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More On the VP-attachment Analysis of OS-relatives*

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I. Introduction

In Takahashi (1984b), we argued that the VP-attachment theory given below offers a better explanation for children's subject control misinterpretation of OS-relatives[1] than the generally accepted S-attachment theory.[2]

(1) There is a stage in early language development in which children interpret all sentence-final embedded clauses that function as modifiers (one of which is the OS-relative) to be modifying the matrix VP and analyze them to be Chomsky-adjoined to the VP node.

In this paper, we will attempt to show that further support for this claim can be found in the results of an investigation reported in Otsu (1981).

The following assumptions will be adopted here in addition to the seven listed in section II of Takahashi (1984b).

The first is that children's structural analysis of a clause at the beginning of the VP-attachment stage is not (2) b. but (2) a..

(2) a. S: COMP NP VP   b. $\overline{S}$: COMP, S (NP VP)
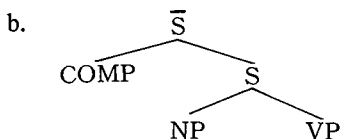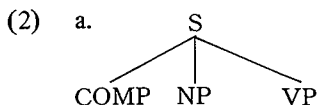
In other words, we presume that $\overline{S}$ does not exist in early child grammar[3] and that COMP appears as the leftmost daughter of S at this stage. The difference between (2) a. and (2) b., however, does not affect the controller selection of OS-relatives discussed in Takahashi (1984b).

The second assumption is that children obey the following constraint.

(3) COMP cannot be filled by more than one wh-element.

Thirdly, we assume that NP and S are the bounding nodes for Subjacency in English.[4]. We also assume that this is the hypothesis children entertain in the absence of positive evidence to the contrary.[5]

II. Otsu (1981)

Otsu (1981) carried out a series of experiments to show that:

(4)   there is strong empirical support for the claim that the Subjacency Condition is part of the innate schematism that allows language acquisition.   (Otsu (1981) p.84)

What he actually tested was the acquisition of the following constraint.

(5)   No movement rule can extract constituents out of a relative clause[6].

In the "Extended Standard Theory" of the generative grammar, (5) is considered to be subsumed under the Subjacency Condition (henceforth SC),[7] which can be informally expressed as:

(6)   No constituent can move across more than one bounding node in any single rule application.
        bounding nodes: NP and S

The rationale underlying Otsu's experiments can be summarized as follows.
If it can be shown that:

(7)   as soon as children master a structure that is relevant to a universal condition P, they honor P with respect to that structure,

it gives strong support to the claim that the condition P is part or the 'innate linguistic endowment'.
Since the relative clause construction is one of the 'structures relevant to' the SC, the claim that the SC is innate amounts to the following statement.

(8)   As soon as children master the relative clause construction, they honor SC with respect to it.

In order to claim (8), experiments described in (9) need to be carried out.

(9) 1. Syntax test: a test to see whether children have mastered the structure of the relative clause construction

　　 2. SC test: a test to see whether children honor the SC

And if the results of the experiments support the statement given in (10), (8) and hence (4) can be concluded.

(10) Children who pass the Syntax test will also pass the SC test.

60 children ranging in age from 3 to 7 years participated in the following experiments.

The Syntax test had two parts. In one, children's comprehension of OS-relatives such as in (11) were tested using a toy-manipulation task.

(11) The cow kissed the horse that jumped over the elephant.

The matrix verbs were randomized among the four listed in (12).[8]

(12) a. kiss, push ($\rightarrow$ OS–A)
　　 b. jump over, bump into ($\rightarrow$ OS–B)

In the other, children's ability to repeat OS-relatives such as the one in (13) were tested.

(13) John is painting a dog that is eating lunch with a fork.

In the SC test, children were shown a picture and heard a story that described the situation depicted in it. For instance, they would hear:
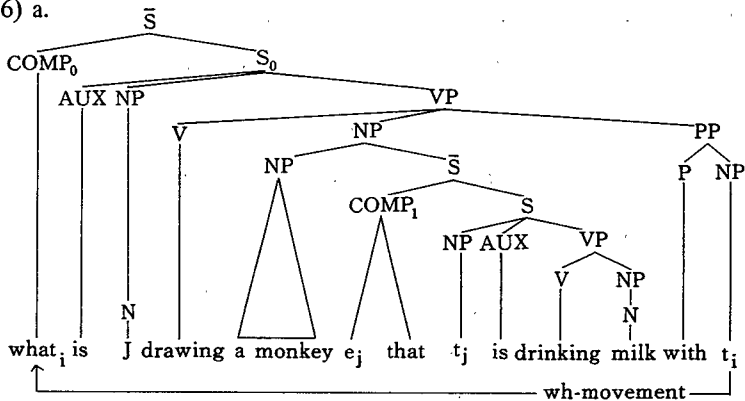
(14) Jane is drawing a monkey with a crayon.
　　 The monkey is drinking milk with a straw.
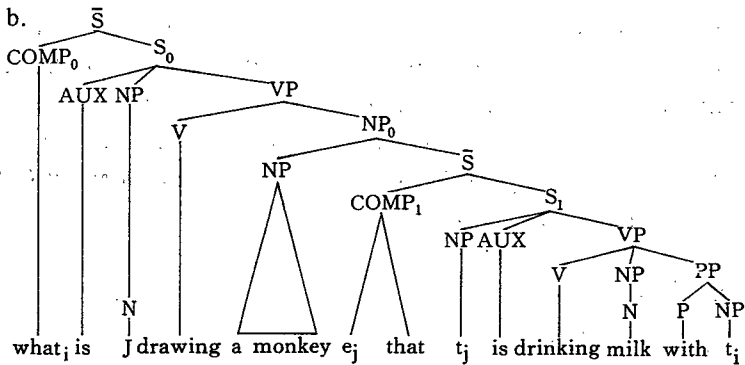
Then, they were asked the following question.

(15) What is Jane drawing a monkey that is drinking milk with?

Prima facie, sentence (15) is ambiguous, each reading corresponding to the two structures given in (16).[9]

(16) a.

$\bar{\bar{S}}$
COMP$_0$ · S$_0$
AUX NP VP
V NP PP
NP $\bar{S}$ P NP
COMP$_1$ S
NP AUX VP
V NP
N N

what$_i$ is J drawing a monkey e$_j$ that t$_j$ is drinking milk with t$_i$

wh-movement

b.

$\bar{\bar{S}}$
COMP$_0$ S$_0$
AUX NP VP
V NP$_0$
NP $\bar{S}$
COMP$_1$ S$_1$
NP AUX VP
V NP PP
N N P NP

what$_i$ is J drawing a monkey e$_j$ that t$_j$ is drinking milk with t$_i$

In (16) a., the *with*-phrase is attached to the matrix VP, while in (16) b., it is attached to the VP in the relative clause. The answers to question (15) corresponding to each of these structural analyses are:

(17)   a. with a crayon ((16) a.)
        b. with a straw ((16) b.)

Note, however, that while the *wh*-movement which derives (16) a. crosses only one bounding node (S$_0$), the one which derives (16) b. moves across three (S$_1$, NP$_0$, and S$_0$). This means that the structural analysis of (16) b. would be excluded by the SC. Children who honor the SC, therefore, are expected to answer, "with a crayon" and not, "with a straw" to the question. Each child received four such story-question pairs.

To ensure that no one who made random guesses pass the tests by

chance, the criteria for passing were set up as in (18).

(18)   Syntax test   1 : 2 or more correct out of 3 and
                      2 : 3 or more correct out of 4
        SC test   : 3 or more correct out of 4

The results of the experiments turned out to be as follows.

Table 1

Syntax test / SC test	Pass	Fail
Pass	21	9
Fail	7	23

Table 1 shows that 28 children passed the Syntax test. These are the children relevant to statement (10). 21 of them also passed the SC test, while 7 of them failed. This means that statement (10) is supported by 75% (21/28) and contradicted by 25% (7/28) of the children who are relevant to it. Otsu judged that the results as a whole bear out (10) and reached the conclusion (4).[10]

III. Discussion

3-1 The problem

We would like to point out here that Otsu's analysis of the experimental results overlooks a potential problem.

Upon closer examination of his data, we find that there were 14 children who gave subject control interpretation to at least two of the three OS-relatives they were given in Syntax test 1. They thus failed the Syntax test. 12 of them also failed the SC test. Consequently, these children were classified in the lower right-hand column of Table 1. But is it true that they had not mastered the structure relevant to the SC? And did they violate the SC? Our anwer is no.

We have been claiming that children go through a stage in which they can analyze the internal structure of the matrix sentence and the relative clause correctly but make a mistake about where the latter is attached. The high proportion of subject control responses indicates that these 14

children were indeed at such a stage of development. The S-attachment theory and our VP-attachment theory agree on this point. The former, which claims that the relative clause is attached to the root S-node, and the latter, which maintains that the relative clause is attached to the matrix VP node, are both compatible with the behavior of these children, since the distinction between the responses to OS-A and OS-B, which is crucial for choosing between the two theories, was disregarded in the analysis of Syntax test 1. If the former is correct, the structure assigned to (15) by these children would be as in (19). If the latter correctly describes children's competence at this stage, their structural analysis of (15) would be as in (23). In either case, these children can be said to have mastered the structure relevant to the SC. For there is no reason why (19) or (23) should be excluded from the application of the SC.

Then, if 12 of them really violated the SC as the results of the SC test apparently suggest, they must be taken to be the evidence against statement (7), which would lead to a considerable weakening of Otsu's argument.[11]

3-2 S-attachment theory

There has been attempts to avoid this undesirable conclusion using the S-attachment theory.[12] Let us examine the validity of this approach first.
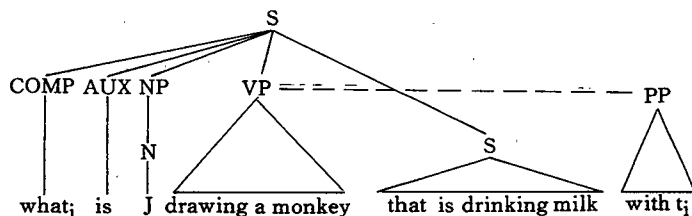
Children who attach relative clauses to the root S node will assign the following structure to question (15).

(19)
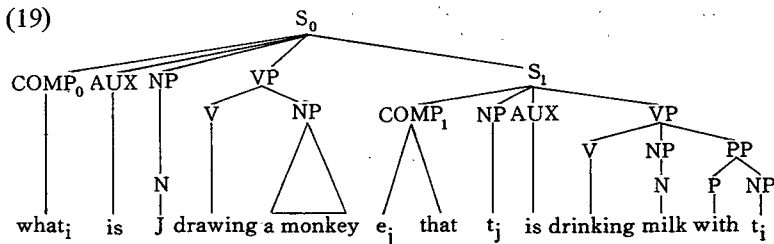
Note in (19) that the *with*-phrase is attached to the VP in the relative clause. This is the only structural analysis permitted by the S-attachment approach, since the adjunction of the *with*-phrase to the matrix VP node

would cause the lines in the tree to cross, as illustrated in (20).

(20)

```
                                S
          COMP AUX  NP      VP = = —  — — — — — — — —  — PP
            |    |    |          /\            S          /\
            |    |    N         /  \          / \        /  \
          what_i  is  J  drawing a monkey  that is drinking milk  with t_i
```

Therefore, the only option left to the children is to answer, "with the straw" to question (15) and to fail the SC test.
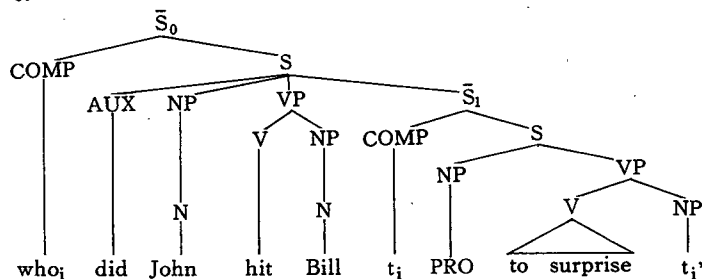
But in the derivation of structure (19), the SC is not violated. The wh-movement which derives (19) crosses only one bounding node, namely S_1. This seems to settle the issue.

This approach, however, has a serious problem. By analyzing the relative clause to be attached to the root S node and allowing the extraction of an element out of it, it is arguing in effect that children are violating the Condition on Extraction Domain (henceforth CED). Huang (1982) formulates this principle as follows.

(21)   A phrase A may be extracted out of a domain B only if B is properly governed.[14]

The CED, for example, explains why (22) b. is judged as ungrammatical even though the *wh*-movement which derives it observes the SC.

(22)   a. John hit Bill to surprise him.
   b. *Who did John hit Bill to surprise?
        c.

```
                     S̄_0
          COMP              S
            |          AUX   NP   VP          S̄_1
            |           |    |    |  \     COMP      S
            |           |    |    V  NP      |      NP    VP
            |           |    N    |  N       |       |    V    NP
          who_i        did  John hit Bill   t_i    PRO  to surprise  t_i'
```

Observe in (22) c. that $\overline{S}_1$ from which t_i is extracted is not properly governed. Structure (19) has essentially the same structure as (22) c. In (19) also, S_1 from which t_i is extracted is not properly governed.

The CED is quite a basic principle which explains various phenomena observed in many languages in a unified way. Thus, it can be regarded to be another very probable candidate for 'an innate linguistic endowment'. To argue that the CED is violated at a stage in language development presents a problem as serious as the failure to explain the apparent violation of the SC. Therefore, the S-attachment theory cannot be accepted to be the solution of the problem raised in 3-1.

3-3. VP-attachment theory

Now let us try out the VP-attachment theory.

Children who attach relative clauses to the matrix VP node would assign the following structure to question (15), assuming that VP-attachment means Chomsky-adjunction to VP.

(23)
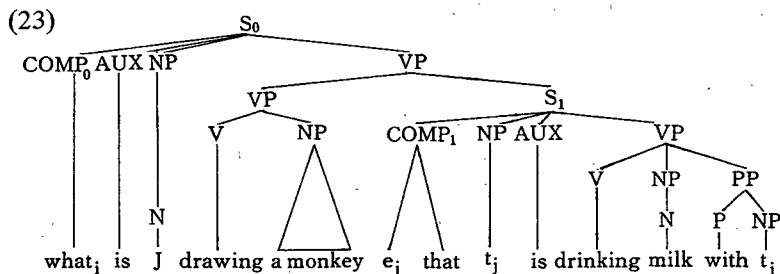
In this case also, the *with*-phrase cannot be attached to the matrix VP. See (24) for illustration of the fact that adjunction of the *with*-phrase to the matrix VP would lead to the violation of the 'no-tangle constraint'.

(24)
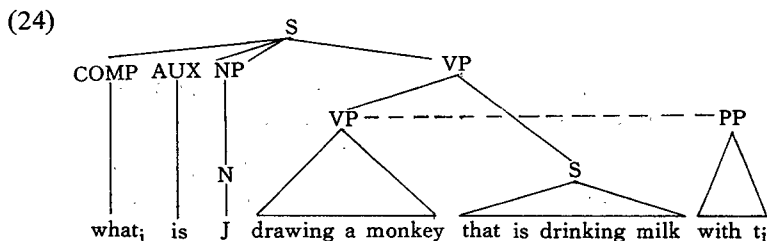
It follows that the *with*-phrase can only be attached to the VP in the relative clause as in (23). Children who are at the 'VP-attachment stage, therefore, have no choice but to answer, "with a straw" to question (15). They thus fail the SC test.

But here again, it can be shown that the SC is not really violated. The *wh*-movement involved in the derivation of (23) crosses only one bounding node, S_1.

Note that in (23), the CED is also observed: S_1 is properly governed by the matrix verb, *drawing*.

Thus the behavior of the 12 children has been explained. They misanalyze relative clauses to be Chomsky-adjoined to the matrix VP node and give a high proportion of subject control responses to OS-relatives in Syntax test 1.[15] Nevertheless, they can be said to have learned a structure relevant to the SC. They also fail the SC test but it was shown that they are not really violating the SC. Therefore, these children actually support statement (8) and strengthen the argument that the SC is part of the 'innate linguistic endowment'.[16]

IV. Conclusion

We have shown that the VP-attachment theory not only solves a potential problem found in Otsu's analysis of his data but also serves to strengthen his argument. The S-attachment theory was unable to do so because it encountered difficulties with the CED. It can be concluded that Otsu's investigation on the acquisition of the Subjacency Condition presents further evidence in favour of the VP-attachment theory.

NOTES

* This paper resumes the argument presented in Takahashi (1984b). See the above for background discussion and the definition of terms used here.

1) OS-relatives are sentences which contain restrictive relative clauses which has a gap in the subject position and whose antecedent is either the object of the matrix sentence or the object of the preposition in the matrix VP. We call the former OS-A and the latter OS-B.

(i) a. The dog hits the cat that kisses the pig. (OS-A)
   b. The dog stands on the cat that kisses the pig. (OS-B)
Young children often interpret the matrix subject to be coreferential with the subject gap in the relative clause.

2) The S-attachment theory claims that the relative clause is attached to the root S node.

3) For discussion on the absence of $\overline{S}$ in early child grammar, see Phinney (1981). See also Roeper (1982).

4) Otsu (1981) assumes that $\overline{S}$ as well as S and NP are the bounding nodes. Our alteration does not affect his argument.

5) Children acquiring English, therefore, will never change their original hypothesis. Italian children, on the other hand, would drop S and replace it by $\overline{S}$ upon encountering sentences such as (ii).
   (ii) Tuo fratello, a cui mi domando che storie abbiano raccontato,
      (Your brother, to whom I wonder which stories they have told,
        era molto preoccupato.
        was very worried.)   (Rizzi (1982) p.50)

6) (5) and (6) are quoted from Radford (1981). He gives (iii), among others, to exemplify (5).
   (iii) a. What have you met the man that invented?
      b. That kind of thing, I know a man who does.
      c. Tomorrow, I know someone who's going to a disco.

7) The ungrammaticality of (iii), for instance, is explained by the fact that the movement which derives these constructions crosses three bounding nodes in each case.

8) Otsu did not distinguish between OS-A and OS-B in analyzing the results of this test. We believe that these two constructions should have been treated separately, since they make different predictions about the controller selection of the subject gap in a VP-attached relative clause.

9) The adjunction of $what_i$ to $COMP_1$ is prohibited by (2), for it is already filled by a *wh*-element. Therefore, $what_i$ is moved directly to $COMP_0$. The same thing can be said of $what_i$ in (19) and (23).

10) Otsu used the figures in the right-hand column as well as those in the left-hand column to calculate the significance of the experiemntal results. But as Crain and Foder (in preparation) point out, how children who haven't yet mastered the relative clause constructions do in the SC test is not directly relevant to statement (10).
   Crain and Foder also argue that since (10) predicts that all of the children who pass the Syntax test pass the SC test also, the 75% success rate is not high enough to support (10). However, they also report that this figure is comparable to the success rate of adults who participated in a similar test. Then, it can at least be said that Otsu's experimental results do not contradict the claim that all the children who know the relative clause construction also obey the SC.

11) Even if we count only the 4 children who passed Syntax test 2 as well as Syntax test 1, Otsu's experimental results would have to be rewritten as follows.

X \ Y	Yes	No.	Total
Yes	21 (66%)	9	30
No	11 (34%) (7+4)	19 (23−4)	30
Total	32 (100%)	26	60

X: honor the SC
Y: have mastered the structure relevant to the SC

12) Roeper (1982), etc.
13) The 'no tangle constraint' (Solan and Roeper (1978)) forbids the branches of a syntactic tree to cross.
14) For the definition of c-command, government, and proper government, see Chomsky (1981) p.166, p.250.
15) See Takahashi (1984b) section III.
16) Now, the table in note 11 can be rewritten as follows.

X \ Y	Yes	No.	Total
Yes	25 (78%) (21+4)	9	30
No	7 (22%)	19	30
Total	32 (100%)	28	60

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