

A SEMANTIC EXPLANATION FOR INTERVENTION EFFECTS

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Abstract

This paper proposes a semantic analysis of intervention effects in wh-constructions. Wh-phrases are assumed to use the same interpretive mechanism as focus. Similar to a focus sensitive operator evaluating the contribution of focus, a question operator evaluates the contribution of a wh-phrase. An intervening focus sensitive operator interferes with this evaluation and renders the structure uninterpretable. Crosslinguistic variation in the appearance of intervention effects arises due to variation in the Logical Form of questions and of focus evaluation.

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. ?? koi nahiiN kyaa paRhaa (Hindi)
anyonenot 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 uninterpretability 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 also show intervention effects.

¹There 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.

The structure of the paper is as follows. Section 2 builds the empirical picture, leading to a characterisation of the universal as well as (some of) 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, specifically under what syntactic circumstances an intervention effect arises. Section 5 is devoted to the question of what a problematic intervener is. 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 some parameters of variation. I lay out the strategy pursued in the paper for dealing with these facts.

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. There will be more discussion of the nature of interveners below.

²The 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 especially grateful to Sei-Rang Oh for helping me to clarify this point.

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 (5a).

- (5) 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 (5a), 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 (5b). Finally, it is once more the structural relation between the quantifier and the wh-phrase that determines acceptability: in the well-formed (5c), 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 (6).

- (6) 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?'

(6a) 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 (6a), the intervener 'nobody' makes the sentence ungrammatical, as witnessed by the acceptable (6b). In (6c), the wh-phrase has moved past the intervener. In those dialects of German that accept movement of this kind, there is a contrast between (6a) and (6c) in that (6c) is acceptable in an appropriate context while (6a) is bad. The point of (6a) is that 'wen' is not in situ. It has moved to the SpecCP of the embedded clause. Still, the intervention effect in (6) is quite parallel to (5). I will therefore adopt (7) (closely following Kim (2002)) as a more appropriate generalisation:

- (7) 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 (8). 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 (8) that we are interested in is thus (9) - the intervention effect.

- (8) [C [... [A [... B ...]]]]
 (9) * [Qi [... [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.

- (10) Hindi (Beck (1996)):
 a. ?? koi nahiiN kyaa paRhaa
 anyonenot what read-Perf.M
 b. kyaa koi nahiiN paRhaa
 what anyonenot read-Perf.M
 ‘What did no one read?’
- (11) 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?’
- (12) 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?
- (13) 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?
- (14) 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 ((15a)), but not after an intervener ((15b)):

- (15) 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]

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

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

- (17) 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 (6) above.

- (18) Passamaquaddy (Bruening and Lin (2001)):
- * 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?

- (19) Thai (Ruangjaroon (2002)):
- * mâymiikhray chôop ?àan nangsii lêmnyay
 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, and (ii) the set of problematic interveners. I discuss them in turn.

Pesetsky (2000) observes that intervention effects exist in English, contrary to first 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. (20).

- (20) 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 (21a). Now, instead of the structurally higher *wh*-phrase, overtly front the structurally lower *wh*-phrase, as in (21b). Normally, this by itself would make the example ungrammatical; compare the contrast in (22a) vs. (22b): 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 (21c), the example becomes unacceptable. Thus, *wh*-phrases in situ that successfully defy superiority are sensitive to intervention effects.

- (21) 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]
- (22) 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.

Moving on to (ii): variation regarding the set of problematic interveners, compare (23) and (24):

- (23) 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?'
- (24) German:³
 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 (25) vs. (26): 'not' is an intervener in many languages, but apparently not in Thai (Ruangjaroon (2002)).

- (25) Thai (Ruangjaroon (2002)):
 Nít mây sí ?aray
 Nit not buy what
 What didn't Nit buy?
- (26) a. Which diplomat should I discuss which issue with _ ?
 a. ?? Which diplomat should I not discuss which issue with _ ? [Pesetsky]

3I 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 5 discusses this variation.

In sum, 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 (27),(28):

- (27) $*[Q_i [\dots [FocP [\dots wh\text{-phrase}_j \dots]]]]$ (Kim (2002))
 (28) A focused phrase (e.g. only+NP) may not intervene between a wh-phrase and its licensing complementizer.

Note that the structure in (27) 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. The topic of sections 4 and 5 are the other data introduced above: the frequent lack of intervention effects in English, and the additional quantifier interveners in English, German etc.

3 Focus Interpretation

Subsection 3.1. motivates the 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 (29), 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 (30a). Alternatively, I will talk about this proposition informally as in (30b).

- (29) [John]_F left.
 (30) a. $\lambda w. \text{John left in } w$
 b. that John left

Besides this proposition, the ordinary semantic value of (29), the sentence makes salient a set of alternative propositions - for example the set in (31a), which contains alternative propositions to the proposition that John left. This is the focus semantic value of the sentence, rendered more generally in (31b), and in the form of a (semi-) logical expression in (31c).

- (31) a. {that John left, that Bill left, that Amelie left,...}
 b. {that x left | x is an individual}
 c. $\lambda p \exists x [p = \lambda w. x \text{ left in } w]$

Turning now to the interrogative in (32), 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 (33a). More generally, this is the set of propositions in (33b) (rendered in more formal terms in (33c)).

- (32) Who left?
- (33) 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 (29) is the same as the ordinary meaning of the question in (32). Questions, 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 (34), 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.

- (34) [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 [ϕ ... 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 \sim 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 (1992) theory of focus. 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 constituent 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 and h can be partial.

- (36) a. $[[\text{John}_{F1}]]^g = \text{john}$ b. $[[\text{John}_{F1}]]^{g,h} = h(1)$ ⁴
(37) a. $[[\text{John}]]^g = \text{john}$ b. $[[\text{John}]]^{g,h} = \text{john}$
(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 \sim and the question operator. We begin with the \sim 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 \sim and (43) the semantics of 'only'.

- (41) a. Only John left.
b. $[\text{only } C [\sim C [\text{John}_{F1} \text{ left}]]]$
- (42) If $X=[\sim C Y]$ 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 $p \in \alpha$, $p \in \beta$.

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

⁴More precisely: $[[\text{John}_{F1}]]^{g,h} = h(1)$ if $1 \in \text{dom}(h)$, =john otherwise. The more precise version is relevant for data like "I only wondered who JOHN invited", which I will not discuss in this paper.

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

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

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. $[[\text{who}_1]]^g, h = h(1)$ ⁵
- (47) a. $[[\text{who}_1 \text{ left}]]^g$ is undefined
 b. $[[\text{who}_1 \text{ left}]]^g, h = \lambda w. h(1) \text{ left in } w$

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 $[[X]]^g = \lambda p \exists x [p = [[Y]]^g, \{ \{ x/i \}]]$
 and $[[X]]^g, h = \lambda p \exists x [p = [[Y]]^g, h [x/i]]$

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

- (51) If $X = [Q_{i_1, \dots, i_n} Y]$ then $[[X]]^g = \lambda p \exists x_1 \dots x_n [p = [[Y]]^g, \{ \{ x_k/i_k \}]]$
 and $[[X]]^g, h = \lambda p \exists x_1 \dots x_n [p = [[Y]]^g, h [x_k/i_k]]$

We will say that a structure is uninterpretable if it does not have a well-defined ordinary semantic value.

⁵More precisely: $[[\text{who}_1]]^g, h = h(1)$ if $1 \in \text{dom}(h)$, undefined otherwise. The more precise version is relevant for the multiple question reading of Baker sentences like "Who knows where we bought which book?", which I will not discuss in this paper.

3.3 Deriving Intervention Effects

We are now in a position to explain intervention effects. I will consider (52a), a prototype of an intervention effect. The relevant LF is (52b), in which the Q operator is associated with the wh-phrase, John_F wants to associate with *only* via the \sim operator, and the Q operator takes scope over *only*.

- (52) a. * Only JOHN saw who?
 b. [CP Q2 [IP3 onlyC [IP2 \sim C [IP1 John_F1 saw who₂]]]]]

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 \sim operator) will lead to uninterpretability despite a c-commanding Q operator, because the \sim operator makes use of both the ordinary interpretation and the focus semantic interpretation. The Q operator is the only binder for distinguished variables that uses just the focus semantic interpretation. We thus exclude structures like (53b). This is very close to the generalization advanced by Kim that we are trying to capture.

- (53) a. *[Q_i [... [FocP [... wh-phrase_i ...]]]] (Kim (2002))
 b. *[Q_i [... [\sim C [... wh-phrase_i ...]]]]

- (54) Generalization: A wh-phrase may not have a \sim 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. Further predictions are examined in the next sections.

4 Movement Issues

We know from section 2 that the way intervention effects manifest themselves varies from one language to another. We will first address the role of overt movement. Then we look at crosslinguistic variation that can be reduced to the inventory of movement operations that a language has.

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 Q3 [Y wen3 [1 [X nurC [~C [[der Dirk]F2 t1 gesehen hat]]]]]
who only the Dirk seen has
- c. $[[Z]]^g = \lambda p \exists x [p = [[Y]]^g, \{x/3\}]$
 $= \lambda p \exists x [p = [[[1[X]]]^g, \{x/3\}] ([[wen3]]^g, \{x/3\})]$
 $= \lambda p \exists x [p = [\lambda z. [[X]]^g [z/1], \{x/3\}](x)]$
 $[[X]]^g [z/1], \{x/3\} = [[only]](g(C))([\lambda w. Dirk \text{ saw } z \text{ in } w])$
 if $g(C) \subseteq \{[[[Dirk]_{F1} \text{ hat } t1 \text{ gesehen}]]^g [z/1], h' : h' \in H\}$
 i.e. $g(C) \subseteq \{[\lambda w. y \text{ saw } z \text{ in } w] : y \in D\}$
 $[[Z]]^g = \{\text{that only Dirk saw } x \mid x \text{ an individual}\}$

The calculation will proceed in a parallel way for other examples with overt movement of a wh-phrase (e.g. scrambling). 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 [X nurC [~C [[der Dirk]F2 wo4 t1 gesehen hat]]]]]
who only the Dirk where seen has
- c. $[[X]]^g$ and $[[X]]^g, h$ are undefined $\implies [[Z]]^g$ is undefined.

These facts indicate that a wh-phrase is interpreted in its moved position - here: where it shows up overtly.

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, and that intervention effects only show up in otherwise permissible superiority violations like (57) (as observed by Pesetsky (2000)).

- (57) 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 pursue 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 (58a) 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 (58b). The in-situ wh-phrase has moved covertly. Consequently, adding an intervener as in (59a) is harmless: the structure we interpret does not include an intervention configuration. The crucial category **X** has a well-defined interpretation.

- (58) a. Who did John introduce to whom?
 b. [Q_{1,2} [who₁ [4 [whom₂ [5 [did [John introduce t₄ to t₅]]]]]]]
- (59) a. Who did only John introduce to whom?
 b. [Z Q_{1,2} [who₁ [4[whom₂ [5[did [**X** only_C [~C[John_{F3} introduce t₄ to t₅]]]]]]]]
 c. [[X]]_g=[[X]]_{g,h}= [[only]](g(C))(λw. John intro. g(4) to g(5))
 [[Z]]_{g,h} = { that only John introduced x to y | x, y individuals }

Matters are different in (60), 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 (60b). While things work out fine in this example, addition of an intervener as in (61a) now leads to ungrammaticality, since we find the familiar intervention configuration in (61b).

- (60) 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]]]]]]]
- (61) a. ?? Which boy did only Mary introduce which girl to _?
 b. [Z Q_{1,2}[[[which boy]₁ [4[did [**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.

5 Focus Issues

5.1 Variable Intervenors

We observed in section 2 that the set of problematic intervenors 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 \sim operator. In Rooth's (1992) theory, which I have followed, the \sim 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 \sim operator and whatever operator is supposed to associate with focus. If we can argue that there is a \sim operator present in structures with quantifiers, then we expect an intervention effect to arise. A \sim 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.

- (62) a. Mary always takes John to the MOVIES. [Rooth]
 \approx If Mary takes John anywhere, she takes him to the movies.
 b. Mary always takes JOHN to the movies.
 \approx If Mary takes anyone to the movies, she takes John to the movies.
- (63) Most ships passed through the lock at NIGHT. [Krifka]
 \approx Most ships that passed through the lock passed through the lock at night.

The structures for (62) are given in (64).

- (64) a. $[\text{always} \cup C [\sim C [\text{Mary takes John to } [\text{the movies}] F_1]]]$
 b. $[\text{always} \cup C [\sim C [\text{Mary takes } [\text{John}] F_1 \text{ to the movies}]]]$

Assuming the simplified interpretation of *always* given in (65), it is easy to see that (66) will lead to the appropriate interpretations of (64a,b) depending on the value of the focus anaphor C .

- (65) $[[\text{always}]] (p)(q)(w)=1$ iff for all s such that $s \leq w$ & $p(s)=1$, $q(s)=1$
 (66) $[[\text{always}]] (g(\cup C))(\lambda w. \text{john takes mary to the movies in } w)$

Thus it seems clear that a \sim 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 \sim operator present in quantified structures in languages in which those quantifiers cause an intervention effect.

At first, this seems problematic. It has been observed (Buring (1996), Beaver and Clark (2002)) that quantifiers do not necessarily associate with focus. A relevant example is given in below. Lack of association in (67a) excludes the structure in (67b).

- (67) a. Mary always managed to complete [her exams]_F [Beaver & Clark]
 b. [always_{∪C} [~C [Mary managed to complete [her exams]_{F1}]]]

Note, however, that nothing precludes the structure in (68), 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. (This could be viewed as an argument for the indirect approach to association with focus represented by Rooth's ~.)

- (68) [always_{C1} [~C₂ [Mary managed to complete [her exams]_{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 (69a) to be impossible on the interpretation in (69b), where I may have lent other things besides Harry Potter to students, but the only thing I lent EVERYONE is Harry Potter.

- (69) a. I only lent every student HARRY POTTER.
 b. Harry Potter is the only thing that I lent every student.

- (70) [only_{C1} [~C₁ [[every_{C2} student] [~C₃ [5[I lent t₅ [Harry Potter]_{F1}]]]]]]]

Under our current assumptions, (69) is associated with the Logical Form in (70). 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 (69b) is impossible - so far, so good.

However, it is claimed in the literature (e.g. Krifka (1991), 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 (71b).

- (71) 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, (71b) would be associated with the Logical Form in (72).

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

(72) runs into the same problem as (70) above: association should be impossible. This means that what we have just said about (69) can't be the whole story. I will come back to the issue of multiple focus, and to possible analyses of (71), in section 5.2. As far as our empirical predictions are concerned, a more realistic expectation is (73).

- (73) 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 \sim 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.

5.2 Multiple Focus

We are already in the process of examining a second 'intervention' constellation structurally parallel to the wh-intervention effect (74a) - multiple focus in (74b). If multiple focus were empirically parallel, the association depicted in (74b) should be impossible.

- | | | | | |
|------|----|---|---|----------------------|
| (74) | a. | * | [Q_i ... [$\sim C$ [... wh_i ...]] ...] | Intervention effects |
| | d. | | [$\sim_i D$...[$\sim_j C$ [... F_j ... F_i ...]] ...] | Multiple Focus |

We have already seen that the LF in (72) does not allow us to capture that reading of (69), since the \sim under 'only' already evaluates the focus on 'Bob', and leaves nothing for 'also' to associate with.

Such examples have received much attention in the literature. Let us briefly review the discussion. Rooth (1996) considers the alternative LF in (75) 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 (75) as a possible LF of (69), and we do after all derive the relevant reading (so Rooth argues). Note that the suggestion mirrors what happens in English multiple questions without intervention effects.

- (75) [alsoC [$\sim C$ [[Bob Kennedy] F_1 [3[onlyD [$\sim D$ [I introduced Marilyn F_2 to t $_3$]]]]]]]

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 (76), where the focus is embedded inside a relative clause (an island for movement).

- (76) 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.

Wold (1996), on the other hand, is led to the suggestion that the \sim 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 \sim operator itself bears an index, and evaluates only the contribution of coindexed foci. A representation of (69) would then look as in (77).

- (77) [alsoC [$\sim_1 C$ [onlyD [$\sim_2 D$ [I introduced Marilyn F_2 to [Bob Kennedy] F_1]]]]]]]

I will not provide a detailed semantics for (77). See Wold (1996). Suffice it to say that the indexed \sim 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 Stechow (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 (78;B2). This is not what we expect under either Rooth's movement theory or Wold's theory.

- (78) 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 (79) 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 5.1., where association across a universal quantifier was similarly impossible.

- (79) # 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 \sim operator. The derivation of the intervention effect in section 3 relies on the fact that the \sim operator evaluates the contribution of all foci in its syntactic scope, and neutralizes their contribution. A selective version of the \sim 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 \sim 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 \sim operator (the unbracketed judgment) or not (the judgment in brackets).

(80)	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 \sim 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 \sim operator. And it is this 'closure' that my explanation of intervention effect relies upon.

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-commanding 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, movement of a wh-phrase may not (under certain circumstances) cross an intervener.⁶

(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

⁶The 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 does not actually say 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.

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 multiple focus make this look like a good prediction. Additional motivation comes from intervention effects in NPI licensing and from alternative questions, both of which very likely involve the construction of alternative sets. An example for a plausible intervention effect in alternative questions is given in (81).

- (81) 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?'

NPI intervention is exemplified in (82) (data discovered by Linebarger (1987)).

- (82) a. Mary didn't wear any earrings to every party.
 * NOT >> every >> any
 b. I didn't give Joe/*most people a red cent.

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 an 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.

Note that a movement analysis is not plausible for intervention in NPI licensing. If we said that (82b) is bad because the NPI obligatorily moves (i.e. undergoes covert phrasal movement) to its licenser, we would wrongly predict that (83a) doesn't have the reading in (83b).

- (83) 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 (84), while a focus analysis has no way of doing so.

- (84) 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. 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 (85).

(85) #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, probably 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 (86), but of course, the Thai version (87) no more permits anaphora than English (85). Korean (88) vs. (89) makes a similar point.

(86) Thai (Ruangjaroon (2002)):

Nít mây síi ?aray
Nit not buy what
What didn't Nit buy?

(87) # 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.

(88) 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?'

- (89) # wuli-nun chachu oypwu yensa-lul chotayha-n-ta.
 we-Top often outsiderspeaker-Acc invite-Pres-Decl
 ku-nun tokilin-i-ta.
 he-TopGerman-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 for example the contrast between (6a) and (6c) from section 2. 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 (for example, a focus inside a question is not affected by the Q operator); 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 Japanese, NPIs like 'anyone' are literally 'who also':

- (90) 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 (compare also Kim (2002)). 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:

(91) * [... [... wh_i ... mo/kaj] ...]-mo/kaj

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.⁷

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 (80) 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.

⁷Although it should be pointed out that their technical implementation, strictly Roothian, is not compatible with mine. This stems from the fact that they have a different empirical focus. 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.

- (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 do strange things.

The syntax of the English examples is taken directly from Guerzoni (in preparation), who uses those same data in NPI-intervention. Her tests 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 (92) naturally permits inverse scope, and relative clauses are pretty solid scope islands.

- (92) 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.

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