Japanese Embedded Questions are Nominal: Evidence from Quantificational Variability Effect

Satoshi Tomioka
University of Delaware

Abstract: The exhaustivity of an embedded interrogative sentence can be altered by the presence of an adverb in the matrix clause. This phenomenon, known as Quantificational Variability Effect (QVE), manifests itself in a peculiar way in Japanese. A QVE-inducing adverb can take the form of a numeral classifier that agrees with the embedded Wh-phrase. Such a long-distance association between a classifier and a noun is not attested elsewhere in Japanse, and the semantic mechanism of QVE cannot easily be analogized to any known strategy. I argue that Japanese embedded questions are implicitly nominalized in the fashion similar to the internally-headed relative clause construction, and that the nominalized embedded questions are treated as concealed questions. The proposed analysis gives a very simple account for the puzzling QVE construction, as the floated quantifier structure with a concealed-question-denoting NP is commonplace. The paper examines a variety of phenomena, such as doubly headed relative clause structure and selectional restrictions on QVE, which support the nominal structure of Japanese embedded questions.

Keywords: Wh-questions, Quantificational Variability Effect (QVE), concealed questions, classifier, exhaustivity, internally headed relative clause.

1 Quantificational Variability Effect (QVE)

This paper concerns the structure and the meaning of an embedded interrogative sentence in Japanese. The main claim is that embedded questions in Japanese are or at least can be implicitly nominalized, and that its semantic interpretation also follows from the nominal structure. However, the proposed process of nominalization does not resemble the embedding strategy known in Turkic languages, in which embedded sentences, interrogative or otherwise, undergo robust nominalization processes. The main motivation for the nominal analysis of Japanese embedded questions comes from what has come to be known as the Quantificational Variability Effect (QVE), and it is therefore useful to present a quick review of the phonemenon. An embedded question selected by a verb like *know* is known to show the 'exhaustivity' property (c.f., Groenendijk and Stokhof 1984, Heim 1994). In (1), for instance, the default interpretation is that for all the people who attended the meeting, David knows that they did so.

(1) David knows who attended the meeting.

Berman (1987) discovered, however, that the exhaustivity can be altered by a presence of an adverbial expression that belongs, at least structurally, to the matrix clause.

(2) a. For the most part, David knows who attended the meeting.
≈ For most of those who attended the meeting, David knows that they attended the meeting.

b. David in part knows who attended the meeting.
≈ For some of those who attended the meeting, David knows that they attended the meeting.

c. David barely knows who attended the meeting.
≈ For very few of those who attended the meeting, David knows that they attended the meeting.

The Quantificational Variability Effect (QVE) refers to this kind of variation in quantificational meaning of an embedded Wh-phrase. Berman (1987, 1991) offers an analysis in which a wh-phrase is treated like an indefinite NP within the framework developed in Heim (1982). Analogizing this effect to the well-known interpretational variability of indefinite NPs with adverbs of quantification, Berman suggests that wh-phrases are restricted variables that can be bound by QVE-inducing adverbs.

(3) a. For the most part, David knows who attended the meeting.

b. Most $_x$ [x attended the meeting] [David knows that x attended the meeting]

Lahiri (2002b) gives a different analysis in which a QVE-inducing adverb quantifies over relevant answers (propositions) to the embedded question.

(4) a. For the most part, David knows who attended the meeting.

b. Most $_p$ [p is a relevant answer to the question 'who attended the meeting?'] [David knows p]

The newest entry to the QVE debate is Beck and Sharvit (2002), who argue that what is quantified over in the QVE phenomenon is sub-questions of the embedded question.

(5) a. For the most part, David knows who attended the meeting.

b. Most $_q$ [q is a sub-question of the question 'who attended the meeting?'] [David knows (the answer to) q]

A sub-question of a Wh-question is typically a yes-no question for some entity x that is included in the domain for the wh-phrase. Imagine, for instance, that for the question of *'who attended the meeting?'*, the four individuals are under consideration; Anna, Bertha, Carla, and Dahlia. Then, (5b) is, in effect, (6).

(6) Most $_q$ [$q \in \{$ whether Anna attended the meeting, whether Bertha attended the meeting, whether Carla attended the meeting, whether Dahlia attended the meeting$\}$] [David knows (the answer to) q]

The three analyses all capture the core cases of the QVE, and one must consider a variety of issues, empirical and conceptual, in order to choose one over the others. QVE-inducing adverbs themselves are not particularly helpful in distinguishing the three analyses, as they do not give out any morphological or syntactic hints about what they quantify over. Categorically, they are capable of being associated with NPs, as discussed in Lahiri (2002b) and Nakanishi and Romero (2004).

(7) For the most part, David despises his relatives.
≈ David despises most of his relatives.

We can even play around with NPs whose denotations are approximately what Lahiri and Beck and Sharvit propose.

(8) a. For the most part, David believes those propositions to be false.
≈ David believes most of those propositions to be false.
b. For the most part, David ignored those questions.
≈ David ignored most of those questions.

This is precisely the point where English and Japanese differ. While Japanese also has 'neutral-looking' adverbs similar to the English counterparts (e.g., (9a)), it is possible to use a numeral classifier (e.g., (9b)) or a universal quantifier (e.g., (9c)) that 'agrees' with the embedded Wh-phrase.[1]

(9) a. Mari-wa [dare-ga ukat-ta-ka] **daitai** sitte-iru.
Mari-Top [who-Nom pass-Past-Q] mostly know-Prog
'For most of the people who passed, Mari knows that they passed.'
b. Mari-wa [dare-ga ukat-ta-ka] **san-nin-gurai** sitte-iru.
Mari-Top [who-Nom pass-Past-Q] three-CL-approx know-Prog
'For about three of the people who passed, Mari knows that they passed.'
c. Mari-wa [dare-ga ukat-ta-ka] **zen-in** sitte-iru.
Mari-Top [who-Nom pass-Past-Q] all-CL know-Prog
'For all of the people who passed, Mari knows that they passed.'

The classifiers *-nin* 'person' and *-in* 'member' can only associate with humans, and our intuition is that they somehow relate to the embedded wh-phrase *dare* 'who'. This paper will present an account for how this association between a QVE-inducing classifier and an embedded wh-phrase can be established. In doing so, however, I will neither try to export my analysis to QVEs in English nor intend to give support to any of the analyses summarized above for English. I will conclude that QVEs with classifiers are made possible by some peculiar syntax and the corresponding semantics of Japanese embedded questions. Since these properties are presumably not shared by the English counterparts, it makes little sense to extend the proposal to English. Putting it differently, I will use QVEs as a window through which we can see the true nature of embedded interrogative sentences in Japanese, and my main contribution to the grammar of QVEs is to point out a novel way to induce QVEs that has not been conceived before.

2 More on Japanese QVEs

In this section, I will lay out more detailed descriptions of the QVEs in Japanese. First of all, it must be stated that QVEs with classifiers are not some kind of anomaly that is found only with the classifiers for humans. Here are some examples that involve different object-classifier pairs.

[1] To my knowledge, this fact was first noted by Kitagawa (2009).

(10) a. Bound objects (e.g., books) - CL (*satu*)

Mari-wa [dono-hon-ga mada kaes-arete-inai-ka] **zyu(s)-satu-wa** age-rareru
Mari-top which-book-nom yet return-pass-not-Q ten-CL-Top list-can

'For at least ten of the books that have not been returned, Mari can list which ones they are .'

b. Nations - CL (*kakoku*)

Mari-wa [dono-kuni-ga NATO-no menbaa-dearu-ka] **yon-kakoku-sika**
Mari-top which-nation-nom NATO-gen member-be-Q four-CL-except
sir-anai
know-neg

'For only four of the nations that belong to NATO, Mari knows that they do.'

c. Firms/companies - CL (*sya*)

[dono-kaisya-ga sinki-saiyoo-o toriyameta-ka] **nizyu(s)-sya-hodo**
which-company-nom new-hire-acc cancelled-Q twenty-CL-about
kaki-tomete oita
write-down-perf

'For about twenty of the companies that have hiring-freeze, I wrote them down.'

Second, grammatical functions of Wh-phrases do not affect the availability of QVEs. An object Wh or even an adjunct Wh can be associated with a QVE classifier.

(11) a. Mari-wa [Suzuki-kyoozyu-ga dare-o suisen-si-ta-ka] **san-nin-gurai**
Mari-top Suzuki-Prof-Nom who-Acc recommend-do-past-Q three-CL-approx
sitte-iru
know-prog

'For three of those Prof. Suzuki recommended, Mari knows that she recommended them'

b. [Sono-kaisya-ga dono-kuni-kara wain-o yunyuu-site-iru-ka]
that-firm-Nom which-nation-from wine-Acc import-do-prog-Q
san-kakoku-hodo osiete-hosii.
3-CL-approx tell-desire

'I want you to tell me (the names of) three of the countries from which that firm imports wine.'

Nor does syntactic distance matter for QVEs: In the example below, the Wh-phrase is further embedded, but QVE is observed.

(12) Mari-wa [keesatu-ga [dare-ga ayasii-to] nirande-iru-ka] **hito-ri-mo** sir-anai
Mari-Top police-nom who-nom suspicious-C speculate-prog-Q one-CL-even know-neg

'Mari has no clue as to who the police think is suspicious.'

The third point is that a simple 'number + CL' combination sounds rather odd. Some readers might have noticed that all the sentences presented so far contain not only numeral classifiers but also approximating expressions (e.g., *-gurai, -hodo* 'about/around'), or focalizing/scalar expressions (e.g., *-wa*, the contrastive topic marker with the scalar implicaure 'at least', *-mo*, 'as

many/much as', *-sika*, the NPI version of 'only', *-izyoo* 'more than'). For some reason, the presence of such an expression makes the sentence sound much more natural. In some cases, however, modifier-less numeral classifiers are quite acceptable, especially when focus is placed on them, as seen in contrastively focused classifiers (13a) or a wh-classifier (13b).

(13) a. [dare-ga kaigi-ni syusseki-sita-ka], Mari-wa **san-nin**, Erika-wa **roku-nin**
who-nom meeting-at attend-did-Q Mari-top three-CL Erika-top six-CL
osiete-kure-ta
tell-give-past
'Among those who attended the meeting, Mari told me about three of them, and Erika about six of them.'

b. [dare-ga kaigi-ni syusseki-sita-ka], **nan-nin** age-raremasu-ka?
who-nom meeting-at attend-did-Q how.many-CL list-can-Q
'How many of those who attended the meeting can you list?'

Although it is not clear to me at this point exactly what the conditions for 'bare' numeral classifiers are, I assume that numeral classifiers can, in principle, function as QVE adverbs, and that modifiers/focalizers play an auxiliary role, rather than an essential one, to make the use of numeral classifiers more salient.

It is also important to solidify the fact that a QVE adverb belongs to the matrix clause in every sense. In particular, we need to consider very carefully the possibility that a numeral classifier is generated within the embedded clause, establishing a local relation with the embedded wh-phrase and is subsequently raised out to the matrix clause. The observed word order 'embedded CP-Adv-matrix V' is created by the remnant movement of the CP to the left following the movement of the adverb. (14bc) shows the result of this process.

(14) a. Mari-wa [dare-ga ukat-ta-ka] **san-nin-gurai** sitte-iru. = (9a)
Mari-Top [who-Nom pass-Past-Q] three-CL-about know-Prog
'For about three of the people who passed, Mari knows that they passed.'

b. Scrambling of the NQ
Mari-wa [**san-nin-gurai**]$_1$ [dare-ga t_1 ukat-ta-ka] sitte-iru

c. Remnant Movement of the CP
Mari-wa [dare-ga t_1 ukat-ta-ka]$_2$ **san-nin-gurai** t_2 sitte-iru.

It is very unlikely, however, that this analysis correctly captures the QVE facts. First, if this sequence of movements is possible at all, it must be limited to interrogative CPs. As the example below shows, a long-distance association between a numeral classifier and its associate NP is generally disallowed.

(15) a. * Mari-wa [gakusei-ga ukat-ta-to] **san-nin-gurai** omotte-iru.
Mari-Top [student-Nom pass-Past-Q] three-CL-about think-Prog
'Intended: Mari thinks, concerning three of the students, that they passed.'

b. * Mari-wa [gakusei-ga t_1 ukat-ta-to]$_2$ [**san-nin-gurai**]$_1$ t_2 sitte-iru

It would be very difficult to differentiate (14c) and (15b) in a disciplined way. Second, observe that the proposed base-generated structure, shown below, is quite awkward, and the interpretation that can be recovered from this awkward sentence is not what (9a) is supposed to mean.

(16) ??? Mari-wa [dare-ga **san-nin-gurai** ukat-ta-ka] sitte-iru.
Mari-Top who-Nom three-CL-about pass-past-Q know-porg
Possibly? 'Mari knows which quintet of people passed the exam.'

Therefore, advocates of this analysis must make two very unusual moves. First, the movement of an QVE adverb and the remnant movement are both obligatory with embedded interrogative CPs but not allowed (not even optional) with non-interrogative CPs. Second, when the movements take place, they create an entirely new interpretation that isn't available with the base order. The story will be far simpler, therefore, if QVE-inducing numeral classifiers belong to the matrix clause in all levels of representations.

Is there any way to motivate a long-distant (= beyond a clausal boundary) association between a QVE-adverb and an embedded wh-phrase? The system must be highly selective since, as we saw in (2), no such long-distance relation is allowed with non-interrogative embedded clauses. As far as I can see, there is no conceivable mechanism that meets the criteria. In addition, the idea of long-dsitance association faces an empirical problem. We saw earlier that a QVE can be induced with an adjunct wh-phrase. The relevant example is repeated below.

(17) [Sono-kaisya-ga dono-kuni-kara wain-o yunyuu-site-iru-ka] **san-kakoku-hodo**
that-firm-Nom which-nation-from wine-Acc import-do-prog-Q 3-CL-approx
osiete-hosii.
tell-desire
'I want you to tell me (the names of) three of the countries from which that firm imports wine.'= (10c)

The numeral classifier *san-kakoku-hodo* 'about three countries' is associated with the PP wh-phrase *dono-kuni-kara* 'from which country'. However, as Miyagawa (1989) pointed out, a floated numeral classifier is supposed to be incapable of modifying a noun contained in a PP.

(18) *? Sono-kaisya-wa yooroppa-no-kuni-kara **san-kakoku** wain-o yunyuu-site-iru
that-firm-Top Europe-Gen-nation-from 3-CL wine-Acc import-do-prog
'That firm imports wine from three European countries.'

The contrast between (17) and (18) makes it even less plausible that a long-distant association between a classifier and an embedded wh-phrase is responsible for QVEs.

The discussion so far confirms our original idea: A numeral classifier can function as a QVE adverb, and despite the 'agreement' with an embedded wh-phrase, there is no reason to believe that the syntax position of a QVE-adverb is any different from that of its English counterpart. When we consider the existing three analyses of English QVEs, the most obvious candidate for the Japanese QVEs is the one given by Berman (1987), who argues that a QVE adverb quantifies over entities. This is certainly a possibility, but by adopting Berman's theory, we must face one outstanding problem that was pointed out by Lahiri (2002b): If wh-phrases are restricted variables in the sense of Heim (1982), there is no reference to its interrogative syntax (and the corresponding interrogative semantics). No matter how one looks at them, Japanese embedded questions clearly

show interrogative syntax, and it would be indeed very strange that a proper analysis of Japanese QVEs has no place for interrogative syntax or semantics.

An alternative analysis that I will pursue in this paper maintains the idea that a QVE classifier does quantify over entities (or things quite like them), but crucially not in the way that Berman envisaged it. More concretely, I will attempt to derive the QVE with a numeral classifier (e.g., (19a)) via a strategy akin to (19b).

(19) a. Mari-wa [dare-ga ukat-ta-ka] **san-nin-gurai** sitte-iru. = (9a)
Mari-Top [who-Nom pass-Past-Q] three-CL-approx know-Prog
'For about three of the people who passed, Mari knows that they passed.'

b. Mari-wa [[e_1 ukat-ta Op_1] hito-o] **san-nin-gurai** sitte-iru.
Mari-Top pass-past person-acc three-CL-approx know-prog
'Mari knows about five of those who passed the exam.'

Structurally, (19b) involves a relative clause. Semantically, it is considered as an instance of 'concealed question' (Romero 2005, Romero 2006, Nathan 2006 and references therein); although the argument of a verb has an appearance of an NP, its meaning is paraphrasable as an interrogative sentence. Here are some examples of concealed questions in English.

(20) a. Anna asked me the time.
≈ Anna asked me what time it was.

b. Bertha knows the winner.
≈ Bertha knows who the winner is/was.

c. The likelihood of Carla's coming depends on the weather.
≈ How likely Carla is coming depends on how the weather is/will be.

It is well-known that Japanese numeral classifiers 'float'; they can be associated with NPs that do not make constituents with them. NPs that are interpreted as concealed questions can also be associated with numeral classifiers in a similar fashion.

(21) a. Kana-wa Winburudon-no kako-no syoosya-o juu-nin-gurai sitte-iru
Kana-Top Wimbledon-Gen past-Gen winner-ACC ten-CL-approx know-prog
'Kana knows ten or so of the past Wimbledon champions.

b. Kei-wa Yooroppa-no syuto-o jut-tosi-hodo age-rare-ru
Kei-Top Europe-Gen capital-ACC ten-CL-approx list-can-pres
'Kei can list ten or so European capitals.

The proposed analysis derives the QVE in Japanese in a very roundabout way. An embedded question looks like nothing but an interrogative sentence, but its structure is actually nominal, and the nominal structure is, in turn, interpreted as a concealed question (back to question meaning). In this sense, Japanese embedded questions are doubly concealed. A proper and complete analysis of Japanese QVEs will do all three of the following.

(22) a. Demonstrate how an embedded question is (implicitly) nominalized.

b. Show how the nominalized embedded question is interpreted as a concealed question.

c. Present a way in which concealed questions and floated numeral classifiers are interpreted compositionally.

In this paper, I will primarily focus on the issue in (22a). While the importance of (22b) and (22c) is undeniable, these issues are more or less independent of the problems at hand. One may object to my characterization of Japanese QVEs with numeral classifiers/quanfitiers as instances of concealed questions. The fact remains, however, that floated numeral classifiers/quantifiers can modify NPs that are interpreted as concealed questions, as (21a) and (21b) demonstrate, and this issue certainly calls for explanation even if my claim about QVEs turns out to be incorrect. I therefore set the primary goal of this paper to present a convincing case for (22a) and leave the remaining two issues for future studies.

3 Japanese Embedded Questions are Nominal

The purpose of this section is to provide some facts that point to the nominal nature of embedded interrogative sentences in Japanese. Particularly revealing is a series of comparisons with embedded declarative sentences, which show none of the NP-like behaviors that embedded questions exhibit.

The first fact concerns case morphology. Embedded questions can be accompanied with structural case particles like *-ga* (nominative) and *-o* (accusative). As for lexical or inherent case particles (e.g., the dative *-ni*), they are obligatory with some verbs. Here are some examples.

(23) a. Keesatu-wa [dare-ga hankoogenba-ni i-ta-ka]-(**o**) sirebete-iru.
police-Top who-Nom scene.of.crime-at be-past-Q-(**Acc**) investigate-prog
'The police are investigating who was at the scene of the crime.'

b. [dono-gakusei-o suisen-su-beki-ka]-(**ga**) hanasi-aw-are-ta.
which-student-Acc nominate-do-should-Q-(**Nom**) discuss-recip-pass-past
'Which student should be nominated was discussed.'

c. Kisyadan-no situmon-wa [kaisan-ga ituni-naru-ka]-**ni** syuutyuu-si-ta.
journalists-Gen question-Top [dissolve-Nom when-be-Q-**Dat** focus-do-past.
'The questions from the journalists were mainly on when the house will be dissolved.

On the other hand, declarative CPs in general cannot host case particles.[2]

(24) a. Keesatu-wa [Mita-ga hankoogenba-ni i-ta-to]-(*o) hookoku-si-ta.
police-Top Mita-Nom scene.of.crime-at be-past-C-(**Acc**) report-do-past
'The police reported that Mita was at the scene of the crime.'

b. [Masaki-o suisen-su-beki-to]-(*ga) teian-s-are-ta.
Masaki-Acc nominate-do-should-C-(**Nom**) propose-do-pass-past
'That Masaki should be nominated was proposed.'

c. *Kisyadan-no situmon-wa [kaisan-ga okure-ta-to]-**ni** syuutyuu-si-ta.
journalists-Gen question-Top [dissolve-Nom delay-past-C-**Dat** focus-do-past.
'The questions from the journalists were mainly on (the fact) that the dissolving of the house was delayed.

[2]The only exception to this generalization is the genitive marker *-no*.

In order for declarative CPs to bear those particles, they must be explicitly nominalized with such nominal heads as *no* 'thing' and *koto* 'fact'.

A similar contrast is found with coordination. An embedded question can be coordinated with an NP, as shown below.

(25) Yoogisya-no namae-to [karera-ga kinoo doko-ni i-ta-ka]-o sirabete-hosii.
suspect-Gen name-and they-Nom yesterday where-at be-past-Q-Acc check-want
'I want you to check out the suspects' names and where they were yesterday.'

This strategy is not available for non-interrogative CPs.

(26) * Yoogisya-no namae-to [karera-ga kinoo hankoogenba-ni i-ta-to](-o)
suspect-Gen name-and they-Nom yesterday scene.of.crime-at be-past-Q-acc
koohyoo-su-bekida.
publicize-do-should
'We should make public the suspects' names and that they were at the scene of the crime yesterday.'

Again, a declarative CP must be nominalized in order to be be coordinated with an NP.

The final piece of evidence comes from the sentence pattern in which an interrogative CP is immediately followed by a definite description that corresponds to the Wh-phrase, as illustrated below.

(27) a. Keesatu-wa [dare-ga hooseki-o ubat-ta-ka] **sono hannin-o** sitte-iru
police-Top who-Nom jewel-Acc steal-past-Q] **the culprit-Acc** know-prog
'The police know who stole the jewels, that culprit.'

b. [ansyoo-bangoo-o doko-ni kakus-ita-ka] **sono basyo-o** hito-ni zettaini
pin-number-Acc where-at hide-past-Q **the place** person-Dat definitely
oiete-wa-ike-nai.
tell-Top-must-Neg
'You should never tell anybody where you hid your pin number, that place.'

Quite exotic though it may look, this type of sentence is actually not uncommon at all. Importantly, if the same strategy is applied to an embedded declarative, the result is crushingly ungrammatical.

(28) * Keesatu-wa [dareka-ga hankoogenba-ni i-ta-to] **sono yoogisya-o**
police-Top someone-Nom scene.of.crime-at be-past-C] **the suspect-Acc**
simeetehai-si-ta
wanted.list-do-past
'The police put on the wanted list the person who was at the scene of the crime.'

While the data considered in this section strongly indicate that embedded interrogatives are more nominal than their declarative counterparts in Japanese, it is still uncertain what kind of nominal structure they have. Are there any analogies that we can make use of in order to understand the structure of embedded questions? I believe there is one, and in the following section I will show that an internally headed relative clause can be a good model for the nominalization of an embedded question.

4 Japanese Embedded Questions are Internally-Headed Relative Clauses (IHRCs)

4.1 IHRCs in Japanese

Of all the facts about Japanese embedded questions that we have seen so far, the most revealing is the addition of a nominal head to the right edge of the interrogative CP. The relevant examples are repeated below.

(29) a. Keesatu-wa [dare-ga hooseki-o ubat-ta-ka] **sono hannin-o** sitte-iru
police-Top who-Nom jewel-Acc steal-past-Q] **the culprit-Acc** know-prog
'The police know who stole the jewels.'

b. [ansyoo-bangoo-o doko-ni kakus-ita-ka] **sono basyo-o** hito-ni zettaini
pin-number-Acc where-at hide-past-Q **the place** person-Dat definitely
oiete-wa-ike-nai.
tell-Top-must-Neg
'You should never tell anybody where you hid your pin number.'

In these examples, the embedded questions with additional demonstrative-like expressions look a lot like relative clauses, but not exactly so. Unlike typical relative clauses, there are no gaps within the embedded CPs. The closest material to the required gap is the wh-phrase itself. Being gap-less and having an overt head within the embedded clause, these sentences resemble internally-headed relative clauses (IHRCs), which take the following form: a CP that contains a head followed by the nominalizer *no*.

(30) [Mari-ga keeki-o reezooko-ni irete-oi-ta]-**no**-o Koji-ga tabete-simat-ta
Mari-Nom cake-Acc fridge-in place-put-past-NM-ACC Koji-Nom eat-finish-past
'Koji ate the cake(s) that Mari put in the fridge.

While the presence of the nominalizer *no* highlights the difference between an embedded question and an IHRC, they share the ability to accommodate an external nominal head with the demonstrative *sono* 'that/the'.

(31) a. [Mari-ga okane-o aru-kaikeesi-ni azukete-oi-ta]-**no**-o
Mari-Nom money-Acc certain-accountant-Dat entrust-put-past-NM-Acc
moti-nige-sarete-simat-ta
have-escape-pass-result-past
'Mari got stolen the money that she entrusted to a certain accountant.

b. [Mari-ga okane-o aru-kaikeesi-ni azukete-oi-ta]-**sono-okane**-o
Mari-Nom money-Acc certain-accountant-Dat entrust-put-past-**the-money**-Acc
moti-nige-sarete-simat-ta
have-escape-pass-result-past
'Mari got her money stolen, the (very) money that she entrusted a certain accountant.

c. [Mari-ga okane-o aru-kaikeesi-ni
Mari-Nom money-Acc certain-accountant-Dat
azukete-oi-ta]-**sono-kaikeesi**-ga kane-o moti-nige-site-simat-ta
entrust-put-past-**the-accountant**-Nom money-Acc have-escape-do-result-past

'Mari entrusted her money to a certain accountant, that very accountant stole the money.

What the examples above show is that Japanese IHRCs can be 'doubly headed'; an IHRC can have an internal head as well as an overt head external to the CP. This construction looks remarkably similar to the embedded question examples, and it provides an empirical motivation to model an analysis of embedded questions after that of IHRCs.

4.2 Syntax and Semantics of Japanese IHRCs

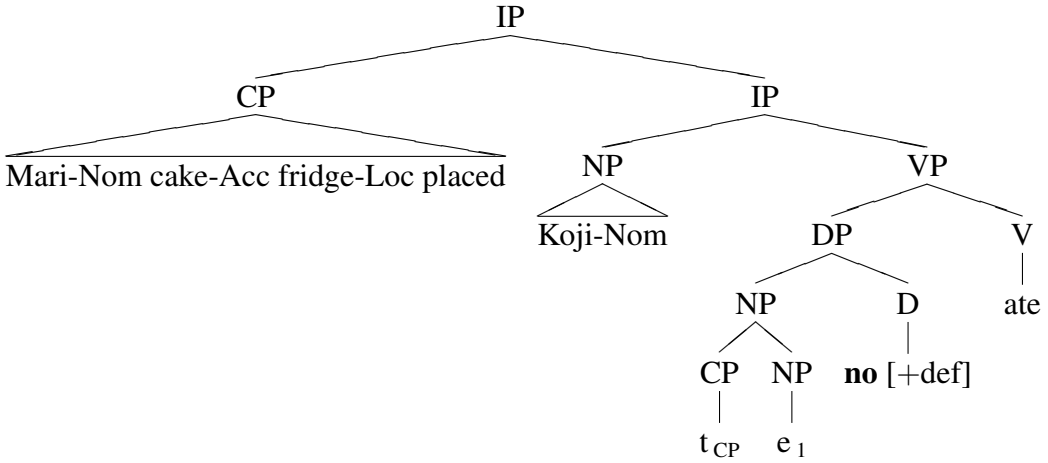
For a theory of IHRCs in Japanese, I will follow the analysis presented by Shimoyama (1999). The main features of her analysis are (32).

(32) a. Semantically, the embedded clause in an IHRC is interpreted as a conjunction to the main clause (cf. Demirdache 1991)

b. The main clause contains an E-type pronoun (cf. Hoshi 1995), which picks out a referent made salient by the embedded clause.

The semantics of (32a) is achieved by QR-ing the embedded CP and adjoin it to the matrix IP. This movement does not leave a trace behind, and the moved CP is interpreted as a part of the conjunction at the level of IP. Meanwhile, there is a phonologically silent property anaphora, and combined with the nominalizer *no*, which acts like a definite determiner, it is treated as a disguised definite description (= an E-type pronoun). Shown below is the LF representation of the sentence (30).

(33)



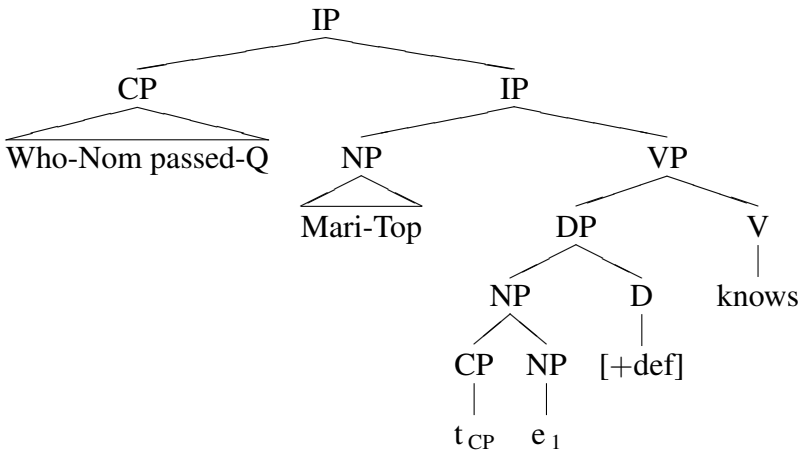
The semantic content of the missing property anaphora is recovered via assignment functions.

(34) Let g:= [1 → λx. x is a cake and Mari placed x in the fridge]
⟦Koji-ga [$_{DP}$ t $_{CP}$ [$_{NP}$ e$_{1\ <e,t>}$] no (+def)]]-o tabe-te-simatta ⟧^{g} = the proposition that Koji ate the maximal x such that x is a cake and Mari put x in the fridge.

4.3 Embedded Questions as IHRCs

Directly importing Shimoyama's analysis of IHRCs would give the following LF representation.

(35)



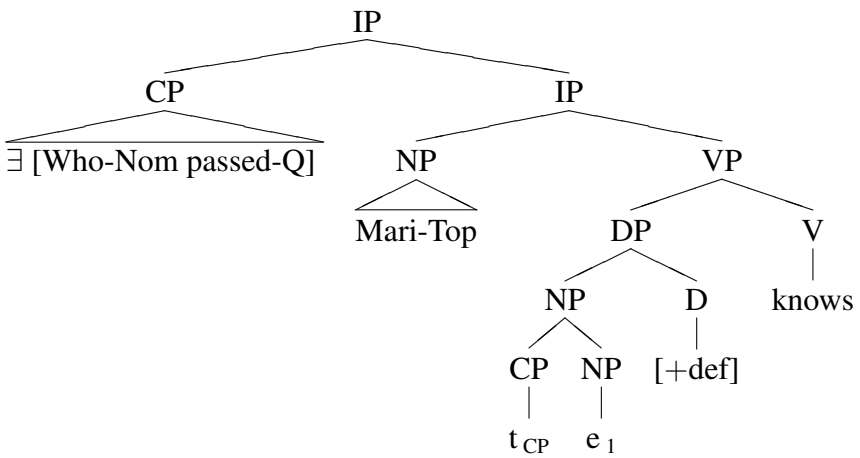
(35) leaves a few uncertainties. In particular, the following issues must be addressed: The raised CP is not a proposition but a set of propositions. Therefore, the conjunctive semantics cannot used. The conjunction strategy also makes little semantic sense because it is unclear what propositional meaning can be conjoined to the matrix clause. Related to this issue is the semantic content of the phonologically silent property anaphora in the E-type pronoun. Without knowing what semantic contribution the raised CP makes, we cannot easily determine the meaning of the E-type pronoun in the representation.

The first step towards the integration of the IHRC idea and the interrogative syntax is the notion of answerhood by Lahiri (2002b). Lahiri also uses 'interrogative raising', an operation that raises an embedded interrogative CP to the matrix IP. The meaning of the raised Q is slightly shifted. It gets the answer layer on top of the question meaning and receives the additional restriction of being relevant in the context.

(36) a. p is an answer to Q (i.e., Ans(p, Q)) iff $\exists$ S $\in$ Pow(Q) [p = $\cap$S]
b. The meaning of a raised Q: λp. [Ans(p, Q) & C(p)]

For Lahiri, the raised question meaning in (36b) serves as the domain for a QVE adverb. I use the idea of the raised question, but instead of applying a QVE adverb to its meaning, I choose to existentially close it at the CP level. The result is a proposition (i.e., no longer a set of propositions) that says there is a relevant (i.e., true) answer to the question. The existentially closed CP can be conjoined with the matrix clause.

(37)



$\exists$ [Who-Nom passed-Q] = $\exists$p [p $\in$ { q: Ans(q, ⟦Who-Nom passed-Q ⟧) & C(q) }]

The next task is to identify the semantic value of the phonologically silent property anaphora that constitutes the core meaning of the E-type pronoun. In order to do so, I will have to make a certain pre-theoretic assumption concerning the semantic type of the E-type pronoun here. Ordinarily, it is rather uncontroversial that an E-type pronoun refers to a particular entity. As mentioned earlier, however, the current case is a bit more complicated because the E-type pronoun is interpreted as something that leads to the concealed question interpretation, and the meaning of an NP that is to be interpreted as a question is anything but a settled issue. Despite the complication, I assume that the E-type pronouns here denotes an entity or the intentional version of it (an individual concept). There are two main reasons. First, even if a concealed question NP ends up denoting something other than entities, we may achieve this by some kind of shifting rule. Second, it would make it easier to associate a floated numeral quantifier with the NP meaning. Although this issue itself is not central to the main goal of this paper, it is perhaps wise even at this stage to eliminate as many obstacles for the final, complete analysis as possible. Our goal here is to interpret the sentence *Mari knows who passed* as the concealed meaning of *Mari knows the people who passed* and to make the E-type pronoun mean something like the relative clause *the people who passed*. We can achieve this by supposing that the E-type pronoun above to refer to the maximal entity x such that the proposition that x passed constitutes a relevant answer to the question of who passed.

(38) Let g:= [1 $\rightarrow$ λx. Ans(x passed, {q: : $\exists$y & q = y passed}) & C (x passed)]
⟦Mari-wa [$_{DP}$ t $_{CP}$ [$_{NP}$ e$_{1\ <e,t>}$] e (+def)]] sitte-iru ⟧^{g} = the proposition that Mari knows the maximal x such that the proposition that x passed is a relevant answer to the question of who passed.
$\approx$ the proposition that Mari knows the people who passed.

To finalize the analysis, we need to find a way to combine a floated numeral classifier/quantifier with an concealed-question-denoting NP, but as mentioned earlier, the necessity of such machinery is independent of how we interpret embedded questions. For instance, the object NPs with floated classifiers in the examples below must be interpreted as concealed questions.

(39) a. Kana-wa Winburudon-no kako-no syoosya-o zyuu-nin-gurai sitte-iru
Kana-Top Wimbledon-Gen past-Gen winner-ACC ten-CL-approx know-prog
'Kana knows ten or so of the past Wimbledon champions. = (21a)

b. Kei-wa Yooroppa-no syuto-o zyut-tosi-hodo age-rare-ru
Kei-Top Europe-Gen capital-ACC ten-CL-approx list-can-pres
'Kana can list ten or so European capitals. = (21b)

I will leave this issue as an open question and concentrate on embedded questions, especially some important consequences of the proposed analysis.

4.4 Further Issues

The current proposal raises a few empirical issues that merit from further discussion. The first issue is whether all question-embedding verbs can license QVEs. The *inquiry*-type verbs, such as *ask*, *investigate*, do not license the answerhood layer, and according to Lahiri (2002b), they do not allow QVEs. Beck and Sharvit (2002) challenged this generalization and presented some examples

with *inquiry*-type verbs that show QVEs. With this debate still not settled, the prediction about the *inquiry*-type verbs may be considered theory-dependent. However, there is another interesting property that separates the *inquiry*-type verbs from the others, namely the availability of concealed question interpretations with NP arguments. In general, *inquiry*-type verbs **can** yield concealed question meaning, as shown below.

(40) a. Emily asked Fred's age. ≈ Emily asked how old Fred is.
b. George checked Hanna's address. ≈ George checked where Hanna lives.

Interestingly, however, these verbs do not seem to allow concealed question interpretations with NPs with relative clauses; the kind of NP that is created by the process I am arguing for.

(41) a. ?? Emily asked the people who passed. ≉ Emily asked who passed.
b. George checked the books that got lost. ≉ George checked which books got lost.

The same restriction applies to the comparable verbs in Japanese. The concealed question meaning is possible with a simple NP but not with a relative clause NP.

(42) a. Mari-wa paatii-no zikan-o tazune-ta
Mari-Top party-Gen time-Acc ask-past
'Mari asked the time of the party' ≈ 'Mari asked what time the party would be.'
b. Kana-wa Kei-no zyuusyo-o sirabe-ta
Kana-Top Kei-Gen address-Acc check-past
'Kana checked Kei's address.' ≈ 'Kana checked where Kei lives.'

(43) a. ?* Mari-wa [paatii-ni ki-ta]-hito-o tazune-ta
Mari-Top party-Loc come-past-people-Acc ask-past
'Mari asked the people who came to the party' ≉ 'Mari asked who came to the party.'
b. Kana-wa [paatii-ni ki-ta]-hito-o sirabe-ta
Kana-Top arty-Loc come-past-people-Acc check-past
'Kana checked the people who came to the party.' ≉ 'Kana checked who came to the party.'

We then expect that these verbs do not show QVEs with embedded questions. This prediction is borne out.

(44) a. Mari-wa [dare-ga ukat-ta-ka] ?*zyuu-nin-gurai/*zen-in tazune-ta
Mari-Top who-Nom pass-past-Q ten-CL-approx/all-CL ask-past
'Intended: For ten or so/all of those who passed, Mari asked whether they passed.'
b. Kana-wa [dare-ga paatii-ni ki-ta-ka] ?*zyuu-nin-gurai/*zen-in sirabe-ta
Kana-Top who-Nom party-Loc come-past-Q ten-CL-approx/all-CL check-past
'Intended: For ten or so/all of those who came to the party, Kana checked whether they came to the party.'

Particularly revealing here is the comparison between *sirabe-ru* and *sirabe-age-ru*. The latter is a complex predicate consisting of *sirabe* 'check' and *age-ru* 'raise/finish', which entails finding out truths after some checking. This complex predicate can yield concealed question meaning with a relative clause NP, as shown in (45a). As expected, it also produces a QVE with a numeral classifier/quantifier, as in (45b).

(45) a. Kana-wa [paatii-ni ki-ta]-hito-o sirabe-**age**-ta
Kana-Top arty-Loc come-past-people-Acc check-finish-past
'Kana discovered (after some investigation) the people who came to the party.' ≈
'Kana discovered (after some investigation) who came to the party.'

b. Kana-wa [dare-ga paatii-ni ki-ta-ka] zyuu-nin-gurai/zen-in
Kana-Top who-Nom party-Loc come-past-Q ten-CL-approx/all-CL
sirabe-**age**-ta
check-finish-past
'For ten or so/all of those who came to the party, Kana discovered (after some investigation) that they came to the party.'

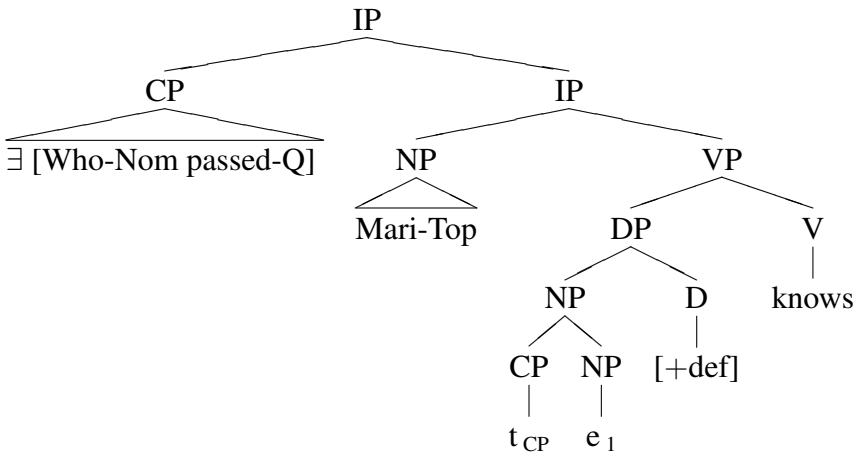
Another crucial point is the issue of semantic selection: Embedded questions must be lexically selected by a question-embedding predicate. This means that, without a question-embedding predicate, the IHRC use of a question cannot be achieved. This will explain why a nominal embedded question is only possible with such a predicate.

(46) a. * [Mari-ga nani-o reezooko-ni irete-oi-ta-ka]-ga nakunatte-ita
Mari-Nom what-Acc fridge-in place-put-past-Q-Nom disappear-be
'The stuff Mari put in the fridge had disappeared.'

b. [Mari-ga keeki-o reezooko-ni irete-oi-ta-]no-ga nakunatte-ita
Mari-Nom cake-Acc fridge-in place-put-past-NM-Nom disappear-be
'The cake(s) Mari put in the fridge had disappeared.'

However, the notion of 'semantic selection' has become a tricky issue under the current proposal. As repeated below, there are extra DP/NP layers between the interrogative CP and the question-selecting predicate, and these intervening phrase markers make the matter of 'selection' a problem much more complex than usual.

(47)



There is another problem closely related to the 'selection' issue. In the proposed syntactic structure, the interrogative CP is, at least syntactically speaking, an adjunct and is buried within a complex NP, which is standardly assumed to be an island for movements. Therefore, it is predicted that movement out of this type of CP would cause a Subjacency violation. While this prediction is borne out for a garden-variety IHRC, as shown in (48a), (48b) shows that no such ill effects are found with embedded questions. [3]

(48) a. * [reezooko-ni]$_1$ Koji-wa [Mari-ga t_1 keeki-o irete-oi-ta]no-o
fridge-Loc Koji-Top Mari-Nom t cake-acc put-place-past-NML-ACC
tabete-simat-ta
eat-finish-past
'In the fridge, Koji ate the cake that Mari put.'

b. [Sono-siken-ni$_2$ Mari-wa [dare-ga t_2 ukat-ta-ka] **san-nin-gurai** sitte-iru.
That-exam-Dat Mari-Top [who-Nom t pass-Past-Q] three-CL-approx know-Prog
'That exam, for about three of the people who passed, Mari knows that they passed it.'

The semantic selection issue and the extraction fact collectively indicate that embedded interrogative CPs are regarded as selected arguments, but the proposed syntax and the semantics that follows from it do not reflect it. While I acknowledge that this is a big obstacle for my proposal, the problem has an extra complication that makes the analysis less vulnerable. Recall that an interrogative CP can have an 'external head'; the demonstrative *sono* and an overt noun. The relevant examples are repeated below.

(49) a. Keesatu-wa [dare-ga hooseki-o ubat-ta-ka] **sono hannin-o** sitte-iru
police-Top who-Nom jewel-Acc steal-past-Q] **the culprit-Acc** know-prog
'The police know who stole the jewels.' = (27a)

b. [ansyoo-bangoo-o doko-ni kakus-ita-ka] **sono basyo-o** hito-ni zettaini
pin-number-Acc where-at hide-past-Q **the place** person-Dat definitely
oiete-wa-ike-nai.
tell-Top-must-Neg
'You should never tell anybody where you hid your pin number.' = (27b)

Some may object to my characterization of embedded questions, which is quite a diversion from our ordinary understanding of what the syntax and semantics of embedded questions is. Even so, the skeptics would be a little warmer to the idea that some kind of nominal structure is involved in the sentences above, where the demonstrative and the noun head are overtly expressed. What is interesting is that this CP+DP structure behaves exactly like an ordinary embedded question as far as the semantic selection and the extraction facts are concerned. It cannot appear in a sentence that lacks a question-selecting predicate, and scrambling out of CP+DP structure is possible.

(50) * [Dare-ga hooseki-o ubat-ta-ka] **sono hannin-ga** hankoogenba-kara nige-ta
[who-Nom jewel-Acc steal-past-Q] **the culprit-Nom** scene.of.crime-from escape-past
'Who stole the jewels, the culprit disappeared from the scene of the crime.'

[3] I am grateful to Kensuke Takita of Nanzan University, who pointed out the importance of the island issue.

(51) a. [Sono hooseki-o]$_1$ keesatu-wa [dare-ga t_1 ubat-ta-ka] **sono hannin-o**
[that jewel-Acc] police-Top who-Nom t steal-past-Q] **the culprit-Acc**
sitte-iru
know-prog
'Those jewels, the police know who stole them.'

b. [ansyoo-bangoo-o]$_1$ dare-ga nan-to itte-mo [t_1 doko-ni kakus-ita-ka]
[pin-number-Acc] who-Nom what-Comp say-even [t where-at hide-past-Q]
sono basyo-o hito-ni zettaini oiete-wa-ike-nai.
the place-Acc person-Dat definitely tell-Top-must-Neg
'Your pin number, you should never reveal, no matter who says what.'

These examples give a strong indication that it is quite reasonable to assimilate the structure of embedded interrogative CPs to that of the corresponding CP-DP sequence, however it is structured. Perhaps, importing Shimoyama's syntax without any modification is too simple-minded, and more innovative syntax that reflects the argumenthood of the CP is necessary both for the CP alone and for the CP-DP sequence. Our next step should be to investigate whether there are other instances where two seemingly independent phrases are selected by a predicate for one single thematic slot and, if there are, how such cases should be syntactically analyzed. I will have to leave this project for a future investigation.

5 Multiple- and Cumulative Wh Questions

5.1 Facts

One serious challenge to the current proposal comes from multiple-Wh questions. Consider the following examples.

(52) a. [uti-no gakka-no dono-gakusei-ga nan-ni-tuite
our-Gen department-Gen which-student-Nom what-Dat-about
kenkyuu-site-iru-ka] **san-nin-gurai-sika** sir-anai
research-do-prog-Q three-CL-approx-but know-neg
'For only three or so of our students, I know what they are working on.'

b. ? [uti-no gakka-no dono-gakusei-ga nan-ni-tuite
our-Gen department-Gen which-student-Nom what-Dat-about
kenkyuu-site-iru-ka] **mit-tu-gurai-sika** sir-anai
research-do-prog-Q three-CL-approx-but know-neg
'For only three or so of the research topics, I know which of our students are working on them.'

The mystery of the QVEs in multiple-Wh questions is two-fold. First, how could a QVE be derived at all in a multiple-Wh question? What kind of nominalization process is involved? Second, why is there a preference for a QVE adverb modifying the first Wh-phrase, as witnessed in the contrast between (55a) and (55b)?

It turns out that these puzzles carry over to 'cumulative' questions. A cumulative question is a single-Wh question with a plural NP that can trigger a 'pair-list' answer. For instance, compare the two paris of sentences shown below.

(53) a. Which student in our department is working on which subject?
b. Which subject are the students in our department (each) working on?

(54) a. Mari knows which student in our department is working on which subject.
b. Mari knows which subject the students in our department are (each) working on.

The two questions in (53) can elicit the same listing answer; *Anna is working on plurality, Bertha on Turkish word stress, Carla on object shift, etc.*, and we can consider the content of Mari's knowledge more or less identical in the two statements in (54). That we can observe QVEs in cumulative Wh-questions may not be too surprising, but how they manifest themselves has one interesting twist.

(55) a. [uti-no gakka-no gakusei-ga nan-ni-tuite kenkyuu-site-iru-ka]
our-Gen department-Gen student-Nom what-Dat-about research-do-prog-Q
san-nin-gurai-sika sir-anai
three-CL-approx-but know-neg
'For only three or so of our students, I know what they are working on.'

b. (?) [uti-no gakka-no gakusei-ga nan-ni-tuite kenkyuu-site-iru-ka]
our-Gen department-Gen student-Nom what-Dat-about research-do-prog-Q
mit-tu-gurai-sika sir-anai
three-CL-approx-but know-neg
'For only three or so of the research topics, I know which of our students are working on them.'

Recall that a multiple-Wh question showed a pattern in which a QVE adverb modifies the first Wh-phrase more comfortably than the second Wh-phrase. What the examples above show is that a QVE adverb seems better associated with the plural NP than with the Wh-phrase. [4] However, our intuition turns out to be rather shifty with cumulative questions. In the context for (55a), it seems that we have a pair-list answer in mind, just as was the case with a multiple-wh question. In the same context, (55b) sounds odd. However, (55b) is actually quite all right and is indeed more appropriate than (55a) when the issue is the general trend of our students' research (e.g., *What research topics are popular among our students these days?*). Such a context does not demand a pair-list answer but a single answer (e.g., *They are working on scrambling and plurals*). Since the latter situation is fundamentally the same as a single-wh question, let us concentrate on the case of the pair-list interpretation with a cumulative wh-question.

What property is shared by the first Wh-phrase in a multi-Wh question and the definite plural in a cumulative question under the pair-list interpretation? What is relevant here is the 'sorting key' hypothesis of Kuno (1982) and Kuno and Takami (1993). They argued that a pair-list answer is asymmetric in such a way that one of them functions as the basis of sorting. For instance, think

[4] This would be surprising if the QVEs stemmed from some semantic relation between the QVE adverb and the Wh-phrase itself (e.g., the characterization given by Berman (1987)). It therefore provides another reason to abandon a direct association with a classifier and a Wh-phrase in a QVE case.

about how one answer to the question *Which student is working on which topic?*. We have our mental list of the students, and we go through the list one by one and figure out which topic each student is currently working on. In a multiple-wh question, the wh-phrase that comes first in the linear order is the most likely candidate for the sorting key, as Kuno (1982) and Kuno and Takami (1993) noted. A cumulative question like the examples above uses the plural NP as the sorting key. Thus, the generalization about the QVEs in multiple- and cumulative Wh questions is that a QVE adverbs prefers modifying the expression, a wh-phrase or otherwise, that corresponds to the sorting key.

5.2 Nominal Structure for Multiple- and Cumulative Wh Questions

As the first step towards a solution for the problem posed by multiple wh-questions and cumulative wh-questions, let us think of what kind of NP that can yield concealed multiple- or cumulative question meaning. The closest paraphrase of (56a) and (56b) seems to be the [NP-Gen NP] structure in (56c).

(56) a. Mari knows which of our students is working on which subject.
b. Mari knows which subject our students are (each) working on.
c. Mari knows our students' research topics.

Is such nominal structure justified? One test that checks its feasibility is the addition of an external 'head' to an embedded question. As the following examples show, both a multiple-wh question (57a) and a cumulative question (57b) can host an external head of the form [NP-Gen NP]. It is also a promising sign that an internally headed relative clause can also have an external head of the same kind, as shown in (57c).

(57) a. Keesatu-wa [dono-yoogisya-ga doko-ni kakurete-iru-ka]
Police-Top [which-suspect-Nom where-Loc hide-prog-Q]
sono-yoogisya-tati-no-idokoro-o tukitometa-no?
that-suspect-Pl-Gen-whereabouts-Acc found.out-Q
'Did the police find out which suspect was hiding where; those suspects' whereabouts?'

b. Keesatu-wa [yoogisya-tati-ga doko-ni kakurete-iru-ka]
Police-Top [suspect-Pl-Nom where-Loc hide-prog-Q]
karera-no-idokoro-o tukitometa-no?
they-Gen-whereabouts-Acc found.out-Q
'Did the police find out where the suspects were hiding; their whereabouts?'

c. [Aru toosika-ga sono-ginkoo-ni kane-o azukete-oita]
[certain investor-Nom that-bank-Dat money-Acc entrust-left]
sono-toosika-no-kane-o ginkooin-no hitori-ga tukaikonde-simatta.
that-investor-Gen-money-Acc banker-Gen 1.CL-Nom embezzle-completed
'Some investor entrusted his money to the bank, but a bank employee embezzled the investors money.'

A bigger challenge is to make it possible for a QVE adverb to associate with the possessor NP. In general, a floated quantifier cannot use the genitive-marked NP in the [NP-Gen NP] structure.

(58) [Gakusei-no ronbun-o] **mit-tu/*san-nin** yonda.
student-Gen paper-Acc three-CL(things)/three-CL(people) read
'I read three of the students papers.

However, there are a few linguistic environments in which this association seems possible. Not surprisingly, NPs with concealed question interpretations are among those exceptional environments.

(59) [Uti-no gakubu-no gakusei-no syussinkoku-o]
our-Gen department-Gen student-Gen home.country-Acc
zyuk-kakoku-gurai/?**zyuu-nin-gurai** age-rareru.
ten-CL(nations)-approx/ten-CL(people)-approx list-can
'I can list about ten of our students' home countries. ≈ Either 'For about ten of our students, I can list which countries they are from.' or 'For about ten of the countries that our students are from, I can list which students are from those countries.

While this is certainly encouraging, it is far from satisfactory. I, as well as the few native speakers that I consulted, find the association with a genitive NP, as in (59) rather awkward. Certainly better than cases like (58), it is nonetheless not as good as the association with the head noun. To make the matter more complicated, we have witnessed that, in QVE cases, the adverb prefers associating with the first NP/the definite plural, which corresponds to the genitive NP in the concealed question strategy. What is the reason for the reversal of the preference? I suggest that the answer lies in the exhaustivity asymmetry in multiple- and cumulative Wh questions. As discussed in Dayal (1996), the exhaustivity does not operate symmetrically in multiple-Wh questions. More concretely, it is better defined with respect to the first Wh-phrase, the sorting key Wh-phrase. The following example illustrates the asymmetry.

(60) a. Who gave what to Jane for her birthday?

b.

Who?	What?
Anna	flowers
Bertha	flowers, a book, a cake
Carla	a mug cup
Dahlia	a pen

The table given above shows the list of givers and their gifts. With this in mind, let us now compare the following two answers.

(61) a. Anna gave her flowers, Bertha flowers and a book, Carla a mug cup, and Dahlia a pen.
b. Anna gave her flowers, Bertha flowers, a book, and a cake, and Dahlia a pen

Our intuition says that (61b) is certainly a partial answer, while we tend to be more lenient about (61a); strictly speaking, not 100% complete, but the sense of partiality is quite weak. As far as the number of 'atomic' propositions is concerned, the two answers are not different. Each fails to mention one ('Bertha gave her a cake' in (61a), and 'Carla gave her a mug cup' in (61b). This contrast shows that missing answers from the set corresponding the first Wh is regarded as a more

serious omission than from the set for the second Wh. The situation is practically the same with cumulative questions. While it is debatable whether the pair-list answer indicates that the question itself must be understood distributively (see (Krifka 1992) for discussion), we seem to have the same intuition when a pair-list answer happens to be given. Imagine, for instance, that one asks (62) instead of (60a).

(62) What did Jane's friends give to her for her birthday?

When we compare (61a) and (61b) as an answer to (62), the same contrast is felt: (61a) seems much less partial than (61b).

The asymmetry in exhaustivity makes an important impact on QVEs. QVE adverbs modify exhaustivity (with numeral classifiers) or sometimes stress it (with the universal Q like *zen-in* 'all people), and this operation should target the expression that induces exhaustivity, which is the sorting key of the distribution; the first Wh in a multiple-Wh question and the definite plural in a cumulative Wh-question. This exhaustivity asymmetry is, I speculate, the source of the preference of the sorting key expression exhibited by QVE adverbs.

6 Some Alternatives

In this section, I present two alternative analyses and investigate how feasible they are. It will turn out that each of them has serious problems that cannot be easily overcome, and that they fail to be serious contenders to be viable alternatives to the proposal presented in the paper. The first possibility is to appeal to the locality defined in the phase-based derivational syntax of Chomsky (2001). The idea is fairly simple. An embedded Wh-phrase moves to the speficifier of the embedded CP at LF, and this position is at the edge of a phase (i.e., a CP) and is considered as a position accessible to an operation at the next phase (i.e., the matrix vP). Assuming that a QVE numeral classifier is contained within the matrix vP, we can interpret this accessibility as a 'local' relation between the Wh-phrase and the classifier. One great advantage of this analysis is the 'sorting key' preference of a QVE classifier in multiple- and cumulative Wh questions. Recently, Kitagawa and Tomioka (2004), Kitagawa, Rohrs, and Tomioka (2004) and Willis (2008) argued that the sorting key Wh-phrase in a multiple-Wh question is topical and takes scope over the entire question. Then, the sorting-key Wh is at the very edge of a CP, even higher than the other Wh, creating a configuration in which the former is closer/more local to the QVE classifier. Assuming that a definite plural that acts as the sorting key in a cumulative question is treated alike, we can account for the preference of the sorting key Wh by a QVE by attributing it to the locality.

While this advantage is appealing, I nonetheless believe that its disadvantage far overweighs it. First of all, we need to explain why the association between a classifier and an NP (a Wh, in case of a question) is limited to interrogative CPs. Consider the following example.

(63) * Mari-wa [gakusei-wa ukaru-daroo-to] **san-nin-gurai** omotte-iru.
Mari-Top [student-Top pass-Evid-C] three-CL-about think-Prog
'Intended: For about three of the students, Mari thinks that they will pass.'

While the topic-marking under embedding is more limited, it is often allowed when the clause that contains a topic is the complement of a propositional attitude verb. The ungrammaticality of (63) is not, therefore, due to the appearance of *wa* in the embedded clause. Rather, it is caused by the

failure to establish a connection between the classifier *san-nin-gurai* 'about five (people)' and the embedded topic *gakusei-wa*. This is mysterious if a topic moves to the edge of the embedded CP and makes itself accessible to the QVE classifier in the matrix vP.

Another problem of this alternative analysis is that the expected interpretation would not match the QVE meaning. If a numeral classifier and a Wh in the specifier of the embedded CP are in a local relation so that the numeral classifier uses the denotation of the Wh as its domain, the question meaning of the embedded clause does not play ay role in restricting the domain. The problem can be easily seen in one of the earlier examples, which is repeated below.

(64) = (9b)

Mari-wa [dare-ga ukat-ta-ka] **san-nin-gura** sitte-iru.
Mari-Top [who-Nom pass-Past-Q] three-CL-approx know-Prog

'For about three of the people who passed, Mari knows that they passed.'

As the translation suggests, the numeral in this example quantifies over the people who passed. However, the expected interpretation under the alternative analysis is: 'For about five people of those who are in the denotation of *dare* 'who', Mari knows that they passed.'

The second alternative is to make the relation between a classifier and its NP associate much more indirect than we have been assuming so far. The basic intuition behind this analysis can be summarized as follows. Even with QVE numeral classifiers, we always 'count' answers (i.e., propositions) as proposed by Lahiri (2002a). Instead of counting propositions directly, we count entities that uniquely define the answer propositions. Imagine, for instance, that four people, namely Anna, Bertha, Carla and Dahlia passed. Each of these four individuals maps to a unique atomic answer, as shown below.

(65)

Individual	Answer
Anna	Anna passed
Bertha	Bertha passed
Carla	Carla passed
Dahlia	Dahlia passed

In the example (64), the numeral classifier *san-nin-gurai* 'about three (people)' counts the passers, by which it indirectly counts the answer propositions that are isomorphic to the passers.

I find the second alternative quite attractive, much more than the first, and the reason for it is rather obvious. The analysis greatly simplifies the syntax of embedded interrogative CPs since there is no need of nominalization. The biggest advantage of the simple syntax is that the lack of island effects and the notion of semantic selection are no longer problems. The use of isomorphism between entities and other semantic objects has been explored by Nakanishi (2007), who proposes that a floated numeral classifier can count events by way of counting entities in them. Perhaps, the analysis can be considered as an extension of Nakanishi's idea. I nonetheless believe that it is not a viable alternative to the one proposed in this paper, as it faces a few problems that I find very hard to overcome. First, the analysis over-generates QVEs. As mentioned in Section 4.2, the *inquire/check* type verbs do not support QVE adverbs. However, the isomorphism between entities and sub-questions (in the sense of (Beck and Sharvit 2002)) can be established, just as easily as was the case with entities and answers.

(66)

Individual	Sub-question
Anna	Did Anna pass?
Bertha	Did Bertha pass?
Carla	Did Carla pass?
Dahlia	Did Dahlia pass?

Therefore, the analysis can offer no account for the selectivity of QVEs that we observed earlier. The second problem comes from the comparison between Japanese and Korean. Numeral classifiers in Korean work very much like their Japanese counterparts. Considering many other syntactic properties that are shared by the two languages, it is quite surprising that Korean numeral classifiers cannot be used as QVE adverbs.

(67) a. Swu-nun [nwu-ka cwukessnun-ci] anh-ta
Su-Top [who-Nom died-Q] know-DCL
'Su knows who died.'

b. * Swu-nun [nwu-ka cwukessnun-ci] **say-salam-cengto** anh-ta
Su-Top [who-nom died-Q] three-CL-about know-DCL
'For about three of the people who died, Su knows that they died.'

It turns out that Korean fails one of the three 'nominal' tests with embedded clauses, namely the availability of 'doubly headed' interrogative clauses with overt demonstrative NPs.

(68) * Kyeongchal-un [nwu-ka unhayng-ul telessnun-ci] **ku pemin-ul** anh-ta
Police-Top [who-Nom bank-Acc robbed-Q] that perpetrator-Acc know-DCL
'The police know who robbed the bank, the culprit.'

The example above suggests that, while the internally headed option is generally available for Korean relative clauses, the strategy cannot be applied to embedded interrogative CPs in Korean. These two facts naturally follow from the internally headed relative analysis of QVEs. With the second alternative we are now considering, however, they come out as unrelated, random facts, and some other explanation must be sought to account for the mismatch between Japanese and Korean.

7 Closing Remarks

The Japanese QVEs with numeral classifiers are challenging in many different respects. On the one hand, a numeral classifier seems to alter the exhaustivity of an embedded Wh-question by directly associating itself with the Wh-phrase. It was demonstrated, however, that the classifier belongs to the matrix clause from the very beginning of the derivation, and the association between a classifier and the Wh-phrase therefore must be established across a clause boundary. The problem is that such a long-distance association is generally banned, and there aren't any compelling reasons to relax the constraint just for QVEs. Even if such an association were justified, it would still leave unanswered the question of how the quantification over Wh-denotations works. Treating a Wh-phrase as a restricted variable would work, as Berman (1987) proposed, but there would be no room for interrogative syntax and semantics to play a role.

This paper has tried to resolve the two well-established but seemingly contradictory facts about numeral classifiers: A numeral classifier quantifies over entities (= denotations of nominal expressions), and the association between a numeral classifier and its nominal associate must be local. The proposed solution makes appeal to the nominal nature of an embedded interrogative sentence, which is highlighted effectively in comparison with embedded non-interrogative clauses. An embedded interrogative CP is treated as a disguised internally-headed relative clause, which results in the concealed question construction. Since NPs that are interpreted as concealed questions are known to associated with floated numeral classifiers, we can fend off the challenges mentioned above. However, the proposal comes with its own challenges. Among those, the most significant and perhaps most intriguing is the problem of semantic selection. While it is clear that an embedded interrogative CP is selected by a question-embedding verb, the proposed syntax does not reflect it. The lack of Island effects with movements out of embedded questions also suggests that an interrogative CP is the complement of the verb that selects it. Although I offered no account, I pointed out that the same applies to an embedded question with overt 'demonstrative+noun' attached to it. The presence of an additional 'external' head clearly indicates that more complex syntax is involved in this construction, but island effects are not observed in it, either. To the extent that I try to draw parallelism between the implicit IHRC structure and the doubly headed structure, I find it encouraging that they behave alike with respect to island effects is encouraging.

I leave as a future project the compositional semantic analysis of concealed question NPs with floated numeral classifiers. As mentioned earlier, this question needs to be addressed, regardless of the solutions to the QVE problems. To my knowledge, the issue of concealed question NPs and numeral classifiers has not been brought up yet. It has been widely debated what kind of semantic creature a concealed question is: individual concepts, propositions, and properties are among the candidates that have been proposed before. It may turn out that the investigation of a concealed question with a numeral classifier can shed new light on this on-going debate.

References

Beck, Sigrid, and Yael Sharvit (2002), "Pluralities of Questions." *Journal of Semantics* 19: 105–157.

Berman, Stephen (1987), "Situation-Based Semantics for Adverbs of Quantification." In J. Blevins and A. Vainikka, eds., *University of Massachusetts Occasional Papers 12*, Amherst, Mass.: University of Massachusetts, pp. 8–23.

Berman, Stephen (1991), *On the Semantics and Logical Form of WH-Clauses*. Ph.D. thesis, University of Massachusetts, Amherst. Distributed by GLSA, Amherst, MA.

Chomsky, Noam (2001), "Derivation by Phase." In Michael Kenstowicz, ed., *Ken Hale: A Life in Language*, Cambridge, MA: MIT Press, pp. 1–52.

Dayal, Veneeta (1996), *Locality in WH Quantification*, vol. 62 of *Studies in Linguistics and Philosophy*. Dordrecht: Kluwer Academic Publishers.

Demirdache, Hamida (1991), *Resumptive Chains in Restrictive Relatives, Appositives and Dislocation Structures*. Ph.D. thesis, Massachusetts Institute of Technology, Cambridge, Massachusetts.

Groenendijk, Jeroen., and Martin Stokhof (1984), *Studies on the Semantics of Questions and the Pragmatics of Answers*. Ph.D. thesis, University of Amsterdam, Amsterdam.

Heim, Irene (1982), *The Semantics of Definite and Indefinite Noun Phrases*. Ph.D. thesis, University of Massachusetts, Amherst.

Heim, Irene (1994), "Interrogative Semantics and the Karttunen's Semantics for Know." In Rhonna Buchalla and Anita Mittwoch, eds., *IATL 1*, Jerusalem: Akademon, pp. 128–144.

Hoshi, Koji (1995), *Structural and Interpretive Aspects of Head-lnternal and Head-External Relative Clauses*. Ph.D. thesis, University of Rochester.

Kitagawa, Yoshihisa (2009), "Exhaustive Focus in Japanese." In *Current Issues in Unity and Diversity of Languages: Collection of the Papers Selected from the CIL 18*, pp. 454–474.

Kitagawa, Yoshihisa, Dorian Rohrs, and Satoshi Tomioka (2004), "Multiple Wh Interpretations." In Han-Jin Yoon, ed., *Generative Grammar in a Broader Perspective: Proceedings of the 4th GLOW in Asia*, pp. 209–233.

Kitagawa, Yoshihisa, and Satoshi Tomioka (2004), "Masked Island Effects in Japanese." In A. Csimaz, Y. Lee, and M. A. Walter, eds., *MIT Working Papers in Linguistics: Proceedings of WAFL*, Cambridge, MA: MITWPL, pp. 315–329.

Krifka, Manfred (1992), "Thematic Relations as Links between Nominal Reference and Temporal Constitution." In Ivan Sag and Anna Szabolcsi, eds., *Lexical Matters*, Stanford, CA: CSLI Publications, pp. 29–53.

Kuno, Susumu (1982), "The Focus of the Question and the Focus of the Answer." In *Papers from the Parasession on Nondeclaratives at Chicago Linguistics Society*, pp. 134–157.

Kuno, Susumu, and Ken-ichi Takami (1993), *Grammar and Discourse Principles: Functional Syntax and GB Theory*. Chicago: University of Chicago Press.

Lahiri, Utpal (2002a), "On the Proper Treatment of "Expletive WH" in Hindi." *Lingua* 112: 501–540.

Lahiri, Utpal (2002b), *Questions and Answers in Embedded Contexts*. Oxford: Oxford University Press.

Miyagawa, Shigeru (1989), *Structure and Case Marking in Japanese*, vol. 22 of *Syntax and Semantics*. San Diego: Academic Press.

Nakanishi, Kimiko (2007), *Formal Properties of Measurement Constructions*, vol. 12 of *Interface Explorations*. Berlin and New York: Mouton de Gruyter.

Nakanishi, Kimiko, and Maribel Romero (2004), "Two Constructions with *Most* and their Semantic Properties." In Keir Moulton and Matthew Wolf, eds., *Proceedings of the North East Linguistic Society 34*, University of Massachusetts at Amherst: Graduate Linguistic Student Association, vol. 2, pp. 453–468.

Nathan, Lance (2006), *On the Interpretation of Concealed Questions*. Ph.D. thesis, Massachusetts Institute of Technology.

Romero, Maribel (2005), "Concealed Questions and Specificational Subjects." *Linguistics and Philosophy* 28(6): 687–737.

Romero, Maribel (2006), "On Concealed Questions." In Masayuki Gibson and Jonathan Howell, eds., *Proceedings from Semantics and Linguistic Theory XVI*, Cornell University, pp. 208–227.

Shimoyama, Junko (1999), "Internally Headed Relative Clauses in Japanese and E-Type Anaphora." *Journal of East Asian Linguistics* 8(2): 147–182.

Willis, Paul (2008), "The Role of Topic-hood in Multiple-Wh Question Semantics." Paper presented at WCCFL 27, UCLA.