

Scrambling and Control

Yuji Takano

This article argues for two points: that scrambling out of a control clause patterns with scrambling out of a finite clause and that obligatory control is derived by movement of the controller. The argument is based on hitherto unnoticed facts about binding effects with scrambling out of a control clause in Japanese. It is proposed that those facts can only be accounted for by looking at an interaction of long-distance scrambling and movement of the controller. It is also shown that the proposal has important consequences for the nature of scrambling, pronominal variable binding, and subject control.

Keywords: control, Japanese, quantifier scope, scrambling, variable binding

This article is concerned with the nature of scrambling and control. It is well known that (Japanese) scrambling has properties that are apparently not shared by other kinds of movement. Therefore, much work has been done on this topic and many proposals have been made to account for those properties (see, e.g., Bošković 2004, Bošković and Takahashi 1998, Fukui 1986, 1993, Grewendorf and Sabel 1999, Kawamura 2004, Kitahara 2002, Ko 2007, Kuroda 1988, Miyagawa 1997, 2005, 2006, Nemoto 1993, Nishigauchi 2002, Oka 1989, Saito 1985, 1989, 1992, 2003, 2005, Saito and Fukui 1998, Sauerland 1999, Tada 1990, 1993, Takano 1995, 1998, Yamashita 2006). For different reasons, control constructions have also received considerable attention in recent literature. Traditionally, obligatory control constructions were assumed to have a PRO in the subject of the complement clause that is coreferential with (controlled by) an element of the matrix clause. However, Hornstein (1999) has argued that obligatory control be analyzed as involving movement of the controller, PRO in the complement clause being replaced by a trace or copy of the controller. This movement theory of control has provoked much debate on the nature of control and movement (see, e.g., Bobaljik and Landau 2009, Boeckx 2000, Boeckx and Hornstein 2003, 2004, 2006, Bowers 2008, Culicover and Jackendoff 2001, 2005, 2006, Fujii 2006, Hornstein 1998, 1999, 2001, 2003, Jackendoff and Culicover 2003, Landau 2000, 2003, 2004, 2006, Polinsky and Potsdam 2006, Runner 2006).

Against this backdrop, this article aims to contribute to a better understanding of the nature of scrambling and control from a novel perspective, by looking at their interaction in Japanese.

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I will show that a close examination of scrambling out of an obligatory control clause (i.e., the complement clause of an obligatory control construction) in Japanese reveals interesting asymmetries in binding effects that have previously gone unnoticed. I will propose that these newly discovered facts can be accounted for only if the following two claims hold: (a) unlike the previous view to the contrary, scrambling out of an obligatory control clause behaves exactly like scrambling out of a finite clause, and (b) obligatory control involves movement of the controller. I will also show that this proposal has important consequences for other issues related to the properties of scrambling, pronominal variable binding, and subject control.

This article is organized as follows. In section 1, I present previously unnoticed facts about binding effects with scrambling out of a control clause in Japanese. In section 2, I propose an analysis of those facts that relies crucially on the two claims mentioned above. In section 3, I discuss other issues directly related to the main proposal of this article. Finally, in section 4, I offer conclusions.

1 The Puzzle: Scrambling out of a Control Clause in Japanese

It is well known that there are asymmetries between clause-internal and long-distance scrambling in Japanese (Saito 1992, Tada 1990, 1993; see also Mahajan 1990 for the same facts in Hindi). The following examples show that a pronominal element contained in the subject cannot be bound by a quantificational phrase (QP) in the object:¹

- (1) a. *Soko_i-no sotugyoosei-ga mittu-izyoo-no daigaku_i-ni syutugansita.
 it-GEN graduate-NOM three-or.more-GEN university-DAT applied
 ‘Their graduates applied to three or more universities.’
 b. *Soko_i-no syain-ga mittu-izyoo-no kaisya_i-o tyoosasita.
 it-GEN employee-NOM three-or.more-GEN company-ACC investigated
 ‘Their employees investigated three or more companies.’

Thus, example (1a) cannot be interpreted as ‘There are three or more x, x a university, such that someone who graduated from x applied to x’. Similarly, example (1b) cannot receive the interpretation ‘There are three or more x, x a company, such that an employee of x investigated x’. These are typical cases of weak crossover effects in Japanese.² In contrast, the intended bound variable interpretation becomes possible when the object QP scrambles to the front of the sentence.

- (2) a. Mittu-izyoo-no daigaku_i-ni soko_i-no sotugyoosei-ga syutugansita.
 three-or.more-GEN university-DAT it-GEN graduate-NOM applied

¹ A few words about the Japanese examples are in order. First, in this article I use *soko* as a pronominal element to be bound by a QP. *Soko* literally means ‘that place’, but I gloss it as ‘it’ for ease of exposition. Second, following Hoji (2003), I avoid using QPs like *daremo* ‘everyone’ and *subete* ‘all’ that can be used to refer to a specific group of entities. Hoji points out that use of such QPs obscures judgment on bound variable interpretation in Japanese.

² If the QP is the subject and the pronominal is contained in the object, the QP can bind the pronominal.

(i) Mittu-izyoo-no daigaku_i-ga soko_i-no sotugyoosei-o saiyoosita.
 three-or.more-GEN university-NOM it-GEN graduate-ACC employed
 ‘Three or more universities employed their graduates.’

This example permits a bound variable interpretation for *soko*, so that it can be interpreted as ‘There are three or more x, x a university, such that x employed someone who graduated from x’.

- b. Mittu-izyoo-no kaisya_i-o soko_i-no syain-ga tyoosasita.
 three-or.more-GEN company-ACC it-GEN employee-NOM investigated

A standard approach to the facts in (1) and (2) is to appeal to a condition on pronominal variable binding to the effect that a pronominal needs to be c-commanded by a QP if the former is to be bound by the latter. Given this condition, the contrast between (1) and (2) follows since in (1) the object QP does not c-command the pronominal, whereas in (2) it does, because of scrambling. In this way, clause-internal scrambling has the effect of making variable binding possible.

Long-distance scrambling (i.e., scrambling out of a clause) does not show the same effects. The examples in (3), without scrambling, do not permit a bound variable interpretation, as expected.

- (3) a. *Soko_i-no sotugyoosei-ga Aya-ni [Ken-ga mittu-izyoo-no daigaku_i-ni
 it-GEN graduate-NOM Aya-DAT Ken-NOM three-or.more-GEN university-DAT
 syutugansita to] itta.
 applied that told
 ‘Their graduates told Aya that Ken applied to three or more universities.’
 b. *Soko_i-no syain-ga Aya-ni [Ken-ga mittu-izyoo-no kaisya_i-o
 it-GEN employee-NOM Aya-DAT Ken-NOM three-or.more-GEN company-ACC
 tyoosasita to] itta.
 investigated that told
 ‘Their employees told Aya that Ken investigated three or more companies.’

What is surprising is the fact that the bound variable interpretation does not become possible even if the object QP of the embedded clause scrambles to the front of the matrix clause, as shown in (4).

- (4) a. *Mittu-izyoo-no daigaku_i-ni soko_i-no sotugyoosei-ga Aya-ni [Ken-ga
 three-or.more-GEN university-DAT it-GEN graduate-NOM Aya-DAT Ken-NOM
 syutugansita to] itta.
 applied that told
 b. *Mittu-izyoo-no kaisya_i-o soko_i-no syain-ga Aya-ni [Ken-ga
 three-or.more-GEN company-ACC it-GEN employee-NOM Aya-DAT Ken-NOM
 tyoosasita to] itta.
 investigated that told

The same pattern can be seen when the pronominal is contained in the indirect object, instead of the subject, of the matrix clause.

- (5) a. *Aya-ga soko_i-no sotugyoosei-ni [Ken-ga mittu-izyoo-no daigaku_i-ni
 Aya-NOM it-GEN graduate-DAT Ken-NOM three-or.more-GEN university-DAT
 syutugansita to] itta.
 applied that told
 ‘Aya told their graduates that Ken applied to three or more universities.’

- b. *Aya-ga soko_i-no syain-ni [Ken-ga mittu-izyoo-no kaisya_i-o
Aya-NOM it-GEN employee-DAT Ken-NOM three-or.more-GEN company-ACC
tyoosasita to] itta.
investigated that told
'Aya told their employees that Ken investigated three or more companies.'
- (6) a. *Mittu-izyoo-no daigaku_i-ni Aya-ga soko_i-no sotugyoosei-ni [Ken-ga
three-or.more-GEN university-DAT Aya-NOM it-GEN graduate-DAT Ken-NOM
syutugansita to] itta.
applied that told
- b. *Mittu-izyoo-no kaisya_i-o Aya-ga soko_i-no syain-ni [Ken-ga
three-or.more-GEN company-ACC Aya-NOM it-GEN employee-DAT Ken-NOM
tyoosasita to] itta.
investigated that told

These facts thus indicate clearly that long-distance scrambling does not produce new binding relations, in sharp contrast to clause-internal scrambling.

The examples in (3)–(6) have finite clauses as their embedded clauses. However, Mahajan (1989) pointed out that in Hindi, scrambling out of an infinitival clause exhibits a different pattern from scrambling out of a finite clause. On the basis of Mahajan's work on Hindi, Nemoto (1993) closely examines scrambling in obligatory control constructions in Japanese and concludes that the same holds in this language. Let us compare (7) and (8).

- (7) a. *Soko_i-no sotugyoosei-ga [mittu-izyoo-no daigaku_i-ni syutugansi-yoo to]
it-GEN graduate-NOM three-or.more-GEN university-DAT apply-will that
sita.
did
'Their graduates tried to apply to three or more universities.'
- b. *Soko_i-no syain-ga [mittu-izyoo-no kaisya_i-o tyoosasi-yoo to]
it-GEN employee-NOM three-or.more-GEN company-ACC investigate-will that
sita.
did
'Their employees tried to investigate three or more companies.'
- (8) a. Mittu-izyoo-no daigaku_i-ni soko_i-no sotugyoosei-ga [syutugansi-yoo to]
three-or.more-GEN university-DAT it-GEN graduate-NOM apply-will that
sita.
did
- b. Mittu-izyoo-no kaisya_i-o soko_i-no syain-ga [tyoosasi-yoo to]
three-or.more-GEN company-ACC it-GEN employee-NOM investigate-will that
sita.
did

The examples in (7) are subject control constructions. As expected, the pronominal contained in the matrix subject cannot be bound by the embedded object QP. In contrast, the intended variable binding becomes possible when the object QP scrambles to the front of the matrix clause, as shown in (8). The contrast between (4) and (6) on the one hand and (8) on the other shows an asymmetry between the two types of long-distance scrambling: whereas scrambling out of a finite clause does not make variable binding possible, scrambling out of a control clause does, as Nemoto (1993) observes.

The same effects can be seen with object control constructions. Compare (9) with (10) and (11).

- (9) a. *Ken-ga soko_i-no sotugyoosei-ni [mittu-izyoo-no daigaku_i-ni
Ken-NOM it-GEN graduate-DAT three-or.more-GEN university-DAT
syutugansuru yoo(ni)] susumeta.³
apply C recommended
'Ken recommended to their graduates that they apply to three or more universities.'
- b. *Ken-ga soko_i-no syain-ni [mittu-izyoo-no kaisya_i-o
Ken-NOM it-GEN employee-DAT three-or.more-GEN company-ACC
tyoosasuru yoo(ni)] iraisita.
investigate C asked
'Ken asked their employees to investigate three or more companies.'
- (10) a. ?Mittu-izyoo-no daigaku_i-ni Ken-ga soko_i-no sotugyoosei-ni
three-or.more-GEN university-DAT Ken-NOM it-GEN graduate-DAT
[syutugansuru yoo(ni)] susumeta.
apply C recommended
- b. ?Mittu-izyoo-no kaisya_i-o Ken-ga soko_i-no syain-ni
three-or.more-GEN company-ACC Ken-NOM it-GEN employee-DAT
[tyoosasuru yoo(ni)] iraisita.
investigate C asked
- (11) a. ?Ken-ga mittu-izyoo-no daigaku_i-ni soko_i-no sotugyoosei-ni
Ken-NOM three-or.more-GEN university-DAT it-GEN graduate-DAT
[syutugansuru yoo(ni)] susumeta.
apply C recommended
- b. ?Ken-ga mittu-izyoo-no kaisya_i-o soko_i-no syain-ni
Ken-NOM three-or.more-GEN company-ACC it-GEN employee-DAT
[tyoosasuru yoo(ni)] iraisita.
investigate C asked

³ Following Uchibori (2000), I assume that *yoo(ni)* appearing at the end of the embedded clause of the object control construction is a complementizer. See Uchibori 2000 for detailed discussion and arguments in favor of this position.

The examples in (9) are object control constructions without scrambling and those in (10) and (11) are their variants with scrambling of the embedded object to the matrix clause, the difference between (10) and (11) lying in the landing site of scrambling. The bound variable reading is impossible in (9) but it is possible in (10) and (11).⁴ This is another indication that scrambling out of a control clause behaves differently from scrambling out of a finite clause.

These observations naturally lead to the generalization in (12).

(12) Scrambling out of a control clause patterns with clause-internal scrambling.

In fact, Nemoto (1993) tries to derive this generalization from the properties of control constructions and movement.

However, on closer inspection, we see that the situation is more complicated. Let us consider the cases in (13) and (14).

- (13) a. *Soko_i-no sotugyoosei-ga Ken-ni [mittu-izyoo-no daigaku_i-ni
it-GEN graduate-NOM Ken-DAT three-or.more-GEN university-DAT
syutugansuru yoo(ni)] susumeta.
apply C recommended
'Their graduates recommended to Ken that he apply to three or more universities.'
- b. *Soko_i-no syain-ga Ken-ni [mittu-izyoo-no kaisya_i-o
it-GEN employee-NOM Ken-DAT three-or.more-GEN company-ACC
tyoosasuru yoo(ni)] iraisita.
investigate C asked
'Their employees asked Ken to investigate three or more companies.'
- (14) a. ?*Mittu-izyoo-no daigaku_i-ni soko_i-no sotugyoosei-ga Ken-ni
three-or.more-GEN university-DAT it-GEN graduate-NOM Ken-DAT
[syutugansuru yoo(ni)] susumeta.
apply C recommended
- b. ?*Mittu-izyoo-no kaisya_i-o soko_i-no syain-ga Ken-ni
three-or.more-GEN company-ACC it-GEN employee-NOM Ken-DAT
[tyoosasuru yoo(ni)] iraisita.
investigate C asked

The cases in (14a–b) are scrambling variants of those in (13a–b), respectively. It is not surprising that the latter do not allow a bound variable interpretation. What is striking is that long-distance scrambling does not make the bound variable reading possible in (14), in contrast to what we saw

⁴ Nemoto (1993) judges examples like (10) and (11) to be fully acceptable on the bound variable reading. Although I find (10) and (11) slightly worse than (8), the important point is that (10) and (11) are much better than (4) and (6).

in (8)/(10)/(11).⁵ Given that the cases in (14), just like those in (8)/(10)/(11), involve scrambling out of a control clause, the contrast between the cases in (14) and the cases in (8)/(10)/(11) shows that the generalization in (12) is not correct.

The point can be strengthened by considering cases where the pronominal is contained in an adjunct belonging to the matrix clause.⁶ First of all, as in the case of (1) and (2), where the pronominal is contained in the subject, clause-internal scrambling of the object QP can make variable binding possible for a pronominal contained in an adjunct. The examples in (16) are scrambling variants of those in (15).

- (15) a. *Ken-ga soko_i-no sotugyoosei-no mae-de mittu-izyoo-no daigaku_i-ni
 Ken-NOM it-GEN graduate-GEN front-at three-or.more-GEN university-DAT
 denwasita.
 called
 ‘Ken called three or more universities in the presence of their graduates.’
- b. *Ken-ga soko_i-no syain-no mae-de mittu-izyoo-no kaisya_i-o
 Ken-NOM it-GEN employee-GEN front-at three-or.more-GEN company-ACC
 hihansita.
 criticized
 ‘Ken criticized three or more companies in the presence of their employees.’
- (16) a. Mittu-izyoo-no daigaku_i-ni Ken-ga soko_i-no sotugyoosei-no mae-de
 three-or.more-GEN university-DAT Ken-NOM it-GEN graduate-GEN front-at
 denwasita.
 called
- b. Mittu-izyoo-no kaisya_i-o Ken-ga soko_i-no syain-no mae-de
 three-or.more-GEN company-ACC Ken-NOM it-GEN employee-GEN front-at
 hihansita.
 criticized

Now consider cases involving control. The examples in (17) have a pronominal contained in an adjunct of the matrix clause and a QP object in the embedded control clause. They do not permit a bound variable interpretation for the pronominal.

⁵ As far as I know, the contrast between cases like (8)/(10)/(11) on the one hand and those like (14) on the other has gone unnoticed in the literature. Uchibori (2000) judges that there is no such contrast (but Uchibori uses *daremo* ‘everyone’ as a QP; see footnote 1). I consulted 14 speakers (all linguists), and 10 of them agreed with my judgment. Three speakers agreed that there is a contrast in the direction indicated here but did not find the bound variable interpretation in (14) to be as bad as I do. The remaining speaker found the bound variable interpretation to be impossible in all cases in (8), (10), (11), and (14). In any event, what is crucial is the fact that those speakers who detect a contrast between (8)/(10)/(11) and (14) all find (14) to be worse than (8)/(10)/(11), not the other way around. This is an important fact that calls for an account.

⁶ Thanks to Daiko Takahashi for bringing the relevance of such cases to my attention.

- (17) a. *Ken-ga soko_i-no sotugyoosei-no mae-de Yumi-ni [mittu-izyoo-no
Ken-NOM it-GEN graduate-GEN front-at Yumi-DAT three-or.more-GEN
daigaku_i-ni syutugansuru yoo(ni)] susumeta.
university-DAT apply C recommended
'Ken recommended to Yumi in the presence of their graduates that she apply to
three or more universities.'
- b. *Ken-ga soko_i-no syain-no mae-de Yumi-ni [mittu-izyoo-no
Ken-NOM it-GEN employee-GEN front-at Yumi-DAT three-or.more-GEN
kaisya_i-o tyoosasuru yoo(ni)] iraisita.
company-ACC investigate C asked
'Ken asked Yumi in the presence of their employees to investigate three or more
companies.'

When the object QP of the control clause scrambles to the matrix clause, the sentences in (18) result. They all disallow the intended bound variable interpretation, just like the examples in (14).

- (18) a. ?*Mittu-izyoo-no daigaku_i-ni Ken-ga soko_i-no sotugyoosei-no mae-de
three-or.more-GEN university-DAT Ken-NOM it-GEN graduate-GEN front-at
Yumi-ni [syutugansuru yoo(ni)] susumeta.
Yumi-DAT apply C recommended
- b. ?*Ken-ga mittu-izyoo-no daigaku_i-ni soko_i-no sotugyoosei-no mae-de
Ken-NOM three-or.more-GEN university-DAT it-GEN graduate-GEN front-at
Yumi-ni [syutugansuru yoo(ni)] susumeta.
Yumi-DAT apply C recommended
- c. ?*Mittu-izyoo-no kaisya_i-o Ken-ga soko_i-no syain-no mae-de
three-or.more-GEN company-ACC Ken-NOM it-GEN employee-GEN front-at
Yumi-ni [tyoosasuru yoo(ni)] iraisita.
Yumi-DAT investigate C asked
- d. ?*Ken-ga mittu-izyoo-no kaisya_i-o soko_i-no syain-no mae-de
Ken-NOM three-or.more-GEN company-ACC it-GEN employee-GEN front-at
Yumi-ni [tyoosasuru yoo(ni)] iraisita.
Yumi-DAT investigate C asked

The ill-formed status of the examples in (18) is unexpected under the generalization in (12).

Thus, the contrast between (8)/(10)/(11) on the one hand and (14)/(18) on the other undermines the generalization in (12) and requires a different account.

Notice that the presence of an obligatory control structure plays an essential role in making cases like (8)/(10)/(11) grammatical. If the embedded clause is finite and has a phonetically null subject coreferential with a matrix element, long-distance scrambling does not make a bound variable interpretation possible, as shown in (19).⁷

⁷ Some speakers seem to find (19) to be slightly better than (14)/(18), but worse than (8)/(10)/(11). I thank Jun Abe, Daiko Takahashi, and one of the reviewers for pointing this out to me.

- (19) a. ?*Mittu-izyoo-no daigaku_i-ni soko_i-no sotugyoosei_j-ga Ken-ni [pro_j
 three-or.more-GEN university-DAT it-GEN graduate-NOM Ken-DAT
 syutugansita to] itta.
 applied that said
 ‘Their graduates told Ken that they applied to three or more universities.’
- b. ?*Mittu-izyoo-no kaisya_i-o soko_i-no syain_j-ga Ken-ni [pro_j
 three-or.more-GEN company-ACC it-GEN employee-NOM Ken-DAT
 tyoosasita to] itta.
 investigated that said
 ‘Their employees told Ken that they investigated three or more companies.’

What about the control structure makes (8)/(10)/(11) grammatical, but not (14)/(18)? A close examination of the relevant examples reveals that the crucial factor distinguishing grammatical (8)/(10)/(11) from ungrammatical (14)/(18) seems to be the fact that the pronominal *soko* is contained in the controller in the former, but not in the latter. The correct generalization thus seems to be (20).

- (20) Scrambling out of a control clause makes variable binding possible only if the pronominal is contained in the controller.

Why does this generalization hold? In the next section, I will propose that (20) follows from an interaction between scrambling and movement of the controller under a movement theory of control.

2 Solving the Puzzle

I propose that the generalization in (20) can be derived if the following claims hold:

- (21) a. Scrambling out of a control clause patterns with scrambling out of a finite clause.
 b. Obligatory control is derived by movement of the controller.
 c. The relevant variable binding in (8)/(10)/(11) is licensed by clause-internal scrambling.

(21a) is an alternative to the generalization in (12). (21b) is a movement theory of control proposed (in different forms) by Bowers (1973, 2008), Hornstein (1998, 1999), and O’Neil (1995), and argued for in Boeckx 2000, Boeckx and Hornstein 2003, 2004, 2006, Fujii 2006, and Hornstein 2001, 2003. (21c) is a consequence of (21a) and (21b).

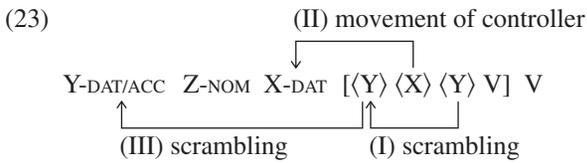
To see how this proposal works, let us consider the derivation of the examples in (8) shown in (22), where material surrounded by angled brackets indicates copies without phonetic realization.

- (22)
- | | | | | | | |
|-----------|-------|-----------------------------|--------------|----------------|----|---|
| | | (II) movement of controller | | | | |
| | | ↓ | ┌──────────┐ | | | |
| Y-DAT/ACC | X-NOM | [<Y> | <X> | <Y> | V] | V |
| | | └──────────┘ | | └──────────┘ | | |
| | | ↑ | | ↑ | | |
| | | (III) scrambling | | (I) scrambling | | |

The first important step of the derivation (step I) is scrambling of the embedded object Y within the control clause. This scrambling puts Y in a position c-commanding the subject X of the embedded clause. Under the movement theory of control, the controller originates from the subject of the embedded clause and moves to the matrix clause. Given this, the next step is movement of X to the matrix clause, in accordance with the movement theory of control (step II). Finally, Y scrambles to the matrix clause (step III).

Given (21a), the second scrambling (i.e., step III) has no effects on binding. On the other hand, the first scrambling (step I) is clause-internal scrambling and can affect binding. Therefore, step I of the derivation ensures that Y can bind the pronominal contained in X.⁸

The object control cases receive a similar analysis. Let us consider (23), which is a derivation for the examples in (10).



Here too, scrambling of Y within the control clause makes the relevant binding possible under the movement theory of control and further scrambling does not play any role with respect to binding.⁹

What is crucial in both (22) and (23) for the pronominal contained in X to be bound by Y is that long-distance scrambling is composed of shorter scramblings and that an intermediate scrambling within an embedded clause can produce new binding relations. That an intermediate scrambling within an embedded clause can produce new binding relations can be independently seen in cases like these:

- (24) a. *Ken-ga Aya-ni [soko_i-no sotugyoosei-ga mittu-izyoo-no daigaku_i-ni
 Ken-NOM Aya-DAT it-GEN graduate-NOM three-or.more-GEN university-DAT
 syutugansita to] itta.
 applied that told
 ‘Ken told Aya that their graduates applied to three or more universities.’

⁸ I assume a derivational approach to binding, according to which binding conditions are satisfied in the course of a derivation. See section 3.3 for related discussion.

⁹ In (22) and (23), Y moves past X and X moves past Y. One might think that this situation raises problems with minimality. However, it is well known that Japanese scrambling does not induce minimality effects (see, for example, Saito and Fukui 1998, Takano 1995, and Yamashita 2006 for discussion and specific proposals). Since the issue is not the main focus of this article, I simply assume this property of scrambling and do not attempt to explain it. See Takano 2009b for an analysis of the lack of minimality effects in (22) and (23) adopting Saito’s (2003, 2005) theory of scrambling.

- b. *Ken-ga Aya-ni [soko_i-no syain-ga mittu-izyoo-no kaisya_i-o
Ken-NOM Aya-DAT it-GEN employee-NOM three-or.more-GEN company-ACC
tyoosasita to] itta.
investigated that told
'Ken told Aya that their employees investigated three or more companies.'
- (25) a. Mittu-izyoo-no daigaku_i-ni Ken-ga Aya-ni [soko_i-no sotugyoosei-ga
three-or.more-GEN university-DAT Ken-NOM Aya-DAT it-GEN graduate-NOM
syutugansita to] itta.
applied that told
- b. Mittu-izyoo-no kaisya_i-o Ken-ga Aya-ni [soko_i-no syain-ga
three-or.more-GEN company-ACC Ken-NOM Aya-DAT it-GEN employee-NOM
tyoosasita to] itta.
investigated that told

In (24), the pronominal is contained in the embedded subject and the QP is an embedded object. In (25), the embedded object QP has undergone long-distance scrambling out of a finite clause. The pronominal cannot be bound by the QP in (24), but can be in (25). Since we know that scrambling out of a finite clause does not affect binding (see (4), (6), and (19)), what makes variable binding possible in (25) must be an intermediate step of long-distance scrambling, that is, scrambling within the embedded clause, on a par with step I in (22)/(23). Thus, the claim that an intermediate step of long-distance scrambling within an embedded clause can produce new binding relations is supported on independent grounds.

Note that on this analysis, scrambling within the control clause never puts the QP in a position c-commanding the pronominal in the case of (14) and (18), where the pronominal is not contained in the controller. As a result, variable binding is impossible in those cases. Therefore, this proposal argues for the movement theory of control since there would be no difference relevant to binding between the derivations of (8)/(10)/(11) and those of (14)/(18) under a nonmovement approach to control, according to which the controller is base-generated in the matrix clause and the subject of the control clause is an independent element (i.e., PRO rather than a trace or copy of the controller).

Note also that the proposed analysis predicts that scrambling of a QP out of a control clause will not license variable binding for a pronominal even if the pronominal is contained in a controller (thereby meeting the necessary condition in (20)), if the QP and the controller do not originate in the same clause.¹⁰ This prediction is borne out. Consider first the example in (26).

- (26) Ken-ga Aya-ni [Masao-ni [mittu-izyoo-no daigaku-ni syutugansuru
Ken-NOM Aya-DAT Masao-DAT three-or.more-GEN university-DAT apply
yoo(ni)] susumeru yoo(ni)] tanonda.
C recommend C asked
'Ken asked Aya to recommend to Masao that he apply to three or more universities.'

¹⁰ Thanks to Hiroyuki Ura for bringing this prediction to my attention.

This example has two embedded clauses, both of which are obligatory object control clauses. *Aya* and *Masao* function as controllers for the subjects of these embedded clauses. Although it is somewhat hard to process, because of center embedding, the example is acceptable. If we replace the controllers with a phrase containing a pronominal and scramble the QP object of the most deeply embedded clause to the front of the matrix clause, a contrast emerges with respect to the possibility of variable binding, depending on the position of the pronominal.

- (27) a. ?Mittu-izyoo-no daigaku_i-ni Ken-ga Aya-ni [soko_i-no sotugyoosei-ni
 three-or.more-GEN university-DAT Ken-NOM Aya-DAT it-GEN graduate-DAT
 [syutugansuru yoo(ni)] susumeru yoo(ni)] tanonda.
 apply C recommend C asked
 ‘Ken asked Aya to recommend to their graduates that they apply to three or more universities.’
- b. ?*Mittu-izyoo-no daigaku_i-ni Ken-ga soko_i-no sotugyoosei-ni [Aya-ni
 three-or.more-GEN university-DAT Ken-NOM it-GEN graduate-DAT Aya-DAT
 [syutugansuru yoo(ni)] susumeru yoo(ni)] tanonda.
 apply C recommend C asked
 ‘Ken asked their graduates to recommend to Aya that she apply to three or more universities.’

The intended bound variable reading is better in (27a) than in (27b). This is exactly what we expect under the analysis proposed here. Under this analysis, scrambling of the QP can affect binding only inside the most deeply embedded clause and further scrambling has no effects on binding. In (27a), the phrase containing the pronominal is generated in the subject of the most deeply embedded clause (under the movement theory of control) and scrambling of the QP inside this clause thus has the effect of allowing the scrambled QP to bind the pronominal. By contrast, in (27b) the phrase containing the pronominal has no derivational relation with the most deeply embedded clause even though it is a controller for the clausal complement to the matrix verb. As a result, scrambling of the QP inside the most deeply embedded clause has no binding effects on the pronominal here.

The contrast in (27) strengthens the point made at the beginning of this section that it is not scrambling out of a control clause that licenses variable binding; rather, only clause-internal scrambling can do so. Hence, it provides additional support for the present proposal.

3 Further Consequences

The proposal made in the previous section has further consequences for related theoretical issues. I will discuss issues related to the nature of scrambling, binding and scope, and subject control.

3.1 Uniform versus Nonuniform Theories of Scrambling

One important claim in the present proposal is that scrambling out of a control clause can never license variable binding. Why should this be the case? Given the claim in (21a), this question

boils down to the question of why scrambling out of a clause cannot license variable binding. The proposed analysis of scrambling out of a control clause has an important consequence for this well-known issue.

One possible answer to the question of why scrambling out of a clause cannot license variable binding is (28).

(28) Scrambling out of a clause is necessarily \bar{A} -movement.

This hypothesis has in fact been quite influential and entertained by many researchers (see in particular Mahajan 1990 and Miyagawa 2005, 2006). One strong motivation for this hypothesis comes from a contrast like that in (29).

- (29) a. *Who_i did his_i mother call *t*?
 b. Every boy_i seems to his_i mother [*t* to be smart].

The example in (29a) shows a weak crossover effect. The point relevant here is that *his* cannot be interpreted as a variable bound by *who* even though overt movement has put *who* in a position that c-commands *his*. In contrast, *his* can be interpreted as bound by *every boy* in (29b) owing to overt movement of *every boy* (compare (29b) with **It seems to his_i mother that every boy_i is smart*, which does not permit a bound variable interpretation for *his*). The difference between (29a) and (29b) is usually attributed to the nature of movement: whereas A-movement can license variable binding, \bar{A} -movement cannot. Along the same lines, scrambling out of a clause cannot license variable binding if such scrambling is necessarily \bar{A} -movement.

Note that approaches relying on (28) assume crucially that whereas clause-internal scrambling can be A-movement (as in (2)), long-distance scrambling is necessarily \bar{A} -movement.¹¹ Those approaches typically attribute the differential properties of clause-internal and long-distance scrambling to the properties of their landing sites; namely, clause-internal scrambling can target a specifier position, but long-distance scrambling must target an adjoined position. The scrambled phrase can thus be in an A-position in the former, but in an \bar{A} -position in the latter. Given that this view claims that there are two different types of scrambling, one involving movement to a specifier and another involving adjunction, we might call it a nonuniform theory of scrambling.

Given the present proposal, the nonuniform theory cannot be the answer to the question of why scrambling out of a clause does not affect binding. Recall that the analysis of (8)/(10)/(11) presented above relies crucially on the movement theory of control. More specifically, movement of X in (22) and (23) plays a crucial role in making binding inside the embedded clause possible. Note that here X moves from the embedded clause to a θ -position in the matrix clause. Given that θ -positions are considered to be typical A-positions, this is A-movement. This means that

¹¹ Cases like (i) show that clause-internal scrambling can also be \bar{A} -movement.

(i) Zibunzisin_i-o Ken_i-ga semeta.
 self-ACC Ken-NOM blamed
 'Ken blamed himself.'

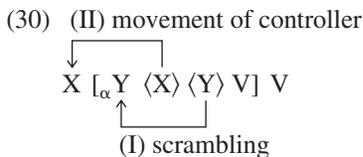
If clause-internal scrambling were always A-movement, (i) would violate Condition C, contrary to fact.

A-movement out of a control clause is possible. Therefore, scrambling out of a control clause should be able to be A-movement and the nonuniform theory of scrambling makes the wrong prediction that scrambling out of a control clause would license variable binding.

The same problem does not arise under a uniform theory of scrambling, which treats clause-internal and long-distance scrambling in the same way with respect to their landing sites and attempts to account for differences between the two, including the one regarding the possibility of licensing variable binding, without appealing to (28). Such theories have been proposed in different forms by Abe (1993), Bošković and Takahashi (1998), Saito (1992, 2003, 2005), and Tada (1990, 1993). The present proposal is thus compatible with the uniform theories of scrambling, whereas it clearly argues against nonuniform theories (see Takano 2009a,b for discussion of Saito's (2003, 2005) uniform theory and its consequences in this context).

3.2 *Illicit Scrambling*

Recall that the present analysis of (8)/(10)/(11) rests crucially on the interaction of (clause-internal) scrambling and movement of the controller under the movement theory of control. The relevant part of the analysis is repeated in (30).



I proposed that clause-internal scrambling of the embedded object Y makes it possible for Y to bind a pronominal contained in the controller X, which moves from within the embedded clause to the matrix clause. In the relevant examples, Y undergoes further scrambling out of the embedded clause, so that it ends up appearing in front of X in the matrix clause. A question arises here.¹² What happens if Y does not scramble further out of the embedded clause? The resulting sentence would have the word order X-Y-V-V, which corresponds to the order in (7a), for instance, repeated here.

- (7) a. *Soko_i-no sotugyoosei-ga [mittu-izyoo-no daigaku_i-ni syutugansi-yoo to] it-GEN graduate-NOM three-or.more-GEN university-DAT apply-will that sita. did
 'Their graduates tried to apply to three or more universities.'

When analyzing (7a), we always assume that it does not involve scrambling of the embedded object. In that way, we can capture the ungrammaticality of this example. But if the derivation in (30) (with no further scrambling of Y) were available, (7a) would be as acceptable as (8), repeated here, contrary to fact.

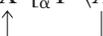
¹² Kensuke Takita (pers. comm.) first brought this question to my attention.

- (8) a. Mittu-izyoo-no daigaku_i-ni soko_i-no sotugyoosei-ga [syutugansi-yoo to]
 three-or.more-GEN university-DAT it-GEN graduate-NOM apply-will that
 sita.
 did

We thus need to exclude this derivation.

In fact, the problem is more general. Problems of the same nature arise independently of the analysis of the control cases in question. Consider the following derivation for a simplex sentence:

- (31) a. [_αY X ⟨Y⟩ V]

 b. X [_αY ⟨X⟩ ⟨Y⟩ V]


In (31a), the object Y scrambles over the subject X; and in (31b), the subject X scrambles over the scrambled Y. This derivation results in the word order X-Y-V, which is identical to an SOV sentence without scrambling. If this derivation were possible, cases like (1a), repeated here, would be acceptable (Y could bind into X because of the step in (31a)).

- (1) a. *Soko_i-no sotugyoosei-ga mittu-izyoo-no daigaku_i-ni syutugansita.
 it-GEN graduate-NOM three-or.more-GEN university-DAT applied
 'Their graduates applied to three or more universities.'

Derivations like that in (31) are a long-standing problem for any analysis of Japanese scrambling, and a number of proposals have been made to deal with this problem. For example, Saito (1985) proposes that the step in (31b) is disallowed because nominative phrases cannot scramble in Japanese. If so, the problem for (1a) does not arise. However, this account does not cover the problem with the derivation in (30), where the movement of X is guaranteed by the movement theory of control.

Another approach to the problem in question has been suggested by Hoji (1985). He puts forth the following condition:

- (32) A syntactic adjunction operation cannot apply if it does not change the order of the overt lexical string. (Hoji 1985:352)

Assuming that scrambling is an adjunction operation, Hoji claims that this condition blocks the applications of scrambling in (31) since these applications do not change the original word order of the subject and the object.¹³ This approach can be extended to cover the problem with (30) if we interpret Hoji's condition as stating that if the surface form of a given sentence corresponds

¹³ Hoji (1985:367) suggests that the condition in (32) may fall outside formal grammar and belong to a domain of parsing. Abe (1993) and I (Takano 1992) have proposed deriving Hoji's condition from economy of derivation. See also Takano 2007 for a different approach capitalizing on the properties of the optional assignment of a feature that triggers scrambling.

to a string that can be analyzed without scrambling, the sentence is indeed understood to involve no scrambling. Since the sentence in (7a) can be analyzed without scrambling, the derivation in (30) with ‘‘superfluous scrambling’’ is blocked.

Recently, Ko (2007) has proposed a different line of analysis that excludes derivations like (30) and (31). On her proposal, the derivation in (31) is blocked by Fox and Pesetsky’s (2003) Linearization Preservation, given in (33), where *Spell-Out domain* refers to a syntactic constituent relevant to determining the linear order of syntactic elements.¹⁴

- (33) The linear ordering of syntactic units is affected by Merge and Move *within* a Spell-out Domain, but is fixed once and for all at the end of each Spell-out Domain. (Fox and Pesetsky 2003:1)

The basic idea here is that linear order is determined cyclically and that linear order established at the end of a given Spell-Out domain must be preserved at the end of each later Spell-Out domain. Let us imagine that α in (31a) is a Spell-Out domain.¹⁵ At the end of this Spell-Out domain, the order between X and Y is fixed in such a way that Y precedes X. By Linearization Preservation, this order between X and Y must be preserved at later Spell-Out domains. Therefore, the derivation in (31b) is disallowed since it changes the order between X and Y fixed at the earlier Spell-Out domain. Thus, the sentence in (1a) cannot have the derivation in (31).¹⁶ This approach can account for the illicit derivation in (30) as well. Suppose that α in (30) is a Spell-Out domain. Then the order between X and Y is fixed there; that is, Y precedes X. But this order is not preserved at a later Spell-Out domain if X moves over Y and Y does not move, as in (30).

¹⁴ Ko’s (2007) proposal is intended to account for facts related to quantifier float in Korean (and Japanese), but it can readily be extended to the cases at hand. See also Takita 2008 for a proposal that Linearization Preservation can account for scope effects with scrambling in Japanese.

¹⁵ Ko (2007) claims that vP and CP are Spell-Out domains for Korean and Japanese. The exact identity of Spell-Out domains does not concern us here.

¹⁶ Consider the following problem, which was originally discussed by Takita (2008) in the context of scope interactions of QPs in Japanese:

- (i) a. [α X Y V]
 b. Y [α X ⟨Y⟩ V]
 c. X Y [α ⟨X⟩ ⟨Y⟩ V]

At the end of the Spell-Out domain α , X precedes Y. Then Y scrambles out of α , followed by scrambling of X. The resulting order between X and Y in (ic) preserves their order determined at α in (ia). So this derivation satisfies Linearization Preservation. If the step in (ib) guaranteed Y’s binding into X, (1a) would allow variable binding with this derivation. The fact that it does not suggests that Y can bind into X only within α . There are a number of conceivable ways to ensure this. Two possibilities were suggested to me by Mamoru Saito. Suppose α is a domain relevant to interpretation (as well as a Spell-Out domain). Following Chomsky (2000, 2001), let us call such a domain a phase. We might then claim that binding relations are established only at the end of each phase. On this view, Y does not bind into X in the derivation in (i) because Y does not c-command X at the end of phase α in (ia) or at the end of the next higher phase in (ic) (here we assume a derivational approach to binding in which only chain heads enter into binding, so that the copies of X and Y inside α in (ic) are irrelevant; note also that this analysis needs to allow a QP to bind into a lower phase, as pointed out by a reviewer, given cases like *Everyone_i thinks that his_i father is smart*). Alternatively, we might entertain the hypothesis that (lack of) binding relations established at a given phase must be preserved throughout a derivation. On this approach, Y does not bind into X at phase α in (ia) and this lack of a binding relation must be preserved throughout the derivation. As a result, scrambling of Y out of α has no effects on binding.

Thus, the derivation in (30) violates Linearization Preservation and hence (7a) cannot be derived in this way.¹⁷

As we have seen, both the approach invoking Hoji's (1985) condition in (32) and the approach appealing to Linearization Preservation can exclude the undesired derivations in (30) and (31). The two approaches are equal on this count. However, there is empirical evidence for the second approach based on binding effects with scrambling out of a control clause.

Observe first the following case (NC = nominal complementizer):

- (34) ?Mittu-izyoo-no daigaku_i-ni soko_i-no sotugyoosei-ga kotosi [rainen
 three-or.more-GEN university-DAT it-GEN graduate-NOM this.year next.year
 syutugansuru koto]-o kessinsita.
 apply NC-ACC decided
 'Their graduates decided this year to apply to three or more universities next year.'

This case involves scrambling of the embedded object out of a control clause, which makes it possible for the scrambled object to bind into the matrix subject, which is a controller. On the present analysis, the acceptability of variable binding indicates that the embedded object first scrambled within the embedded clause. Now observe the case in (35).¹⁸

- (35) ?*Soko_i-no sotugyoosei-ga mittu-izyoo-no daigaku_i-ni kotosi [rainen
 it-GEN graduate-NOM three-or.more-GEN university-DAT this.year next.year
 syutugansuru koto]-o kessinsita.
 apply NC-ACC decided

Here the embedded object scrambles out of the control clause to a position between the matrix subject and the matrix adjunct. Unlike the example in (34), this example does not permit a bound variable interpretation for the pronominal contained in the matrix subject (though scrambling of the embedded object itself is fine, as evidenced by the fact that (35) is grammatical if the matrix subject is replaced by *Ken*).

The fact that (35) does not allow a bound variable interpretation poses a serious problem for the approach that blocks the derivation in (30) by appealing to (32). Notice that in the case of (35), the embedded object scrambles to the matrix clause, as is clearly indicated by its position in front of the matrix adjunct. Since this scrambling of the embedded object does affect word order, from the perspective of (32), it should be allowed with the intermediate step in (30). But then the impossibility of the bound variable reading cannot be accounted for.

In contrast, the derivation in (30) is correctly excluded for (35) under the approach invoking Linearization Preservation. On this approach, the order between X and Y determined at α in (30), namely, the embedded object preceding the controller, must be preserved. But in (35) the controller precedes the embedded object, violating Linearization Preservation. Therefore, (35) cannot involve the derivation in (30).

¹⁷ The same reservation applies here as in the previous footnote.

¹⁸ I am indebted to Norvin Richards for this example.

These considerations show that scrambling out of a control clause provides independent empirical evidence for an approach like Ko's (2007) that constrains the application of scrambling with Linearization Preservation.¹⁹

3.3 Variable Binding and Quantifier Scope

We have seen that the examples in (10) and (11), repeated in (36) and (37), allow the pronominals to be bound by the scrambled QPs.

- (36) a. ?Mittu-izyoo-no daigaku_i-ni Ken-ga soko_i-no sotugyoosei-ni
 three-or.more-GEN university-DAT Ken-NOM it-GEN graduate-DAT
 [syutugansuru yoo(ni)] susumeta.
 apply C recommended
 'Ken recommended to their graduates that they apply to three or more universities.'
- b. ?Mittu-izyoo-no kaisya_i-o Ken-ga soko_i-no syain-ni
 three-or.more-GEN company-ACC Ken-NOM it-GEN employee-DAT
 [tyoosasuru yoo(ni)] iraisita.
 investigate C asked
 'Ken asked their employees to investigate three or more companies.'
- (37) a. ?Ken-ga mittu-izyoo-no daigaku_i-ni soko_i-no sotugyoosei-ni
 Ken-NOM three-or.more-GEN university-DAT it-GEN graduate-DAT
 [syutugansuru yoo(ni)] susumeta.
 apply C recommended
- b. ?Ken-ga mittu-izyoo-no kaisya_i-o soko_i-no syain-ni
 Ken-NOM three-or.more-GEN company-ACC it-GEN employee-DAT
 [tyoosasuru yoo(ni)] iraisita.
 investigate C asked

In addition to the availability of binding, which we have already accounted for, there is another fact about these examples that needs to be accounted for. To see this, let us consider the examples in (38) and (39).

- (38) a. Ken-ga Aya-ni [mittu-izyoo-no daigaku-ni syutugansuru yoo(ni)]
 Ken-NOM Aya-DAT three-or.more-GEN university-DAT apply C
 susumeta.
 recommended
 'Ken recommended to Aya that she apply to three or more universities.'

¹⁹ Juan Uriagereka (pers. comm.) raises a concern about introducing into the grammar a principle like Linearization Preservation that implies that language has "counters." A reviewer also points out that ordering statements on which Linearization Preservation is based raise an issue with respect to the Inclusiveness Condition (see Chomsky 2000 for this condition). I agree that these are important issues bearing on the exact nature of the computational system of human language, but at present I have no better account of the facts in question than the one invoking Linearization Preservation.

- b. Ken-ga Aya-ni [mittu-izyoo-no kaisya-o tyoosasuru yoo(ni)] iraisita.
 Ken-NOM Aya-DAT three-or.more-GEN company-ACC investigate C asked
 'Ken asked Aya to investigate three or more companies.'
- (39) a. Mittu-izyoo-no daigaku-ni Ken-ga Aya-ni [syutugansuru yoo(ni)]
 three-or.more-GEN university-DAT Ken-NOM Aya-DAT apply C
 susumeta.
 recommended
- b. Mittu-izyoo-no kaisya-o Ken-ga Aya-ni [tyoosasuru yoo(ni)] iraisita.
 three-or.more-GEN company-ACC Ken-NOM Aya-DAT investigate C asked

(39a–b) are scrambling counterparts of (38a–b), respectively. Unlike the examples in (36) and (37), these examples do not involve variable binding. The puzzling fact can be seen when we consider the scope of the QP in these examples. The examples in (38) and (39) allow the QP to have scope over the matrix clause (wide scope) as well as the embedded clause (narrow scope). Thus, both (38a) and (39a) are ambiguous and can be interpreted as in (40a) and (40b).

- (40) a. There are three or more x , x a university, such that Ken recommended to Aya that she apply to x . (wide scope reading)
 b. Ken recommended to Aya that she apply to three or more arbitrary universities. (narrow scope reading)

The same ambiguity obtains in (38b) and (39b). The examples in (36) and (37) contrast sharply in this respect: they permit only the wide scope reading of the QP. This is the fact that calls for an explanation.

The fact that the examples in (36) and (37) have only the wide scope reading of the QP is apparently puzzling because on the present analysis, the QP binds the pronominal inside the embedded clause. This indicates that the establishment of a binding relation does not guarantee the scope of the binder. Indeed, the relevant fact in (36) and (37) tells us something very important about the nature of variable binding and quantifier scope.

From the point of view of logical form, it is clear that for a pronominal to be interpreted as a variable bound by an operator, the pronominal must be in the scope of the operator. This can be seen in the simple example in (41).

- (41) a. Every boy_{*i*} called his_{*i*} mother.
 b. For every x , x a boy, x called x 's mother.

On the intended bound reading, the sentence in (41a) is interpreted as in (41b). The interpretation in (41b) shows that the pronominal variable (x in x 's mother) is in the scope of the universal quantifier functioning as an operator. If a pronominal is not in the scope of an operator, it simply cannot be interpreted as a bound variable, as can be seen in (42), where the QP *every boy* takes scope only over the embedded clause.

- (42) *His_{*i*} mother thinks that every boy_{*i*} is smart.

Let us call this property the *scope condition* on pronominal variable binding.

It is also well known that there is an additional requirement on pronominal variable binding. Observe (43).

- (43) a. *His_i mother called every boy_i.
 b. *Who_i did his_i mother call?

The operators *every boy* and *who* in (43) take scope over the entire clause and so *his* falls within their scope. Nevertheless, variable binding is impossible in these cases. A standard approach to this problem is to assume that pronominal variable binding requires A-binding—more specifically, that pronominals must be A-bound by antecedents that function as operators. Since *his* is not A-bound by *every boy* and *who* in (43), it cannot be interpreted as a bound variable. Let us call this second requirement on pronominal variable binding the *A-binding condition*.

The scope condition and the A-binding condition interact in an interesting way in cases like (44a–b), discussed by Hornstein (1998).

- (44) a. Someone seems to Bill [to be reviewing every report].
 b. Someone_i seems to his_i boss [to be reviewing every report].

Hornstein points out that whereas (44a) permits *someone* to be interpreted as taking scope either over or under *every report*, (44b) permits only wide scope for *someone*. Hornstein observes that the lack of ambiguity in (44b) is due to *someone* binding *his* in the matrix clause, which makes it necessary for *someone* to be interpreted in the matrix clause (thus taking scope over *every report*). Note that the fact that *every report* cannot take scope over *someone* in (44b) indicates that the wide scope reading for *every report* in (44a) is possible not because *every report* takes scope over the matrix clause but because *someone* takes scope inside the embedded clause.

The available interpretation of (44b) satisfies both the scope condition and the A-binding condition: *his* is in the scope of *someone* and is A-bound by *someone*. By contrast, if *someone* takes scope in the embedded clause, it violates the scope condition since in that case, *his* is not in the scope of the operator.

Hornstein (1998) takes the observed restriction on the interpretation in (44b) to indicate that only one chain member enters into interpretation (thus arguing for eliminating the concept of chains in syntax). Assuming both the A-binding condition and the scope condition to be conditions on the interpretive interface, Hornstein claims that if more than one member of a chain could enter into interpretation, (44b) would permit a reading on which the copy of *someone* in the matrix clause in (45) binds *his* and the one in the embedded clause takes scope within the embedded clause, scoping under *every report*.

- (45) Someone seems to his boss [(someone) to be reviewing every report].

Brody (1999, 2001) argues against Hornstein's account, claiming that the interpretive fact in (44b) is consistent with the view that more than one chain member enters into interpretation (thus defending the position that chains exist in syntax). Brody points out that the unavailable

reading is excluded because it leads to a contradiction: *someone* takes scope both over *his* (because of A-binding) and under it (because of scoping inside the embedded clause).

Here I remain neutral about whether chains exist or not. Instead, I would like to point out that the available interpretations in (36) and (37) imply something very important about the nature of pronominal variable binding. Let us look at the schematic structure of (36a–b) shown in (46), where different copies of the same element are assigned different numbers for ease of reference.

(46) QP3 Subj X2 [\langle QP2 \rangle \langle X1 \rangle \langle QP1 \rangle V] V

Recall that QP binds a pronominal contained in X and that on this bound variable interpretation, the structure in (46) yields only the wide scope reading of the QP. This fact indicates two important things. First, it indicates that the scope of QP is determined independently of scrambling. Recall that QP3 does not affect binding, which suggests strongly that it does not enter into interpretation. This means that the wide scope of QP is not due to scrambling from QP2 to QP3. In fact, the wide scope reading of QP is possible even when QP stays inside the embedded clause, as evidenced by (38). So something like QR is responsible for the wide scope of QP in (46). The second important point that (46) indicates is that different chain members satisfy the A-binding condition and the scope condition. In (46), X contains a pronominal that needs to satisfy the two conditions. On the analysis proposed here, the A-binding condition is met by the pronominal contained in X1 being bound by QP2. On the other hand, the scope condition is met by the pronominal contained in X2 falling within the scope of QP (which takes scope over the matrix clause by an operation like QR).

The second point apparently contradicts Hornstein's (1998) claim that only one chain member enters into interpretation (in (46) both X1 and X2 play a role in satisfying the two conditions on pronominal variable binding). The problem arises if the two conditions on pronominal variable binding are both conditions on interpretation, applied at the interpretive interface, as Hornstein assumes. However, there is reason to doubt this assumption. In (46), as we have seen, the pronominal contained in X1 satisfies the A-binding condition. If both the A-binding condition and the scope condition are conditions on interpretation, it is not clear why the same pronominal contained in X1 cannot satisfy the scope condition as well by falling within the scope of QP, which is the embedded clause. This strongly suggests that there is a fundamental asymmetry between the two conditions that allows the A-binding condition to refer to X1, but forces the scope condition to refer to X2.

In fact, such an asymmetrical view of the two conditions has been proposed by Saito (2005: 350–351). In discussing the proper interpretation of reciprocals, which he takes to be a form of bound variable, Saito proposes (47) (see also Hicks 2008 for a similar proposal for anaphor binding).

- (47) a. The A-binding condition is a derivational condition.
b. The scope condition is a condition on interpretation.

On Saito's view, A-binding syntactically determines antecedents for "antecedent-seeking" elements, whereas binding by operators is necessary for such elements to be interpreted as bound

variables. Given (47), the interpretive facts under consideration follow straightforwardly. The A-binding condition can be met at the point of the derivation in (46) where QP2 c-commands X1, that is, right after QP scrambles within the embedded clause. On the other hand, the scope condition cannot be met at this point; instead, it has to be met at the interpretive interface after the derivation is completed, taking into consideration all the material that enters into interpretation. Under the movement theory of control, X1 moves to X2 in (46). Given that X1 and X2 receive independent θ -roles, both of them enter into interpretation. Then the copies of the pronominal contained in both X1 and X2 must satisfy the scope condition.²⁰ As a result, the QP must take scope over the matrix clause.

Therefore, the apparently puzzling interpretive facts in (36) and (37) turn out to lend strong support to Saito's (2005) view of variable binding, according to which A-binding is a syntactic condition satisfied in the course of a derivation, while falling within the scope of operators is a matter of interpretation.

3.4 Promise-Type Subject Control

Another issue that bears on the present proposal has to do with contrasts like this:

- (48) a. Replicants of themselves_i seemed to the boys_i [*e* to be ugly].
 b. *Replicants of themselves_i promised the boys_i [*e* to be ugly].
 (Belletti and Rizzi 1988, credited to Kyle Johnson)

Such contrasts have been attributed to a derivational difference between raising and control: raising involves movement (hence induces reconstruction effects), but control does not (hence induces no reconstruction effects).²¹ The fact that binding is possible in (48a), but not in (48b), thus poses a problem for any approach adopting a movement theory of control.

Notice that the problem is not just about binding facts. In fact, the very existence of subject control sentences like (49) is a problem for a movement theory of control.

- (49) John promised Mary [*e* to return by noon].

The problem here is that if *John* moves from *e*, it crosses *Mary*, in violation of Minimality (to put it differently, subject control here violates Rosenbaum's (1967) Minimal Distance Principle). So subject control with a matrix object should not be derived under the movement theory of control.

There are two possible avenues to dealing with this problem:

- (50) a. The matrix object DP is contained in a PP whose head is a null P.
 b. Cases like (49) do not involve obligatory control.

²⁰ Hornstein (1998) claims that only the head of the control chain enters into interpretation at the interpretive interface. The conclusion in the text remains the same if we adopt this analysis. The important point is that QP must take scope over X2 (the head of the control chain) in (46).

²¹ However, see also Lasnik 1999, where the relevant data are disputed.

(50a) is due to Boeckx and Hornstein (2003) and (50b) to Martin (1996). Assuming that cases like (49) involve obligatory control, Boeckx and Hornstein (2003) suggest that if the matrix object is contained in a PP, it does not interfere with movement of the controller, thereby ensuring obligatory control on the movement theory of control (see Boeckx and Hornstein 2003 for evidence from language acquisition in favor of this analysis). Note that this in itself does not account for the contrast in (48). To account for the contrast, something more needs to be said. On the other hand, Martin (1996), pointing out that cases like (49) show the properties of nonobligatory control, claims that they do not involve obligatory control. If they do not involve obligatory control, they are not derived by movement of the controller, but instead involve base generation of the matrix subject in the matrix clause, the embedded subject being an independent element (perhaps a phonetically null pronominal). Given that there is no movement relation between the matrix subject and *e* in (48b) and (49), this analysis can account for the lack of binding in (48b) as well as the existence of sentences like (49).

Japanese scrambling provides new evidence related to this issue. Consider first the following cases:

- (51) Yumi-ga Ken-ni [hiru-madeni kaeru to] yakusokusita.
 Yumi-NOM Ken-DAT noon-by return that promised
 ‘Yumi promised Ken to return by noon.’
- (52) *Soko_i-no sotugyoosei-ga mittu-izyoo-no daigaku_i-ni [itiokuen-o
 it-GEN graduate-NOM three-or.more-GEN university-DAT 100.million.yen-ACC
 kifusuru to] yakusokusita.
 donate that promised
 ‘Their graduates promised three or more universities to donate 100 million yen.’

The example in (51) is a Japanese equivalent of (49). The example in (52) shows that the matrix object QP cannot bind a pronominal in the matrix subject.²² In this respect, (52) patterns with English (48b).

Of interest are the cases in (53).

- (53) a. ?*Mittu-izyoo-no daigaku_i-ni soko_i-no sotugyoosei-ga Ken-ni
 three-or.more-GEN university-DAT it-GEN graduate-NOM Ken-DAT
 [syutugansuru to] yakusokusita.
 apply that promised
 ‘Their graduates promised Ken to apply to three or more universities.’
- b. ?*Mittu-izyoo-no kaisya_i-o soko_i-no syain-ga Ken-ni
 three-or.more-GEN company-ACC it-GEN employee-NOM Ken-DAT
 [tyoosasuru to] yakusokusita.
 investigate that promised
 ‘Their employees promised Ken to investigate three or more companies.’

²² The dative phrase in (52) can also be interpreted as an object of the embedded verb. We are concerned with the interpretation in which it is an object of the matrix verb.

In these cases, the subject of the matrix clause contains a pronominal to be bound by the object QP of the embedded clause and the QP has scrambled out of the embedded clause to the front of the matrix clause. This scrambling does not make variable binding possible.

The fact that variable binding is not possible in (53) is apparently surprising since here the pronominal is contained in the phrase that controls the subject of the clause in which the scrambled QP originates. Note that the issue here has nothing to do with the nature of the matrix object (i.e., whether it is a DP or a PP). Recall that scrambling out of a clause does not affect binding. Given this, the lack of binding effects in (53) cannot be captured by making reference to the properties of the matrix object. By contrast, it can be accounted for if there is no movement relation between the matrix subject and the embedded subject in (53). In that case, there is no way for the embedded object to bind into the matrix subject and the fact in (53) is treated on a par with that in (19).

These observations suggest that Japanese cases like (51) do not involve movement of the matrix subject from the embedded subject, but instead have a *pro* in the embedded subject that is coreferential with the matrix subject, in consistency with Martin's (1996) view for English given in (50b). The lack of variable binding in (52) then falls into place.

Thus, we have evidence from scrambling out of a control clause that Japanese *promise*-type subject control (with a matrix object) is not derived by movement of the controller and hence does not involve obligatory control.²³

²³ This conclusion is thus incompatible with Fujii's (2006) claim that Japanese *promise*-type subject control is an instance of obligatory control.

Another point is in order here as well. Langendoen and Battistella (1982) observe the following contrast:

- (i) a. Friends of each other seemed [to amuse the men].
- b. *Friends of each other wanted [to amuse the men].

The contrast apparently shows another binding asymmetry between raising and control. However, the ungrammaticality of (ib) is not problematic if it does not involve obligatory control. In fact, Williams (1980) argues that the infinitival complement to *want*, not having the properties of obligatory control, is a nonobligatory control clause (see also Martin 1996). A real problem arises with cases like (ii).

- (ii) *Friends of each other tried [to amuse the men].

The infinitival complement to *try* is clearly an obligatory control clause. Then, under the movement theory of control, (ii) is derived by movement of the controller. I suspect that the lack of binding in (ii) has to do with the semantic properties of the clause embedded under *try*. It is well known that the infinitival complement to *try* expresses an action controllable by the subject of *try*. If so, the subject of the embedded clause in (ii) will be interpreted as an agent. In that case, *amuse* will function as an agentive, rather than psychological, predicate. Binding will then fail in (ii) for the same reason that the example in (iii) does not allow binding if the subject is interpreted as an agent.

- (iii) Friends of each other amused the men.

A reviewer points out that if this line of thinking is on the right track, it predicts that the sentence in (ii) will become grammatical if *try* is replaced by verbs like *remember*, *love*, and *hate*. The prediction is valid if those verbs are obligatory control verbs. If it turns out that they are nonobligatory control verbs like *want*, the prediction will not hold. Since the issue requires a detailed investigation of the properties of these verbs and their complement clauses, which is beyond the scope of this article, I will leave it for future study.

4 Conclusion

In the history of generative grammar, studies of scrambling have revealed many interesting and important properties of human language. I hope that the present study has done the same thing. On the basis of newly discovered facts about binding effects with scrambling out of a control clause in Japanese, I have proposed an analysis of those facts consisting of two major claims:

- (54) a. Scrambling out of a control clause patterns with scrambling out of a finite clause with respect to binding effects.²⁴
 b. Obligatory control involves movement of the controller.

The present study thus provides a new argument in favor of these claims. I have also shown that this proposal has the further consequences listed in (55).

- (55) a. Nonuniform theories of scrambling cannot be the correct answer to the question of why long-distance scrambling does not license variable binding.
 b. The application of scrambling is constrained by Linearization Preservation.
 c. Pronominal variable binding obeys two conditions—the A-binding condition and the scope condition—and whereas the A-binding condition is a derivational condition, the scope condition is a condition on interpretation.
 d. Japanese *promise*-type subject control (with a matrix object) does not involve obligatory control.

Given that a close investigation of Japanese scrambling plays a crucial role in achieving them, the results given in (54) and (55) constitute a unique contribution that the study of scrambling makes toward a better understanding of the nature of human language.

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²⁴ Although this article focuses on binding effects, the same patterns can be reproduced with quantifier scope interaction. Thus, suppose QP1 is in a matrix clause and QP2 is in an embedded clause. Scrambling of QP2 over QP1 has the effect of allowing QP2 to take scope over QP1 only if QP1 is contained in the phrase that obligatorily controls the subject of the embedded clause in which QP2 originates. So quantifier scope interaction, like variable binding, supports the present view that scrambling out of control clauses patterns with scrambling out of finite clauses. However, there are other empirical domains where scrambling out of control clauses does behave differently from scrambling out of finite clauses (see Nemoto 1993 for relevant discussion). Why this should be so is an interesting issue for future research.

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Department of English
Kinjo Gakuin University
2-1723 Omori
Moriyama-ku, Nagoya 463-8521
Japan
ytakano@kinjo-u.ac.jp