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Exhaustifying Focus Intervention Effects: A Crosslinguistic Study

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1 Introduction

This paper describes, from a crosslinguistic perspective, the empirical pattern of focus phrases interacting with *wh*-in-situ arguments in their scope, and provides a preliminary theoretical analysis of the pattern. It has been observed in the literature (e.g., Beck 1996, Pesetsky 2000) that an in-situ *wh*-phrase cannot be separated from its operator by a quantificational phrase or a focus phrase. Violation of this constraint would give rise to the so-called intervention effects. In the minimal pair in (1), the quantificational phrase *jede Aufgabe* in the ungrammatical (a) sentence blocks *wann* in a lower position from linking with its covert operator at the sentence-top level. No such blocking exists in the grammatical (b) sentence.

(1) a. *Wer hat jede Aufgabe wann gelöst? (German)
who has every problem when solved
b. Wer hat wann jede Aufgabe gelöst?
who has when every problem solved
'Who solved every problem when?' (Beck 1996)

The phenomenon of intervention effects (IE) is by no means a uniform one, especially when seen from a crosslinguistic perspective. This claim can be verified from several different angles. First, *wh*-arguments and *wh*-adjuncts in a language may have distinguished behaviors with respect to whether they are subject to IE (Soh 2005, Yoon 2011). Second, a *wh*-phrase that is subject to IE in one language may not be subject to it in another language (Tsai 1994, Ko 2005). Third, an intervener in one language does not necessarily intervene in another

language (Kim 2002, 2005, Beck 2006, Yang 2012). Against the background set by the third observation, Kim (2002, 2005) argued that among all the potential elements that trigger intervention effects, focus phrases (FPs) consist of a cross-linguistically stable core set of interveners. This generalization has been adopted by, and/or formed the empirical basis of, many subsequent works on (focus-induced) IE (Beck 2006, Tomioka 2007, Yang 2012, among others).

In this paper, I will cite examples from genetically unrelated languages to show that, contrary to Kim's (2002, 2005) claim, not all FPs trigger IE. To control for any potential asymmetry between *wh*-arguments and *wh*-adjuncts, in my discussion of focus-included IE, I exclude *wh*-adjunct questions from consideration. I will show that whether an FP is an intervener for *wh*-in-situ argument questions depends on whether the FP receives an exhaustive interpretation or not.

The paper is organized as follows. In the next section, I synthesize current literature on the exhaustive vs. non-exhaustive distinction of FPs. Certain focus strategies are exhaustive in all languages, while some other focus strategies show crosslinguistic and/or contextual variations with regard to exhaustive interpretation. In Section 3, I demonstrate that crosslinguistically, exhaustive FPs, but not non-exhaustive FPs, trigger IE for *wh*-in-situ argument questions. In Section 4, I outline a preliminary semantically-oriented account of the new pattern of focus-induced IE that has been observed in this paper. Section 5 concludes the paper.

2 An Exhaustivity-based Dichotomy of Focus Phrases

This paper classifies focus phrases on the basis of whether they are exhaustively interpreted or not. Here, the notion of "focus" is defined in terms of the property of triggering alternatives in the sense of Rooth's (1985, 1992) theory. This is in line with Kim's use of "focus" in her generalization mentioned above; so I will be comparing apples to apples when I claim that Kim's generalization over-predicts. I adopt a rather broad definition of "exhaustivity:" if an FP in a sentence *identifies or implicates* all and only the individuals of whom the predicate holds true in a relevant contextual domain, then the FP is said to be interpreted exhaustively in the contextual domain. Furthermore, if the FP receives an exhaustive interpretation in all contextual domains, then the FP is considered to be exhaustive.

The use of exhaustivity to classify FPs has a long tradition, and does not come out of the blue. É. Kiss (1998), for example, proposed two types of FPs in Hungarian that manifest different syntactic and semantic properties: the exhaustive, identificational focus and the non-exhaustive, presentational focus. According to van Rooij (2008), bare focus in languages like English is interpreted exhaustively. Beaver and Clark (2008) classified FPs from the perspective of what effects they achieve, and claimed that some focus strategies encode exhaustivity.

In this section, I offer a brief review of whether bound focus, bare focus, and weak negative polarity items (NPIs) receive an exhaustive interpretation. I claim

that crosslingustically, FPs that associate with *only* and *even*, the cleft construction, and weak NPIs are all exhaustive. On the other hand, whether bare FPs are exhaustively interpreted is subject to crosslinguistic variation and (to a lesser extent,) contextual manipulation (in certain languages). First, let us consider bound focus, which refers to FPs associated with an overt focus sensitive element. For reasons to be made clear later in this paper, I will postpone the discussion of bound FPs associated with the additive focus element *also* until the next section.

2.1 *Only*-focus

It appears rather intuitive to account for the meaning of *only* in terms of exhaustivity. This is indeed the line of analysis pursued by Zeevat (1994) and Beaver and Clark (2008). However, van Rooy (2002) raised an important question: if the meaning of *only* is reduced to exhaustification, given that bare focus phrases (in English) such as "$[\text{Bill}]_F$" in (2) encode exhaustivity as well (cf. van Rooij 2008), isn't it uneconomical to mark exhaustivity twice when *only* associates with an FP (3)? Why would one ever use *only*, at least for focus in English?

(2) John introduced $[\text{Bill}]_F$ to Sue.

(3) John only introduced $[\text{Bill}]_F$ to Sue. (van Rooij 2008: ex. 2)

In this paper, I claim that FPs associated with *only* have an inherently exhaustive interpretation all by themselves, and that *only* contributes a scalar reading. There is empirical evidence to attribute exhaustivity with *only*-focus to the FP associated with *only*, as opposed to *only* itself. Consider the following Hungarian question-answer pair (Balogh 2006). The *wh*-phrase *kik* 'who' in (4a) is plural, so the inquirer has an expectation that more than one person has called Emil. In the answer (4b), the focus phrase "Anna" is in an identificational focus position that is inherently exhaustive in Hungarian (É. Kiss 1998). If the function of *csak* 'only' in (4c) is to contribute exhaustivity, then, contrary to fact, one would expect the two answers in (4b-c) to be equally (in)felicitous as answers to (4a).

(4) a. *Kik* *hívták* *fel* *Emilt*?
who.PL called.PL VM Emil.ACC
'Who(plural) called Emil?'
b. *#[Anna]$_F$ hívta fel Emilt.* (= $[\text{Anna}]_F$ called Emil.)[1]
c. *Csak [Anna]$_F$ hívta fel Emilt.* (*csak*: 'only')

Based on data like (4), Balogh (2006) proposed that the focus sensitive element *only* itself does not contribute exhaustivity. Its function is to cancel the plu-

[1] "#" in (4b) is used to indicate that the sentence is infelicitous as an answer to (4a).

rality expectation. Moreover, exhaustivity on the FP and the cancellation of the plurality expectation by *csak* 'only' has a similar effect. Both (4b) and (4c) receive the interpretation that no one else but Anna called Emil. However, *csak* in (4c) has a pragmatic effect that the actual answer is against the inquirer's plurality expectation. *Csak* is not responsible for the exhaustive meaning; rather, exhaustivity comes from the meaning of the associated FP. The sentence in (4b) is unacceptable as an answer to (4a) because nothing cancels out the pragmatic plurality expectation. I assume that the Hungarian evidence that *only* is not responsible for the exhaustive interpretation of its associated FP carries over to other languages.

2.2 *Even*-focus

FPs introduced by the scalar additive element *even* have an exhaustive interpretation, as well. Take (5) as an example. It says that John came to the party and other people in the relevant contextual domain also came. The scalar implicature says that the likelihood of any of those other people coming to the party exceeds the likelihood of John coming. That is, from (5) one can induce that everyone in the relevant contextual domain, including the least likely John, came to the party. In this sense, *even* and *only* behave like opposites (Beaver and Clark 2008), because from (6) one can induce that *no one except John* (parallel to *everyone including John* for (5)) came to the party. The sentences in (5-6) are similar when it comes to exhaustivity. The FP "$[\text{John}]_F$" in (5) encodes the exhaustive set of partygoers by way of scalar implicature, and the FP in (6) presumably does so via semantic interpretation. In addition, just as with FPs associated with *only*, I assume that exhaustivity in (5) is attributable to the FP "$[\text{John}]_F$," not to *even*. The scalar additive *even* only serves to guarantee the right "type" of exhaustivity on the FP.

(5) Even $[\text{John}]_F$ came to the party.

(6) Only $[\text{John}]_F$ came to the party.

2.3 The Cleft Construction

The cleft construction conveys exhaustivity, as well. It is often compared to FPs associated with *only*. For the sentence in (7), native intuition has it that John was the only one who dropped the course. In this paper, I adopt Büring and Kriz's (2013) proposal that exhaustivity with the cleft construction is a product of assertion and presupposition. More specifically, a cleft sentence has a conditional presupposition whose protasis is the assertion (for positive cleft sentences) or the positive counterpart of the assertion (for negative cleft sentences). The assertion and presupposition for (7) are given in (7a-b), respectively. According to Büring and Kriz, exhaustivity comes about because the presupposition, combined with

the assertion, amounts to saying that the individuals in the extension of the predicate in the cleft sentence are all and only the individuals in the extension.

(7) It was [John]$_F$ who dropped the course.
a. assertion: John dropped the course.
b. presuppsition: If John dropped the course, no one else dropped it.

2.4 (Weak) Negative Polarity Items

There are two major types of negative polarity items (Zwarts 1995): weak NPIs (e.g., *any*, *ever*) and strong NPIs (e.g., *lift a figure*, *give a damn*). According to Krifka (1995), weak NPIs have two key properties. First, they introduce alternatives. Second, the alternatives are ordered based on semantic specificity, with NPIs denoting "a most specific element in that order" (p. 8). The first property suggests that weak NPIs resemble canonical FPs. From the second property, Krifka derived that a weak NPI is exhaustive, in the sense that it excludes all alternatives it introduces from verifying the sentence in which it occurs.

As for strong NPIs, they have been argued to involve a covert focus sensitive element *even* (Heim 1984). Because FPs associated with *even* are exhaustive, I assume that strong NPIs are focus-sensitive and exhaustive, as well. That being said, strong NPIs trigger negative bias in questions (van Rooy 2003, Guerzoni 2004), giving *wh*-questions a rhetorical "flavor" and as such, interfering with judgment of the availability of information-seeking reading. Thus, in this paper, I will not consider cases of strong NPIs being potential interveners.

2.5 Bare Focus

Whether bare focus is exhaustive is subject to crosslinguistic variation, and to a lesser extent, contextual manipulation (in certain languages). Previous works (e.g., Beaver and Clark 2008, Schulz and van Rooy 2006) have claimed that bare focus in English has an exhaustive interpretation. Roughly the same pattern exists in such languages as Korean and Japanese. Lee (2003), for example, argued that the sentence in (8), with contrastive focus on "Sam," is comparable to English "Did [Sam]$_F$ leave?" which asks whether Sam is the only one who left.

(8) *[Sam]$_F$-i* *ttena-ss-ni*? (Korean)
Sam-NOM leave-PAST-Q
'Did [Sam]$_F$ leave?' (Lee 2003)

Destruel (2009) claimed that bare focus in French is open, regarding whether it is exhaustively interpreted, and that contextual factors may help to disambiguate. The sentence in (9) is compatible with both situations where only Paul bought

Mary a watch and situations where someone else also bought Mary a watch.

(9) *[Paul]$_F$ a offert une montre à Marie pour son anniversaire.*
Paul has bought a watch to Mary for her birthday
'[Paul]$_F$ bought Mary a watch for her birthday.'

On the other hand, in languages like Mandarin Chinese and Tibetan, bare focus has an inherently non-exhaustive interpretation. There is empirical evidence in support of this claim. According to É. Kiss (1998), exhaustivity can be denied by negating the associated proposition and following it with an alternative proposition that is modified by *too* or *as well*. In a situation where Mary picked a hat, a coat, a scarf, and nothing else, an exhaustive proposition expressing that Mary only picked a hat can be denied with "no" and followed by saying that she also took a coat (10), if the hearer knew (or just thought) that Mary did so. The proposition cannot be followed by an acknowledgement and then saying that she also took a coat. For a non-exhaustive proposition, the pattern is exactly the reverse, as illustrated in (11) (in the non-exhaustive interpretation intended here).

(10) a. Mary only picked a [hat]$_F$.
b. No, she picked a coat, too.
b'. *Yes, and she picked a coat, too
(11) a. Mary picked a hat.
b. *No, she picked a coat, too.
b'. Yes, and she picked a coat, too.

Mandarin Chinese and Tibetan sentences with bare focus phrases pattern with non-exhaustive propositions rather than exhaustive propositions. This is evident from the observation that the Mandarin Chinese sentence in (12) can be followed by "Yes, he bought a printer, too," but not by "No, he bought a printer, too." Similarly, the Tibetan sentence in (13) can be followed by "Yes, he went to Shigatse, too," but not by "No, he went to Shigatse, too."

(12) *Zhangsan mai le [diannao]$_F$.* (Mandarin Chinese)
Zhangsan buy PAST computer
'Zhangsan bought a [computer]$_F$.'
(13) *Bkrashis-lags [Lhasa]$_F$-la phyin-pa-red* (Tibetan)
Tashi-HON Lhasa-LOC go- PAST-AGR
'Tashi went to [Lhasa]$_F$.'

To summarize, in this section I classified FPs based on whether they are interpreted exhaustively or non-exhaustively. Exhaustive focus includes FPs associated with *only* and *even*, the cleft construction, and (weak) NPIs. Non-exhaustive

focus shows crosslinguistic variation and to a lesser extent, contextual variation.

3 Correlation between Exhaustivity and Focus-induced IE

Recall that Kim (2002, 2005) claimed, and many works followed her work to assume, that FPs constitute a crosslinguistically stable core set of interveners. None of those works distinguished among different types of FPs. In this section, I show that crosslinguistically, a correlation exists between whether an FP is exhaustively interpreted and whether it triggers IE for *wh*-in-situ argument questions.

3.1 Exhaustive Focus

All FPs that Kim (2002, 2005) argued to trigger IE are actually exhaustive focus (excluding cases of additive *also* to be discussed later). Thus, it is relatively trivial for the current paper to show that exhaustive focus triggers IE. The following examples, taken from a variety of languages, show that *only*-focus, *even*-focus, the cleft construction, and NPIs are interveners for *wh*-in-situ argument questions.

***Only*-focus**

(14) ?* [*Mira*]$_F$-*man* *nwukwu-lul* *chotayha-ess-ni*? (Korean)
Mira-only who-ACC invite-PAST-Q
Intended: 'Who did only [Mira]$_F$ invite?' (Kim 2005)

(15) * *Seulement* [*Jean*]$_F$ *arrive* *à* *faire* *quoi*? (French)
only Jean arrive to do what
Intended: 'What does only [Jean]$_F$ manage to do?' (Mathieu 1999)

***Even*-focus**

(16) **Lian* [*Zhangsan*]$_F$ *dou* *chi le* *shenme*? (Mandarin Chinese)
Even Zhangsan DOU eat PAST what
Intended: 'What did even [Zhangsan]$_F$ eat?' (Yang 2012)

(17) *[*Kofi*]$_F$ *mpo* *bɔɔ* *hena* (Asante Twi)
Kofi even hit.PAST who
Intended: 'Who did even [Kofi]$_F$ hit?' (Kobele and Torrence 2006)

The cleft construction

(18) *Which book was it that which person read? (English)
(cf. Which book did which person read?)
(cf. Which book was it that John read?) (based on Pesetsky 2000: ex.98)

(19) **Shi* [*Zhangsan*]$_F$ *chi* *le* *shenme*? (Mandarin Chinese)
Cop Zhangsan eat PAST what
Intended: 'What was x s.t. it was Zhangsan who ate x?' (Yang 2012)

Weak NPIs

(20) ?**amuto* *muôs-ûl* *sa-chi* *anh-ass-ni*? (Korean)
anyone what-ACC buy-CHI not do-PAST-Q
Intended: 'What did no one buy?' (Kim 2002)

(21) **Pierre* *n'a* *jamais* *vu* *qui*? (French)
Pierre not has ever seen whom?
Intended: 'Who has Pierre ever not seen?' (Zubizarreta 2003)

It has been shown that bare FPs in Korean receive an exhaustive interpretation. Thus, to further illustrate the correlation, bare FPs in Korean trigger IE. The same observation holds in Japanese, a typologically similar language.

(22) **[Mira]$_F$-ka* *nwukwu-lul* *chotayha-ess-ni*? (Korean)
Mira-NOM who-ACC invite-PAST-Q
Intended: 'Who did [Mira]$_F$ invite?' (Kim 2005)

(23) ???*[Ken]$_F$-ga* *nani-o* *yon-da-no*? (Japanese)
Ken-NOM what-ACC read-PAST-Q
Intended: 'What did [Ken]$_F$ read?' (Tomioka 2008)

3.2 Non-Exhaustive Focus

In this subsection, I show that non-exhaustive FPs do not induce IE. First of all, when certain FPs in a language can have both exhaustive and non-exhaustive interpretations, only the exhaustive interpretation triggers IE. Bare FPs in French are ambiguous between being exhaustive and non-exhaustive. Zubizarreta (2003) argued that French bare FPs trigger IE *when and only when* they are interpreted exhaustively. According to Zubizarreta's idea, only when *Jean* and *Livre* in (24a-b) are "contrastively focused" and thus interpreted exhaustively are the two sentences ungrammatical.[2]

(24) a. */√ [*Jean*]$_F$ *a* *parlé* *à* *qui?* (French)
'[Jean]$_F$ talked to whom?'

[2] Zubizarreta (2003) argued for a correlation between IE and what she called "contrastive focus." "Contrastive focus" in her paper is necessarily associated with an exhaustive interpretation.

b.*/√ *Pierre a donné un* [*Livre*]$_F$ *à qui?*
'Pierre gave a [book]$_F$ to whom?' (Zubizarreta 2003)

Secondly, in Section 2 I showed that bare FPs in Mandarin Chinese and Tibetan are interpreted non-exhaustively. Correlatively, bare FPs in the two languages do not trigger IE. Take the sentences in (25) as an example. In (25a), the focus on the subject *mali* does not preclude Mary's invitee(s) from being invited by someone else (for exhaustivity on *only*-associating FPs) or everyone else (for exhaustivity on *even*-associating FPs). The FP in the sentence is not interpreted exhaustively, and (25a) is acceptable. Likewise, the FP *[shuxue]$_F$* in (25b) does not receive an exhaustive interpretation. Thus, though it appears in a potentially intervening position, it does not trigger IE. By contrast, *mali* in (26a-b), associating with *zhiyou* 'only' and *lian…ye* 'even' respectively, is interpreted exhaustively and induces IE.

(25) a. *[Mali]$_F$ qing le shei*? (Mandarin Chinese)
Mary invite PAST who
'Who did [Mary]$_F$ invite?'
b. *Zhangsan xiang song [shuxue]$_F$ laoshi shenme*?
Zhangsan want send math teacher what
'What does Zhangsan want to give the [math]$_F$ teacher?'

(26) a. **zhiyou [Mali]$_F$ qing le shei?* (Mandarin Chinese)
only Mary invite PAST who
Intended: 'Who is the person x such that only [Mary]$_F$ invited x?'
b. **lian [Mali]$_F$ ye qing le shei?*
even Mary Emp invite PAST who
Intended: 'Who is the person x such that even [Mary]$_F$ invited x?'

A similar pattern exists in Tibetan. In this language, bare focus is not interpreted exhaustively and does not trigger IE, whereas bound focus, by virtue of being exhaustive, triggers IE. This contrast is illustrated by the sentences in (27).[3]

(27) a. *[Bkrashis]$_F$-lags kare slobsbyong-gnang pa-red*? (Tibetan)
Tashi-HON what study-do PAST-AGR
'What did [Tashi]$_F$ study?'
b. **[Bkrashis]$_F$-lags gcigpo kare slobsbyong-gnang pa-red*?
Tashi-HON only what study-do PAST-AGR
Intended: 'What did only [Tashi]$_F$ study?'

[3] *Gcigpo* is ambiguous between a focus sensitive reading 'only' and a non-focus sensitive reading 'alone.' (27b) is ungrammatical only when *gcigpo* receives the former reading.

The above discussion argued that exhaustive FPs, but not non-exhaustive FPs, trigger IE. Thus, Kim's generalization – that FPs indiscriminatively constitute a crosslinguistically stable core set of interveners – over-predicts. It follows that any analysis that takes Kim's generalization as given needs to be revised or even abandoned.

3.3 Excursion: The Special Case of *also*

It is intuitively clear that focus phrases associated with the additive focus element *also* do not have an exhaustive interpretation (Beaver and Clark 2008, Krifka 2008). Nevertheless, they trigger IE (28-29). This fact begs the following question: does *also* constitute a counterexample to the new pattern of focus-induced IE that I proposed with reference to exhaustivity? The answer is negative.

(28) *[*Lili*]$_F$-*yum* *eete* *pustakam-aane* *waayikk-ate*? (Malayalam)
Lili-also which book-COP read-NOM
Intended: 'Which book did [Lili]$_F$, too, read?' (Beck 2006)

(29) *[*zhangsan*]$_F$ *ye* *mai* *le* *shenme?* (Mandarin Chinese)
Zhangsan also buy PAST what
Intended: 'What was the thing x such that [Zhangsan]$_F$ also bought x?'

The unacceptability of sentences like (28-29) arises from the pragmatic infelicity of asking uninformative questions (Kuno and Takami 1997). The use of *ye* 'also' in (29), for example, suggests that a contextually relevant alternative individual (say Zhangsan's brother) bought the same thing as Zhangsan did. If the speaker does not know what Zhangsan's brother bought, she is not in the position to use *ye* 'also.' On the other hand, if she knows, she infelicitously asks an information-seeking question to which she already knows the answer.

4 Interaction of Focus and Exhaustivity in *wh*-questions

No existing analysis of (focus-induced) IE makes reference to the exhaustivity-based distinction of focus phrases. As such, previous analyses all fall short of the new pattern of IE that I observed in Section 3. In this section, following the spirit of Beck's (2006) analysis, I argue that focus-induced IE arises when an exhaustive focus operator "evaluates" (informally speaking) both the focus semantic value and the exhaustive interpretation of the *wh*-in-situ argument in the scope of the focus operator. In such cases, the higher Q operator associated with the *wh*-phrase has nothing to evaluate, which leads to ungrammaticality. By contrast, the focus operator associated with a non-exhaustive FP cannot evaluate the *wh*-phrase in its scope, duly leaving this job to the Q operator; hence the absence of intervention effect. I present my idea in a rather informal manner below, and leave the formal

implementation of the idea for another venue.

4.1 Background Assumptions

Several theoretical postulates are necessary for my analysis. First, focus and *wh*-questions are interpreted in a similar fashion under the Alternative Semantics framework (Hamblin 1973, Rooth 1985, 1992). According to Rooth's theory of focus, focus contributes both an ordinary semantic value and a focus semantic value. The ordinary semantic value ($[\![\Phi]\!]^o$) of a sentence with an FP is the same proposition expressed by the sentence just as if the FP were not focused. The focus semantic value ($[\![\Phi]\!]^f$) is the set of propositions that can be obtained from the ordinary semantic value by making a substitution in the position of the FP. The ordinary semantic value itself belongs to the set of semantic alternatives.

(30) a. $[\text{John}]_F$ left. (= Φ)
b. $[\![\Phi]\!]^o$: λw.John left in w
c. $[\![\Phi]\!]^f$: λp. ∃ x[p = λw.x left in w]

Wh-phrases also introduce a set of alternatives, but different from "regular" focus, they are used to ask questions. Being interrogative in nature, they do not make an ordinary semantic contribution on their own. Rather, along the lines of Beck's (2006) proposal, it is the Q operator that evaluates the focus semantic value of a *wh*-phrase to the ordinary semantic value.

Second, I assume that a *wh*-in-situ argument question receives an exhaustive interpretation, in the sense that it asks for the complete set of individuals that meet the predication in the question.[4] Moreover, I assume that exhaustivity is encoded

[4] Beck and Rullmann (1999) and Schulz and van Rooij (2006) argued that *wh*-argument questions can receive both exhaustive and non-exhaustive readings. However, their arguments for the non-exhaustive reading of *wh*-argument questions are either pragmatic contextualization of questions, or restricted to *wh*-movement argument questions, and cannot carry over to *wh*-in-situ argument questions. One such argument comes from the observation that argument *wh*-phrases can be explicitly modified by non-exhaustivity markers like *for example* and *say*:

(i) Who, for example, was at the party last night?

However, such non-exhaustivity markers cannot modify in-situ argument *wh*-phrases. The contrast is most evident from the different grammaticality judgments of the minimal pair of French sentences in (ii). French allows both *wh*-movement and *wh*-in-situ for *wh*-questions. While the dislocated *wh*-phrase in (ii-a) is fine with being modified by *par exemple* 'for example,' the same, yet in-situ, *wh*-phrase in (ii-b) does not allow for such modification (Taylor and Pires 2009).

(ii) a. Qui par exemple (est-ce que) Pierre a invite?
Who for example did Peter invited
'Who, for example, did Peter invite?'

in the semantics of *wh*-in-situ argument questions (Higginbotham 1993, Guerzoni and Sharvit 2007), rather than being a property of their answerhood (Groenendijk and Stokhof 1984, Schulz and van Rooij 2006).

Third, *wh*-arguments consist of two components: *wh*- and an existential quantification (Baker 1970, Haspelmath 1997). In light of the Logical Form in (31), I assume that the exhaustive semantics of a *wh*-phrase is undefined. It is an operator associated with the *wh*-phrase that evaluates the *wh*-phrase from the existential interpretation to the exhaustive interpretation. There is only one operator associated with *wh*-questions, i.e., Q. It is precisely this operator that assumes the function of evaluating the existential interpretation to the exhaustive interpretation.

(31) *what* = *wh* + something

At the same time, along the lines of Beck's (2006) analysis, the ordinary semantic value of a *wh*-phrase is not defined, either. It is also the Q operator that evaluates the focus semantic value of the *wh*-phrase to its ordinary semantic value. Thus, the Q operator assumes the function of evaluating the focus semantic value of the *wh*-phrase to its ordinary semantic value, as well as the function of evaluating the existential interpretation of the *wh*-phrase to the exhaustive interpretation. The two functions are inseparable, presumably because they are the results of a single process – applying the Q operator to the focus contribution of the *wh*-phrase in its default existential form. Moreover, the exhaustive interpretation of in-situ *wh*-arguments is dependent upon their focus interpretation. Exhaustivity for an in-situ *wh*-argument amounts to selecting, from the *set of alternatives* for the *wh*-phrase, all and only the individuals of whom the relevant predicate holds true. Without the focus interpretation of the *wh*-phrase, there is no set of alternatives, and in turn, no exhaustive interpretation.

4.2 Explanation

Given the above background, we can now extend Beck's (2006) analysis to explain why exhaustive focus triggers IE, while non-exhaustive focus does not. Exhaustive FPs are associated with an exhaustive focus operator ($\sim_{exh}$). This

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b.*Pierre a invite qui par exemple?

Another argument from the above authors is that *wh*-questions can be embedded under predicates like *surprise* that do not require exhaustive knowledge of all propositions in the denotation of the *wh*-question. However, *wh*-in-situ argument questions cannot be embedded under such predicates to form a declarative sentence, as shown by the Mandarin Chinese sentence below:

(iii) *zhangsan jingya (yu) ta didi mai le shenme.
Zhangsan surprised at his brother buy PAST what
Intended: 'It surprised Zhangsan what his brother bought.'

operator, unselectively, takes as input the focus semantic value of the FP and the focus semantic value of the *wh*-phrase in its scope. Thus, it neutralizes all of the foci in its scope. At the same time, the $\sim_{exh}$ operator evaluates the default existential interpretation on the *wh*-phrase to an exhaustive interpretation. After both the alternative semantics and exhaustive evaluation of the *wh*-phrase have been "dispensed with" by the $\sim_{exh}$ operator, the higher Q operator has no appropriate input to operate on, and the resulting LF (32) is uninterpretable, leading to ungrammaticality.

(32) *[Q …[$\sim_{exh}$ [φ…XP … *wh*…]]]

For non-exhaustive FPs, the associated focus operator ($\sim_{non\text{-}exh}$) is only able to evaluate the focus semantic value of the FP to its ordinary semantic value (33). It has to skip evaluating the focus semantic value of the *wh*-phrase, because, given the dependency between the focus interpretation and the exhaustive interpretation of in-situ *wh*-phrases discussed above, any operation to realize the focus interpretation of the *wh*-phrase has to realize the exhaustive interpretation of the *wh*-phrase at the same time. But the $\sim_{non\text{-}exh}$ operator cannot perform the latter function. Hence, the Q operator can duly evaluate the focus semantic value on the *wh*-phrase to the ordinary semantic value, and the default existential interpretation to the exhaustive interpretation. Nothing rules out the LF in (33); hence the absence of focus-induced IE when the FP is non-exhaustive.

(33) [Q …[$\sim_{non\text{-}exh}$ [φ…XP … *wh*…]]]

Clearly, my analysis, as embodied in the schematizations in (32-33), captures the empirical pattern of focus-induced IE discussed in Section 3. It makes reference to the exhaustivity distinction of FPs and the mechanism of deriving the exhaustive interpretation for *wh*-phrases from their existential interpretation. In this respect, my proposal departs from previous analyses, including Beck's (2006).

5 Conclusions

The primary purpose of this paper is to dismiss the rather popular claim that focus phrases uniformly trigger intervention effects. With empirical data from genetically unrelated languages such as French, Japanese, Korean, Mandarin Chinese, and Tibetan, I showed that exhaustivity is a determining factor in whether a focus phrase triggers intervention effects or not. Exhaustive focus induces intervention effects for *wh*-in-situ argument questions, and non-exhaustive focus does not. No analysis of intervention effects so far has made reference to the exhaustivity distinction of focus phrases. My analysis holds that intervention effects arise when an exhaustive focus operator evaluates both the focus semantic value and the ex-

haustive interpretation of the in-situ *wh*-phrase in its scope. In such cases, the higher Q operator associated with the *wh*-phrase has nothing to evaluate, which leads to ungrammaticality. By contrast, the focus operator associated with a non-exhaustive focus phrase cannot evaluate the *wh*-phrase in its scope, duly leaving this job to the Q operator, and hence, the absence of intervention effects.

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