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On the i-within-i Condition*

Katsunori Fukuyasu

0. Introduction

This paper attempts to solve some problems on referential circularity of the sort exemplified by (1):

(1) a. *There is a picture of itself on the mantelpiece.
    b. *The best friend of Tom is himself.

In (1a), the antecedent of the reflexive pronoun itself is intended to be the whole noun phrase a picture of itself. This interpretation, however, is not legitimate: in order to determine the antecedent of itself, the referent of the whole noun phrase a picture of itself that contains itself must be determined. But to determine the referent of the whole noun phrase, the referent of itself must be determined, and that depends on the referent of the antecedent. But the referent of the antecedent is. . . . We could continue the explanation of referential circularity endlessly.

If the ungrammaticality of the examples in (1) is related with referential circularity, it is worth asking what representations referentially circular expressions have. Is there any linguistically significant generalization? There have been several proposals on this question, among which I will take Chomsky's (1981) proposal as a starting point.

Section 1 will introduce Chomsky's (1981) i-within-i condition and its modification. Section 2 will point out counterexamples to his condition. Section 3 will make clear when the noun phrase co-indexed with the noun phrase that contains it is acceptable and when it is not. I will propose a condition on i-within-i representations to capture the significance of N'-complements in the relevant representations. Section 4 considers why such a condition exists, demonstrating the difference between the semantic effects of restrictive modifiers and functional arguments. Section 5 presents my conclusions.

1. Chomsky's (1981) i-within-i Condition

Chomsky proposes the i-within-i condition (2), which prohibits ill-formed constructions like (3):

(2) * [r ... δ ...], where r and δ bear the same index

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(3) a. * [NP; the friends of [i each other's] parents ]
   b. * There is [NP; a picture of [NP; itself]] on the mantelpiece
   c. * [NP; the owner of [NP; his boat]]
   d. * [NP; the friends of [NP; their parents]] (Chomsky (1981))

(2) is a well-formedness condition and what it means is that the (anaphoric)
element indexed i cannot occur in the phrase which is also indexed i. The
condition (2) is, however, too strong, as stated by Chomsky (1981). For example,
relative constructions have a representation which would be ruled out by (2).
He suggests modifying the condition (2) by adding (4) to it (p. 229):

(4) unless δ is coindexed with the head of τ

This modification will accommodate the relative constructions of the sort
exemplified by (5):¹

(5) [NP; [NP; the man]] [s; [i who] [s t; saw [NP; himself]]]

Chomsky assumes here that there is percolation of an index to the NP head of the
relative clause and that the structure of relatives is like [NP; NP, S']. Since
who, t, and himself in (5) are co-indexed with the head of the relative
construction, the man, the example is not ruled out by (2).

2. Counterexamples

2.1. Counterexamples to (2)

Let us now examine the validity of the i-within-i condition (2).
First, consider the examples in (6):

(6) a. [the man next to his dog] ; (Haiik (1987))
   b. a woman in her forties
   c. a girl with her own way of living
   d. the boy sleeping with his eyes half-open
   e. the man with whom Mary talked about the rumor that he was a KGB
      agent. ((b)-(e) from Tsurusaki (1985))

Haiik (1987) cites (6a) as a counterexample to the condition (2). The example
(6a) would be marked as unacceptable since the pronoun his indexed i is within
its antecedent indexed i. The same thing holds true with the examples (6b-e).
Therefore, we can say that the condition (2) is so strong that it would
incorrectly rule out examples like (6) as ungrammatical.
2.2. Counterexamples to (2) plus (4)

The unless-condition (4) is added to (2) in order to accommodate grammatical constructions, typically, relative constructions like (5). Then, (6e) cannot be a counterexample to (2) plus (4) any more, if we assume that the structure of a relative construction has an NP head followed by $S'$. How about the examples (6a-d)? Do they have an NP head? Haik (1987) assumes that the structure of (6a) is (7): 

(7)  

\[
\begin{array}{c}
\text{NP}_1 \\
\text{NP}_2 \\
\text{PR} \\
\text{P} \\
\text{NP} \\
a \text{man} \quad \text{next to} \quad \text{his \ dog}
\end{array}
\]

If this structure is tenable, the example (6a) is not a counterexample to (2) plus (4). In the structure (7), although his dog is within $[\text{NP}_1 \ a \text{man} \ next \ to \ his \ dog ]$, it is co-indexed with the head of the construction, a man. The grammaticality of (6a) is predictable. If we can set up the analogous structures for the examples (6b-d), they would not be counterexamples to the i-within-i condition (2) along with the unless-condition (4). Unfortunately, Haik gives no arguments supporting the structure (7) for (6a). The examples (6a-d) could be counterexamples to (2) plus (4) if they don't have a structure which has the NP head followed by a complement in the whole NP.

2.3. Further Counterexamples

Consider the following examples:

(8) a. Marie's sincerest admirer is herself.
   
b. John's best friend is himself.
   
c. The book's best advertisement is itself.

   (Langendoen and Battistella (1982))

In these examples, the subject NP and the possessive NP within it can be coreferential.

The appropriate structural representations for the examples in (8) would be
the ones shown in (9):

(9) a. [NP [Marie]'s sincerest [N admirer]] is herself,
   b. [NP [John]'s best [N friend]] is himself.
   c. [NP The book]'s best [N advertisement] is itself.

I am assuming here that the subject NP in each example is co-indexed with the NP after the verb be by a rule of predication of the type proposed in Williams (1980). He argues that there is a predication relationship between John and a fool in the sentence John is a fool, for example. If the representations (9) are correct, the examples in (8) are counterexamples to (2): the possessive NP in each example is within the NP coindexed with it. These would be wrongly excluded as ungrammatical by the condition (2).

Furthermore the examples in (8) will be counterexamples to the i-within-i condition (2) plus the unless-condition (4). In each structure of (9), there is no NP head analogous to the one found in a relative construction. The examples (8), whose structural representations are like (9), would be predicted as ungrammatical but in fact they are not.

The i-within-i condition along with the unless-condition does not explain the contrast in grammaticality between (8) and the next examples:

(10) a. *The best friend of John is himself.

   (Langendoen and Battistella (1982))

The subject NPs in both (8) and (10) have the structure [\tau_i... \delta_i...], but the examples in (8) are acceptable and the ones in (10) are unacceptable. We need to give an explanation to these facts.

3. The N'-Complement Condition

Since the i-within-i condition plus condition (4) proposed by Chomsky (1981) is not adequate enough, we are now in a position to ask the next questions:

(11) a. What condition exists on the structure [\tau_i... \delta_i...]
   b. Why does such a condition exist?

In this section I will try the question (11a), putting the question (11b) aside for a while. To find out the answer for this question, we must ask the
following questions:

(12) a. What makes a contrast between (3) and (6)?

b. What makes a contrast between (8) and (10)?

Let us consider (12a) first. The difference between the examples (3) and (6) is that the relationship between the head N and its complement in (3) is, in informal terms, "closer" than that in (6). This "closeness" has been captured by several linguists (Cattell (1976), Hirose (1982), Sano (1981) and many others). Jackendoff's (1977) analysis of complements as $N''$, $N'$, and $N'$-complements, for example, can be regarded as an attempt to differentiate between the varieties of closeness in terms of structure. I will assume Jackendoff's analysis of nominal complements to be correct and use it in the subsequent discussion.

One of the criteria Jackendoff uses is the applicability of the pronoun one which is sensitive to the kind of the complement:

(13) a. Jack met the king from England, and I met the one from France.

b. *Jack met the king of England, and I met the one of France.

He observes that the pronoun one cannot be followed by of NP and argues that of-NPs which are complements of nouns like part, picture, and father are $N'$-complements.

Another criterion for $N'$-complementhood is the possibility of $wh$-questions and relatives. Consider the following examples:

(14) a. Fathers of which children had fun?

b. I met some children the fathers of whom like to drink.

(Jackendoff (1977))

(15) a. Who(m) did he see a picture of?

b. Which book did you read $[_{NP} \text{a review of }]$ ? (Fukuchi (1979))

(16) a. *Fathers with which children had fun?

b. *I met some children the fathers with whom like to drink.

(Jackendoff (1977))

(17) a. *What did he see $[_{NP} \text{a girl with }]$ ?

(cf. He saw a girl with blue eyes.)

b. *Which cage do you want to buy $[_{NP} \text{a bird in }]$ ?
c. *Who did Pheneas get to know [NP a girl [s working with__] ]?

((17b-c) from Fukuchi (1979))

The head-complement relationship in the examples (14) and (15) is of the type observed in (3) and the one in (16) and (17) is of the type observed in (6). Wh-questions and relatives are possible in (14) and (15) whereas they are impossible in (16) and (17). These facts suggest that the complements of the noun phrases in (3) are different from the ones in (6).

Thus we might conclude that friend, picture, and owner in (3) have an N'-complement and the nouns man, woman, girl, and boy in (6) have an N''-complement. If this is correct, we can propose a condition on representations which have been described as "i-within-i."

(18) N'-Complement Condition:
* [NPi ... NPi ... ]
where NPi is within the N'-complement of the whole NPi.

This condition replaces the i-within-i condition plus the unless-condition.

Let us see the consequences that this condition brings, putting aside and later coming back to the general principle involved in the descriptive statement (18). This condition can correctly predict a contrast between (8) and (10) in question:

(19) a. Marie's sincerest admirer is herself. (=8)
b. John's best friend is himself.
c. The book's best advertisement is itself.

(20) a. *The best friend of John is himself. (=10)

The appropriate representations of (20) with indexes would be (21).

b. * [NPi The best advertisement of [NPi the book] ] is itselfi.

By this condition, these structural representations are correctly predicted as ungrammatical. On the other hand, the examples (19), whose structural representations with indexes are represented in (9), are correctly predicted as well-formed by the condition (18), since the co-indexed noun phrases are not in complement positions but in specifier positions.

Note that the condition (18) is only a descriptive generalization. We are
now tempted to ask why the condition like (18) exists. I will try to find it out, by considering the inherent properties of complements and specifiers.

4. Why the $N'$-Complement Condition Exists

In this section, I will tackle the question of why the $N'$-complement condition (18) exists by considering the following questions:

(22) a. Why is there a contrast between (3) and (6)?
   b. Why is there a contrast between (8) and (10)?

As for (22a), we have already seen that the complement within the noun phrase in (3) might be identified with an $N'$-complement in the sense of Jackendoff (1977) while the one in (6) is not. The question to ask is why the noun phrase in an $N'$-complement co-indexed with the noun phrase that contains it becomes ungrammatical while the one in an $N''$-complement co-indexed with the noun phrase that contains it does not.

I assume, following Jackendoff, that an $N''$-complement is interpreted as a restrictive modifier and an $N'$-complement as a functional argument. Then, because the noun picture takes an $N'$-complement, the noun phrase *a picture of John*, for example, has the meaning of the sort represented by the formula $f(x) = \text{the picture of } (x)$, where $x$ is *John*. Therefore, the expression *a picture of itself* in (3b) becomes ungrammatical, since its meaning is roughly represented as "a picture of (x), where x is *a picture of (x)'" and the circularity of reference occurs. Similar explanations can hold of the other ungrammatical examples in (3). Whether the noun phrase co-indexed with a noun phrase that contains it becomes unacceptable or not depends on whether the co-indexed noun phrase in a complement is a functional argument or not.

The complement of each example in (6) is interpreted as a modifier and it is an $N''$-complement. Therefore the co-indexed noun phrase in a complement does not count as a functional argument and there is no referential circularity of the kind found in (3). Why no circularity in the examples in (6) then?

Consider the next examples:

(23) a. the man next to his dog
   b. the man who is next to his dog
(24) a. a woman in her forties
   b. a woman who is in her forties
(25) a. a girl with her own way of living
   b. a girl who has her own way of living
(26) a. the boy sleeping with his eyes half-open
   b. the boy who are sleeping with his eyes half-open

The a-example in each pair is paraphrasable as the b-example using a relative pronoun plus be (except (25)). We might say that the a-examples are "reduced relative clauses." If for each example in (6), there exists a representation similar to the b-example at a certain level of interpretation (cf. the analysis (7)), then we can explain the grammaticality of the examples in (6) on the assumption that the structure of relative clauses is like \[ \text{NP, NP, S'} \] (as the example (5) has) and there is a rule of predication of the sort suggested in Chomsky (1982). These examples are grammatical because the anaphoric pronouns are bound.

Interestingly, examples with friend of, picture of, and owner of show a sharp contrast to the examples in (6) in paraphrasability with a relative pronoun plus be:

(27) a. the friends of his parents
   b. *the friends who are of his parents
(28) a. a picture of these flowers
   b. ??a picture which is of these flowers
(29) a. the owner of the boat
   b. *the owner who is of the boat

Let us now turn to the question (22b): why is there a contrast between (8) and (10), repeated here as (30) and (31)?

(30) a. Marie's sincerest admirer is herself.
   b. John's best friend is himself.
   c. The book's best advertisement is itself.
(31) a. *The best friend of John is himself.

We can explain the ungrammaticality of the examples in (31) in the same way as we explain the ungrammaticality of the examples in (4) at the beginning of this section. In (31a), for example, the noun phrase the best friend of John has a meaning of the sort represented by the formula f(x) = the best friend of (x), where x is John and at the same time it is identified with John because of the
verb be and the anaphor himself. Therefore the meaning of the expression the best friend of John is roughly represented as "the best friend of (x), where x equals 'the best friend of (x),'," with the result of referential circularity.

The interesting question to ask is why (30) is acceptable in contrast with (31). This might be explained on the assumption that specifiers have the effect of narrowing down the field of reference. In other words, possessives are different from N'-complements in semantic interpretation. To see this, consider the example John's best friend. The total meaning of the phrase might be construed as the intersection of the semantic fields denoted by best friend and John's. John's best friend must be someone who is referred to as a friend, someone who is described as best friend and at the same time, someone who is described as belonging to John mentally or physically. Then the meaning of John's best friend is described as follows:

(32)

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<td>friend</td>
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<td>John's</td>
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The intersection of the three fields does not exclude the possibility of John himself. John can be his own best friend. The way of determining the total meaning of the expression John's best friend is different from the way of determining the total meaning of the best friend of John. The possessive John's has the semantic effect of narrowing down the field of reference while John in the N'-complement works semantically as an argument of the function which maps terms into terms. The same explanation can be applied to Marie's best admirer and the book's best advertisement. This might be an answer for the grammaticality of the examples in (8).

I have shown that the N'-complement condition is crucially related with the property of N'-complement: N'-complement works as a functional argument. This property is a significant factor of the representation \([N_{Fi} \ldots N_{Pi} \ldots]\). If the contained NP, of \([N_{Fi} \ldots N_{Pi} \ldots]\) is in the N'-complement or it is a possessive NP, the representation is not ill-formed, for reasons we have seen.

5. Concluding Remarks

In this paper, I have attempted to find an adequate condition which replaces Chomsky's (1981) t-within-t condition. The t-within-t condition can
explain examples of the type $[\text{NP}_i: a \text{ picture of } [i, \text{ it self}] ]$. But Chomsky's condition would wrongly predict that $[\text{NP}_i: \text{ a man next to } [i, \text{ his } ] \text{ dog}]$ and $[\text{NP}_i: [i, \text{ John} ]'s \text{ best friend}]$ are ungrammatical, nor would it explain the difference in grammaticality between $[\text{NP}_i: [i, \text{ John} ]'s \text{ best friend}]$ and $[\text{NP}_i: \text{ the best friend of } [i, \text{ John} ]$ when they are used with the verb be and a reflexive pronoun. *

Then I have proposed a well-formedness condition, the N'-complement condition (18), which can account for such differences in grammaticality. The noun phrase co-indexed with the whole noun phrase that contains it is excluded if it works as a functional argument or it is within a noun phrase that works as a functional argument. The descriptive generalization (18) comes from the difference in the semantic effect involved in deciding reference. A functional argument results in creating referential circularity, whereas this is not the case with a restrictive modifier or possessives.

NOTES

* I have benefited from discussions with Hiroaki Horiuchi. I am grateful to Daisuke Inagaki, Seiji Iwata, Masao Okazaki, Takeru Homma and Yuji Takano for their invaluable comments on an earlier version of this paper.

1 Chomsky (1981: 229) also proposes to use (i) instead of (2) in the definition of "accessibility."

\[(i) \quad \ast [\ldots \alpha_i \ldots [\beta_i \ldots \tau_i \ldots ] \ldots \alpha_i \ldots ]
\]

where $\tau_i$ is not the head of $\beta_i$.

2 Naïk's explanation of the difference in grammaticality between (6a) and (i) below is that "the pronominal is bound" in (7) and "free" in (i) "inside the antecedent constituent" (505). She proposes a condition which "excludes a structure in which a constituent X is annotated as referentially dependent on itself." The structure $[\beta_i \ldots \delta_i \ldots ]$ is not excluded if $\delta_i$ is bound inside $\beta_i$.

\[(i)\]

```
Det | NP_i
   | N' NP
   | P
   | a picture of its frame
```

4 Yuji Takano has called my attention to the interesting examples found in Williams (1982):

(i) a. That is [a picture of itself, ] NPi .
   b. I consider John ; [master of himself, ] NPi .
(ii) a. * [A picture of itself, ] NPi is on the mantel.
   b. *John saw a picture of itself.
   c. *John met a master of himself.

Williams observes that there is a contrast between predicative NPs and referential NPs. In (i), the NPs a picture of itself and master of himself are used predicatively while in (ii), the NPs a picture of itself and a master of himself are used referentially. The examples in (i) and (ii) show that an NP can occur inside its antecedent NP when the antecedent NP is used predicatively, and not referentially.

We need to account for the grammaticality of the examples (i). In each of the examples, a reflexive pronoun occurs in the N'-complement position of its antecedent. Why are they grammatical? An answer for this might be found if we assume that a predicative use of a picture (of), like the adjective proud (of), maps terms into properties. Cf. Jackendoff (1977). If it is true that a function which maps terms into terms is involved in referential circularity and that a function which maps terms into properties is not, we can explain the difference between (i) and (ii). The examples in (ii) contain a referentially circular expression but those in (i) do not. Therefore if condition (18) is too strong, we could modify (18) by adding (iiib):

(iii) N'-Complement Condition:
* NPi ... NPi ... , where
   (a) NPi is within the N'-complement of the whole NP,
   (b) the whole NPi is referential

5 This observation is not new. See Fukuchi (1979: 18), for example.
6 We might argue that a rule of predication which is sensitive to cleft-sentences and relative constructions applies at the LF' level.
7 This assumption is similar to the idea found in Fromkin and Rodman (1988). They argue that most adjectives have "the semantic effect of narrowing down the field of reference." I borrow their term "narrow down" and use it to describe
the effect that possessives have.

The demonstrative-possessive-noun sequences are found in Shakespeare's English (and the next examples are brought to my attention by Suzuki (1989) and Araki and Ukaji (1984)).

(i) a. this my sword (Shakespeare H5 IV. iv. 41)
    b. this her mother's plot (Ibid. Wiv. IV. vi. 32)

In these examples, the demonstrative this in addition to the possessive noun phrase narrows down the field of reference:

(ii)

We could say that this my sword is a more specific description than my sword. These examples suggest the possibility of narrowing down the field of reference described by a possessive noun phrase and a noun.

The interaction between be and reference is an interesting problem. As for a related problem, see Fukuyasu (1986) and Higginbotham (1980).

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