

# INFORMATION STRUCTURE, SYNTAX AND INTONATIONAL PROPERTIES OF MULTIPLE *WH*-QUESTIONS\*

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## 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*~~ ... [<sub>v\*P</sub> ~~*who*~~ bought [<sub>VP</sub> ... *what*]]]]
- (4) a. \*What did who buy?  
       b. [CP *what* did [TP *who* ... [<sub>v\*P</sub> ~~*who*~~ buy [<sub>VP</sub> ... ~~*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 *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 *wh*-questions that arise in the currently assumed phase framework and cartographic system. In section 3, I discuss the information-structural properties of multiple *wh*-questions. With data from several languages, I argue that in multiple *wh*-questions with a PA reading, the *wh*-phrase that is interpreted as specific always moves to the position higher than the *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 *wh*-questions with a SA reading, *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 *wh*-questions. In section 5, discussing the intonational properties of (multiple) *wh*-questions, I argue that the spelled-out positions of *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 *wh*-subjects. In section 6, I briefly conclude this paper.

Throughout this paper, I presuppose a familiarity with the currently assumed theoretical framework in generative syntax on the readers' side. With the 'phase framework', I mean the theoretical framework proposed by Chomsky in a series of his literature, Chomsky 2000, 2001, 2004, 2008. With the 'cartographic system', I mean the theoretical system proposed by a series of the literature, Rizzi 1997 and Cinque 1999.

## **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 Slavic languages (6). One *wh*-phrase moves to sentence-initial position, with the other *wh*-phrase(s) remaining in situ, e.g. in English (7). All *wh*-phrases remain in situ, e.g. in Japanese (8).<sup>1</sup> Languages such as French have the option between the English type and the Japanese type: only one *wh*-phrase moves in some cases (9a);

all *wh*-phrases can remain in situ in others (9b).<sup>2</sup>

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

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 *wh*-subject *who* or the *wh*-object *what* to its Spec, contrary to fact.<sup>3</sup>

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 *wh*-movement, a *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 *wh*-question does not differ between these languages, a *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 *wh*-phrases is spelled out in PHON, i.e. either the copy in [Spec,CP] (10b) or the copy in situ (11b) (cf. Groat and O’Neil 1996).<sup>4,5</sup>

(10) a. What did you eat?

b. [CP what ... [TP ... [v\*P ... [VP ... ~~what~~]]]] (<what,~~what~~>)

(11) 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 a multiple *wh*-question should move to the operator position to take the 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 a *wh*-chain is spelled out in PHON, i.e. either the highest copy in all *wh*-chains (12a), the highest copy in one *wh*-chain and the in-situ copy in the other *wh*-chain (12b), or the in-situ copy in all *wh*-chains (12c) (cf. Bošković and Nunes 2007)

(12) a. [CP koj kakvo ... [TP ... [v\*P koj ... [VP ... ~~kakvo~~]]]] (=6)  
*wh*-chains: <koj,~~koj~~>, <kakvo,~~kakvo~~>

b. [CP who ~~what~~ ... [TP ... [v\*P ~~who~~ ... [VP ... what]]]] (=3a)  
*wh*-chains: <who,~~who~~>, <~~what~~,what>

- c. [<sub>CP</sub> ~~dare-ga nani-o~~ ... [<sub>TP</sub> ... [<sub>v\*P</sub> dare-ga [<sub>VP</sub> nani-o ...]]]] (=2)  
 wh-chains: <~~dare-ga~~, dare-ga>, <~~nani-o~~, nani-o>

### 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.<sup>6</sup> 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).<sup>7</sup>

- (14) 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?’

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?<sup>8</sup> [Hun.]  
 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).<sup>9</sup> 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? [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  
 ‘What did each person (known in the context) buy?’  
 (*dare* ‘who’ – specific; *nani* ‘what’ – focus)

- c. Nani-wa dare-ga kat-ta-no?  
 what-TOP who-NOM buy-PAST-Q  
 ‘Who bought each thing (known in the context)?’  
 (*nani* ‘what’ – specific; *dare* ‘who’ – 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.<sup>10</sup> 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.<sup>11</sup>

- (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 and Karlsson 1979, Karttunen and 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.<sup>12</sup> 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? [Fin.]  
 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?’  
 (Huhmarniemi 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, i.e.  $\forall x_{[wh]}$  (19a)/ $\forall y_{[wh]}$  (19b), moves higher than the other *wh*-phrase interpreted as the focus, i.e.  $\exists y_{[wh]}$  (19a)/ $\exists x_{[wh]}$  (19b), 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  $\forall x_{[wh]}$  [CP  $\exists y_{[wh]}$  [TP ... [v\*P  $\forall x_{[wh]}$  [VP ...  $\exists y_{[wh]}$ ]]]]]  
 b. [CP  $\forall y_{[wh]}$  [CP  $\exists x_{[wh]}$  [TP ... [v\*P  $\exists x_{[wh]}$  [VP ...  $\forall y_{[wh]}$ ]]]]]  
 (20) a. [CP kinek [CP mit ... [TP ... [v\*P ... [VP ... ~~kinek mit~~]]]]] (=14a)  
 b. [CP mit [CP kinek ... [TP ... [v\*P ... [VP ... ~~kinek mit~~]]]]] (=14b)

- (21) a. [CP dare-wa [CP ~~nani-o~~ ... [TP ... [v\*P ~~dare-wa~~ ... [VP nani-o ...]]]]] (=16b)  
 b. [CP nani-wa [CP ~~dare-ga~~ ... [TP ... [v\*P dare-ga ... [VP ~~nani-wa~~ ...]]]]] (=16c)
- (22) a. [CP who [CP ~~what~~ ... [TP ... [v\*P ~~who~~ ... [VP ...what]]]]] (=17a)  
 b. [CP ~~which-present~~ [CP who ... [TP ... [v\*P ... [VP ...which present ... ~~who~~]]]]] (=17b)
- (23) a. [CP ~~kenen-kin~~ ... [CP kuka ... [TP ... [v\*P ~~kuka~~ ... [VP ... kenen-kin ...]]]]] (=18a)  
 b. [CP ~~kuka-kin~~ [CP mitä ... [TP ... [v\*P 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? [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, 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) varpailla? [Fin.]  
 who-NOM stands whose *-kin* toes.on  
 ‘Who stands on whose toes?’  
 (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.<sup>1 3</sup> 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? [Hun.]  
 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.<sup>1 4</sup> Therefore, I argue that in multiple *wh*-questions with a SA reading, *wh*-phrases carry the focus of a sentence together.

- (27) 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-Q<sup>1 5</sup>  
 ‘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), ...)

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, i.e.  $\exists x_{[wh]}$ , and a *wh*-object, i.e.  $\exists y_{[wh]}$ , 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).<sup>1 6</sup>

(28)  $[CP \exists x_{[wh]} + \exists y_{[wh]} [TP \dots [_{V^*P} \exists x_{[wh]} [VP \dots \exists y_{[wh]}]]]]$

(29) a.  $[CP \text{dare-ga} + \text{nani-o} [TP \dots [_{V^*P} \text{dare-ga} \dots [VP \text{nani-o} \dots]]]]$  (=24a)

b.  $[CP \text{dare-ga} + \text{nani-o} [TP \dots [_{V^*P} \text{dare-ga} \dots [VP \text{nani-o} \dots]]]]$  (=24b)

(30)  $[CP \text{kuka} + \text{kenen} \dots [TP \dots [_{V^*P} \text{kuka} \dots [VP \dots \text{kenen} \dots]]]]$  (=25)

(31)  $[CP \text{ki} + \text{ki} [TP \dots [_{V^*P} \text{ki} \dots [VP \dots \text{kit}]]]]$  (=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<sub>2</sub>,who<sub>3</sub>>. <sup>17</sup> The *wh*-subject in [Spec,v\*P] is also directly raised by [Sp] in C, and the raised *wh*-phrase *who*<sub>1</sub> functions as the distributive universal quantifier operator that ranges over the A-chain (cf. Chomsky 2008, Miyagawa 2010). <sup>18</sup> 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<sub>2</sub>,what<sub>3</sub>>. The *wh*-object in (the outer) [Spec,v\*P] is successively raised by [Foc] in C, and the raised *wh*-phrase *what*<sub>1</sub> functions as the focus *wh*-operator that ranges over the A-chain.

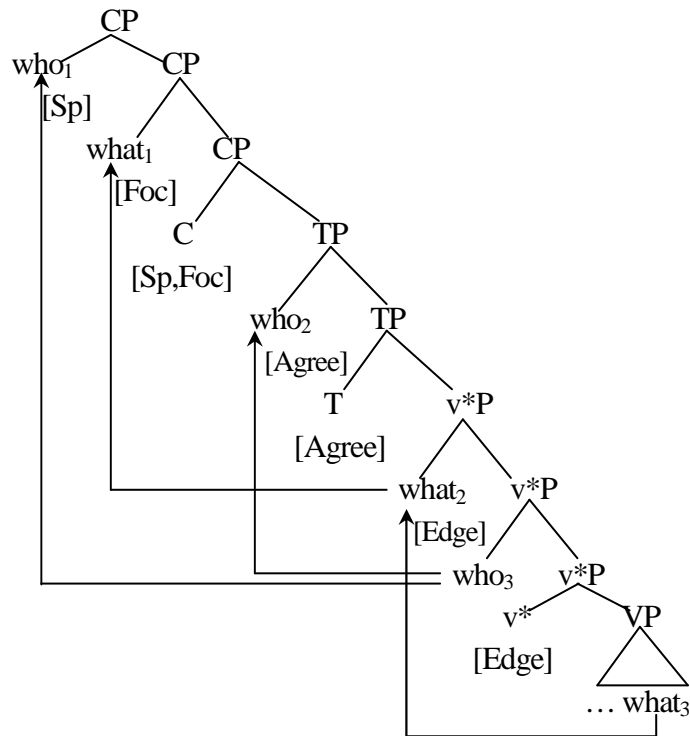
The derivation of (5b), in which the SE is avoided, proceeds in the same way, as illustrated in (33). <sup>19</sup> The *wh*-subject in [Spec,v\*P] is raised by [Agree] inherited from C to T and its two copies compose an A-chain, i.e. <which student<sub>2</sub>,which student<sub>3</sub>>. The *wh*-subject in [Spec,v\*P] is also directly raised by [Sp] in C, and the raised *wh*-phrase *which student*<sub>1</sub> 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<sub>2</sub>,which book<sub>3</sub>>. The *wh*-object in (the outer) [Spec,v\*P] is successively raised by [Foc] in C, and the raised *wh*-phrase *which book*<sub>1</sub> 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*<sub>3</sub> is spelled out in situ after the Spell-Out S-O of v\*P; the *wh*-subject in (the

outer) [Spec,CP] *who<sub>1</sub>* is spelled out after the S-O of CP. In (33) the *wh*-subject in (the inner) [Spec,v\*P] *which student<sub>3</sub>* and the *wh*-object in (the inner) [Spec,CP] *which book<sub>1</sub>* are spelled out after the S-O of CP.

(32) a. Who ate what?

(=17a)



b. <*who<sub>2</sub>*,*who<sub>3</sub>*> – A-chain

*who<sub>1</sub>* – distributive universal quantifier operator that ranges over the A-chain

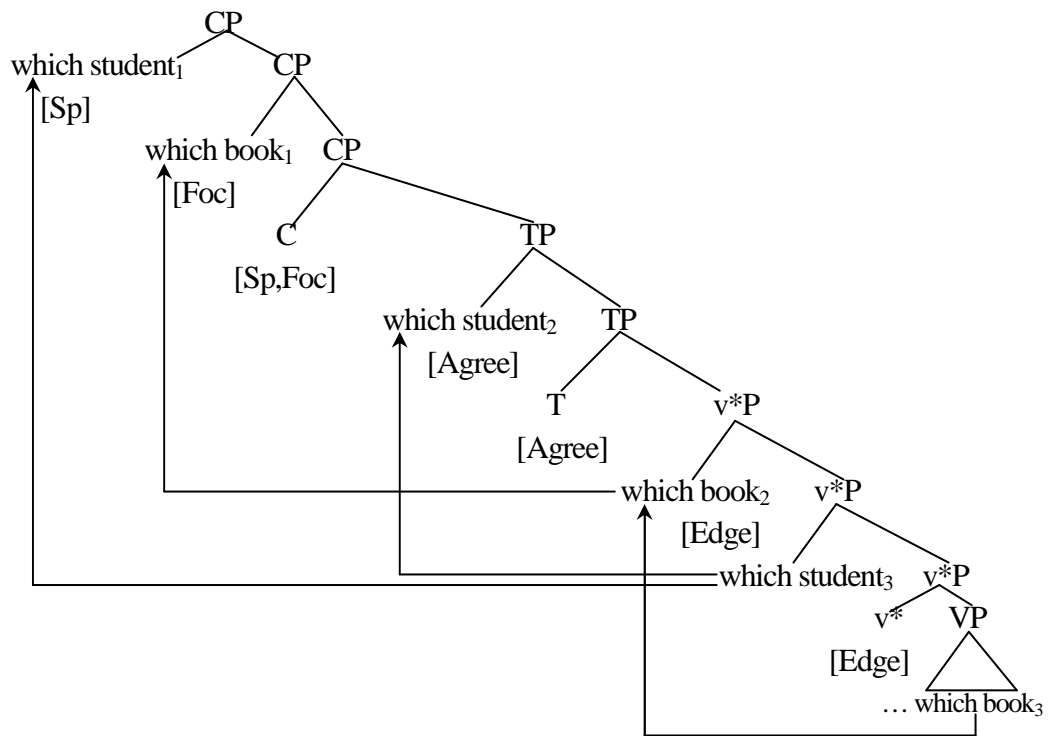
<*who<sub>2</sub>*,*who<sub>3</sub>*>

<*what<sub>2</sub>*,*what<sub>3</sub>*> – A-chain

*what<sub>1</sub>* – focus *wh*-operator that ranges over the A-chain <*what<sub>2</sub>*,*what<sub>3</sub>*>

(33) a. Which book did which student read?

(=5b)



b. <which student<sub>2</sub>, which student<sub>3</sub>> – A-chain

which student<sub>1</sub> – distributive universal quantifier operator that ranges over the A-chain <which student<sub>2</sub>, which student<sub>3</sub>>

< which book<sub>2</sub>, which book<sub>3</sub>> – A-chain

which book<sub>1</sub> – focus *wh*-operator that ranges over the A-chain

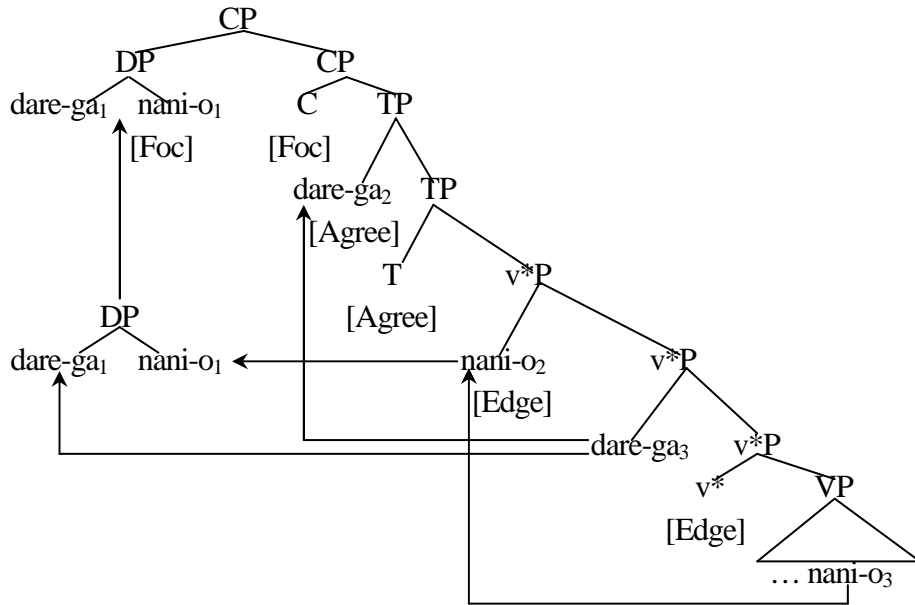
<which book<sub>2</sub>, which book<sub>3</sub>>

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.<sup>20</sup> 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. <nani-o<sub>2</sub>, nani-o<sub>3</sub>>. 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. <dare-ga<sub>2</sub>, dare-ga<sub>3</sub>>. A copy is made for the *wh*-object *nani-o*<sub>2</sub> in (the outer) [Spec, v\*P] and the in-situ *wh*-subject *dare-ga*<sub>3</sub> respectively, and the two copies merge, resulting in a *wh*-complex *dare-ga*<sub>1</sub>+*nani-o*<sub>1</sub>; the *wh*-complex is raised by [Foc] in C (cf. *sideward movement*, Nunes 2004, Hornstein 2001). The *wh*-subject *dare-ga*<sub>1</sub> 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-ga<sub>2</sub>,dare-ga<sub>3</sub>>. The *wh*-object *nani-o*<sub>1</sub> 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-o<sub>2</sub>,nani-o<sub>3</sub>>. The in-situ *wh*-object *nani-o*<sub>3</sub> is spelled out after the S-O of v\*P. The in-situ *wh*-subject *dare-ga*<sub>3</sub> is spelled out after the S-O of CP.<sup>2 1</sup>

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



- b. <nani-o<sub>2</sub>,nani-o<sub>3</sub>> – A-chain  
 <dare-ga<sub>2</sub>,dare-ga<sub>3</sub>> – A-chain  
 nani-o<sub>1</sub> – focus *wh*-operator that ranges over the A-chain <nani-o<sub>2</sub>,nani-o<sub>3</sub>>  
 dare-ga<sub>1</sub> – focus *wh*-operator that ranges over the A-chain <dare-ga<sub>2</sub>,dare-ga<sub>3</sub>>

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 ... Q [*wh*<sub>1</sub> ... *wh*<sub>2</sub>]  
       b. Q ... [*wh*<sub>1</sub> ... *wh*<sub>2</sub>+Q]  
       c. *wh*<sub>1</sub> Q ... [~~*wh*<sub>1</sub>~~ ... *wh*<sub>2</sub>+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 entire 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).<sup>2 2</sup>

- (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).<sup>2 3</sup>

## 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 focus 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 focus 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.<sup>2 4</sup>

- (37) a. Kinek MIT hozott János? [Hun.]  
LH H\*L  
(who what brought János ‘What did János bring for whom?’)
- b. Mit KINEK hozott János?  
LH H\*L  
(what who brought János ‘For whom did János bring what?’)

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).<sup>2 5</sup> 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? [Ger.]  
           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 and Beckman 1988). In *wh*-questions (39b), a focus 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.<sup>2 6</sup>

- (39) a. Taro-ga nanika-o kat-ta. [Jap.]  
           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.<sup>2 7</sup> 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 (14a-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 (16b-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 focus 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).<sup>28,29</sup>

- (40) a. [CP kinek [CP mit ... [TP ... [V\*P ... [VP V kinek mit]]]]] (=14a,20a)  
       b. [CP mit [CP kinek ... [TP ... [V\*P ... [VP V kinek mit]]]]] (=14b,20b)
- ←
- (41) a. [CP dare-wa [CP ~~nani-o~~ ... [TP ... [V\*P ~~dare-wa~~ ... [VP nani-o V]]]]] (=16b,21a)  
       b. [CP nani-wa [CP ~~dare-ga~~ ... [TP ... [V\*P ~~dare-ga~~ ... [VP ~~nani-wa~~ V]]]]] (=16c,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.

- (42) a. \*What did who buy? (=4a)
- b. \*<sub>[CP ~~who~~ [CP what ... [TP ... [<sub>V\*P</sub> who ... [<sub>VP</sub> ... ~~what~~]]]]]</sub>
- c. \*<sub>[CP what [CP ~~who~~ ... [TP ... [<sub>V\*P</sub> who ... [<sub>VP</sub> ... ~~what~~]]]]]</sub>

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.<sup>30</sup> 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.

(44) a. Who bought what? (=43a)  
           H    HL    L\*%

b. Who bought the car?  
           H    HL        L\*%

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*.<sup>31</sup> 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.

(45) a. \*What did who buy? (=42a)  
           H            L\*    L\*%

b. Which student read which book? (=5a)  
           H    HL    L    H    L\*%

c. Which book did which student read? (=5b)  
           H    L            H    HL    L\*%

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.



- (46) a. \*Wen hat niemand wo gesehen? [Ger.]  
 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).<sup>3 2</sup> 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

(49) a. Who didn't read what? (=47a)  
           H   (HL)   HL   L\*%

b. Which children wanted to show nobody which pictures? (=47b)  
           H    HL     HL     L   H\*L   H   HL%

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.

(50) a. Qu'est-ce que Marie a acheté? [Fre.]  
           what is-it that Marie has bought  
           'What did Marie buy?'

b. Qu'est-ce que Marie a acheté?  
           H\*L%

- (51) a. Marie a acheté quoi? [Fre.]  
 Marie has bought what  
 ‘What did Marie buy?’
- b. Marie a acheté quoi?  
 LH\*%  
 (Cheng and Rooryck 2000:4,(8-9))

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 Japanese multiple *wh*-questions with a SA reading (52).

- (52) a. Qu’ a-t-il donné à qui? (=9a)  
 what has-he given to who  
 ‘What did he give to whom?’
- b. Il a donné quoi à qui? (=9b)  
 he has given what to whom  
 ‘What did he give to whom?’
- (53) Dare-ga nani-o kat-ta-no? (=8)  
 who-NOM what-ACC buy-PAST-Q  
 ‘Who bought what?’

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.<sup>3 3</sup> 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.<sup>3 4</sup>

## 6. Conclusion

In this paper I have argued that 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 NS differs too. I have argued that 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 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 *wh*-questions with a SA reading, *wh*-phrases compose a pair, and move and function as a focus operator together. I have claimed that the spelled-out positions of *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 *wh*-subjects.

The arguments presented here show that the SE is not caused by any problems in NS operations. The derivation of multiple *wh*-questions with a PA reading proceeds in one uniform way for all languages, on the one hand, and the derivation of multiple *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.

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<sup>1</sup> 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).

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

<sup>3</sup> 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.

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

<sup>5</sup> 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



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framework.

<sup>6</sup> 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).

<sup>7</sup> 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.

<sup>8</sup> The subject *János* is raised for topicalization here.

<sup>9</sup> See the literature (e.g. Lambrecht 1994) which claims that the Japanese *-ga* is a focus marker.

<sup>10</sup> 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.

<sup>11</sup> 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.

<sup>12</sup> The literature (e.g. Huhmarniemi and 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 and 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.

<sup>13</sup> 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.

<sup>14</sup> Note that the topic marker *-wa* is attached to *kino* ‘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.

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<sup>1 5</sup> *HON* stands for an honorific morpheme.

<sup>1 6</sup> 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.

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

<sup>1 7</sup> The in-situ *wh*-subject *who*<sub>3</sub> also composes an A-chain by itself, which I leave aside here.

<sup>1 8</sup> See Chomsky (2008) and Miyagawa (2010), who propose that [Agree] 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'.

<sup>1 9</sup> 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.

<sup>2 0</sup> 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.

<sup>2 1</sup> When Japanese multiple *wh*-questions have a PA reading, the derivation proceeds as illustrated in (32).

<sup>2 2</sup> The other Q-morpheme *-no* (often) appears in Japanese (*yes-no/wh-*) questions:

i) (Kimi (-wa)) kinou eiga-ni itt-ta-no? [Jap.]  
you (-TOP) yesterday cinema-DAT go-PAST-Q  
'Did you go to cinema yesterday?'  
ii) (Kimi (-wa)) kinou doko-ni itt-ta-no?  
you (-TOP) yesterday where-DAT go-PAST-Q  
'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

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‘something’) VS \**nani*+*-no* (what+*-no*).

<sup>23</sup> See also Sigurðsson (2004) for the argument that all morphophonological differences among languages are confined to PHON.

<sup>24</sup> 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?’)

<sup>25</sup> See Grohmann (2006) for a detailed analysis of German multiple *wh*-questions.

<sup>26</sup> 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.

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

<sup>28</sup> 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.

<sup>29</sup> 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

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prevented from being spelled out in situ:

- i) [CP wer [CP ~~was~~ ... [TP ... [V\*P ~~wer~~ ... [VP was V]]]]] (=38a)  
       [CP was [CP ~~wer~~ ... [TP ... [V\*P wer ... [VP ~~was~~ V]]]]] (=38b)

<sup>30</sup> In Romanian multiple *wh*-questions too, *wh*-phrases with a non-echo reading receive a falling intonation, whereas ones with an echo reading receive a rising intonation (Comorovski 1996).

<sup>31</sup> The pitch pattern of in-situ *which*-phrases in which the pitch rises not on *which* but on the word modified by *which* is also possible (Michael Rochemont, p.c.).

<sup>32</sup> As predicted, when the in-situ *wh*-phrase moves to a higher position and is interpreted as given/the topic (Grohmann 2006), the sentence is grammatical:

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

<sup>33</sup> See also Boucher (2010), who states that more than 90% of French *wh*-in-situ constructions are realized by a falling intonation:

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

<sup>34</sup> Recall the discussion in 3.2. that a SA can be obtained when *wh*-phrases apply to the same set in a given context in Hungarian, which property is shared by French. This indicates that Japanese multiple *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 *wh*-questions with a SA reading, e.g. (26b) repeated below, the first pitch peak occurs on the immediately preverbal *wh*-phrase *ki*, and the pitch falls on it. The pitch can rise again on the second *wh*-phrase *kit*, as if it would compose a separate phonological phrase.

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

I leave this issue for future research.

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