention in anaphoric dependencies empirically looks somewhat similar to Beck effects. In particular, it is well known that indefinites can be anaphorically related to pronouns they do not c-command – so-called donkey anaphora – as shown in (106a) and indicated by co-indexing. Crucially, replacing the higher indefinite with a universal or negative quantifier as in (106b) and (106c) leads to unacceptability (see Heim 1982, among others). The quantifiers make the indefinite inaccessible for entering into an anaphoric relation with the non-c-commanded pronoun. See "Donkey Anaphora" and "Pronouns: Binding and Anaphora" for more details.

(106) a. If a farmer, owns a donkey, he, beats it.
    b. *If every farmer owns a donkey, he beats it.
    c. *If no farmer owns a donkey, he beats it.

Honcoop and Haida now suggest that the problematic interveners causing Beck effects should be seen as establishing inaccessible domains for anaphora similar to what is happening in (106).25 This makes sense under the assumption that the wh-in-situ expression in (107), repeated from above, must undergo an anaphoric relationship with an operator at the top of the clause. That is, assume an LF like (108) and assume that the question operator must bind the variable introduced by the index 2 on which book.

(107) ?*Which student did no one give which book to ___?
    (Pesetsky 2000, ex. 100)

(108) [? [which student 1[ no one gave which book 2 to t1]]]

If the quantifier binds the variable contributed by which book unselectively, however, the question operator cannot bind it anymore. Thus no question denotation obtains, or at least not the intended one. Note that for this to work, the quantifier must not bind the variable corresponding to the trace of the fronted wh-expression. Otherwise, simple wh-interrogatives with negative quantifiers would be equally unacceptable. That is, binding by no one must be somewhat selective.

What was just described essentially replicates the Discourse Representation Theory (DRT) approach to donkey anaphora as laid out in chapter 2 of Heim (1982), making use of unselective binding.26 Note that this brings out a similarity to Beck’s (2006) account. She essentially applies the DRT strategy making use of unselective binding to the focus domain rather than the ordinary denotation.

Of course, this approach can be supplemented by a dynamic interpretation procedure as in Heim’s chapter 3 and as done by Honcoop (1998) and Haida (2007). The nature of Beck effects makes it, however, difficult to see how a purely dynamic approach as advanced by Groenendijk and Stokhof (1990; 1991) and Chierchia
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(1992a) for (106) could be applied to (107). Such an approach is designed to bring expressions that are outside of the c-command domain of an indefinite into its semantic scope nevertheless, so that binding becomes possible whenever there is no intervening quantifier. A quantifier like no one in particular has the effect that an indefinite c-commanded by it can at the most bring the nuclear scope of the quantifier into its own scope, that is, the latter’s scope is restricted. The situation in (108), however, is quite different. The question operator c-commands the wh-in-situ expression and can bind it by the usual non-dynamic mechanism. Consequently, the scope-restricting property of no one simply does not matter.

The class of problematic interveners predicted by Honcoop and Haida is close to what we have seen in the discussion of Mayr (2014). It should, however, be noted that focus operators like only do not seem to cause intervention in donkey anaphora, as in (109), unlike what we have seen for Beck effects. This is somewhat unexpected on Honcoop’s and Haida’s accounts.

(109) If only John has a donkey, he beats it.

3.2.3 Intervention by anti-topics

(110) a. ?*Daremo nani-o yom-ana-katta-no
donkey what-ACC read-NEG-PAST-Q
b. Nani-o daremo ___ yom-ana-katta-no
what-ACC donkey ___ read-NEG-PAST-Q
‘What did no one read?’

(Tomioka 2007, ex. 1a)

He notes that in a wh-interrogative without problematic intervener, the expression that occurs in the position where the problematic intervener occurs in (110a) is typically marked as a topic, as in (111). The same is shown to be true for Korean.

(111) Japanese
John-wa / ?-ga nani-o yon-da-no?
N-top / NOM what-ACC read-PAST-Q
‘What did John read?’

(Tomioka 2007, ex. 11a)

Now, Tomioka notices that the class of problematic interveners such as daremo in (110a) cannot be marked with wa. That is, they cannot function as topics. They are anti-topics. Tomioka consequently draws on the observation that the material in a wh-interrogative that is not wh-marked must be old information (Prince 1981; Schwarzschild 1999). In particular, daremo in (110a) should be old information. However, it cannot be so because it is an anti-topic. On Tomioka’s account Beck effects are thus the consequence of two incompatible pragmatic constraints; one a constraint on non-wh-marked expressions occurring in a wh-interrogative and one a constraint on certain lexical expressions such as daremo. For (110b) it is
shown that the fronting of the *wh*-expression leads to deaccenting of the remaining material including *daremo*. Via this deaccenting, material that can otherwise not become a topic does so, whereby (110b) becomes acceptable.

While an intriguing idea, it is less clear whether the approach carries over to other languages. In particular, Mayr (2014) argues that the correlation noted by Tomioka for Japanese and Korean does not hold up for German (but see Grohmann 2006 for a different view). See also “Information Structure” and “Topics” for discussion.

### 4 Conclusion

In this chapter we discussed two ways in which *wh*-dependencies are blocked by intervening material: weak islands and Beck effects. In both cases we have reasons to believe that the resulting intervention effect is semantic in nature. The main reasons for this are that weak islands, on the one hand, can be alleviated in various ways and that Beck effects, on the other hand, seem to be about a dependency that is closer to anaphora than syntactic movement. Syntactic accounts are hard pressed to account for such behavior, as we have seen. We also saw that the two kinds of intervention effects must be held apart, mainly for these two very same reasons. We discussed a number of semantic accounts attempting to deal with weak islands and Beck effects. What they have in common is that they restrict the pre-theoretically plausible meanings grammar can generate. That is, they either restrict the kinds of denotations a *wh*-interrogative can have or they directly limit the kinds of speech acts one can make by various assumptions.

Throughout I have tried to make clear that there are still numerous open issues in both empirical domains. One such question is what the crosslinguistic picture regarding intervention effects looks like. I have pointed to differences between languages, but much work remains to be done in this area. Moreover, it is not clear that semantics and pragmatics are the only factors contributing to intervention effects. It is conceivable that factors such as intonation and general processing restrictions (see, e.g., Kluender 1998 and later) play a role as well. Finally, the field would also benefit from more controlled experimental work. In particular, the question of what kind(s) of deviance intervention effects correspond to could be addressed in this way.

SEE ALSO: Donkey Anaphora; Negative Polarity; Matrix and Embedded Presuppositions: Projection, Accommodation, Cancellation, and Ambiguities; Projective Meanings; Pronouns: Binding and Anaphora; Quantifiers, Scope, and Pseudo-Scope; Questions and Interrogatives: Exhaustivity vs. Quantificational Variability

### Notes

1. The paraphrase makes it plain that the preposition is pied-piped by the *wh*-expression (see Ross 1967, among others). That is, the preposition is strictly speaking not part of the dependency established. Rather it is carried along – i.e., pied-piped – for independent syntactic reasons. For recent discussion see Cable (2010).
2. a c-commands β iff a ≠ β and the first node that irreflexively dominates a also irreflexively dominates β (Reinhart 1976).
3. At this point the question arises whether the syntactic notion of c-command is the one relevant for the definition of intervention or whether it is the semantic notion of scope that is crucial. These two notions often coincide and it is thus not always easy to discriminate (e.g., Barker 2012). The phenomena to be dealt with are generally taken to be sensitive to c-command and thus derivatively to scope.

4. This is an oversimplification. While the restrictions placed on dependencies by complex noun phrases indeed seem to be considered to be syntactic in nature by most researchers, there are strong island constraints whose formulations have been, at least, partly framed in semantic terms. The coordinate structure constraint is one such example (Ruys 1992; Fox 2000).

5. A reviewer reminds me that even with strong islands a certain kind of selectivity is sometimes found. Would it follow that even strong islands should be considered instances of intervention? Why not? Ultimately, however and foreshadowing the discussion to follow somewhat, the question is whether one can devise coherent semantic/pragmatic theories of strong islands. Only then could one, potentially, group them with weak islands, as we will see. See also note 4.

6. This paraphrase suggests a single pair reading, which is only one possible interpretation. See section 3.3.1 for discussion.

7. Note that the discussion of Beck effects is deliberately framed in such a way as to not require that in situ wh-expressions undergo covert fronting (Huang 1982; Dayal 1996). They might, but there are other proposals to be found in the literature as to how operator–variable relations can be established for in situ wh-phrases (see, e.g., Pesetsky 1987; Winter 1997; Reinhart 1998). The definition of intervention effect in (4) also applies if the latter option turned out to be correct. Here a would be some abstract operator that undergoes a dependency with the in situ wh-expression. See section 3.2.

8. A few words on the formal conventions adopted here. For the abbreviation of types I use $e$ for individuals, $t$ for truth values, $s$ for worlds, $d$ for degrees, and $m$ for manners. Propositions are assumed to be of type $\langle s, t \rangle$, i.e., they denote functions from worlds to truth values. I leave out the angled brackets from types when there is no threat of confusion. I adopt Heim and Kratzer’s 1998 convention for presuppositions by notating them as definedness conditions. $\langle p, \lambda x : p(w) = 1. x \text{ regrets } p \text{ in } w \rangle$ is a function that is only defined for propositions $p$ that are true in $w$. I will say that it presupposes that $p$ is true in $w$. Moreover, I assume that world variables are introduced by a world parameter on the interpretation function $\llbracket \cdot \rrbracket^w$. Finally, an assignment $g$ is a function from the set of natural numbers to entities, for now to individuals. That is, the denotation of a pronoun or trace with index $i$, $g(i)$, is an individual. Therefore, the interpretation function is ultimately relativized to both worlds and assignments, $\llbracket \cdot \rrbracket^{w_0}$. I leave off $g$ from the interpretation function whenever there is no expression which is dependent on it for interpretation.

9. This semantics for interrogatives is particularly useful for present purposes because many of the theories discussed below are framed in terms of it. Also it is more expressive than, say, a question semantics such as the one advocated by Groenendijk and Stokhof (1982; 1984). In the latter approach, an interrogative denotes its strong exhaustive answer. As Heim (1994) and Beck and Rullmann (1999) show, this is expressible in a Karttunen semantics as well. One would apply an answer operator to the question denotation discussed in the text to get at this type of answer. Moreover, a Karttunen semantics is closely related to an alternative semantics for interrogatives such as Hamblin’s (1973) one or the one argued for by inquisitive semantics (Ciardelli,
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Groenendijk, and Roelofsen 2013). The hope is therefore that by using a Karttunen semantics for the discussion of intervention effects, one is on the safe side. For further discussion see “Questions and Interrogatives: Exhaustivity vs. Quantificational Variability”.

10. The precise semantics for attitude predicates would be spelled out by universal quantification over worlds. This could be done by assuming that \( x \) regrets \( p \) roughly means either that in all of the worlds bouletically accessible to \( x \) the most similar worlds to \( w \) where \( p \) is true are better than the ones most similar to \( w \) where \( p \) is false (Heim 1992; Villalta 2008). See “Attitude Verbs”.

11. I will not discuss extrapolation islands here. As noted by Honcoop (1998), the class of predicates where extrapolation leads to an intervention effect are the factive ones. That is, extrapolation islands can be seen to be a special case of factive islands (see also Abrusán 2014).

12. Islands caused by \( wh \)-interrogatives seem to be subject to crosslinguistic variation. That is, there are languages where it has been claimed that they should be seen as instances of weak islands too (Szabolcsi and Zwarts 1992). Why there is variation is an interesting topic for future research.

13. To be sure, (32b) is unacceptable under the reading where it is implied that this letter is from a unique person, a reading that is perfectly accessible in the unnegated version in (32a). There might be a reading under which (32b) is acceptable as well, namely one where this letter is understood as referring to a type of letter rather than a particular token (Szabolcsi and Zwarts 1992). There can of course be multiple instances of \( type \).

14. Syntactic accounts often rely on a distinction between referentiality and non-referentiality (Pesetsky 1987; Cinque 1990; Rizzi 1990). Note, however, that this would entail that \( wh \)-phrases like \( which \ NP \) are referential in a way that those such as \( how \) – without specific context – are not; only referential \( wh \)-phrases are hypothesized to be able to undergo a dependency across a weak island intervener. Unfortunately, it is not clear at all what syntactic “referentiality” of \( wh \)-phrases could mean on the semantic side (Cresti 1995; Rullmann 1995).

15. This also means that the assignment function must be able to map indices to manners, and degrees as we will see below. Moreover, the predicate abstraction rule must also be able to generate functions from all those denotation types to denotations. We can generalize the rule as in (i). This rule essentially assumes that indices come with information as to what their denotation type must be, a kind of definedness condition. It might be best to make the predicate abstraction rule completely unconstrained and have the definedness condition be contributed by a presupposition on the trace position that projects in the standard way. I indicate the intended type for the variable as a subscript on the traces in the LFs.

(i) Predicate abstraction (generalized)

If \( a \) is a node with immediate daughters \( \beta \) and \( \gamma \), where \( \beta \) is a numerical index \( i \), where \( \chi \in \{ e, d, m \} \) then for any assignment \( g \), \([a]^{\chi} g = \lambda x. [\chi]^{w g[\chi i \mapsto \chi x]} \) (where \( g[i \mapsto x] \) is like \( g \) except that it maps \( i \) to \( x \) if \( g \) does not do so already).

16. Note that something must be said about how manners are compositionally factored in. We could assume that they are functions from eventualities to functions from individuals to truth values, which would make it necessary to introduce eventualities into the picture, of course. I do not wish to speculate on this either. Similar questions arise below. See “Manner Adverbs”.

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22. This also means that the assignment function must be able to map indices to manners, and degrees as we will see below. Moreover, the predicate abstraction rule must also be able to generate functions from all those denotation types to denotations. We can generalize the rule as in (i). This rule essentially assumes that indices come with information as to what their denotation type must be, a kind of definedness condition. It might be best to make the predicate abstraction rule completely unconstrained and have the definedness condition be contributed by a presupposition on the trace position that projects in the standard way. I indicate the intended type for the variable as a subscript on the traces in the LFs.

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17. The situation for (51) is parallel to the one just seen for modal obviation effects. Assume that exactly three eggs are sufficient for baking the cake. This entails that 3.01 eggs are sufficient, but also that 3.001 eggs are sufficient and so on. Thus the unique true proposition entailing all other true propositions in the question denotation is that 3 eggs are sufficient to bake the cake.

18. Szabolcsi and Zwarts (1992) also intend their account discussed in section 2.3.1 to deal with factive islands. They suggest that what we normally take to be a factive presupposition is a conjunct in the assertive component. Again, it is not quite clear how to implement this for the case of factive islands. Their comments in the paper suggest that they take the conjunction to take place at the level where I implemented the maximality operator. As a consequence, there would have to be two maximality operators involved. I do not see how to do this other than with rather ad hoc syntactic assumptions.

19. Note that explicit domain restriction by partitives has been claimed to block the possibility of presupposition accommodation (Beaver 2001), thereby revealing the nature of the quantificational force derived from the projection algorithm. See the “Matrix and Embedded Presuppositions: Projection, Accommodation, Cancellation, and Ambiguities”.

20. The predicted presupposition is actually a weaker one, namely that for every individual the addressee believes that they got the latter from that individual (Heim 1992). This would only attribute a contradictory belief to the addressee and could in principle be the case. Presumably we do not make such presuppositions in the general case. Moreover, it is also known that such weak presuppositions somehow get strengthened to stronger ones, as assumed in the text.

21. There are also languages with the option to leave wh-phrases in situ for which Beck effects are reported to be absent, such as Amharic (Eilam 2009) and Egyptian Arabic (Branan 2016).

22. Somewhat more precisely, the relevant interpretation rules can be given as in (i) and (ii). If is an F-mark, i.e., indicates focus. Note also that for reasons of simplicity and unlike what (i) and (ii) imply, the composition in the text proceeds syncategorematically. That is, the question operator and only are given meaning only in context (see Rooth 1985 for discussion).

(i) **Focus values for lexical expressions**
- If is a lexical expression and \( \llbracket a \rrbracket^{w,g} \in D_f \),
  - \( \llbracket a \rrbracket^{w,g} = \llbracket a \rrbracket^{w,g} \).
  - \( \llbracket a \rrbracket^{w,g} = \{ x : x \in D_f \} \).
(ii) **Focus values for complex constituents**
- If is a node with immediate daughters and , then for any assignment \( g \), a is in the domain of \( \llbracket a \rrbracket^{w,g} \) if and are in the domain of \( \llbracket a \rrbracket^{w,g} \). If so \( \llbracket a \rrbracket^{w,g} = \{ x : \exists y \in \llbracket \beta \rrbracket^{w,g}, \exists h \in \llbracket \gamma \rrbracket^{w,g}, x = h(y) \} \).

23. See, however, Kitagawa, Tamaoka, and Tomioka (2013) for experimental data suggesting that focus operator only is, not an intervener in Japanese, whereas NPI any is, thereby challenging Beck’s approach.

24. Upward and downward monotonicity are defined as follows:

(i) \( f \in D_{e,x} \) is upward monotonic iff for all \( a, b \in D_a \) where \( a \Rightarrow b, f(a) \Rightarrow f(b) \).

(ii) \( f \in D_{e,x} \) is downward monotonic iff for all \( a, b \in D_a \) where \( a \Rightarrow b, f(b) \Rightarrow f(a) \).

25. Honcoop (1998) actually also intends his account for weak islands. As we have seen above, it is, however, unlikely that weak islands are directly related to Beck effects given their differences. Moreover, his account makes better predictions for Beck effects than weak islands.
26. In fact, Honcoop and Haida indirectly argue for such an approach to cases like (106). If (106) were to be accounted for by, say, the E-type strategy making use of a situation semantics (Heim 1990; Elbourne 2005), it would be quite hard to see how the parallel with Beck effects could be held up.

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Abstract:  This chapter provides an overview of both weak island phenomena and Beck effects. In both cases, reasons suggesting that accounts of such effects should at the least involve a semantic or pragmatic component are found. The chapter then gives a survey of currently existing proposals along that general vein. It does so by comparing them with each other and identifying some open issues.

Keywords:  Beck effects; binding; degrees; focus; negation; presuppositions; quantifiers; weak islands; wh-questions