Intervention Effects Follow from Focus Interpretation

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Abstract

The paper provides a semantic analysis of intervention effects in wh-questions. The interpretation component of the grammar derives uninterpretability, hence ungrammaticality, of the intervention data. In the system of compositional interpretation that I suggest, wh-phrases play the same role as focused phrases, introducing alternatives into the computation. Unlike focus, wh-phrases make no ordinary semantic contribution. An intervention effect occurs whenever a focus sensitive operator other than the question operator tries to evaluate a constituent containing a wh-phrase. It is argued that this approach can capture the universal as well as the crosslinguistically variable aspects of intervention effects, in a way that is superior to previous approaches to intervention effects. Further consequences concern other focus-related constructions: multiple focus data, NPI licensing and alternative questions.

1. Introduction

The sentences in (1) exemplify a set of data referred to as intervention effects: the combination of a wh-phrase with a quantificational or focusing element leads to ungrammaticality in certain configurations.

(1)	a.	*	Minsu-man	nuku-lûl	po-ass-ni?		(Korean)
			Minsu-only	who-Acc	see-Past-Q		
			‘Who did only Minsu see?’				
	b.	*	Lili-yum	eete	pustakam-aane	waayikk-ate	(Malayalam)
			Lili-also	which	book-be	read-Nom	
			'Which book did Lili, too, read?'				
	c.	??	koi	nahiiN	kyaa paRhaa		(Hindi)
			anyone	not	what read-Perf.M		
			‘What did no one read?’				

Until now, there have been syntactic (Beck (1996), Beck & Kim (1997), Hagstrom (1998), Kim (2002), among others) as well as semantic (Honcoop (1998)) explanations of this phenomenon.[1] This paper proposes yet another approach to intervention effects, which is semantic in the sense that intervention effects are made to follow from the component of the grammar that compositionally interprets interrogative sentences. The proposal identifies a core case of intervention, in which a focusing operator interferes with the interpretation of a wh-phrase in situ. Compositional interpretation proceeds in such a way that both focus and wh-phrase make use of the same interpretational mechanism. The way the framework is designed, a wh-phrase interpreted within the scope of a focussing operator leads to uninterpretabilty of the structure as a whole.

Motivation for this strategy comes from the fact that research over the past several years has shown intervention effects to exist in a wide variety of typologically unrelated languages. Moreover, the most stable intervention effect crosslinguistically appears to be that of focussing elements like *only*, *even* and *also*. This suggests that the cause of intervention effects is relatively fundamental, anchored in rather basic properties of the grammar. These properties plausibly concern focus interpretation. Further support for the idea comes from the observation that other focus-related constructions like NPI-licensing and alternative questions also show intervention effects.

The structure of the paper is as follows. Section 2 builds the empirical picture, leading to a characterisation of the universal as well as the variable properties of intervention effects in wh-constructions. In section 3 I develop the framework of focus interpretation and question interpretation that derives the core intervention effect. I address in section 4 some of the aspects of intervention effects that are variable crosslinguistically, like when an intervention effect arises, and what a problematic intervener is. Section 5 is devoted to the bigger picture of intervention effects on the one hand, and the bigger picture of focus interpretation on the other. Conclusions are drawn in section 6.

2. Data

Subsection 2.1. introduces and defines intervention effects as they will be understood in this paper. In 2.2. we construct a crosslinguistic picture of intervention effects, identifying a core intervention effect that is crosslinguistically stable, as well as parameters of variation. Section 2.3. lays out the strategy pursued in the paper for dealing with these facts.

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[1]There is also a proposal by Lee and Tomioka (presented at the 2001 Japanese/Korean Linguistics conference) which suggests to derive intervention effects from information structure. Unfortunately, the paper is not yet available in a form that would enable me to comment in an informed way.

2.1. Intervention Effects

A wh-in-situ language like Korean allows us to construct the simplest examples for intervention effects. Observe that (2a) is ungrammatical, even though the sentence is what we would expect in Korean for the question 'who did only Minsu see?'. Responsible for the ungrammaticality is the element 'only', as shown by the acceptable (2b). Moreover, the structural relationship between the wh-phrase and 'only' is relevant: in the well-formed (2c), the wh-phrase has moved past 'only' and is no longer c-commanded by this element. A preliminary characterisation of the effect is given in (3).[2]

(2)	a.	*	Minsu-man	nuku-lûl	po-ass-ni?	(Korean)
			Minsu-only	who-Acc	see-Past-Q	
			Who did only Minsu see?			
	b.		Minsu-nun	nuku-lûl	po-ass-ni?	
			Minsu-Top	who-Acc	see-Past-Q	
			Who did Minsu see?			
	c.		nuku-lûl	Minsu-man	po-ass-ni?	
			who-Acc	Minsu-only	see-Past-Q	
			Who did only Minsu see?			

(3) A wh-phrase in situ may not be c-commanded by a focussing or quantificational element.

Data ruled out by the generalisation in (3) will be referred to as intervention effects. The set of focussing and quantificational elements contains (counterparts of) the following items:

(4) only, even, also, not, (almost) every, no, most, few (and other nominal quantifiers), always, often, never (and other adverbial quantifiers).

These items will be referred to as interveners. (5) and (6) provide some preliminary support for this characterisation of the class of problematic interveners. There will be more discussion of the nature of interveners below.

[2] The judgments described are the ones from Beck & Kim (1997). It has since come to my attention that, while most people agree with the data reported there, some speakers of Korean do not perceive as strong an intervention effect with these data. I have convinced myself that the variation is genuine, but won't offer an analysis of the more liberal dialect. I am espescially grateful to Sei-Rang Oh for helping me to clarify this point.

(5) a. * amuto muôs-ûl ilk-chi anh-ass-ni?
anyone what-Acc read-CHI not do-Past-Q
b. muôs-ûl$_i$ amuto t_i ilk-chi anh-ass-ni?
what-Acc anyone read-CHI not do-Past-Q

'What did no one read?'

(6) a. ?? nukuna-ka ônû kyosu-lûl chonkyôngha-ni?
everyone-Nom which professor-Acc respect-Q
b. [ônû kyosu-lûl]$_i$ nukuna-ka t_i chonkyôngha-ni?
which professor-Acc everyone-Nom respect-Q
b'. 'For which x, x a professor: everyone respects x.'

In a language with overt wh-movement, like German, relevant examples are necessarily more complex, because it is harder to successfully place a wh-phrase in situ. Still, German provides further illustration of (3), for example in the multiple question in (7a).

(7) a. * Wen hat niemand wo gesehen?
whom has nobody where seen
'Where did nobody see whom?'
b. Wen hat Luise wo gesehen?
whom has Luise where seen
'Where did Luise see whom?'
c. Wen hat wo niemand gesehen?
whom has where nobody seen
'Where did nobody see whom?'

In (7a), the wh-phrase 'where' is in situ and c-commanded by 'nobody'. The sentence is ungrammatical. Clearly, the element 'nobody' is responsible, cf. the well-formed (7b). Finally, it is once more the structural relation between the quantifier and the wh-phrase that determines acceptability: in the well-formed (7c), the wh-phrase has moved past the intervener.
I refer the reader to Beck (1996) and Beck and Kim (1997) for more Korean and German data illustrating (3), and move on to data that require a refinement of (3) - the example in (8).

(8) a. * Was glaubt niemand wen Karl gesehen hat?
what believes nobody whom Karl seen has
'Who does nobody believe that Karl saw?'

b.		Was	glaubt	Luise	wen	Karl	gesehen	hat?	
		what	believes	Luise	whom	Karl	seen	has	
		'Who does Luise believe that Karl saw?'							
c.	%	Wen	glaubt	niemand	daß	Karl	gesehen	hat?	
		whom	believes	niemand	that	Karl	seen	has	
		'Who does nobody believe that Karl saw?'							

(8a) is a scope marking construction (compare Lutz et al. (2000) and references therein). Informally speaking, the element 'was' marks the scope of the wh-phrase 'wen', and the entire sentence is a non-multiple question. In (8a), the intervener 'nobody' makes the sentence ungrammatical, as witnessed by the acceptable (8b). In (8c), the wh-phrase has moved past the intervener. In those dialects of German that accept movement of this kind, there is a contrast between (8a) and (8c) in that (8c) is acceptable in an appropriate context while (8a) is bad. The point of (8a) is that 'wen' is not in situ. It has moved to the SpecCP of the embedded clause. Still, the intervention effect in (8) is quite parallel to (7). I will therefore adopt (9) (closely following Kim (2002)) as a more appropriate generalisation:

(9) A quantificational or focusing element may not intervene between a wh-phrase and its licensing complementizer.

By 'A intervenes between B and C' I mean that A c-commands B, and C c-commands both A and B, as illustrated in (10). I will refer to the licensing complementizer of a wh-phrase, for the moment informally, as the complementizer of the clause in which intuitively the wh-phrase takes scope. The instantiation of the schema in (10) that we are interested in is thus (11) - the intervention effect.

(10) [C [... [A [... B ...]]]]

(11) * [Q_i [... [intervener [... wh-phrase$_i$ ...]]]]

2.2. Crosslinguistic Data

It has become clear over the past few years that intervention effects are a fairly widespread phenomenon among the world's languages. According to my knowledge, they have been claimed to exist in Dutch, English, German, French, Hindi/Urdu, Japanese, Korean, Malayalam, Mandarin, Passamaquaddy, Persian, Thai and Turkish. Below is a sample of relevant data from other wh-in-situ languages besides Korean.

(12) Hindi (Beck (1996)):

a.	??	koi	nahiiN	kyaa	paRhaa	
		anyone	not	what	read-Perf.M	
b.		kyaa	koi	nahiiN	paRhaa	
		what	anyone	not	read-Perf.M	

‘What did no one read?’

(13) Japanese (from Pesetsky (2000) who cites Miyagawa (1998)):

a.	*	Hotondo	dono hito-mo	nani-o	yonda	no?
		almost	every person	what-Acc	read	Q
b.		Nani-o	hotondo	dono hito-mo	yonda	no?
		what-Acc	almost	every person	read	Q

'what did almost every person read?'

(14) Mandarin (Kim (2002):

a.	?*	zhiyou	Lili kan-le	na-ben	shu?	
		only	Lili read-ASP	which-CL	book	
b.		na-ben	shu	zhiyou	Lili kan-le?	
		which-CL	book	only	Lili read-ASP	

Which book did only Lili read?

(15) Malayalam (Kim (2002)):

a.	*	Lili-maatram	eete	pustakam-aane	waayikk-ate	
		Lili-only	which	book-be	read-Nom	
b.		eete	pustakam-aane	Lili-maatram	waayikk-ate	
		which	book-be	Lili-only	read-Nom	

Which book did only Lili read?

(16) Turkish (Beck (1996)):

a.	*	Kimse	kimi	görmedi?		
		anyone	who-Acc	see-Neg-Past?		
b.		Kimi	kimse	görmedi?		
		Who-Acc	anyone	see-Neg-Past		

Whom did nobody see?

See Hagstrom (1998), Pesetsky (2000) and Lee & Tomioka (2001) for more Japanese data, Kim (2002) for Malayalam and Mandarin, and Beck (1996) for Hindi/Urdu and Turkish. French allows wh-in-situ normally ((17a)), but not after an intervener ((17b)):

(17) French (from Pesetsky (2000) who cites Chang (1997) & Boskovic (to appear)):

a. Ils ont rencontré qui?
they have met who
'Whom did they meet?'

b. # Il n'a pas rencontré qui?
he Neg has Neg met who
Whom did he not meet? [only as echo question]

(18)-(19) illustrate effects parallel to German intervention effects for the wh-movement languages Dutch and English.

(18) Dutch:

a. * Wat heeft niemand an boeken gelezen? (Honcoop (1998))[3]
what has nobody on books read
What books did nobody read?

b. * Wie heeft niemand aan wie voorgesteld? (van den Born, p.c.)
Who has nobody to who introduced
'Who did nobody introduce to whom?'

(19) English (Pesetsky (2000)):

a. ?? Which diplomat should I not discuss which issue with _?

b. ?? Which book did almost everyone write to which newspaper about _ ?

Finally, the following examples from Passamaquaddy and Thai, respectively, have been brought forth by Bruening and Lin (2001) and by Ruangjaroon (2002) as examples of intervention effects in those languages. The Passamaquaddy example is a scope marking construction similar to German (8) above.

(20) Passamaquaddy (Bruening and Lin (2001)):

a. Wen skat Tihitiyas itom-uhk [$_{CP}$ *t* wenatomine-t]
Who Neg Tihitiyas say-3ConjNeg IC.be.crazy-3Conj

[3] The Dutch example (18a) is a split construction instead of a multiple question - compare section 4.3 for discussion.

b. * Keq(sey) skat itom-uhk Tihitiyas [$_{CP}$ wen wenatomine-t]
What Neg say-3ConjNeg Tihitiyas who IC.be.crazy-3Conj
Who didn't Tihitiyas say was crazy?

(21) Thai (Ruangjaroon (2002)):
* mâymiikhray chôop ?àan nangsii lêmnay
nobody like read book which
Which books does nobody like to read?

This short list of data should suffice to show that intervention effects plausibly exist in these languages. Persian has been claimed to have intervention effects in Megerdoomian and Ganjavi (2000), who unfortunately do not provide actual examples.

Beyond the mere fact that all these languages seem to have intervention effects, it has become clear that the way the effect manifests itself is subject to some crosslinguistic variation. This variation concerns (i) the syntactic circumstances under which intervention effects arise, (ii) the set of problematic interveners, and (iii) the wh-phrases that are sensitive to interveners. I discuss them in turn.

Pesetsky (2000) observes that intervention effects exist in English, contrary to fist appearances, but they occur only under rather special circumstances - namely, in otherwise permissible violations of superiority. So, in contrast to German, many potential intervention constellations are grammatical, cf. (22).

(22) a. Who did only John introduce to whom?
b. Which children didn't buy which book?

An intervention effect in English is constructed as follows. Take a multiple question with 'which'-phrases like (23a). Now, instead of the strucurally higher wh-phrase, overtly front the structurally lower wh-phrase, as in (23b). Normally, this by itself would make the example ungrammatical; compare the contrast in (24a) vs. (24b): a superiority violation. In the case of 'which'-phrases, though, a superiority violation does not induce ungrammaticality (compare Pesetsky (1982)). However, if you now add an intervener, as in (23c), the example becomes unacceptable. Thus, wh-phrases in situ that successfully defy superiority are sensitive to intervention effects.

(23) a. Which girl did (only) Mary introduce _ to which boy?

b. Which boy did Mary introduce which girl to _ ?
c. ?? Which boy did only Mary introduce which girl to _? [Pesetsky]

(24) a. Who did Mary introduce _ to who?
b. * Who did Mary introduce who to _ ?

Pesetsky accounts for the contrast between English and German, and the English facts in particular, by claiming that the inventory of covert movement operations differs between the two languages. We will come back to these data and to Pesetsky's analysis in section 4.1.

Moving on to (ii): variation regarding the set of problematic interveners, compare (25) and (26):

(25) Korean (Beck & Kim (1997)):

Minsu-nûn	chachu	nuku-lûl	p'ati-e	teliko ka-ss-ni?
Minsu-Top	often	who-Acc	party-Dir	take-Past-Q

'Who did Minsu often take to the party?'

(26) German:[4]

a.	*	Luise zaehlt auf, welche Uni	oft	welche Linguisten eingeladen hat.
		Luise enumerates which university	often	which linguists invited has
b.		Luise zaehlt auf, welche Uni	welche Linguisten	oft eingeladen hat.
		Luise enumerates which university	which linguists	often invited has

'Luise enumerates which university often invited which linguists.'

While the adverb 'often' is a problematic intervener in German, it is not in Korean (cf. Beck & Kim (1997)). Even more striking is the contrast (27) vs. (28): 'not' is an intervener in many languages, but apparently not in Thai (Ruangjaroon (2002)).

(27) Thai (Ruangjaroon (2002)):

Nít	mây	síi	?aray
Nit	not	buy	what

What didn't Nit buy?

(28) a. Which diplomat should I discuss which issue with _ ?
a. ?? Which diplomat should I not discuss which issue with _ ? [Pesetsky]

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[4]I have chosen to embed the question under the verb 'enumerate' in order to avoid a single-pair interpretation, which may sometimes be possible with such questions. I do not know why that is.

Kim (2002) proposes that the core set of interveners, which is crosslinguistically stable, consists of the focussing operators 'only', 'even' and 'also'. Other elements may or may not be problematic interveners. Section 4.2. discusses this variation.

Finally, wh-phrases don't all behave uniformly in the presence of an intervener. The following data from Mandarin show that 'which'-phrases are sensitive to intervention effects while wh-phrases like 'who' and 'what', for some speakers, are not. This issue is addressed in section 4.3.

(29) Mandarin:

a. % zhiyou Lili kan-le shenme?
only Lili read-Asp what

b. ?* zhiyou Lili kan-le na-ben shu?
only Lili read-Asp which-CL book

c. na-ben shu zhiyou Lili kan-le?
which-CL book only Lili read-ASP
Which book did only Lili read?

2.3. Strategy

We have seen that intervention effects exist in a wide variety of languages. I conjecture that the effect itself may well be universal, while its exact appearance is subject to crosslinguistic variation. The question is how to account for the hypothesised universality of intervention effects, as well as the variation in their appearance. My strategy in this paper is to identify a core case of intervention, and to develop a semantic analysis for that. I follow Kim (2002) who identifies the core intervention effect as in (30):

(30) *[Q_i [... [FocP [... wh-phrase$_i$ ...]]]] (Kim (2002))
A focused phrase (e.g. only+NP) may not intervene between a wh-phrase and its licensing complementizer.

Note that the structure in (30) is the syntactic level that is the input to compositional interpretation, Logical Form. Section 3 presents an analysis of the core case in terms of focus interpretation. A successful analysis of the core intervention effect leaves out a fair number of data introduced above: the frequent lack of intervention effects in English, the additional quantifier interveners in English, German etc., and the difference between 'which' and other wh-phrases revealed in Mandarin. These issues are the topic of section 4.

3. Focus Interpretation

Subsection 3.1. motivates my suggestion that wh-questions are interpreted by the same mechanism as focus. The framework for focus and question interpretation is introduced in section 3.2. Section 3.3. shows how the framework derives the core intervention effect.

3.1. Motivation and Idea

The sentence in (31), in which the subject NP 'John' is focused, is standardly (Rooth (1885, 1992)) associated with two semantic objects: On the one hand, there is the proposition expressed by the sentence - the set of possible worlds in (32a). Alternatively, I will talk about this proposition informally as in (32b).

(31) $[\text{John}]_F$ left.

(32) a. λw.John left in w

b. that John left

Besides this proposition, the ordinary semantic value of (31), the sentence makes salient a set of alternative propositions - for example the set in (32'a), which contains alternative propositions to the proposition that John left. This is the focus semantic value of the sentence, rendered more generally in (32'b), and in the form of a semi-logical expression in (32'c).

(32') a. {that John left, that Bill left, that Amelie left,...}

b. {that x left | x is an individual}

c. λp∃x[p= λw.x left in w]

Turning now to the interrogative in (33), according to the standard semantic theory of questions (Hamblin (1973), Karttunen (1977)) the denotation of a question is the set of answers to the question - for example (34a). More generally, this is the set of propositions in (34b) (rendered in more formal terms in (34c)).

(33) Who left?

(34) a. {that John left, that Bill left, that Amelie left,...}

b. {that x left | x is an individual}

c. $\lambda p \exists x[p= \lambda w.x \text{ left in } w]$

It is obvious that the focus semantic value of example (31) is the same as the ordinary meaning of the question in (33). Wh-phrases, like focus, introduce a set of alternatives. Unlike a focused phrase, introducing alternatives seems to be the only semantic role of a wh-phrase. It is not surprising that this parallel has inspired semanticists to derive the interpretations of questions and focus in the same way; relevant references include for example Hamblin (1973), Ramchand (1997) Rullmann & Beck (1998), and Kratzer and Shimoyama (2002). I will develop a particular way of doing that in the next subsection.

Before I move on to the technicalities, I give the reader an informal idea of the plot. I follow Rooth in attributing a twofold semantic contribution to focused phrases: their ordinary semantic value on the one hand, and a set of alternatives of the same type on the other. A wh-phrase shares with focus the second role. Unlike focus, the wh-phrase makes no ordinary semantic contribution. I propose that the ordinary semantics of the wh-phrase is in fact undefined. Since wh-phrases occur in expressions that have a perfectly well-defined ordinary semantic value, something must rescue the structure as a whole from undefinedness. This is the role of the question operator. Thus I propose that the LF of (33) is (33'), and that the semantics of Q lets it ignore the ordinary semantic value of its sister, and elevate its focus semantic value to the ordinary semantics.

(33') [Q [who left]]

Things go wrong when there is in addition a focus in the question whose contribution is evaluated within the question, i.e. within the scope of the Q operator. This situation is schematized in (35).

(35) [Q ... [Op [$_{\phi}$ ... XP_F ... wh ...]]]

For the focus on XP to be evaluated within the scope of the Q operator means that there is a focus sensitive operator, here: Op, which uses the semantic contribution of the focus. Op could be 'only' or 'even' or the like, or, in Rooth's (1992) more indirect framework for association with focus, it could be the ~ operator. We know that when focus is evaluated at the level of a phrase ϕ, focus semantic values enter into ordinary semantics. For example, in order to derive

the semantics of "only John left", we need to consider both the proposition that John left, and alternative propositions 'that x left' for alternatives x to John.
This means that with all focus sensitive operators (other than the question operator), we use the ordinary as well as the focus semantic value of ϕ. Moreover, the effect of focus is neutralized, i.e. for external purposes the expression ϕ behaves as if all foci had been reset to their ordinary semantics. The problem that arises in (35) is that the wh-phrase has no ordinary semantics. Thus the ordinary semantics of ϕ is undefined. This undefinedness is inherited by the larger structure. But since the focus semantic value has been reset to the ordinary semantic value, the sister of the Q operator has neither a well-defined ordinary nor a well defined focus semantic value. Not even the Q operator can save the structure from undefinedness. This, I claim, is why structures like (35) are unacceptable. We now move on to the explicit proposal.

3.2. Framework

It should be noted that to my knowledge, none of the available frameworks for the compositional interpretation of wh-questions predicts uninterpretability of the intervention effect data. Therefore a new framework is developed below that achieves that. This framework is based on Wold's (1996) implementation of Kratzer's (1991) version of Rooth's (1985, 1992) theory of focus.[5] Each Logical Form α is associated with an ordinary semantic interpretation $[[\alpha]]^{g}$ and a focus semantic interpretation $[[\alpha]]^{g,h}$. The focus feature is indexed and functions as a variable from a set of distinguished variables. A second variable assignment function h interprets distinguished variables. The ordinary semantic value of a focused constituent is the same as the interpretation of that consituent without a focus feature. The focus semantic interpretation is the value assigned to the distinguished variable by the variable assignment h. The focus semantic value of an unfocused item is the same as its ordinary semantic value. Both g ang h can be partial. I assume we always start out with h={}.

(36) a. $[[\text{John}_{F1}]]^{g}$ = john
b. $[[\text{John}_{F1}]]^{g,h}$ = h(1) [6]

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[5]With Kratzer (1991), I depart from Rooth's original framewrk by using variables to derive focus semantic values. The reason for that is that evaluation of focus alternatives has to be to some extent selective for me; see section 5.1. for discussion of that point. Like Wold and unlike Kratzer I use a direct interpretation framework instead of translation into a formal language. I differ from Wold in that I have both ordinary and distinguished variables. I think this is necessary for data like (i).

(i) Every boy thinks that only HE should be considered.

Finally, I follow Rooth more strictly than Kratzer or Wold by using the ~ operator.
[6]More precisely: $[[\text{John}_{F1}]]^{g,h}$ = h(1) if $1 \in \text{dom}(h)$, =john otherwise. The more precise version is relevant in section 5.

(37) a. $[[\text{John}]]^{g}$ = john b. $[[\text{John}]]^{g,h}$ = john

(38) a. $[[\text{left}]]^{g} = [\lambda x.\lambda w.x \text{ left in } w]$ b. $[[\text{left}]]^{g,h} = [\lambda x.\lambda w.x \text{ left in } w]$

Translations of complex expressions are constructed from the translations of their parts in the usual way. (39) below gives the relevant version of Function Application.

(39) Function Application:
If X=[Y Z] then for any g,h: $[[X]]^{g} = [[Y]]^{g}([[Z]]^{g})$ and $[[X]]^{g,h} = [[Y]]^{g,h}([[Z]]^{g,h})$

(40) a. $[[\text{John}_{F1} \text{ left}]]^{g} = \lambda w.\text{john left in } w$
b. $[[\text{John}_{F1} \text{ left}]]^{g,h} = \lambda w.h(1) \text{ left in } w$

Focus sensitive operators evaluate the contribution of focus. In this framework, they bind the distinguished variables. The two focus sensitive operators I will use are the ~ and the question operator. We begin with the ~ operator and a translation of Rooth's theory of focus evaluation into our framework. According to this theory, the LF of (41a) is (41b). (42) specifies the semantics of the ~ and (43) the semantics of 'only'. Rooth's ~ evaluates all foci in its scope and neutralizes their contribution.

(41) a. Only John left.
b. [only C [~C [John_{F1} left]]]

(42) If X=[~C Y] then $[[X]]^{g} = [[Y]]^{g}$ if $g(C) \leq \{[[Y]]^{g,h'} : h' \in H\}$, undefined otherwise, and $[[X]]^{g,h} = [[X]]^{g}$.

(43) $[[\text{only}]](\alpha)(\beta)(w) = 1$ iff for all p such that $p(w)=1$ and $p \in \alpha$, $p=\beta$.

Putting things together, we compositionally intepret (41b) as in (44). This results in the desired truth conditions (45).

(44) $[[\ [\text{ only C [\sim C [John}_{F1} \text{ left]]] }]]^{g}(w) = 1$ iff
$[[\text{only}]](g(C))(\lambda w.\text{ john left in } w)(w) = 1$ iff
for all p such that $p(w)=1$ and $p \in g(C)$, $p = \lambda w.$ john left in w
if $g(C) \leq \{[[\ [\text{John}_{F1} \text{ left}]\ ]]^{g,h'} : h' \in H\}$
i.e. $g(C) \leq \{\lambda w.\ x \text{ left in } w : x \in D\}$

(45) for all p such that p(w)=1 and $p \in \{\lambda w.\ x$ left in w: $x \in D\}$, $p=\lambda w.$ john left in w

To this system we add wh-questions. Wh-phrases use the same mechanism of distinguished variables. This reflects the fact that they introduce alternatives. In contrast to focus, they make no ordinary semantic contribution - introducing alternatives is their only semantic function.

(46) a. $[[\text{who}_1]]^g$ is undefined
b. $[[\text{who}_1]]^{g,h} = h(1)$ [7]

(47) a. $[[\text{who}_1 \text{ left}]]^g$ is undefined
b. $[[\text{who}_1 \text{ left}]]^{g,h} = \lambda w.h(1)$ left in w

The second focus sensitive operator that is relevant for our purposes, recall, is the question operator. Similar to Berman's (1991) and Shimoyama's (2002) interpretations, the question operator is a variable binder. In contrast to their proposals, the variables bound by this operator are distinguished variables. I assume that a wh-question like (48a) has the Logical Form in (48b). The semantic effect of the question operator is specified in (49) (for the case of one wh-phrase) and in (51) (the general case). The translation of our example in (48) is given in (50).

(48) a. Who left?
b. $[Q_1\ [\text{who}_1 \text{ left}]]$

(49) If $X=[Q_i\ Y]$ then $[[X]]^g = \lambda p \exists x[p=[[Y]]^{g,h[x/i]}]$
and $[[X]]^{g,h} = \lambda p \exists x[p=[[Y]]^{g,h[x/i]}]$

(50) $[[\ [Q_1\ [\text{who}_1 \text{ left}]]\ ]]^g$ $= \lambda p \exists x[p=[[\ [\text{who}_1 \text{ left}]\ ]]^{g,\{\}[x/1]}]$
$= \lambda p \exists x[p=\lambda w.x$ left in w$]$

(51) If $X=[Q_{i1,\ldots in}\ Y]$ then $[[X]]^g = \lambda p \exists x1 \ldots xn[p=[[Y]]^{g,h[xk/ik]}]$
and $[[X]]^{g,h} = \lambda p \exists x1 \ldots xn[p=[[Y]]^{g,h[xk/ik]}]$

Since intervention effects, as announced earlier, will come out uninterpretable in this framework, we need to specify a notion of interpretability for the framework:

(52) Principle of Interpretability:

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[7] More precisely: [[who1]]g,h = h(1) if $1 \in$ dom(h), undefined otherwise.

An LF must have an ordinary semantic interpretation.

3.3. Deriving Intervention Effects

We are now in a position to explain intervention effects. I will consider (53a), a prototype of an intervention effect. The relevant LF is (53b), in which the Q operator is associated with the wh-phrase, 'John$_F$' wants to associate with 'only' via the ~ operator, and the Q operator takes scope over 'only'.

(53) a. * Only JOHN saw who?
b. [$_{CP}$ Q$_2$ [$_{IP3}$ only$_C$ [$_{IP2}$ ~C [$_{IP1}$John$_{F1}$ saw who$_2$]]]]]

Crucially, $[[IP1]]^g$ is undefined for any g, since the wh-phrase's ordinary translation is undefined. Accordingly, $[[IP2]]^g$ is undefined; but then $[[IP2]]^{g,h}$ is also undefined, for any g,h. So are both $[[IP3]]^g$ and $[[IP3]]^{g,h}$. But since $[[IP3]]^{g,h}$ is not defined, neither is $[[CP]]^g$. The structure in (53b) is therefore uninterpretable, and hence ungrammatical.

In more general terms, the system I have introduced requires a wh-phrase to be immediately c-commanded by a coindexed Q operator. A wh-phrase not c-commanded by a Q operator will be uninterpretable, since the expression it is contained in can never have a well-defined ordinary interpretation. A wh-phrase c-commanded by an intervening focus sensitive operator (here: the ~ operator) will lead to uninterpretability despite a c-commanding Q operator, because the ~ operator makes use of both the ordinary interpretation and the focus semantic interpretation of its sister, and it resets the focus semantics to the ordinary semantics. The Q operator is the only binder for distinguished variables that uses just the focus semantic interpretation. We thus exclude structures like (54b). This is very close to the generalization advanced by Kim that we are trying to capture.

(54) a. *[Q$_i$ [...[FocP [... wh-phrase$_i$ ...]]]] (Kim (2002))
b. *[Q$_i$ [... [~C [... wh-phrase$_i$ ...]]]] (G)

(G) Generalization: A wh-phrase may not have a ~ operator as its closest c-commanding potential binder.

The crucial ingredients for this analysis are that both focus and wh-phrases are interpreted via the mechanism of distinguished variables; in contrast to focus, wh-phrases make no ordinary contribution, and can therefore only be evaluated by the question operator.

Prima facie, we now expect that a focus sensitive operator can never intervene between a wh-phrase and its associated question operator. To the extent that I am aware of the relevant data, Hindi, Korean, Turkish and Malayalam transparently meet our prediction. In a lot of other languages, the set of available data is unfortunately too small to permit firm conclusions. Section 4 deals with those empirical aspects of intervention effects that do not appear to fit (G).
In prinicple, we expect that the ~ operator acts as an intervener whenever an alternative semantics is used. This is because the properties of the ~ that cause the intervention effect in wh-constructions - unselectivity and resetting of focus semantic value - should create a similar minimality effect in other focus related constructions. This expectation is examined in section 5.

4. Predictions of and Refinements to the Basic Theory

We know from section 2 that the way intervention effects manifest themselves varies from one language to another. Subsection 4.1. discusses crosslinguistic variation that can be reduced to the inventory of movement operations that a language has. In section 4.2. we look at variation with respect to what is a problematic intervener. Different types of wh-phrases are the topic of section 4.3.

4.1. Movement Issues

German presents a small complication over Korean etc. in terms of the availability of overt wh-movement. The trace this leaves must be an ordinary variable. Other than that, German transparently meets the prediction. I go over two relevant examples below. In the simple question (55), the crucial category is the one labeled **X**. **X** is where we are done with evaluating the contribution of focus. This category has a perfectly well-defined ordinary and focus semantic interpretation containing an ordinary variable bound from the outside. The calculation proceeds in the usual way, and the question is associated with the semantics in (55c).

(55) a. Wen hat nur der Dirk gesehen?
whom has only the Dirk seen
'Whom did only Dirk see?'

b. $[_Z\ Q_3\ [_Y$ wen$_3$ [1 $[_{\mathbf{X}}$ nur$_C$ [~C [[der Dirk]$_{F2}$ t1 gesehen hat]]]]]
who only the Dirk seen has

c. $[[Z]]^g$ $= \lambda p \exists x[p=[[Y]]^{g,\{\}[x/3]}]$
$= \lambda p \exists x[p=[[\ [1[X]]]]^{g,\{\}[x/3]}\ ([[wen_3]]^{g,\{\}[x/3]})]$
$= \lambda p \exists x[p=[\lambda z.[[X]]^{g[z/1],\{\}[x/3]}](x)]$

$[[X]]^{g[z/1],\{\}[x/3]}$ = [[only]] (g(C))([λw.Dirk saw z in w])

if g(C)≤ {[[[Dirk$_{F1}$ hat t1 gesehen]]]$^{g[z/1],h'}$: h'∈ H}

i.e. g(C)≤ {[λw.y saw z in w]:y∈ D}

$[[Z]]^g$ = {that only Dirk saw x | x an individual}

By contrast, addition of an in situ wh-phrase as in (56) leads to uninterpretability. The crucial category is once more **X**, which indeed does not have a well-defined interpretation. Undefinedness is inherited by the rest of the tree.

(56) a. * Wen hat nur der Dirk wo gesehen?
whom has only the Dirk where seen
Who did only Dirk see where?

b. [$_Z$ Q3,4 [$_Y$ wen3 [1 [$_{\mathbf{X}}$ nur$_C$ [~C [[der Dirk]$_{F2}$ wo4 t1 gesehen hat]]]]]
who only the Dirk where seen has

c. $[[X]]^g$ and $[[X]]^{g,h}$ are undefined ==> $[[Z]]^g$ is undefined.

These facts indicate that a wh-phrase is interpreted in its moved position - here: where it shows up overtly. Note that the same point is made by examples that involve scrambling of a wh-phrase, e.g. (57b). The trace that scrambling leaves is an ordinary variable, hence scrambling can save the example from uninterpretability.

(57) a. * Minsu-man nuku-lûl po-ass-ni? (Korean)
Minsu-only who-Acc see-Past-Q

b. nuku-lûl Minsu-man po-ass-ni?
who-Acc Minsu-only see-Past-Q

Who did only Minsu see?

A different and more serious complication arises once we look at the contrast between English and German. Recall that a lot of prospective intervention effects are actually fine in English (cf. (58)), and that intervention effects only show up in otherwise permissible superiority violations like (59) (as observed by Pesetsky (2000)).

(58) a. Who did only John introduce to whom?

b. Which children didn't buy which book?

(59) a. Which girl did (only) Mary introduce _ to which boy?

b. Which boy did Mary introduce which girl to _ ?

c. ?? Which boy did only Mary introduce which girl to _? [Pesetsky]

This looks like a genuine problem for my analysis of intervention effects. Interestingly, however, one option open to me is to simply persue Pesetsky's analysis of these data.

According to Pesetsky (2000), wh-phrases in situ in English generally undergo LF wh-movement ("covert phrasal movement"). Superiority effects are an indicator of such movement, and those wh-phrases that are sensitive to superiority constraints therefore must undergo phrasal movement. Conversely, wh-phrases that are not sensitive to superiority thereby show that they do not move. This is true of 'which'-phrases. A 'which'-phrase that has successfully violated superiority thus doesn't undergo phrasal movement. According to Pesetsky, such a wh-phrase is 'interpreted' via the alternative strategy of feature movement. The above English data show us that feature movement is sensitive to intervention effects, and that covert phrasal movement is not.

I propose to view my focus related interpretation mechanism as the interpretational strategy that underlies the term 'feature movement' - i.e. what I do in the previous section is to provide an interpretation of the notion of feature movement as used by Pesetsky. I further propose to adopt the part of his analysis that has wh-phrases insensitive to interveners move covertly, i.e. at LF, past the intervener. My suggestions are illustrated for the relevant English examples below.

Sentence (60a) is an ordinary multiple question with the kind of wh-phrase sensitive to superiority. Pesetsky shows us that the LF for the sentence (i.e. the structure that is the input to compositional interpretation) must look as in (60b). The in-situ wh-phrase has moved covertly. Consequently, adding an intervener as in (61a) is harmless: the structure we interpret does not include an intervention configuration. The crucial category **X** has a well-defined interpretation.

(60) a. Who did John introduce to whom?

b. [$Q_{1,2}$ [who_1 [4 [$whom_2$ [5 [did [John introduce t4 to t5]]]]]]

(61) a. Who did only John introduce to whom?

b. [$_Z$ $Q_{1,2}$ [who_1 [4[$whom_2$ [5[did [$_{\mathbf{X}}$ $only_C$ [~C [$John_{F3}$ introduce t4 to t5]]]]]]

c. $[[X]]^g = [[X]]^{g,h} = [[only]](g(C))(\lambda w.$ John intro. g(4) to g(5))

$[[Z]]^{g,h}$ = { that only John intodoced x to y | x, y individuals}

Matters are different in (62), a multiple question containing a 'which'-phrase that defies superiority. This wh-phrase does not move, and the input to the interpretation component looks as in (62b). While things work out fine in this example, addition of an intervener as in (63a) now leads to ungrammaticality, since we find the familiar intervention configuration in (63b).

(62) a. Which boy did Mary introduce which girl to _?

b. [$Q_{1,2}$[[which boy]$_1$ [4[did [Mary introduce [which girl]$_2$ to t4]]]]]]]

(63) a. ?? Which boy did only Mary introduce which girl to _?

b. [$_Z$ $Q_{1,2}$[[which boy]$_1$ [4[did [$_{\mathbf{X}}$ only$_C$ [~C [Mary$_{F3}$ int. [which girl]$_2$ to t1]]]]

c. $[[X]]^g$ and $[[X]]^{g,h}$ are undefined ==> $[[Z]]^g$ is undefined

Essentially, there is no intervention effect in many English data because at the relevant level, Logical Form, there is no intervention configuration. Pesetsky's account thus works well with the present analysis. It should be pointed out that it leads to a few non-trivial further expectations. For one thing, covert phrasal movement of the kind assumed for regular English wh-phrases must be unavailable in all those languages that reliably show intervention effects in multiple questions (e.g. Japanese, Korean, German etc.). One wonders what kind of movement this is: what triggers it, and how it is parametrized. See Pesetsky for discussion. A general prediction is that in languages that have superiority effects, we expect the limited English-type intervention effects. In languages without superiority effects (or any other indication that wh-phrases must move phrasally) we expect general intervention effects of the German, Korean etc type. I.e., the analysis predicts a correlation of limited vs. general intervention effects and superiority vs. no superiority effects. Further research will have to show if this is borne out.

4.2. Variable Interveners

We observed in section 2 that the set of problematic interveners varies between languages. In particular, in English and German quantified expressions in general cause an intervention effect - not just focusing operators like 'only', 'even' and 'also' (compare Beck (1996) and Pesetsky (2000) for more data illustrating this). Let us first consider what could, in principle, be said about the intervention effect caused by items such as 'always', 'often', 'every' etc. under the present analysis.

Intervention effects arise through focus sensitive operators. The relevant one so far is ultimately the ~ operator. In Rooth's (1992) theory, which I have followed, the ~ operator evaluates the contribution of focus. In the data relevant for us, it derives association with focus via the focus anaphor C, shared by the ~ operator and whatever operator is supposed to associate with focus. If we can argue that there is a ~ operator present in structures with quantifiers, then we expect an intervention effect to arise. A ~ operator is plausibly present if we can find association with focus.

It is well-known that quantifiers do associate with focus. Some relevant examples are given below.

(64) a. Mary always takes John to the MOVIES. [Rooth]
≈ If Mary takes John anywhere, she takes him to the movies.
b. Mary always takes JOHN to the movies.
≈ If Mary takes anyone to the movies, she takes John to the movies.

(65) Most ships passed through the lock at NIGHT. [Krifka]
≈ Most ships that passed through the lock passed through the lock at night.

(66) a. Most New Yorkers eat Chinese food with CHOPSTICKS.
≈ Most New Yorkers that eat Chinese food eat Chinese food with chopsticks.
b. Most New Yorkers eat CHINESE food with chopsticks.
≈ Most New Yorkers that eat something with chopsticks eat Chinese food with chopsticks. [Geilfuss]

(67) Few INCOMPETENT cooks appied. [Herburger]
≈ Few cooks that applied were incompetent.

The structures for (64) are given in (68).

(68) a. [always$_{\cup C}$ [~C [Mary takes John to [the movies]$_{F1}$]]]
b. [always$_{\cup C}$ [~C [Mary takes [John]$_{F1}$ to the movies]]]

Assuming the simplified interpretation of *always* given in (69), it is easy to see that (70) will lead to the appropriate interpretations of (68a,b) depending on the value for the focus anaphor C.

(69) [[always]] (p)(q)(w)=1 iff for all s such that s≤w & p(s)=1, q(s)=1

(70) [[always]] (g(∪C))(λw.mary takes john to the movies in w)
a. g(∪C) = λw.∃x[mary takes john to x in w]
b. g(∪C) = λw.∃x[mary takes x to the movies in w]

Thus it seems clear that a ~ operator can be part of structures with quantifiers (see for example Rooth (1996)). This, however, is not quite good enough for my purposes: the intervention effect in English, German etc. does not depend on association with focus. That is, intervention effects arise without any indication that the intervening quantifier in that structure associates with focus. Therefore I have to claim that there is always a ~ operator present in quantified structures in languages in which those quantifiers cause an intervention effect.

At first, this seems problematic. It has been observed (Buering (1996), Beaver and Clark (2002)) that quantifiers do not necessarily associate with focus. Relevant examples are given in (71) and (72). Lack of association in (72) excludes the structure in (73).

(71) Max polished MOST cars CAREFULLY. [Büring (1996) who cites Eckardt (1993)]

(72) Mary always managed to complete [her exams]$_F$ [Beaver & Clark]

(73) a, [always$_{\cup C}$ [~C [Mary managed to complete [her exames]$_{F1}$]]]

Note, however, that nothing precludes the structure in (74), in which there is a ~ operator, but the focus anaphor is not coindexed with the resource domain variable of the quantifier. All that is required for my purposes is that focus is obligatorily evaluated in the scope of the quantifier - not that the quantifier obligatorily associates with focus.

(74) [always$_{C1}$ [~C2 [Mary managed to complete [her exames]$_{F1}$]]]

Let us ask ourselves, then, what predictions obligatory evaluation of focus in the domain of a quantifier makes. This question, it turns out, is not easy to answer.

Note that the ~ operator unselectively evaluates all foci in its syntactic scope. The Roothian definition in (42) binds all distinguished variables in the scope of the ~. It also makes those variables inaccessible from the outside by setting the new focus semantic value to the ordinary semantic value. An obvious hypothesis would be that since any foci in the scope of a quantifier have to be evaluated within the scope of that quantifier, they cannot be evaluated higher up, outside its scope. Thus we would expect (75a) to be impossible on the interpretation in (75b), where I may have lent other things besides Harry Potter to students, but the only thing I lent EVERYONE is Harry Potter.

(75) a. I only lent every student HARRY POTTER.

b. Harry Potter is the only thing that I lent every student.

(76) [only$_{C1}$ [~C1 [[every$_{C2}$ student] [~C3 [5[I lent t5 [Harry Potter]$_{F1}$]]]]]]

Under our current assumptions, (75) is associated with the Logical Form in (76). The definition of the ~ operator makes '~C3' in the above structure evaluate the focus on 'Harry Potter' and neutralize that focus. Hence association of 'Harry Potter' with 'only' (via the higher '~C1') is precluded. It turns out that in fact, reading (75b) seems to be impossible - so far, so good.

However, it it is claimed in the literature (e.g. Krifka (1992), Rooth (1996)) that a focus can skip one focus sensitive operator and associate with a higher one. An example of this kind is given in (77b).

(77) a. I only introduced MARILYN to John Kennedy. [Rooth]
b. I also only introduced Marilyn to BOB Kennedy.
= Bob Kennedy is another person that I introduced only Marilyn to.

We know that the focus on 'Bob Kennedy' skips a focus sensitive operator because 'only' obligatorily associates with focus (here: Marilyn), but 'Bob Kennedy' associates with the structurally higher 'also'. Given our current assumptions, (77b) would be associated with the Logical Form in (78).

(78) [$also_C$ [~C [$only_D$ [~D [I introduced $Marilyn_{F2}$ to [Bob $Kennedy]_{F1}$]]]]

(78) runs into the same problem as (76) above: association should be impossible. This means that what we have just said about (75) can't be the whole story. I will come back to the issue of multiple focus, and to possible analyses of (77), in section 5.1. As far as our empirical predictions are concerned, a more realistic expectation is (79).

(79) If an element Y is an intervener in language X, then any focus contained in the scope of Y should have the same options of focus evaluation as a focus contained in the scope of an obligatorily focus sensitive item (like 'only') in X. If Y is not an intervener in X, then Y does not have to come with a ~ operator, and a focus contained in the scope of Y should be completely free in its evaluation.

We have yet to determine concretely what the options of focus evaluations are for a focus contained in the scope of an focus sensitive item, as opposed to some other focus. Only then can we examine the predictions made by my proposal.
Other predictions are similarly complex to follow up on. Truckenbrodt (1995) sugggests that the ~ has phonological consequences. Thus we should observe those in a language whenever an expression that is an intervener in that language occurs. And regarding discourse properties of

focus, we expect that the focus anaphor associated with the ~ underneath the intervener could be discourse operative, or else some focus above the intervener, but not a focus anaphor simply evaluating focus for the whole structure. I must leave these for future research.

4.3 Wh-Phrases, Remnants

First an empirical point. Remember the data concering 'which' vs. 'who' etc. in Mandarin, exemplified by (80).

(80)	a. %	zhiyou	Lili kan-le		shenme?		
		only	Lili read-Asp		what		
	b. ?*	zhiyou	Lili kan-le		na-ben	shu?	
		only	Lili read-Asp		which-CL	book	
	c.	na-ben	shu	zhiyou	Lili kan-le?		
		which-CL	book	only	Lili read-ASP		
		Which book did only Lili read?					

Soh (2001) reports that data like (80a) are acceptable (she does not discuss 'which'-phrases and does not offer a judgement for data like (80b)). According to the judgements reported to me, there is disagreement on whether or not (80a) is grammatical. On the other hand, speakers seem to agree that (80b) is unacceptable.[8] The point is interesting partly because there are also differences between 'which'-phrases and other wh-phrases in English. Let us suppose for the moment that there is a dialect of Mandarin in which 'which'-phrases show an intervention effect, but 'who', 'what' and the like do not.

In terms of the analysis we have developed so far, the data suggest that in Mandarin, wh-phrases like 'who' and 'what' can undergo covert phrasal movement, while 'which' cannot. This is similar to what we said about English, but not identical. Superiority effects in English showed us (according to Pesetsky (2000)) hat 'who', 'what' etc have to move phrasally, while 'which' does not have to move ((81a) vs. (81b)). There is one type of data in Pesetsky (2000) that indicates that English 'which' can move, namely, multiple wh-questions with a which-phrase in situ that has not violated superitoriy - (82b) vs. (82a):

(81) a. Which boy did Mary introduce which girl to _ ?
b. * Whom did Mary introduce who to _?

(82) a. ?? Which boy did only Mary introduce which girl to _?

[8] I am very grateful to Liang Chen, Lisa Cheng, Ji-yung Kim and Ning Pan for their help with these data.

b. __ Which girl did only Mary introduce _ to which boy?

According to Pesetsky, (82b) is acceptable. I have not been able to replicate this judgment reliaby - many speakers I have consulted perceive no contrast between (82a) and (82b); see also Simpson (2002). For those speakers, 'which' in English appears to behave like 'which' in Mandarin: it cannot move. (For an explanation of the pattern of judgments reported in Pesetsky (2000), see Pesetsky).
The obvious question is what distinguishes 'who' and the like from 'which' that could be responsible for this difference. Pesetsky (2000) suggests that D-linked (Pesetsky (1982)) wh-phrases don't (or, on his analysis, don't have to) move. While we may not understand completely what D-linking is semantically (and I have nothing to add here), perhaps the pattern we observe with intervention effects can serve as another piece of the puzzle.

A possibly related matter, and one that arises in particular in the present framework of compositional interpretation, is the question of how the restrictor of a 'which'-phrase is to be interpreted. Note that the wh-phrases discussed so far were translated as simple variables. This is not possible for 'which'-phrases. Note also that the framework as it is specified requires us to interpret the restrictor in situ. I see two options for this: on the one hand, a choice function analysis in the style of Reinhart (1992), and on the other hand a presuppositional analysis in the style of Rullmann and Beck (1998). The two options, adapted to the present framework, are exemplified for the simple prototype of a 'which'-question in (83).

(83) Molly bought which car?

(84) a. [Q1 [Molly bought [f1(car)]]]
b. A function f: $D<e,t> \rightarrow De$ is a choice function, CH(f),
iff P(f(P)) for all P
c. $\lambda p \exists f[CH(f)\ \&\ p=\lambda w.$ molly bought f(car) in w]
d. {that Molly bought the car selected by f | f a choice function}

(85) a. [Q1 [Molly bought [the car x1]]]
b. $[[\text{ the } N<e,t>\ NP<e>\ ]]^g$ is defined only if $[[N]]^g([[NP]]^g)=1$
If defined, then $[[\text{ the } N<e,t>\ NP<e>\ ]]^g = [[NP]]^g$
c. $\lambda p \exists x[p=\lambda w.$ molly bought the car x in w]
d. {that Molly bought the car x | x an individual}

The choice between the two versions does not matter for the present concerns, and I will leave it open. What is important is that on both analyses, the 'which'-phrase may remain in situ without semantic catastrophe. See Reinhart (1992) and Rullmann and Beck (1998) for more discussion.

A final issue related to the behaviour of various types of wh-phrases w.r.t. intervention effects are split constructions (called separation construction in Pesetsky (2000)). I observed in Beck (1996) that an intervener separating the two parts of a split construction leads to ungrammaticality. An example is given in (86a). (86b) illustrates that overtly fronting the entire wh-phrase saves the example. (87) is provided to show that it is indeed the presence of the intervener that renders (86a) ungrammatical.

(86) a. * Wen hat nur der Dirk [__ von den Musikern] gesehen?
whom has only the Dirk of the musicians seen
b. [Wen von den Musikern] hat nur der Dirk __ gesehen?
whom of the musicians has only the Dirk seen

Which of the musicians did only Dirk see?

(87) Wen hat der Dirk von den Musikern gesehen?
whom has the Dirk of the musicians seen
Which of the musicians did Dirk see?

From the perspective developed in this paper, the example shows that the interpretative contribution of the wh-phrase must take effect in the position of the remnant, not in the position of the moved part of the wh-phrase. I suggest that the two parts of the wh-phrase must be interpreted together, and that for this purpose the moved part behaves as if it occupied its original position. The LF associated with (86a) then looks as in (88), and we expect the intervention effect.

(88) [Q_1 [__ [**X** nur_C [~C [$[\text{der Dirk}]_{F2}$ [wen_1 von den Musikern] gesehen hat]]]]]]

<u>5. General Outlook</u>

This section is devoted to the general expectations raised by the analysis of intervention effects introduced above. I consider the interaction of different focus-related operators in situations other than the classical wh-intervention effect. Section 5.1. discusses the other logical possibilities concerning the ~ operator and the question operator, in particular the case of multiple focus. Section 5.2. addresses the question of where else intervention effects can be expected to arise besides wh-questions.

5.1. Focus Issues: Multiple Focus, Baker Ambiguities, Focus in Questions

When we look at the interaction of the ~ operator and the Q operator, three other constellations are possible besides the intervention configuration in (89a) - (89b), (89c) and (89d).

(89)	a. *	$[Q_i \ldots [\ {\sim}C\ \ [\ldots wh_i \ldots]]\ \ldots]$	Intervention effects
	b.	$[Q_i \ldots [\ Q_j\ \ [\ldots wh_i \ldots]]\ \ldots]$	Baker sentences
	c.	$[{\sim}_i\ C\ldots[\ Q_j\ \ [\ldots F_i \ldots]]\ \ \ldots]$	Focus evaluation out of question
	d.	$[{\sim}_i\ D\ldots[\ {\sim}_jC\ \ [\ldots F_j \ldots\ F_i \ldots]]\ \ldots]$	Multiple Focus

(89b) occurs in Baker ambiguities, (89c) informally represents a question containing a focus evaluated outside the question, and (89d) two foci associated with two different focus operators.
Neither Baker ambiguities nor focus inside a question are problematic. I provide examples and their Logical Forms below. The reader can verify that the structures receive the appropriate interpretations.[9]

(90) a. Who knows where we bought what?
b. [Q1,3 [who1 knows [Q2 [where2 we bought what3]]]]
c. $\lambda p.\exists x1x3[p{=}\lambda w.x1 \text{ knows in } w\ (\lambda q.\exists x2[q{=}\lambda w'.\text{we bought } x3 \text{ in } x2 \text{ in } w'])]$

(91) a. I only wonder who BILL invited.
b. [only_C [~C [I wonder [Q1 [who1 Bill_{F2} invited]]]]]
c. $[[\text{only}]](g(C))(\lambda w.\text{I wonder}_w\ ([[\ Q1\ [\ \text{who1 Bill}_{F2} \text{ invited }]\ ]]^{g,\{\}})) =$
$[[\text{only}]](g(C))(\lambda w.\text{I wonder}_w\ (\lambda p.\exists x1[p{=}[[\text{who1 Bill}_{F2} \text{ invited}]]^{g,\{\}[x1/1]}])=$
$[[\text{only}]](g(C))(\lambda w.\text{ I wonder in } w\ (\lambda p.\exists x1[p{=}\lambda w'.\text{ Bill invited } x1 \text{ in } w']))$
(where g(C) is a set of propositions of the form
'I wonder who y invited' (y an individual))

Note that such examples show that the Q operator needs to be selective, in the sense that it only binds the variables it is coindexed with. It does not automatically bind all distinguished variables; for instance, it does not touch the variable introduced by focus on 'Bill' in (91). This

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[9]Using the more precise versions of the interpretations of 'who' and Bill_F.

is why I do not use Rooth's original framework of focus interpretation for my purposes (compare Fn 5).

Next, let's turn to multiple focus, and come back to example (92) from section 4.2. Remember that association of 'Bob' with 'also' is claimed to be possible across intervening 'only'.

(92) a. I only introduced MARILYN to John Kennedy.
b. I also only introduced Marilyn to BOB Kennedy.

We have already seen that the LF in (78) does not allow us to capture that reading of (92), since the ~ under 'only' already evaluates the focus on 'Bob', and leaves nothing for 'also' to associate with.

(78) [$also_C$ [~C [$only_D$ [~D [I introduced $Marilyn_{F2}$ to [Bob $Kennedy]_{F1}$]]]]]

Such examples have received much attention in the literature. Let us briefly review the discussion. Rooth (1996) considers the alternative LF in (93) for the example. Here, 'Bob Kennedy' has moved out of the c-command domain of 'only' at LF and is now free to associate with 'also'. Since we know independently that phrases can move at LF, nothing precludes (93) as a possible LF of (92), and we do after all derive the relevant reading (so Rooth argues). Note that this is similar to our treatment of English wh-phrases.

(93) [$also_C$ [~C [[Bob $Kennedy]_{F1}$ [3[$only_D$ [~D [I introduced $Marilyn_{F2}$ to t3]]]]]

This makes the prediction that skipping an intervening focus sensitive operator should be possible only when movement can come to the rescue. Rooth tests this prediction with (94), where the focus is embedded inside a relative clause (an island for movement).

(94) a. We only recovered the diary entries that MARILYN made about John.
b. We also only recovered [the diary entries [that Marilyn made about BOBBY]]

Rooth reports that association with 'also' is still possible, and leaves the example as a problem for a restrictive theory of movement. Krifka (1997) points out that this example does not establish unambiguously that 'Bobby' is inside the island. He argues on the basis of further data that island effects do show up in that, when both foci are clearly inside the island, association with two different operators is bad.

Wold (1996), on the other hand, is led to the suggestion that the ~ operator is not, after all, truly unselective in that it evaluates all foci in its scope. He develops a version of the theory in which the ~ operator itself bears an index, and evaluates only the contribution of coindexed foci. A representation of (92) would then look as in (95).

(95) [also$_C$ [~$_1$C [only$_D$ [~$_2$D [I introduced Marilyn$_{F2}$ to [Bob Kennedy]$_{F1}$]]]]]

I will not provide a detailed semantics for (95). See Wold (1996). Suffice it to say that the indexed ~ is a binder for only those variables that bear the same index. This predicts that association of focus across intervening focus sensitive operators is completely free.
On the other hand, von Fintel (1994, p.49, Fn 44) observes that when the order of 'only' and 'also' is reversed, the relevant reading is completely impossible. His example is (96;B2). This is not what we expect under either Rooth's movement theory or Wold's theory.

(96) A: I know that John drank water at the party. What else did he drink?
B1: Besides water he only drank [CARrot juice]$_F$.
B2: #He only also drank [CARrot juice]$_F$.

In the same vein, Heck and Sauerland (2003) note that in (97) focus on 'bike' does not seem to be able to skip the intervening universal quantifier. This example is parallel to the Harry Potter example from section 4.2., where association across a universal quantifier was similarly impossible.

(97) #	Tina hat nur	jedem Kind	ein FAHRRAD gegeben.		[Heck & Sauerland]
	Tina has only	every child	a bike	given	
*	The only thing Tina gave to every child was a bike.				

The empirical situation thus seems to be less clear than one would like.
Let us consider the relevance of this problem for the purposes of this paper. The immediate issue is the semantics of the ~ operator. The derivation of the intervention effect in section 3 relies on the fact that the ~ operator evaluates the contribution of all foci in its syntactic scope, and neutralizes their contribution. A selective version of the ~ operator like Wold's is incompatible with that explanation. On a more conceptual level, intervention effects are supposed to follow from the mechanism responsible for evaluating the contribution of focus. This leads us to expect that they might show up in other constructions that use an alternative semantics. Specifically, under the present assumptions, the ~ operator should lead to an intervention effect for the binding of distinguished variables, through being unselective and

through the closure effect. The effect need not show up as one of grammaticality (as in the case of wh-phrases), but it should be detectable (as an interpretational effect concerning possibility of association with focus, or circumstances under which such association is possible).
It follows that both the empirical issue of multiple focus and its theoretical implications are extremely important for the present purposes.

In order to contribute to the empirical picture, I have conducted a small survey that tests association with focus across an intervening focus sensitive operator. My results are summarized in the table below. The first column reports the judgments collected for association of 'only' with focus across intervening 'nobody', the second column for association across intervening 'nobody' in an island condition. The third column reports the judgments of association of 'also' (English) or 'sogar' ('even'; German) across intervening 'only', the fourth column adds an island condition to that. The last two columns are test sentences without intervener. I obtained judgments for seven native speakers of English and ten native speakers of German. The actual data used in the survey are reported in the appendix. The last three rows in the table are the theoretical predictions made by Wold's theory, and by Rooth's theory including/not including the movement option. In the 'nobody' condition, there is also the question of whether Rooth would go along with my claim that 'nobody' requires a ~ operator (the unbracketed judgment) or not (the judgment in brackets).

(98)	negation	negation, Is	only	only Is	T	T Is
EnglLiberal	*	*	ok	ok	ok	ok
EnglRestr.	*	*	*	*	ok	ok
GerLiberal	ok	ok	*	*	ok	ok
GerRestr.	*	*	*	*	ok	ok
PredWold	ok	ok	ok	ok	ok	ok
PredRooth+M	ok	* (ok)	ok	*	ok	ok
PredRooth-M	* (ok)	* (ok)	*	*	ok	ok

I found considerable variation in the judgments collected, both within and across the two languages. In English, there is a dialect in which 'nobody' is a problematic intervener for association with focus, but 'only' is not. There is a second dialect in which both 'nobody' and 'only' are problematic interveners. The German judgments reveal a dialect in which 'nobody' is not a harmful intervener, but 'only' is, and a second dialect in which both 'nobody' and 'only' are problematic interveners. It seems fair to say the following:

(i) Association across intervening operators is not freely possible. There are intervention effects for association with focus. A theory like Wold's in which anything ought to be possible does not seem to be on the right track.

(ii) Movement constraints do not play a role. Movement does not seem to be able to rescue bad cases of intervention, and movement constraints don't seem to block unproblematic cases of association. It looks as if focus never moves.

(iii) Rooth's theory without the option of movement, and agreeing with me on the role of 'nobody', makes good predictions for the two restrictive dialects. But the two liberal dialects are fairly mysterious.

(iv) The class of problematic interveners for association with focus seems to vary from one language/dialect to another.

Beyond these points, I hesitate to base definitive conclusions on the nature of association with focus and focus evaluation on the data I have collected. For one thing, a larger set of data ought to be tested than the ones I have looked at, where more interveners are considered as well as other focus sensitive items. For another, one ought to test similar data in a different experimental/contextual set-up to make sure there are no side effects from that.

At this point, I conclude that we have no theory of focus evaluation that completely covers the available data. It is possible that we have to revise the theory of the ~ operator that I have used, but it is unclear exactly how. One should also explore, alternatively, the possibility of leaving the theory of focus evaluation intact and finding a different explanation for the liberal dialects. In the case of association with 'also', one could consider association with Topic alternatives (suggested e.g. in Krifka (1998)). If that were plausible, the 'also' data would turn out to be a garden path for testing association with focus. I must leave the issue unresolved.

Importantly, for the present purposes, we do not want a theory of focus evaluation without the 'closure' effect of Rooth's ~ operator. And it is this 'closure' that my explanation of intervention effect relies upon.

5.2. Other Intervention Effects: NPIs, Alterative Questions

An obvious question regarding the theory of wh-intervention effects developed here is where else focusing and quantificational elements could lead to an intervention effect, besides wh-questions. Since it is the evaluation of focus that I have argued is to blame, we should examine other constructions in which an alternative semantics is used. Focus evaluation could plausibly interfere with that. I am aware of two likely candidates, other than association with focus itself, for such constructions that do indeed exhibit intervention effects: the licensing of negative polarity items, and alternative questions. I will discuss them in turn.

Linebarger (1987) shows that an operator intervening between a negative polarity item and its licenser leads to ungrammaticality. Relevant examples are given below. Linebarger proposes the constraint in (101) to capture such data.

(99) a. Mary didn't wear any earrings to every party.

b. * NOT >> every >> any

(100) I didn't give Joe/*most people a red cent.

(101) Immediate Scope Constraint (Linebarger (1987)):

A negative polarity item is acceptable in a sentence S if in the LF of S the subformula representing the NPI is in the immediate scope of the negation operator. An operator is in the immediate scope of NOT only if (i) it occurs in a proposition that is the entire scope of NOT, and (ii) within this proposition there are no logical elements intervening between it and NOT.

The effect is obviously strongly reminiscent of the wh-intervention effect, and it has been suggested in Beck (1996), Honcoop (1998), Kim (2002) and Guerzoni (in preparation) that it should be viewed as kin to intervention in questions. It goes beyond the scope of this paper to give a complete explanation of intervention effects in negative polarity licensing; see in particular Honcoop and Guerzoni (as well as Krifka (1995) and Chierchia (2001), discussed in Guerzoni) for such accounts. I will briefly argue (i) that NPI intervention effects do indeed look parallel to intervention in wh-questions, and (ii) that an extension of my theory in terms of focus interpretation is a plausible direction for an analysis.

Re (i), I will draw from Kim (2002) and Guerzoni (in preparation). Kim's (2002) argument is based on a crosslinguistic study of NPI intervention and its relationship to wh-intervention in the same languages. She observes that intervention effects in NPI-licensing are similarly widespread to intervention in wh-questions. Moreover, while the set of problematic interveners varies from one language to another, the same items that are problematic for wh-intervention are also problematic for NPI intervention in a given language. This suggests a close tie between the two phenomena. I exemplify this for German with the examples in (102)-(104), and refer the reader to Kim (2002) for more data.

(102) weil niemand fuer Otto einen Finger geruehrt hat.

because nobody for Otto a finger lifted has
'because nobody lifted a finger for Otto.'

(103) a. ?? weil niemand nur fuer Otto einen Finger geruehrt hat.
because nobody only for Otto a finger lifted has
b. weil nur fuer Otto niemand einen Finger geruehrt hat.
because only for Otto nobody a finger lifted has
'because nobody lifted a finger only for Otto.'

(104) a. weil niemand den Fritz je eingeladen hat.
because nobody the Fritz ever invited has
'because nobody ever invited Fritz.'
b. * weil niemand jeden je eingeladen hat.
because nobody everybody ever invited has
'because nobody ever invited everybody.'

Guerzoni (in preparation) investigates NPI intervention in English; she argues that the class of problematic interveners is the same as in wh-questions, and that the intervention effect arises under the same syntactic circumstances. To explain the latter, Guerzoni assumes the inventory of movement operations argued for in Pesetsky (2000), in particular feature movement and covert phrasal movement. The connection between an NPI and its licenser must be made by one of these two operations. Like in wh-questions, we find an intervention effect with NPIs just in case covert phrasal movement is impossible. Feature movement is thus blocked by an intervening operator. Diagnostics for covert phrasal movement, in this case, are (i) the possibility of ACD, and (ii) scope. The following three examples, from Guerzoni, illustrate her generalization.

(105) there-constructions:
a. There must be some student in the department.
Reading: must >> some
b. I didn't tell Mary that there was any food in the fridge.
c. * I didn't tell everybody that there was any food in the fridge.

(106) object of embedded clause:
a. John didn't say that Bill met every student Maria did.
Reading1: John didn't say that Bill met every student that Maria said he met.
John didn't [every student Maria did _][say that Bill met t1]

Reading2: John didn't say that Bill met every student that Maria met.

John didn't say that [[every student Maria did_][Bill met t1]]

b. John didn't say that Bill met any student.

c. The secretary didn't tell everybody that she called any student.

(107) subject of embedded clause:

a. * John didn't say that every student Maria did met Bill.

John didn't say that every student Maria said that met Bill, met Bill

John didn't [every student Maria did _][say that t1 met Bill]

b. John didn't say that any student met Bill.

c. * The secretary didn't tell everybody that anybody called.

Under (a) I give diagnostics for covert phrasal movement; they show that the object of an embedded clause can undergo this movement, while neither the associate in a there-construction nor the subject of an embedded clause can. In (b) I give an example for NPI licensing, which is ordinarily possible in all three conditions. In (c) I give an example with an intervener added between the NPI and its licenser. We see that only the object of an embedded clause permits an NPI despite the intervener. This NPI must undergo covert phrasal movement (and we accordingly predict it to take scope above the intervener).

It is obviously tempting to try to subsume Guerzoni's analysis of intervention under the framework developed here for wh-questions. In both cases, the mechanism of feature movement has been argued to be affected by an intervener. I have suggested to regard feature movement as the syntactic correlate of focus interpretation. Is it plausible that focus interpretation is involved in NPI licensing?

In very general terms, the answer is yes. The theories of Heim (1984) and Lahiri (1998) about strong NPIs, and the analysis of Krifka (1995) for both strong and weak NPIs, make crucial use of focus alternatives. Strong NPIs are argued to include a hidden element 'even' whose implicatures determine the environments in which the NPIs are licensed. It is generally assumed that the semantics of 'even' relies on focus alternatives. Weak NPIs have been argued by Krifka to give rise to scalar implicatures, again determining their licensing environments. Scalar implicatures are also calculated using focus alternatives.

Beyond general plausibility, the path becomes more thorny. Let's consider the example in (108). It illustrates NPI intervention by virtue of the fact that the reading described in (108b) is impossible.

(108) a. I didn't always buy ANYTHING.

b. # It is not the case that I always bought a thing.

c. * NOT >> always >> ANYTHING

Combining a Lahiri-style theory of strong NPIs with my assumptions leads to (109) as the prospective Logical Form of the relevant, ungrammatical reading of (108).

(109) [even_D [~D [NOT [always_{C1} [~C2 [I bought a $[\text{thing}]_{F1}$]]]]

The example looks quite parallel to a multiple focus case as discussed in section 5.1. Accordingly, the LF in (109) does not permit association of the focus on 'thing' with 'even', for the same reason as (78) above did not permit association with 'also': the lower ~ operator has already evaluated all foci in its scope. There is no focus left to associate with 'even'. This makes the presuppositions associated with 'even' unsatisfiable. Hence, under our current assumptions (108) is indeed predicted to be unacceptable on the reading in (108b).

I hasten to add many open questions remain for this story on NPI intervention. For example, we need to make sure that all NPI licensing involves focus evaluation, and that this has the desired consequences for intervention effects in NPI licensing (see Krifka (1995) on weak NPIs). Also, the empirical conditions for intervention with NPI licensing and intervention with association with focus are not the same. While Guerzoni observes that movement constraints are operative in NPI licensing, we saw above that those same movement constraints do not appear to concern association with focus. We need to ask ourselves why movement should affect wh-phrases and NPIs but not focus.

These open questions will have to await future research. I content myself with sketching how an analysis of NPI intervention should proceed that follows the spirit of my porposal. All NPIs should introduce focus alternatives and be evaluated by a focus sensitive operator (i.e. an operator binding distinguished variables and thereby creating alternative sets). An intervening ~ operator leads to a clash. This could be for two reasons: perhaps the case of NPI intervention is parallel to multiple focus, and the clash happens simply because all foci have already been evaluated. This would leave the upper evaluating operator without anything to evaluate. Alternatively, the clash could happen because of the specific semantics of the NPI, similar to the case of wh-questions. While the ordinary semantics of an NPI is not undefined, it is pathologically weak. Empirical differences between intervention with multiple focus and intervention with NPI licensing may derive from that. A proper analysis remains to be worked out.

A second potentially intervention sensitive construction are alternative questions. A well-formed example is given in (110a); the question is to be read as a choice between the answers 'Peter invited Maria' and 'Peter invited Susanne'. On this reading, (110b), where I added the element 'only', is unacceptable. A second parallel example in (111) illustrates the same effect: (111a), in which the intervener 'only' precedes the disjunction, is unacceptable (on the reading as an alternative question). The question is fine without the intervener, and with the disjunction moved past the intervener ((111b) and (111c)). (112) is the same example with the intervener 'nobody'.

(110) a. Hat Peter Maria$_F$ oder Susanne$_F$ eingeladen?
has Peter Maria or Susanne invited
'Did Peter invite Maria or Susanne?'
b. * Hat nur Peter Maria$_F$ oder Susanne$_F$ eingeladen?
has only Peter Maria or Susanne invited
'Did only Peter invite Maria or Susanne?'

(111) a. *War nur Peter gestern$_F$ oder heute$_F$ im Buero?
was only Peter yesterday or today in the office
'Was only Peter in the office today or yesterday?'
b. War Peter gestern$_F$ oder heute$_F$ im Buero?
was Peter yesterday or today in the office
'Was Peter in the office today or yesterday?'
c. War gestern$_F$ oder heute$_F$ nur der Peter im Buero?
was yesterday or today only Peter in the office
'Was only Peter in the office today or yesterday?'

(112) a. ?? War niemand gestern$_F$ oder heute$_F$ im Buero?
was nobody yesterday or today in the office
'Was nobody in the office today or yesterday?'
b. War gestern$_F$ oder heute$_F$ niemand im Buero?
was yesterday or today nobody in the office
'Was nobody in the office today or yesterday?'

The parallel to the wh-intervention effect is obvious. It is clear that alternative questions involve alternative sets, just like wh-questions. Once more, an intervening focus operator interferes with question formation. Beck & Kim (2004) provide a detailed discussion of intervention effects in alternative questions, building on the semantics and composition of alternative questions from Romero and Han (2003). Romero and Han suggest that alternative questions involve ellipsis, on the one hand - so the disjuncts are larger than it first appears -, and variable binding on the other: similar to the case of wh-questions, an operator at the CP level binds a wh-variable. That variable corresponds to a choice function semantically. The Logical Form of (110a) adapted to our framework might look as in (113) (where the ellipsis has been reconstructed, and the Q operator binds a distinguished variable wh_i ranging over choice functions of the appropriate type). See Romero and Han (2003) for a more detailed discussion of the syntax and semantics of alternative questions.

(113) Q_i [[Peter [wh_i [[Maria eingeladen hat] oder [Susanne eingeladen hat]]]]]]

Under these assumptions, the ungrammatical (110b) can be associated with the LF in (114). It is obvious that we have an intervention configuration in (114).

(114) Q_i [nur_C [~C [$Peter_F$ [wh_i [[Maria eingeladen hat] oder [Susanne eingeladen hat]]]]]]

Compare Beck & Kim (2004) for details and consequences. I suggest that alternative questions are another plausible candidate for intervention effects that arise due to conflicts in the interpretation of focus, and amenable to the analysis I have proposed.

6. Conclusions

6.1. Summary and Literature

I have developed an analysis of intervention effects that ties them to the evaluation of focus. Wh-phrases are interpreted via the same mechanism that also interprets focus. In the case of intervention effects, the semantic properties of wh-phrases interfere with focus evaluation. Focus evaluation unselectively applies to all foci and neutralizes their contribution, i.e. reduces their contribution to their unfocused semantics. Since wh-phrases do not have an 'unfocused' semantics, this leads to uninterpretability of the structure as a whole. Thus a wh-phrase may never have a focus sensitive operator other than the Q operator as its closest c-commmanding potential binder.

I propose this view of intervention effects as an alternative to previous accounts, which analyse them either as a violation of a movement constraint (Beck (1996), Hagstrom (1998), Kim (2002), among others), or as a consequence of restrictions on variable binding in general (Honcoop (1998)). I will discuss these two types of analysis in turn.

The basic idea of a movement analysis is that something prohibits the structure indicated in (M); that is, (under certain circumstances) movement of a wh-phrase may not cross an intervener.[10]

(M) [CP __ [... [Interv [... wh-phrase ...]]]]
↑________x__________|

It is irrelevant for our purposes what exactly the constraint on movement is. I think there are several reasons to be sceptical of this kind of explanation. First, we know that movement constraints (or, more generally, constraints on when a syntactic connection like the one above can be made) vary considerably from language to language. There is no reason to expect that the one that rules out (M) is universal. On the whole, the constraint is something that is stipulated rather superficially on top of a grammar that would actually permit a grammatical derivation of the intervention data. Now, as laid out in section 2, it seems likely that intervention effects per se are in fact universal. It would be desirable to derive their existence more profoundly from the structure of the grammar. The present proposal tries to do so on the basis of the specific semantic contribution of wh-phrases, in interaction with what we know about focus evaluation.
Secondly, recent years have brought to light a number of arguments against moving wh-phrases in situ, as well as ways of interpreting them in their surface position (see in particular Reinhart (1992)). This should make us cautious of designing an analysis of intervention effects that crucially relies on such movement.
Then, there are, for English wh-questions in particular, the arguments by Pesetsky (2000) that the wh-phrases that are sensitive to intervention are just the ones of which we would like to say that they do NOT move. The connection between superiority and intervention discovered by Pesetsky argues against a movement analysis of intervention.
These would be good reasons to look for a theory of intervention effects that does not rely on movement. Conversely, let's think about what an explanation in terms of alternative semantics buys us, compared to a movement analysis. The focus-related analysis leads to different expectations regarding where intervention effects should surface. Now, we expect them to (potentially) show up when semantics makes use of alternatives. The data on NPI licensing and

[10]The analyses I subsume under movement accounts differ from each other and deviate from the concrete picture in (M) in ways I will not address. In Kim's (2002) proposal the syntactic connection between the wh-phrase and the "landing site" could be, but doesn't have to be, made by movement. For Hagstrom (1998) it is not the wh-phrase that moves but an abstract Q morpheme/operator (which, however, originates from the vicinity of the wh-phrase). My comments as they are phrased below apply to movement accounts such as the one proposed in Beck (1996), although the more general considerations are relevant for other syntactic accounts as well.
I do not include Pesetsky (2000) under the movement accounts I comment on here, because I propose to give a reconstruction of his notion of feature movement - not to argue against it. Pesetsky's analysis does not actually provide an explanation for why interveners block feature movement. He refers to Honcoop (1998) for a semantic explanation. I comment on Honcoops analysis below. I think for Pesetsky's purposes, the reference to Honcoop could be replaced by a reference to the present proposal without problem.

alternative questions, as well as the findings in section 5.1 about multiple focus, make this look like a good prediction. Note that a movement analysis is not plausible for intervention in NPI licensing. If we said that (115) is bad because the NPI obligatorily moves (i.e. undergoes covert phrasal movement) to its licenser, we would wrongly predict that (116a) doesn't have the reading in (116b).

(115) * I didn't give most people a red cent.

(116) a. Peter didn't need to eat any cherries.
b. NOT >> need >> any

Similarly, a movement analysis is not attractive for intervention with multiple focus, because it would make us posit a movement analysis of focus in cases that violate island constraints.
There is also the reverse type of case in which a movement analysis leads us to expect an intervention effect, but alternatives don't seem to play a role. Scope rigidity is such a case. Heck and Sauerland (2003) observe that a movement analysis can capture the lack of an inversely linked reading in (117), while a focus analysis has no way of doing so.

(117)	Kein	Produkt	aus	jedem	EU-Land	verkauft	sich	gut.
	No	product	from	every	EC country	sells	Refl.	well
	No product from every EC-country sells well.							[from Beck (1996)]

I concur with Heck and Sauerland that we lose the connection between intervention and scope rigidity by giving up a movement analysis. However, I believe that this is the right move, in view of the fact that English, for example, does not have scope rigidity, but it does show intervention effects, as Pesetsky has shown us. In sum, I have come to the conclusion that the bigger picture fits an alternative semantic analysis of intervention better than a movement analysis.

A competitor of the movement analysis of intervention effects has been Honcoop (1998), who argues that intervention effects are the consequence of general constraints on the binding of variables, as they are reflected in particular by the possibility of anaphora. Under this view, the intervention effect caused by negation, for example, would be linked to the fact that negation also blocks an anaphoric connection in (118).

(118) # There wasn't a man in the garden. He was smoking.

Honcoop suggests that weak islands, as well as intervention effects, are caused by intervening operators that create inaccessible domains for anaphora - more technically: interveners in his sense are operators across which variable binding is prohibited.
First it should be noted that there is some similarity between Honcoop's suggestion and my present proposal, in that binding of a certain variable is blocked by an intervener. The main difference I see is that my proposal applies in an empirically overlapping, but ultimately rather different domain. On my account, binding is affected of those variables that are used in the construction of alternative sets: wh-phrases, focused phrases, NPIs. This happens at the level of focus semantic values. On Honcoop's account, it is the binding of ordinary variables that is affected, in the calculation of ordinary semantic values. The two proposals "overlap" where a given variable could be taken to be either an ordinary or a distinguished variable, as e.g. in the case of wh-phrases. But let's look at the empirical consequences of this difference.
There is a large set of data that fall under Honcoop's analysis but not mine. This specifically includes weak islands and anaphora. Honcoop claims that problematic interveners are just those elements that block anaphora. I think that the crosslinguistic picture makes such a general claim unsustainable. Recall that there is variation between languages with respect to what is a problematic intervener. In Thai, negation is not an intervener in (119), but of course, the Thai version (120) no more permits anaphora than English (118). Korean (121) vs. (122) makes a similar point.

(119) Thai (Ruangjaroon (2002)):

Nít	mây	síi	?aray
Nit	not	buy	what

What didn't Nit buy?

(120)

#	mây	mee	phuuchay	yuu	nay	su:an.	khao	su:p	buri:
	Neg	have	man	be	in	garden	he	smoke	cigarette

\# There isn't a man in the garden. He is smoking.

(121) Korean (Beck & Kim (1997)):

Minsu-nûn	chachu	nuku-lûl	p'ati-e	teliko ka-ss-ni?
Minsu-Top	often	who-Acc	party-Dir	take-Past-Q

'Who did Minsu often take to the party?'

(122)

#	wuli-nun	chachu	oypwu	yensa-lul	chotayha-n-ta.
	we-Top	often	outside	speaker-Acc	einladen-Pres-Decl
	ku-nun	tokilin-i-ta.			

		he-Top	German-be-Decl				
	#	We often invite an outside speaker. He is German.					

Quite generally, I would be exceedingly surprised if anaphoric possibilities across languages mirrored wh-intervention effects. While I have not collected extensive crosslinguistic data, I would conjecture that anaphoric accessibility is fairly stable. On the other hand, we know that there is considerable variation with both weak islands and intervention effects. I do not think that Honcoop's analogy can be maintained.

Moreover, I believe that it is necessary to make a distinction between weak islands and intervention effects. Recall the contrast below from section 2:

(123)	a. *	Was	glaubt	niemand	wen	Karl	gesehen	hat?
		what	believes	nobody	whom	Karl	seen	has
		'Who does nobody believe that Karl saw?'						
	b. %	Wen	glaubt	niemand	daß	Karl	gesehen	hat?
		whom	believes	niemand	that	Karl	seen	has
		'Who does nobody believe that Karl saw?'						

Overt wh-movement is possible in cases where an intervention effect arises. Hence we cannot use one and the same mechanism (constraints on variable binding) to exclude both. See also Beck (1996, chapter 4) for discussion.

Conversely, there are two kinds of data that fall more naturally under my proposal than Honcoop's: intervention effects with multiple focus and NPI licensing. Honcoop does provide an analysis of NPI licensing within his framework, but it is somewhat roundabout, as he acknowledges. And while an analysis of focus is possible in which there is binding of ordinary variables, this is not the standard assumption.

I conclude that there are empirical reasons to favour an analysis in terms of focus semantics.

6.2. Consequences

The theory of intervention effects I have proposed identifies a set of constructions in natural language as 'focus related' in that they all employ a particular interpretational mechanism: the one that constructs alternatives. The proposal is that not only do all these constructions involve the same semantic object - alternative sets -, but that that semantic object is derived by the grammar in the same way as well. I have chosen distinguished variables for that mechanism. Thus wh-phrases, focused phrases and NPIs all correspond to distinguished variables. Alternative formation is binding of those variables. The choice of variable binding for this purpose is guided by the fact that we need an evaluation of these expressions that is to some extent selective (compare section 5.1. on Baker ambiguities and focus inside a question); thus the mechanism of alternative formation in Rooth (1985) would not work.

In addition to the obvious semantic support for a uniform analysis, there is some morphological support for making this connection between wh-phrases, NPIs and focus. In Malayalam, Mandarin and Japanese, NPIs like 'anyone' are literally 'who also':

(124) a. Malayalam:
aar-um = anyone
who-also

b. Mandarin:
shei ye = anyone
who also

c. Japanese:
dare-mo =anyone
who-also/even

We expect this tie since the semantic function of 'who' is the same in a wh-phrase and an NPI. Such morphology should be recurring crosslinguistically, which seems correct. A further expectation is that other contexts in which this morphology shows up should also involve an alternative semantics. The work of Shimoyama (2001) and Kratzer and Shimoyama (2002) explores this connection. They examine in particular Japanese wh-pronouns in *mo*- and *ka*-constructions (as well as a German free choice indefinite) and provide an analysis in terms of alternative semantics. *Mo* and *ka* are operators evaluating the contribution of the alternatives. Among other things, this semantics explains intervention effects such as the following:

(125) * [... [... wh_i ... mo/ka_j] ...]-mo/ka_i

A wh-pronoun must associate with the closest potential binder. This effect is thus another example of an intervention effect in a focus related construction. Kratzer and Shimoyama's work converges with my suggestions.[11]

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[11]Although it should be pointed out that their technical implementation, strictly Roothian, is not compatible with mine. This stems from the fact that they concentrate on a different empirical domain. In the *mo*- and *ka*-constructions, focus sensitive operators invariably cause an intervention effect. This is not generally the case. Accordingly, Kratzer and Shimoyama do not extend their analysis to standard wh-intervention effects. They propose to adopt Pesetsky's analysis in terms of feature movement for those data, where feature movement is blocked by an intervener, for reasons unknown. My proposal is to find a semantic source for the blocking of feature movement, and to trace the Japanese data and the standard wh-intervention effects both to that source. I think this is in the spirit of their work, even though we make different specific claims here.

My proposal raises further questions. The most important empirical question concerns multiple foci. It needs to be clarified to what extent focus association is possible across intervening operators, and why there is variation w.r.t. to which intervener is harmful. Only then can we decide whether the semantics of the focus evaluation needs to be revised, and if so how. This is a theoretical question concerning the evaluation of focus, here done by the ~ operator. There is also the claim implied by my analysis that the grammar may require the presence of a ~ in certain domains (the scope of quantifiers) without any apparent semantic necessity for this (i.e. there is no association with focus). Finally I find it puzzling that focus may not move. I see no reason for this. I can only hope that it will turn out to be a virtue of the present proposal that it raises these questions, and that it may lead to a better understanding of how the grammar of natural language constructs and uses alternative sets.

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Appendix: the Survey

The sentences I report judgements for in the table in (98) are the B-sentences of the first six dialogues for English and the next six dialogues for German. The bracketed material is the overall context for the examples, which I also gave to the native speakers I consulted.

[Sally, Maria, Bill, A and B are all training to become spies. It is very important in a spy network that personal contact between spies is controlled. If you meet another spy in person, for example, you are establishing a connection that may give away the whole network. That's what the fuss below is about.]

(Neg) A: You told nobody that Maria met Sally.
B: No - I only told nobody that Maria met BILL.

(NegIs) A. You told nobody that Sally met Bill.
B: No - I only told nobody that MARIA met Bill.

(only) A: You only told THE BOSS thst Maria met Sally
B: Right. I also only told the boss that Maria met BILL.

(onlyIs) A: You only told THE BOSS that Sally met Bill.
B: Right. I also only told the boss that MARIA met Bill.

(T) A: You told the boss that Maria met Sally.
B: No - I only told the boss that Maria met BILL.

(TIs) A: You told the boss that Sally met Bill.
B: No - I only told the boss that MARIA met Bill.

[A and B are talking about the annual company excursion ('Betriebsausflug') of their company, which took place a few days ago. By now photos are circulating that have created a certain amount of discussion.]

(Neg) A: Du hast also keine Photos auf Karls Schreibtisch gelegt.
So you didn't put any photos on Karl's desk.
B: Das stimmt nicht. Ich hab nur keine Photos auf die REZEPTION gelegt.
That's not true. I only didn't put any photos on the reception desk.

(NegIs) A: Du hast also niemandem ein Bild gezeigt, in dem der Karl nackt ist.
So you didn't show anybody a picture on which Karl is naked.
B: Nee - ich hab nur niemandem ein Bild gezeigt, in dem der CHEF nackt ist.
No - I only didn't show anybody a picture on which the boss is naked.

(only) A: Du hast also gestern nur 2 Abzuege auf Karls Schreibtisch gelegt.
So you only put 2 prints on Karl's desk yesterday.
B: Stimmt. Ich hab sogar gestern nur 2 Abzuege auf die REZEPTION

gelegt.
Right. I even only put 2 prints on the reception desk yesterday.

(onlyIs) A: Du hast also nur dem Otto ein Bild gezeigt, in dem der Chef nackt ist.
So you only showed Otto a picture on which the boss is naked.
B: Stimmt. Ich hab sogar nur dem Otto ein Bild gezeigt, in dem der KARL nackt ist.
Right. I even only showed Otto a picture on which Karl is naked.

(T) A: Hast Du Photos auf Karls Schreibtisch gelegt?
Did you put photos on Karl's desk?
B: Nein. Ich hab nur Photos auf die REZEPTION gelegt.
No. I only put photos on the reception desk.

(TIs) A: Du hast also dem Otto ein Bild gezeigt, in dem der Chef nackt ist.
So you showed Otto a picture on which the boss is naked.
B: Nee - ich hab dem Otto nur ein Bild gezeigt, in dem der KARL nackt ist.
No - I only showed Otto a picture on which Karl is naked.

A few comments on the choice of the examples: I tested intervening negation because that is a fairly solid and reliable intervener for English and German wh-constructions. I used association with 'only' for this case, which seems the most canonical example of association with focus. I tested intervening 'only' for association with 'also' in English because those are the data reported in the literature on multiple focus. I changed to German 'sogar' ('even') in this condition because German 'auch' ('also') is known to be able to so strange things.
The syntax of the English examples is taken directly from Guerzoni (in preparation), who uses those same data in NPI-intervention. Recall the tests from section 5 that show that the subject position of an embedded clause is an island for covert phrasal movement (of the relevant kind - we used to call it QR), while the object position is not an island. These particular island- vs. non-island-configurations differ minimally and have exactly the same complexity, so I judged them to be an interesting test case - especially in view of Guerzoni's data.
The German constructions were chosen to make sure that we really have a non-island-configuration for covert phrasal movement vs. an island configuration. The example in (126) naturally permits inverse scope, and relative clauses are pretty solid scope islands.

(126)	Ich	habe	eine	Karte	auf	jeden	Tisch	gelegt.
	I	have	a	menu	on	every	table	put

I have put a menu on every table.

The English and the German test items thus differ in several important ways. A lot of empirical work remains to be done.

My informants were asked to judge the examples on a scale ranging from 1 (perfect) to 4 (completely horrible). I report the 'raw' results below. It is not clear how G10 fits in; other than that, I think the simplified table in the main text captures the relevant findings.

	negation	negation, Is	only	only Is	T	T Is
E1	4	4	1	1	1	1
E2	3-4	3-4	1	1	1	1
E3	4	4	1	1	1	1
E4	2	2	1	1	1	1
E5	2	3	3	3	1	1
E6	3	3	4	4	1	1
E7	3	3	2	2	1	1
G1	1	1	3	3	1	1
G2	1	1	4	3	1	1
G3	1	1	3	2	1	1
G4	1	1	4	3	1	1
G5	1	1	3	1?	1	1
G6	3	1	4	4	3	1
G7	2	2	3	4	1	1
G8	3	3	4	4	2	1
G9	1-2	2	3	3	1	1
G10	4	4	1-2	1	1	1
PredWold	1	1	1	1	1	1
PredRooth+M	1	4 (1)	1	4	1	1
PredRooth-M	4(1)	4 (1)	4	4	1	1

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