Information Structure, Syntax and Intonational Properties of Multiple *Wh*-Question[*]

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Abstract

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

1. Introduction

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

(1) What did John give to whom?

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

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

(3) a. Who bought what?

b. [$_{CP}$ who C [$_{TP}$ who … [$_{v*P}$ who bought [$_{VP}$ … what]]]]

(4) a. *What did who buy?

b. [$_{CP}$ what did [$_{TP}$ who … [$_{v*P}$ who buy [$_{VP}$ … what]]]]

(5) a. Which student read which book?

b. Which book did which student read?

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

In this paper I discuss multiple *wh*-question from the perspective of information structure. I argue that the information-structural effects differ between the multiple *wh*-question that has a PA reading and that which has a SA reading, thus the way of deriving them in narrow syntax NS differs too, with the spelled-out positions of *wh*-phrases solely determined in the phonological component PHON. I suggest that the spelled-out positions of *wh*-phrases are determined by the intonational properties of individual languages. I claim that SE does not arise in the unmarked case, and that SE is no longer problematic in the currently assumed phase framework (Chomsky 2008). This paper is organized as follows. In section 2 I discuss the problems of multiple *wh*-question that arise in the currently assumed phase-cartographic framework (Chomsky 2008, Rizzi 1997). In section 3 I discuss the information-structural properties of multiple *wh*-question. On the basis of the literature (Kiss

1993), I argue that in the multiple *wh*-question that has a PA reading the *wh*-phrase interpreted as specific always moves to the position higher than the *wh*-phrase interpreted as focus and takes a wide scope over the latter as a universal quantifier, with SE not arising in the unmarked case. I also argue that in the multiple *wh*-question that has a SA reading *wh*-phrases move and function as a focus operator in pairs. I argue that the derivation of the multiple *wh*-question that has a PA reading proceeds in one uniform way for all languages, on the one hand, and the derivation of the multiple *wh*-question that has a SA reading proceeds in another uniform way for all languages, on the other, with the spelled-out positions of *wh*-phrases are solely determined in PHON. In section 4 I provide the way of derivation for each of the multiple *wh*-question that has a PA reading and the multiple *wh*-question that has a SA reading. In section 5 I suggest that the spelled-out positions of *wh*-phrases are determined by the intonational properties of individual languages. I also suggest that SE in English is caused by the inappropriate intonational pattern that could arise in the case of monosyllabic in-situ *wh*-phrases. In section 6 I briefly conclude this paper, suggesting that SE is not problematic any longer in the current system. Throughout this paper I presuppose the familiarity to the current phase-cartographic system on readers' side.

2. The problems of multiple *wh*-question

Languages differ in whether and how many *wh*-phrases move in multiple *wh*-question. All *wh*-phrases move to sentence-initial position in Slavic languages (6). One *wh*-phrase moves to sentence-initial position, with the rest *wh*-phrase(s) remaining in situ, in, e.g. English (7). All *wh*-phrases remain in situ in, e.g. Japanese (8).[1] Languages like 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).[2]

(6) Koj kakvo e kupil? (Bul.)
who what is bought
'Who bought what?'

(7) What did John give to whom? (=1)

(8) Dare-ga nani-o kat-ta-no? (=2)
who-NOM what-ACC buy-PAST-Q
'Who bought what?'

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

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

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

Multiple *wh*-question gives at least two problems in this currently assumed theoretical framework. 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*-question is subject to SE (4) is problematic, as Chomsky (2008:152) notes, since (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.

Second, a sentential element that receives a same interpretation in SEM should be located in the corresponding structural position in NS in all languages, despite the difference in the surface appearance. In *wh*-movement a *wh*-phrase moves to [Spec,CP] in English (10a), whereas it remains in situ in Japanese (11a). As long as the interpretation as a constituent *wh*-question does not differ between these languages, a *wh*-phrase should move to the operator position in NS in both English and Japanese on the assumption of the uniformity of NS and SEM. The surface difference should be attributed to which occurrence of a *wh*-phrase, the one in [Spec,CP] (10b) or the one in situ (11b), is spelled out in PHON (cf. Groat and O'Neil 1996).[3]

(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?'

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

b. [$_{CP}$ nani-o … [$_{TP}$ … [$_{v*P}$ … [$_{VP}$ nani-o …]]]] (<nani-o,nani-o>)

In the same way, all *wh*-phrases in multiple *wh*-question should move to the operator position to take a 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 position in *wh*-chains, the highest position in both *wh*-chains (12a), the highest position in one *wh*-chain and the in-situ position in the other *wh*-chain (12b), or the in-situ position in both *wh*-chains (12c), is spelled out in PHON (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. [$_{CP}$ dare-ga nani-o … [$_{TP}$ … [$_{v*P}$ dare-ga [$_{VP}$ nani-o …]]]] (=2)
wh-chains: <dare-ga,dare-ga>, <nani-o,nani-o>

3. Information structure of multiple *wh*-question

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

Kiss (1993) claims that multiple *wh*-question triggers the specific reading for either one of the *wh*-phrases.[4] Without any contexts, *who* in a single *wh*-question (13a) is understood as non-specific in the unmarked case. *Who* in a multiple *wh*-question (13b), on the other hand, 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' (Kiss 1993:87).

(13) a. Who ate it?

b. Who ate what?

The Hungarian multiple *wh*-question belongs to the Bulgarian type (6), in which all *wh*-phrases move. The cases below are interpreted as a PA reading. Kiss states that a set of persons is known in (14a), in which *kinek* 'who' moves to the position higher than *mit* 'what'. The question is targeted to the direct object, which carries the focus of a sentence: (14a) means, 'for each person, what did János bring for him?'. A set of things, on the other hand, is

[4] Specificity is defined as follows: '[a]n operator is specific if it quantifies over a set which the speaker and listener can partition exhaustively in an identical way' (Kiss 1993:92-93).

given in (14b), in which *mit* 'what' moves to the position higher than *kinek* 'who'. The question is targetted to the indirect object, which carries the focus of a sentence: (14b) means, 'for each thing, who did János bring it for?' (Kiss 1993:86).[5]

(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?'

Kiss argues that the position in which the highest *wh*-phrase (i.e. *kinek* 'who' (15a)) is located in Hungarian corresponds to that in which a universal quantifier (i.e. *mindenkinek* 'everybody' (15b)) is located. Kiss argues that a specific *wh*-operator located in a higher position is interpreted as a distributive universal quantifier (Kiss 1993:107).

(15) a. János kinek mit hozott?[6] (Hun.)
János who-DAT what-ACC brought
'What did János bring for whom? (For each person, what did János bring for him?)

b. János mindenkinek egy könyvet hozott.
János everbody-DAT a book-ACC brought
'John brought everybody a book.' (For everybody, it was a book that János brought.)

Kiss' data and arguments indicate i) that the multiple *wh*-question that has a PA reading contains one *wh*-phrase that is interpreted as specific and the other *wh*-phrase that is interpreted as focus, ii) that the former moves to the position higher than the latter to take a wide scope over the latter as a distributive universal quantifier, and iii) that SE does not arise in the unmarked case.[7]

The same situation is observed in the Japanese multiple *wh*-question (8), in which all *wh*-phrases remain in situ. The Nominative Case marker *-ga* can be, but the topic marker *-wa* cannot be, attached to *wh*-phrases in the unmarked case (16a)[8]. In the Japanese multiple *wh*-question both PA and SA readings are available, as we saw in (2). To force a PA reading, *-wa* is attached to one of the *wh*-phrases (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, whereas the one to which it is not attached is interpreted as focus. SE does not arise and, the *wh*-phrase to

5 See also Surányi (2007), who states for the Hungarian multiple *wh*-question that the *wh*-phrase in a higher position is interpreted like a topic, whereas the one in a lower position is interpreted as focus.
6 The subject *János* is raised for topicalization here.
7 See Diesing (2003), who states that SE does not arise in Yiddish.
8 See the recent literature (e.g. Lambrecht 1994) which claim that the Japanese *-ga* is a focus marker.

which *-wa* is attached appears in the position higher than the one to which it is not attached.

(16) a. Dare ^{OK}-ga/*-wa kore-o kat-ta-no? (Jap.)
who NOM/TOP this-ACC buy-PAST-Q
'Who bought this?'

b. Dare-wa nani-o kat-ta-no?
who-TOP what-ACC buy-PAST-Q
'For each person, what was it that he bought?'
(*dare* 'who' – specific; *nani* 'what' – focus)

c. Nani-wa dare-ga kat-ta-no?
what-TOP who-NOM buy-PAST-Q
'For each thing, who bought it?'
(*nani* 'what' – specific; *dare* 'who' – focus)

In the English multiple *wh*-question, in which one *wh*-phrase appears in sentence-initial position and the rest remain(s) in situ, a *wh*-subject that appears in sentence-initial position tends to be interpreted as specific, as illustrated in (17a). Kiss points out that (17b), in which SE is avoided, is interpreted as 'for each present, to whom did you give it?': 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 focus.[9] 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.[10]

(17) a. Who ate what? (=13b)

b. Who did you give which present to who?

The Finnish multiple *wh*-question belongs to the English type as introduced above. In the multiple *wh*-question (18a), which has only a PA reading like 'Pekka stands on Merja's toes, Minna stands on Antti's toes, ...', a suffix *-kin*, which triggers a distributive reading of *wh*-phrases (Hakulinen and Karlsson 1979, Vilkuna 1989), is attached to one of the *wh*-phrases. When *-kin* is attached to a *wh*-subject, it remains in situ, which results in the avoidance of SE (18b). These facts show that the *wh*-phrase to which *-kin* is attached is interpreted as specific, and the one to which *-kin* is not attached is interpreted as focus.[11]

[9] According to the traditional literature (e.g. Pesetsky 1987), 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.

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

[11] The literature on Finnish have claimed that *-kin* is a focus particle. However, since *-kin* triggers a distributive

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 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 of whom buy?'
(Huhmarniemi and Vainikka 2011:2-3,(3a),(5))

All of the data above show i) that the information structure of the multiple *wh*-question that has a PA reading does not differ among languages in that it contains a *wh*-phrase interpreted as specific and one interpreted as focus, ii) that it is uniformly derived for all languages in the way that the *wh*-phrase interpreted as specific moves to the position higher than the *wh*-phrase interpreted as focus to take a wide scope over the latter as a distributive universal quantifier, and iii) that the spelled-out positions of *wh*-phrases are solely determined in PHON. Specifically, in Hungarian either a *wh*-subject *kinek* 'who' or a *wh*-object *mit* 'what' that is interpreted as specific moves higher than the other that is interpreted as focus; the *wh*-phrases are always spelled out in a higher position regardless of whether they are interpreted as specific or focus (19a-b). In Japanese too either the *wh*-subject *dare* 'who' or the *wh*-object *nani* 'what' that is interpreted as specific moves higher than the other *wh*-phrase interpreted as focus; the *wh*-phrase interpreted as specific is always spelled out in a higher position, and the one interpreted as focus is spelled out in situ (20a-b). Also in English the *wh*-phrase interpreted as specific (i.e. *who* (21a) and *which present* (21b)) moves higher than the one interpreted as focus (i.e. *what* (21a) and *who* (21b)); in some cases (21a) the former is spelled out in a higher position, and the latter is spelled out in situ; in others (21b) the former is spelled out in situ, and the latter is spelled out in a higher position. In Finnish too a *wh*-phrase interpreted as specific moves higher than one interpreted as focus; the former (i.e. *kenen-kin* ... (18a)/*kuka-kin* (18b)) is always spelled out in a lower position, and the latter (i.e. *kuka* (18a)/*mitä* (18b)) is spelled out in a higher position (22a-b).

(19) a. $[_{CP}$ kinek $[_{CP}$ mit … $[_{TP}$ … $[_{v*P}$ … $[_{VP}$ … kinek mit]]]]] (=14a)
b. $[_{CP}$ mit $[_{CP}$ kinek … $[_{TP}$ … $[_{v*P}$ … $[_{VP}$ … kinek mit]]]]] (=14b)

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reading in multiple *wh*-question and the *wh*-phrase to which it is attached functions as a distributive universal quantifier, the *wh*-phrase to which *-kin* is attached in fact does not carry focus in multiple *wh*-question. This is clear from the English translation of (18b) by Huhmarniemi and Vainikka. This claim is supported by the fact that *-kin* cannot appear with a *wh*-phrase in a single *wh*-question in any order:

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

(20) 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)

(21) 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)

(22) 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*-question that has a single-answer reading

I turn to the multiple *wh*-question that has a SA reading. In Japanese the topic marker *-wa*, which forces a PA reading, cannot appear to get a SA reading. Compare (23a-b) with (16b-c).

(23) a. Dare-ga/#-wa nani-o kat-ta-no? (Jap.)
who-NOM/-TOP what-ACC buy-PAST-Q
'Who bought something, and what was it?'

b. Nani-o/#-wa dare-ga kat-ta-no?
what-ACC/-TOP who-NOM buy-PAST-Q
'What did someone buy, and who was that person?'

In Finnish, to get a SA reading, the suffix *-kin*, which triggers a distributive reading of *wh*-phrases, cannot appear and *wh*-phrases must appear in a bare form. Below, a SA reading like 'Pekka stands on Merja's toes' can be obtained when the suffix *-kin* is not attached to the *wh*-phrase that appears in a lower position *kenen*.

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

Kiss (1993:99) observes for Hungarian that (15a) repeated in (25a) cannot have a SA reading: it cannot be interpreted as 'for which person did János bring something, and what was it'. (25b) is the construction in which a SA reading like 'John killed Bob' is obtainable. A main verb *öl* precedes an aspect marker *meg*, which indicates that the verb moves across that particle. *Ki* 'who' moves across the main verb. *Kit* 'whom' remains in situ and follows the aspect marker.[12] According to Kiss, SA can be obtained when *wh*-phrases apply to the same

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

set in a given context. Specifically in (25b), 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.

(25) a. János kinek mit hozott? (=15a)
János who-DAT what-ACC brought
'What did János bring for whom? (For each person, what did János bring for him?)

b. A regény végén ki öl meg kit? (Hun.)
the novel's end who kills PERF whom
'Who kills whom at the end of the novel?

Kiss' argument indicates that in the multiple *wh*-question that has a SA reading *wh*-phrases make a pair and function as an operator in pairs. It indicates for the Japanese multiple *wh*-question like (23) that there is a set that contains the pairs made by a person and an item, ((John, apples), (Bob, oranges), …), and *wh*-phrases apply to one of them in pairs. However, the set to which *wh*-phrases apply is not necessarily given in a context. Imagine that someone came into a luxury shop and stole a valuable necklace yesterday. A policeman came to the shop and asks a clerk:

(26) a. Kino-wa dare-ga nan-ji-ni koko-e ki-mashi-ta-ka?
yesterday-TOP who-NOM what-time-at here-to come-HOR-PAST-Q
'Yesterday, who came here at what time?'

b. Kimura-san-ga 2-ji-ni ki-mashi-ta.
Kimura-HOR-NOM 2-time-at come-HOR-PAST
'Mr. Kimura came at 2:00.'

c. ((Kimura, 2:00), (Sato, 3:00), …)

In the context above the policeman who asks (26a) does not need to have the information list of who came to the shop at what time (26c) in advance. In that sense (26b) can fully be appropriate as an answer that presents a new information consisting of a pair made by a person and the time at which he came.[13] Therefore, I argue that in the multiple *wh*-question that has a SA reading *wh*-phrases carry a focus and function as a focus operator in pairs.

All of the data and arguments above show i) that the information structure of the multiple *wh*-question that has a SA reading differs from that of the multiple *wh*-question that has a PA reading in that *wh*-phrases carry a focus in pairs in the former, ii) that it is uniformly derived for all languages in the way that the two *wh*-phrases move and function as a focus operator in pairs, and iii) that the spelled-out positions of *wh*-phrases are solely determined in

[13] And note that the topic marker *-wa* is attached to *kino* 'yesterday' in sentence-initial position in (26a), which indicates that neither a *wh*-subject *dare* 'who' nor a *wh*-time adverbial *nan-ji* 'what time' is given a topic status.

PHON. Specifically, in Japanese a *wh*-subject *dare* 'who' and a *wh*-object *nani* 'what' make a pair and move to the operator position in pairs; they are both spelled out in situ in some cases (27a); the *wh*-subject is spelled out in situ and the *wh*-object is spelled out in sentence-initial position in others (27b). In Finnish the *wh*-subject *kuka* 'who' and the *wh*-object with a bare form *kenen* … 'whose …' make a pair and move to the operator position together; the former is spelled out in sentence-initial position and the latter is spelled out in situ (28). In Hungarian too the *wh*-subject *ki* 'who' and the *wh*-object *kit* 'whom' make a pair and move to the operator position in pairs; the former is spelled out in sentence-initial position and the latter is spelled out in situ (29).[14]

(27) a. [$_{CP}$ dare-ga+nani-o [$_{TP}$ … [$_{v*P}$ dare-ga… [$_{VP}$ … nani-o]]]] (=23a)
b. [$_{CP}$ dare-ga+nani-o [$_{TP}$ … [$_{v*P}$ dare-ga… [$_{VP}$ … nani-o]]]] (=23b)

(28) [$_{CP}$ kuka+kenen ... [$_{TP}$ … [$_{v*P}$ kuka … [$_{VP}$ … kenen ...]]]]] (=24)

(29) [$_{CP}$ ki+kit [$_{TP}$ … [$_{v*P}$ ki … [$_{VP}$ … kit]]]]] (=25b)

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

4. Syntax of multiple *wh*-question

In this section I propose the ways of deriving multiple *wh*-question. In the multiple *wh*-question that has a PA reading the *wh*-phrase interpreted as specific always moves to the position higher than the one interpreted as focus and takes a scope over the latter. In the current phase system a category is interpreted in the position raised by (the [Edge] feature of) a feature in a functional head. I propose that in the multiple *wh*-question that has a PA reading C has [Spe(cific)] and [Foc(us)], and those features raise a *wh*-phrase respectively. On the

[14] No restriction on the linear order of *wh*-phrases should arise, since they simply make a pair. Thus, a *wh*-object should freely be spelled out in sentence-initial position and a *wh*-subject in situ. This is attested by Japanese as illustrated by (23b), but not by Finnish; see below. Bošković (2002) suggests that the Japanese case is derived by scrambling. I turn to the issue on 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))

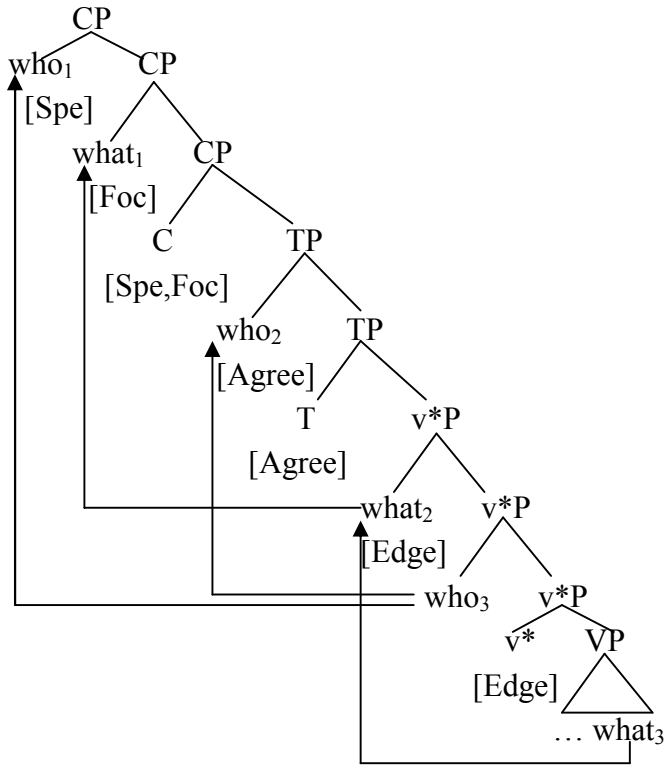
basis of Chomsky (2008) (and also Miyagawa 2010), who proposes that [Agree] (i.e. φ-features) inherited from C to T raises a *wh*-subject in [Spec,v*P] to [Spec,TP] and [Edge] in C raises it to [Spec,CP] 'in a parallel way', I provide the way of deriving (17a) as illustrated in (30). The *wh*-subject in [Spec,v*P] is raised by [Agree] inherited from C to T and its two occurrences make an A-chain (i.e. <who$_2$,who$_3$>).[15] The *wh*-subject in [Spec,v*P] is also directly raised by [Spe] in C, and the raised *wh*-phrase *who$_1$* functions as the distributive universal quantifier that ranges over the A-chain. A *wh*-object is raised by [Edge] in v* (cf. Chomsky 2008) and successively by [Foc] in C (cf. Rizzi 1997), and its occurrences make a focus *wh*-operator-variable chain (i.e. <what$_1$,what$_2$,what$_3$>). The derivation of (5b), in which SE is avoided, proceeds in the same way, as illustrated in (31).[16] The *wh*-subject in [Spec,v*P] is raised by [Agree] inherited from C to T and its two occurrences make an A-chain (i.e. <which student$_2$,which student$_3$>). The *wh*-subject in [Spec,v*P] is also directly raised by [Spe] in C, and the raised *wh*-phrase *which student$_1$* functions as the distributive universal quantifier that ranges over the A-chain. The *wh*-object is raised by [Edge] in v* and successively by [Foc] in C, and its occurrences make a focus *wh*-operator-variable chain (i.e. <which book$_1$,which book$_2$,which book$_3$>). In both cases [Spe] always raises a *wh*-phrase to a higher position than [Foc] does. The difference between them is the spelled-out positions of *wh*-phrases, which are solely determined in PHON. In (30) the *wh*-object *what$_3$* is spelled out in situ after the Spell-Out S-O of v*P, and the *wh*-subject in (the outer) [Spec,CP] *who$_1$* is spelled out after the S-O of CP. In (31) the *wh*-subject in (the inner) [Spec,v*P] *which student$_3$* and the *wh*-object in (the inner) [Spec,CP] *which book$_1$* are spelled out after the S-O of CP.[17]

[15] The in-situ *wh*-subject *who$_3$* will also make an A-chain by itself, which I leave aside here.

[16] See footnote 10. Here I simply assume that a *wh*-subject *which student* is interpreted as specific, and a *wh*-object *which book* as focus.

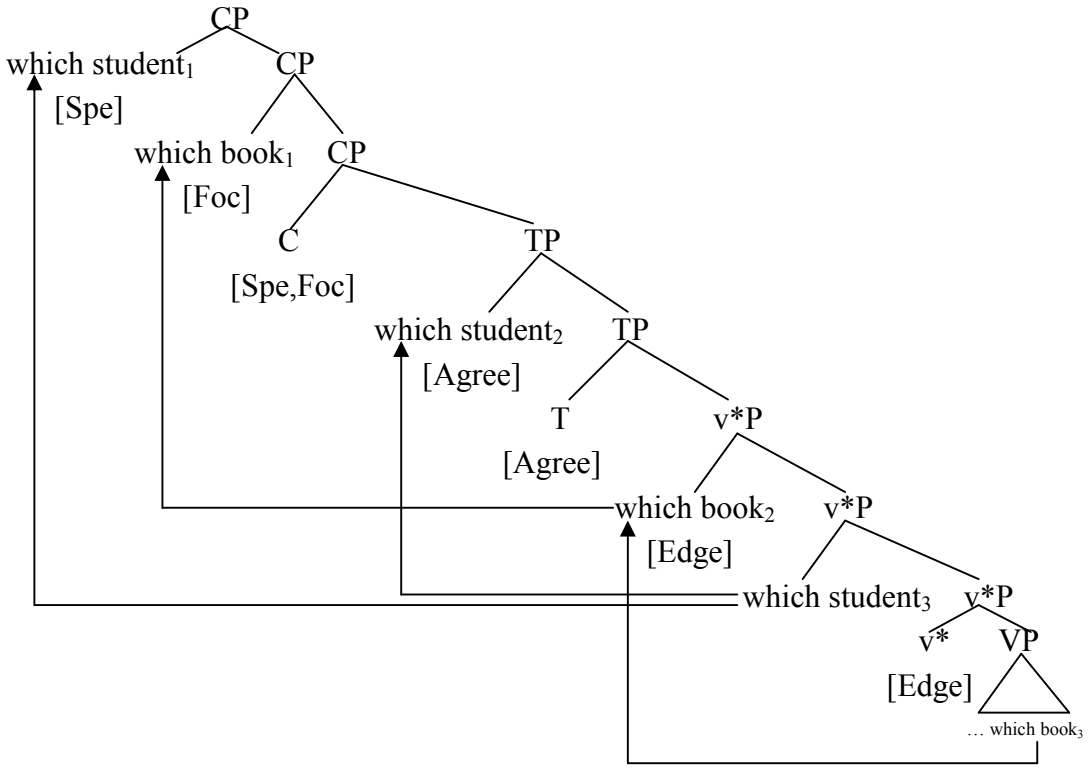
[17] Alternatively, the *wh*-object in (the outer) [Spec,v*P] *what$_2$* could be spelled out after the S-O of CP in (30). The *wh*-subject in [Spec,TP] *which student$_2$* could be spelled out after the S-O of CP in (31). I leave these possibilities open here.

(30) a. Who ate what? (=17a)



b. <who$_2$,who$_3$> – A-chain
who$_1$ – distributive universal quantifier that ranges over the A-chain
<what$_1$,what$_2$,what$_3$> – focus *wh*-operator-variable chain

(31) a. Which book did which student read? (=5b)

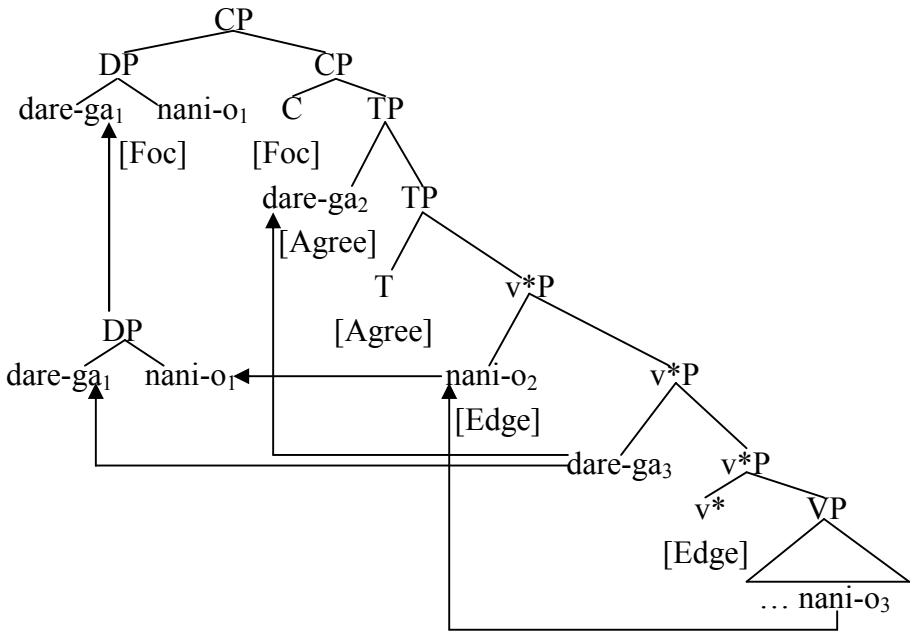


b. <which student$_2$,which student$_3$> – A-chain
which student$_1$ – universal quantifier operator that ranges over the A-chain
<which book$_1$,which book$_2$,which book$_3$> – focus *wh*-operator-variable chain

In the case of the multiple *wh*-question that has a SA reading *wh*-phrases make a pair and they carry a focus in pairs. I assume that C has only [Foc] in this case. Assuming sideward movement (Nunes 2004, Hornstein 2001), I provide the way of deriving (8) as illustrated in (32). An in-situ *wh*-object is raised by [Edge] in v* and its two occurrences make an A'-chain (i.e. <nani-o_2,nani-o_3>). A *wh*-subject in [Spec,v*P] is raised by [Agree] inherited from C to T and its two occurrences make an A-chain (i.e. <dare-ga_2,dare-ga_3>). A copy is made for each of the *wh*-object in [Spec,v*P] and the in-situ *wh*-subject, and those copies merge to each other, resulting in a *wh*-complex *dare-ga$_1$+nani-o$_1$*. The *wh*-complex is raised by [Foc] in C. The *wh*-subject in the raised *wh*-complex *dare-ga$_1$* functions as the focus *wh*-operator that ranges over the A-chain. The *wh*-object in the raised *wh*-complex *nani-o$_1$* functions as the focus *wh*-operator that ranges over the A'-chain. The in-situ *wh*-object *nani-o$_3$* is spelled out after the S-O of v*P. The in-situ *wh*-subject *dare-ga$_3$* is spelled out after the S-O of CP.[18]

[18] Alternatively, the *wh*-subject in [Spec,TP] *dare-ga$_2$* and the *wh*-object in (the outer) [Spec,v*P] *nani-o$_2$* could be spelled out after the S-O of CP. I leave this possibility open here. When the Japanese multiple *wh*-question has

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



b. <nani-o_2,nani-o_3> – A'-chain
<dare-ga_2,dare-ga_3> – A-chain
nani-o_1 – focus *wh*-operator that ranges over the A'-chain
dare-ga_1 – focus *wh*-operator that ranges over the A-chain

5. Intonational properties of multiple *wh*-question

We have argued that the spelled-out positions of *wh*-phrases are solely determined in PF in both the multiple *wh*-question that has a PA reading and the one that has a SA reading. A question remains: what PF factor can determine the spelled-out positions of *wh*-phrases in individual languages, specifically, in, e.g. the multiple *wh*-question that has a PA reading, what PF factor can detemine that both a *wh*-phrase interpreted as specific and one interpreted as focus are always spelled out in higher positions in Hungarian (19a-b), and so on?

The literature have presented the intonational properties of individual languages. Szendrői (2003) presents Hungarian data that show that a sentence accent that expresses the focus of a sentence is strictly located on the constituent that immediately precedes a finite verb, except when the verb itself receives a focus accent. A single *wh*-question (33a) asks a missing information of an object. In the answer (33b) the object *egy könyvet* 'a book', which is located in the position right before a finite verb *vett* 'bought', carries the focus of a sentence,

a PA reading, the derivation proceeds as in (30).

with the sentence accent coming on it. (Partially) due to this intonational property, Surányi (2007) argues that the *wh*-phrase located right before a main verb, e.g. *mit* 'what' in (25a), carries the focus of a sentence in multiple *wh*-question.

(33) a. Mit vett a barátod? (Hun.)
what-ACC bought the friend-yours
'What did your friend buy?'

b. (A barátom) egy KÖNYVET vett.
friend-my a book-ACC bought
'My friend bought a BOOK.'
(Szendrői 2003:38,(3a-b))

German belongs to the English type, in which one *wh*-phrase appears in sentence-initial position and the rest appear(s) in situ or in a lower position.[19] SE does not arise in the unmarked case, as illustrated in (34a-b). According to Büring (1997), a topic must precede a focused constituent in German. The former is realized by a rising intonation and the latter by a falling intonation. This statement indicates for multiple *wh*-question that when *wer* 'who' appears in sentence-initial position, it is interpreted as specific and *was* 'what' in a sentence-medial position is interpreted as focus (34a). When *was* 'what' appears in sentence-initial position, on the other hand, it is interpreted as specific and *wer* 'who' in a sentence-medial position is interpreted as focus (34b). The *wh*-phrase interpreted as specific (i.e. *wer* (34a)/*was* (34b)) is realized by a rising intonation. The pitch peak comes on the main syllable of the *wh*-phrase interpreted as focus (i.e. *was* (34a)/*wer* (34b)), from which pitch falls.[20]

(34) a. ↗Wer hat was↘ gelesen? (Ger.)
who has what read
'Who read what?

b. ↗Was hat wer↘ gelesen?
what has who read
'Who read what?'

Ishihara (2002) reports the intonational properties of the *wh*-question in Japanese, a *wh*-in-situ language. In declarative sentences (35a) pitch slightly rises before each of the sentential elements, though the pitch level on each constituent is gradually reduced due to downstep. In *wh*-queston (35b) pitch peak comes on the *wh*-phrase *nani* 'what', which receives a focus accent too. The pitch level on the sentential element that follows the

19 See Grohmann (2006) for a detailed analysis of the German multiple *wh*-question.
20 Many thanks to Jana Haussler and Malte Zimmermann (p.c.) for the native judgment of German.

wh-phrase (i.e. *kat-ta* 'buy-PAST') is significantly reduced, accompanied by the deaccentuation of it. The low pitch continues until the Q-morpheme *-no* appears, where pitch slightly rises again.[21]

(35) a. ↗Taro-ga↘ ↗nanika-o↘ ↗kat-ta↘. (Jap.)
Taro-NOM something-ACC buy-PAST
'Taro bought something.'

b. ↗Taro-wa↘ ↗NANI-O↘ kat-ta-no↗?
Taro-TOP what-ACC buy-PAST-Q
'What did Taro buy?'

On the basis of the data and statements above I suggest that the intonational properties of individual languages are closely involved in determining the spelled-out positions of *wh*-phrases in multiple *wh*-question. More detailed studies of individual languages are required to identify the intonational factors that actually determine the spelled-out positions of *wh*-phrases, which I leave for future research.[22]

Let us turn to SE in English. As we have seen so far, SE does not arise in the unmarked case. Assuming that an in-situ *wh*-subject *who* in (36a) is interpreted as specific, it should be possible that it moves higher than the *wh*-object *what* interpreted as focus, and the former is spelled out in situ and the latter in sentence-initial position (36b), contrary to fact.

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

b. *[$_{CP}$ who [$_{CP}$ what … [$_{TP}$ … [$_{v*P}$ who … [$_{VP}$ … what]]]]]

According to the literature (Bolinger 1965, Jackendoff 1972, Büring 1997), a topic is

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

i) Cine ce↘ a uitat să deschidă? (Rom.)
who what has forgotten to open
'Who forgot to open what?'

ii) Tu vas où↘? (Fre.)
you go where
'Where do you go?'

[22] On the basis of Ishihara's data, Richards (2010) proposes a universal constraint that a *wh*-phrase not be separated from a complementizer by phonological phrases. According to him, a language takes either one of the strategies: i) one prosodic domain that contains C and a *wh*-phrase is made, with all phonological boundaries removed between them, e.g. Japanese; ii) a *wh*-phrase is raised to shorten the distance from it to C, with phonological boundaries left as they are, e.g. English. With this constraint, it could be argued here that in C-initial languages like English *wh*-phrases are spelled out in a higher position, whereas in C-final languages like Japanese they are spelled out in situ. Though this argument could apply to 'rigid' multiple *wh*-fronting languages like Bulgarian, many exceptional cases arise for multiple *wh*-question in general: for instance, one *wh*-phrase is spelled out in sentence-initial position and the rest in situ in, e.g. English. As we have seen so far, different languages have different options for the spell-out positions of *wh*-phrases in multiple *wh*-question.

realized by a fall-rise intonation and a focused phrase is realized by a falling intonation in English. A subject *John* is a topic and an object *candies* carries the focus of an answer sentence (37a); the subject *John* carries the focus and the object *candies* is a topic in the answer sentence (37b). The topic phrases *John* (37a) and *candies* (37b) are realized by a fall-rise, and the focused phrases *candies* (37a) and *John* (37b) are realized by a fall, as illustrated by arrows. In multiple *wh*-question the *wh*-phrase interpreted as specific (i.e. *who* (38a)/*which present* (38b)/*who* (38c)) should be realized by a fall-rise, and the one interpreted as focus (i.e. *what* (38a)/*who* (38b)/*what* (38c)) should be realized by a fall.

(37) a. What did John eat? – ↗John↘↗ ate CANDIES↘.

b. Who ate candies? – JOHN↘ ate ↗candies↘↗.

(38) a. ↗Who↘↗ ate what↘? (=17b)

b. Who↘ did you give ↗which present↘↗ to? (=17a)

c. *What↘ did ↗who↘↗ buy? (=35a)

Note that a fall-rise intonation on a topic/specific phrase aligns with the right/final boundary of a phonological phrase (cf. Nespor and Vogel 1986): ↗[John]↘↗ (37a), ↗[candies]↘↗ (37b), and ↗[who]↘↗ (38a). The fall-rise on an in-situ *wh*-phrase (i.e. *which present* (38b) and *who* (38c)) does not align with the right boundary. However, it can be realized on more than one syllable in the case of *which*-phrases, whereas it must be realized on only one syllable in the case of monosyllabic *wh*-phrases. Then, SE, I suggest, is derived from the inappropriate intonational pattern that could arise in the case of monosyllabic in-situ *wh*-phrases: a fall-rise intonation would have to be realized on a syllable that does not align with the right/final boundary of a phonological phrase in the case of monosyllabic in-situ *wh*-phrases. This situation is not compatible with the appropriate intonational patterns of English.

6. Conclusion

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

spelled-out positions of *wh*-phrases are determined by the intonational properties of individual languages, and that SE in English is caused by the inappropriate intonational pattern that could arise in the case of monosyllabic in-situ *wh*-phrases.

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

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