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WH-Quantifier Interaction and the Interpretation of WH-Phrases

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1 Introduction

Since May 1985, the contrast between (1) and (2) has been a central topic in syntactic theory.

- (1) wh_i t_i saw everyone
 (2) a. what_i did everyone buy t_i
 b. what_i does John think that everyone bought t_i

The examples in (1) and (2) all allow singular answers. Thus, (1) can be answered as in (3a), and (2a) as in (3b).

- (3) a. Mary.
 b. A book.

(2a-b), in contrast with (1), allow pair-list answers in addition. For example, (4) is a possible answer for (2a).

- (4) Mary bought a book, John bought a pen, and Bill bought a CD.

The interpretations of (1)–(2) corresponding to singular answers are rather straightforward. (1) and (2a) can be represented as in (5a) and (5b) respectively.¹

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tively.¹

- (5) a. [for which y] [for every x] y saw x
 b. [for which y] [for every x] x bought y

On the other hand, the interpretations of (2) corresponding to pair-list answers have been controversial. May (1985), and Lasnik and Saito (1992), for example, propose that *everyone* takes scope over the *wh* in the “pair-list reading” of (2a), as in (6).

- (6) [for every x] [for which y] x bought y

Chierchia (1992), on the other hand, argues for an analysis based on the functional interpretation of *wh*-phrases. More specifically, extending the analysis in Engdahl 1986, he proposes that (2a), in the pair-list reading, should be represented as in (7).

- (7) [for which f] everyone_x bought f(x)

In this representation, (i) the *wh*-phrase is decomposed into *for which f* and *f(x)*, and (ii) the universal quantifier *everyone* specifies the domain of the function *f*. Hornstein (1995), adopting this analysis, extends it to multiple-*wh* questions. He argues that (8a), for example, is interpreted roughly as in (8b).

- (8) a. wh_i t_i bought what
 b. [for which f on D] D_x bought f(x)

The main purpose of this paper is to present arguments for Chierchia's analysis of the pair-list reading of (2) and Hornstein's extension outlined above. I will discuss three sets of facts from Japanese, and show that they lead to supporting evidence for the Chierchia-Hornstein theory.

Before I start presenting the arguments, I will discuss one complication with the use of Japanese data in the investigation of quantifier-*wh* interpretation. As first noted by Hoji (1986), the direct Japanese counter-parts of (2a-b) do not allow pair-list answers. Thus, (4) is not a possible answer for (9).²

¹ (5a), for example, is more precisely as in (i) with the restrictions.

(i) [for which y: y is a person] [for every x: x is a person] y saw x

I will ignore the restrictions when they are irrelevant for the discussion.

² For some, (9) is awkward under any interpretation, and contrasts with (i), where the

- (9) daremo-ga nani-o katta no
 everyone-NOM what-ACC bought
 'What did everyone buy?'

For this reason, I will be using the plural pronoun *karera* 'they' in place of the universal quantifier when I examine certain Japanese paradigms. The following section contains a brief remark on the use of the plural pronoun in this context.

The main arguments for the Chierchia-Hornstein theory will be presented in sections 3 and 4. In section 3, I will take advantage of the fact that the weak crossover effect on Japanese long scrambling is extremely weak, if not completely absent, and present an argument for the decomposition of *wh*-phrases. In sections 4, I will argue for the hypothesis that *everyone* in (2) (with the relevant pair-list reading) and *who* in (8a) specify the domain of a function. The argument relies on the fact that Japanese multiple-*wh* questions, unlike their English counterparts, do not require pair-list answers. Given this difference between Japanese and English, the Chierchia-Hornstein theory makes a specific prediction for the quantifier-*wh* interaction in Japanese multiple-*wh* question sentences. I will show that the prediction is indeed borne out.

In section 5, I will turn to examples such as (9), and speculate on why they do not allow pair-list answers. Adopting Kawashima's (1994) semantic analysis of Japanese universal quantifiers of the form *wh+mo*, I will suggest a possible interpretation of this fact under Chierchia's theory of quantifier-*wh* interaction. If the speculation is on the right track, the fact constitutes further evidence for his analysis of (2).

2 Plural Pronouns in Japanese

As noted above, Hoji (1986) reports that the Japanese quantifier *daremo*, which is assumed to correspond in meaning to *everyone*, does not interact at

object is scrambled to the sentence-initial position.

- (i) nani-o daremo-ga katta no
 what-ACC everyone-NOM bought

This is immaterial for the discussion here, since (i) does not allow pair-list answers either.

all with *wh*-phrases to yield the pair-list reading. This means that we cannot use *daremo* when we investigate the "pair-list representation" of Japanese question sentences. I will, hence, use the plural pronoun *karera* 'they' in place of *daremo* in the discussion in the following two sections. Although May (1985) and Pritchett (1990) argue that plural pronouns behave like universal quantifiers and can "take scope over *wh*-phrases," the use of plural pronouns in this context is somewhat controversial. In this section, I will briefly discuss the interpretation of the Japanese plural pronoun in relation to *wh*-phrases, and show that its use in place of the universal quantifier does not affect the arguments to be presented below.

As pointed out initially by Williams (1986), the contrast observed between (1) and (2a-b) does not hold straightforwardly with plural pronouns. Thus, (10a) and (10b) both allow pair-list answers.

- (10) a. *who*_i criticized them
 b. *who*_i did they criticize *t*_i

The relevant "reading" of (10a) is attributed to the plural interpretation of *who*. That is, the answer to (10a) can be as in (11a), and when this is spelled out in more detail, the answer in (11b) also becomes possible.

- (11) a. John and Mary criticized them (= Susan and Bill).
 b. John criticized Susan, and Mary criticized Bill.

But if pair-list answers are possible in this way for examples with plural pronouns, the mere fact that (10b) allows a pair-list answer does not by itself show that the example has a representation that parallels that for the pair-list reading of (2a). In particular, it is not clear that the example can have the representation in (12a) or (12b).³

- (12) a. [for *x*: *x* ∈ they] [for which *y*] *x* criticized *y* (cf. (6))
 b. [for which *f*] they_{*x*} criticized *f*(*x*) (cf. (7))

Despite this complication, there is good reason, I believe, to suppose that plural pronouns can be used in the examination of Japanese quantifier-*wh* interpretation. Hoji (1986) argues that plural pronouns in fact interact with *wh*-phrases exactly like English universal quantifiers, at least in Japanese.

³ See Krifka 1992 and Srivastav 1992 for more detailed discussion on this point.

He first notes that the observation on (10a–b) holds in Japanese as well. Thus, both (13a) and (13b) allow pair-list answers.⁴

- (13) a. [dare-ga karera-o hihansita ka] osiete kudasai
 who-NOM they-ACC criticized Q tell-me please
 'Who criticized them?'
- b. [karera-ga dare-o hihansita ka] osiete kudasai
 they-NOM who-ACC criticized Q tell-me please
 'Who did they criticize?'

But he also notes that there is a clear difference between (13a) and (13b). The direct answer to the former would be as in (11a), and (11b) would sound like a spelled-out version of this. (11b) would be most natural when prefixed by an adverb like "specifically." On the other hand, (13b) clearly can have a pair-list as a direct answer to the question. Although Hoji's point is based solely on intuition, his judgments seem to be clear. He concludes that the contrast between (1) and (2) in fact obtains in (13), and hence, adopting May's (1985) analysis, assumes that *karera* 'they' can have scope over *dare* 'who' in (13b) but not in (13a).

The distinction that Hoji alludes to is confirmed by another set of examples. Longobardi (1987) points out that unlike (2b), repeated below in (14a), the examples derived by *wh*-movement out of an island do not allow pair-list answers. A relevant example is given in (14b).

- (14) a. *what_i does John think that everyone bought t_i*
 b. *?what_i does John wonder whether everyone bought t_i*

It is noted in Murasugi and Saito 1992, and Saito 1994 that the same effect obtains with long scrambling in Japanese. First, pair-list answers are possible for both (15a) and (15b).

- (15) a. [Yamada-ga [karera-ga dare-kara wairo-o uketotta to]
 Yamada-NOM they-NOM who-from bribe-ACC received that
 omotte iru ka] osiete kudasai
 think Q tell-me please
 '[Q Yamada thinks [that they received bribes from whom]]'
- b. [dare-kara_i [Yamada-ga [karera-ga t_i wairo-o uketotta to]
 who-from Yamada-NOM they-NOM bribe-ACC received that
 omotte iru ka]] osiete kudasai
 think Q tell-me please
 '[Q from whom_i Yamada thinks [that they received bribes t_i]]'

The relevant reading is slightly more difficult in the case of (15b), where *dare-kara* 'who-from' is preposed out of its own clause by long scrambling. But it is possible in this example as well as in (15a). (15b) corresponds to (14a) in structure.

The example in (16) has roughly the same status as (15b) with respect to the possibility of the pair-list reading.

- (16) ??[Yamada-ga [karera-ga dare-kara wairo-o uketotta kadooka]
 Yamada-NOM they-NOM who-from bribe-ACC received whether
 sirabete iru ka] osiete kudasai
 is-investigating Q tell-me please
 '[Q Yamada is investigating [whether they received bribes from whom]]'

This example is marginal because of the "wh-island effect" on *wh*-phrases in situ, discussed in detail in Nishigauchi 1990, Watanabe 1992, and Maki 1995. But, like (15b), it allows the reading corresponding to a pair-list answer. This example contrasts sharply with (17), where *dare-kara* 'who-from' is preposed out of the "wh-island" by long scrambling.

- (17) ?[dare-kara_i [Yamada-ga [karera-ga t_i wairo-o uketotta kadooka]
 who-from Yamada-NOM they-NOM bribe-ACC received whether
 sirabete iru ka]] osiete kudasai
 is-investigating Q tell-me please
 '[Q from whom_i Yamada is investigating [whether they received bribes t_i]]'

⁴ In (13) and below, I will embed Japanese *wh* questions under *osiete kudasai* 'please tell me' to make the examples more natural, but I will ignore the added matrix part in the translations. Also, in some cases, I will substitute the rough structure of the Japanese example for its translation.

(17) parallels the English (14b) in structure, and as in the case of (14b), a pair-list answer is inappropriate for this example. Thus, Longobardi's effect is observed with long scrambling in Japanese as well.⁵

Although I stated above that (17) parallels (14b) not only in structure but also in interpretation, this requires a qualification. The example does contrast sharply with those in (15)–(16): it clearly does not ask for a pair-list answer. (18) would be a direct, natural answer to this example.

(18) The head of R Corporation and the head of S Corporation.

But (19) is marginally possible if (and only if) it is taken as a spelled-out version of (18).

(19) Yamada is investigating whether Mr. O received a bribe from the head of R Corporation, and whether Mr. H received a bribe from the head of S Corporation.

This answer is natural if it follows (18).

The observation on (15)–(17) discussed above confirms Hoji's judgement on (13). The plural pronoun *karera* 'they' has an interpretation that parallels the universal quantifier *everyone*. Because of this interpretation, (13b) and (15a–b) allow pair-list answers exactly as (2a) and (14a). The pronoun, however, makes a pair-list answer possible in a different way: pair-list answers are possible for (13a) and (17) as the detailed versions of the more direct answers. As Hoji observed, there is a clear intuitive difference between the two ways in which pair-list answers are made possible. Given that the difference is clear, I will abstract away from the second way in the following sections and concentrate on the interpretation of *karera-wh* that is possible in (13b) and (15a–b). Thus, in what follows, when I state that a particular example allows a pair-list answer, I mean that it allows a pair-list answer as in (13b) and (15a–b), as opposed to (13a) and (17).

⁵ See also Saito 1995 for a more detailed discussion of the Japanese facts. As noted in this work and those cited in the text, if the Longobardi effect is an LF phenomenon, then the fact that (16) allows a pair-list answer indicates that there is no phrasal LF *wh*-movement in Japanese (i.e., at least for argument *wh*-phrases), a conclusion that is argued for extensively by Tsai (1994). This is so since with phrasal LF *wh*-movement, (16) and (14b) would be indistinguishable at LF in the relevant respects.

3 On the Decomposition of *Wh*-Phrases

As noted at the outset of this paper, (2a–b) allow pair-list answers, but (1) does not. The examples (1) and (2) are repeated below.

- (1) *who_i t_i saw everyone*
 (2) a. *what_t did everyone buy t_i*
 b. *what_t does John think that everyone bought t_i*

May (1985), and Lasnik and Saito (1992), among others, attribute this contrast directly to the possible scope relations of *everyone* and the *wh*-phrase. They assume that the *wh*-phrase, as a whole, takes scope at the matrix CP Spec, and propose that (2a–b) allow pair-list answers because *everyone* can have scope over the *wh* in these examples. According to Lasnik and Saito 1992, (20), which is interpreted as in (21), is a possible LF for (2b).

- (20) [_{CP} *everyone*₁ [_{CP} *what_t* [_{IP} John thinks [_{CP} that [_{IP} *t_i* bought *t_i*]]]]]]
 (21) [for every *y*] [for which *x*] John thinks that *y* bought *x*

Chierchia's (1992) analysis, as mentioned in section 1, is quite different. He first notes that examples such as those in (2) allow functional answers in addition to singular and pair-list answers. Thus, "his or her own picture" is a possible answer for (2a). If this functional answer denotes a function from the set of people into the set of their pictures, as in (22), it is reasonable to represent the corresponding reading of (2a) as in (23).

- (22) {<*x*, *y*> : *y* is *x*'s picture} = {<*a*, *a*'s picture>, <*b*, *b*'s picture>, ...}
 (23) [for which *f*] *everyone_x* bought *f(x)*

But once it is assumed that (2a) has the representation in (23), a pair-list answer can also be construed as an answer to this reading. A function, after all, is a set of ordered pairs, and hence, a pair-list answer specifies a function. Chierchia, thus, concludes that (23) is the representation of the reading of (2a) corresponding to a pair-list answer.

This analysis has a clear advantage when it is applied to (2b). The representation of the pair-list reading of this example is as in (24).

- (24) [for which *f*] John thinks that *everyone_x* bought *f(x)*

Here, unlike in the case of (20), the quantifier *everyone* need not take matrix

scope. Because of the decomposition of *whai* into *which f* and *f(x)*, the only requirement imposed on this quantifier is that it includes *f(x)* within its scope. Since the scope of quantifiers such as *everyone* is known to be clause-bound, at least in more straightforward examples like (25), this is clearly a desirable feature of this analysis over the non-decomposition analysis illustrated in (20)–(21).⁶

- (25) someone thinks that everyone bought a book

In this section, I will present further data that support this analysis, in particular, the decomposition of *wh*-phrases.

3.1 Quantifier-Wh Interpretation in a Weak Crossover Context

The two analyses mentioned above make different predictions for the quantifier-*wh* interpretation in certain configurations of weak crossover. Let us consider the structures in (26).

- (26) a. [Wh_i [_{NP}... [_{CP} that [_{NP} everyone [_{VP}... *t_i*...]]]]]
 b. [Wh_i [_{NP} [_{CP}... pronoun_i...] ... [_{CP} that [_{NP}... *t_i*...]]]]
 c. [Wh_i [_{NP} [_{CP}... pronoun_i...] ... [_{CP} that [_{NP} everyone [_{VP}... *t_i*...]]]]]

A pair-list answer is allowed with the configuration in (26a), as shown in (2b) and confirmed by (27).

- (27) who_i does John think that everyone criticized *t_i*

This is predicted by the non-decomposition analysis as well as Chierchia's. According to the former, the relevant reading of (27) is represented roughly as in (28).

- (28) [for every *y*] [for which *x*] John thinks that *y* criticized *x*

(26b) is a configuration of weak crossover, and hence, examples with this structure are out as shown in (29).

- (29) a. ?*who_i does his_i mother think that Mary criticized *t_i*
 b. [for which *x*] his (=x's) mother thinks that Mary criticized *x*

The crucial configuration is that in (26c). Examples with this structure violate weak crossover exactly like (29a). But according to the non-decomposition analysis, those examples, at the same time, should allow pair-list answers like (27). (30) illustrates this point.

- (30) a. ?*who_i does his_i mother think that everyone criticized *t_i*
 b. [for every *y*] [for which *x*] his (=x's) mother thinks that *y* criticized *x*

Since by assumption *everyone* in (27) can take scope over the matrix CP, this should be possible for *everyone* in (30a) as well. As far as the quantifier-*wh* interpretation is concerned, there should be no difference between (27) and (30a).

Chierchia's analysis seems to make the opposite prediction for (30a). According to this analysis, the representation of (27), with the relevant reading, is as in (31).

- (31) [for which *f*] John thinks that everyone_x criticized *f(x)*

Hence, the parallel representation of (30a) should be as in (32).

- (32) [for which *f*] his (=f(x)'s) thinks that everyone_x criticized *f(x)*

In (32), *his* covaries not with the value for *f*, but with the value for *f(x)*. Further, *f(x)* contains a variable bound by *everyone*. Here, we know on independent grounds that when a pronoun covaries with an NP that contains a variable, the pronoun must itself be within the scope of the quantifier that binds the variable. This is a strong requirement, as the totally ungrammatical (33) shows.

- (33) *his_i wife thinks that every boy_i criticizes [his_i father]_j

If the scope of the universal quantifier *everyone* in (32) is confined to the embedded clause, as that of *every boy* in (33) is, Chierchia's analysis predicts that a pair-list answer is totally impossible for (30a).

It seems to me that (30a) confirms Chierchia's prediction, as opposed to that of the non-decomposition analysis. That is, when we abstract away from the

⁶ Lasnik and Saito (1992) propose a way to allow the scope of *everyone* to extend to the matrix clause in (2b), while confining it to the embedded clause in (25). But the proposal faces a problem with the data presented below in this section.

effects of weak crossover, there is a contrast between (27) and (30a): the former allows a pair-list answer but the latter does not. However, the data, unfortunately, are not as clear as we hope them to be. Since the weak crossover effect is quite strong in examples like (30a), many report that it is simply impossible to interpret examples of this kind. In the following subsection, I will show that clearer data supporting Chierchia's analysis can be constructed in Japanese.

3.2 Evidence for the Decomposition of Wh-Phrases

We have seen in section 2 that there is no difference between English and Japanese with respect to the configuration in (26a). (15b) has the same structure as (27), except that *karera* 'they' appears in place of *everyone*, and the *wh* is preposed by long scrambling instead of *wh*-movement. Another relevant example is shown in (34).

- (34) [dare-_o [_i Yamada-no hahay_a-ga] [karera-ga _t hiansita to]
 who-ACC Yamada-GEN mother-NOM they-NOM criticized that
 omotte iru ka] osiete kudasai
 think Q tell-me please
 '[Q who_i, Yamada's mother thinks [that they criticized _t]]'

(34) as well as (15b) allow pair-list answers exactly as their English counterpart in (27). Thus, examples with the rough configuration in (26a) allow pair-list answers regardless of whether the *wh* is preposed by *wh*-movement or long scrambling. The interpretive property of the Japanese examples is predicted by both the non-decomposition analysis and Chierchia's. The two analyses would assign to (34) the representations in (35) and (36) respectively.

- (35) [for x: x ∈ they] [for which y] Yamada's mother thinks that x criticized
 y
 (36) [for which _i Yamada's mother thinks that they_x criticized _i(x)]

But a difference emerges between English and Japanese when we consider the configuration in (26b). As noted above, the weak crossover effect on English examples with this configuration is rather strong. On the other hand, the corresponding Japanese examples with long scrambling are not as bad. Consider first (37), a typical example of weak crossover in Japanese.

- (37)?*[soitu-no_i hahay_a]-ga [Yamada-ga dare-_o hiansita to]
 that guy-GEN mother-NOM Yamada-NOM who-ACC criticized that
 omotte iru ka] osiete kudasai
 think Q tell-me please
 '[Q that guy's_i mother thinks [that Yamada criticized who_i]]'

It has been controversial whether long scrambling in Japanese "remedies" weak crossover. The issue is whether (37) becomes grammatical when *dare-o* 'who-ACC' is preposed to the position in front of *soitu* 'that guy' as in (38).

- (38) ?[dare-_o [soitu-no_i hahay_a]-ga [Yamada-ga _t hiansita to]
 who-ACC that guy-GEN mother-NOM Yamada-NOM criticized that
 omotte iru ka] osiete kudasai
 think Q tell-me please
 '[Q who_i, that guy's_i mother thinks [that Yamada criticized _t]]'

Yoshimura (1989) and Saito (1992), for example, state that this example is much better than (37), and consider it grammatical. Tada (1990), among others, treats this example as a weak crossover violation, since it is not as good as (39), where *dare-o* 'who-ACC' is preposed by clause-internal scrambling.⁷

- (39) [dare-_o [soitu-no_i hahay_a]-ga _t hiansita ka] osiete kudasai
 who-ACC that guy-GEN mother-NOM criticized Q tell-me please
 '[Q who_i, that guy's_i mother criticized _t]]'

But whether (38) should be treated as a weak crossover violation or not, everyone agrees, as far as I know, that the example is "interpretable." That is, we can easily read off the meaning from the sentence.

The weakness (or absence) of weak crossover effects with long scrambling enables us to get clear judgments on the interpretive property of examples with the structure in (26c). (40) is an example with the configuration.

⁷ Mahajan (1989), who first discussed the effects of scrambling on weak crossover, presents the same judgments as Tada's on the relevant Hindi examples.

(40) ?[dare-o_i soitu-no_i hahayal-ga [karera-ga t_i hihansita to]

who-ACC that guy-GEN mother-NOM they-NOM criticized that
omotte iru ka] osiete kudasai

think Q tell-me please

'[Q who_i, that guy's_i mother thinks [that they criticized t_i]]'

This example has the same grammatical status as (38): it may be slightly off, but it is "interpretable." Further, although a singular answer is possible for this question, it clearly does not allow a pair-list answer. In this respect, it contrasts sharply with (34).

It is straightforwardly predicted under any analysis that (40) has the same grammatical status as (38) with the singular answer reading. Its representation with this reading is as in (41).

(41) [for which y] his (=y's) mother thinks that [for x: x ∈ they] x criticized y

However, the non-decomposition analysis fails to explain the absence of the pair-list reading. (42) should be a possible representation for (40) according to this analysis, and hence, it predicts that the example allows the pair-list reading, just as in the case of its English counterpart in (30a).

(42) [for x: x ∈ they] [for which y] his (=y's) mother thinks that x criticized y

Chierchia's decomposition analysis, on the other hand, predicts correctly that pair-list reading is not possible for (40). The example must have the following representation for this reading to be possible:

(43) [for which f] his (=f(x)'s) mother thinks that they_x criticized f(x)

But as noted in the discussion of the English example (30a), this kind of representation is illicit. (33) shows that when a pronoun covaries with an NP containing a variable, it must be within the scope of the quantifier that binds the variable.

The interpretive property of (40), thus, constitutes a strong piece of evidence for Chierchia's analysis. It is the decomposition of a *wh*-phrase into *which f* and *f(x)* that enables us to maintain the hypothesis that the scope of quantifiers, such as *everyone* and *karera* 'they', is in general clause-bound.

And given this hypothesis, the absence of the pair-list reading in (40) is straightforwardly predicted. (40), then, provides supporting evidence specifically for the decomposition of *wh*-phrases.⁸

4 *Wh*-Quantifier Interpretation in Multiple-*Wh* Questions

In this section, I will present evidence for another major component of Chierchia's analysis, i.e., that in the pair-list interpretation of examples like (44), *everyone* specifies the domain of a function.

(44) what_t did everyone buy t_i

I will discuss a difference between English and Japanese with respect to quantifier-*wh* interpretation in multiple-*wh* question sentences. I will show that this difference is expected given Chierchia's analysis and Hornstein's (1995) extension of the analysis to multiple-*wh* questions.

4.1 Hornstein (1995) on English Multiple-*Wh* Questions

As mentioned in section 1, a proposal is made in Hornstein 1995 to extend Chierchia's analysis of quantifier-*wh* interpretation to multiple-*wh* questions. It has been noted that (45) is very similar to (44) (with the relevant pair-list reading) in meaning.

(45) who_i t_i bought what

(45), in fact, requires a pair-list answer as in (46).

(46) Mary bought a book, John bought a pen, and Bill bought a CD.

Capitalizing on this observation, Hornstein proposes that (45) should be represented roughly as in (47).

(47) [for which f on D] D_x bought f(x)

⁸ There are other ways of decomposition that are proposed in the literature. For example, Lasnik and Saito (1992), Sloan (1991), and Murasugi and Saito (1992) suggest the possibility that the *wh*-phrases in (2a-b) are decomposed into the *wh* part and the indefinite (or existential) part, along the lines proposed in Katz and Postal 1964, Kuroda 1968, and Chomsky 1970. The interpretive property of (40) is consistent also with this analysis.

This analysis consists of the following two more specific proposals:

- (48) a. A *wh* in situ can be interpreted functionally, i.e., as ' $f(x)$ '.
 b. A *wh* in CP Spec can specify the domain of a function.

The latter assumes that a *wh* in CP Spec can be "D-linked" in the sense of Pesetsky 1987.

(48a-b) together make the representation in (47) possible for (45). But since (45) not only allows but requires a pair-list answer, (47) seems to be the only possible representation for this example. Hornstein proposes the following to account for this fact:

- (49) A *wh* in situ is licensed by binding (from CP Spec).

This condition states that a *wh*-phrase in situ must contain an element bound by the *wh*-phrase that moved overtly to CP Spec. The representation in (47) satisfies this requirement as the *wh*-phrase in situ is interpreted as $f(x)$, and f is bound by *which f on D*. On the other hand, those in (50), which would correspond to a single pair answer like (51), do not.

- (50) a. [for which x] [for which y] x bought y
 b. [for which x, y] x bought y
 (51) Mary bought a book.

It follows then that multiple-*wh* questions in English can only have pair-list answers.⁹

Hornstein's analysis makes an interesting prediction for the quantifier-*wh* interpretation in multiple-*wh* questions. It is reported in Aoun and Li 1993 that a pair-list reading is impossible between a quantifier and a *wh* in situ in English. The following example illustrates this observation:

- (52) $who_i t_i$ said that everyone bought what

This example has the representation in (53), and hence, (54) is an appropriate answer.

- (53) [which f on D] D_x said that everyone bought $f(x)$

⁹ Multiple-*wh* questions like (45) do not seem to allow functional answers. I have no explanation for this fact at present.

- (54) Tom said that everyone bought a book, Susan said that everyone bought a pen, and Dave said that everyone bought a CD.

(54) is a pair-list answer on *who* and *what*. What (52) cannot have is a pair-list answer on *everyone* and *what*. Thus, (55) and (56) are both inappropriate answers.

- (55) Tom said that John bought a book, Mary bought a pen, and Bill bought a CD.

- (56) Tom said that John bought a book, Mary bought a pen, and Bill bought a CD, and Susan said that John bought a diskette, Mary bought a pencil, and Bill bought a video tape, and Dave said that ...

Hornstein (1995:230-231) suggests that this fact follows from his analysis. Chierchia's analysis implies that the pair-list reading of *everyone* and *what* is possible only when the former specifies the domain of the function f as in (57).

- (57) a. $what_i$ did everyone buy t_i
 b. [for which \uparrow] everyone_{*} bought $f(x)$

But since (52) is a multiple-*wh* question, *what* must be "bound" by *who* due to (49). This forces the representation in (53), where *for which f on D* binds f , and the domain D of *who* serves as the domain of the function f . Since a single function cannot have two separate domains, this implies that *everyone* cannot specify the domain of the function. It thus follows that the pair-list reading of *everyone* and *what* is impossible.¹⁰ In the following subsection, I will show that this analysis makes a different, yet correct prediction for the quantifier-*wh* interpretation in Japanese multiple-*wh* questions.

4.2 Quantifier-Wh Interpretation in Japanese Multiple-Wh Questions

Hornstein's analysis of (52) apparently makes a wrong prediction for Japanese. Let us consider (58), which corresponds to (52) except that *kanera* 'they' appears in place of *everyone*.

¹⁰ See Aoun and Li 1993 for an alternative account.

- (58) [dare-ga [karera-ga nani-o katta to] itta ka] osiete kudasai
 who-NOM they-NOM what-ACC bought that said Q tell-me please
 '[Q who said [that they bought what]]'

This example, in contrast with (52), allows a pair-list reading between *karera* 'they' and *nani* 'what'. (55) is in fact a possible answer for this question. This is quite puzzling if we apply Hornstein's analysis of (52) directly to Japanese. If *everyone* fails to specify the domain of the function *f* in (52), then it is not immediately clear why *karera* 'they' can do so in (58). In this subsection, I will argue that (58), contrary to appearance, provides support for Hornstein's analysis.

One difference between English and Japanese is that multiple-*wh* questions in the latter do not require pair-list answers. Thus, (59b) is a perfectly appropriate answer for (59a).¹¹

- (59) a. [dare-ga nani-o katta ka] osiete kudasai
 who-NOM what-ACC bought Q tell-me please
 '[Q who bought what]'
 b. Taroo-ga hon-o kaimasita.
 Taroo-NOM book-ACC bought
 'Taroo bought a book.'

This property of Japanese multiple-*wh* questions is not surprising. Note first that Hornstein's (49), repeated below in (60), cannot be applied directly to Japanese.

- (60) A *wh* in situ is licensed by binding (from CP Spec).

The language does not have syntactic *wh*-movement, and all *wh*-phrases can appear in situ. A *wh*-phrase in situ, then, clearly need not be "bound" by another *wh*-phrase in CP Spec in this language. Once it is assumed that (60) is inapplicable to Japanese *wh*-phrases, nothing forces the multiple-*wh* question in (59a) to have a representation of the kind in (61).

¹¹ The status of this difference between English and Japanese may be controversial. Possible answers to multiple-*wh* questions depend on the context, and even a representation like (47) should in principle allow a single pair answer, as a function can consist of a single ordered pair. Nevertheless, I will assume that the difference is real, and further, that it is to be explained by the mechanism of *wh*-licensing/interpretation.

- (61) [which *f* on *D*] *D*_x bought *f*(*x*)

In fact, nothing seems to prevent this example from having the representation in (62), which would correspond to a single pair answer.

- (62) [which *x*, *y*] *x* bought *y*

Given that Japanese *wh*-phrases are not subject to (60), it will be useful to briefly go over how they are licensed. Here, I adopt the analysis proposed in Kuroda 1965, Nishigauchi 1990, and Pesetsky 1987. Kuroda (1965) has suggested that Japanese *wh*-words are "indeterminate pronouns" that are interpreted in relation with particles such as the question marker *ka*. Nishigauchi (1990) develops this idea and proposes that they are indefinites that are subject to "unselective binding" in the sense of Heim 1982. Roughly put, the C head *ka* unselectively binds *nani* 'what' in (63a) and yields the interpretation in (63b), exactly as *every* unselectively binds *a donkey* in (64a) and yields the reading in (64b).¹²

- (63) a. [[Taroo-ga nani-o katta] ka] osiete kudasai
 Taroo-NOM what-ACC bought Q tell-me please
 '[Q Taroo bought what]'
 b. [which *x*] Taroo bought *x*
 (64) a. every man who owns a donkey beats it
 b. [every *x*, *y*: *x* is a man & *y* is a donkey & *x* owns *y*] *x* beats *y*

According to this analysis, *wh*-phrases in situ in Japanese are licensed by binding. They differ from their English counterparts in that they can be bound by *ka* in the head C position, and need not be "bound" by another *wh*-phrase in CP Spec. If this analysis of Japanese *wh*-phrases is on the right track, then, (60), when stated more generally as in (65), applies to both English and Japanese.

- (65) A *wh* in situ is licensed by binding from the C projection (i.e., from the C head or the CP Spec).

In Japanese, the question marker *ka* in the head C position is an unselective

¹² (63b) is more precisely as in (i) with the restriction on the *wh*.

(i) [which *x*: *x* is a thing] Taroo bought *x*

binder, and hence, can license *wh*-phrases in situ. On the other hand, a [+*wh*] C in English is not an unselective binder. Consequently, a *wh* in situ must be bound by another *wh*-phrase in CP Spec, and (65) takes the form of (60) in this language.

Note that unselective binders are so called because they can have multiple bindees. Thus, *ka* can bind both *dare* 'who' and *nani* 'what' in (59a). This yields the representation in (62). In both (59a) and (63a), the *wh*-phrases have the "individual reading," i.e., they are interpreted as individual variables. We saw above that they can also be interpreted functionally like English *wh*-phrases. A relevant example is shown below in (66) with its representation.

- (66) a. [[Karerera-ga nani-o katta] ka] osiete kudasai
 they-NOM what-ACC bought Q tell-me please
 '[Q they bought what]'
 b. [for which f] they_x bought f(x)

But the possibility of the functional interpretation does not seem to necessitate any change in the mechanism of *wh*-interpretation in Japanese. We may assume, as seems reasonable, that a *wh*-phrase in Japanese, when unselectively bound by *ka*, can be interpreted as an individual variable as in (59) and (63), or as a functional variable as in (66).

Let us now return to the apparently problematic Japanese example in (58), repeated below in (67).

- (67) [dare-ga [Karerera-ga nani-o katta to] itta ka] osiete kudasai
 who-NOM they-NOM what-ACC bought that said Q tell-me please
 '[Q who said [that they bought what]]'

As noted above, this example allows the pair-list reading between *karerera* 'they' and *nani* 'what'. Thus, (55), repeated in (68), is a possible answer for this question.

- (68) Tom said that John bought a book, Mary bought a pen, and Bill bought a CD.

In this respect, (67) contrasts with the English (52), repeated in (69), which does not allow (68) as an answer.

- (69) who_i t_i said that everyone bought what

Recall here that in (69) *what* must be "bound" by *who* in the matrix CP Spec. This is ensured by (65). Since the matrix [+*wh*] C is not an unselective binder, the *wh* in situ can only be licensed by the *wh*-phrase in CP Spec, as stated in (60). This gives the following representation to (69):

- (70) [for which f on D] D_x said that everyone bought f(x)

But we saw above that (65) works differently in the case of Japanese. Since the question marker *ka* is an unselective binder, a *wh* in situ in this language can be licensed by virtue of unselective binding from C. Thus, (71) is a possible representation for (67).

- (71) [for which x, y] x said that they bought y

The corresponding single pair answer in (72) is in fact possible for this question.

- (72) John said that they bought a book.

In addition, we saw that a Japanese *wh* can be interpreted functionally with the same mechanism. This implies that (73) is also a possible representation for (67).

- (73) [for which y, f] y said that they_x bought f(x)

Since (68) is an appropriate answer for (73), the interpretive property of the apparently problematic (67) is accounted for.

The analysis of (67) presented above provides an indirect, but strong support for the Chierchia-Hornstein theory. According to Chierchia, the pair-list reading of a quantifier and a *wh* is possible only when the former specifies the domain of the function contained in the latter. And according to Hornstein, English multiple-*wh* questions require pair-list answers because the *wh*-phrase in CP Spec must "bind" the *wh* in situ. This implies that the former *wh* must specify the domain for the functionally interpreted *wh* in situ. This prevents the pair-list reading between *everyone* and *what* in (69). This account for (69) predicts that if there is an language in which multiple-*wh* questions do not require pair-list answers, the pair-list reading of *everyone* and *what* is possible in its counterpart to (69). This is so since, then, *who* need not specify the domain for the functionally interpreted *what*, and consequently, *everyone* can assume the role of the domain specifier. It was shown that this prediction is

indeed borne out in Japanese.

5 Universal Quantifiers in English and Japanese

In this section, I will turn to Hoji's (1986) observation that the direct Japanese counterpart of (74), given in (75), does not allow pair-list answers.

- (74) what_i did everyone buy_i;
 (75) [[daremo-ga nani-o katta] ka] osiete kudasai
 everyone-NOM what-ACC bought Q tell-me please
 '[Q everyone bought what]'

This fact seems puzzling since *daremo* 'everyone' clearly can take scope over the existential *nanika* 'something', as (76) shows.

- (76) daremo-ga nanika-o katta
 everyone-NOM something-ACC bought
 'Everyone bought something.'

However, the fact is by no means an isolated phenomenon. Note that *daremo* in (75)-(76) consists of the *wh dare* 'who' and the particle *mo*. The same effect is observed whenever the subject position is occupied by a universal quantifier of the form, *wh+mo*, as illustrated in (77).

- (77) a. [[dono kodomo+mo nani-o katta] ka] osiete kudasai
 which child+MO what-ACC bought Q tell-me please
 '[Q every child bought what]'
 b. dono kodomo+mo nanika-o katta
 which child+MO something-ACC bought
 'Every child bought something.'

Dono kodomo+mo 'every child' can take wide scope over *nanika* 'something' in (77b), but (77a) does not have a pair-list reading.

The effect is also observed when a definite plural subject is accompanied by a quantificational particle like *mo* 'also', *sae* 'even', and *dake* 'only'. Thus, the examples in (78) all allow the wide scope reading of the subject, but those in (79b-d) do not allow pair-list answers in clear contrast with (79a).¹³

- (78) a. [Taroo to Hanako]-ga nanika-o katta
 Taroo and Hanako-NOM something-ACC bought
 'Taroo and Hanako bought something.'
 b. [Taroo to Hanako]-mo nanika-o katta
 Taroo and Hanako-also something-ACC bought
 'Taroo and Hanako, in addition to the others, bought something.'
 c. [Taroo to Hanako]-sae-ga nanika-o katta
 Taroo and Hanako-even-NOM something-ACC bought
 'Even Taroo and Hanako bought something.'
 d. [Taroo to Hanako]-dake-ga nanika-o katta
 Taroo and Hanako-only-NOM something-ACC bought
 'Only Taroo and Hanako bought something.'
- (79) a. [[[Taroo to Hanako]-ga nani-o katta] ka] osiete kudasai
 Taroo and Hanako-NOM what-ACC bought Q tell-me please
 'What did Taroo and Hanako buy?'
 b. [[[Taroo to Hanako]-mo nani-o katta] ka] osiete kudasai
 Taroo and Hanako-also what-ACC bought Q tell-me please
 'What did Taroo and Hanako, in addition to the others, buy?'
 c. [[[Taroo to Hanako]-sae-ga nani-o katta] ka] osiete kudasai
 Taroo and Hanako-even-NOM what-ACC bought Q tell-me please
 'What did even Taroo and Hanako buy?'
 d. [[[Taroo to Hanako]-dake-ga nani-o katta] ka] osiete kudasai
 Taroo and Hanako-only-NOM what-ACC bought Q tell-me please
 'What did only Taroo and Hanako buy?'

A uniform account for (75), (77a) and (79b-d) is clearly desirable.¹⁴

In section 5.1, I will briefly discuss Kawashima's (1994) semantic analysis of phrases of the form *wh+mo*, and suggest a possible interpretation of the

cational particles.

¹³ Some of the translations in (78)-(79) are awkward, if not ungrammatical. But their intended meanings should be clear.

¹⁴ See Kuroda 1971 for a detailed general discussion on the semantics of these quantifi-

facts in (75) and (77a) based on this analysis and Chierchia's (1992) theory of quantifier-*wh* interaction. Then, in section 5.2, I will argue that the suggested interpretation extends to cases like (79b-d).

5.1 *Kawashima (1994) on the Semantics of Wh+mo*

As Kawashima notes, phrases of the form *wh+mo* have three kinds of interpretations. As we saw above, they can be interpreted as universal quantifiers. The other two interpretations parallel those of English phrases with *any*. Thus, they can receive negative polarity and free choice interpretations as shown in (80).

- (80) a. John-wa dare+mo syootaisinakatta
John-TOP who+MO invite-did not
'John did not invite anyone.'
b. John-wa dono supootu+mo dekiru
John-TOP which sport+MO do-can
'John can play any sport.'

Given this similarity between *wh+mo* and *any*, Kawashima proposes that Kadmon and Landman's (1993) semantic analysis of *any* is directly applicable to *wh+mo*.

According to Kadmon and Landman, *any* semantically "widens" the interpretation of the phrase it is attached to, and further, is licensed only if the widening results in a stronger statement. Their proposal is shown below in (81).

- (81) a. *Widening*: In an NP of the form *any* CN, *any* widens the interpretation of the common noun phrase (CN) along some contextually given dimension.
b. *Strengthening*: *Any* is licensed only if the widening that it induces creates a stronger statement, i.e., if the statement on the wide interpretation entails the statement on the narrow interpretation.

They present examples such as (82)-(83) to illustrate this proposal.

- (82) A: An owl hunts mice.
B: A sick one doesn't, right?
A: Any owl hunts mice.

- (83) A: I don't have potatoes.
B: You have decorative ones, right?
A: I don't have any potatoes.

The first (82A) is a generic statement on owls. Speaker B tries to confirm that sick owls are irrelevant in this case. Speaker A then rejects this with *any*, claiming that sick owls are not exceptions. *Any* clearly widens the interpretation of *owl* to include sick ones. Further, this widening creates a stronger statement, since the second (82A) entails the narrow interpretation of the first (82A), which is that a healthy owl hunts mice. The example in (83) shows that (81) applies to the negative polarity *any* as well.

Kawashima first shows that (81) applies to the Japanese form *wh+mo* under the negative polarity and free choice interpretations. (84) is a case of the free choice *wh+mo*, and parallels the English example (82).

- (84) A: Nezumi-wa zisin-o yotisuru.
mouse-TOP earthquake-ACC foretell
'A mouse foretells an earthquake.'
B: Kawareteiru no-wa sinai desyo?
domesticated one-TOP do-not right
'A domesticated one doesn't, right?'
A: Iya, dono nezumi+mo zisin-o yotisuru.
no which mouse+MO earthquake-ACC foretell
'No, any mouse foretells an earthquake.'

The second (84A) with *wh+mo* widens the interpretation of *nezumi* 'mouse' to include domesticated ones, just as *any* in (82) widens that of *owl* to include sick ones.

Then, Kawashima goes on to argue that *wh+mo* shows the same effect even when it is interpreted as a universal quantifier. One of her examples is given in (85).

- (85) A: Kinoo gakuseitai-wa sono hoteru-ni tomatta.
yesterday students-TOP that hotel-at stayed
'Yesterday, the students stayed at that hotel.'
B: Demo John-wa tomodati-no ie-ni tomaru to itte ita.
but John-TOP friend-GEN house-at stay that saying was
'But John was saying that he would stay at a friend's house.'

A: Iya, dono gakusei+mo sono hoteru-ni tomatta.
 no which student+MO that hotel-at stayed
 'No, every (= EVERY) student stayed at that hotel.'

Here, (85B) sets up the context for the second (85A). It tries to confirm that the predicate of (85A) applies to the set of students excluding John. The second (85A) denies this, and states that the predicate applies to John as well. Kawashima, hence, concludes that *wh+mo* in this case widens the "contextually given narrow domain."¹⁵

Let us now assume Kawashima's analysis and reconsider the universal quantifier-*wh* interaction in Japanese. A relevant example is shown in (86).

- (86) [[daremo-ga dare-o sonkeisiteiru] ka] osiete kudasai
 everyone-NOM who-ACC respect Q tell-me please
 '[Q everyone respects who]'

This example, like (75), allows a singular answer but not a pair-list answer. What would be the interpretation of the example with the singular reading? According to Kawashima, *daremo* widens a contextually given narrow domain. For concreteness, suppose that the contextually given narrow domain is {Tom, Mary} and the widened domain is {Tom, Mary, John}. Then, the interpretation of (86) is roughly as in (87).

- (87) For which *x*, [every *y*: $y \in D$] *y* respects *x*? continues to hold when *D* is widened from {Tom, Mary} to {Tom, Mary, John}?

The question presupposes that there are more than one person respected by Tom and Mary, and asks which of them is respected by John as well. So, it makes perfect sense in the following situation, where $R = \{ \langle x, y \rangle : x \text{ respects } y \}$:

¹⁵ As noted in section 4, it is proposed in Nishigauchi 1990 that *wh*-expressions in Japanese are indefinites, and are given quantificational force by the associated particles. (See also Kuroda 1965.) Kawashima's analysis of *wh+mo* is based on this proposal. If *wh*-expressions in Japanese are indeed indefinites, then *wh+mo* has a form similar to *any+indefinite*. Her proposal is that *mo*, like *any*, induces widening.

Kawashima also proposes that *wh+mo*, taken as a whole, can be definite, and in this case, can be associated with a distributive operator. This yields the universal interpretation not observed with *any*. More intuitively, *daremo*, for example, would be literally 'an indefinite person+also', i.e., "not only those given contextually but also an indefinite (arbitrary) person."

y};

- (88) $R = \{ \langle \text{Tom, Descartes} \rangle, \langle \text{Tom, Beethoven} \rangle, \langle \text{Mary, Descartes} \rangle, \langle \text{Mary, Beethoven} \rangle, \langle \text{John, Descartes} \rangle \}$

In this case, the correct answer to the question is 'Descartes'.

Next, let us consider what the pair-list reading of (86) would mean. Given Chierchia's analysis, the question should have the representation in (89) under this interpretation.

- (89) [for which *f*] $\text{daremo}_x \text{ respects } f(x)$

Then, roughly speaking, the question presupposes that there are more than one function that satisfy '*x* respects *f*(*x*)' with the narrow domain *D* (= {Tom, Mary}), and asks which of them continues to satisfy the sentence even when the domain is widened to include John. But there is something strange with this interpretation, at least on intuitive grounds. Suppose we have the following "respect relation":

- (90) { <Tom, Descartes>, <Tom, Beethoven>, <Mary, Descartes>, <John, Babe Ruth> }

The following two functions satisfy '*x* respects *f*(*x*)' with the narrow domain in this case:¹⁶

- (91) a. { <Tom, Descartes>, <Mary, Descartes> }
 b. { <Tom, Beethoven>, <Mary, Descartes> }

The question in (89) asks which of the two functions continues to satisfy '*x* respects *f*(*x*)' when the domain is widened to include John. The answer is trivially both if the ordered pair <John, Babe Ruth> can be added to them. More generally, the answer to (89) would be trivially 'all of the functions' if John respects someone, and 'none of the functions' if John does not respect anyone. Thus, it is simply impossible for a question like (89) to have a

¹⁶ It is possible that the "respect function" with the domain {Tom, Mary} should be simply as in (i) instead of (91a-b).

(i) { <Tom, {Descartes, Beethoven}>, <Mary, Descartes> }

In this case, the presupposition fails: there is only one function with the domain {Tom, Mary} that satisfies '*Dx* respects *f*(*x*)', i.e., (i).

unique function as the answer. The absence of the pair-list reading for (89), then, is expected if something like (92) holds.

- (92) For a question of the form '[for which x : $x \in D$] $\phi(x)$ ', the presupposition must allow for the possibility that there are $a, b \in D$ such that $\phi(a)$ and $\sim\phi(b)$.

It is interesting to note in this context that questions like (86) do allow functional answers in distinction with pair-list answers, an observation made in Yoshida 1993 and Miyagawa 1998.¹⁷ Thus, (93) is a legitimate answer for (86).

- (93) Zibun-no hahaoya desu.
self-GEN mother is
'His/her own mother.'

This is what we expect. Suppose that Tom and Mary respect their own mothers and their own fathers as well. Then, both (94a) and (94b) satisfy 'x respects $f(x)$ ' with the domain {Tom, Mary}.

- (94) a. $\{ \langle x, y \rangle : y \text{ is } x \text{'s mother} \}$
b. $\{ \langle x, y \rangle : y \text{ is } x \text{'s father} \}$

With this presupposition, (86) can be construed as asking which of (94a-b) continues to satisfy 'x respects $f(x)$ ' when the domain is widened to include John. If John respects his mother, but not his father, then the answer will be (94a), i.e., (93). Thus, Kawashima's analysis of *wh+mo*, when combined with Chierchia's theory of quantifier-*wh* interaction, seems to capture properly the interpretive properties of examples like (86).

5.2 Predictions for Other Similar Cases

We have seen that there is a way to interpret the peculiar property of examples such as (86). The "account" relies crucially on Kawashima's hypothesis that *wh+mo* as a universal quantifier induces "widening." Since *wh+mo* shows the widening effect also when it has the negative polarity or free choice interpretation, it is predicted that it interacts with *wh*-phrases in the same way

¹⁷ I thank Hiroshi Aoyagi for first bringing this fact to my attention.

under these interpretations. In this section, I will first show that this prediction is borne out. Then, I will consider the examples in (79b-d), where the particles *mo* 'also', *sae* 'even', and *dake* 'only' are attached to definite plurals, and show that the "account" extends to those cases as well.

Let us first consider the case of the free choice *wh+mo*. As (95a) indicates, it can have scope over the existential *nanika* 'something'.

- (95) a. dare-de+mo nanika-ga tada-de moraeru
anyone something-NOM free-for receive-can
'Anyone can get something for free.'
b. [[dare-de+mo nani-ga tada-de moraeru] ka] osiete kudasai
anyone what-NOM free-for receive-can Q tell-me please
'[Q anyone can get what for free]'

On the other hand, (95b) allows singular and functional answers as in (96a-b) but not a pair-list answer as in (96c).

- (96) a. A book.
b. A copy of his/her own book.
c. Tom can get a book for free, Mary can get a CD for free, and John can get a pen for free.

This interpretive property of (95b) is exactly what we expect. The pair-list reading of (95b) presupposes that there are at least two functions that satisfy 'x can get $f(x)$ for free' with the narrow domain, say, {Tom, Mary}. It then asks which of the functions continues to satisfy the sentence when the domain is widened, say, to include John. The pair-list reading will be anomalous for (95b) in the same way that it is for (86). Note that a pair-list answer is impossible also for the English counterpart of (95b), shown in (97).

- (97) What can anyone get for free?

This is again what we expect, given Kadmon and Landman's analysis of *any*.

The same line of reasoning applies to the negative polarity *wh+mo*. A relevant example is given in (98).¹⁸

¹⁸ (98) is out for an independent reason in the unmarked word order, where the subject precedes the object. (See Takahashi 1990 and Tanaka 1997 for discussion.) The scrambling of the object *nani-o* 'what-ACC' over the subject in this example does not affect the

- (98) [[nani-o dare+mo kawanakatta] ka] osiete kudasai
 what-ACC anyone buy-did not Q tell-me please
 'Q no one bought what?']

The singular and functional answers in (99) are possible for this question, but not a pair-list answer.

- (99) a. The picture of the Emperor.
 b. His/her own picture.

For the pair-list reading of (98), what seems to be presupposed is that there are multiple functions that satisfy 'x did not buy f(x)' with the narrow domain. The question, then, asks which of them continues to satisfy the sentence with the widened domain. The same problem occurs as in the cases of (86) and (95b).

We have seen that *wh+mo* interacts with *wh*-phrases in the same way under any of the three interpretations, as expected. Before we go on to consider the cases of definite plurals with the particles *mo* 'also', *sae* 'even', and *dake* 'only', let me pause for a moment and comment on the intuition behind the discussion so far. The basic fact is that a question of the form in (100) allows a functional answer, but not a pair-list answer, when Q induces domain widening.

- (100) [For which f] Q_x predicate f(x)

The question presupposes that there are at least two functions f_1 and f_2 that satisfy 'x predicate f₁(x)' with the narrow domain N, and it asks which of them continues to have this property with the wide domain W. Intuitively, we may say that if f_1 and f_2 are defined as in (101a), it is clear how they should be extended when the domain is widened to include additional members.

- (101) a. $\{ \langle x, y \rangle : j(x, y) \}$ (E.g., $\{ \langle x, y \rangle : y \text{ is } x \text{'s mother} \}$)
 b. $\{ \langle a_1, b_1 \rangle, \langle a_2, b_2 \rangle, \dots, \langle a_n, b_n \rangle \}$

On the other hand, if f_1 and f_2 are given as lists of ordered pairs as in (101b), it is not clear at all how we should go about extending them when a_{n+1} is added to the domain. I assumed above that the extension can be made by simply

discussion, as far as I can tell.

adding to the set an ordered pair whose first member is a_{n+1} . But then, there is no way to differentiate between f_1 and f_2 . This particular problem does not arise if Q in (100) does not induce domain widening.

However, if the reasoning above holds, we should find cases where the quantifier Q does not induce domain widening and yet, similar problems arise. That is, similar problems should arise whenever (i) a question has a presupposition that involves a function that is given simply as a list of ordered pairs, and (ii) it requires an extension or "application" of the function to a domain that includes new members. It seems that the examples in (79b-c), repeated below in (102a-c), instantiate this general case.

- (102) a. [[[Taroo to Hanako]-mo nani-o katta] ka] osiete kudasai
 Taroo and Hanako-also what-ACC bought Q tell-me please
 'What did Taroo and Hanako, in addition to the others, buy?'
 b. [[[Taroo to Hanako]-sae-ga nani-o katta] ka] osiete
 Taroo and Hanako-even-NOM what-ACC bought Q tell-me
 kudasai
 please
 'What did even Taroo and Hanako buy?'
 c. [[[Taroo to Hanako]-dake-ga nani-o katta] ka] osiete
 Taroo and Hanako-only-NOM what-ACC bought Q tell-me
 kudasai
 please
 'What did only Taroo and Hanako buy?'

The examples in (102) all resist pair-list answers but allow singular and functional answers exactly like (86), (95b), and (98). Thus, (99a-b) are both possible answers to these questions.

The singular interpretation of (102a) presupposes that there are at least two objects, say, A and B, that each member of the contextually given set of people, say, {John, Mary}, bought. The sentence asks which of the two objects Taroo and Hanako also bought. There is no problem with this interpretation. The functional and pair-list interpretations, on the other hand, presuppose that there are at least two functions that satisfy 'x bought f(x)' with the given domain {John, Mary}, and asks which of them satisfies the sentence even with the domain {Taroo, Hanako}. Domain widening may not be involved here, strictly speaking, but the question certainly demands the evaluation of the

presupposed functions with respect to a new domain {Taroo, Hanako}.¹⁹ This is possible when the presupposed functions are specified as in (103a).

- (103) a. $\{ \langle x, y \rangle : j(x, y) \}$ (E.g., $\{ \langle x, y \rangle : y \text{ is } x\text{'s picture} \}$)
 b. $\{ \langle a_1, b_1 \rangle, \langle a_2, b_2 \rangle, \dots, \langle a_n, b_n \rangle \}$

But it is unclear how to proceed with the evaluation when those functions are given as lists of ordered pairs as in (103b). This discussion applies directly to (102b) as well: it is roughly synonymous with (102a) except that it carries an extra presupposition that Taroo and Hanako are less likely buyers than those in the contextually given set.

The singular reading of (102c) is also straightforward. It presupposes that there are at least two objects that both Taroo and Hanako bought, and asks which of them "all the others," say, John and Mary, did not buy. The functional and pair-list interpretations accompany the assumption that there are at least two functions that satisfy 'x bought f(x)' with the domain {Taroo, Hanako}. It then asks which of them satisfies 'x did not buy f(x)' when the domain consists of "all the others," excluding Taroo and Hanako. This is clearly not a case of widening. But our reasoning for the cases of widening carries over to this case. If the presupposed functions are specified as in (103a), it is possible to see whether they satisfy 'x did not buy f(x)' with the domain consisting of "all the others." On the other hand, it is not clear how to evaluate the presupposed functions when they are specified as lists of ordered pairs as in (104).

- (104) $\{ \langle \text{Taroo}, A \rangle, \langle \text{Hanako}, B \rangle \}$

In this section, I first suggested a possible interpretation for the observation that Japanese universal quantifiers of the form *wh+mo* do not interact with *wh*-phrases to yield the pair-list reading. The suggestion was based on

¹⁹ Whether domain widening is involved here depends on whether the presupposition that *mo* carries is just a presupposition or something more. Examples like (i) certainly has the presupposition that those contextually specified (excluding *Taroo*) are early risers.

- (i) *Taroo-mo hayaoki da*
Taroo-also early riser is
 'Taroo, in addition to the others, is an early riser.'

The question is whether this is part of the assertion of (i) as well. If not, *mo* in this case does not induce widening, strictly speaking.

Kawashima's proposal that *wh+mo* induces widening exactly as *any* in English. Then, I showed that the reasoning extends to many other cases where the pair-list reading is missing.²⁰ The discussion in this section was merely suggestive, and it remains to be seen whether the suggestion can be turned into a formal proposal. It should be noted, however, that the suggestion was based on Chierchia's analysis of pair-list readings. Hence, if it is tenable, it provides further support for the analysis.

6 Conclusion

In this paper, I discussed three facts of quantifier-*wh* interaction in Japanese, and argued that the first two constitute clear evidence for the Chierchia-Hornstein theory. The first was the absence of the pair-list interpretation in the following configuration, where the *wh*-phrase is preposed by long scrambling:

- (105) [wh_1 [... pronoun_i ...] ... [_{CP} [they [... t_i ...]]]]

I concluded that this fact supports Chierchia's hypothesis that the pair-list reading should be analyzed with the decomposition of the *wh*-phrase into *which f* and *f(x)*. The second fact was that the pair-list reading between the plural pronoun and the second *wh* is possible in a Japanese multiple-*wh* question of the following form:

- (106) [wh_1 ... [_{CP} [they [... wh_2 ...]]]]

This, I argued, provides indirect evidence for Chierchia's hypothesis that the quantifier specifies the domain of the function *f* in the pair-list reading. The discussion here relied crucially on Hornstein's extension of Chierchia's analysis to English multiple-*wh* questions. The last fact I dealt with was Hoji's observation that the direct Japanese counterpart of (107) does not allow pair-list answers.

- (107) What did everyone buy?

Assuming Chierchia's theory, I suggested a possible interpretation of this fact

²⁰ Whether the "account" can be extended to further cases like (i) remains to be seen.

- (i) What did no one/most people buy?

based on Kawashima's analysis of universal quantifiers in Japanese.

The quantifier-*wh* interaction is a very complex phenomenon, and the arguments in this paper are by no means conclusive. But the Japanese facts discussed in this paper bear on the analysis of this phenomenon, and they provide support for the Chierchia-Hornstein theory. And more generally, I hope I succeeded in showing that some apparently language-specific facts can shed light on the theoretical issues concerning the phenomenon.

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