

Chapter 2

Surface and Inverse Scope

2.1. Introduction

One of the main objectives in this dissertation is to scrutinize the thesis in (1), which is endorsed by the majority of researches that investigate the interface between syntax and semantics.

- (1) All instances of scope interpretations emerge directly from the grammar, i.e., from LF compositional computation.

As the first step toward this end, this chapter provides a descriptive study of the scope interaction among *quantificational noun phrases* (= QPs) of the most basic kind, namely the scope interaction in the configuration of (2), where QP_{Sub} and QP_{Obj} stand for a subject QP and an object QP respectively. For convenience, the configuration in (2) will be referred to as *the basic order*.

- (2) [... QP_{Sub} [... QP_{Obj} ...]], where the QP_{Sub} and the QP_{Obj} are clause-mates

If we confine our attention to cases like (3), the subject QP seems able to take either wide scope or narrow scope with respect to the object QP. (3), for example, can be taken to mean either (4a) or (4b).

- (3) More than two students visited three professors.
- (4) a. There are more than two x s, x is a student such that there are three y s, y is a professor such that x visited y .
- b. There are three y s, y is a professor such that there are more than two x s, x is a student such that x visited y .

This intuition is also truth-conditionally substantiated by the fact that (3) can be truthfully uttered in the situation where three students each visited a different set of three professors and in the situation where three professors were each visited by a different set of three students. As we will observe in the following section, however, the option of the object QP taking scope above the subject QP is much more limited than that of the opposite scope order.

In the following discussion, I will refer to readings like the ones in (4) where one QP is within the scope of another QP as *wide scope readings*.¹ And among wide scope readings, those whose scope order corresponds to the surface linear order (e.g., (4a)) are called *surface scope readings*, and those whose scope order is reversed from the surface linear order *inverse scope readings* (e.g., (4b)). For convenience, I will abbreviate a wide scope reading where a QP β is within the scope of a QP α as $WSR\langle\alpha, \beta\rangle$.

¹ Although readings like (i-b) for (i-a) and (ii-b) for (ii-a) are often treated as instances of wide scope readings in the literature, it is not clear that they are such instances.

- (i) a. Three boys love some girl.
b. There is some y , y is a girl such that there are three x s, x is a boy such that x loves y .
- (ii) a. Some girl loves three boys.
b. There is some x , x is a girl such that there are three y s, y is a boy such that x loves y .

As pointed out correctly in Kuroda 1994, (i-b), for example, is truth-conditionally equivalent with the branching reading in (iii-a), where neither element takes wide scope with respect to the other, and similarly, (ii-b) cannot be truth-conditionally differentiated from (iii-b).

- (iii) a. There is some y , y is a girl and there are three x s, x is a boy such that x loves y .
b. There is some x , x is a girl and there are three y s, y is a boy such that x loves y .

To the extent that branching readings must be recognized independently from wide scope readings in a theory of the grammar, therefore, we cannot take readings like (i-b) and (ii-b) as evidence for the object QP or the subject QP takes scope above the other. For this reason, I will not use a singular-denoting QP as the potential wide-scope-taking element in the following discussion.

The empirical materials to be presented are from English and Japanese. In each relevant section, both English and Japanese materials are presented; however, the order of presentation may vary section to section for convenience.

2.2. Differences between surface and inverse scope readings

In this section, I will demonstrate that there are (at least) three linguistic conditions that are necessary for inverse scope readings to emerge, and the availability of surface scope readings is not subject to such conditions.

2.2.1. Specificity effects²

The study of quantifier scope in the generative tradition begins with the debate between Chomsky 1957 and Katz & Postal 1964, as briefly mentioned in Chapter 1. Since this debate, the generalization in (5) has served as the standard generalization regarding the scope interaction in the basic order for about three decades.

- (5) The basic order gives rise to both $WSR\langle QP_{Sub}, QP_{Obj} \rangle$ and $WSR\langle QP_{Obj}, QP_{Sub} \rangle$.

In the 1990s, however, researchers extended the investigation to a wider range of the QP types, and concluded that inverse scope readings are not always available. Proposed generalizations differ from each other in regards to their classifications of QPs. Ruys (1992), Ben-Shalom (1993), and Beghelli & Stowell (1997), for example, maintain that $WSR\langle QP_{Obj}, QP_{Sub} \rangle$ obtains in the basic order only if the QP_{Obj} is a strong QP in the

² This section is based on Hayashishita 1999:Section 2, pp. 202-204 & Section 5.1, pp.211-213, and Hayashishita 2000a:Section 3.1, pp. 285-286 & Section 4.3.1, pp.291-293.

sense of Milsark 1974, 1977. A subset of strong QPs and that of weak QPs are listed in (6) for your reference.

(6) a. Strong QPs

every boy, all boys, most boys, etc.

b. Weak QPs

some boy, many boys, four boys, more than four boys, less than four boys,
exactly four boys, no boy, a certain boy, etc.

Liu (1990), on the other hand, maintains a less strict generalization. She claims that $WSR\langle QP_{Obj}, QP_{Sub}\rangle$ obtains in the basic order only if the QP_{Obj} is a QP having [+G-specific], where the group characterized with [+G-specific] includes strong QPs and some weak QPs, as listed in (7).³

(7) a. QPs with [+G-specific]

every boy, all boys, most boys, a certain boy, some boy, many boys, four boys,
a majority of boys, two-third of the boys, etc.

b. QPs with [-G-specific]

more than four boys, less than four boys, exactly four boys, at least two boys,
about ten boys, 10% of the boys, one-third of the boys, etc.

³ In my opinion, the motivation for the G-specific feature is not clear. Regarding G-specificity, Liu states only (i).

(i) (= Liu 1990 (56), p.38)

The branching reading is available if the NPs involved are G-specific.

Notice that G-specificity in (i) is defined in association with two elements. Thus, we are yet to see a property of [+G-specific] in regard to one element. Furthermore, (i), in and of itself, seems to have no content. What is stated in (i) is one sufficient, but not necessary, condition for the branching reading; thus, (i) does not exclude the possibility of a branching reading without involving a QP with [+G-specific], and the distribution of branching readings cannot be accounted for.

I agree with the works in the 1990s that inverse scope readings are not always available in the basic order. I argue, however, that the distribution of inverse scope readings cannot be captured in terms of grammatical classifications of QPs, and the notion necessary for the generalization is *specificity*, a pragmatic notion.

First, consider the examples in (8) and (9).⁴

- (8) a. In the departmental election, [*_S* more than 10 students] voted for [*_O* two professors], but the other professors did not receive any vote.
- b. (Context: There are five bad-mannered students. You came to know the news that several professors split up into five groups and visited each of the students. Then, you spread the news.)
- [*_S* Some professor] visited [*_O* every bad-mannered student].
- (9) a. At USC, each year [*_S* three selected professors] recommend [*_O* more than five incoming students] for a fellowship award.
- b. In the coming workshop at USC, if [*_S* two or more people] argue with [*_O* more than 15% of the presenters], it will be considered a success.

Inverse scope readings can obtain in (8) but not (so easily) in (9). (8b), for example, can be true in the situation where each of the five bad-mannered students has received a visit from a different professor. However, (9a), for instance, cannot be uttered to describe the situation where each year, six incoming students are each recommended by a different set of three selected professors for a fellowship award.

The contrast we have just observed appears to render support to the Liu generalization above (but see FN 3). But we can also reasonably interpret the contrast under dis-

⁴ *S* and *O* in italicized bold subscript stand for *subject* and *object*, and are used to mark the QPs whose scope interaction is under discussion.

cussion as indicating that $WSR\langle QP_{Obj}, QP_{Sub}\rangle$ obtains in the basic order only if the speaker refers to a specific group with the QP_{Obj} . (8a), for example, is a description of a past event of an election, and in a usual circumstance, the speaker is equipped with the information regarding who received votes and who did not. Similarly, (8b) is a report regarding the five bad-mannered students the speaker has in mind. The examples in (9), on the other hand, seem to be cases where the speaker does not refer to a specific group with the QP_{Obj} . (9a), for example, is a statement about a USC yearly activity, where the value of *more than five incoming students* changes annually. Similarly, (9b) is a description of a future event, and the value of *more than 15% of the presenters* is yet to be determined.

What is of interest to us is that the fact that inverse scope readings are not available in the examples in (9) cannot be attributed to the property of *more than five NP* or *more than 15% of the NP*. As illustrated in (10), when the context allows the speaker to associate specific groups with the relevant QPs, they can be understood as taking wide scope with respect to the subject QPs.

- (10) a. (Context: We are wondering if we should rob some shops on 5th Avenue in New York. We agree that we will not execute the plan if more than five buildings on 5th Avenue are guarded. You go to spy, and see seven buildings guarded by two security guards each. You return and report the observation.)⁵

Well, we should forget about the plan because [_S two guards] were standing in front of [_O more than five buildings].

- b. (Context: You are watching a film showing a court situation of the Roman Empire. In this period, for each court case, two witnesses are required. You

⁵ I thank Maria Gallardo (p.c. May 1999) for the context just given and relevant discussion.

have seen in the film that 16 out of the 100 criminals were testified against. Then, you report what you have seen.)⁶

[_S Two witnesses] testified against [_O more than 15% of the criminals].

Hence, I reject the Liu generalization, and maintain that $WSR\langle QP_{Obj}, QP_{Sub}\rangle$ obtains in the basic order only if the speaker refers to a specific group with the QP_{Obj} .

Surface scope readings contrast with inverse scope readings. They seem to obtain whether or not the speaker refers to a specific group with the QP_{Sub} , as illustrated in (11) and (12).

- (11) a. In the departmental election, [_S two students] voted for [_O more than three professors], but other students did not vote for anyone.
- b. [_S Every automobile company in Japan] proposed a deal to [_O three or more insurance companies].
- (12) a. At USC, each year [_S many incoming students] nominate [_O three professors] for a teaching award.
- b. In the coming workshop at USC, if [_S more than 20% of the audience] argue with [_O two presenters], it will be considered a success.

In summary, the generalizations that correctly capture the distribution of wide scope readings in the basic order are:⁷

⁶ I thank Barry Schein (p.c. July 1999) for the context just given and relevant discussion.

⁷ James Higginbotham (p.c. May 2002) pointed out to me that the generalizations in (13) do not cover embedded cases. For example, consider (i).

(i) (Context: George told you that he believes that certain two students have each been recommended by more than three professors. But you do not have a clue as to who the students are. So you simply report George's speech.)

George believes that [_S more than three professors] have recommended [_O two students].

- (13) a. $WSR\langle QP_{Obj}, QP_{Sub} \rangle$ obtains in the basic order only if the speaker refers to a specific group with the QP_{Obj} .
- b. $WSR\langle QP_{Sub}, QP_{Obj} \rangle$ obtains in the basic order even if the speaker does not refer to a specific group with the QP_{Sub} .

Let us now turn to Japanese. The study of quantifier scope in Japanese starts with the generalization that the basic order gives rise only to $WSR\langle QP_{Sub}, QP_{Obj} \rangle$ (cf. Kuroda 1969/70, Hoji 1985). Recently, however, a number of examples have been reported, which illustrate that the basic order also yields $WSR\langle QP_{Obj}, QP_{Sub} \rangle$ (e.g., Kitagawa 1990, Kuroda 1994, Kuno et al 1999). In particular, Kitagawa (1990) argues against Kuroda (1969/70) and Hoji (1985), and maintains that the basic order is associated with both surface and inverse scope readings.⁸

In (i), the speaker reports George's speech. George refers to specific two students in his speech, but crucially, the speaker does not know who the students are. Yet, *two students* can be understood as taking wide scope with respect to *more than three professors* within the embedded clause.

The generalization that covers both non-embedded cases and embedded cases seems to be (ii).

- (ii) Let $S_1, S_2, S_3, \dots, S_n$ be persons, where n is the largest number. In the situation where S_1 reports a speech of S_2 , who in turn reports a speech of S_3 , who in turn reports a speech of S_4, \dots, \dots a speech of S_n , and S_n 's speech has a form of [... QP_{Sub} [... QP_{Obj} ...]], where the QP_{Sub} and the QP_{Obj} are clause-mate, $WSR\langle QP_{Obj}, QP_{Sub} \rangle$ may obtain in the lowest clause as long as the QP_{Obj} is taken as a referring to a group specific with respect to S_k , where $k = n$ or $k < n$.

In the following discussion, I will suppress this problem, and continue to use the generalization in (13) in order to present the subsequent discussion in a simpler way. The suppression of this problem does not affect any of the claims I will be making.

⁸ Incidentally, Kitagawa (1990) reports that $WSR\langle QP_{Obj}, QP_{Sub} \rangle$ is available in the basic order only marginally. One may thus argue that he does not challenge the Kuroda/Hoji generalization. He attributes, however, the marginality to a non-syntactic reason (due to the PF/LF mismatch (p.28)), and proposes the grammar that generates $WSR\langle QP_{Sub}, QP_{Obj} \rangle$ and $WSR\langle QP_{Obj}, QP_{Sub} \rangle$ on a par with each other. I therefore understand Kitagawa's generalization to be that the basic order yields both surface and inverse scope readings, as far as the grammar is concerned.

I maintain that (i) $WSR\langle QP_{Obj}, QP_{Sub}\rangle$ may obtain in the basic order, but (ii) only when a certain condition is met; I thus reject both (i) the Kuroda/Hoji generalization and (ii) Kitagawa generalization. In particular, I argue that the generalizations in (13) hold also for Japanese.⁹ In what follows, I will illustrate the generalizations in (13) on the basis of Japanese examples. Readers who are not interested in empirical materials in Japanese might skip to the beginning of Section 2.2.

First, observe that inverse scope readings can obtain in the examples in (14), but not in those in (15). We can take this contrast as indicating that $WSR\langle QP_{Obj}, QP_{Sub}\rangle$ obtains in the basic order only if the speaker refers to a specific group with the QP_{Obj} .

- (14) a. Gakubunaisenkyo-de, [_S 10ninizyoo-no gakusei]-ga [_O hutari-no kyoozyu]-ni
 department:election-at 10:more-GEN student-NOM two-GEN professor-DAT
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⁹ Incidentally, Kuroda (1994) puts forth the generalization in (i)

- (i) $WSR\langle QP_{Obj}, QP_{Sub}\rangle$ obtains in the basic order only if the verb is an event verb.

In support of the generalization, he assumes that the verb, *mensetusita* 'interviewed', in (ii-a) is an event verb while the verb, *sitteiru* 'know', in (ii-b) is not, and maintains that (ii-a) can give rise to the inverse scope reading while (ii-b) cannot.

- (ii) a. (= Kuroda 1994 (63), slightly adapted)
 [_S Tanaka sensei ka Yamada sensei]-ga [_O gonin-no sigansya]-o mensetusita.
 Tanaka teacher or Yamada teacher-NOM five-GEN applicant-ACC interviewed
 '[_S Prof. Tanaka or Prof. Yamada] interviewed [_O five applicants].'
 b. (= Kuroda 1994 (65), slightly adapted)
 [_S Tanaka sensei ka Yamada sensei]-ga [_O gonin-no sigansya]-o sitteiru.
 Tanaka teacher or Yamada teacher-NOM five-GEN applicant-ACC is:knowing
 '[_S Prof. Tanaka or Prof. Yamada] know [_O five applicants].'

I, however, contend that his generalization is invalid. In fact, it is not difficult to construct counterexamples to (i). For instance, the sentences in (iii), where the verbs cannot be considered as event verbs, can give rise to inverse scope readings.

- (iii) a. [_S Sukunakutomo sannin-no gakusei]-ga [_O subete-no sensei]-o nikundeiru.
 at:least three-GEN student-NOM all-GEN teacher-ACC is:hating
 '[_S At least three students] hate [_O every teacher].'
 b. [_S Sukunakutomo sannin-no gakusei]-ga [_O rei-no hutari-no sensyu]-ni akogareteiru.
 at:least three-GEN student-NOM the-GEN two-GEN athlete-DAT is:admiring
 '[_S At least three students] admire [_O the two athletes].'

toohyoosita. Demo hoka-no kyoozyu-ni-wa daremo toohyoosi-na-katta.
voted but other-GEN professor-DAT-TOP no:one vote-not-PAST

'In the departmental election, [_S 10 or more students] voted for [_O two professors]. But for the other professors, no one voted.'

- b. (Context: There are five bad-mannered students. You know the fact that several professors split up into five groups and went to visit each of the students. You describe your knowledge as follows.)

[_S Sukunakutomo dareka]-ga [_O subete-no huryoo gakusei]-o
at:least someone-NOM all-GEN bad-mannered student-ACC

hoomonsita.
visited

'[_S At least someone] visited [_O every bad-mannered student].'

- (15) a. USC-de-wa maitosi [_S sannin-no kyoozyu]-ga [_O goninizyoo-no
USC-at-TOP every:year three-GEN professor-NOM five:more-GEN

sinnyuusei]-o zimbunkagakusyoo-ni suisensuru.
new:student-ACC humanity:award-DAT recommend

'In USC, each year [_S three professors] recommend [_O five or more incoming students] for the humanity award.'

- b. Kondo-no gakkai-wa, mosi [_S hutariizyoo-no hito]-ga
coming-GEN conference-TOP if two:more-GEN person-NOM

[_O takusan-no happyoosya]-ni giron-o sikaketa ra, seikoo to siyoo.
many-GEN presenter-DAT argument-ACC initiated if success that suppose

'In the coming conference, if [_S two or more persons] argue with [_O many presenters], let us consider the conference to be a success.'

Because the examples in (16) allow inverse scope readings, we cannot attribute the absence of the inverse scope readings in (15) to the properties of *goninizyoo-no NP* 'five or more NP' and *takusan-no NP* 'many NP'.

- (16) a. (Context: We are wondering if we should rob some shops on 5th Avenue in New York. We agree that we will not execute the plan if five or more

buildings on 5th Avenue are guarded. You go to spy, and see seven buildings guarded by two security guards. You return and report your observation.)

Dame-da. [_S Hutari-no gaadoman]-ga [_o itutuizyoo-no biru]-no mae-ni
bad-COPULA two-GEN guard-NOM five:more-GEN building-GEN front-DAT

tatteita.
was:standing

'We got a bad luck. [_S Two guards] were standing in front of [_o five or more buildings].'

- b. (Context: You are watching a film showing a court situation of the Roman Empire. In this period, for each court case, two witnesses are required. You have seen that 55 out of the 100 criminals (in the film) were testified against. Then, you report what you have seen.)

[_S Hutari-no syoonin]-ga [_o takusan-no yoogisya]-ni hurina
two-GEN witness-NOM many-GEN criminal-DAT disadvantageous

syoogen-o dasiteita.
testimony-ACC was:reporting

'[_S Two witnesses] testified against [_o many criminals].'

As in the case of English, surface scope readings contrast with inverse scope readings. $WSR\langle QP_{Sub}, QP_{Obj} \rangle$ obtains in the basic order whether or not the speaker refers to a specific group with the QP_{Sub} , as illustrated in (17)-(18).

- (17) a. [_S Toyota to Nissan]-ga [_o mittuizyoo-no hokengaisya]-ni keiyaku-o
Toyota and Nissan-NOM three:more-GEN insurance:company-DAT contract-ACC

moosikonda to siyoo.
requested that suppose

'Suppose that [_S Toyota and Nissan] proposed a deal to [_o three or more insurance companies].'

- b. (Context: You know the fact that Student A and Student B voted for four professors. You describe your knowledge as follows.)

Gakubunaisenkyo-de, [_S hutari-no gakusei]-ga [_o sanninizyoo-no kyoozyu]-ni
department:election-at two-GEN student-NOM three:more-GEN professor-DAT

toohyoosita.
voted

'In the departmental election, [_S two students] voted for [_O three or more professors].'

- (18) a. USC-de-wa, maitosi [_S takusan-no sinnyuusei]-ga [_O gonin-no kyoozyu]-o
USC-at-TOP every:year many-GEN new:student-NOM five-GEN professor-ACC

zinbunkagakusyoo-ni suisensuru.
humanity:award-DAT recommend

'In USC, each year [_S many incoming students] recommend [_O five professors] for the humanity award.'

- b. Kondo-no gakkai-wa, mosi [_S 20%izyoo-no happyoosya]-ga
coming-GEN conference-TOP, if 20%:more-GEN presenter-NOM

[_O hutari-no tyoosyuu]-ni giron-o sikaketa ra, seikoo to siyoo.
two-GEN audience-DAT argument-ACC initiated if success that suppose

'In the coming conference, if [_S 20% or more of the presenters] argue with [_O two people in the audience], let us consider it to be a success.'

We have thus observed that the generalizations in (13), repeated here, hold for both English and Japanese.¹⁰

- (13) a. WSR<QP_{Obj}, QP_{Sub}> obtains in the basic order only if the speaker refers to a specific group with the QP_{Obj}.
b. WSR<QP_{Sub}, QP_{Obj}> obtains in the basic order even if the speaker does not refer to a specific group with the QP_{Sub}.

¹⁰ But see FN 7.

2.2.2. Freezing effects¹¹

In this subsection, I will provide two-fold demonstration that while inverse scope readings induce a certain interpretive restriction on the QP taking narrow scope, surface scope readings do not.

2.2.2.1. Freezing effects on scope

The first set of generalizations I will put forth is:

- (19) a. When $WSR\langle QP_{Obj}, QP_{Sub} \rangle$ obtains in the basic order, the narrow scope taking QP, the QP_{Sub} , cannot take wide scope with respect to another QP.
- b. When $WSR\langle QP_{Sub}, QP_{Obj} \rangle$ obtains in the basic order, the narrow scope taking QP, the QP_{Obj} , can still take wide scope with respect to another QP.

In order to demonstrate that (19a) holds, let us first consider the following example.

- (20) [_S Sanninizyoo-no kyoozyu]-ga [_O rei-no hutari-no gakusei]-o kaisya-ni
 three:more-GEN professor-NOM that-GEN two-GEN student-ACC company-DAT
 suisensiteita.
 was:recommending

'[_S Three or more professors] recommended [_O the two students] to companies.'

The sentence in (20) allows the direct object QP to take scope above the subject QP. This is not surprising since we can reasonably assume that the speaker refers to a specific group with *rei-no hutari-no gakusei* 'the two students' at the speech time.

Next, confirm the availability of the wide scope reading of the subject QP over the indirect object QP in (21).

¹¹ Similar empirical materials are also found in Hayashishita 1999:Section 5.2, pp. 213-215 and Hayashishita 2000a:Section 3.2, pp. 286-288.

- (21) [_S Sanninizyoo-no kyoozyu]-ga John-o [_o hutatu-no kaisya]-ni
 three:more-GEN professor-NOM John-ACC two-GEN company-DAT

suisensiteita.
 was:recommending

'[_S Three or more professors] recommended John to [_o two companies].'

What is of interest is that the two instances of wide scope readings, which we have just observed in isolation, cannot obtain simultaneously. This is illustrated in (22).

- (22) [_S Sanninizyoo-no kyoozyu]-ga [_o rei-no hutari-no gakusei]-o [_o hutatu-no
 three:more-GEN professor-NOM the-GEN two-GEN student-ACC two-GEN

kaisya]-ni suisensiteita.
 company-DAT was:recommending

'[_S Three or more professors] recommended [_o the two students] to [_o two companies].'

In (22), when the direct object QP scopes above the subject QP, the subject QP cannot take wide scope with respect to the indirect object QP, and conversely, when the subject QP scopes above the indirect object QP, the direct object QP cannot take wide scope with respect to the subject QP. The unavailable reading under discussion is expressed as (23) with logical formulas.¹²

¹² This is a very rough translation of the reading under discussion. The uniqueness presupposition implied by *rei-no hutari-no gakusei* 'the two students', for example, is ignored. This simplification, however, does not affect the point here, for (23) is entailed by the more accurate translation that includes the uniqueness presupposition.

In what follows, when a translation with logical formulas seems necessary for a given reading, I will provide a rough translation to achieve a simpler presentation, as long as the point of discussion is not obscured.

$$(23) \quad \exists Y (Y \subseteq \textit{student} \wedge |Y| = 2) \forall y (y \in Y) [\exists X (X \subseteq \textit{professor} \wedge |X| \geq 3) \\ \forall x (x \in X) [\exists Z (Z \subseteq \textit{company} \wedge |Z| = 2) \forall z (z \in Z) [x \textit{ recommended } y \textit{ to} \\ z]]]]$$

To substantiate the absence of this reading, the situation in (24) may be considered. If (22) were taken to mean (23), it should be true in (24). However, the fact is on the contrary.

(24) Elena and Victoria are the students under discussion.

For Elena, Professor A recommended her to Companies 1 & 2, Professor B to Companies 2 & 3, and Professor C to Companies 3 & 4.

For Victoria, Professor D recommended her to Companies 4 & 5, Professor E to Companies 5 & 6, Professor F to Companies 6 & 7, and Professor G to Companies 7 & 8.

When the direct object QP takes scope above the subject QP in (22), the available reading seems to be only (25), where the subject QP does not take wide scope or narrow scope with respect to the indirect object QP.¹³

$$(25) \quad \exists Y (Y \subseteq \textit{student} \wedge |Y| = 2) \forall y (y \in Y) [\exists X (X \subseteq \textit{professor} \wedge |X| \geq 3) \\ \exists Z (Z \subseteq \textit{company} \wedge |Z| = 2) [\forall x (x \in X) \exists z (z \in Z) [x \textit{ recommended } y \textit{ to } z] \\ \wedge \forall z (z \in Z) \exists x (x \in X) [x \textit{ recommended } y \textit{ to } z]]]]$$

This intuition is supported by the fact that (22) can be truthfully uttered in the situation of (26), where the number of companies to which each of the students under discussion is recommended is two.

¹³ I owe Daisuke Bekki (p.c. December 1998) for this formalism.

(26) Elena and Victoria are the students under discussion.

For Elena, Professor A recommended her to Companies 1 & 2, Professor B, to Company 2, and Professor C, to Company 1.

For Victoria, Professor D recommended her to Companies 3 & 4, Professor E to Company 3, Professor F to Company 4, and Professor G to Companies 3 & 4.

Altering the linear order between the direct object and the indirect object in (22) as in (27) does not change the factual assessment. Like (22), (27) can be used to express the reading in (25), but not that in (23); i.e., it can be truthfully uttered in (26), but not in (24).

(27) [_S Sanninizyoo-no kyoozyu]-ga [_o hutatu-no kaisya]-ni [_o rei-no hutari-no
three:more-GEN professor-NOM two-GEN company-DAT the-GEN two-GEN
gakusei]-o suisensiteita.
student-ACC recommended

'(Lit.) [_S Three or more professors] recommended to [_o two companies] [_o the two students].'

The fact that (22) and (27) cannot give rise to (23) should not be dismissed since the reading itself is possible in another minimally different construction. For example, (28), the *niyotte*-passive counterpart of (22) and (27), can yield the reading under discussion, i.e., it can be truthfully uttered in (24).

(28) [_o Rei-no hutari-no gakusei]-ga [_S sanninizyoo-no kyoozyu]-niyotte
the-GEN two-GEN student-NOM three:more-GEN professor-by
[_o hutatu-no kaisya]-ni suisens-are-ta.
two-GEN company-DAT recommend-PASSIVE-PAST

'[_o The two students] were recommended by [_s three or more professors] to [_o two companies].'

My interpretation of the fact regarding (22) and (27) is as follows. When $WSR\langle QP_{Obj}, QP_{Sub}\rangle$ obtains in the basic order, some interpretive restriction is imposed on the QP_{Sub} such that it cannot take wide scope with respect to another QP. In the following discussion, I refer to those phenomena where a QP that is able to take wide scope with respect to another QP in one context but is unable to do so in another context as *freezing effects on scope*.

A few more examples are supplied in (29) to further illustrate the generalization under discussion. In these examples, when the indirect object takes scope above the subject, the subject cannot take wide scope with respect to the direct object.

- (29) a. [_s Sanninizyoo-no heddohantaa]-ga [_o hutatu-no kaisya]-o [_o subete-no
three:more-GEN headhunter-NOM two-GEN company-ACC all-GEN

gakusei]-ni syookaisiteita.
student-DAT introduced

'[_s Three or more headhunters] introduced [_o two companies] to [_o every students].'

- b. [_s Sanninizyoo-no heddohantaa]-ga [_o subete-no gakusei]-ni [_o hutatu-no
three:more-GEN headhunter-NOM all-GEN student-DAT two-GEN

kaisya]-o syookaisiteita.
company-ACC introduced

'(Lit.) [_s Three or more headhunters] introduced to [_o every students] [_o two companies].'

Freezing effects on scope can also be observed in English. In the examples in (30), for instances, the wide scope reading of the direct object QP over the subject QP cannot co-occur with the wide scope reading of the subject QP over the indirect object QP. Similarly, in the examples in (31), the wide scope reading of the indirect object QP

over the subject QP cannot co-occur with the wide scope reading of the subject QP over the direct object QP.

- (30) a. [_S Many professors] recommended [_o the two students under discussion] to [_o three companies].
- b. [_S More than three professors] introduced [_o every student] to [_o two scholars].
- (31) a. [_S Many professors] recommended [_o three companies] to [_o the two students under discussion].
- b. [_S More than three professors] introduced [_o two scholars] to [_o every student].

Let us now turn to the generalization in (19b). Given the observation in Section 2.2.1 that the availability of surface scope readings is not limited in the way that of inverse scope readings is, one might suspect that when $WSR\langle QP_{Sub}, QP_{Obj} \rangle$ obtains in the basic order, freezing effects on scope would not be induced. Such is indeed the case.

First, observe that the subject QP can take scope above the indirect object QP in (32a) and the indirect object QP can take wide scope with respect to the direct object QP in (32b).

- (32) a. Maitosi [_S takusan-no kyoozyu]-ga [_o gonin-no gakusei]-ni Toyota-o
 every:year many-GEN professor-NOM five-GEN student-DAT Toyota-ACC
 suisensuru.
 recommend
 'Each year, [_S many professors] recommend Toyota to [_o five students].'
- b. Maitosi Kimura kyoozyu-ga [_o gonin-no gakusei]-ni [_o hutatuizyoo-no
 every:year Kimura professor-NOM five-GEN student-DAT two:more-GEN
 kaisya]-o suisensuru.
 company-ACC recommend

'Each year, Prof. Kimura recommend [_o two or more companies] to [_o five students].'

Furthermore, the two instances of wide scope readings can occur simultaneously, as illustrated in (33). A translation of the reading under discussion is provided in (34) for convenience.

- (33) Maitosi [_s takusan-no kyoozyu]-ga [_o gonin-no gakusei]-ni [_o hutatuizyoo-no
every:year many-GEN professor-NOM five-GEN student-DAT two:more-GEN
kaisyu]-o suisensuru.
company-ACC recommend

'Each year, [_s many professors] recommend [_o two or more companies] to [_o five students].'

- (34) $\exists X (X \subseteq \textit{professor} \wedge |X| \geq k) \forall x (x \in X) [\exists Y (Y \subseteq \textit{student} \wedge |Y| = 5)$
 $\forall y (y \in Y) [\exists Z (Z \subseteq \textit{company} \wedge |Z| \geq 2) \forall z (z \in Z) [x \textit{ recommends } z \textit{ to } y$
]], where k is an integer considered to be large in a given context.

The generalization under discussion seems to hold with other types of QPs. Here I supply two more examples for further illustrations. The examples in (35) allow the wide scope reading of the subject QP over the indirect object QP to co-occur with the wide scope reading of the indirect object QP over the direct object QP.

- (35) a. [_s Kimura kyoozyu to Yamada kyoozyu]-ga [_o sanninzyoo-no gakusei]-ni
Kimura professor and Yamada professor-NOM three:more-GEN student-DAT
[_o yottu-no kaisyu]-o syookaisiteita.
four-GEN company-ACC introduced

'[_s Prof. Kimura and Prof. Yamada] introduced [_o four companies] to [_o three or more students].'

- b. Maitosi, [_s hutariizyoo-no kyoozyu]-ga [_o sannin-no gakusei]-ni
every:year two:more-GEN professor-NOM three-GEN student-DAT

[_o gosatuizyoo-no hon]-o susumeru.
 five:more-GEN book-ACC recommend

'Each year, [_s two or more professors] recommend [_o five or more books] to [_o three students].'

The generalization in (19b) seems to be valid also in English. In the following examples, for instance, the subject QP can take scope above the direct object QP, which in turn can take scope above the indirect object QP.

- (36) a. [_s Every professor] introduced [_o more than three people] to [_o four companies].
 b. Every year, [_s two newly hired professors] recommend [_o more than three books] to [_o five students].

In summary, we have observed in this subsection that the generalizations in (19), repeated here, hold in both Japanese and English.

- (19) a. When $WSR\langle QP_{Obj}, QP_{Sub} \rangle$ obtains in the basic order, the narrow scope taking QP, the QP_{Sub} , cannot take wide scope with respect to another QP.
 b. When $WSR\langle QP_{Sub}, QP_{Obj} \rangle$ obtains in the basic order, the narrow scope taking QP, the QP_{Obj} , can still take wide scope with respect to another QP.

2.2.2.2. Freezing effects on binding

In the previous subsection, I have maintained that inverse scope readings impose some interpretive restriction on the QP taking narrow scope, while surface scope readings do not. This subsection further supports this conclusion. In particular, I argue that the generalizations in (37) hold.

- (37) a. When $WSR\langle QP_{Obj}, QP_{Sub} \rangle$ obtains in the basic order, the narrow scope taking QP, the QP_{Sub} , cannot bind a dependent term.

- b. When $WSR \langle QP_{Sub}, QP_{Obj} \rangle$ obtains in the basic order, the narrow scope taking QP, the QP_{Obj} , can still bind a dependent term.

In order to illustrate (37a), let us first observe that the sentence in (38) allows the direct object QP to take scope above the subject QP.

- (38) [_S *Mittuizyoo-no ginkoo*]-ga [_O *rei-no hutatu-no kaisya*]-o torihikisaki-ni
 three:more-GEN bank-NOM the-GEN two-GEN company-ACC customer-DAT
 syookaisita to siyoo.
 introduced that suppose
 'Suppose that [_S three or more banks] introduced [_O the two companies] to customers.'

Second, confirm that bound variable anaphora can be established between *mittuizyoo-no ginkoo* 'three or more banks' and *soko* 'it' in (39);¹⁴ i.e., (39) can be used to express the proposition that there are three or more banks such that each of the banks introduced Toyota to its customer.

- (39) [_S *Mittuizyoo-no ginkoo*]-ga Toyota-o *soko*-no torihikisaki-ni
 three:more-GEN bank-NOM Toyota-ACC that:place-GEN customer-DAT
 syookaisita to siyoo.
 introduced that suppose
 '(Lit.) Suppose that [_S three or more banks] introduced Toyota to its customer.'

Note that the anaphoric relation under discussion cannot be that of co-reference since *soko* 'it' is singular-denoting, and *mittuizyoo-no ginkoo* 'three or more banks' is not.¹⁵ In

¹⁴ (Intended) bound variable anaphora will be indicated with the use of underlines.

¹⁵ It is argued in Hoji 1998a that *soko* 'it' is singular-denoting on the basis of its incapability of co-referring to split antecedents. He argues that the contrast between (i) and (ii), for example, can be accounted for under the assumption that *soko* 'it' in (i-a)-(i-b) is singular-denoting, while *karera* 'them' and *aitura* 'them' in (ii-a) and (ii-b) are not.

(i) (= Hoji 1998a (3), p.652, slightly adapted)

the following discussion, in order to ensure that the anaphoric relation between a QP α and an NP β is not that of co-reference but that of bound variable anaphora, I will utilize for α an element that is not singular-denoting, and for β an element that is singular-denoting.¹⁶

What is of interest is that the instances of wide scope reading and bound variable anaphora, which we have observed in isolation, cannot obtain simultaneously, as the following example illustrates.

- (40) [_S Mittuizyoo-no ginkoo]-ga [_O rei-no hutatu-no kaisya]-o soko-no
 three:more-GEN bank-NOM the-GEN two-GEN company-ACC that:place-GEN

torihikisaki-ni syookaisita to siyoo.
 customer-DAT introduced that suppose

'(Lit.) Suppose that [_S three or more banks] introduced [_O the two companies] to its customer.'

- a. *Toyota₁-ga Nissan₂-ni [_{IP} zeimusyo-ga soko₁₊₂-o sirabeteiru] to tugeta (koto)
 Toyota-NOM Nissan-DAT tax:office-NOM that:place-ACC is:investigating that told that
 'Toyota₁ told Nissan₂ that the tax office was investigating them₁₊₂.'
- b. *Toyota₁-wa Nissan₂-ni soko₁₊₂-no goodoo paatii-no kaizyoo-o teiansita.
 Toyota-TOP Nissan-DAT that:place-GEN joint party-GEN place-ACC suggested
 'Toyota₁ suggested to Nissan₂ a place for their₁₊₂ joint party.'

(ii) (= Hoji 1998a (2a)-(2b), pp.650-651, slightly adapted)

- a. Tom₁-ga Nick₂-ni [_{IP} CIA-ga karera₁₊₂-o sirabeteiru] to tugeta (koto)
 Tom-NOM Nick-DAT CIA-NOM them-ACC is:investigating that told that
 'Tom₁ told Nick₂ that the CIA was investigating them₁₊₂.'
- b. Ano ninensei₁-wa ano itinensei₂-ni aitura₁₊₂-no atarasii kooti-o syokaisita.
 that sophomore-TOP that freshman-DAT them-GEN new coach-ACC introduced
 'That sophomore₁ introduced to that freshman₂ their₁₊₂ new coach.'

¹⁶ See Hoji 2003:Section 2.2.2.1 for the demonstration that the judgmental fluctuation of the speaker's intuition regarding the (un)availability of bound variable anaphora is smaller in the case where a given anaphoric relation is between a non-singular-denoting element and a singular-denoting element than in the case where the anaphoric relation is between two singular-denoting or two non-singular-denoting elements.

In (40), when the wide scope reading of the direct object QP over the subject QP obtains, the subject QP cannot bind the dependent term, *soko* 'it', and conversely, when the subject QP binds *soko* 'it', the inverse scope reading fails to obtain. The unavailable reading under discussion is expressed as (41), using logical formulas.

$$(41) \quad \exists Y (Y \subseteq \textit{company} \wedge |Y| = 2) \forall y (y \in Y) [\exists X (X \subseteq \textit{bank} \wedge |X| \geq 3) \\ \forall x (x \in X) [x \textit{ introduced } y \textit{ to } x\text{'s customer}]]$$

To substantiate the intuition truth-conditionally, we may consider the situation in (42). If (40) were understood to mean (41), it should be true in (42); however, the fact is on the contrary.

(42) Toyota and Nissan are the two companies under discussion. There are seven banks, A, B, C, D, E, F, and G. For Toyota, A introduced it to A's customer, B to B's customer, C to C's customer, and D to D's customer. For Nissan, E introduced it to E's customer, F to F's customer, and G to G's customer.

As the alternation of the linear order between the direct and indirect objects did not eliminate freezing effects on scope in Section 2.2.1, the change of the linear order as in (43) does not alter the factual assessment; like (40), (43) cannot give rise to the reading in (41).

(43) [_S Mittuizyoo-no ginkoo]-ga soko-no torihikisaki-ni [_O rei-no hutatu-no
three:more-GEN bank-NOM that:place-GEN customer-DAT the-GEN two-GEN
kaisya]-o syookaisita to siyoo.
company-ACC introduced that suppose

'(Lit.) Suppose that [_S three or more banks] introduced to its customer [_O the two companies].'

The fact that (40) and (43) cannot give rise to the reading in (42) is noteworthy, since (44), their *niyotte*-passive counterpart, allows the reading under discussion.

- (44) [_oRei-no hutatu-no kaisya]-ga [_smittuizyoo-no ginkoo]-niyotte
the-GEN two-GEN company-NOM three:more-GEN bank-by

soko-no torihikisaki-ni syookais-are-ta to siyoo.
that:place-GEN customer-DAT introduce-PASSIVE-PAST that suppose

'(Lit.) Suppose that [_othe two companies] were introduced by [_sthree or more banks] to its customer.'

And I take this fact as indicating that when $WSR\langle QP_{Obj}, QP_{Sub}\rangle$ obtains in the basic order, an interpretive restriction is imposed on the QP_{Sub} such that it cannot be interpreted as binding a dependent term. Let us refer to phenomena where a QP that can be interpreted as binding a dependent term in one context is unable to do so in another context as *freezing effects on binding*.

The following examples further illustrate the generalization under discussion, in which the wide scope reading of the indirect object QP over the subject QP cannot co-occur with the subject QP binding *soko* 'it.'

- (45) a. Tyoosa-ni yoruto, [_situtuizyoo-no kaisya]-ga [_osubete-no bengosi]-ni
survey-DAT according:to five:more-GEN company-NOM all-GEN attorney-DAT

soko-no mondai-o motikaketeita.
that:place-GEN problem-ACC brought

'(Lit.) According to a survey, [_sfive or more companies] brought to [_oevery attorney] its problem.'

- b. Tyoosa-ni yoruto, [_situtuizyoo-no kaisya]-ga soko-no
survey-DAT according:to five:more-GEN company-NOM that:place-GEN

mondai-o [_osubete-no bengosi]-ni motikaketeita.
problem-ACC all-GEN attorney-DAT brought

'(Lit.) According to a survey, [_sfive or more companies] brought its problem to [_oevery attorney].'

We can also observe freezing effects on binding in English.¹⁷ In the examples in (46)-(47), for instance, the inverse scope reading cannot co-occur with the subject QP binding the pronoun. (To ensure that the relevant anaphoric relation is that of bound variable anaphora, I have utilized *at least NP*, which is a non-singular-denoting, and a singular-denoting pronoun.¹⁸)

- (46) a. [_S At least one company] recommended [_O the two banks] to its customer.
 b. [_S At least one professor] introduced [_O every student] to his colleague.
- (47) a. [_S At least one company] recommended its customer to [_O the two banks].
 b. [_S At least one professor] introduced his colleague to [_O every student].

We now turn to the generalization in (37b). First, observe that (48a) allows the subject QP to take wide scope with respect to the indirect object QP, and (48b) permits the indirect object QP to bind *soko* 'it'.

- (48) a. Mosi [_S hutatuizyoo-no ginkoo]-ga [_O itutuizyoo-no zidoosyagaisya]-ni
 if two:more-GEN bank-NOM five:more-GEN automobile:company-DAT
 Toyota-no kanrengaisya-o syookaisita ra, zidoosyagyookai-wa
 Toyota-GEN related:company-ACC introduced if automobile:industry-TOP
 antaida.
 is:stable

¹⁷ Phenomena that seem analogous to freezing effects on binding are also noted in Fox 2000:Ch.2, FN 52, p. 64, where he evaluates the interrogative raising analysis in Moltmann & Szabolcsi 1994. Fox reports that the wide scope reading of the object QP over the subject QP is possible in (i-a), but not in (i-b) with the relevant binding, but he does not provide any account for this contrast. (See also Hornstein 1995, p.160 & p.180.)

- (i) (= Fox 2000:Ch.2, FN 52 (ii), p.64, slightly adapted)
 a. [_S A girl] expected [_O every boy] to come to the party.
 b. [_S A girl] expected [_O every boy] to come to her party.

¹⁸ I thank Anthony Kroch for pointing out that *at least NP* can be used for the relevant demonstration and for constructing examples similar to those in (46) (p.c. November 1999).

'(Lit.) If [_S two or more banks] introduced Toyota's related company to [_O five or more automobile companies], the automobile industry will remain stable.'

- b. Mosi Sumitomo ginkoo-ga [_O itutuizyoo-no zidoosyagaisya]-ni
if Sumitomo Bank-NOM five:more-GEN automobile:company-DAT

soko-no kanrengaisya-o syookaisita ra, zidoosyagyookai-wa
that:place-GEN related:company-ACC introduced if automobile:industry-TOP

antaida.
is:stable

'(Lit.) If Sumitomo Bank introduced its related company to [_O five or more automobile companies], the automobile industry will remain stable.'

As (49) illustrates, the instances of wide scope reading and bound variable anaphora under discussion can co-occur with each other. With logical formulas, the reading under discussion can be expressed as (50).

- (49) Mosi [_S hutatuizyoo-no ginkoo]-ga [_O itutuizyoo-no zidoosyagaisya]-ni
if two:more-GEN bank-NOM five:more-GEN automobile:company-DAT

soko-no kanrengaisya-o syookaisita ra, zidoosyagyookai-wa
Toyota-GEN related:company-ACC introduced if automobile:industry-TOP

antaida.
is:stable

'(Lit.) If [_S two or more banks] introduced its related company to [_O five or more automobile companies], the automobile industry will remain stable.'

- (50) $\exists X (X \subseteq \text{bank} \wedge |X| \geq 2) \forall x (x \in X) [\exists Y (Y \subseteq \text{automobile company} \wedge$
 $|Y| \geq 5) \forall y (y \in Y) [x \text{ introduced } y\text{'s related company to } y]]$

The generalization under discussion is also illustrated in (51) with different types of QPs.

- (51) a. [_S Rei-no hutatu-no keieisoodan zimusyo]-ga [_O takusan-no
the-GEN two-GEN management:consultation office-NOM many-GEN

kaisyā]-ni soko-no mondai-no kaiketuan-o teisyutusia.
company-DAT that:place-GEN problem-GEN solution-ACC reported

'(Lit.) [_S The two management consultation companies] brought a solution to its problem to [_O many companies].'

- b. Maitosi, [_S takusan-no kyoozyu]-ga [_O hutariizyoo-no gakusei]-ni soitu-no
every:year many-GEN professor-NOM two:more-GEN student-DAT that:guy-GEN

ronbun-o kakinaosaseru.
paper-ACC make:rewrite

'(Lit.) Each year [_S many professors] make [_O two or more students] to rewrite his paper.'

We can also illustrate the generalization under discussion in English. In the examples in (52), for instance, while the wide scope reading of the subject QP over the object QP obtains, the object QP can still bind a pronoun.

- (52) a. [_S Every professor] recommended [_O at least one company] to a student who hates it.
b. In the last three years, [_S many professors] forced [_O at least one student] to rewrite his qualifying paper.

We have thus observed that the generalizations in (37), repeated here, hold both in Japanese and English.

- (37) a. When $WSR\langle QP_{Obj}, QP_{Sub} \rangle$ obtains in the basic order, the narrow scope taking QP, the QP_{Sub} , cannot bind a dependent term.
b. When $WSR\langle QP_{Sub}, QP_{Obj} \rangle$ obtains in the basic order, the narrow scope taking QP, the QP_{Obj} , can still bind a dependent term.

2.2.3. Scope minimizing effects on negation

In this subsection, we will observe yet another difference between inverse and surface scope readings. In particular, I maintain that the following generalizations hold.

- (53) a. When $WSR\langle QP_{Obj}, QP_{Sub}\rangle$ obtains in the basic order in which the verb is negated, the scope of the verbal negation is limited to the verb itself.
- b. When $WSR\langle QP_{Sub}, QP_{Obj}\rangle$ obtains in the basic order in which the verb is negated, the scope of the verbal negation is not limited to the verb itself.

First consider the example in (54).

- (54) (Context: We have been talking about two students, Lynn and Jennifer.)
 If Prof. Smith does not recommend [_o the two students] to Toyota, John would be mad.

We can take (54) to mean that the condition for John to be mad is that it is not the case that Prof. Smith recommends both Lynn and Jennifer (i.e., John would be mad if either Lynn or Jennifer fails to be recommended), indicating that the negation can take scope above the direct object QP.

Next, consider the sentence in (55).

- (55) If [_s more than three professors] do not recommend Bill to Toyota, John would be mad.

(55) can be understood to mean that if the number of professors that recommend Bill to Toyota does not reach four, John would be mad; hence, we may assume that the negation can also take scope above the subject QP.

Now consider the sentence in (56).

- (56) (Context: We have been talking about two students, Lynn and Jennifer.)
 If [_s more than three professors] do not recommend [_o the two students] to Toyota, John would be mad.

For the embedded clause, there are three logical scope orders, as listed in (57), provided that *the two students* takes scope above *more than three professors*.

- (57) a. negation > *the two* > *more than three*
 b. *the two* > negation > *more than three*
 c. *the two* > *more than three* > negation

However, what is actually available among the three scope orders is only (57c), confirming the generalization in (53a).

Let me elaborate this point a little bit more. If the embedded clause of (56) is interpreted with the scope order in (57a), the entire meaning of (56) should be that John will be mad if it is not the case that both Lynn and Jennifer are recommended by four professors (= Reading 1). If the interpretation of the embedded clause is with the scope order in (57b), then the whole meaning of (56) should be that John will be mad under the condition that for each of Lynn and Jennifer, it does not hold that more than three professors recommend her (= Reading 2). If its interpretation is with the scope order in (57c), the entire sentence should mean that John will be mad if each of Lynn and Jennifer has more than three professors that do not recommend her to Toyota (= Reading 3). Our intuition is that Reading 3 is possible, but not Reading 1 or 2.

To substantiate the intuition truth-conditionally, let us consider the situations in (58).

- (58) a. Situation 1

Regarding Lynn, four professors recommended her, but four professors refused to recommend. Regarding Jennifer, five professors recommended her, but four professors refused to recommend.

b. Situation 2

Regarding Lynn, one professor recommended her, but two professors refused to recommend. Regarding Jennifer, two professors recommended her, but one professor refused to recommend.

These situations differentiate Reading 3 from Readings 1 & 2. In Situation 1, John would be mad under Reading 3, but not under Reading 1 & 2. In Situation 2, on the other hand, John would be mad under Readings 1 & 2, but not under Reading 3. The fact is that when (56) is uttered, John is mad in Situation 1, but not in Situation 2, substantiating our intuition that (56) gives rise to Reading 3, but not Reading 1 or 2.

I maintain that whenever $WSR\langle QP_{Obj}, QP_{Sub}\rangle$ obtains in the basic order (i.e., no matter what kinds of QPs are used for the QP_{Obj} and the QP_{Sub}), the verbal negation must take scope below both the QP_{Obj} and the QP_{Sub} . Here I supply two more examples to further illustrate the generalization.

- (59) a Since [_S more than three students] did not vote for [_O two professors], John must be mad.
- b. Contrary to our expectation, [_S more than three students] did not approach [_O every professors].

Japanese seems to work in the same way. In (60a) and (60b), for example, setting aside the scope interaction among the QPs, the negation can take scope above the subject

QP, and the object QP (cf. McGloin 1976 and Imani 1993).¹⁹ However, if the object QP takes scope above the subject QP, the negation must take scope below both QPs.

- (60) a. Mosi [_S hutariizyoo-no kyoozyu]-ga [_O subete-no gakusei]-o Toyota-ni
if two:more-GEN professor-NOM all-GEN student-ACC Toyota-DAT

suisensi-na-katta ra, John-wa hungaisuru daroo.
recommend-not-PAST if John-TOP get:mad probably

'If [_S two or more professors] do not recommend [_O every student] to Toyota, John would be mad.'

- b. [_S Sanninizyoo-no gakusei]-ga [_O rei-no hutari-no kyoozyu]-ni
three:more-GEN student-NOM the-GEN two-GEN professor-DAT

hanasikake-na-katta node, John-wa gakkarisiteiru daroo.
talk-not-PAST since John-TOP being:disappointed probably

'Since [_S three or more students] did not approach [_O the two professors], John must be disappointed.'

Unlike inverse scope readings, surface scope readings do not minimize the scope of a verbal negation. Consider the following sentence:

- (61) If [_S three professors] do not recommend [_O more than two students] to Toyota,
John would be mad.

Within the embedded clause in (61), there are three logical scope orders, as listed in (62), provided the subject QP takes wide scope with respect to the direct object QP.

- (62) a. negation > *three* > *more than two*
b. *three* > negation > *more than two*
c. *three* > *more than two* > negation

¹⁹ McGloin (1976) and Imani (1993) argue that the generalization maintained by Kuno (1980) and Takubo (1985) that the scope of a verbal negation is the verb itself does not hold, as far as conditional contexts are concerned.

As I will explain in detail below, all of the three scope orders seem to be available, confirming the generalization in (53b).

If the embedded clause in (61) is interpreted with the scope order in (62a), then the entire meaning of (61) should be that John will be mad if it is not the case that three professors each recommend more than two students to Toyota (= Reading 1). With the scope order in (62b), the whole meaning of (61) should be that John will be mad if there are three x s, x is a professor such that it is not the case that x recommend more than two students to Toyota (= Reading 2). With the scope order in (62c), the meaning of the whole sentence should be that John will be mad if there are three professors such that each of them has more than two students who he or she does not recommend to Toyota (= Reading 3). Our intuition is that (61) allows all of the readings.

To substantiate the intuition truth-conditionally, let us consider the three situations in (63).

(63) a. Situation 1

There are 3 and only 3 professors, A, B, and C.

A recommended 3 students and refused to recommend 3 students.

B recommended 3 students and refused to recommend 3 students.

C recommended 3 students and refused to recommend 3 students.

b. Situation 2

There are 6 and only 6 professors, A, B, C, D, E, and F.

A recommended 3 students and refused to recommend 1 student.

B recommended 3 students and refused to recommend 1 student.

C recommended 3 students and refused to recommend 1 student.

D recommended 2 students and refused to recommend 2 students.

E recommended 2 students and refused to recommend 2 students.

F recommended 2 students and refused to recommend 2 students.

c. Situation 3

There are 3 and only 3 professors, A, B, and C.

A recommended 2 students and refused to recommend 2 students.

B recommended 3 students and refused to recommend 1 student.

C recommended 3 students and refused to recommend 1 student.

In Situation 1, John must be mad under Reading 3, but not under Reading 1 or 2. In Situation 2, however, he should be mad under Reading 2, but not under Reading 1 or 3. In Situation 3, on the other hand, he must be mad under Reading 1, but not Reading 2 or 3. The fact seems to be that when (61) is uttered, John can be mad in all of the situations, substantiating the intuition that (61) gives rise to all of the readings.

A similar illustration can be provided with other types of QPs. Here I supply two additional examples.

- (64) a. Since [_S more than three students] did not present [_O two papers], John must be mad.
- b. Contrary to our expectation, [_S every student] did not approach [_O more than two professors].

Japanese also supports the generalization under discussion (i.e., when $WSR\langle QP_{Sub}, QP_{Obj} \rangle$ obtains in the basic order, the scope of the verbal negation is not limited to the verb itself), although a certain scope order that is possible in English seems not to be available. For example, consider the following sentences:

- (65) a. Mosi [_S subete-no kyoozyu]-ga [_O hutariizyoo-no gakusei]-o Toyota-ni
 if all-GEN professor-NOM two:more-GEN student-ACC Toyota-DAT
 suisensi-na-katta ra, John-wa hungaisuru daroo.
 recommend-not-PAST if John-TOP get:mad probably
 'If [_S every professor] does not recommend [_O two or more students] to Toyota,
 John would be mad.'
- b. [_S Goninizyoo-no gakusei]-ga [_O hutatu-no kasetu]-o happyoosi-na-katta
 five:more-GEN student-NOM two-GEN hypotheses-ACC present-not-PAST
 node, John-wa gakkarisiteiru daroo.
 since John-TOP being:disappointed probably
 'Since [_S five or more students] did not present [_O two hypotheses], John must
 be disappointed.'

In the embedded clauses of the examples in (65), there are three logically possible scope orders, provided the subject QP takes scope above the object QP. Among them, the *negation>subject>object* order and the *subject>object>negation* order are possible, although the *subject>negation>object* order is not.²⁰

We have thus confirmed that the generalizations in (53), repeated here, hold in both English and Japanese.

- (53) a. When $WSR\langle QP_{Obj}, QP_{Sub} \rangle$ obtains in the basic order in which the verb is negated, the scope of the verbal negation is limited to the verb itself.
- b. When $WSR\langle QP_{Sub}, QP_{Obj} \rangle$ obtains in the basic order in which the verb is negated, the scope of the verbal negation is not limited to the verb itself.

²⁰ I suspect that the contrast between English and Japanese regarding the absence or presence of the *subject>negation>object* order is derived from a fundamental difference between the two languages, namely the presence or absence of subject raising (cf. Fukui 1986, Kitagawa 1986, Kuroda 1988).

We have observed above that when $WSR\langle QP_{Obj}, QP_{Sub}\rangle$ obtains in the basic order, the verbal negation cannot take wide scope with respect to the QP_{Obj} or the QP_{Sub} . As illustrated in (66), it is also the case that when $WSR\langle QP_{Obj}, QP_{Sub}\rangle$ obtains in the basic order, the verbal negation fails to take wide scope with respect to another clause-mate QP that is not the QP_{Sub} or the QP_{Obj} , further confirming the generalization in (53a).

(66) a. (Context: We have been talking about two students, Lynn and Jennifer.)

If [_S more than three professors] do not recommend [_O the two students] to [_O four companies], John would be mad.

b. Since [_S some professors] did not introduce [_O every student] to [_O more than two companies], John should be mad.

(66a), for example, cannot be taken to mean that John would be mad under the condition that each of Lynn and Jennifer has more than three professors who fail to achieve the goal of recommending her to four companies. This indicates that when *the two students* takes scope above *more than three professors* in (66a), it is not possible for the negation to take scope below *the two students* and *more than three professors* but above *four companies*. The only available interpretation in the situation under discussion is that the negation scopes below all of the QPs; i.e., John would be mad under the condition that each of Lynn and Jennifer has more than three professors who refused to recommend her and four companies to whom she was not recommended.

The same point can be made with Japanese examples. In the examples in (67), for instance, when the direct object QP or the indirect object QP takes scope above the subject QP, the other object QP must also take scope above the negation.

(67) a. Mosi [_S hutariizyoo-no kyoozyu]-ga [_O subete-no gakusei]-o [_O yottu-no
if two:more-GEN professor-NOM all-GEN student-ACC four-GEN

kaisya]-ni suisensi-na-katta ra, John-wa hungaisuru daroo.
 company-DAT recommend-not-PAST if John-TOP get:mad probably

'If [_S two or more professors] do not recommend [_O every student] to [_O four companies], John would be mad.'

- b. [_S Dareka]-ga [_O rei-no hutari-no gakusei]-ni [_O mittuizyoo-no kaisya]-o
 someone-NOM the-GEN two-GEN student-DAT three:more-GEN company-ACC

syookaisi-na-katta node John-wa hungaisiteiru daroo.
 introduce-not-PAST since John-TOP being:mad probably

'Since [_S someone] did not introduce [_O three or more companies] to [_O the two students], John must be mad.'

2.3. Summary

The generalizations that have emerged above are summarized in (68).

- (68) a. $WSR\langle QP_{Obj}, QP_{Sub} \rangle$ obtains in the basic order only if all of the conditions, (i)-(iii), are met.²¹
- b. $WSR\langle QP_{Sub}, QP_{Obj} \rangle$ obtains in the basic order even if it is not the case that all of the conditions, (i)-(iii), are met.
- i. The speaker refers to a specific group with the QP taking wide scope.
 - ii. If there is a QP α that is not the QP_{Sub} or the QP_{Obj} , or a potential dependent term β , then the QP taking narrow scope does not take wide scope with respect to α or bind β .
 - iii. If the verb is negated, the scope of the verbal negation is limited to the verb itself.

²¹ But see FN 7.

In the next chapter, I will provide a theoretical characterization for the generalizations in (68). In particular, I will argue that surface scope readings can be considered as emerging through LF compositional computation while inverse scope readings cannot. The characteristics associated with inverse scope readings will thus turn out to be those of an extra-grammatical operation.