

On Control into NP*

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0. Introduction

In this paper, we will consider a construction like (1a) which might suggest the existence of something like control relation in NP.

- (1) a. The leaves curl during maturation.
- b. The leaves curl while maturing.

In (1a) we understand that the leaves curl during the leaves' maturation, parallel to (1b) which involves control of PRO. The main purpose of this paper is to make clear what principles are operative in (1a) to interpret the subject of maturation and what parallelism holds between (1a) and (1b).

In the first section of this paper, we will survey Chomsky's (1985) idea that there is a PRO subject of NP (called here the NP PRO theory, following Williams (1985)), according to which the representation of (1a) is like (1a'), which is completely parallel to that of (1b).

- (1) a'. The leaves curl during [_{NP} PRO maturation]

After showing some problems of his analysis in section 2, in section 3 we will discuss Williams' (1985) theory, which is based on other mechanisms than those of the NP PRO theory. His main idea seems to be a valid one, although some inadequacies remain. In section 4, we will present our theory to overcome Chomsky's and Williams' difficulties, concentrating on the facts about the binding relation in NP. Finally, some of the consequences will be shown.

1. Chomsky (1985) : The NP PRO Theory

Chomsky (1985) argues that an NP may have a PRO subject in its specifier position (the NP PRO theory), mainly from the facts with respect to binding relation in NP. Let us survey his claim, considering the following examples:

- (2) a. They_i told [_{NP} stories about each other_i]
 b. *They_i told [_{NP} stories about them_i]
- (3) a. They_i heard [_{NP} stories about each other_i]
 b. They_i heard [_{NP} stories about them_i]

In (2) and (3), the NP has no subject. The binding theory, with the form (4), requires that the anaphor be bound in the full clause and the pronominal be free in the full clause because the governing category is the full clause in (2) and (3).¹

- (4) a. An anaphor is bound in its governing category.
 b. A pronominal is free in its governing category.
 c. An R-expression is free.

(Chomsky (1981))

Cases (2a, b) and (3a) are as expected, but (3b) is not. Contrary to expectations, in (3b) the pronoun them can be coreferential with they. If the S-structure and LF representation correspond straightforwardly to the surface structure in (3b), then we have a violation of the binding theory.

Chomsky argues that in (2b), we assume that the stories to be theirs, whereas in (3b) we assume them to be someone else's, and hence the representations of (2b) and (3b) would be as follows:

- (5) a. * They_i told [_{NP} PRO_i stories about them_i]
 b. They_i heard [_{NP} PRO_j stories about them_i]

In (5), the governing category for them is the NP because the NP has a PRO subject. Hence (5b) is grammatical because them is free in the NP, while (5a) is ungrammatical because them is not free in the NP.

Another evidence in support of this assumption, as discussed by Chomsky (1985) and Ross (1969), is provided by the following pair in (6).

- (6) a. [_{NP} The knowledge that John might fail] bothered him.

- b. [_{NP} The possibility that John might fail] bothered him.

In (6b) John can be the antecedent of him, but in (6a) it cannot. According to Chomsky, this is because the NP of (6a) has a PRO which is controlled by him, as in (7) which is the normal control structure, and binding theory requires that John be disjoint from PRO.

- (7) [_{NP} PRO knowing that John might fail] bothered him.

As to (6b), on the other hand, this problem does not arise because there is no subject appearing in the specifier position in this case:

- (8) a. our knowledge that S
b. *our possibility that S

Thus Chomsky's NP PRO theory can, in a very simple way, account for the fact that in (6a) John cannot be the antecedent of him, which would otherwise require a rather complicated explanation.

Further evidence in favor of the NP PRO theory might be provided by the following contrasts.

- (9) a. [_{NP} The picture of himself] was important to John.
b. * [_{NP} The picture of herself] shows that Mary is an excellent dancer.
(Terazu (1983))
c. [_{NP} The picture of herself] shows [_S Mary to be a liar]
(Ibid.)
d. * [_{NP} The picture of himself] pleased John's sister.
e. [_{NP} The fear of himself] is John's greatest problem.
(Bouchard (1985))

- (10) a. Washing himself was important to John.
b. *Contradicting himself will prove that Mr. Jones is a liar.

(Mohanani (1983))

- c. Contradicting himself will prove [_S Mr. Jones to be a liar]

(Ibid.)

- d. *Living by himself depressed John's sister.

(Hasegawa (1983))

- e. Living by himself would damage John's health.

(Ibid)

It is well known that picture noun phrases create exceptional syntactic phenomena with respect to anaphor binding; for example, the anaphor can take a non-c-commanding antecedent, as in (9a). As can be seen from (9b-e), however, when the anaphor is not c-commanded by the antecedent, there are some special conditions on the binding relation.

Note that if we posit a PRO subject in the specifier position of the NP in (9), then the conditions just mentioned are not on anaphor binding, but on control in general. This seems to be correct, because the great parallelism holding between (9b-e) and (10b-e) can be straightforwardly explained.

2. Problems of the NP PRO Theory

In this section, two problems of the NP PRO theory will be pointed out.

First, PRO is not always present in the specifier position when a lexical NP is not there and there seems to be no independent motivation for positing a PRO subject of NP, although it is required by the binding theory, as shown in the preceding section. Let us consider (3a, b) again, repeated here as (11a,b):

- (11) a. They_i heard [_{NP} stories about each other_i]
 b. They_i heard [_{NP} stories about them_i]

The examples in (11) are grammatical with each other and them sharing the same index with they. As section 1 showed, the

S-structure (or LF representation) of (11b) is as follows:

- (12) They_i heard [_{NP} PRO_j stories about them_j]

Therefore, the example (11a) would require that the NP has no PRO in the specifier position, for if it did, the PRO would have to bind the reflexive and be controlled by they, but this would imply that stories are theirs, which is wrong for this example.

Thus it follows that PRO is obligatorily present in some circumstances while it is absent in other circumstances to satisfy the binding theory.

Let us now turn to (13a, b) below, which seem to be more problematic. In (13a, b) it is not clear whether PRO is present or not in the specifier position, if the PRO is required only to satisfy the binding theory as in (11).

- (13) a. John_i saw [_{NP} pictures of himself_i]
 b. John_i saw [_{NP} pictures of him_i]

In (13a), for example, if we posit the PRO subject controlled by John, the governing category for himself would be the NP, while if we do not posit the PRO subject, the governing category for himself would be the full clause. In either case, himself is properly bound by John or the PRO controlled by John within the governing category. Thus it seems to be impossible to determine whether PRO is present or not in examples like (13).

The second problem is that control of PRO in NP does not work in the same way as control of PRO in S, making the NP PRO theory doubtful. For example, in (12) PRO must be disjoint from them. In the case of PRO in S, however, control is obligatory when the S containing PRO appears as a complement of a verb. (See Manzini (1983) for details.)

Furthermore, consider the contrast below, cited from Williams (1982, 1985).

- (14) a. The leaves should not be bothered while
 dessicating.

- b. The leaves should not be bothered during dessication.
- c. *You should not bother the leaves while dessicating.
- d. You should not bother the leaves during dessication.

Examples in (14) show that the controller in the case of the gerund is restricted to surface matrix subject, whereas the controller of the PRO in NP could be either subject or object.

The following example also shows the same problem.

- (15) We felt that [_S [_{NP} any (PRO) criticisms of each other] would be inappropriate]

In (15), it is "our" criticisms that we feel would be inappropriate. According to the NP PRO theory, one might naturally assume here that the PRO, which would be contained in the specifier position of the NP, is controlled by we. Note, however, that in (15) the PRO in the NP must be bound by its antecedent inside the immediate matrix clause, shown by (16):

- (16) *We thought that John felt [_S [_{NP} any (PRO) criticisms of each other] would be inappropriate]

But there is no such restriction on PRO in the normal control structure:

- (17) a. Mary said that John knows that [PRO to behave herself in public] would help Bill.
(Mohanana (1985))
- b. Eric knows that Roxane said it would be difficult [PRO to criticize herself/himself]
(Bouchard (1984))

So, in order to rule out sentences like (16), the NP PRO theory would require some extra machinery to guarantee that PRO in NP unlike PRO in the normal control structure, will find its antecedent in its own clause or its immediate matrix clause as in (15). Thus, here again, we must admit that PRO in NP behaves very

differently from PRO in S, regardless of the great parallelism between (9) and (10) in the preceding section.

3. Williams (1985)

In this work, Williams argues against the idea of positing a PRO subject in NP and introduces some important mechanisms for the relevant facts. In this section, we will discuss his claim.

To begin with, let us consider (18):

(18) John took a picture of Mary.

In (18), John is understood as Agent or Maker of picture. According to the NP PRO theory, this fact is explained in the following way: PRO in the specifier position of picture is assigned the role, as any NP in this position would be, and John controls the PRO.

Williams (1985), on the other hand, argues that the account just mentioned cannot be extended to (19), which appears to involve the same phenomenon as (18).

(19) John took Mary's picture (t).

Here, the specifier position is occupied by Mary and so PRO cannot occur, yet John is still understood as Agent of picture. Thus Williams assumes that there must be some way to establish directly this link between John and the Agent role (his association rule), but not between John and the specifier position of picture. This association rule is part of the meaning of take, which says that its subject is understood as filling its object's Agent role, which can be linked to the syntactic position as in (20):

(20) John_i took his_i first picture yesterday.

Assuming that lexical items have a list of arguments as in (21), and that these arguments are syntactically visible, Williams introduces the mechanism for his association rule, illustrated in (22):

(21) Give : (Agent, Theme, Goal)

disjoint from they.

(24) They_i told [_{NP} stories about them { *_i }_j]

According to the NP PRO theory, the NP has a PRO subject controlled by the matrix subject they. So, the binding principle (4b) requires that them be disjoint from the PRO, and hence from they which controls the PRO. Thus the NP PRO theory correctly predicts the disjoint relation between they and them.

Now, let us examine how the binding theory works in Williams' (1985) theory. Williams claims that the binding relation in (24) can be equally well treated under his theory, by letting the binding theory "see" the implicit arguments (the unexpressed arguments)² and giving the following treatments of implicit arguments:

An implicit argument c-commands X if the verb (or noun) of which it is an implicit argument c-commands X. If an implicit argument is coindexed with X and c-commands X, then it binds X.

Given this, in (24) the implicit argument (teller) of stories c-commands them and is in the same local domain (NP) as them. Thus the disjoint relation between the two arguments of stories holds under the binding theory. And they is identified with the Agent role by the association rule in (22), so they must be disjoint from them, as expected:

(24') *They_i told [_{NP} stories about them_i]
 (Agent_i, Theme)

Note, however, that the following pair (=3) seems to be a problem for Williams' analysis, as well as for Chomsky's.

(25) a. They_i heard [_{NP} stories about each other_i]
 (Agent_j³, Theme)

- b. They_i heard [_{NP} stories about each other_i]
 (Agent_j, Theme)

In (25), both them and each other can be bound by they. So, Williams must assume that in (25a) the binding principle (4b) sees the implicit argument (Agent) of stories whereas in (25b) the binding principle does not see it. If the binding principle were to see the implicit argument (Agent_j) in (25b) as in (25a), then (25b) would be wrongly marked as ungrammatical because each other would be free in its governing category NP.

The same remark could be made on the following pair, where the association rule or something like that would not apply.

- (26) a. They_i tore up [_{NP} pictures of them_i]
 (Agent, Theme)
- b. They_i tore up [_{NP} pictures of themselves_i]
 (Agent, Theme)

In (25) and (26), both the anaphor and the pronominal can be bound by they, which leads Chomsky to assume that a PRO optionally appears in the specifier position. Similarly, Williams must assume that the binding theory optionally sees the implicit argument. Thus the first problem of the NP PRO theory remains unsolved. In the next section, we will try to give an answer to this problem.

4. Control and Binding in English

Our main concern in this section is to give an answer to the problem why both the anaphor and the pronominal can be bound by they in (25) and (26). To solve the problem, we assume that the main idea of Williams (1985) is a valid one, except for the association rule. Instead, we assume a rule of control whose target is an implicit argument, but not PRO as in the normal control structure.⁴ The nature of control and binding in NP, which is somewhat different from that in S, will be investigated in this section.

- (31) (i) α is bound by β in the NP (governing category).
 or (ii) β controls the implicit argument with which
 α is coindexed (indirect binding).

In (31ii) we assume that β can control an implicit argument of NP if and only if β is in the same θ -domain as the NP to rule out examples as in (32), with the definition of θ -domain as in (33), following Nishigauchi (1984).

- (32) a. *John's_i mother took pictures of himself_i.
 b. *Pictures of himself_i were taken by John's_i
 mother.

- (33) γ is the θ -domain for α if γ is a minimal category —NP, \bar{S} (or S) — that contains (i) α and (ii) a θ -assigner for α .

Given (33), John and pictures of himself in (32) are not in the same θ -domain, so John cannot control into the NP. Some other justification for the notion of θ -domain will be examined in the next section.

(31i) is the standard binding theory for the anaphor, whereas (31ii) is not. So, we must mention (31ii); how can the anaphor satisfy the binding theory by (31ii)? Consider the sentence below:

- (34) PRO to wash herself was important to Mary.

Nishigauchi (1984) observes that PRO in (34) is thematically controlled and that there are similarities between the behavior of thematically controlled PRO and that of the anaphor: (i) lack of split antecedent and (ii) obligatoriness of the antecedent. Note that his thematic control is defined on the basis of the θ -domain. There is an apparent parallelism between (27)-(28), for example, and (34). As for (34), we might say that the PRO as an anaphor is licensed by the controller Mary, for if Mary is outside the clause, and hence is not in the same θ -domain as the minimal S which contains the PRO, then the PRO is no

longer anaphoric, but pronominal.

Thus, in this section the first problem of Chomsky (1985) (and also of Williams (1985)) has been solved on the assumption that examples such as (25) and (26) are control constructions.

5. Conclusion and Some Consequences

To summarize, we have discussed the problem of control into NP and have argued that in NP, unlike in S, the target of control is the implicit argument in the argument structure of NP, following Williams' (1985) idea (But, as section 3 showed, he assumes the association rule, but not a rule of control). Our argument is, however, different from Williams' (1985) in that ALL NPs with its argument structure can be the control structure in our theory. In the preceding section, we have examined how binding and control work in our theory.

In this section, we will discuss some consequences that arise from the discussion presented so far. Let us consider (35):

(35) Each other's_i pictures were important to them_i.

Cases like (35) cannot be accounted for straightforwardly by the standard theory of the binding, for in (35) the antecedent them does not c-command each other. If we are on the right track, however, (35) is the control construction and each other is indirectly bound by them; them, which is in the same θ -domain as the NP containing each other, controls the implicit argument with which each other is coindexed.

Now, compare (36) with (35):

(36) *Each other's_i girl friends upset the boys_i.

Thus, the difference in the grammaticality between (35) and (36) depends on whether the head noun of the NP containing the anaphor has its argument structure or not.

We presented the notion of θ -domain for a controller in section 4. The necessity of this notion is evident from the examples in (37):

- (37) a. *Each other's_i pictures would please their_i professor.
 b. *Each other's_i pictures convinced John that the boys_i
 were in love with the same girl.

(Mohanana(1985))

The examples in (37) indicate that the stipulation that an anaphor as in (35) can take a non-c-commanding antecedent is not sufficient to characterize the behavior of the anaphor. In our theory, the ungrammaticality of the examples in (37) is due to the inapplicability of control. And it is because their in (37a) and the boys in (37b) are not in the same θ -domain as the NPs containing the anaphors.

Now, let us return to the parallelism between (9) and (10) in section 1. To repeat:

- (9) a. [_{NP} The picture of himself] was important to John.
 b. * [_{NP} The picture of herself] shows that Mary is an excellent dancer.
 c. [_{NP} The picture of herself] shows [_S Mary to be a liar].
 d. * [_{NP} The picture of himself] pleased John's sister.
 e. [_{NP} The fear of himself] is John's greatest problem.
- (10) a. Washing himself was important to John.
 b. *Contradicting himself will prove that Mr. Jones is a liar.
 c. Contradicting himself will prove [_S Mr. Jones to be a liar].
 d. *Living by himself depressed John's sister.
 e. Living by himself would damage John's health.

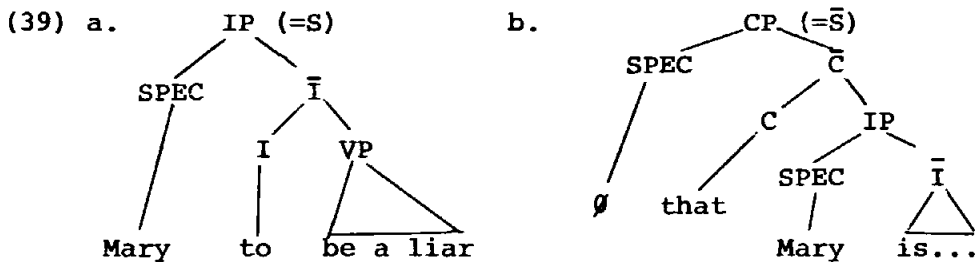
The parallelism between (9) and (10) comes from the same rule (control) applying to both of them. Thus, given the notion of θ -domain, cases (9a, b, d) and (10a, b, d) can be explained. But, cases (9c, e) and (10c, e) seems to be a problem for our analysis.

To solve the problem, we will propose the following condition (38), assuming that a controller must be [+animate]:

- (38) If every category in the same θ -domain as the minimal category containing a controllee is [-animate], then its specifier is a possible controller.

With the condition (38), the contrast between (9d) and (9e), for example, can be explained: in (9d) John's sister is [+animate], so John cannot be a controller, whereas in (9e) John's greatest problem is [-animate], so its specifier John can be a controller. The same explanation holds for the contrast between (10d) and (10e).

Let us turn to the contrast between (9b) and (9c). Here, we assume Chomsky's (1986) version of X-bar theory, according to which, the phrase structure of the S or \bar{S} complements of (9b) and (9c) are (39a) and (39b), respectively:



As seen in (39), Mary in (39a) is the specifier of IP (S complement of (9b)), while Mary in (39b) is not the specifier of CP (\bar{S} complement of (9c)). Thus, the fact that only Mary in (9b) can be a controller follows. The same explanation holds for the contrast between (10b) and (10c).

The parallelism between (9) and (10) and the difference in the grammaticality among them are, thus, elegantly explained without any problem.

NOTES

*I would like to express my deepest gratitude to Jun Abe, Hiroaki Horiuchi, Daisuke Inagaki, Hiroto Ohnishi and Toshifusa Oka for their invaluable comments and criticisms on an early version of this paper. I am also grateful to Wayne Lawrence

for acting as an informant. Needless to say, all remaining errors are my own.

¹ Following Chomsky (1981), we define governing category as in (a), along with the independent principle (b) and the notion accessibility defined in (c).

- (a) β is a governing category for α if and only if β is the minimal category containing α , a governor of α and a SUBJECT accessible to α .
- (b) The i-within-i condition
* $[_\delta \dots \alpha \dots]$, where δ and α bear the same index.
- (c) α is accessible to β if and only if β is in the c-command domain of α and assignment of the index of α to β would not violate (b).

² This terminology is from Roeper (1983).

³ However, this jointness between they and Agent of stories might not be part of Williams' association rule.

⁴ Here, we are assuming that no principle in the grammar should refer specifically only to, for example, PRO. Thus, the target of control may be some other kind of NP, as also argued in Saito (1985).

⁵ Note that the possibility that they controls the Agent role of pictures must be excluded; otherwise, the (a) examples in (25) and (26) wrongly ruled out for exactly the same reason as (24'). As for (25), this possibility is excluded for a semantic reason; the verb hear seems to specify that they must be disjoint from the Agent role of pictures. But, for (26), it is not. We assume, then, that whether pictures are taken by them or by someone else is vague in (26), and hence it should not be handled in the syntax. Thus we propose the following condition:

- (i) The Semantic Preserving Condition

No syntactic rule can "build up" any new meaning
We owe this condition to Jun Abe (personal communication).

⁶ To be more exact, the head noun of NP has its argument structure.

⁷ This example was pointed out to me by Toshifusa Oka.
See also Oka (1986).

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