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PF Intervention Conditions on Covert Pied-Piping*

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ABSTRACT. In this paper, I propose a PF intervention condition on covert pied-piping constructions. After critically reviewing Kotek and Erlewine's (2013) argument for covert pied-piping of larger constituents, new evidence is provided that covert pied-piping may target smaller constituents. I argue that all of the data are accounted for by imposing the PF intervention condition on those units which are defined under the current phase theory and spelled-out to the PF component (Chomsky 2000).

Keywords: PF conditions, covert movement, pied-piping, an intervention effect, phase theory

1. Introduction

The purpose of this paper is to provide evidence against Kotek and Erlewine's (2013) arguments for covert pied-piping of larger constituents on the basis of Japanese multiple *wh*-phrase constructions; and to argue for a PF intervention condition on the covert pied-piping construction.

This paper is organized as follows: In section 2, I review Kotek and Erlewine's (2013) argument for covert pied-piping of larger constituents. In section 3, I provide evidence against Kotek and Erlewine's (2013) argument and show that covert pied-piping of smaller constituents is possible based on the lack of an intervention effect in Japanese multiple *wh*-phrase constructions. In section 4, I argue for a PF intervention condition imposed on those constituents which are spelled-out to the PF component. Section 5 concludes this paper.

2. Kotek and Erlewine's (2013) argument for covert pied-piping of larger constituents

It has been widely assumed that no *wh*-phrase may move across another *wh*-phrase when it moves to sentence-initial position in violation of the superiority condition, defined in (1).

(1) *Superiority Condition*

> No rule can involve *X, Y* in the structure
> … *X* … [$_{\alpha}$ ... *Z* … *–WYZ* …] …
> where the rule applies ambiguously to Z and Y and Z is superior to Y
>
> (Chomsky 1973: 246)

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Confirmation of this condition can be obtained from the following examples.

(2) a. Who$_1$ t_1 read what?

b. * What$_1$ did who read t_1?

Sentence (2a) is grammatical because the *wh*-phrase *who* in subject position moves overtly to sentence-initial position without crossing the other *wh*-phrase *what* in object position. On the other hand, sentence (2b) is ungrammatical because the *wh*-phrase *what* in object position moves to sentence-initial position with crossing the other *wh*-phrase *who* in subject position, violating the superiority condition in (1).

Notice, however, that the superiority condition is assumed to apply only to non-D-linked *wh*-phrases, such as *who*, *what*, and *where*; if we replace the non-D-linked *wh*-phrases with D-linked *wh*-phrases like *which boy* and *which book*, no superiority violation arises: A D-linked *wh*-phrase may move overtly across another D-linked *wh*-phrase. This is evident from the following examples.

(3) a. Which boy$_1$ t_1 read which book?

b. Which book$_1$ did which boy read t_1? (Kotek and Erlewine 2013: 4)

The grammaticality of (3b) provides strong evidence for the claim that a D-linked *wh*-phrase moves across another D-linked *wh*-phrase. Pesetsky (1987, 2000) accounts for this superiority-violating fact by assuming that the in-situ D-linked *wh*-phrase does not move at all. Instead of a movement strategy, this *wh*-phrase (*which boy* in this case) is licensed through unselective binding. Of course, the interrogative C^0 attracts a *wh*-phrase to its edge position in English from the necessity of checking uninterpretable features overtly. In terms of this, overt movement of the other *wh*-phrase (*which book* in this case) is sufficient to satisfy the requirement, as illustrated in (4).

(4) [$_{CP}$ *which book*$_2$ [C [$_{TP}$ … *which boy*$_1$ … t_2]]]

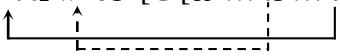
No problem arises for the licensing of the *wh*-phrases and the requirement of C^0. This non-movement strategy is unavailable for sentences with non-D-linked *wh*-phrases like (2). In this case, all of the non-D-linked *wh*-phrases have to move to the edge of C^0, whether the movement is overt or covert. In (2a), for example, the *wh*-phrase *who* in subject position moves overtly to the edge of C^0 and the other *wh*-phrase *what* in object position moves covertly, as given in (5),[1] the original order being preserved between *who* and *what*, so that no superiority violation occurs.

(5) [$_{CP}$ *who*$_1$ *what*$_2$ [C [$_{TP}$ … t_1 … t_2]]]

[1] Following Kotek and Erlewine (2013), I use straight arrows to indicate overt movement and dashed arrows indicate covert movement.

In (2b), on the other hand, *what* in object position moves overtly to the edge of C^0 and *who* in subject position moves covertly, as given in (6), the original order being destroyed between *who* and *what*, so that a kind of superiority violation occurs.

(6) * [$_{CP}$ *what*$_2$ *who*$_1$ [C [$_{TP}$ … t_1 … t_2]]]



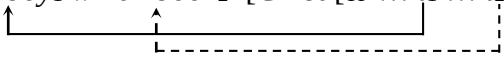
Although the difference in grammaticality between (2b) and (3b) is taken as evidence for the non-movement approach of the in-situ D-linked *wh*-phrase, a closer look undermines the argument. Pesetsky (2000) observes that the superiority effect arises when there is an intervener (e.g., *not* and *only*) between the *wh*-phrases. Let us consider the following sentences.

(7) a. Which boy$_1$ did**n't** t_1 read which book?

b. * Which book$_1$ did**n't** which boy read t_1? (ibid.)

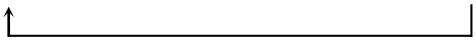
Pesetsky (2000) asserts that the derivations are different between (7a) and (7b). In (7a), *which boy* in subject position moves overtly and *which book* in object position moves covertly, as in (8).

(8) [$_{CP}$ *which boy*$_1$ *which book*$_2$ [C not [$_{TP}$ … t_1 … t_2]]]



In (7b), on the other hand, *which book* in object position moves overtly but *which boy* in subject position does not move at all, as in (9).

(9) [$_{CP}$ *which book*$_2$ [C not [$_{TP}$ … *which boy*$_1$ … t_2]]]



Then, the interpretation of the in-situ *wh*-phrase is assumed to be ensured by a certain semantic mechanism proposed by Hamblin (1973) and Karttunen (1977). Since the intervener between the in-situ *wh*-phrase and the interrogative C^0 blocks the license of the *wh*-phrase by the C^0, the sentence is ungrammatical (see also Beck 2006 at this point).[2] This structural relation is schematized as in (10).

(10) Intervention schema with in-situ *wh*-phrases

* LF: [C … **intervener** … *wh*] (ibid.: 9)

The crucial difference between (8) and (9) is whether or not the *wh*-phrase moves overtly crossing the other *wh*-phrase. If the *wh*-phrase in subject position moves overtly without crossing the *wh*-phrase in object position, as in (8), the in-situ *wh*-phrase in object position moves covertly to the edge of C^0. By contrast, if the *wh*-phrase in object position moves overtly with crossing the *wh*-phrase in subject position, as in (9), the in-situ *wh*-phrase in subject position does not move covertly to the edge of C^0, and it is licensed by a semantic mechanism. We can refer to the former type of derivation as superiority-obeying question and to the latter type of

[2] Space limitations prevent me from elaborating at length here.

derivation as superiority-violating question with respect to whether or not the *wh*-phrase moves overtly crossing the other *wh*-phrase. Then, the important generalization we can make is that the superiority violation, as defined in (10), arises when the intervener appears between the interrogative C^0 and the in-situ D-linked *wh*-phrase in the superiority-violating question.

A similar argument applies to the case of *wh*-pied-piping. Cable (2010) claims that Q-particle is a head to select a phrase as its complement to trigger pied-piping of the phrase for interrogative movement. For example, if the head Q merges with NP as its complement, the whole QP moves to [Spec, CP] as in (11).

(11) $[_{CP}\ [_{QP}\ Q\ NP]_1\ C\ [_{TP} \ldots\ t_1\ \ldots]]$

If Q merges with PP embedded within the NP as its complement, the QP moves to [Spec, CP] as in (12).

(12) $[_{CP}\ [_{QP}\ Q\ PP]_1\ C\ [_{TP} \ldots\ [_{NP}\ N\ t_1]\ \ldots]]$

On these grounds, look at the following sentences.

(13) a. ? [A picture of which president]$_1$ does Jim own t_1?

b. [Of which president]$_1$ does Jim own a picture t_1?

c. [Which president]$_1$ does Jim own a picture of t_1? (ibid.: 11)

In (13a), Q merges with the object, so that the whole object is a target of movement. In (13b), Q merges with the PP within the object, so that the PP is the target. In (13c), Q merges only with the *wh*-phrase, so that the *wh*-phrase alone moves to sentence-initial position. If the intervener under discussion appears between Q and a *wh*-phrase, the sentence is ungrammatical. Consider the following examples.

(14) a. ? [A picture of *which* president]$_1$ does Jim own t_1?

b. * [**No** pictures of which president]$_1$ does Jim own t_1?

c. * [**Only** pictures of which president]$_1$ does Jim own t_1? (ibid.: 10)

Example (14a) is acceptable, since there is no intervener between the (covert) head Q and a *wh*-phrase. Examples (14b) and (14c) are both ungrammatical because there is an intervener between the (covert) head Q and a *wh*-phrase, as schematized in (15).

(15) Intervention schema for *wh*-pied-piping

* $[_{QP}$ Q … **intervener** … *wh* …$]_1$ … t_1 … (ibid.: 12)

If the *wh*-phrase moves overtly to avoid the application of the representation in (15), the sentence is grammatical as in (16).

(16) [Which president]$_1$ does Jim own [**no** picture of t_1]? (Cable 2010: 138)

Here, Q merges with the *wh*-phrase and trigger the pied-piping of the *wh*-phrase, as shown in

(17), and no violation of (15) arises, so that the sentence is grammatical.

(17) $[_{CP}\ [_{QP}\ Q\ \textit{wh}\text{-phrase}]_1\ C\ [_{TP}\ldots\ [_{NP}\ \textbf{no}\ \text{picture of}\ t_1]]]$

Given these arguments, Kotek and Erlewine (2013) seek to reveal the nature of covert pied-piping. In particular, they propose that "covert pied-piping of larger constituents is preferred over that of smaller constituents" (p. 14). The crucial examples to consider are the following.

(18) a. Which student read a book from which library?

b. * Which student read **no** book from which library?

(Kotek and Erlewine 2013: 16-17)

Three possible options for covert pied-piping at LF in (18a) are given in (19).

(19) Options for covert pied-piping at LF in (18a)

a. [QP which student] read [QP Q a book from which library].

b. [QP which student] read a book [QP Q from which library].

c. [QP which student] read a book from [QP Q which library].

It is important to note that the sentence is the superiority-obeying question with the D-linked *wh*-phrases and involves no intervener. Thus, the license of the *wh*-phrase within the QP in the object position is available through a semantic mechanism. None of these three options violates (15), so that the sentence should be grammatical; and actually, it is grammatical. We fail to decide which option is selected to receive the LF interpretation because the interpretation is done covertly; we do not see the mechanism overtly.

However, Kotek and Erlewine (2013) argue that the ungrammaticality of (18b) is taken to show that covert pied-piping of larger constituents is preferred. Let us take a close look at the options available for covert pied- piping at LF in (18b).

(20) Options for covert pied-piping at LF in (18b)

a. * [QP which student] read [QP Q **no** book from which library].

b. [QP which student] read **no** book [QP Q from which library].

c. [QP which student] read **no** book from [QP Q which library].

Here, the sentence is the superiority-obeying question with the D-linked *wh*-phrases and involves the intervener *no*. In (20a), Q merges with the object and the whole object is the target of pied-piping. In (20b), the PP embedded within the object phrase is pied-piped. In (20c), only the *wh*-phrase is selected for pied-piping. The cases of (20b) and (20c) are a fine LF representation, in that they are irrelevant to test the applicability of the following filter.

(21) Intervention schema for *wh*-pied-piping

* $[_{QP}\ Q\ \ldots$ **intervener** $\ldots\ \textit{wh}\ \ldots]_1\ \ldots\ t_1\ \ldots$ (=(15))

On the other hand, (20a) is exactly the corresponding pattern to (21), so that it is taken as a bad LF representation. Recall that (18b) is ungrammatical. This ungrammaticality indicates that the LF representation of (18b) is (20a). The size of pied-piping used by (20a) is a larger constituent. Therefore, Kotek and Erlewine (2013) conclude that covert pied-piping of larger constituents is preferred over that of smaller constituents.

To summarize the point of this section, Kotek and Erlewine (2013) have argued for a kind of large-scale LF pied-piping on the basis of multiple *wh*-phrase constructions in English. In the next section, I will provide evidence against Kotek and Erlewine's (2013) argument on the basis of multiple *wh*-phrase constructions in Japanese.

3. Evidence against covert pied-piping of larger constituents

Pesetsky (1987) hypothesizes that the large-scale pied-piping strategy applies to *wh*-in-situ constructions in Japanese. That is, the *wh*-phrase itself does not move. As its consequence, the *wh*-phrase can appear within an island, including a relative clause, because the island is an opaque domain to movement. This is supported by the following context.

(22) Q: Mary-wa [[John-ni nani-o ageta] hito-ni] atta-no?
Mary-Top John-Dat what-Acc gave man-to met-Q
'What did Mary meet the man who gave to John'

A1:*/?? Konpyuutaa desu.
computer-Acc Cop
'It's a computer.'

A2: [[Konpyuutaa-o ageta] hito] desu.
computer-Acc gave man Cop
'It's the man who gave a computer (to him).' (Pesetsky 1987: 113)

In the question sentence, the *wh*-phrase *nani-o* 'what' appears within the relative clause. We have to answer the question by the pied-piping of the whole relative clause as its answer, shown in A2. This strongly suggests that the large-scale pied-piping strategy is used, which apparently supports Kotek and Erlewine's (2013) argument.

Recall, however, that we confine ourselves to using a D-linked *wh*-phrase to test the validity of the large-scale pied-piping strategy. That is, we have to consider the case involving the D-linked *wh*-phrase. An example of this sort is given in (23).

(23) Q: (IBM-to, Apple-to, Fuzituu-to, Matsusita-no naka-de…)
IBM-and Apple-and Fujitsu-and Panasonic-Gen among
'Among IBM, Apple, Fujitsu, and Panasonic (National) …'

Mary-wa [[John-ni dono konpyuutaa-o ageta] hito-ni] atta-no?
Mary-Top John-to which computer-Acc gave man-Dat met-Q
'Which computer did Mary meet the man who gave to John?'

A1: IBM-no konpyuutaa desu.
IBM-Gen computer Cop
'It's the IBM computer.'

A2: [[IBM-no konpyuutaa-o ageta] hito] desu.
IBM-Gen computer-Acc gave man Cop
'It's the man who gave the IBM computer (to him).' (ibid.: 115)

The important point is that A1 can be an answer to Q as well. This means that just the *wh*-phrase can be the target for LF interpretation; no large-scale pied-piping is involved. Hence, this counts as evidence against Kotek and Erlewine's (2013) claim.

Another evidence against Kotek and Erlewine's (2013) claim comes from the following multiple *wh*-phrase constructions in Japanese.

(24) Q: [Dono gakusei-ga [dono hanaya-no bara-**dake**-o
which students-Nom which flower shop-Gen rose-**only**-Acc
katta-ka] osietekuremasu-ka?
bought-Q tought-Q
'Lit. Would you tell me which students bought only roses in which flower shop?'

A: Taroo-ga A-shi-no hanaya, Ziroo-ga B-machi-no
Taroo-Nom A City-Gen flower shop Ziroo-Nom B Street-Gen
hanaya, Hanako-ga C-ku-no hanaya desu.
flower shop Hanako-Nom C Ward-Gen flower shop Cop
'Lit. Taroo bought A City's, Ziroo bought B Street's, and Hanako bought C Ward's roses.'

Here, the two D-linked *wh*-phrases are included in the question sentence: One is the embedded subject and the other is within the embedded object. In addition, the intervener *dake* 'only' intervenes in-between. That is, the question sentence corresponds to (18b), a crucial example for Kotek and Erlewine's (2013) analysis. Their analysis predicts that the question sentence should be ungrammatical, since it violates the intervention schema, repeated in (25).

(25) Intervention schema for *wh*-pied-piping

* [$_{QP}$ Q … **intervener** … *wh* …]$_1$ … t_1 …

However, this sentence is grammatical and we can easily make an answer to the question, as shown in (24A), which shows that smaller constituents can be a target for covert pied-piping. Therefore, the grammaticality of (24) provides crucial evidence against Kotek and Erlewine's (2013) analysis.

The next section will propose an alternative PF-based analysis of covert pied-piping and show that this analysis accounts for all of the data in English and in Japanese in a uniform fashion.

4. Proposal

In this section, I propose that the intervention schema for *wh*-pied-piping given in (25) is not a condition on LF but a condition on PF.

With respect to the LF interface, Chomsky (1993) argues that only the LF representation is available for semantic interpretations from the point of view of minimalist perspective. One of the motivations for it stems from an operator-variable relation. For example, a typical question sentence like (26a) has established the proper operator-variable relation at LF with the help of a *trace,* as in (26b).

(26) a. What did you buy?

b. [$_{CP}$ what$_1$ did [$_{TP}$ you buy t_1]]

Here, the *wh*-operator in [Spec, CP] binds its trace properly, so that the sentence receives the LF interpretation. Chomsky (1993) points out that this mechanism with a trace theory fails to account for a sentence that involves pied-piping of a phrase including a *wh*-phrase as in (27).

(27) a. Whose book did you buy?

b. [$_{CP}$ whose book$_1$ did [$_{TP}$ you buy t_1]]

In this case, the *wh*-phrase is embedded within the noun phrase moving to [Spec, CP] and fails to bind its trace position, resulting in violation of an operator-variable construction. To avoid this, Chomsky (1993) argues for a copy theory of movement and eliminates the notion of traces; he assumes copy and deletion operations. Assuming this, the potential LF structures of (27) then are as follows.

(28) a. [$_{CP}$ [whose *x*, *x* a book] did [$_{TP}$ you buy [*x*]]]

b. [$_{CP}$ [whose *x*] did [$_{TP}$ you buy [*x* book]]]

In (28a), *x* is understood as a DP variable and it has two types of readings. If it is taken as substitutional, it can be replaced by a DP; if it is taken as objectual it ranges over books, as determined by the restricted operator. In (28b), *x* is understood as a D variable. If it taken as substitutional, it can be replaced by a D; if it is taken as objectual, it ranges over entities.

Then, Chomsky (1993: 36) maintains that "[f]or convergence at LF, we must have an operator-variable structure. Accordingly, in the operator position [Spec, CP], everything but the operator phrase must delete; therefore, the phrase *wh* of [(28)—SK] deletes. In the trace position, the copy of what remains in the operator position deletes, leaving just the phrase *wh*." In this way, the pied-piping construction is accounted for. The point relevant here is that LF is a component to capture an operator-variable relation.

This suggests that a kind of filter as in (29) acts as a condition on LF, while a filter as in (30) is not a condition of LF.

(29) Intervention schema with in-situ *wh*-phrases

* LF: [C … **intervener** … *wh*]

(30) Intervention schema for *wh*-pied-piping

* [$_{QP}$ Q … **intervener** … *wh* …]$_1$ … t_1 …

Since the condition of (29) is relevant to an operator-variable relation between the interrogative C^0, which provides an operator position in its edge position, and the in-situ *wh*-phrase, it should be dealt with at LF. On the other hand, the condition of (30) is irrelevant to an operator-variable relation, but rather it stipulates the relationship within QP, so that it is not a condition on LF. Hence, I would like to propose that it is a condition on the other side of the interface, PF.

This proposal accounts for all of the data discussed in this paper. Incidentally, I assume in this paper that the LF and PF conditions in (29) and (30) are imposed on the constituent defined by Transfer under the current phase theory.[3] Since Chomsky (2000), syntactic computation proceeds phase by phase. Once the phase is constructed, a certain part of the syntactic constituent is transferred to PF and LF interfaces. Such a constituent is a target of (29) and (30). Given this, let us firstly consider the following sentences.

(31) a. Which boy$_1$ did**n't** t_1 read which book?

b. * Which book$_1$ did**n't** which boy read t_1? (=(7))

The contrast in grammaticality is accounted for by the LF condition of (29). In (31a), as illustrated in (32) below, once the phase CP is constructed, the underlined part is sent to PF and LF interpretations.[4] This underlined part does not conform to the filter (29), so that the sentence is grammatical.

(32) [$_{CP}$ Which boy$_1$ [$_C$ did**n't**] [$_{TP}$ [$_{v*P}$ read [$_{VP}$ which book]]]]?

In (31b), on the other hand, the relevant part of the representation violates the LF condition. Once the phase CP is constructed, the underlined part is sent to PF and LF interpretations. That part of the representation is filtered out at LF by (29).

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[3] I thank Yoshihito Dobashi (personal communication) for suggesting this possibility to me.

[4] I tentatively assume that the matrix CP undergoes transfer and is sent to PF and LF interfaces.

(33) [$_{CP}$ Which book$_1$ [$_C$ did**n't**] [$_{TP}$ which boy [$_{v*P}$ read [$_{VP}$ t_1]]]]?

Therefore, (31b) is ungrammatical.

Secondly, let us turn to consider the overt *wh*-pied-piping cases in English.

(34) a. ? [A picture of *which* president]$_1$ does Jim own t_1?

b. * [**No** pictures of which president]$_1$ does Jim own t_1?

c. * [**Only** pictures of which president]$_1$ does Jim own t_1? (=(14))

Since (34a) violate neither (29) nor (30), the sentence is grammatical. In (34b) and (34c), the relevant part of the representation violates the PF condition.

(35) [$_{CP}$ [$_{QP}$ **No/Only** pictures of which president] [$_C$ does] [$_{TP}$ Jim [$_{v*P}$ read own [$_{VP}$]]

Since the underlined part of (35) corresponds to the representation of (30), the sentences of (34b) and (34c) are ungrammatical. Further evidence for the proposal that (30) is a PF condition is the following: If the *wh*-phrase alone moves overtly, the sentence should be grammatical. This is because it avoids the violation of (30). Actually, the relevant example is fine.

(36) [Which president]$_1$ does Jim own [**no** picture of t_1]? (=(16))

Thirdly, let us consider covert pied-piping in English multiple *wh*-questions as in (37).

(37) a. Which student read a book from which library?

b. * Which student read **no** book from which library? (=(18))

This contrast follows from the PF condition of (30) as well. Once the phase *v**P is completed, the complement of the phase head, VP, is sent to PF and LF interfaces. In (37a), the relevant part of the underlined representation does not violate the PF condition in (30).

(38) [$_{CP}$ Which student read [$_{VP}$ a book from which library]]?

Thus, the example is grammatical. In (37b), on the other hand, the relevant part of the representation violates the PF condition.

(39) [$_{CP}$ Which student read [$_{VP}$ **no** book from which library]]?

Thus, the example is ungrammatical.

Fourthly, let us consider the covert pied-piping in Japanese multiple *wh*-questions, which is crucial evidence against Kotek and Erlewine's (2013) analysis.

(40) Q: [Dono gakusei-ga [dono hanaya-no bara-**dake**-o
which students-Nom which flower shop-Gen rose-**only**-Acc
katta-ka] osietekuremasu-ka?
bought-Q tought-Q

'Lit. Would you tell me which students bought only roses in which flower shop?'

A: Taroo-ga A-shi-no hanaya, Ziroo-ga B-machi-no
Taroo-Nom A City-Gen flower shop Ziroo-Nom B Street-Gen
hanaya, Hanako-ga C-ku-no hanaya desu.
flower shop Hanako-Nom C Ward-Gen flower shop Cop
'Lit. Taroo bought A City's, Ziroo bought B Street's, and Hanako bought C Ward's roses.' (=(24))

The relevant part of the PF representation in (40Q) is as follows.

(41) [$_{CP}$ [$_{CP}$ dono gakusei-ga [$_{v*P}$ [$_{VP}$ dono hanaya-no bara-**dake**-o] kata-ka]] oshietekuremasu-ka]

Once the embedded *v**P phase is constructed, the underlined part of the VP is spelled-out. This part does not violate the PF condition of (30), so that no problem arises. Thus, the example is grammatical. As a further prediction, if we change the linear order between *don hanaya-no* 'which flower shop' and *bara-dake* 'only roses,' the sentence should be degraded in violation of (30). Actually, this type of sentence is degraded.

(42) ?? [Dono gakusei-ga [bara-**dake**-no dono sakuhin-o
which students-Nom rose-**only**-Gen which work-Acc
katta-ka] osietekuremasu-ka?
bought-Q tought-Q
'Lit. Would you tell me which students bought which work of only roses?'

Therefore, the difference in acceptability between (40) and (41) supports the present analysis in which the PF condition plays a central role in interpreting the pied-piping construction.

5. Conclusion

In this paper, I have provided evidence against Kotek and Erlewine's (2013) arguments for covert pied-piping of larger constituents on the basis of Japanese multiple *wh*- phrase constructions and have proposed that the PF condition is imposed on covert pied-piping constructions.

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