

Complement Structure of Perception Verbs

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Abstract: Although a wide range of analyses of the complement structure of perception verbs have been proposed, it is a shame that they are not without problems. Akamjian (1977), who claims that the complement of perception verbs does not have a sentential source but has an NP head plus its VP complement. Inoue (1982) asserts that the perception verb complements are identical with the *believe*-type complements. Both of them, however, are subject to our severe criticisms. In the present paper, the perception verb complements will be assumed to be small clauses, and it will be verified by several pieces of evidence that this assumption properly explains the nature of the perception verb complements.

Key word: Perception verb, Small clause, Complement structure

0. Introduction

This article will be concerned with the complement structure of perception verbs like *see* and *hear*, which will be properly tagged as "Perception Verb Complements" (henceforth: PVCs). See for example the underlined parts below:

- (0) PVC [Perception Verb Complement]
 - a. IPVC [Infinitival Perception Verb Complement]
I saw the moon rise over the mountain.
 - b. PPVC [Participial Perception Verb Complement]
I saw the moon rising over the mountain.

As exemplified by the specimens above, PVCs are typically classified into two types: IPVCs and PPVCs. Sentences including PVCs have proved to be difficult to analyze in the traditional framework of transformational grammar, as is obvious from the fact that a whole variety of analyses have been proposed. Akmajian (1977) claims that a PPVC does not have a sentential source but has a noun-head plus a VP complement. This analysis is, however, rather problematic, as some other linguists point out. Declerck (1982), for instance, objects to Akmajian and proposes three different structures of PPVCs according to the observation that PPVCs occur in three different types of constructions. His proposal is apparently plausible, but has also some defects. Moreover, it is asserted that PVCs equal to the *believe*-type complement, but quite regrettably, this assertion also lacks adequacy.

This paper will first observe a great deal of behaviours of PVCs, engaged in the investigation of the previous studies, and will then be destined to come to the conclusion that all PVCs must be "small clauses."

1. Grammatical Behaviours and the Constituency of PVCs

The most crucial matter that we must tackle first is to decide whether PVCs are single syntactic constituents or not. A set of well-known syntactic tests establishes that PVCs are single syntactic constituents:

(1) a. Pseudo Cleft:

What we saw was the moon rising over the mountain.

b. Equative "Colon" Construction:

We saw what we had all hoped to see: the moon rising over the mountain.

c. Right Node Raising:

You can see, but you certainly can't hear, the moon rising over the mountain.

(Akmajian (1977: 430))

The postcopular and "postcolon" positions in pseudo-cleft and equative sentences are usually assumed to contain only single constituents (cf. (1a) and (1b)), and the rule of Right Node Raising¹ operates exclusively on single syntactic units (cf. (1c)). However, IPVCs cannot be subjected to these tests:

(2) a. *What we saw was Raquel Welch take a bath.

b. *?We could hear, but we couldn't see, Raquel Welch take a bath.

(ibid.)

Judging from these facts, Akmajian reaches the conclusion that IPVCs are not single units, while PPVCs must be.

On the other hand, Gee (1977) notes that Chomsky cast a doubt on the validity of these constituent tests by Akmajian. Chomsky allegedly claimed that sentences without a complementizer cannot occur in the focal positions. Witness the following examples:

(3) a. What we wanted was for John to tell the truth for a change.

b. ?*What we wanted was John to tell the truth for a change.

(Gee (1977: 479))

(4) a. What I know is that John lied.

b. ?*What I know is John lied.

(ibid.)

The ungrammaticality of (3b) and (4b) is due to the lack of a complementizer. Accordingly, if we suppose that IPVCs are S-complements without a complementizer, IPVCs can be a constituent even if they are ruled out by Akmajian's constituents tests.

In the recent GB framework, moreover, we are able to explain the ungrammatical specimens in (2) - (4) by means of Case Filter. The requirements for a complementizer is a natural consequence of assigning Case to the NP subjects in the complement sentence, but they are not fulfilled in the ungrammatical examples in (2) - (4). The reason why the sentences in (2) are ungrammatical is that the NP in IPVCs (*Raquel Welch*) does not succeed in receiving Case. Therefore, it is possible that IPVCs are a single syntactic unit² regardless of the ungrammaticality of (2). Furthermore, look into the following example:

(5) a. I saw Mary run away, and Bill saw it too.

b. I saw Mary run away, which surprised me.

(Declerck (1981a: 111))

Akmajian's treatment of IPVCs as a non-constituent is disproved by the fact that the IPVC can be coreferential with anaphoric pronouns and they can be antecedents of the relative pronoun. Needless to say, the same facts can be observed in the PPVC constructions:

- (6) a. I saw Mary running away, and Bill saw it too.
b. I saw Mary running, which surprised me.

Based on these facts, we can conclude that both IPVCs and PPVCs must be a single constituent. At this point, we are doomed to investigate the syntactic category of PVCs and their internal structure.

1.1. The Syntactic Category of PVCs and their Internal Structure

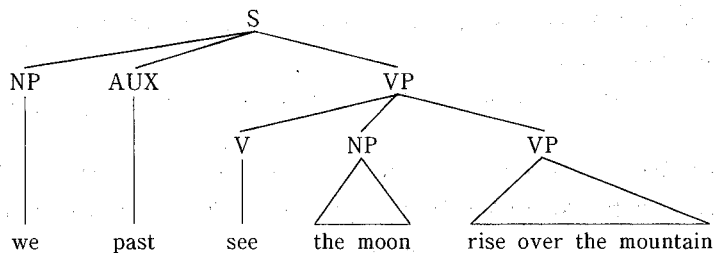
Now is the time to get engaged in examining the two previous studies.

1.1.1. Akmajian (1977)

1.1.1.1. The NP Analysis

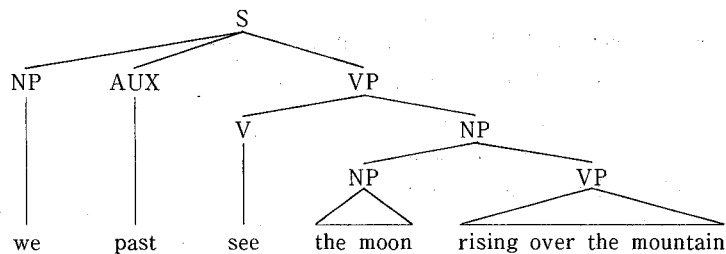
Akmajian (1977) presents the two different constructions for IPVCs and PPVCs:

- (7) a. IPVCs:



(Akmajian (1977 : 433))

- b. PPVCs:



(ibid. : 439)

The possibility of IPVCs being composed of several parts has been already eliminated. We are now on the position to consider the adequacy of the structure in (7b). Akmajian indicates that a set of diagnostic tests establish PPVCs as a NP constituent:

- (8) a. Cleft Sentence:

It was the moon rising over the mountain that we saw.

- b. Object Deletion:

The moon rising over the mountain was a breathtaking sight to see ____.

c. Passive:

The moon rising over the mountain has been witnessed by many a lover here on Lover's Lane.

d. Deep Subject:

The moon rising over the mountain is a beautiful sight.

(ibid. : 430)

(8a) shows that NPs alone can be inserted into the clefted positions. (8b) indicates that only NPs can be deleted by the rule of Object Deletion. (8c) shows that only NPs can be fronted into the derived subject positions by the passive formation rule. (8d) indicates that PPVCs can occur in the deep NP positions.

Consider further four pieces of evidence that the internal structure of PPVCs is a noun-head plus a VP-complement. The auxiliary element (e. g. *have*) never appears within PPVCs³:

(9) *I heard Mary having played my song.

(ibid. : 431)

Take notice of the phenomenon of the number agreement when PVCs are in the subject positions:

(10) a. The moon and Venus rising in conjunction have/*has often been observed by the astronomers at Kitt Peak.

b. The moons of Jupiter rotating in their orbits are/*is a breathtaking sight.

(ibid. : 432)

It is obvious that the verb agreement in the matrix sentence is triggered by the plural NP within PPVCs, and that the NP within PPVCs is the head. The following examples are related to the extraposition:

(11) a. The moon rising over the mountain looks spectacular.

b. The moon looks spectacular rising over the mountain.

(ibid. : 433)

(12) a. A review of a new book about China will appear soon.

b. A review will appear of a new book about China.

(ibid. : 434)

(13) a. A man who we all know walked in.

b. A man walked in who we all know.

(ibid.)

PVCs are extraposed just like a complement to the NP head.

Here is another piece of evidence having to do with anaphoricity:

(14) John saw himself/*him trembling all over (in the mirror).

(ibid.)

On the assumption that the reflexive and its antecedent must be a "clause mate," (14) suggests the head-complement analysis of PVCs.

1.1.1.2. Appraisals

In this section, let us point out some problems of Akmajian's analysis. First of all, the following two examples are completely contradictory to (10), as Gee (1977) asserted.

(15) Them trying to play Brahms together is/*are quite a sight.

(Gee (1977: 463))

(16) Us trying to make up and be friends was/*were quite a sight.

(ibid.)

Therefore, the evidence from the number agreement is nullified. Moreover, we must pay special attention to the fact that the supposed noun-head of the PPVC (*them* or *us*) is assigned a objective Case but not a nominative Case. If the PVC as a whole is assigned a nominative Case by AGR, why does not the head NP receive a nominative Case by percolation?⁴ At this point, Akmajian's analysis comes to a total deadlock.

Moreover, we can point out the counterexample to (11). Declerck (1982) states that in contrast to (11) the extraposed VP-*ing* in the PVC cannot follow an adverbial adjunct as in (17), while a true NP with a noun-head can as in (18):

(17) a. I have not heard John whistling since last week.

b. *I have not heard John since last week whistling.

(Declerck (1982: 23))

(18) a. A review of this article came out yesterday.

b. A review came out yesterday of this article.

(ibid.)

Finally, let us comment on the reflexivization in (14). If we make use of the notion of the Binding Theory introduced by Chomsky (1981), the governing category of *himself* is the main clause⁵. This explanation removes the support for Akmajian's analysis drawn from the characteristic of anaphora.

Thus far, Akmajian's analysis has been completely nullified.

1.1.2. Inoue (1982)

1.1.2.1. The *Believe*-Type Analysis

In this section, PVCs are supposed to be the *believe*-type complement, that is, either S' with a null complementizer or S undergoing S' deletion. Consider (19) and (20):

(19) a. We heard it raining cats and dogs.

c. I've never seen there be so many complaints from students before.

d. We heard all hell

break
breaking

 loose.

(Gee (1977: 468, 472))

(20) a. I believe it to be raining.

b. We believed there to be three girls in the room.

c. I believed advantage to have been taken of the new situation.

(Sakakibara (1981: 107))

Based on (19) and (20), we find that expletives can occur in the subject position within both the PVCs and the complements to *believe*. Therefore, it can be judged that the PVCs and the *believe*-type complements are equivalent as far as the distribution of the expletives are concerned.

A second piece of evidence is related to reflexive pronouns:

- (21) a. John saw Bill looking at himself (in the mirror).
 b. John saw Bill take a glance at himself (in the mirror).

(Inoue (1982: 96))

Each reflexive pronoun refers to only *Bill*. Since *himself* and *Bill* are coreferential, we can consider it plausible that a PVC is an S-complement and that *Bill* is a subject within it.

- (22) John heard himself saying such foolish things.

(Kodama (1983: 154))

- (23) John believes himself to be honest.

(ibid.)

In (22) and (23) *John* and *himself* are coreferential if we take the governing category into account. Judging from (21)-(23), PVCs seem to be tantamount to the *believe*-type complements.

Thirdly, anaphoric pronominals referring to PVCs are neutral and singular:

- (24) What/*Who I heard was John laughing.

(Inoue (1982: 96))

- (25) I saw John hit the little girl and Mary saw it too.

(Gee (1977: 468))

Fourthly, witness the examples about Quantifier Shift:

- (26) a. All the men left.
 b. The men all left.

(Inoue (1982: 97))

- (27) a. *We met all the men.
 b. *We met the men all.

(ibid.)

It is manifest that Quantifier Shift can apply only when the quantifier is contained in the subject NP unless the NP is a pronoun. Compare (26)-(27) and (28)-(29):

- (28) a. We heard all the girls screaming with fear.
 b. We heard the girls all screaming with fear.

(ibid.)

- (29) a. We heard all the girls ask for hot chocolate.
 b. We heard the girls all ask for hot chocolate.

(ibid.)

The comparison shows that the NP in the PVCs is the subject within S-complements.

Lastly, as noted by Postal (1974), adverbials like *by oneself* can appear only if they are related to the subject NP:

- (30) a. John spoke to Mary by himself.
 b. *John spoke to Mary by herself.

(Postal (1974: 196))

Compare (30) and (31):

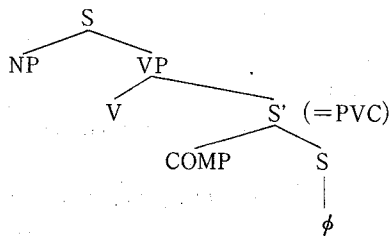
- (31) a. We saw John paint the whole house by himself.
 b. We saw John painting the whole house by himself.

(Inoue (1982: 97))

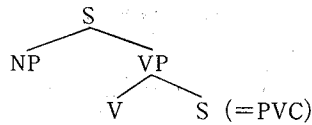
In (31) *himself* refers to John, which is assumed to be the subject NP within the PVC.

So far, we have seen the strong evidence that PVCs are S-complements. Therefore, the structure of PVCs will be either of the following⁶:

(32) a.



b.



1.1.2.2. Problems

Let us evaluate the analysis proposed in the preceding section. First of all, contrast (33) and (9), which is repeated here for convenience:

(33) We believe John to have examined Mary.

(Gee (1977: 468))

(9) *I heard Mary having played my song.

The *believe*-type complements have AUX nodes, while PVCs do not. It follows from this point that they must be strictly differentiated from each other. Moreover, consider the semantic disparity between (34) and (35):

(34) I saw the moon rising.

(Akmajian (1977: 427))

(35) a. I could hear that John was singing.

b. We saw him to be a complete charlatan.

(ibid.: 453)

(34) can only be interpreted as "I actually saw the moon," and it has the direct perception reading. On the other hand, in (35), which has the S' complement, we may deduce that John was singing or that he was a complete charlatan, but do not hear or see it directly. Hence, if we assume that PVCs are Ss or S's, how can the semantic distinction between (34) and (35) be explained successfully?

To sum up, it appears to be difficult to conclude that PVCs are S-complements just like the *believe*-type complements in terms of the non-existence of AUX and the direct vs indirect perception reading.

2. An Alternative

2.1. The Small Clause Analysis of PVCs

In the preceding section, we saw that PVCs are not equal to the *believe*-type complement (S or S'). However, their sentential nature is worth noticing. In the present section, let us assume that they are a kind of sentence lacking AUX (INFL) and COMP, i. e. small clauses [henceforth: SCs]. As a point of departure, let us enumerate several parallelisms between PVCs and SCs as [A]-[E]:

[A] (36) shows the typical behavior of SCs, and is supposed to be compared with (37):

(36) a. John considers [himself honest].

- b. Bill is considered [*t* honest].
 c. Who do you consider [*t* honest].
 d. *John considers [PRO honest].
- (37) a. John saw himself trembling all over (in the mirror).
 (= (14))
 b. The moon was seen (by me) rising over the mountain.
 (Declerck (1982: 2))
 c. What did you see rising over the mountain?
 (Akmajian (1977: 438))
 d. *I saw trembling all over in the mirror.
 (Sakakibara (1981: 112))

As is clear from the comparison, PPVCs are closely similar to SCs. However, there is one problem that needs mentioning, i. e. how to treat the ungrammaticality of (38):

- (38) *The moon was seen (by me) rise over the mountain last night.
 cf. The moon was seen (by me) rising over the mountain last night.
 (Declerck (1982: 2))

In this case it is impossible to extract the NP from the IPVC in the Passive formation, while it is possible in the case of the PPVC. Inoue (1983) ascribes the ungrammaticality to an "accidental gap" on the basis of its resemblance to the ungrammaticality below:

- (39) a. *I was helped do it by John.
 b. *I was let do it by him.
 (Inoue (1983: 97))

On the other hand, the NP within IPVCs is extractable from the IPVCs in such a case as Cleft:

- (40) Cleft:
 It was the moon that we saw rise over the mountain.
 (Declerck (1982: 21))

Taking the facts above into consideration, Inoue's proposal can be judged as plausible.

[B] Pay attention to the similarity between (5b)-(6b) and (41):

- (5b) I saw Mary run away, which surprised me.
 (6b) I saw Mary running away, which surprised me.
 (41) John considers Bill foolish, which will, however, turn out not to be the case.
 (Adachi (1985: 19))

Both PVCs and SCs can serve as the antecedent of the relative pronouns.

[C] Here are examples concerning Quantifier Shift:

- (42) a. We heard all the girls screaming with fear.
 b. We heard the girls all screaming with fear.
 (43) We considered $\left\{ \begin{array}{l} \text{all the students} \\ \text{the students all} \end{array} \right\}$ honest.

It can be stated that Quantifier Shift applies exclusively to the subject within both PVCs and SCs.

[D] Remember that PVCs in general are able to occur in the subject position:

- (8d) The moon rising over the mountain is a beautiful sight.
 (15) Them trying to play Brahms together is/*are quite a sight.
 (16) Us trying to make up and be friends was/*were quite a sight.

It should be noted that SC constructions also occasionally appear in the subject position, as Safir (1983) etc. point out:

- (44) a. Workers angry about the pay is just the sort of situation that the ad campaign was designed to avoid.
 (Safir (1983: 732))
 b. Lawyers (perpetually) subjected to attacks from the press is a shocking idea.
 (McCawley (1983: 285))
 c. Max (still) afraid of flying is a laughable thought.
 (ibid.: 286)

Here again, we are obliged to admit the parallelism between PVCs and SCs.

[E] The following evidence is related to expletives. The data below list five pleonastic elements within the small clauses:

- (45) a. "w-it" [weather-it]
 I consider it hotter here than in Africa.
 b. "o-it" [obvious or likely]
 We consider it obvious that John is intelligent.
 c. "id-c" [idiom chunk]
 Consider your goose cooked.
 d. "there" [expletive there]
 *I consider there a great opportunity here.
 e. "s-it" [seem or appear]
 *I consider it seeming that John is intelligent.
 (Arimoto (1989: 68))

It is obvious that the expletive *there* and *s-it* cannot occur in the SC complement. On the other hand, the *believe*-type complements cannot take only *s-it*:

- (46) a. "w-it"
 I believe it hotter here than in Africa.
 b. "o-it"
 Everyone believes it to be likely that Hanrahan is guilty.
 c. "id-c"
 Believe your goose cooked.
 d. "there"
 I believe there a great opportunity here.
 e. "s-it"
 *Everyone believes it to seem that Hanrahan is guilty.

(b, e: ibid.: 74)

Therefore, SCs and the *believe*-type complements are different in terms of the distribution of the pleonastic elements. As for S'-complements (e. g. the *want*-type complements), all the pleonastic elements can appear within them. We must notice that the appearance of *s-it*, among others, is

the distinguishing character of S'-complements:

(47) a. "w-it"

I want it to rain today.

b. "o-it"

We want it to be obvious that John is innocent.

c. "id-c"

You want your goose to be cooked.

b. "there"

I want there to be a great opportunity here.

e. "s-it"

I want it to seem that I am rich.

(e: *ibid.*)

Bearing the linguistic facts above in mind, consider the distribution of the pleonastic elements within PVCs:

(48) a. "w-it"

We saw it $\left\{ \begin{array}{l} \text{rain} \\ \text{raining} \end{array} \right\}$ yesterday.

b. "o-it"

I'd like to see it proven that John was there last night.

c. "id-c"

I saw my goose being cooked.

d. "there"

(i) *I saw there be someone executed without being a chance to confess first.

(ii) *I saw there be so many mistakes.

e. "s-it"

*I saw (have never seen) it seem/seeming that John was guilty.

(c, d, e: *ibid.*)

The mere comparison of (45) and (48) might lead to the conclusion that SCs and PVCs are identical in terms of the pleonastic elements. However, there are two problems that need pointing out. First, how do we explain the contrast between the grammaticality of (48b) and the ungrammatical example in (49)?

(49) a. "o-it"

*I saw it proven that John was there last night.

(*ibid.*: 73)

We must also refer to the similar contrast indicated by the two sentences below:

(50) a. I've never seen it be so easy to please John before.

b. *I saw it be so easy to please John yesterday.

(Gee (1977))

These contrasts make us suspect that the ungrammaticality in (49) and (50b) is due to the semantic restriction, not to the structural one. Thus, *o-it* can occur within the PVC only when the verb takes such a form as "would like to see" or "have never seen." In other words, *o-it* is only possible if the perception verb bears the connotation of thinking.

Let us now turn to the other problem which concerns the expletive *there*. Almost the same story about *o-it* applies here. Compare the ungrammaticality of (48d) and the grammaticality of (51):

(51) a. I've never seen *there* be anyone executed here without being given a chance to confess first.

(Gee (1975))

b. I wouldn't like to see *there* be so many mistakes.

(Higginbotham (1983: 103))

Just like the discussion of *o-it*, it can be judged that the expletive *there* usually cannot occur within the PVCs and that it is possible only if the perception verb shows the indirect perception as is indicated by (51). Hence, the expletive *there* as well as *o-it* cannot appear within PVCs in principle, but only in a circumscribed situation can occur as indicated by (51).

To sum up, here again we can observe the parallelism between PVCs and SCs; the distribution of the pleonastic elements within PVCs is similar to that within SCs except for the case of *o-it*, which seems to have some kind of semantic restriction. That is, *w-it* and *id-c* can occur within both of the complements, while *there* and *s-it* cannot. Moreover, this story is not true of the *believe*-type constructions in that expletive *there* can appear within them. At this point we can once again confirm that PVCs equal to SCs.

2.2. Structure of SCs – XP vs S

In this section we will concentrate on the type of SC tagged as "SC complements" as illustrated in (52a) rather than the type referred to as "SC adjuncts" as in (52b):

(52) a. "SC Complements"

We consider John a genius.

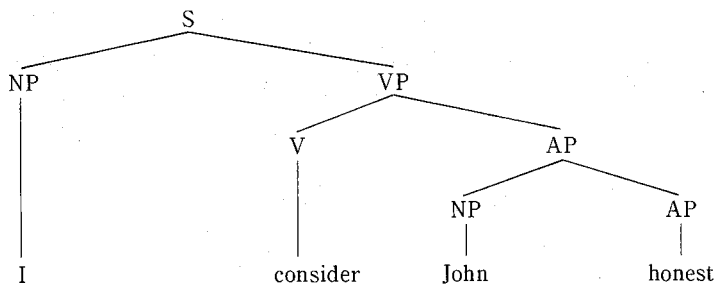
b. "SC Adjuncts"

I ate the fish raw.

(Hayashi (1987: 29))

Here are two different proposed analyses of the structure of SCs as a single syntactic unit. One is proposed by Chomsky (1989), Stowell (1981, 1983), etc. They analyze the SC as an X-bar projection of the predicate contained in it, i. e. VP, AP, PP, and NP. The structure is posited roughly as follows:

(53)



The strongest argument for this predicate phrase analysis of SCs comes from the restricted selection of SCs by the higher predicate, as illustrated below:

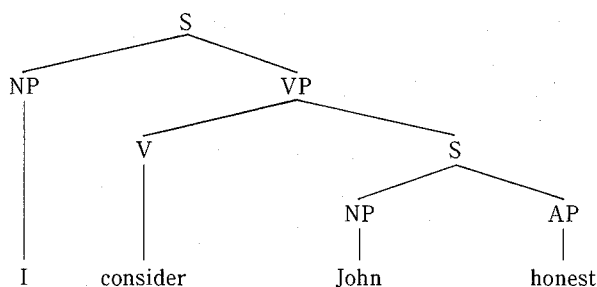
- (54) a. I consider [him honest].
 b. *I consider [that sailor *off* my ship by midnight].
- (55) a. I expect [that sailor *off* my ship by midnight].
 b. *I expect [him honest].

((54)-(55) : Kitagawa (1985 : 211))

The grammatical contrasts in (54) and (55) is due to the limited categorial selection by the matrix predicates. In other words, *consider* and *expect* does not select the projection of PP and AP respectively.

The other analysis is proposed by Hayashi (1987), Aarts (1989), etc. They claim that SCs have the categorial status of S (Kitagawa (1985) among others claims that SCs are S's with COMP and INFL nodes, though), positing a structure roughly like the following:

(56)



They conclude that an S node should be postulated in the structure of SCs mainly based on the fact that some sentence adverbs can appear in the SC structure and that the SC structure serves as a cyclic domain of the application of Passive, Raising, Extraposition, and so on.

We have briefly surveyed the two representative analyses of SCs, but in the present paper we will leave open the exact identification of the structure of SCs. Still, it is claimed here that the candidates are confined to VPs or Ss.

3. Conclusion

In this article we have been engaged in the scrutiny of the character of PVCs. Two past analyses have been looked into, and as a result they have turned out to be devoid of validity. Consequently, we have asserted that PVCs are SCs with the structure of either VPs or Ss.

Notes:

1. For the detailed discussion of the rule of Right Node Raising and its use as a constituent structure test, see Postal (1974).
2. For the time being, I will leave it open why PPVCs alone can appear in the focal position and how the NP within PPVCs receives Case.

- 3 . A related fact is that PVCs never include any overt complementizers. That is, they never co-occur with such complementizers as *that*, *for-to*, and *poss-ing*. This fact is totally unexplained if PVCs are derived from a sentential source.
- 4 . This comment is due to Kodama (1983).
- 5 . See Barss (1985) for detail.
- 6 . (32a) is proposed by Inoue (1982), while (32b), which undergoes S-bar deletion, is due to Sakakibara (1981), Iwakura (1984), and Kodama (1983).

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