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Zibun as Distributor and Its Interaction with Pronominal Kare

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Since Lebcaux (1983), the analysis of anaphors in terms of LF-movement has been widespread in the literature. One of the important questions relating to this kind of analysis is what forces anaphors to move at LF. Katada (1988, 1989, 1991) gives an interesting answer to this question for Japanese reflexive zibun. She characterizes it as an operator anaphor and hence it must move to take scope at LF, like a typical operator such as a wh-operator and a quantifier. In this paper, I argue first that one of Katada's syntactic arguments for the LF-movement of zibun does not go through, and further that it raises a problem with respect to weak crossover; that is, that the operator zibun does not seem to show this effect, unlike a true operator such as a wh-operator and a quantifier. Nevertheless, I provide some supporting evidence for her analysis of zibun concerning strong crossover. In order to account for this array of facts, I propose that zibun is rather characterized as a distributor like each of each other and that it is directly adjoined to its antecedent at LF, along the lines of Heim et al.'s (1991) analysis of each other. It will be shown that the problem with respect to weak crossover is straightforwardly accounted for by this characterization of zibun, and furthermore that our analysis accounts for the behavior of zibun regarding strong crossover as naturally as Katada's.

1. Katada (1988, 1989, 1991)

One of Katada's syntactic arguments for the claim that *zibun* is an operator anaphor is concerned with the interaction of *zibun* with pronominal *kare*. Lasnik (1989) and Aoun and Hornstein (1991) note that *zibun* cannot bind *kare*, as illustrated in (1):

1

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Katada hypothesizes that *zibun* is adjoined to the VP whose subject is its antecedent. Thus, the schematic LF structure of (1) is something like the following:

(2) John₁ [vp zibun₁ [vp [s¹ t₁ kare₁ ...] ...]]

She assumes that, once *zibun* is attached to a VP, it has the status of A'-binder. Then, the ungrammaticality of (1) follows from the well-known fact that overt pronominal *kare* cannot be bound by an operator, as illustrated in (3):

(3) *Dareka1-ga [kare1-ga katta to] omotta. someone-nom he -nom won Comp thought 'Someone1 thought that kare1 won.'

Hong (1985) and Aoun and Hornstein (1991) characterizes this property as follows:

(4) Kare must be A'-free. (Aoun and Hornstein (1991), Hong (1985))

Then, in (2), *zibun* is adjoined to the matrix VP to take scope, and as a result it A'-binds *kare*, in violation of (4). That is why sentence (1) is ungrammatical.

2. Some Problems

2

However, there are some problems with this analysis. First, it incorrectly rules out the following sentences:

(5) Masao₁-wa [[kare₁-ga sukidatta sensei]-ga zibun₁-o -top he -nom liked teacher-nom self -acc nikundeiru to] itta. hate Comp said 'Masao₁ said that the teacher kare₁ liked hates zibun₁.'

Under Katada's analysis, this sentence will have the following LF structure:

(6) Masao₁ [vp zibun₁ [vp [s^{*}[Np kare₁ ...] t₁ ...] ...]]

Again, zibun is adjoined to the matrix VP to take Masao as its antecedent here. In this structure, kare is A'-bound by zibun, violating (4). Hence, this sentence should be ungrammatical, but this is not the case. This may suggest that (4) is not the right characterization of kare for Katada's analysis. The generalization seems to be something like the following:

ZIBUN AS DISTRIBUTOR

3

(7) Kare cannot be bound by formal variables.

I simply assume *formal variables* as traces of operator movements here. With (7) instead of (4), Katada's analysis still holds; that is, that *kare* is not bound by the formal variable of *zibun* in (6), satisfying (7), while *kare* is bound by the formal variable of *zibun* in (2), violating (7).

However, there is a more critical problem with Katada's analysis, which is pointed out by Hoji (1990). He claims that the phenomena like (1) may not be related to the inherent property of *kare*. It has been observed in the literature that some overt elements like *soitu* can be construed as bound variables in Japanese, as illustrated below:

(8) Daremo karemo₁-ga soitu₁ -no ronbun-o mottekita everyone -nom the guy-gen paper-acc brought 'Everyone₁ brought soitu₁'s paper.'

Then, Hoji claims that, if the ungrammaticality of (1) is due to *kare's* inability to be construed as a bound variable, then we would expect that, if *kare* is replaced by *soitu*, then the relevant sentence should be grammatical. But this is not borne out, as shown below:

(9)?*Daremo karemo1-ga [zibun1-ga soitu1 -no hahaoya-o semeta
 everyone -nom self -gen the guy-gen mother-acc blamed
 to] itta.
 Comp said
 'Everyone1 said that zibun1 blamed soitu1's mother.'

This strongly suggests that the data like (1) do not have anything to do with *kare*'s inability of being A'-bound, and hence they are rather weak as a supporting evidence for the LF movement of *zibun*.

Further, there seems to be another problem with a LF structure like (6), which is pointed out by Hong (1984). Notice that, if *zibun* is an operator like a *wh*-operator or a quantifier, then the configuration in (6) should show a weak crossover effect, since pronominal *kare* does not c-command the trace of *zibun*. However, as Daiko Takahashi pointed out, it is not immediately clear whether the configuration in (6) is really a configuration inducing a weak crossover effect. Lasnik and Stowell (1991) observe that a null operator does not show a weak crossover effect, as illustrated below:

(10) John₁ was hard [O₁ [PRO to persuade his₁ boss [PRO to vouch for t₁]]]

In (10), even though *his* is not c-commanded by the trace of the null operator, the sentence is grammatical. They describe a weak crossover configuration as follows:

(11) Weak crossover effects arise only in contexts where a pronoun is locally A'-bound at LF by a true quantifier ranging over possibly nonsingleton set.

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Since the null operator in (10) is not a true operator, (10) does not satisfy the description in (11). That is why (10) is grammatical. Let us, then, turn to (6). It is quite plausible to assume that *zibun* functions as a null operator in this case as in (10), since *zibun* just picks up the value of its antecedent. Then the reason why (6) is grammatical would be exactly the same as the reason why (10) is grammatical; that is, in both cases, the operators are not true operators, but rather null operators, so that their configurations do not satisfy (11).

We can show the same point under the linking theory. Saito and Hoji (1983) derives a weak crossover effect from the following condition:

(12) A variable cannot be the antecedent of a pronoun that it does not c-command.

Let us consider a typical sentence showing a weak crossover as follows:

(13) Who does his mother like t? ↑_____

4

Let us follow Higginbotham (1983) to assume that linking is automatic under movement and that the position related through free linking is confined to Apositions, except Saito and Hoji's (1983) assumption that linking to a referential operator is allowed. The last assumption is independently necessary to distinguish (13) from a sentence like the following:

(14) ↓ | John, his mother likes t.

In (14), the linking of *his* to *John* is allowed since *John* is referential. On the other hand, *his* cannot be linked to *who* directly in (13) since *who* is a true operator, nor can it be linked to a trace of *who*, either, because of (12). As a result, *his* cannot take the same value as that of the variable of *who*. Then, in (6), nothing prevents *kare* to be linked to *Masao* directly as in follows:

(15) ↓ | Masao [vp zibun [vp [s'[NP kare ...] t ...]] ↑_____

Thus, even with the linking theory, we can show that (6) does not satisfy a configuration of weak crossover.

Then, let us consider the following sentences, where *zibun* takes a plural antecedent:

(16) [Masao to Yoichi]₁-wa [[karera₁/*₂-ga sukidatta and -top they -nom liked sensei]-ga zibun₂-o nikundeiru to] itta. teacher-nom self -acc hate Comp said 'Masao and Yoichi₁ said that the teacher karera₁/*₂ liked hates zibun₂.'

https://scholarworks.umass.edu/nels/vol22/iss1/2

ZIBUN AS DISTRIBUTOR

5

The LF structure of this sentence will be as follows (where indexing and linking are both provided for convenience):

(17) Masao and Yoichi₁ [v_P zibun₂ [v_P [s_* [N_P karera₁/*₂...] t₂...

In (17), zibun seems to function like a true operator, unlike zibun in (6), in the sense that it takes [Masao and Yoichi] as the range of its function and maps it into an atomic individual, so that the variable of zibun covaries with it. Then, according to (11), karera should not be coindexed with zibun, since it is locally bound by the true quantifier zibun. This prediction is correct and karera only takes the value of Masao and Yoichi as a group. Correspondingly, the linking theory makes the same prediction, since karera cannot be linked to the trace of zibun due to condition (12) and as a result Masao and Yoichi is the only element karera can be linked to. As a result, karera only takes the value of Masao and Yoichi as a group.

So far we have showed that Katada's analysis would correctly predict that a weak crossover effect only shows up when *zibun* functions as a true operator, i.e., when it takes a plural antecedent. However, the following sentence clearly shows that movement of *zibun* does not show a weak crossover effect:

(18) [Masao to Yoichi]₁-wa [[pro₁/₂ (sorezore) sukidatta and -top each liked sensei]-ga zibun₂-o nikundeiru to] itta. teacher-nom self -acc hate Comp said 'Masao and Yoichi₁ said that the teacher pro₁/₂ liked hates zibun₂.'

(18) is the same sentence as (16) except that *karera* is substituted by *pro* in (18). Interestingly, *pro* can be interpreted as a variable of *zibun* in this case. This is unexpected either in the indexing approach or in the linking approach. Let us consider the LF structure of (18), as shown below, where *pro* takes the same value as *zibun*:

As mentioned in (17), zibun functions like a true operator in this case. Then, the configuration in (19) should show a weak crossover effect, according to (11). Similarly, under the linking theory, pro cannot be linked to the trace of zibun according to condition (12), nor can it be directly linked to the true operator. Hence, pro should take a different value from the value of zibun. But this is not correct. This suggests that the LF-movement of zibun does not show a weak crossover effect.

Notice that, if this is correct, then it suggests that the reason why karera cannot take zibun as its antecedent in (17), unlike pro, has nothing to do with a

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6

weak crossover effect. This reminds us of the property of pronominal kare that it cannot be bound by a quantifier as illustrated in (3), since karera also cannot be bound by a quantifier. Notice that zibun functions like a true operator in (17). However, if the relevant property of kare and karera is described as in (7), which amounts to saying that kare or karera cannot be bound by formal variables, then karera should be able to take zibun as its antecedent just like kare in (6), since it is not bound by the formal variable of zibun. But this is not the case. If we assume the indexing theory, the right characterization scems to be as follows:

(20) Kare and karera cannot be bound by a true operator.

Then, in (17), which is a schematic structure of sentence (16), karera cannot take zibun as its antecedent, since zibun functions as a true operator, and binds karera. On the other hand, in (6), which is a schematic structure of sentence (5), kare can take zibun as its antecedent, since zibun functions like a null operator in this case. Similarly, under the linking theory, we can adopt Montalbetti's (1984) characterization of kare and karera:

(21) Kare and karera cannot have formal variables as antecedents.

Then, both in (6) and (17), kare and karera cannot be linked to the variable of zibun. Hence, they can only be linked to the matrix subjects directly. In those cases, kare can take Masao as its value in (6), and karera can take Masao and Yoichi as its value in (17). Notice, however, that, with both characterizations in (20) and (21), we would predict that (1) should be grammatical, since zibun functions like a null operator in this case in terms of the indexing theory, or nothing prevents kare from being linked to John under the linking theory. This state of affairs, in conjunction with Hoji's counterargument, strongly suggests that data like (1) cannot be regarded as a supporting evidence for her characterization of zibun as an operator anaphor. Furthermore, the lack of weak crossover effects in the LF-movement of zibun undermines her treatment of zibun.

3. Some Supporting Evidence for LF Movement of Zibun

There seems to be some evidence for the LF movement of *zibun*, however. First, as noticed in the discussion of (17) and (19), *zibun* functions like a true operator when it takes a plural antecedent; this is clearly seen in the contrast between *karera* in (17) and *pro* in (19). This supports Katada's proposal that *zibun* is an operator anapher.

Furthermore, it seems true that LF movement of *zibun* shows a strong crossover effect. As is well known, *zibun* takes only a subject as its antecedent, as illustrated below:

(22) *Miyuki-ga Masao1-ni zibun1-no syasin -o tewatas-anakat-ta. -nom -dat self -gen picture-acc hand-not-past 'Miyuki didn't hand Masao1 zibun1's picture.'

This sentence is ungrammatical with *zibun* coindexed with *Masao*. Katada derives this property of *zibun* from the assumption that *zibun* is adjoined to a VP. Thus,

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ZIBUN AS DISTRIBUTOR

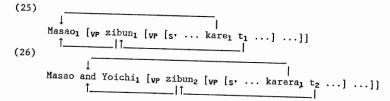
7

7

arguments inside a VP are not high enough to serve as the antecedents of zibun. Keeping this in mind, let us consider the following sentences:¹

(23)?*Masao1-wa [Miyuki-ga kare1 -ni zibun1 -no syasin -o -top -nom -dat -gen picture-acc tewatas-anakat-ta koto-ni] hara-o tatete-iru. hand-not-past fact-dat be-angry 'Masaoı is angry about the fact that Miyuki didn't hand himı zibun1 picture.' (24)?*Masao to Yoichiı-wa [Miyuki-ga kareraı -ni zibunı -no and -top -nom -dat -gen syasin -o tewatas-anakat-ta koto-ni] hara-o tatete-iru. picture-acc hand-not-past fact-dat be-angry Masao and Yoichi₁ are angry about the fact that Miyuki didn't hand them₁ zibun₁'s picture.'

The LF structures of these sentences will be something like the following:



Let us assume, following Hoji (1985), that indirect objects are higher than direct objects in Japanese. Then, in (25) and (26), *kare* and *karera* c-command I_1 and I_2 , respectively. Here, *zibun* cannot be attached to the embedded VP to take *kare* or *karera* as its antecedent, since it is not high enough to serve as its antecedent. As a result, *zibun* must be attached to the matrix VP to take the value of *Masao* in (25) and (26). The resulting structures in (25) and (26) seem to be a typical configuration of strong crossover, where the operator *zibun* crosses a pronoun that c-commands its trace.

It has been usually claimed under a standard version of indexing theory that strong crossover effects follow from Condition C of the binding theory. Under this approach, a variable has the binding feature [-a, -p], so that it is subject to Condition C. This condition is formulated in Chomsky (1986) as follows:

(27) [-a, -p] must be A-free (in the domain of the head of its A'-chain).

Then, in (25), the variable t_1 is A-bound by kare in the domain of its A'-chain,

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¹ I am indebted to Iliroaki Tada for bringing my attention to similar kinds of data.

violating (27).² However, as Barss (1986) points out, this analysis raises some problems with the following sentences:

(28) Himself1, John1 likes t1.

8

(29) Him1, John1 said Mary loves t1 with all her heart.

Under the assumption that any A'-movement leaves the binding features [-a, -p] behind, the sentences in (28) and (29) should be ruled out by (27), since t_1 is A-bound by John in the domain of its chain. But these sentences are grammatical. One might propose the following:

(30) A'-movement leaves the binding features of a moved element behind.

Then, we correctly rule in (28) and (29), since the binding features of the traces are [+a, -p] and [-a, +p], respectively. However, Barss points out that the statement in (30) cannot be extended to A-movement, since, if it was, (31) and (32) would incorrectly be ruled out by Conditions C and B, respectively:

(31) John₁ was arrested t₁
 -a,-p
 -a,-p
 (32) He₁ was arrested t₁
 -a,+p
 -a,+p
 -a,+p

Thus, (30) raises a conceptual problem; namely, why does A-movement differ from A'-movement in the relevant respect? That is one of the reasons why Barss abandons (30) and proposes the No Feature Hypothesis for empty categories. Cases like (25) and (26) will give an empirical support for his move. Notice that, in these representations, what is moved to an A'-position is *zibun*, which has been assumed to have either [+a, -p] or [-a, +p] as its binding features. If this is the case, it will be a mystery why this type of A'-movement of *zibun* shows a strong crossover effect, compared with the sentences in (28) and (29).

On the other hand, Barss's treatment of strong crossover under the linking theory seems to account for the contrast between (25) and (26) on the one hand and (28) and (29) on the other. He proposes the Chain Obviation Condition (COC), stated below:³

then the indices assigned in (26) will violate (i), since indices 1 and 2 are not disjoint in reference. That will be why (26) is ungrammatical.

- 3 The notion "contain" in (34) is reflexive. Thus, X contains itself. The notion of "antecedent" is defined as follows:
 - Y is an <u>antecedent</u> of X if X is linked to Y or, for some
 Z, X is linked to Z and Y is an antecedent of Z. (Higginbotham (1983, 404))

With the indices assigned in (26), the variable t₂ is A-free in the domain of the operator anaphor zibun, satisfying (27). However, if we assume the following interpretive condition, proposed by Lasnik (1989):

⁽i) If the intersection of the index of A and the index of B is null, then A,B are disjoint in reference.

ZIBUN AS DISTRIBUTOR

(33) The Chain Obviation Condition (COC) For a chain C = (a₁, ..., a_n), and for an expression Z where Z is not a member of C and Z is in an A-position, if Z is dependent upon a_i, then Z does not c-command any member a_j of C.
(34) X is dependent upon Y if:

(i) Y is contained in an antecedent of X, or

(ii) for some Z, X is dependent on Z, and Z is dependent on Y.

9

Barss assumes that, if the head of an A'-chain is a null operator, then this chain creates a composed chain with the element that the operator is linked to. Then, under the assumption that zibun functions like a null operator in (25), (Masao, zibun, t) create a composed chain, since zibun forms an A'-chain with its trace and it is linked to Masao. Then, kare is not a member of this chain, but it is dependent upon Masao and furthermore it c-commands one member of this chain, i.e., t; hence (25) violates the COC. On the other hand, in order to rule out (26) by the COC, it is necessary to modify the assumption with respect to a composed chain. since zibun seems to function like a true operator in this case. We would have to modify it as something like the following: if the head of an A'-chain is linked to some other element, then the chain creates a composed chain with that element. Here, the head of an A'-chain entitled to compose a chain is generalized from a null operator to any operator. Since I do not see any apparent problems with this modification and any consequences, let us just suppose that it is tenable. Then, in (26), (Masao to Yoichi, zibun, t) create a composed chain. Karera is not a member of this chain, is dependent upon Masao to Yoichi and c-commands a member of the chain, i.e., t. Hence, (26) violates the COC. On the other hand, the schematic LF structure of (28) and (29) will be something like the following:

(35)

| ↓ Himself/Him, John ... t ↑_____|

In (35), (himself/him, t) create an A'-chain. Since John is not dependent upon any element, it does not violate the COC. That is why the sentences in (28) and (29) are grammatical.

4. Zibun as Distributor

I have so far claimed that Katada's analysis is supported by the following facts: one is that *zibun* functions like a true operator when it takes a plural antecedent, and the other is that the LF movement of *zibun* shows a strong cross-over effect. However, I have also argued that her analysis has a problem with a weak crossover effect; that is, the LF movement of *zibun* does not show this effect.

I propose that *zibun* is characterized as a distributor like *each* of *each other*; along the lines of Heim et al.'s (1991) analysis. They propose that *each* of *each other* is attached to an NP at LF to make it an operator. Thus, in a sentence like

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(36), each is first adjoined to its antecedent, as shown in (37):4

10

Heim et al. also assume that, when *each* is attached to an NP, it functions like the head of the whole NP. This is obvious for a semantic reason, since the whole NP attached to by *each* means something like *each of the men*. Hence the value of *each* amounts to that of the whole NP. Therefore, as far as referential dependencies are concerned, linking to *each* will be the same as linking to the whole NP. Then, let us assume relinking which changes linking to *each* into linking to the whole NP, as shown below:

(38) [s[NP[NP the men] each][VP saw [NP e other]]]

Furthermore, once *each* is adjoined to an NP, the whole NP carries the same function as a quantifier like *each man*. That is why Heim et al. assume that, when *each* is attached to an NP, the whole NP undergoes Quantifier Raising (QR), so that we will get the following structure:

Similarly, there is good reason to consider that Japanese reflexive zibun functions as a distributor like *each* of *each other*. Interestingly, zibun always takes an atomic individual as its semantic value. Let us consider the following sentence:

(40) sono otoko-tati-ga zibun-o nikundeiru (koto)
 the men -nom self -acc hate fact
 'The men examined zibun.'

(40) only means that each of the men hates himself. I propose that Japanese reflexive *zibun* moves at LF as a distributor. Then, (40) will have the following LF derivation:

(41) a.	[s[NP[NP sono otoko-tati] zibun]-ga [VP e V]]
b.	[s[NP[NP sono otoko-tati] zibun]-ga [vp e V]]
с.	[s[NP[NP sono otoko-tati] zibun]-ga [s t [vP e V]]] ↑

In (41a), *zibun* is attached to its antecedent, and next relinking takes place as shown in (41b), since the whole NP has the same value as that of *zibun*. Then, QR applies to the whole NP to get (41c). Furthermore, let us just assume that, even when *zibun* takes a singular NP as its antecedent, it moves at LF as

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⁴ Since we have adopted the linking theory in the last section, we use linking instead of indexing for representations, unlike Heim et al. (1991).

ZIBUN AS DISTRIBUTOR

11

distributor. Then, sentence (42) will have the LF derivation as in (43):

We saw that *zibun* functions like a true operator when it takes a plural antecedent in sentence (16). The LF structure of (16) is repeated below:

(17) Masao and Yoichi₁ [VP zibun₂ [VP [s'[NP karera₁/ $*_2$...] t₂ ... \uparrow

Now, under our analysis where zibun is treated as a distributor, (16) will have the LF representation:

(44)

[s[NP[NP Masao and Yoichi] zibun][s t'... [NP ... karera ...] t

In (44), the chain ([[Masao and Yoichi]zibun], t', t) is created by first attaching distributor zibun to Masao and Yoichi and then, after relinking from zibun to the whole NP, moving that NP by QR. Thus, the linking from t to t' and from t' to the operator is straightforward. A problem arises about the linking of karera. Recall our assumption that linking is automatic under movement and that the position related through free linking is confined to A-positions except Saito and Hoji's (1983) assumption that linking to a referential operator is allowed. Then, the linking of karera to [Masao and Yoichi] does not seem possible under this assumption, since the position of [Masao and Yoichi] is not A-position nor is it an operator position. On the other hand, the linking of karera to the whole NP [[Masao and Yoichi]zibun] may be allowed, since it is in operator position. The question is whether this is a referential operator or not. The answer seems negative. However, there are cases where pronouns refer to the range of a true quantifier, as if they take the true operator as their antecedent and treat it as referential. Let us compare the two sentences below:

North East Linguistics Society, Vol. 22 [1992], Iss. 1, Art. 2

JUN ABE

In both cases, the linking of t to every linguist is construed as operator-variable chain, as is usually assumed. Further, when a pronoun is used as bound variable like he in (45a), it must be linked to another variable, since linking of a bound pronoun to its true operator is not allowed under the present assumption. However, in (45b), they refers to the range of every linguist. So it can be said that linking of they to every linguist is allowed because the operator is treated as referential in this linking. Suppose that this is correct. Then, going back to (44), the linking of karera to the whole NP [[Masao and Yoichi]zibun] would be allowed for the same reason as the linking of they to every linguist in (45b); that is, the whole NP is treated as referential when karera is linked to it. For this reason, I assume that, in (44), the linking of karera to the whole operator rather than that to the inner NP is a proper linking.

Notice that, if we assume (21) to describe the inability of *kare* and *karera* to be bound variables, then in (44) *karera* cannot be linked to t', since, the trace is a variable of the operator [[Masao and Yoichi]zibun]. Hence it violates (21). On the other hand, *karera* can be directly linked to that operator, and, in that case, it refers to the range of the operator. As a result, *karera* can only take the value of Masao and Yoichi. Then, (44) represents the following meaning: 'for each x, where x is Masao or Yoichi, x said that the teacher Masao and Yoichi liked hates x.' (44) has an advantage over (17) in that, while (17) does not clearly represent the fact that the matrix subject is distributed in the meaning of the sentence, (44) transparently expresses this fact, since *zibun* is treated as an atomic distributor and is attached to the matrix subject. Therefore, our characterization of *zibun* as a distributor is preferred over Katada's, from the viewpoint of the semantic transparency of LF representations.

We also saw the cases where *zibun* functions like a null operator when it takes a singular antecedent shown in (5). Now, under our analysis, (5) will have the following LF representation:

In (46), *kare* cannot be linked to t' according to (21), since the latter is a variable of [[Masao]zibun]. On the other hand, it can be directly linked to that operator, referring to its range, so that the operator functions as referential in this linking. Since its range is only Masao, *kare* can take the same value as *Masao* in (46).

12

ZIBUN AS DISTRIBUTOR

Let us consider a weak crossover effect. We saw that Katada's analysis of *zibun* raises a problem with this effect, which is shown in (18). Now, under our analysis, this sentence will have the following LF representation:

(47)

| | [s[NP[NP Masao and Yoichi] zibun][s t' [NP pro ...] t ...]] ↑_____|

Recall that we are assuming Saito and Hoji's (1983) condition (12) to derive a weak crossover effect, which states that a variable cannot be the antecedent of a pronoun that it does not c-command. In (47), pro can be linked to the variable t', since t' c-commands it. Therefore, under our analysis, we correctly rule in a sentence like (18) where the LF movement of zibun does not show a weak crossover effect. Notice that this comes from our proposal that zibun is first directly attached to its antecedent as a distributor. Further, Hong (1984) notes that the each-movement of each other does not show a weak crossover, either, as illustrated below:

(Hong (1984, 9-10))

13

The LF structure of (48b), for instance, will be as follows:

(49)

↓ | [s[NP[NP they] each][t put pictures of [e other] in their rooms ↑______

In (49), their may be linked to the variable t, since t c-commands their.

Finally, we saw that the LF movement of *zibun* does show a strong crossover, as illustrated in (25) and (26). Now, under our analysis, the structures in (25) and (26) will be represented as follows:

Now let us see whether these structures satisfy the COC, which we are assuming here to derive a strong crossover effect. If we take ([[Masao]zibun], t', t) and ([[Masao and Yoichi]zibun], t', t) as relevant chains for the COC, then these structures will violate this condition, since *kare* and *karera* are not members of these chains, but they are dependent on the operators and c-commands t, a member of these chains.

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⁽⁴⁸⁾ a. They₁ introduced their₁ mothers to each other₁'s teachers.
b. They₁ put pictures of each other₁ in their₁ rooms.

One may ask the question of whether the linking of t to t' in (50) and (51) forms a chain in a relevant sense for the COC. Barss assumes that a chain stated in the COC includes A-chain and A'-chain. But the linking of t to t' is not an A'-chain nor an A-chain. Notice that this chain involves two theta-positions, so it should not form an A-chain. So what makes this linking a chain relevant for the COC? One answer will be that movement always makes a chain, so that the linking of t to t' can be regarded as a relevant chain for the COC. Another answer, which is more interesting, is that an operator-variable chain always counts as a relevant for the COC, no matter whether a variable is a formal or semantic variable. There is some evidence for this claim. Let us consider the following examples:

- (52) a. Every linguist, here criticized the books her wrote for their, publishers.
 - b. *Every linguist₁ here criticized the books they₁ wrote for his₁ publishers.

(52b) seems to have a configuration characteristic of a strong crossover effect. Notice that *they* refers to the range of *every linguist* and that it intervenes between the formal variable and the bound pronoun. The schematic LF structure of (52b) will be something like the following:

(53)

14

3) +[Every linguist][IP t ... they ... his ...] ↑ ______|

The ungrammaticality of (53) follows from the COC if we assume that a chain relevant for the COC includes an operator-variable chain, where a variable is either a formal or semantic variable. Suppose that this is correct. Then, in (53), (every linguist, t, his) makes an operator-variable chain, and *they* is not a member of this chain, but it is dependent on a member of the chain, that is, *every linguist*, and it c-commands a member of the chain, that is, *his*. Hence (53) violates the COC. Let us turn to (50) and (51). Under the present assumption, ([[Masao]zibun], t', t) and ([[Masao]and Yoichi]zibun], t', t) make an operator-variable chain in (50) and (51), respectively. *Kare* and *karera* are not a member of these chains, but they are dependent on a member of the chains, that is the operators [[Masao]zibun] and [[Masao and Yoichi]zibun], and, also c-command a member of the chains, that is, t. Hence, (50) and (51) violate the COC, which now incorporates an extended notion of a chain.

5. Conclusion

I claimed that Katada's proposal that *zibun* is an operator variable has a problem with a weak crossover effect; that is, movement of *zibun* does not show this effect. On the other hand, I presented some evidence for her proposal. First, *zibun* functions like a true operator when it takes a plural antecedent. Second, movement of *zibun* shows a strong crossover effect. I proposed as an alternative to Katada's that *zibun* is characterized as a distributor like *each* of *each other*, along the lines of Heim et al. (1991). In this alternative, *zibun* is first attached directly to its antecedent, so that it makes the whole NP it attached to an operator.

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ZIBUN AS DISTRIBUTOR

Then, the whole NP undergoes QR. The fact that zibun functions like an operator is attributed to the second movement by QR, and the fact that only a strong crossover effect emerges with movement of *zibun*, but not a weak crossover effect, is attributed to the first movement, in which zibun is directly attached to its antecedent.

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15