

Information Structure, Syntax and Intonational Properties of Multiple *Wh*-Questions*

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Abstract

I discuss the issues on multiple *wh*-questions from the perspective of information structure. I argue, on the basis of the literature (Kiss 1993), that in the multiple *wh*-question that has a pair-list answer reading the *wh*-phrase interpreted as specific always moves to the position higher than the *wh*-phrase interpreted as focus and takes wide scope over the latter as a distributive universal quantifier, with the Superiority Effect not arising in the unmarked case. I also argue that in the multiple *wh*-question that has a single-answer reading *wh*-phrases move and function as a focus operator in pairs. I argue that the information-structural effects differ between the multiple *wh*-question that has a pair-list answer reading and the one that has a single-answer reading, thus the way of deriving them in narrow syntax differs too, with spelled-out positions of *wh*-phrases solely determined in the phonological component. I suggest that spelled-out positions of *wh*-phrases are determined by the intonational properties of individual languages, from which the Superiority Effect is derived too, and that the Superiority Effect is not problematic any longer in the current framework (Chomsky 2008).

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1. Introduction

It is well-known that in multiple *wh*-questions one *wh*-phrase moves to sentence-initial position and additional *wh*-phrases remain in situ in, e.g. English (1), whereas all *wh*-phrases remain in situ in, e.g. Japanese (2). It is widely claimed that only a pair-list answer PA reading is obtainable in the former, whereas both a PA and a single-answer SA reading can be obtained in the latter. Specifically, (1) can have only a PA like ‘he gave a ring to Mary, a flower to Lucy, ...’, whereas (2) can have both a PA like ‘John bought a ring, Bob a flower, ...’ and a SA like ‘John bought a ring’.

(1) What did John give to whom?

(2) Dare-ga nani-o kat-ta-no? [Jap.]
 who-NOM what-ACC buy-PAST-Q
 ‘Who bought what?’

It is also widely claimed that in, e.g. English, multiple *wh*-questions are subject to the Superiority Effect SE (Pesetsky 2000). The *wh*-phrase base-generated in the highest position among *wh*-phrases can be raised to sentence-initial position in the unmarked case, whereas the *wh*-phrase base-generated in a lower position cannot be raised across the one base-generated in the highest position. Specifically, *who*, which is base-generated in the highest position among *wh*-phrases, can be raised to sentence-initial position (3), whereas *what*, which is base-generated in a position lower than *who*, cannot move across *who*. In some cases, however, the SE can be avoided, and the *wh*-phrase base-generated in a lower position can move to sentence-initial position across the one base-generated in the highest position: either a *wh*-subject *which student* (5a) or a *wh*-object *which book* (5b) can move

to sentence-initial position.

- (3) a. Who bought what?
 b. [CP who C [TP ~~who~~ ... [_{v*P} ~~who~~ bought [VP ... what]]]]
- (4) a. *What did who buy?
 b. [CP what did [TP who ... [_{v*P} ~~who~~ buy [VP ... ~~what~~]]]]
- (5) a. Which student read which book?
 b. Which book did which student read?

The fact that multiple *wh*-questions are subject to the SE is problematic in the current phase system (Chomsky 2008), which I discuss in the next section.

In this paper I discuss the issues on multiple *wh*-questions from the perspective of information structure. I argue that the information-structural effects differ between the multiple *wh*-question that has a PA reading and the one that has a SA reading, thus the way of deriving them in narrow syntax NS differs too, with spelled-out positions of *wh*-phrases solely determined in the phonological component PHON. I suggest that spelled-out positions of *wh*-phrases are determined by the intonational properties of individual languages, from which the SE is also derived, and that the SE is no longer problematic in the currently assumed framework (Chomsky 2008). This paper is organized as follows. In section 2 I discuss the problems of multiple *wh*-questions that arise in the current framework (Chomsky 2008, Rizzi 1997). In section 3 I discuss the information-structural properties of multiple *wh*-questions. On the basis of the literature (Kiss 1993), I argue that in the multiple *wh*-question that has a PA reading the *wh*-phrase interpreted as specific always moves to the position

higher than the *wh*-phrase interpreted as focus and takes wide scope over the latter as a universal quantifier, with the SE not arising in the unmarked case.¹ I also argue that in the multiple *wh*-question that has a SA reading *wh*-phrases move and function as a focus operator in pairs. I argue that the derivation of the multiple *wh*-question that has a PA reading proceeds in one uniform way for all languages, and the derivation of the multiple *wh*-question that has a SA reading proceeds in another uniform way for all languages, with spelled-out positions of *wh*-phrases solely determined in PHON. In section 4 I propose the ways of deriving multiple *wh*-questions. In section 5 I suggest that spelled-out positions of *wh*-phrases are determined by the intonational properties of individual languages. I also suggest that the SE is caused by the inappropriate intonational pattern that could arise in the case of monosyllabic *wh*-phrases that are interpreted as specific and spelled out in situ. In section 6 I briefly conclude this paper, suggesting that the SE is not problematic any longer in the current framework. Throughout this paper I presuppose that the reader is familiar with the current framework (Chomsky 2008, Rizzi 1997).

2. The problems of multiple *wh*-questions

Languages differ in whether and how many *wh*-phrases move in multiple *wh*-questions. All *wh*-phrases move to sentence-initial position in the Slavic languages (6). One *wh*-phrase moves to sentence-initial position, with the other *wh*-phrase(s) remaining in situ, in, e.g. English (7). All *wh*-phrases remain in situ in, e.g. Japanese (8).² Languages like French have the option between the English type and the Japanese type: only one *wh*-phrase moves in some cases

¹ The definition of specificity is given in section 3.1.

² The surface appearance does not differ between Japanese and Bulgarian. However, Japanese is an SOV language, whereas Bulgarian is an SVO language, which indicates that the *wh*-phrases are raised in (6) but remain in situ in (8).

(9a); all *wh*-phrases can remain in situ in others (9b).³

- | | | |
|-----|---|--------|
| (6) | Koj kakvo e kupil?
who what is bought
'Who bought what?' | [Bul.] |
| (7) | What did John give to whom? | (=1) |
| (8) | Dare-ga nani-o kat-ta-no?
who-NOM what-ACC buy-PAST-Q
'Who bought what?' | (=2) |
| (9) | a. Qu' a-t-il donné à qui?
what has-he given to who
'What did he give to whom?' | [Fre.] |
| | b. Il a donné quoi à qui?
he has given what to whom
'What did he give to whom?' | |

Scandinavian languages belong to the English type (7). One *wh*-phrase moves to sentence-initial position, with the other *wh*-phrase(s) remaining in situ; the *wh*-phrase base-generated in the highest position among *wh*-phrases can be raised to sentence-initial position in the unmarked case (10a). The *wh*-phrase base-generated in a lower position cannot be raised across the one base-generated in the highest position (10b). The SE can be avoided in some cases, and the *wh*-phrase base-generated in a lower position can move to sentence-initial position across the one base-generated in the highest position (11a-b).

³ See Bošković (2002) for a classification of the Slavic languages into the language types illustrated by (7-9).

- (10) a. Vem åt vad? [Swe.]
 who ate what
 ‘who ate what?’
- b. *Vad åt vem?
 what ate who
 ‘what did who eat?’
- (11) a. Vilken person åt vilken mat? [Swe.]
 which person ate which food
 ‘which person ate which food?’
- b. Vilken mat åt vilken person?
 which food ate which person
 ‘which food did which person eat?’

In the current phase theory (Chomsky 2000, 2001, 2004, 2008) it is assumed that the computation of human language proceeds uniformly in NS and the semantic component SEM for all languages (Chomsky 2004). This assumption is supported by the cartographic system (Rizzi 1997, Cinque 1999), in which the position where a category is located in NS corresponds to, and must correspond to, the interpretation that the category receives in SEM in all languages. Thus, a category that is located in, e.g. [Spec,Foc(us)P], in NS is, and must be, interpreted as focus in SEM in all languages. Also conversely, a category that is interpreted as focus in SEM is, and must be, located in [Spec,FocP] in NS in all languages.

Multiple *wh*-questions provide at least two problems for this currently assumed theoretical framework. First, a category is interpreted in the moved position, being raised by (the [Edge] feature of) a feature in a functional head. It is not necessary to assume any uninterpretable features as the trigger of movement. A feature in a functional head can freely choose a category that it ‘wants to’ raise. Thus, the fact that multiple *wh*-questions are subject to the SE

(10b) is problematic, as Chomsky (2008:152) notes, since (the [Edge] feature of) a feature in C could freely seek and raise either the *wh*-subject *vem* or the *wh*-object *vad* to its Spec, contrary to fact.⁴

Second, a sentential element that receives the same interpretation in SEM should be located in the corresponding structural position in NS in all languages, despite the difference in the surface appearance. In *wh*-movement a *wh*-phrase moves to [Spec,CP] in Swedish (12a), whereas it remains in situ in Japanese (13a). As long as the interpretation as a constituent *wh*-question does not differ between these languages, a *wh*-phrase should move to the operator position in NS in both Swedish and Japanese on the assumption of the uniformity of NS and SEM. The surface difference should be attributed to which copy of the *wh*-phrases is spelled out in PHON, either the copy in [Spec,CP] (12b) or the copy in situ (13b) (cf. Groat and O’Neil 1996).⁵

(12) a. Vad åt du? [Swe.]
 what ate you
 ‘What did you eat?’

b. [CP vad ... [TP ... [v*P ... [VP ... vad]]]] (<vad,vad>)

(13) a. Kimi-wa nani-o tabe-ta-no? [Jap.]
 you-TOP what-ACC eat-PAST-Q
 ‘What did you eat?’

b. [CP ~~nani-o~~ ... [TP ... [v*P ... [VP nani-o ...]]]] (<~~nani-o~~,nani-o>)

In the same way, all *wh*-phrases in multiple *wh*-questions should move to the

⁴ Strictly speaking, the problem lies in the possibility that (the [Edge] feature in) v* can raise a *wh*-object to its Spec, which further paves the way to the possibility that either the *wh*-object or a *wh*-subject can be raised by (the [Edge] feature in) C. See Chomsky (2008) for the detailed argument.

⁵ From now on, I omit all the details of the sentential elements other than the relevant ones.

operator position to take scope as a *wh*-operator in all languages, as long as the interpretation, e.g. a PA reading, does not differ among languages. The surface difference should be attributed to which copy in *wh*-chains is spelled out in PHON, either the highest copy in both *wh*-chains (14a), the highest copy in one *wh*-chain and the copy in situ in the other *wh*-chain (14b), or the copy in situ in both *wh*-chains (14c) (cf. Bošković and Nunes 2007).

- (14) a. [CP koj kakvo ... [TP ... [v*P ~~koj~~ ... [VP ... ~~kakvo~~]]]] (=6)
wh-chains: <koj,~~koj~~>, <kakvo,~~kakvo~~>
- b. [CP vem vad ... [TP ... [v*P ~~vem~~ ... [VP ... vad]]]] (=10a)
wh-chains: <vem,~~vem~~>, <~~vad~~,vad>
- c. [CP ~~dare-ga nani-o~~ ... [TP ... [v*P dare-ga [VP nani-o ...]]]] (=2)
wh-chains: <~~dare-ga~~,dare-ga>, <~~nani-o~~,nani-o>

3. Information structure of multiple *wh*-questions

3.1. The multiple *wh*-question that has a pair-list answer reading

Kiss (1993) claims that in multiple *wh*-questions the specific reading is triggered for either one of the *wh*-phrases. Specificity is defined as follows: ‘[a]n operator is specific if it quantifies over a set which the speaker and listener can partition exhaustively in an identical way’ (Kiss 1993:92-93). Without any contexts, *vem* ‘who’ in a single *wh*-question (15a) is understood as non-specific in the unmarked case. *Vem* in a multiple *wh*-question (15b), on the other hand, has a more specific reading than *vad* ‘what’, as ‘it applies to a countable set of discrete entities, which can be ... easily identified with a contextually or situationally given set’ (Kiss 1993:87).

- (15) a. Vem åt den? [Swe.]
 who ate it
 ‘Who ate it?’
- b. Vem åt vad? (=10a)
 who ate what
 ‘Who ate what?’

The Hungarian multiple *wh*-question belongs to the Bulgarian type (6), in which all *wh*-phrases move. The cases below are interpreted with a PA reading. Kiss states that a set of persons is known in (16a), in which *kinek* ‘who’ moves to the position higher than *mit* ‘what’. The question is targeted to the direct object, which carries the focus of the sentence: (16a) means, ‘for each person, what did János bring for him?’. A set of things, on the other hand, is given in (16b), in which *mit* ‘what’ moves to the position higher than *kinek* ‘who’. The question is targeted to the indirect object, which carries the focus of a sentence: (16b) means, ‘for each thing, who did János bring it for?’ (Kiss 1993:86).⁶

- (16) a. Kinek mit hozott János? [Hun.]
 who-DAT what-ACC brought János
 ‘What did János bring for whom?’
- b. Mit kinek hozott János?
 what-ACC who-DAT brought János
 ‘For whom did János bring what?’

Kiss argues that the position in which the highest *wh*-phrase (i.e. *kinek* ‘who’ (17a)) is located in Hungarian corresponds to the one in which a universal

⁶ See also Surányi (2007), who states for the Hungarian multiple *wh*-question that the *wh*-phrase in a higher position is interpreted as a topic, whereas the one in a lower position is interpreted as focus.

quantifier (i.e. *mindenkinek* ‘everybody’ (17b)) is located. According to Kiss, a *wh*-operator interpreted as specific that is located in a higher position functions as a distributive universal quantifier (Kiss 1993:107).

- (17) a. János kinek mit hozott?⁷ [Hun.]
 János who-DAT what-ACC brought
 ‘What did János bring for whom?’
 (‘For each person, what did János bring for him?’)
- b. János mindenkinek egy könyvet hozott.
 János everybody-DAT a book-ACC brought
 ‘John brought everybody a book.’
 (‘For everybody, it was a book that János brought.’)

Kiss’ data and arguments indicate i) that the multiple *wh*-question that has a PA reading contains one *wh*-phrase that is interpreted as specific and the other *wh*-phrase that is interpreted as focus, ii) that the former moves to the position higher than the latter to take wide scope over the latter as a distributive universal quantifier, and iii) that the SE does not arise in the unmarked case.⁸

The same situation is observed in the Japanese multiple *wh*-question (8), in which all *wh*-phrases remain in situ. The Nominative Case marker *-ga* can be, but the topic marker *-wa* cannot be, attached to a *wh*-phrase in a single *wh*-question in the unmarked case (18a).⁹ In the Japanese multiple *wh*-question both PA and SA readings are available, as we saw in (2). To force a PA reading, *-wa* is attached to one of the *wh*-phrases (18b-c). Regardless of whether it is a *wh*-subject or a *wh*-object, the *wh*-phrase to which *-wa* is attached is interpreted as specific, whereas the one to which it is not attached is interpreted as focus.

⁷ The subject *János* is raised for topicalization here.

⁸ See Diesing (2003), who states that the SE does not arise in Yiddish either.

⁹ See the literature, e.g. Lambrecht (1994), which claim that the Japanese *-ga* is a focus marker.

The SE does not arise, and the *wh*-phrase to which *-wa* is attached appears in the position higher than the one to which it is not attached.

- (18) a. Dare^{OK}-ga/*-wa kore-o kat-ta-no? [Jap.]
 who NOM/TOP this-ACC buy-PAST-Q
 ‘Who bought this?’
- b. Dare-wa nani-o kat-ta-no?
 who-TOP what-ACC buy-PAST-Q
 ‘For each person, what was it that he bought?’
 (*dare* ‘who’ – specific; *nani* ‘what’ – focus)
- c. Nani-wa dare-ga kat-ta-no?
 what-TOP who-NOM buy-PAST-Q
 ‘For each thing, who bought it?’
 (*nani* ‘what’ – specific; *dare* ‘who’ – focus)

In the multiple *wh*-question of languages like Swedish and English, in which one *wh*-phrase appears in sentence-initial position with the other remaining in situ, the *wh*-subject that appears in sentence-initial position tends to be interpreted as specific as we saw in (15b), which I repeat below. Following Kiss (1993), the multiple *wh*-question like (19b), in which the SE is avoided, is interpreted as ‘for each person, which food did he eat?’: the in situ *wh*-subject *vilken person* is interpreted as specific and the *wh*-object in sentence-initial position *vilken mat* is interpreted as focus.¹⁰ These data show that in this type of languages *wh*-phrases can be spelled out either in sentence-initial position or in situ, regardless of the interpretation they receive.¹¹

¹⁰ According to the traditional literature (e.g. Pesetsky 1987), the SE is avoided when an in-situ *wh*-phrase is D(iscourse)-linked. The concept of D-linking is not so different from that of specificity, as they both apply to sentential elements that are presupposed/given in a context.

¹¹ In the cases like (5a-b) and (11a-b) it might be difficult to identify which *wh*-phrase, either a *wh*-subject or a *wh*-object, is interpreted as specific, as they are both modified by *which*. I

- (19) a. Vem åt vad? (=15b)
 who ate what
 ‘who ate what?’
- b. Vilken mat åt vilken person? (=11b)
 which food ate which person
 ‘which food did which person eat?’

The Finnish multiple *wh*-question belongs to the Swedish-English type introduced above. In the multiple *wh*-question (20a), which has only a PA reading like ‘Pekka stands on Merja’s toes, Minna stands on Antti’s toes, ...’, a suffix *-kin*, which triggers a distributive reading of *wh*-phrases (Hakulinen and Karlsson 1979, Vilkuna 1989), is attached to one of the *wh*-phrases. When *-kin* is attached to a *wh*-subject, it remains in situ, which results in the avoidance of the SE (20b). These facts show that the *wh*-phrase to which *-kin* is attached is interpreted as specific, and the one to which *-kin* is not attached is interpreted as focus.¹² Finnish differs from the other languages presented above in that the *wh*-phrase interpreted as specific is always spelled out in a lower position than the one interpreted as focus.

- (20) a. Kuka seisoo kenen-kin varpailla? [Fin.]
 who-NOM stands whose-*kin* toes.on
 ‘Who stands on whose toes?’

leave this issue for future research.

¹² The literature on Finnish have claimed that *-kin* is a focus particle. However, since *-kin* triggers a distributive reading in multiple *wh*-questions and the *wh*-phrase to which it is attached functions as a distributive universal quantifier, the *wh*-phrase to which *-kin* is attached in fact does not carry focus in multiple *wh*-questions. This is clear from the English translation of (20b) by Huhmarniemi and Vainikka. This claim is supported by the fact that *-kin* cannot appear with a *wh*-phrase in a single *wh*-question in any order:

- i) (*mitä-kin) Pekka osti (*mitä-kin). [Fin.]
 what-PAR-*kin* Pekka-NOM bought what-PAR-*kin*
 (Huhmarniemi and Vainikka 2011:5,(12))

- b. Mitä kuka-kin osti?
 what-PAR who-NOM-kin bought
 ‘What did each of whom buy?’
 (Huhmarniemi and Vainikka 2011:2-3,(3a),(5))

All of the data above show i) that the information structure of the multiple *wh*-question that has a PA reading does not differ among languages in that it contains the *wh*-phrase interpreted as specific and the one interpreted as focus, ii) that it is uniformly derived for all languages in the way that the *wh*-phrase interpreted as specific moves to the position higher than the *wh*-phrase interpreted as focus to take wide scope over the latter as a distributive universal quantifier, and iii) that spelled-out positions of *wh*-phrases are solely determined in PHON. Specifically, in Hungarian either the *wh*-subject *kinek* ‘who’ or the *wh*-object *mit* ‘what’ that is interpreted as specific moves higher than the other that is interpreted as focus; the *wh*-phrases are always spelled out in a higher position regardless of whether they are interpreted as specific or focus (21a-b). In Japanese either the *wh*-subject *dare* ‘who’ or the *wh*-object *nani* ‘what’ that is interpreted as specific moves higher than the other *wh*-phrase interpreted as focus; the *wh*-phrase interpreted as specific is always spelled out in a higher position, and the one interpreted as focus is spelled out in situ (22a-b). In languages like Swedish and English the *wh*-phrase interpreted as specific (i.e. *vem* (23a) and *vilken person* (23b)) moves higher than the one interpreted as focus (i.e. *vad* (23a) and *vilken mat* (23b)); in some cases (23a) the former is spelled out in a higher position, and the latter is spelled out in situ; in others (23b) the former is spelled out in situ, and the latter is spelled out in a higher position. In Finnish the *wh*-phrase interpreted as specific moves higher than the one interpreted as focus; the former (i.e. *kenen-kin* ... (20a)/*kuka-kin* (20b)) is always spelled out in a lower position, and the latter (i.e. *kuka* (20a)/*mitä* (20b)) is spelled out in a higher position (24a-b).

- (21) a. [CP kinek [CP mit ... [TP ... [v*P ... [VP ... ~~kinek mit~~]]]]] (=16a)
 b. [CP mit [CP kinek ... [TP ... [v*P ... [VP ... ~~kinek mit~~]]]]] (=16b)
- (22) a. [CP dare-wa [CP ~~nani-o~~ ... [TP ... [v*P ~~dare-wa~~ ... [VP ... nani-o]]]]] (=18b)
 b. [CP nani-wa [CP ~~dare-ga~~ ... [TP ... [v*P dare-ga ... [VP ... ~~nani-wa~~]]]]] (=18c)
- (23) a. [CP vem [CP ~~vad~~ ... [TP ... [v*P ~~vem~~ ... [VP ... vad]]]]] (=19a)
 b. [CP ~~vilken person~~ [CP vilken mat ... [TP ...
 [v*P ... [VP ... vilken person ... ~~vilken mat~~]]]]] (=19b)
- (24) a. [CP ~~kenen-kin~~ ... [CP kuka ... [TP ... [v*P ~~kuka~~ ... [VP ... ~~kenen-kin~~ ...]]]]] (=20a)
 b. [CP ~~kuka-kin~~ [CP mitä ... [TP ... [v*P kuka-kin ... [VP ... mitä]]]]] (=20b)

3.2. The multiple *wh*-question that has a single-answer reading

I turn to the multiple *wh*-question that has a SA reading. In Japanese the topic marker *-wa*, which forces a PA reading, cannot appear to get a SA reading. Compare (25a-b) with (18b-c).

- (25) a. Dare-ga/#-wa nani-o kat-ta-no? [Jap.]
 who-NOM/-TOP what-ACC buy-PAST-Q
 ‘Who bought something, and what was it?’
- b. Nani-o/#-wa dare-ga kat-ta-no?
 what-ACC/-TOP who-NOM buy-PAST-Q
 ‘What did someone buy, and who was that person?’

In Finnish, to get a SA reading, the suffix *-kin*, which triggers a distributive reading of *wh*-phrases, cannot appear and *wh*-phrases must appear in

a bare form. Below, a SA reading like ‘Pekka stands on Merja’s toes’ can be obtained when the suffix *-kin* is not attached to the *wh*-phrase that appears in a lower position *kenen*.

- (26) Kuka seisoo *kenen*(*-*kin*) varpailla? [Fin.]
 who-NOM stands whose *-kin* toes.on
 ‘Who stands on whose toes?’
 (Huhmarniemi and Vainikka 2011:1-2,(2-3a))

Kiss (1993:99) observes for Hungarian that (17a) repeated in (27a) cannot have a SA reading: it cannot be interpreted as ‘for which person did János bring something, and what was it’. (27b) is the construction in which a SA reading like ‘John killed Bob’ is obtainable. A main verb *öl* precedes an aspect marker *meg*, which indicates that the verb moves across that particle. *Ki* ‘who’ moves across the main verb. *Kit* ‘whom’ remains in situ and follows the aspect marker.¹³ According to Kiss, a SA reading can be obtained when *wh*-phrases apply to the same set in a given context. Specifically in (27b), there is a set of persons, (John, Bob, Mary, Lucy, ...), and both the filler of a *wh*-subject and that of a *wh*-object are chosen from that set.

- (27) a. János *kinek* mit hozott? (=17a)
 János who-DAT what-ACC brought
 ‘What did János bring for whom?’
 (‘For each person, what did János bring for him?’)
- b. A regény végén *ki* öl meg *kit*? [Hun.]
 the novel’s end who kills PERF whom
 ‘Who kills whom at the end of the novel?’

¹³ It is difficult to see if a verb always moves in the multiple *wh*-question that has a SA reading. Surányi (2007) simply states that a SA reading is obtained when one *wh*-phrase moves and the other remain(s) in situ.

Kiss' argument indicates that in the multiple *wh*-question that has a SA reading *wh*-phrases make a pair and function as an operator in pairs. It indicates for the Japanese multiple *wh*-question like (25) that there is a set that contains the pairs made by a person and an item, e.g. ((John, apples), (Bob, oranges), ...), and *wh*-phrases apply to one of them in pairs. However, the set to which *wh*-phrases apply is not necessarily given in a context. Imagine that someone came into a luxury shop and stole a valuable necklace yesterday. A policeman came to the shop and asks a clerk:

- (28) a. *Kino-wa dare-ga nan-ji-ni koko-e ki-mashi-ta-ka?* [Jap.]
 yesterday-TOP who-NOM what-time-at here-to come-HON-PAST-Q¹⁴
 'Yesterday, who came here at what time?'
- b. *Kimura-san-ga 2-ji-ni ki-mashi-ta.*
 Kimura-HON-NOM 2-time-at come-HON-PAST
 'Mr. Kimura came at 2:00.'
- c. ((Kimura, 2:00), (Sato, 3:00), ...)

In the context above the policeman who asks (28a) does not need to have the list of the information on who came to the shop at what time (28c) in advance. In that sense (28b) can fully be appropriate as an answer that presents a new information consisting of a pair made by a person and the time at which he came.¹⁵ Therefore, I argue that in the multiple *wh*-question that has a SA reading *wh*-phrases carry a focus and function as a focus operator in pairs.

From all of the data and arguments above, I claim i) that the information structure of the multiple *wh*-question that has a SA reading differs from that of

¹⁴ 'HON' indicates an honorific morpheme.

¹⁵ Note also that the topic marker *-wa* is attached to *kino* 'yesterday' in sentence-initial position in (28a). This indicates that neither a *wh*-subject *dare* 'who' nor a *wh*-time adverbial *nan-ji* 'what time' is given a topic status.

the multiple *wh*-question that has a PA reading in that *wh*-phrases carry a focus in pairs in the former, ii) that it is uniformly derived for all languages in the way that the two *wh*-phrases move and function as a focus operator in pairs, and iii) that spelled-out positions of *wh*-phrases are solely determined in PHON. Specifically, in Japanese the *wh*-subject *dare* ‘who’ and the *wh*-object *nani* ‘what’ make a pair and move to the operator position in pairs; they are both spelled out in situ in some cases (29a); in others (29b) the *wh*-subject is spelled out in situ and the *wh*-object is spelled out in sentence-initial position. In Finnish the *wh*-subject *kuka* ‘who’ and the *wh*-object with a bare form *kenen* ... ‘whose ...’ make a pair and move to the operator position together; the former is spelled out in sentence-initial position and the latter is spelled out in situ (30). In Hungarian the *wh*-subject *ki* ‘who’ and the *wh*-object *kit* ‘whom’ make a pair and move to the operator position in pairs; the former is spelled out in sentence-initial position and the latter is spelled out in situ (31).¹⁶

- (29) a. [_{CP} ~~dare-ga~~+~~nani-o~~ [_{TP} ... [_{V*P} ~~dare-ga~~... [_{VP} ... ~~nani-o~~]]]] (=25a)
 b. [_{CP} ~~dare-ga~~+~~nani-o~~ [_{TP} ... [_{V*P} ~~dare-ga~~... [_{VP} ... ~~nani-o~~]]]] (=25b)
- (30) [_{CP} ~~kuka~~+~~kenen~~ ... [_{TP} ... [_{V*P} ~~kuka~~ ... [_{VP} ... ~~kenen~~ ...]]]] (=26)
- (31) [_{CP} ~~ki~~+~~kit~~ [_{TP} ... [_{V*P} ~~ki~~ ... [_{VP} ... ~~kit~~]]]] (=27b)

Briefly summarizing, in the multiple *wh*-question that has a PA reading

¹⁶ No restriction on the linear order of *wh*-phrases should arise, since they simply make a pair. Thus, a *wh*-object should freely be spelled out in sentence-initial position and a *wh*-subject in situ. This is attested by Japanese as illustrated by (25b), but not by Finnish; see below. Bošković (2002) suggests that the Japanese case is derived by scrambling. I turn to the issue on how spelled-out positions of *wh*-phrases can be determined in section 6.

i) *Mitä kuka osti? [Fin.]
 what-PAR who-NOM bought
 ‘What who bought’
 (Huhmarniemi and Vainikka 2011:2-3,(4))

the *wh*-phrase interpreted as specific always moves to the position higher than the *wh*-phrase interpreted as focus in NS, and the former takes wide scope over the latter as a universal quantifier. In the multiple *wh*-question that has a SA reading *wh*-phrases make a pair, and move and function as a focus operator in pairs. The derivation of the multiple *wh*-question that has a PA reading proceeds in one uniform way for all languages, and the derivation of the multiple *wh*-question that has a SA reading proceeds in another uniform way for all languages. Spelled-out positions of *wh*-phrases are solely determined in PHON.

4. Syntax of multiple *wh*-questions

In this section I propose the ways of deriving multiple *wh*-questions. In the multiple *wh*-question that has a PA reading the *wh*-phrase interpreted as specific always moves to the position higher than the one interpreted as focus and takes scope over the latter. In the current phase system a category is interpreted in the position raised by (the [Edge] feature of) a feature in a functional head. I propose that in the multiple *wh*-question that has a PA reading C has [Spe(cific)] and [Foc(us)], and those features raise a *wh*-phrase respectively. On the basis of Chomsky (2008) (and also Miyagawa 2010), who proposes that [Agree] (i.e. φ -features) inherited from C to T raises a *wh*-subject in [Spec,v*P] to [Spec,TP] and [Edge] in C raises it to [Spec,CP] ‘in a parallel way’, I provide the way of deriving (10a) as illustrated in (32). The *wh*-subject in [Spec,v*P] is raised by [Agree] inherited from C to T and its two copies make an A-chain, i.e. $\langle v_{em_2}, v_{em_3} \rangle$.¹⁷ The *wh*-subject in [Spec,v*P] is also directly raised by [Spe] in C, and the raised *wh*-phrase v_{em_1} functions as the distributive universal quantifier operator that ranges over the A-chain. The *wh*-object is raised by [Edge] in v* after Case-agreement (or due to [wh] of the *wh*-object, cf.

¹⁷ The in-situ *wh*-subject v_{em_3} will also make an A-chain by itself, which I leave aside here.

Chomsky 2008), and its copies make an A-chain, i.e. $\langle vad_2, vad_3 \rangle$. The *wh*-object in (the outer) [Spec,v*P] is successively raised by [Foc] in C, and the raised *wh*-phrase vad_1 functions as the focus *wh*-operator that ranges over the A-chain.

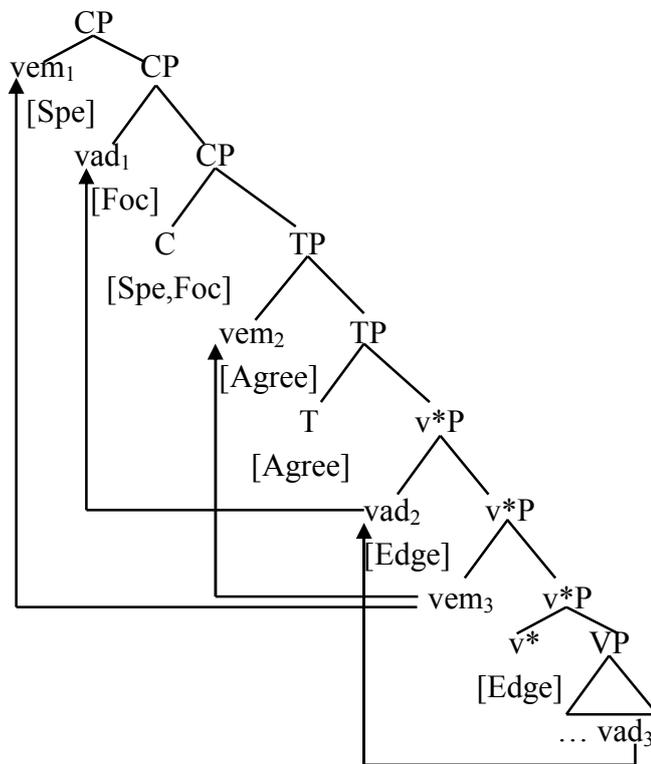
The derivation of (11b), in which the SE is avoided, proceeds in the same way, as illustrated in (33).¹⁸ The *wh*-subject in [Spec,v*P] is raised by [Agree] inherited from C to T and its two copies make an A-chain, i.e. $\langle vilken\ person_2, vilken\ person_3 \rangle$. The *wh*-subject in [Spec,v*P] is also directly raised by [Spe] in C, and the raised *wh*-phrase $vilken\ person_1$ functions as the distributive universal quantifier operator that ranges over the A-chain. The *wh*-object is raised to [Spec,v*P], and its copies make an A-chain, i.e. $\langle vilken\ mat_2, vilken\ mat_3 \rangle$. The *wh*-object in (the outer) [Spec,v*P] is successively raised by [Foc] in C, and the raised *wh*-phrase $vilken\ mat_1$ functions as the focus *wh*-operator that ranges over the A-chain.

In both of the cases above [Spe] always raises a *wh*-phrase to a higher position than [Foc] does. They differ in spelled-out positions of *wh*-phrases, which are solely determined in PHON. In (32) the *wh*-object vad_3 is spelled out in situ after the Spell-Out S-O of v*P, and the *wh*-subject in (the outer) [Spec,CP] vem_1 is spelled out after the S-O of CP. In (33) the *wh*-subject in (the inner) [Spec,v*P] $vilken\ person_3$ and the *wh*-object in (the inner) [Spec,CP] $vilken\ mat_1$ are spelled out after the S-O of CP.¹⁹

¹⁸ See footnote 11. Here I tentatively assume that the *wh*-subject $vilken\ person$ is interpreted as specific, and the *wh*-object $vilken\ mat$ as focus.

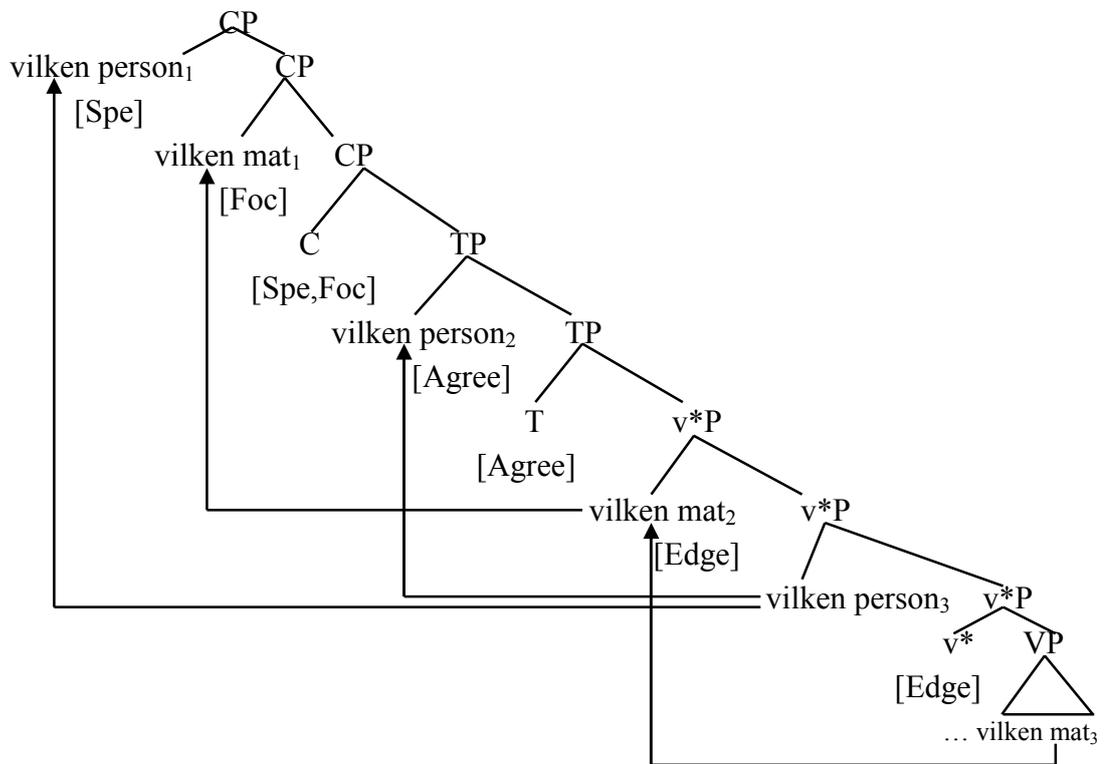
¹⁹ Christer Platzack (p.c.) points out that (32a) also has the interpretation that vem can be interpreted as focus, and vad as specific. In that case it is [Foc] that raises vem , and [Spe] that raises vad . Vad moves higher than vem and functions as the distributive universal quantifier operator. Vem , which is raised in the position lower than vad , functions as the focus *wh*-operator. The in-situ *wh*-object vad_3 and the *wh*-subject in (the inner) [Spec,CP] vem_1 are spelled out respectively.

- (32) a. Vem åt vad? (=10a)
 ‘Who ate what?’



- b. $\langle vем_2, vем_3 \rangle$ – A-chain
 $vем_1$ – distributive universal quantifier operator that ranges over the
 A-chain $\langle vем_2, vем_3 \rangle$
 $\langle vad_2, vad_3 \rangle$ – A-chain
 vad_1 – focus *wh*-operator that ranges over the A-chain $\langle vad_2, vad_3 \rangle$

- (33) a. Vilken mat åt vilken person? (=11b)
 ‘Which food did which person eat?’



- b. $\langle \text{vilken person}_2, \text{vilken person}_3 \rangle$ – A-chain
 vilken person₁ – distributive universal quantifier operator that ranges over the A-chain $\langle \text{vilken person}_2, \text{vilken person}_3 \rangle$
 $\langle \text{vilken mat}_2, \text{vilken mat}_3 \rangle$ – A-chain
 vilken mat₁ – focus *wh*-operator that ranges over the A-chain $\langle \text{vilken mat}_2, \text{vilken mat}_3 \rangle$

In the case of the multiple *wh*-question that has a SA reading *wh*-phrases make a pair and they carry a focus in pairs. I assume that C has only [Foc] in this case.²⁰ Assuming sideward movement (Nunes 2004, Hornstein 2001), I

²⁰ Christer Platzack (p.c.) points out that this assumption could be a ‘look ahead’ case, with the assumption on the multiple *wh*-question that has a PA reading taken into account. In the current ‘phase’ framework (Chomsky 2000, 2001, 2004, 2008) the phasal heads, v* and C, are freely assigned the discourse-related feature(s) in the course of a derivation due to the interface requirement. Since the interpretation differs between the multiple *wh*-question that has a PA reading and the one that has a SA reading, it is not surprising if C is assigned [Spe] and [Foc] in the former, whereas it is assigned only [Foc] in the latter.

- b. <nani-o₂,nani-o₃> – A-chain
 <dare-ga₂,dare-ga₃> – A-chain
 nani-o₁ – focus *wh*-operator that ranges over the A-chain
 <nani-o₂,nani-o₃>
 dare-ga₁ – focus *wh*-operator that ranges over the A-chain
 <dare-ga₂,dare-ga₃>

5. Intonational properties of multiple *wh*-questions

We have argued that spelled-out positions of *wh*-phrases are solely determined in PHON in both the multiple *wh*-question that has a PA reading and the one that has a SA reading. A question remains: what factors in PHON can determine spelled-out positions of *wh*-phrases in individual languages? Specifically, in, e.g. the multiple *wh*-question that has a PA reading, what factors in PHON can determine that both the *wh*-phrase interpreted as specific and the one interpreted as focus are always spelled out in higher positions in Hungarian (21a-b), and so on?

The literature have discussed the intonational properties of individual languages. Szendrői (2003) presents Hungarian data and shows that a sentence accent that expresses the focus of a sentence is strictly located on the constituent that immediately precedes a finite verb, except when the verb itself receives a focus accent. A single *wh*-question (35a) asks a missing information of an object. In the answer (35b) the object *egy könyvet* ‘a book’, which is located in the position right before a finite verb *vett* ‘bought’, carries the focus of a sentence, with the sentence accent coming on it. (Partially) due to this intonational property, Surányi (2007) argues that the *wh*-phrase located right before a main verb, e.g. *mit* ‘what’ in (27a), carries the focus of a sentence in multiple *wh*-questions.

- (35) a. Mit vett a barátod? [Hun.]
 what-ACC bought the friend-yours
 ‘What did your friend buy?’
- b. (A barátom) egy KÖNYVET vett.
 friend-my a book-ACC bought
 ‘My friend bought a BOOK.’
 (Szendrői 2003:38,(3a-b))

German belongs to the English type, in which one *wh*-phrase appears in sentence-initial position with the other appearing in situ or in a lower position.²² The SE does not arise in the German multiple *wh*-question in the unmarked case, as illustrated in (36a-b). According to Büring (1997), a topic must precede a focused constituent in German. The former is realized by a rising intonation and the latter by a falling intonation. This statement indicates for multiple *wh*-questions that when *wer* ‘who’ appears in sentence-initial position, it is interpreted as specific and *was* ‘what’ in a sentence-medial position is interpreted as focus (36a). When *was* ‘what’ appears in sentence-initial position, on the other hand, it is interpreted as specific and *wer* ‘who’ in a sentence-medial position is interpreted as focus (36b). The *wh*-phrase interpreted as specific (i.e. *wer* (36a)/*was* (36b)) is realized by a rising intonation. The pitch peak comes on the main syllable of the *wh*-phrase interpreted as focus (i.e. *was* (36a)/*wer* (36b)), from which pitch falls.²³

- (36) a. ^Wer hat was↘ gelesen? [Ger.]
 who has what read
 ‘Who read what?’

²² See Grohmann (2006) for a detailed analysis of the German multiple *wh*-question.

²³ Many thanks to Jana Häussler and Malte Zimmermann (p.c.) for the native judgment of German.

- b. \nearrow Was hat wer \searrow gelesen?
 what has who read
 ‘Who read what?’

Ishihara (2002) reports the intonational properties of the *wh*-question in Japanese, a *wh*-in-situ language. In declarative sentences (37a) pitch slightly rises before each of the sentential elements, though the pitch level on each constituent gradually lowers due to downdrift. In *wh*-question (37b) pitch peak comes on the *wh*-phrase *nani* ‘what’, which receives a focus accent too. The pitch level on the sentential element that follows the *wh*-phrase (i.e. *kat-ta* ‘buy-PAST’) significantly lowers, accompanied by the deaccentuation of that element. The low pitch continues until the Q-morpheme *-no* appears, where pitch slightly rises again.²⁴

- (37) a. \nearrow Taro-ga \searrow \nearrow nanika-o \searrow \nearrow kat-ta \searrow . [Jap.]
 Taro-NOM something-ACC buy-PAST
 ‘Taro bought something.’
- b. \nearrow Taro-wa \searrow \nearrow NANI-O \searrow $\overrightarrow{\text{kat-ta-no}}\nearrow$?
 Taro-TOP what-ACC buy-PAST-Q
 ‘What did Taro buy?’

On the basis of the data and statements above I suggest that the intonational properties of individual languages are closely involved in determining spelled-out positions of *wh*-phrases in multiple *wh*-questions.

²⁴ See Comorovski (1996) for Romanian, a multiple *wh*-fronting language, in which pitch must fall right after the last *wh*-element, i.e. *ce* (i). See Boucher (2010) for French, in which more than 90% of the *wh*-in-situ constructions are realized by a falling intonation (ii).

- i) Cine ce \searrow a uitat să deschidă? [Rom.]
 who what has forgotten to open
 ‘Who forgot to open what?’
- ii) Tu vas où \searrow ? [Fre.]
 you go where
 ‘Where do you go?’

Let us turn to the SE repeated below (38). Assuming the arguments made in this paper, the *wh*-subject that appears in situ *vem* could be interpreted as specific, and the *wh*-object in sentence-initial position *vad* as focus. It should be possible that the *wh*-subject *vem* is raised by [Spe] in C and moves to the position higher than the *wh*-object *vad*, which is raised by [Foc]; the former could be spelled out in situ and the latter in the moved position, contrary to fact:

(38) a. *Vad åt vem? (=10b)

b. * $[_{CP} \text{vem} \quad [_{CP} \text{vad} \quad C \quad [_{TP} \dots [_{v*P} \text{vem} \dots [_{VP} \dots \text{vad}]]]]]$
 [Spe] [Foc] [Spe,Foc]
 * $\langle \text{vem}, \text{vem} \rangle$, $\langle \text{vad}, \text{vad} \rangle$

A conjecture from the argument in this section is that the SE is also derived from some factors in PHON. Let us consider the SE in English. According to the literature (Bolinger 1965, Jackendoff 1972, Büring 1997), a topic is realized by a fall-rise intonation and a focused phrase is realized by a falling intonation in English. A subject *John* is a topic and an object *candies* carries the focus of an answer sentence (39a); the subject *John* carries the focus and the object *candies* is a topic in the answer sentence (39b). The topic phrases *John* (39a) and *candies* (39b) are realized by a fall-rise, and the focused phrases *candies* (39a) and *John* (39b) are realized by a fall, as illustrated by arrows. In multiple *wh*-questions the *wh*-phrase interpreted as specific (i.e. *who* (40a)/*which present* (40b)/*who* (40c)) should be realized by a fall-rise, and the one interpreted as focus (i.e. *what* (40a)/*who* (40b)/*what* (40c)) should be realized by a fall.²⁵

²⁵ ‘|’ indicates an intonational phrase boundary.

- (39) a. What did John eat? – \uparrow John \downarrow \uparrow || ate CANDIES \downarrow . ||
 b. Who ate candies? – JOHN \downarrow || ate \uparrow candies \downarrow \uparrow . ||
- (40) a. \uparrow Who \downarrow \uparrow || ate what \downarrow ? || (=19b)
 b. Who \downarrow || did you give || \uparrow which present \downarrow \uparrow to? || (=19a)
 c. *What \downarrow || did \uparrow who \downarrow \uparrow buy? || (=37a)

Note that a fall-rise intonation on a topic/specific phrase aligns with the right/final boundary of an intonational phrase (cf. Nespor and Vogel 1986): \uparrow [John] \downarrow \uparrow || (39a); (ate) \uparrow [candies] \downarrow \uparrow || (39b); \uparrow [who] \downarrow \uparrow || (40a). The fall-rise on an in-situ *wh*-phrase (i.e. *which present* (40b) and *who* (40c)) does not align with the right boundary. However, it can be realized on more than one syllable in the case of *which*-phrases, whereas it must be realized on only one syllable in the case of monosyllabic *wh*-phrases. Then, the SE, I suggest, is derived from the inappropriate intonational pattern that could arise in the case of monosyllabic *wh*-phrases that are interpreted as specific and appear in situ: a fall-rise intonation would have to be realized on only one syllable that does not align with the right boundary of an intonational phrase; this situation is not compatible with the appropriate intonational patterns of English. More detailed studies of individual languages are required to identify the intonational factors that cause the SE as well as those which actually determine spelled-out positions of *wh*-phrases. I leave these studies for future research.²⁶

²⁶ On the basis of Ishihara's (2002) data, Richards (2010) proposes a universal constraint that a *wh*-phrase must not be separated from a complementizer by phonological phrases. According to him, a language takes either one of the strategies: i) one prosodic domain that contains C and a *wh*-phrase is made, with all phonological boundaries removed between them, e.g. Japanese; ii) a *wh*-phrase is raised to shorten the distance from it to C, with phonological

6. Conclusion

In this paper I have argued that in the multiple *wh*-question that has a PA reading the *wh*-phrase interpreted as specific always moves to the position higher than the *wh*-phrase interpreted as focus and takes wide scope over the latter as a universal quantifier, with the SE not arising in the unmarked case. I also argued that in the multiple *wh*-question that has a SA reading *wh*-phrases move and function as a focus operator in pairs. I argued that the information-structural effects differ between the multiple *wh*-question that has a PA reading and the one that has a SA reading, thus the way of deriving them in NS differs too, with spelled-out positions of *wh*-phrases solely determined in PHON. I suggested that spelled-out positions of *wh*-phrases are determined by the intonational properties of individual languages, and that the SE is caused by the inappropriate intonational pattern that could arise in the case of monosyllabic *wh*-phrases that are interpreted as specific and appear in situ.

The data and arguments presented here show that the SE is not caused by any problems in NS operations. The derivation of the multiple *wh*-question that has a PA reading proceeds in one uniform way for all languages, and the derivation of the multiple *wh*-question that has a SA reading proceeds in another uniform way for all languages. The cause of the SE is attributed to an inappropriate intonational pattern that could arise in PHON, not to any NS operations. Thus, I suggest that the SE is not problematic any longer in the currently assumed framework (Chomsky 2008).

boundaries left as they are, e.g. English. With this constraint, it could be argued here that in C-initial languages like English *wh*-phrases are spelled out in a higher position, whereas in C-final languages like Japanese they are spelled out in situ. Though this argument could apply to ‘rigid’ multiple *wh*-fronting languages like Bulgarian, many exceptional cases arise for multiple *wh*-questions in general: for instance, one *wh*-phrase is spelled out in sentence-initial position and the rest in situ in, e.g. English. As we have seen so far, different languages have different options for spell-out positions of *wh*-phrases in multiple *wh*-questions.

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