Abstract
I discuss multiple wh-questions from the perspective of information structure. I argue that information-structural effects differ between multiple wh-questions with a pair-list answer reading and ones with a single-answer reading, thus the way of deriving them in narrow syntax differs too. I claim that the spelled-out positions of wh-phrases are solely determined in the phonological component, specifically by the intonational properties of individual languages. I also argue that the Superiority Effect is derived from a conflicting pitch pattern caused by in-situ monosyllabic wh-subjects and no longer problematic in the current phase framework.

1. Introduction

It is well-known that in multiple wh-questions one wh-phrase moves to sentence-initial position and the other wh-phrase remains in situ, e.g. in English (1), whereas all wh-phrases remain in situ, e.g. in Japanese (2). It has been 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 such as ‘he gave a ring to Mary, a flower to Lucy,…’, whereas (2) can have both a PA such as ‘John bought a ring, Bob a flower, …’ and a SA such as ‘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 has also been widely claimed that, e.g. in 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* (3) can be raised to sentence-initial position, whereas *what* (4) 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 the *wh*-subject *which student* (5a) or the *wh*-object *which book* (5b) can move to sentence-initial position.

(3) a. Who bought what?

   b. [CP who C [TP who [vP who bought [VP ... what]]]]

(4) a. *What did who buy?*

   b. [CP what did [TP who ... [vP 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 framework, which I introduce in the next section.

In this paper, I discuss multiple *wh*-questions from the perspective of information structure. I argue that the information-structural effects differ between multiple *wh*-questions with a PA reading and ones with a SA reading, thus the way of deriving them in narrow syntax NS differs too: the derivation of the former proceeds in one uniform way for all languages, on the one hand, and the derivation of the latter proceeds in another uniform way for all languages, on the other. I argue that the spelled-out positions of *wh*-phrases are solely determined in the phonological component PHON, specifically by the intonational properties of individual languages. I also claim that the SE (in English) is derived from a conflicting pitch pattern that
could arise in the case of in-situ monosyllabic \textit{wh}-subjects and no longer problematic in the current phase framework. This paper is organized as follows. In section 2, I introduce the problems of multiple \textit{wh}-questions that arise in the currently assumed phase framework and cartographic system. In section 3, I discuss the information-structural properties of multiple \textit{wh}-questions. With data from several languages, I argue that in multiple \textit{wh}-questions with a PA reading, the \textit{wh}-phrase that is interpreted as specific always moves to the position higher than the \textit{wh}-phrase that is interpreted as the focus and takes a wider scope over the latter as a distributive universal quantifier operator. I also show that the SE does not arise in the unmarked case. I claim that in multiple \textit{wh}-questions with a SA reading, \textit{wh}-phrases compose a pair, and move and function as a focus operator together. In section 4, I provide a derivational way for both types of multiple \textit{wh}-questions. In section 5, discussing the intonational properties of (multiple) \textit{wh}-questions, I argue that the spelled-out positions of \textit{wh}-phrases are determined by the intonational properties of individual languages. I also claim that the SE in English is caused by a conflicting pitch pattern that could arise in the case of in-situ monosyllabic \textit{wh}-subjects. In section 6, I briefly conclude this paper.


2. The problems of multiple \textit{wh}-questions

Languages differ in whether and how many \textit{wh}-phrases move in multiple \textit{wh}-questions. All \textit{wh}-phrases move to sentence-initial position in Slavic languages (6). One \textit{wh}-phrase moves to sentence-initial position, with the other \textit{wh}-phrase(s) remaining in situ, e.g. in English (7). All \textit{wh}-phrases remain in situ, e.g. in Japanese (8). Languages such as French have the option between the English type and the Japanese type: only one \textit{wh}-phrase moves in some cases (9a);
all *wh*-phrases can remain in situ in others (9b).²

(6) Koj kakvo e kupil?  who what is bought
   ‘Who bought what?’  [Bul.]

(7) What did John give to whom?

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

(9) a. Qu’ a-t-il donné à qui?  what has-he given to who
    ‘What did he give to whom?’

   b. Il a donné quoi à qui?  he has given what to whom
    ‘What did he give to whom?’  [Fre.]

In the phase framework it is assumed that the computation of human language uniformly proceeds in NS and the semantic component SEM for all languages (cf. Chomsky 2004). This assumption is ‘ensured’ by the cartographic system, in which the position where a category is located in NS corresponds, and in fact must correspond, to the interpretation that the category receives in SEM in all languages. Thus, a category that is located, e.g. in [Spec,Foc(us)P], in NS is, and must be, interpreted as the focus in SEM in all languages. Also conversely, a category that is interpreted as the 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 the phase framework and cartographic system introduced above. First, a category is interpreted in the moved position, being raised by (the [Egde] 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 as illustrated in (4) is problematic, as Chomsky (2008:152) notes: (the [Egde]
feature of) a feature in C could freely seek and raise either the \textit{wh}-subject \textit{who} or the \textit{wh}-object \textit{what} to its Spec, contrary to fact.  

Secondly, 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. Specifically in \textit{wh}-movement, a \textit{wh}-phrase appears in [Spec,CP] in English (10a), whereas it appears in situ in Japanese (11a). As long as their interpretation as a constituent \textit{wh}-question does not differ between these languages, a \textit{wh}-phrase must move to the operator position in NS in both English and Japanese. The surface difference should be attributed to which copy of the \textit{wh}-phrases is spelled out in PHON, i.e. either the copy in [Spec,CP] (10b) or the copy in situ (11b) (cf. Groat & O’Neil 1996). 

(10) a. What did you eat?  
   b. [CP what ... [TP ... [vP ... [vP ... what]]]] (<what,what>)

(11) a. Kimi-wa nani-o tabe-ta-no?  
   ‘What did you eat?’  
   b. [CP nani-o ... [TP ... [vP ... [vP nani-o ...]]]] (<nani-o,nani-o>)

In the same way, all \textit{wh}-phrases in a multiple \textit{wh}-question should move to the operator position to take the scope as a \textit{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 a \textit{wh}-chain is spelled out in PHON, i.e. either the highest copy in all \textit{wh}-chains (12a), the highest copy in one \textit{wh}-chain and the in-situ copy in the other \textit{wh}-chain (12b), or the in-situ copy in all \textit{wh}-chains (12c) (cf. Bošković & Nunes 2007)

(12) a. [CP koj kakvo ... [TP ... [vP koj ... [vP ... kakvo]]]]  
   \textit{wh}-chains: <koj,koj>, <kakvo,kakvo>  
   (=6)

 b. [CP who what ... [TP ... [vP who ... [vP ... what]]]]  
   \textit{wh}-chains: <who,who>, <what,what>  
   (=3a)
3. Information structure of multiple *wh*-questions

3.1. *Multiple wh*-questions with a pair-list answer reading

É. Kiss (1993) claims that multiple *wh*-questions trigger the specific reading for either one of the *wh*-phrases. Without any context, *who* in a single *wh*-question (13a) is understood as non-specific in the unmarked case. *Who* in a multiple *wh*-question (13b) is more subject to the specific reading than *what*, as “it applies to a countable set of discrete entities, which can be … easily identified with a contextually or situationally given set” (É. Kiss 1993:87).

(13) a. Who ate it?

b. Who ate what?

Hungarian multiple *wh*-questions belong to the Bulgarian type (6), in which all *wh*-phrases move. The cases below are interpreted as a PA reading. É. Kiss states that a set of persons is known in (14a), in which *kinek* ‘who’ moves higher than *mit* ‘what’. The question is targeted at the direct object, which carries the focus of the sentence: (14a) means, ‘what did János bring for each person (known in the context)?’ A set of things is given in (14b), in which *mit* ‘what’ moves higher than *kinek* ‘who’. The question is targeted at the indirect object, which carries the focus of the sentence: (14b) means, ‘for whom did János bring each thing (known in the context)?’ (É. Kiss 1993:86).

(14) a. Kinek mit hozott János?  [Hun.]

who-DAT what-ACC brought János
‘What did János bring for whom?’
É. Kiss argues that in Hungarian, the position in which the highest *wh*-phrase (i.e. *kinek* ‘who’) (15a)) appears corresponds to the position in which a universal quantifier (i.e. *mindenkinek* ‘everybody’ (15b)) appears. She also argues that a specific *wh*-operator located in a higher position is interpreted as a distributive universal quantifier (É. Kiss 1993:107).

(15) a. János kinek mit hozott?  
   János who-dat what-acc brought  
   ‘What did János bring for whom (/What did János bring for each person (known in the context))?’

   b. János mindenkinek egy könyvet hozott.  
   János everybody-dat a book-acc brought  
   ‘János brought everybody a book (/János brought a book each for everybody).’

A similar situation is observed in Japanese multiple *wh*-questions (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 *wh*-phrases in the unmarked case (16a). Both PA and SA readings are available in Japanese multiple *wh*-questions, as we saw in (2). To force a PA reading, *-wa* is attached to one of the *wh*-phrases (16b-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, and the one to which it is not attached is interpreted as focus. The SE does not arise, and the *wh*-phrase with *-wa* appears in the position higher than the one without it.

(16) a. Dare-ga/*-wa kore-o kat-ta-no?  
   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  
   ‘What did each person (known in the context) buy?’  
   (*dare* ‘who’ – specific; *nani* ‘what’ – focus)
In English multiple wh-questions, in which one wh-phrase appears in sentence-initial position and the other remains in situ, a wh-subject that appears in sentence-initial position tends to be interpreted as specific, as we saw in (13b) (, which is repeated in (17a)). É. Kiss (1993) points out that (17b), in which the SE is avoided, is interpreted as ‘to whom did you give each present (known in the context)?’: the in-situ wh-direct object which present is interpreted as specific and the wh-indirect object in sentence-initial position who is interpreted as the focus. These data show that in English wh-phrases can be spelled out either in sentence-initial position or in situ, regardless of the interpretation they receive.

(17)  a.  Who ate what?

b.  Who did you give which present to who?

Finnish multiple wh-questions belong to the English type as introduced above. In the multiple wh-question (18a), which has only a PA reading such as ‘Pekka stands on Merja’s toes, Minna stands on Antti’s toes, …’, a suffix -kin, which triggers a distributive reading of wh-phrases (Hakulinen & Karlsson 1979, Karttunen & Peters 1980, 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 (18b). This shows 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 the focus. Finnish differs from the other languages seen above in that the wh-phrase interpreted as specific always appears in a lower position than the one interpreted as the focus.

(18)  a.  Kuka seisoo kenen-kin varpailla?

who-NOM stands whose-kin toes.on

‘Who stands on whose toes?’
b. Mitä kuka-kin osti?
   what-PAR who-NOM-kin bought
   ‘What did each person (known in the context) buy?’
   (Huhmamiemi and Vainikka 2011:2-3,(3a),(5))

All of the data above show i) that the information structure of multiple *wh*-questions with a PA reading does not differ among languages in that this type of multiple *wh*-question contains one *wh*-phrase interpreted as specific and the other *wh*-phrase interpreted as the focus, ii) that this kind of multiple *wh*-question is uniformly derived for all languages in the way that the *wh*-phrase interpreted as specific moves higher than the *wh*-phrase interpreted as the focus to take a wider scope over the latter as a distributive universal quantifier operator, and iii) that the SE does not arise in the unmarked case, with the spelled-out positions of *wh*-phrases solely determined in PHON. Specifically, see (19a-b). In all the languages above, the *wh*-phrase interpreted as specific, which is represented by *wh*∀, moves higher than the other *wh*-phrase interpreted as the focus, which is represented by *wh*∃ regardless of which one is a *wh*-subject or a *wh*-object (and aside from the basic word order). In Hungarian the copy of a *wh*-phrase is always spelled out in the highest position regardless of whether it is interpreted as specific or the focus (20a-b). In Japanese the copy of the *wh*-phrase interpreted as specific is always spelled out in the highest position, and the one interpreted as the focus is spelled out in situ (21a-b). In English the copy of the *wh*-phrase interpreted as specific is spelled out in the highest position and the copy of the *wh*-phrase interpreted as the focus is spelled out in situ in some cases (22a); the copy of the former is spelled out in situ and the copy of the latter is spelled out in the highest position in others (22b). In Finnish the *wh*-phrase interpreted as specific is always spelled out in situ, and the *wh*-phrase interpreted as the focus is spelled out in the highest position (23a-b).

(19)  a. \[CP \text{-} \textbf{wh}\forall \left[CP \text{-} \textbf{wh}\exists \left[TP \ldots \left[vP \text{-} \textbf{wh}\exists \left[vP \ldots \text{wh}_1\right]\right]\right]\right]\]
   b. \[CP \text{-} \textbf{wh}\forall \left[CP \text{-} \textbf{wh}\exists \left[TP \ldots \left[vP \text{-} \textbf{wh}\exists \left[vP \ldots \text{wh}_2\right]\right]\right]\right]\]

(20)  a. \[CP \text{-} \textbf{kinek} \left[CP \text{-} \textbf{mit} \ldots \left[TP \ldots \left[vP \ldots \left[vP \ldots \text{\textbf{kinek mit}}\right]\right]\right]\right]\]
   b. \[CP \text{-} \textbf{mit} \left[CP \text{-} \textbf{kinek} \ldots \left[TP \ldots \left[vP \ldots \left[vP \ldots \text{\textbf{kinek mit}}\right]\right]\right]\right]\]  (=14a)
   (=14b)
(21) a.  \[\text{CP dare-wa [CP nani-o ... [TP ... [vP dare-wa ... [VP nani-o ...]]]]} \]
\[=16b\] 
b.  \[\text{CP nani-wa [CP dare-ga ... [TP ... [vP dare-ga ... [VP nani-wa ...]]]]} \]
\[=16c\] 

(22) a.  \[\text{CP who [CP what ... [TP ... [vP who ... [VP ...what]]]]} \]
\[=17a\] 
b.  \[\text{CP which present [CP who ... [TP ... [vP ... which present ... who]]]]} \]
\[=17b\] 

(23) a.  \[\text{CP kenen-kin ... [CP kuka ... [TP ... [vP kuka ... [VP ... kenen-kin ...]]]]} \]
\[=18a\] 
b.  \[\text{CP kuka-kin [CP mitä ... [TP ... [vP kuka-kin ... [VP ... mitä]]]]} \]
\[=18b\] 

3.2. Multiple wh-questions with a single-answer reading

I now turn to multiple wh-questions with a SA reading. In Japanese, the topic marker -wa, which forces a PA reading, cannot appear when a multiple wh-question has a SA reading. Compare (24a-b) with (16b-c). Note also that either a wh-subject (24a) or a wh-object (24b) can appear in sentence-initial position: the SE does not arise.

(24) a.  Dare-ga/#-wa nani-o kat-ta-no?  
\[\text{who-NOM/-TOP what-ACC buy-PAST-Q} \]
\[\text{‘Who bought something, and what was it?’} \]

b.  Nani-o/#-wa dare-ga kat-ta-no? 
\[\text{what-ACC/-TOP who-NOM buy-PAST-Q} \]
\[\text{‘What did someone buy, and who was that person?’} \]

In Finnish, in order for a multiple wh-question to obtain a SA reading, the suffix -kin, which triggers a distributive reading of wh-phrases, cannot appear with a wh-phrase. Below, a SA reading such as ‘Pekka stands on Merja’s toes’ can be obtained when the suffix -kin is not attached to the wh-phrase kenen that appears in the in-situ position.

(25) Kuka seisoo kenen(#-kin) varpaila? 
\[\text{who-NOM stands whose -kin toes.on} \]
\[\text{‘Who stands on whose toes?’} \]
\[\text{(Huhmarniemi and Vainikka 2011:1-2,(2-3a))} \]
É. Kiss (1993:99) observes for Hungarian that (15a) repeated in (26a) cannot have a SA reading: it cannot be interpreted as ‘for whom did János bring something, and what was it?’ (26b) is the construction in which a SA reading such as ‘John killed Bob’ is obtainable. A 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. According to É. Kiss, SA can be obtained when wh-phrases apply to the same set in a given context. Specifically in (26b), 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. É. Kiss’s argument indicates that in multiple wh-questions with a SA reading, wh-phrases compose a pair and function as an operator together.

(26) a. János kinek mit hozott?
    János who-DAT what-ACC brought
    ‘What did János bring for whom (/What did János bring for each person (known in the context))?’

    b. A regény végén ki öl meg kit?
    the novel’s end who kills PERF whom
    ‘Who kills whom at the end of the novel?’

É. Kiss’s argument indicates for Japanese multiple wh-questions such as (24) that there is a set that contains pairs consisting of a person and an item, (John, apples), (Bob, oranges), …), and the pair of wh-phrases applies to one of them. However, the set to which wh-phrases apply does not always have to be 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 asked a clerk with (27a) and the clerk answered with (27b). In this context, the policeman who asked (27a) does not need to have the information list of who came to the shop at what time (27c) in advance. In that sense, (27b) can be fully appropriate as an answer that presents new information on a person and the time at which he came. Therefore, I argue that in multiple wh-questions with a SA reading, wh-phrases carry the focus of a sentence together.
    ‘Yesterday, who came here at what time?’

    ‘Mr. Kimura came at 2:00.’

     c. ((Kimura, 2:00), (Sato, 3:00), …)

All of the arguments above show i) that the information structure of multiple $wh$-questions with a SA reading differs from that of multiple $wh$-questions with a PA reading in that $wh$-phrases carry a focus together in the former, ii) that multiple $wh$-questions with a SA reading are uniformly derived for all languages in the way that two $wh$-phrases move and function as a focus operator together, and iii) that the SE does not arise in the unmarked case, with the spelled-out positions of $wh$-phrases solely determined in PHON. Specifically, see (28). In all the languages above, a $wh$-subject and a $wh$-object, both of which are represented by $wh_{\exists}$, compose a pair, and move to the operator position together (aside from the basic word order). In Japanese both $wh$-phrases are spelled out in situ in some cases (29a); in others, a $wh$-subject is spelled out in situ and a $wh$-object is spelled out in sentence-initial position (29b). In Finnish a $wh$-subject is spelled out in sentence-initial position and a $wh$-object (to which the suffix -$kin$ is not attached) is spelled out in situ (30). Similarly in Hungarian, a $wh$-subject is spelled out in sentence-initial position and a $wh$-object is spelled out in situ (31).

(28)  $[CP \, wh_{\exists}+wh_{\exists} \, [TP \, … \, [vP \, wh_{\exists} \, [VP \, … \, wh_{\exists}]]]$

(29)  a.  $[CP \, dare-ga+nani-o \, [TP \, … \, [vP \, dare-ga\, \, [VP \, nani-o \, …]]] \quad (=24a)$
     b.  $[CP \, dare-ga+nani-o \, [TP \, … \, [vP \, dare-ga\, \, [VP \, nani-o \, …]]] \quad (=24b)$

(30)  $[CP \, kuka+kenen \, [TP \, … \, [vP \, kuka \, \, [VP \, … \, kenen \, …]]]] \quad (=25)$

(31)  $[CP \, ki+kit \, [TP \, … \, [vP \, ki \, \, [VP \, … \, kit]]]] \quad (=26b)$
3.3. Brief summary

To sum up, in multiple *wh*-questions with a PA reading, the *wh*-phrase interpreted as specific always moves to the position higher than the *wh*-phrase interpreted as the focus in NS, and the former takes a wider scope over the latter as a distributive universal quantifier operator. In multiple *wh*-questions with a SA reading, *wh*-phrases compose a pair, and move and function as a focus operator together. The derivation of the former proceeds in one uniform way for all languages, on the one hand, and the derivation of the latter proceeds in another uniform way for all languages, on the other. The SE does not arise in the unmarked case, and the spelled-out positions of *wh*-phrases are solely determined in PHON.

The proposed information-structural analyses of multiple *wh*-questions are compatible with existing semantic analyses of *wh*-questions. Hagstrom (1998) argues that the semantic value of multiple *wh*-questions with a PA reading is represented as a set of questions: asking ‘who bought what?’ is equivalent to asking a series of the questions ‘what did John buy?, what did Mary buy?, what did Bill buy’ (Hagstrom 1998:147). As can be seen clearly, the subjects *John*, *Mary* and *Bill* have been already presented in this series of questions. Thus, the semantic value that is to be assigned to the *wh*-subject in ‘who bought what?’ is provided as the topic in the answer sentence. This analysis is fit for the proposal here based on information structure that this type of multiple *wh*-question contains one *wh*-phrase interpreted as specific and the other *wh*-phrase interpreted as the focus.

Hagstrom (1998:147) also argues that the semantic value of the multiple *wh*-question with a SA reading is represented as a set of propositions and it is ‘answered by providing a single proposition, filling in a single value for each *wh*-phrase’. His statement indicates that the values that are given to each *wh*-phrase compose one proposition (in collaboration with a verb taking them as complements). That the proposition composed by the values given to each *wh*-phrase is provided as an answer indicates that they carry the focus of the answer sentence together, as claimed in this paper.
4. Syntax of multiple *wh*-questions

In this section I propose the ways of deriving multiple *wh*-questions. In the phase framework a category is interpreted in the position raised by (the [Edge] feature of) a feature in a functional head. We have seen that in multiple *wh*-questions with a PA reading, the *wh*-phrase interpreted as specific always moves higher than the *wh*-phrase interpreted as the focus and takes a wider scope over the latter as a distributive universal quantifier operator. I propose that in this type of multiple *wh*-question, C has the features of [Sp(ecific)] and [Foc(us)], and these features raise a *wh*-phrase respectively. I provide the way of deriving (17a) as illustrated in (32). The *wh*-subject in [Spec,v*P] is raised by [Agree] inherited from C to T and its two copies compose an A-chain, i.e. <who,who>. The *wh*-subject in [Spec,v*P] is also directly raised by [Sp] in C, and the raised *wh*-phrase who functions as the distributive universal quantifier operator that ranges over the A-chain (cf. Chomsky 2008, Miyagawa 2010). The *wh*-object is raised by [Edge] in v* after Case-agreement (or due to [wh] of the *wh*-object, cf. Chomsky 2008), and its copies compose an A-chain, i.e. <what,what>. The *wh*-object in (the outer) [Spec,v*P] is successively raised by [Foc] in C, and the raised *wh*-phrase what functions as the focus *wh*-operator that ranges over the A-chain.

The derivation of (5b), in which the SE is avoided, proceeds in the same way, as illustrated in (33). The *wh*-subject in [Spec,v*P] is raised by [Agree] inherited from C to T and its two copies compose an A-chain, i.e. <which student,which student>. The *wh*-subject in [Spec,v*P] is also directly raised by [Sp] in C, and the raised *wh*-phrase which student 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 compose an A-chain, i.e. <which book,which book>. The *wh*-object in (the outer) [Spec,v*P] is successively raised by [Foc] in C, and the raised *wh*-phrase which book functions as the focus *wh*-operator that ranges over the A-chain.

In both (32-33), [Sp] always raises a *wh*-phrase higher than [Foc] does. (32-33) differ in the spelled-out positions of *wh*-phrases, which are solely determined in PHON. In (32) the *wh*-object what is spelled out in situ after the Spell-Out S-O of v*P; the *wh*-subject in (the
outer) [Spec,CP] who is spelled out after the S-O of CP. In (33) the wh-subject in (the inner) [Spec,v*P] which student and the wh-object in (the inner) [Spec,CP] which book are spelled out after the S-O of CP.

(32) a. Who ate what?  

b. <who,who> – A-chain
   who1 – distributive universal quantifier operator that ranges over the A-chain
   <who,who>
   <what,what> – A-chain
   what1 – focus wh-operator that ranges over the A-chain <what,what>
(33) a. Which book did which student read? (=5b)

b. \(<\text{which student}_2, \text{which student}_3> \rightarrow \text{A-chain}
\)
\(\text{which student}_1 \rightarrow \text{distributive universal quantifier operator that ranges over the A-chain <which student}_2, \text{which student}_3> \)
\(<\text{which book}_2, \text{which book}_3> \rightarrow \text{A-chain}
\)
\(\text{which book}_1 \rightarrow \text{focus wh-operator that ranges over the A-chain}
\)<which book}_2, \text{which book}_3>

We have seen that in multiple \(wh\)-questions with a SA reading, \(wh\)-phrases compose a pair and carry a focus together. I assume that C has only [Foc] in this case. I provide the way of deriving (8) as illustrated in (34). The in-situ \(wh\)-object is raised to [Spec,\(v^*\)P] and its two copies compose an A-chain, i.e. \(<\text{nani-o}_2, \text{nani-o}_3>\). The \(wh\)-subject in [Spec,\(v^*\)P] is raised by [Agree] inherited from C to T and its two copies compose an A-chain, i.e. \(<\text{dare-ga}_3, \text{dare-ga}_3>\). A copy is made for the \(wh\)-object \(nani-o_2\) in (the outer) [Spec,\(v^*\)P] and the in-situ \(wh\)-subject \(dare-ga_3\) respectively, and the two copies merge, resulting in a \(wh\)-complex \(dare-ga_1+nani-o_1\); the \(wh\)-complex is raised by [Foc] in C (cf. sideward movement, Nunes 2004, Hornstein 2001). The \(wh\)-subject \(dare-ga_1\) in the raised \(wh\)-complex functions as the focus \(wh\)-operator that ranges
over the A-chain consisting of the two wh-subject copies, <dare-ga₂,dare-ga₃>. The wh-object nani-o₁ in the raised wh-complex functions as the focus wh-operator that ranges over the A-chain consisting of the two wh-object copies, <nani-o₂,nani-o₃>. The in-situ wh-object nani-o₃ is spelled out after the S-O of v*P. The in-situ wh-subject dare-ga₃ is spelled out after the S-O of CP.

(34) a. Dare-ga nani-o kat-ta-no? (=8)
    who-NOM what-ACC buy-PAST-Q
    ‘Who bought what?’

b. <nani-o₂,nani-o₃> – A-chain
   <dare-ga₂,dare-ga₁> – 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>

The ways of derivation proposed above have many implications for the existing proposals made for (multiple) wh-questions. Watanabe (1992) was the first to argue that a wh-phrase cross-linguistically moves to a higher position for the purpose of scope-taking, despite the surface difference in whether it appears in a higher or in-situ position. This basic intuition is straightforwardly incorporated into the proposal here on the assumption of the uniformity of NS
and SEM: *wh*-phrases all move to the operator position for the purpose of scope-taking either as a distributive universal quantifier operator or as a focus *wh*-operator in all languages; their spelled-out positions are determined strictly in PHON.

Hagstrom (1998) discusses the correlation between *wh*-in-situ languages that have a *Q*-morpheme and the possibility for them to have an SA reading in multiple *wh*-questions, which is further developed into a general theory of multiple *wh*-questions by Bošković (2001). The basic idea is that a *Q*-morpheme is base-generated in any position higher than all *wh*-phrases when a multiple *wh*-question has a SA reading (35a), in which both *wh*-phrases are inside the scope of the *Q*-morpheme. When a multiple *wh*-question has a PA reading, a *Q*-morpheme is base-generated with the *wh*-phrase in a lower position (35b). In this case, the *wh*-phrase in a lower position is inside the scope of the *Q*-morpheme, but the *wh*-phrase in a higher position is outside its scope. In both cases, a *Q*-morpheme moves to a far higher position to exert an interrogative force. This argument indicates for the languages that do not allow a SA reading, e.g. English, that one of the *wh*-phrases must move higher than the *Q*-morpheme to avoid being subject to the scope of the latter (35c).

(35)  
\[ a. \ Q \ldots Q [wh_1 \ldots wh_2] \]
\[ b. \ Q \ldots [wh_1 \ldots wh_2+Q] \]
\[ c. \ wh_1 Q \ldots [wh_4 \ldots wh_7+Q] \]

The syntactic accounts by Hagstrom (1998) and Bošković (2001) above are not incompatible with the one proposed in this paper. Recall the discussion in 3.3, where I claimed that Hagstrom’s account in fact indicates that *wh*-phrases carry a focus together in the SA reading. It is possible for the *Q*-morpheme, instead of a focus operator, to exert the interrogative force and range over two *wh*-phrases in (35a). In the PA reading, it is possible for one of the *wh*-phrases that moves higher than the *Q*-morpheme to function as a distributive universal quantifier operator, being interpreted as specific; the *Q*-morpheme then ranges over the *wh*-phrase in a lower position that is interpreted as the focus.

Cable (2010) argues that not only *wh*-in-situ languages but also *wh*-fronting languages
such as English obligatorily have a Q-particle. On the assumption that a Q head takes a
*wh*-phrase as its complement, it is argued that C enters an Agree relation with a Q head and the
total QP that contains a *wh*-phrase moves to [Spec,CP]. In this account a *wh*-phrase itself is not
involved in any Agree relation with the C head; its movement occurs simply due to a kind of
‘pied-piping’ along with the movement of the Q-morpheme.

The appearance of the Japanese Q-particle *-ka* is not obligatory in
(yes-no/*wh*)-questions in Modern Japanese (36a) (cf. Yoshida and Yoshida 1996). Rather, it does
not appear in the unmarked case, except when it appears with an honorific morpheme (36b).

(36) a. (Kimi (-wa)) kinou doko-ni itt-ta(#-ka)?  [Jap.]
    you (-TOP) yesterday where-DAT go-PAST(-Q)
    ‘Where did you go yesterday?’

    b. Sensei (-wa) kinou doko-ni it-ta-n(o)desu-ka?
    teacher (-TOP) yesterday where-DAT go-PAST-HON-Q
    ‘Where did (our) teacher go yesterday?’

Cable’s account would predict that there are languages that can express *wh*-questions ‘without
an overt *wh*-phrase’. That is, the Agree operation is carried out between C and a Q head in his
system. Not directly involved in that operation, a *wh*-phrase could be null without any
morphophonological realization. However, no such languages can be found in the world.
Specifically, we find languages that have both a Q-particle and a *wh*-phrase (e.g. Japanese) and
those which have a *wh*-phrase but do not have a Q-particle (e.g. English); but we do not find
languages that have a Q-particle but do not have a *wh*-phrase and those which have neither of
them. The reason is that (at least one of the) *wh*-phrases must carry the focus in a *wh*-question
sentence. Since a sentence must have one focus for information-structural reasons (cf. 
Lambrecht 1994), a *wh*-phrase that carries the focus cannot be null.

These facts indicate that the Q-morpheme cannot be a core feature of the linguistic
properties of human language. The morphophonological realization of a Q-particle is strictly a
matter of PHON, not a matter of NS. A language may lexicalize a Q-head, possibly due to the
requirement of clause-typing, as argued by Cheng (1991).
5. Intonational properties of multiple wh-questions

I have argued so far that the spelled-out positions of wh-phrases are solely determined in PHON in both multiple wh-questions with a PA reading and ones with a SA reading. What PHON factors actually determine the spelled-out positions of wh-phrases in individual languages? Specifically for instance, what PHON factors determine that both the wh-phrase interpreted as specific and the one interpreted as the focus are always spelled out in higher positions in Hungarian multiple wh-questions with a PA reading as illustrated in (20a-b), and so forth?

According to Szendrői (2003), a sentence accent that expresses the focus of a sentence is strictly located on the constituent that immediately precedes a finite verb in Hungarian, except when the verb itself receives a focal accent. Below, I repeat the examples of Hungarian multiple wh-questions, which are immune to the SE. The wh-phrase in sentence-initial position that is interpreted as specific (kinek (37a)/mit (37b)) receives a rising intonation. The wh-phrase located immediately before the finite verb (mit (37a)/kinek (37b)) receives the focal accent, and the pitch peak also occurs on it. The pitch falls on that last wh-phrase and keeps a low level until sentence-final position.

\[(37)\]

\[\begin{align*}
\text{a. Kinek mit hozott János?} & \quad \text{[Hun.]} \\
\text{LH H*L} & \\
(\text{who what brought János ‘What did János bring for whom?’})
\end{align*}\]

\[\begin{align*}
\text{b. Mit kinek hozott János?} & \\
\text{LH H*L} & \\
(\text{what who brought János ‘For whom did János bring what?’})
\end{align*}\]

German belongs to the English type, in which one wh-phrase appears in sentence-initial position and the other wh-phrase appears in situ (or in some lower position). The SE does not arise in the unmarked case. 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 (38a), it is interpreted as specific and the in-situ was ‘what’ is interpreted as the focus.
When *was* ‘what’ appears in sentence-initial position (38b), it is interpreted as specific and the in-situ *wer* ‘who’ is interpreted as the focus. The *wh*-phrase interpreted as specific (i.e. *wer* (38a)/*was* (38b)) is realized by a rising intonation. The pitch peak occurs on the primary stressed syllable of the *wh*-phrase interpreted as the focus (i.e. *was* (38a)/*wer* (38b)), on which the pitch subsequently falls.

(38) a. Wer hat *was* gelesen?
    LH    H*L
    (who has what read ‘Who read what?’)

b. *Was* hat *wer* gelesen?
    LH    H*L
    (what has who read ‘Who read what?’)

Ishihara (2002) reports the intonational properties of *wh*-questions of Japanese, a *wh*-in-situ language in which the SE effect does not arise. In declarative sentences (39a), pitch movement is quite flat. The pitch level on each constituent gradually lowers due to downdrift (cf. Pierrehumbert & Beckman 1988). In *wh*-questions (39b), a focal accent and pitch peak is placed on the *wh*-phrase *nani* ‘what’, which is located immediately before the verb. The pitch substantially rises on that *wh*-phrase and lowers on the sentential element following it, i.e. *kat-ta* ‘buy-PAST’. The low pitch continues until the Q-morpheme *-no* appears, where the pitch (slightly) rises again.²⁶

(39) a. Taro-ga nanika-o *kat-ta*.
    HL    HL    L+L%
    (Taro-NOM something-ACC buy-PAST ‘Taro bought something.’)

b. Taro-wa *NANI-O* *kat-ta-no*?
    HL    H*L    L+L+H%
    (Taro-TOP what-ACC buy-PAST-Q ‘What did Taro buy?’)

All of the statements above show that in languages in which the SE does not arise, the pitch peak is placed on the sentential element immediately preceding the verb.²⁷ Recall the discussion in 3.1. In multiple *wh*-questions with a PA reading, either a *wh*-subject or a *wh*-object that is
interpreted as specific moves higher than the other *wh*-phrase that is interpreted as the focus in all languages. The copy of a *wh*-phrase is always spelled out in the highest position regardless of whether it is interpreted as specific or the focus, e.g. in Hungarian (20a-b). The copy of the *wh*-phrase interpreted as specific is always spelled out in the highest position, and the one interpreted as the focus is spelled out in situ, e.g. in Japanese (21b-c). The answer to the question why *wh*-phrases are spelled out in those positions is provided in the following way. In both languages, the focal accent, thus the focus of a sentence, is located on the (immediately) preverbal position, as illustrated by the arrows in (40-41). Hungarian is a VO language, which forces a *wh*-phrase carrying the focus to be spelled out not in situ but in the highest position (40). Japanese is an OV language, on the other, which does not prevent a *wh*-phrase interpreted as the focus from being spelled out in situ (41). ₪8, ₪9

(40)  a.  [CP kinek [CP mit ... [TP ... [vP ... [VP \[kinek mit]]]]]] (=20a)
b.  [CP mit [CP kinek ... [TP ... [vP ... [VP \[kinek mit]]]]]] (=20b)

(41)  a.  [CP dare-wa [CP nani-o ... [TP ... [vP dare-wa ... [VP nani-o \[\]]]]]] (=21a)
b.  [CP nani-wa [CP dare-ga ... [TP ... [vP dare-ga ... [VP nani-wa \[\]]]]]] (=21b)

Let us now turn to the SE in English. As we have seen so far, the SE cross-linguistically does not arise in the unmarked case. The ungrammaticality illustrated in (42a) indicates that the *wh*-phrase *who* cannot be spelled out in situ in the following two possible interpretations. First, (42a) could have the interpretation in which the in-situ *wh*-subject *who* is interpreted as specific and the *wh*-object *what* is interpreted as the focus; *who* would move higher than *what* and the former could be spelled out in situ and the latter in sentence-initial position, as illustrated in (42b), contrary to fact. Secondly, (42a) could also have the interpretation in which the in-situ *wh*-subject *who* is interpreted as the focus and the *wh*-object *what* is interpreted as specific; *what* would then move higher than *who* and the former could be spelled out in sentence-initial position and the latter in situ, as illustrated in (42c), contrary to fact.
Let us consider the intonational properties of English multiple wh-questions. When an English multiple wh-question is interpreted as a constituent-focus, i.e. multiple wh-questions with a PA reading, the pitch becomes low on an in-situ wh-phrase. See (43a), which does not violate the superiority condition. The pitch is high on the wh-subject who in sentence-initial position; it presumably begins to lower on the main verb bought; it further lowers and reaches its lowest level on the wh-object what in sentence-final position. When (43a) is interpreted as an echo question, the in-situ wh-object receives a rising intonation: after the pitch lowers on the main verb bought, it rises again on the wh-object what (43b). Note that when the in-situ wh-subject who in (42a) receives a rising intonation, the sentence is grammatical as an echo question, which is illustrated in (43c): the pitch is high on the wh-object what in sentence-initial position; it (slightly) lowers on the Aux(iliary verb) did; it rises again on the in-situ wh-subject who; then, it lowers sentence-finally. From the data, the ungrammaticality of (42a) is derived from the fact that the pitch cannot be low on the in-situ wh-subject who.

(43) a. Who bought what? (PA reading) 
   H   HL   L*%

b. Who bought what? (Echo reading) 
   H   HL   LH%

c. What did who buy? (=42a, OK as an echo reading) 
   H   (L)   LH   L*%

Why can the pitch NOT be low on the in-situ wh-subject who (42a)? Note that the intonational properties of (43a) repeated in (44a) are the same as those of a single wh-question (44b), in which the pitch level is the lowest on the object the car. This fact indicates that the pitch level must be the lowest on an in-situ wh-phrase in multiple wh-questions.
I argue that the SE in English is derived from the conflicting pitch pattern in which two (adjacent) sentential elements would be realized at the lowest pitch level, as illustrated by $L^*L^*\%$ in the inappropriate intonational pattern (45a). The in-situ wh-subject who must be realized at the lowest pitch level; the following sentential element, the verb buy, should also be realized at the lowest pitch level. Note that regardless of whether a which-phrase, e.g. which student, appears in sentence-initial position (45b) or in situ (45c), the pitch rises on the part of which.31 Due to this pitch property, the pitch level does not lower immediately after the in-situ which-subject which student and remains (slightly) higher than the pitch level on the following verb read in (45c). Thus, the SE in English is ultimately derived from the conflicting pitch pattern caused by in-situ monosyllabic wh-subjects.

The intonational approach taken here also provides an account for what is called the Intervention Effect (Beck 1996, 2006, Pesetsky 2000, Cable 2010). In languages such as German, a certain kind of operator, e.g. a negative operator niemand, can cause ungrammaticality by intervening between wh-phrases (46a), though the intervention by an NP does not cause such an ungrammaticality in the unmarked case (46b). English multiple wh-questions are not subject to the Intervention Effect: negative phrases such as didn’t (47a) and nobody (47b) can intervene between two wh-phrases.
   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?’
      (Beck 2006:4,(7a-b))

(47)  a. Who didn’t read what?

   b. Which children wanted to show nobody which pictures?
      (Cable 2010:123,(41))

It is widely claimed in the literature that negative operators carry the focus. The highest
prominence should occur on the negative operator. Recall that in German, an in-situ wh-phrase,
e.g. wo ‘where’ (46a), would be interpreted as the focus in the immediately preverbal position
and would receive the highest prominence on it; see (38a-b). This situation yields a conflicting
pitch pattern in which the pitch peak would be placed on two (adjacent) sentential elements,
niemand ‘nobody’ and wo ‘where’, as illustrated by $H^*(H)H^*L$ in (48a). Such a conflicting
pitch pattern does not occur in the case of NPs, since an NP does not carry the focus; see (48b).
In English, the pitch level is the lowest on an in-situ monosyllabic wh-phrase interpreted as the
focus, as illustrated by what (49a); see also (44a). Since the pitch level on the negative phrase
didn’t is higher than that of the in-situ wh-object, a conflicting pitch pattern does not arise. In
cases of which-phrases, a rising intonation occurs on a which-part and a falling intonation occurs
on the part modified by which; see (45b-c) (and also footnote 31). No matter what pitch
properties the negative phrase nobody (49b) displays, a conflicting pitch pattern does not arise.
Thus, the presence and absence of the Intervention Effect is derived from whether a conflicting
pitch pattern arises or not in a relevant language.

(48)  a. *Wen hat niemand wo gesehen? (=46a)
       LH   H*(H)  H^*L

       b. Wen hat Luise wo gesehen? (=46b)
       LH   HL  H^*L
To sum up, the intonational properties of individual languages play a significant role in determining the spelled-out positions of *wh*-phrases in (multiple) *wh*-questions. The SE in English is derived from a conflicting pitch pattern in which both an in-situ *wh*-subject and the following verb would be realized at the lowest pitch level. Recall that in Finnish, in which the SE does not arise in the unmarked case, the *wh*-phrase interpreted as specific is spelled out in situ, unlike in Hungarian and Japanese. To identify which intonational properties definitely determine the spelled-out positions of *wh*-phrases, more detailed investigations of the intonational properties of each language (/construction) are required.

The idea that intonation plays a significant role in determining whether a *wh*-phrase appears in the raised position or in situ has already been proposed by Cheng and Rooryck (2000). French allows the option between the English type in which only one *wh*-phrase moves and the Japanese type in which all *wh*-phrases can remain in situ. According to Cheng and Rooryck, when *wh*-movement occurs, a sentence has a falling intonation (50). When a *wh*-phrase remains in situ, a sentence has a rising intonation (51). They propose to encode intonation as a syntactic feature, the question morpheme [Q:], which is assigned a phonological realization in PHON. When [Q:] is included in the numeration, it forces a *wh*-phrase to remain in situ. When it is not included, a *wh*-phrase moves in NS.
Bošković (2002) states that in French multiple *wh*-questions, when one of the *wh*-phrases moves to sentence-initial position (52a), that sentence has a PA reading; when all *wh*-phrases remain in situ (52b), that sentence has a SA reading. This statement could indicate that the information structure of (52b) is the same as that of the Japanese counterpart with a SA reading (53).

As Cheng and Rooryck (2000) show, however, French *wh*-in-situ constructions require a certain presupposed context for them to be usable, whereas Japanese *wh*-questions do not require any presupposed context. In addition, some of French *wh*-in-situ constructions require a rising intonation as illustrated in (51b), whereas others can have either a falling or rising intonation; see their paper for the details.\(^3\)\(^3\) On the other hand, Japanese (*yes-no*/*wh*)-questions have a rising intonation in general, as illustrated in (39b). Hence, the information structure, the way of derivation, and the intonational properties may differ between French *wh*-in-situ constructions (of multiple *wh*-questions) and Japanese *wh*-in-situ constructions (of multiple *wh*-questions). I leave a more detailed investigation of this issue for future research.\(^3\)\(^4\)
6. Conclusion

In this paper I have argued that information-structural effects differ between multiple \textit{wh}-questions with a PA reading and ones with a SA reading, thus the way of deriving them in NS differs too. I have argued that in multiple \textit{wh}-questions with a PA reading, the \textit{wh}-phrase interpreted as specific always moves to the position higher than the \textit{wh}-phrase interpreted as the focus and takes a wider scope over the latter as a distributive universal quantifier operator, with the SE not arising in the unmarked case. In multiple \textit{wh}-questions with a SA reading, \textit{wh}-phrases compose a pair, and move and function as a focus operator together. I have claimed that the spelled-out positions of \textit{wh}-phrases are solely determined in PHON, specifically by the intonational properties of individual languages. I have also claimed that the SE (in English) is caused by a conflicting pitch pattern that could arise in the case of in-situ monosyllabic \textit{wh}-subjects.

The arguments presented here show that the SE is not caused by any problems in NS operations. The derivation of multiple \textit{wh}-questions with a PA reading proceeds in one uniform way for all languages, on the one hand, and the derivation of multiple \textit{wh}-questions with a SA reading proceeds in another uniform way for all languages, on the other. The SE (in English) is caused by a conflicting pitch pattern that could arise in PHON, not in any NS operations. Thus, I claim that the SE is no longer problematic in the phase framework.

References


Mouton.


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

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

3 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 for the possibility that either a wh-object or a wh-subject can be raised by (the [Edge] feature in) C. See Chomsky (2008) for the detailed argument.

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

5 The stronger argument is that there cannot exist more than one way of deriving sentences on the assumption of the uniformity in NS and SEM, as long as they have the same interpretation. Some strategies to account for the interpretation and derivation of in-situ wh-phrases have been proposed (e.g. Reinhart 1995, Hagstrom 1998). However, both one way to derive what did John eat? and another way to derive John-wa nani-o tabe-ta-no? (John-TOP what-ACC eat-PAST-Q ‘what did John eat?’) cannot exist at the same time: the derivation of those sentences that have the same interpretation must proceed in a parallel way for all languages under the phase
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” (É. Kiss 1993:92-93).

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

The subject János is raised due to topicalization here.

See the literature (e.g. Lambrecht 1994) which claims that the Japanese -ga is a focus marker.

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.

In cases such as (5a-b), it might be difficult to identify which wh-phrase, either the wh-subject which student or the wh-object which book, is interpreted as specific, as they are both modified by which. I leave this issue for future research.

The literature (e.g. Huhmarniemi & Vainikka 2011) has 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 the focus of a multiple wh-question sentence. This is clear from the English translation of (18b). 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))

According to Karttunen & Peters (1980), -kin is attached to all wh-phrases except the highest one in Finnish multiple wh-questions. When it is not attached to any wh-phrases, that multiple wh-question is interpreted as an echo question.

It is difficult to see whether a verb always moves in multiple wh-questions with a SA reading. Surányi (2007) simply states that a SA reading is obtained when one wh-phrase moves and the other remains in situ.

Note that the topic marker -wa is attached to kinou ‘yesterday’ in sentence-initial position in (27a), which indicates that neither the wh-subject dare ‘who’ nor the wh-time adverbial nan-ji ‘what time’ is given topic status.
HON stands for an honorific morpheme.

No restriction on the linear order of wh-phrases should arise, since they would simply compose a pair. Thus, a wh-object should be freely spelled out in sentence-initial position and a wh-subject in situ. This is attested by Japanese (23b), but not by Finnish; see below. Bošković (2002) suggests that the Japanese case is derived by scrambling. I deal with how to determine the spelled-out positions of wh-phrases in section 6.

1) *Mitä kuka osti? [Fin.]
   ‘What who bought’
   (Huhmarniemi & Vainikka 2011:2-3,(4))

The in-situ wh-subject who also composes an A-chain by itself, which I leave aside here.


See footnote 11. Here I simply assume that the wh-subject which student is interpreted as specific, and the wh-object which book as the focus.

Christer Platzack (p.c.) points out that this assumption could be a ‘look ahead’ case, with the assumption on multiple wh-questions with a PA reading that C has both [Sp] and [Foc] taken into account. In the phase framework 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 multiple wh-questions with a PA reading and ones with a SA reading, it is not surprising that C is assigned [Sp] and [Foc] in the former, whereas it is assigned only [Foc] in the latter.

When Japanese multiple wh-questions have a PA reading, the derivation proceeds as illustrated in (32).

The other Q-morpheme -no (often) appears in Japanese (yes-no/wh-) questions:

i) (Kimi (-wa)) kinou eiga-ni itt-ta-no? [Jap.]
   ‘Did you go to cinema yesterday?’
ii) (Kimi (-wa)) kinou doko-ni itt-ta-no?
   ‘Where did you go yesterday?’

This morpheme cannot, however, exert the quantificational force on the basis of Hagstrom (1998), since it cannot compose a wh-phrase with a wh-part. Compare: nani+ka (what+ka
‘something’) VS *nani+-no (what+-no).

23 See also Sigurðsson (2004) for the argument that all morphophonological differences between languages are confined to PHON.

24 The same pitch pattern is observed in multiple wh-questions in Romanian, a multiple wh-fronting language similar to Bulgarian (Comorovski 1996). In the cluster of wh-phrases, the pitch must fall immediately on the last wh-phrase:

i) Cine ce a uitat să deschidă? [Rom.]
   LH H*L
   (who what has forgotten to open ‘Who forgot to open what?’)

25 See Grohmann (2006) for a detailed analysis of German multiple wh-questions.

26 On the basis of Ishihara’s data, Richards (2010) proposes a universal constraint that a wh-phrase cannot be separated from a complementizer by phonological phrases. According to Richards, a language takes either one of the following 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 boundaries left as they are, e.g. English. With this constraint, it could be argued here that in C-initial languages such as English, wh-phrases are spelled out in a higher position, whereas in C-final languages such as Japanese, they are spelled out in situ. Though this argument could apply to ‘rigid’ multiple wh-fronting languages such as 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 other wh-phrase in situ, e.g. in English. As we have seen so far, different languages have different options for the spell-out positions of wh-phrases in multiple wh-questions.

27 Note also that these languages are either OV or free word order languages. See Dezsö (1982) for a seminal work on prosodic typology. According to Dezsö, the focal accent tends to appear in a preverbal position in OV languages but in a postverbal position in VO languages.

28 The reason why wh-phrases interpreted as specific are spelled out in the highest position in both Hungarian and Japanese is plausibly derived from the topic-before-comment /given-before-new principle (Gundel 1988). See Gundel’s paper for the issues on syntactic typology of the topic-comment structure.

29 The account here also applies to German multiple wh-questions. It is standardly assumed that German is an OV language. Similar to Japanese, wh-phrases interpreted as the focus are not
prevented from being spelled out in situ:

\[
\begin{align*}
\text{i) } & \quad [\text{CP wer } [\text{CP was } \ldots [\text{TP } \ldots [\text{v*P wer } \ldots [\text{VP was } \Box]]]]] \\
& \quad [\text{CP was } [\text{CP wer } \ldots [\text{TP } \ldots [\text{v*P wer } \ldots [\text{VP was } \Box]]]]] 
\end{align*}
\]

(=38a)

(=38b)

\[30\] In Romanian multiple \textit{wh}-questions too, \textit{wh}-phrases with a non-echo reading receive a falling intonation, whereas ones with an echo reading receive a rising intonation (Comorovski 1996).

\[31\] The pitch pattern of in-situ \textit{which}-phrases in which the pitch rises not on \textit{which} but on the word modified by \textit{which} is also possible (Michael Rochemont, p.c.).

\[32\] As predicted, when the in-situ \textit{wh}-phrase moves to a higher position and is interpreted as given/the topic (Grohmann 2006), the sentence is grammatical:

\text{i) Wen hat wo niemand gesehen?} \quad \text{[Ger.]} \\
\text{whom has where nobody seen} \\
\text{‘Where did nobody see whom?’} \\
\text{(Beck 2006:4,(7a-c))}

\[33\] See also Boucher (2010), who states that more than 90% of French \textit{wh}-in-situ constructions are realized by a falling intonation:

\text{i) Tu vas où?} \quad \text{[Fre.]} \\
\text{L*} \\
\text{(you go where ‘Where do you go?’)}

\[34\] Recall the discussion in 3.2. that a SA can be obtained when \textit{wh}-phrases apply to the same set in a given context in Hungarian, which property is shared by French. This indicates that Japanese multiple \textit{wh}-questions with a SA reading differ from their Hungarian and French counterparts in that the former does not, but the latter does, require a certain context. In Hungarian multiple \textit{wh}-questions with a SA reading, e.g. (26b) repeated below, the first pitch peak occurs on the immediately preverbal \textit{wh}-phrase \textit{ki}, and the pitch falls on it. The pitch can rise again on the second \textit{wh}-phrase \textit{kit}, as if it would compose a separate phonological phrase.

\text{i) A regény végén ki öl meg kit?} \quad (=26b) \\
\text{L*H} \\
\text{H*L} \\
\text{(the novel’s end who PERF whom ‘Who kills whom at the end of the novel?’)}

I leave this issue for future research.

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