ON THE ENGLISH ANAPHORIC EXPRESSION *ANOTHER*

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In this paper, I try to draw attention to many patterns which anaphors in the usual sense (pronouns) and *another N* share. Both can be used as bound variables and the syntactic configurations govern the possibility of binding in the same way. However, unlike pronouns, *another N* has lexical content and shows scope ambiguity. These observations lead us to recognize two kinds of indices -- anaphoric and categorial. The idea is implemented in a categorial theory of binding, which assumes transparent model-theoretic interpretation. Finally, it is suggested that some remaining problems for the binding of *another N* in donkey sentences be treated on the discourse level, as in the case of pronouns.

0. INTRODUCTION

Among many context dependent expressions in natural language, anaphoric expressions such as reflexives, reciprocals, and pronouns show referential dependencies within or outside of a sentence. Binding theory is concerned with these kinds of dependencies. But we sometimes notice that context dependencies in a totally different area show a pattern very similar to the referential dependencies of anaphors. For example, Partee (1983) reveals a strikingly similar pattern between English past tense and pronouns (deictic use, use as bound variable, etc.). In this paper, I wish to draw attention to the fact that the pattern of "another" as in *another person* is very similar to that of pronouns, and to suggest a way to accommodate this in a binding theory.[1] For concrete implementation, I will extend the Categorial theory of binding proposed by Bach and Partee (1980), Chierchia (to appear), and Chierchia and Jacobson (1985).

1. *ANOTHER* (*PERSON*) AND PRONOUNS

There are many similarities between pronouns and *another (person)*.[2] Before

[1] Partee (1986) discussed many context dependent expressions in language, such as *local, enemy, foreigner, arrive, opposite,* and *unfamiliar*. She tried to argue for a "broader theory of context dependent elements in which pronouns occupy one extreme position on a continuum." Although she did not mention *another* in that talk, it should be in the scope of the data. Here, I concentrate more on syntactic constraints and try to give a possible treatment with indexing.

I enumerate these similarities, a word on notation is in order. For example,

(1) John$_1$ likes another person$_1$.

(1) means that John likes a person x such that x ≠ John. That is, *another* means "another" with respect to John, and I use coindexing to express this anaphoric dependency.

The similarities between pronouns and *another (person)* are as follows:

First, like pronouns, *another (person)* can be used as if it were a bound variable (or as if it had a bound variable in its meaning).

(2) a. Every man$_1$ thinks that he$_1$ is happy.
  b. Every man$_1$ thinks that another person$_1$ is happy.

As (2a) can mean that for each man x, x thinks that x is happy, (2b) can mean that for each man x, there is a person y such that y ≠ x and x thinks that y is happy.[3] The value of *another person* varies for each man, which is exactly the behavior of bound variables.

Second, like pronouns, *another (person)* shows the weak crossover (WCO) and strong crossover (SCO) effect.

(3) a. *His$_1$ mother likes no man$_1$.
  b. *Another person$_1$'s mother likes no man$_1$.

(3a) cannot mean that there is no man x such that x's mother likes x -- the WCO effect. Similarly, (3b) cannot mean that there is no man x such that there is a person y such that y ≠ x and y's mother likes x. Notice also the similar acceptability of the following sentences.

(4) a. No man$_1$'s mother hates him$_1$.
  b. No man$_1$'s mother likes another person$_1$ (better than him$_1$).

Another example is the following.

(5) a. *He$_1$ likes every man$_1$.
  b. *Another person$_1$ likes every man$_1$.

(5a) cannot mean that for each man x, x likes x (which can be experssed by *Every man likes himself*) -- the SCO effect. Similarly, (5b) cannot mean that for each man x, there is a person y such that y ≠ x and y likes x (which is expressed by *Every man is liked by another person*). Since I am only treating Quantifier cases, what I mean by SCO is a special case of WCO if WCO is

[2] *Another* seems to have two different (but related) senses: 1) roughly "a different" or "other than oneself", and 2) roughly "one more" as in *John has a servant and he wants another (one)*. This paper concerns only with the first use ("different") of *another*. I will leave it open whether the two senses should be reduced to one.

[3] For the time being, let us ignore the ambiguity due to the opaque context created by *think*.

treated in terms of "leftness" (Jacobson 1979). Here, I am using the term SCO in the sense that the pronoun c-commands the Quantifier and the Quantifier does not c-command the pronoun.

Third, like pronouns, *another (person)* cannot be bound to a quantified NP which is not higher, i.e. a c-commanding NP or a later argument in function-argument structure. (But notice the exceptional case of (4) above.)

(6) a. *A woman who knows no man_1 hates him_1.
b. *A woman who knows no man_1 hates another person_1.

(6a) cannot mean that there is no man x such that a woman who knows x hates x. Similarly, (6b) cannot mean that there is no man x such that there is a person y such that $y \neq x$ and a woman who knows x hates y.

Fourth, like pronouns, *another (person)* can be bound to a discourse referent.

(7) a. I like John_1. Mary likes him_1, too.
b. I like John_1. Mary likes another person_1.

The second sentence in (7b) means that there is a person x such that $x \neq$ John and Mary likes x.

Finally, like pronouns, *another (person)* can be used in "donkey" sentences (Geach 1962).

(8) a. If a farmer owns a donkey_1, he beats it_1.
b. If a man knows a person_1, he likes another person_1.
(9) a. Every farmer who owns a donkey_1 beats it_1.
b. Every man who knows a person_1 likes another person_1.

(8a) means that for each man x and donkey y, if x owns y, then x beats y. Similarly, (8b) means that for each man x and person y, if x knows y, then there is a person z such that $z \neq y$ and x likes z. (9) is a similar case. (For some differences, see section 4.)

Thus far, I have shown that the behavior of *another (person)* is similar to that of singular pronouns. It also has properties similar to the plural pronoun *they* in that it can have split antecedents.

(10) a. Every man_1 and Mary_2 think that $\text{they}_{1,2}$ are happy.
b. Every man_1 and Mary_2 think that another $\text{person}_{1,2}$ is happy.

(10a) can mean that for each man x, x and Mary think that x and Mary are happy. Similarly, (10b) can mean that for each man x, x and Mary think that there is a person y such that $y \neq x$, $y \neq$ Mary, and y is happy (in addition to the readings where *another person* is anaphorically related with only one of *every man* and *Mary*).

2. A BINDING THEORY FOR *ANOTHER* (*PERSON*)

The above observations indicate that *another (person)* should be treated like pronouns in binding theory (in that sense that it is the theory for pronouns). In this section, I will try to accommodate *another (person)* in a syntactic theory of binding. I will not treat the usage in discourse as in "donkey" sentences.

In a sense, when we consider the meaning of *another person* as 'some person other than *him/her*', the above observations may not be surprising, as pointed out by Barry Schein (p.c.). So, one might be tempted to use the meaning of *another person* directly in grammar, so that all the behavior of *another person* might reduce to the behavior of pronouns. But in the current interpretive frameworks (GB or any other current theories), we certainly cannot have *some person other than him/her* at any syntactic level to derive *another person* on the surface. Rather, the way to incorporate *another* in binding theory is to extend the notion that binding theory is a theory for referential dependency rather than a theory for coreference (and noncoreference), as explicitly advocated by Reinhart (1983), among others[4]. In this view, coindexing does not mean "the same referent" but only means the referential dependency in interpretation. I propose that we should represent anaphoric dependencies by coindexing in syntax, and that this "anaphoric dependency" should be interpreted not only as referential dependency for bound pronouns like those in (2a) - (10a), but also as "disjoint dependency" for *another (person)* in (2b) - (10b). Under this proposal, the only difference between pronouns and *another (person)* is the way they are actually interpreted, even though both are bound (by coindexing) in the same sense. Any account for constraints on binding for pronouns (such as cross-over) will automatically serve for the cases of *another (person)*.

As a matter of fact, the notion of "disjoint dependency" was already introduced by Saxon (1984) and Roberts (1987). Saxon introduced the term "disjoint anaphor" for an anaphor in Dogrib (an Indian language in Canada) which should be bound in the governing category but which should be interpreted disjointly from the antecedent. Yet *another person* contrasts with the disjoint anaphor in Dogrib in many respects. Particularly, it cannot be just a pronoun in the usual sense, as will be seen subsequently, while the disjoint anaphor in Dogrib is more like a pronoun.

Another (person) is different from pronouns in certain important respects. Unlike pronouns, *another (person)* or more generally *another N* has its lexical

[4] Farmer (1987) presents data that show problems if one assumes that indices express the relation of coreference, disjoint reference, and overlapping reference. Farmer concludes that the above relations should be determined by the lexical meaning of pronouns (*I, we, you, he they, . . .*). This conclusion is consistent with my view on *another (person)* here.

content-*another person, another man another girl,* etc. Also it introduces the existential quantifier in interpretation. For example,

(11) $John_1$ thinks that Mary likes another $person_1$.

(11) can be interpreted roughly as (12).

(12) a. $\exists x[\text{person'}(x) \ \& \ x \neq j \ \& \ \text{think'}(j, \text{like'}(m, x))]$
b. $\text{think'}(j, \exists x[\text{person'}(x) \ \& \ x \neq j \ \& \ \text{like'}(m, x)])$

This shows that we ultimately will have to deal with the scope phenomena by adopting certain methods such as Quantifier Raising (May 1985) or Storage (Cooper 1983). Also, it can be shown that the lexical content of *another N* affects the possibilities of binding.

(13) $John_1$ thinks that $Mary_2$ likes another $girl_{2, *1}$.
(14) Every $bachelor_1$ thinks that a $girl_2$ likes another $man_{1, *2}$.

As can be seen in the above examples, *another N* should be "another" with respect to an individual which is a member of the set denoted by N.

The above observations reveal that *another N* has properties of full NP's, too. My suggestion is that the appropriate way to handle *another N* should be to separate the notion of "anaphoric index" from that of "categorial index". The anaphoric index is the one showing anaphoric dependencies (for pronouns and for *another N*) and the categorial index is the one which the NP's (Generalized Quantifiers) inherently have. That is, if we allow QR, the latter is the index which the trace left behind by the Quantifier will have. In other words, what I suggest is to separate A-binding and Ā-binding as viewed in Chomsky (1981) and Higginbotham (1983), but, unlike Chomsky and others, to allow the two kinds of binding to be represented at the same time. For pronouns, the distinction does not matter because pronouns do not show the scope ambiguity and do not have much lexical content. We may think that the anaphoric index and the categorial index of pronouns are the same. (Or, we may think that pronouns have only the anaphoric index.) But for *another N* it certainly does make a difference.

3. A CATEGORIAL IMPLEMENTATION

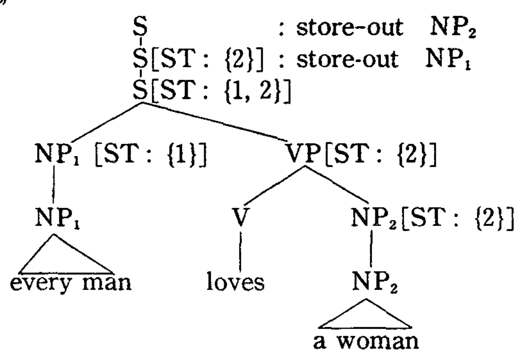
Now I will show how the idea presented above (i.e. the idea that the anaphoric index and the categorial index can be separated) may be implemented in a categorial theory of binding suggested by Chierchia (to appear) and Chierchia and Jacobson (1985), among others.

This theory combines the technique of Cooper storage (which corresponds to Quantifier Raising in the GB literature) and feature passing mechanisms of GPSG (Gazdar et al. 1985). Originally, storage was designed strictly as an interpretive mechanism to handle the scope ambiguity of quantified NP's, as in (15), without using Quantifying-in syntactically, as in Montague (1974).

(15) Every man loves a woman.

But in Chierchia and Jacobson's framework, storage is not a purely interpretive device. When a quantifier has been stored and needs to be assigned scope, this fact is also recorded in the syntax via a feature called ST(ore), which has a set of indices as its value. For example, one reading of (15) is analyzed as in (16).

(16)



meaning: $\exists x[\text{woman}'(x)\ \&\ \forall y[\text{man}'(y) \rightarrow \text{love}'(y)\ (x)]]$

In (16), among the stored quantified NP's, NP_1 is interpreted before NP_2, giving the narrow scope reading to *every man* and the wide scope reading to *a woman*. The feature ST is passed by something like the Foot Feature Principle (FFP) of GPSG. Basically, to interpret the sentence with pronouns as in (17),

(17) Every man_1 thinks that he_1 is a genius.

quantified NP *(every man)* is stored-in, and later when it is stored-out it binds both the position it originates from and the pronoun it is coindexed with. Another syntactic feature used for binding is LPS, representing "local pronoun store". This feature, which originates from Bach and Partee (1980), also has a set of indices as its value and the purpose of it is to capture the locality effect (Principle A and Principle B) in English.

A lexical item is a six-tuple represented as in (18), and (19) lists some examples.

(18) ⟨expression, category (with categorial index), IL-translation, stored meaning, ST, LPS⟩

(19) a. <he, NP[4], x_4, Ø, ST : Ø, LPS : Ø>

b. <every man, NP[2], x_2, <$\lambda P[\forall x[\text{man}'(x) \rightarrow P(x)]]$, 2>, ST : {2}, LPS : Ø>

c. <himself, NP[7refl], x_7, Ø, ST : [7refl], LPS : Ø>

And the core rule will be conditioned as in (20) to regulate feature passing.

(20) $A/B + B => A$ Def: $CI(A)$ = the categorial index of A
$\quad 0 \quad\; 1 \quad\; 2$ $ST(A)$ = the value of ST on A
$LPS(A)$ = the value of LPS on A

Conditions;

i) $LPS(2) = LPS(0) \cup CI(1)$ [opacity]
ii) $LPS(0) \cap CI(1) = \emptyset$ [Principle B effect]
iii) $ST(2) = ST(0) \cup ST(1)$ [feature passing]

Technical details aside, ST is the feature which passes the binding possibilities through tree structure and LPS is the feature which assigns local domain for reflexives and pronouns.

In addition to these mechanisms including the categorial index, I add the feature "anaphoric index". For pronouns, the anaphoric index and the categorial index should be the same, as mentioned eariler. But for *another N* they can be different. For example, *another person* in (21) has the categorial information of (22).

(21) Every boy_3 likes another person_3.

(22) $<$another person, NP[9, 3], $\lambda P \exists y[y \neq x_3$ & person'(y) & $P(y)]$, $\emptyset$, ST : $\emptyset$, LPS : $\emptyset>$

The derivation of (21) is demonstrated in (23).

(23) (LPS is ignored here)

$<$every boy likes another person, S,
$\forall x[\text{boy'}(x) \rightarrow \text{like'}(\lambda P \exists y[\text{person'}(y) \& y \neq x \& P(y)])(x)]$, $\emptyset$, ST : $\emptyset>$

| Store-out NP[3]

$<$every boy likes another person,
S, $\text{like'}(\lambda P \exists y[\text{person'}(y) \& y \neq x_3 \& P(y)])(x_3)$,
$<\lambda P \forall x[\text{boy'}(x) \rightarrow P(x), 3>]$, ST : 3$>$

$<$every boy, NP[3], x_3, $<\lambda P \forall x[\text{boy'}(x) \rightarrow P(x)], 3>$, ST : {3}$>$
$<$likes a.p., $\text{like'}(\lambda P \exists y[\text{person'}(y) \& y \neq x_3 \& P(y)])$, $\emptyset$, ST : $\emptyset>$

$<$likes, V, like', $\emptyset$, ST : $\emptyset>$
$<$another person, NP[9, 3], $\lambda P \exists y[\text{person'}(y) \& y \neq x_3 \& P(y)]$, $\emptyset$, ST : $\emptyset>$

Since like' is an extensional verb, (24a) is related to (24b) by a meaning postulate and we finally get the meaning of (25) for (23).

(24) a. $\text{like'}(\lambda P \exists y[\text{person'}(y) \;\&\; y \neq x \; P(y)])(x)$
b. $\exists y[\text{person'}(y) \;\&\; y \neq x \;\&\; \text{like'}_*(x, y)]$

(25) $\forall x[\text{boy'}(x) \rightarrow \exists y[\text{person'}(y) \;\&\; y \neq x \;\&\; \text{like'}_*(x, y)]$

The same result will be obtained if we store *another person* and store it out before *every boy.*

Let us try a more complex example of (11) (repeated below).

(11) John_3 thinks that Mary_2 likes another person_3.
Reading 1 : $think'(j, \exists x[person'(x) \& x \neq j \& like'_*(m, x)])$
Reading 2 : $\exists x[person'(x) \& x \neq j \& think'(j, like'_*(m, x))]$

These two readings are derived as follows[5].

(26) Reading 1 :

$<\ldots, think'(j, \exists y[person'(y) \& y \neq j \& like'_*(m, y)]), \ldots>$

| Store-out 3

$<$John thinks that Mary likes another person, S,
$think'(\exists y[person'(y) \& y \neq x_3 \& like'_*(m, y)])(x_3), <\lambda PP(j), 3>, ST : \{3\}$

$<$John, NP[3], x_3, $<\lambda PP(j),3>$, ST : {3}$>$

$<$think that Mary likes another person, VP,
$think'(\exists y[person'(y) \& y \neq x_3 \& like' * (m, y)]) \ldots >$

$<$think, V, think', ...$>$

$<$Mary likes another person, S
$like'(\lambda P \exists y[person'(y) \& y \neq x_3 \& P(y)])(m), \ldots >$

$<$Mary, NP[2], m, ∅, ST : ∅, LPS : ∅$>$

$<$likes another person, VP, $like'(\lambda P \exists y[person'(y) \& y \neq x_3 \& P(y)])$, ∅, ST : ∅$>$

$<$likes, V, like', ∅, ST : ∅$>$

$<$another person, NP[9, 3], $\lambda P \exists y[person'(y) \& y \neq x_3 \& P(y)]$, ∅, ST : ∅$>$

Here, I wish to add some comments on the translation of *another N* which is bound to an antecedent. Unlike pronouns, *another N* can be bound only to an antecedent which is in the set denoted by N, as mentioned before. A wrong way to accommodate this condition would be to use a translation like: $\lambda P \exists y[person'(y) \& person'(x_3) \& y \neq x_3 \& P(y)]$, which will give the wrong interpretation. For example, (11) will mean that John thinks that there is a person x such that x is not John and John is a person and Mary likes x : think'

[5] The following derivation draws heavily on the scope theory of the *de re / de dicto* ambiguity with respect to opaque contexts. It may be controversial whether it is the best way to treat the ambiguity in opaque contexts. However, there is an example which shows my point clearly without recourse to the scope theory.

John_1 thinks that every woman_2 likes another person_1.

a. $think'(j, \forall x[woman'(x) \rightarrow \exists y[y \neq j \& person'(y) \& like'_*(x,y)]])$

b. $think'(j, \exists y[y \neq j \& person'(y) \& \forall x[woman'(x) \rightarrow like'_*(x,y)]])$

These two readings are due to the scope ambiguity within a clause, which seems uncontroversial (*Every man loves a woman*).

(27) Reading 2:

$\langle \ldots, \exists y[\text{person}'(y) \,\&\, y \neq j \,\&\, \text{think}'(j, \text{like}'_{*}(m,y))], \ldots \rangle$

Store-out 3

$\langle \ldots, \exists y[\text{person}'(y) \& y \neq x_3 \& \text{think}'(x_3, \text{like}'_{*}(m, y))], \ldots \text{ ST}: \{3\} \rangle$

Store-out 9

$\langle$John thinks that Mary likes another person, S, $\text{think}'(\text{like}' * (m,x_9))(x_3), \ldots, \text{ST}: \{9, 3\} \rangle$

$\langle$John, NP[3], x_3, $\langle \lambda PP(j), 3 \rangle$, ST: $\{3\} \rangle$

$\langle$think that Mary likes another person, VP, $\text{think}'(\text{like}' * (m,x_9)) \ldots \rangle$

$\langle$think, V, think', $\ldots \rangle$

$\langle$Mary likes another person, S, $\text{like}'_{*}(m,x_9), \ldots \rangle$

$\langle$Mary, NP[2], m, $\emptyset$, ST: $\emptyset$, LPS: $\emptyset \rangle$

$\langle$likes a.p., VP, $\text{like}'(x_9^{*})$, $\langle \lambda P \exists y[\text{person}'(y) \& y \neq x_3 \& P(y)]), 3 \rangle$, ST: $\{9\} \rangle$

$\langle$likes, V, like', $\emptyset$, ST: $\emptyset \rangle$

$\langle$another person, NP[9,3], x_3^{*}, $\langle \lambda P \exists y[\text{person}'(y) \& y \neq x_3 \& P(y), 9 \rangle$, ST: $\{9\} \rangle$

$(j, \exists y[\text{person}'(y) \,\&\, \text{person}'(j) \,\&\, y \neq j \,\&\, \text{like}'_{*}(m,y)])$. Certainly, (11) dose not mean this since (11) does not express John's belief that "John is a person". What is really going on is that the antecedent is presupposed to be a person in this case. Therefore, the requirement that *another N* should be bound to an antecedent which is a member of N is really a presupposition[6].

[6] Here, what is presupposed is that the antecedent should be (semantically) a member of the set denoted by N in *another N*. Thus, it is a restriction on coindexing. Postal talked about "presupposed coreference" between coindexed pronouns and their antecedents. For example, in a theory that coindexing should mean coreference, a sentence like *He is John* should be problematic for binding theory. Usually, a pronoun cannot have an antecedent which it c-commands (**He*$_1$ *likes John*$_1$), but in the above case, *he* and *John* should be the same person. Postal noticed that the coreference in *He is John* is "stated", not "presupposed", and claimed that binding theory should be concerned with presupposed coreference. In the theory adopted in this paper, "presupposed coreference" for pronouns is a special case of referential dependency. In other words, Postal's presupposition can be regarded as a condition on the interpretation of the coindexed pronouns, and the presupposition I am talking about with respect to *another person* is the condition on coindexing, just as the pronoun *he* should be bound to a male individual.

Since coreference is independent from indexation to a certain degree the following situation can arise (an example pointed out by an anonymous LR referee): *John told Jane that Mary likes Bob. But Jane told John that Mary likes another boy, namely John.* In this case, the referent of *another boy* can be John. In other words, the index of *another boy* should be that of *Bob* (discourse binding).

Until now, I have treated the cases where the anaphoric index of *another N* is a singleton set. In cases where *another N* has the anaphoric index which is more than a singleton set, a slight change of translation is enough. For example,

(28) Every boy_1 told $John_2$ that Mary likes another $boy_{1,2}$.

in (28), *another boy* will be represented as follows.

(29) $<$another boy, NP[8,{1,2}], $\lambda P \exists y[boy'(y) \ \& \ y \neq x_1 \ \& \ y \neq x_2 \ \& \ P(y)]$, $\emptyset$, ST : $\emptyset$, LPS : $\emptyset$$>$

Eventually, we will get the reading of (30) for (28).

(30) $\forall x[boy'(x) \rightarrow tell'(x, j, \exists y[boy'(y) \ \& \ y \neq x \ \& \ y \neq j \ \& \ like'_*(m,y)])]$

The present analysis will be straightforwardly extended to *other N's* such as *other persons, other boys, other girls, etc.* For example,

(31) Every boy_1 likes other $persons_1$.

(31) means that for each boy x, x likes a sufficiently large number of people who are not x. Technically, *other persons* in (31) could be treated as follows[7].

(32) $<$other persons, NP[7,1], $\lambda P \exists Y[x_1 \notin Y \ \& \ person'(Y) \ \& \ P(Y) \ \& \ |Y| > n]$,...$>$, where Y is a plural variable and n is a sufficiently large number which is to be determined contextually.

(31) will be given the following interpretation.

(33) $\forall x[boy'(x) \rightarrow \exists Y[x \notin Y \ \& \ person'(Y) \ \& \ like'_*(Y)(x) \ \& \ |Y| > n]$

4. DISCOURSE

The categorial analysis presented above have not been concerned with the cases of "donkey" sentences. In fact, current syntactic treatments of pronouns, whether GB or Categorial Grammar, do not have much to say about pronouns in "donkey" sentences. In "donkey" sentences, the c-command (or f-command) condition for bound variables is violated and an indefinite NP gets a universal interpretation. The Discourse Representation Theory (DRT) proposed by Kamp (1981) and Heim (1982) handles theses problems in an interesting way by an unconventional treatment of conditionals and indefinites. The DRT treats all kinds of pronouns in the same fashion through the notion of "discourse referent" (Karttunen 1976).

Let us take a typical "donkey sentence".

[7] Following Hoeksema (1983), I assume that every verb has plural objects in its argument domain.

(34) If a farmer owns a donkey, he beats it.

In the Kamp-style box notation, (34) will be represented by the following discourse representation structure (DRS).

(35)

m0 $\boxed{\text{If a farmer owns a donkey, he beats it.}}$

$$\text{m1}\ \boxed{\begin{array}{l} \quad x\ \ y \\ \text{farmer }(x) \\ \text{donkey }(y) \\ x \text{ owns } y \end{array}} \Longrightarrow \text{m2}\ \boxed{\begin{array}{c} \\ x \text{ beats } y \\ \\ \end{array}}$$

The assumed embedding condition for conditionals gives the effect of unselective binding by the universal quantifier and gives the correct interpretation: for each farmer-donkey pair ⟨x, y⟩ such that x owns y, x beats y.

The *another N* in "donkey" sentences may be treated in a similar way.

(36) If a farmer owns a donkey, he beats another donkey.

Here is an approximate DRS for (36):

(37)

m0 $\boxed{\text{If a farmer owns a donkey, he beats another donkey.}}$

$$\text{m1}\ \boxed{\begin{array}{l} \quad x\ \ y \\ \text{farmer }(x) \\ \text{donkey }(y) \\ x \text{ owns } y \end{array}} \Longrightarrow \text{m2}\ \boxed{\begin{array}{l} \qquad z \\ \text{donkey }(z) \\ z \neq y \\ x \text{ beats } z \end{array}}$$

From the above, we can conclude that *another N* in donkey sentences can be treated in a certain way as pronouns in donkey sentences in the DRT. That is, discourse binding is going on in both cases. The natural question which arises is: How far should the discourse binding go? For pronouns, the DRT claims that all the uses of pronouns should be treated in the same fashion. But more syntactically oriented theories such as Categorial Gammar and GB will separate the pronouns in donkey sentences from other uses of pronouns. As for *another N*, we may either follow the analysis of the DRT to treat all the cases in the same fashion. Or, we may keep the syntactic analysis given in the previous sections as it is, and treat only donkey sentences as a case of discourse phenomena. I have no definite opinion on this issue, which can be rephrased as: Where should one draw the line between syntax and discourse? What I belive is that it would be ad hoc to distinguish syntactically bound pronouns from discourse bound pronouns, and at the same time to treat all the uses of *another N* as discourse phenomena. As I showed earlier, their behavior is very similar. If syntactically bound pronouns should be recognized, the syntactically bound *another N* should be recognized, too[8].

5. SUMMARY

In this paper, I have tried to draw attention to many patterns which are common to anaphors in the usual sense (pronouns) and *another N*. They both can be used as bound variables, and the syntactic configurations govern the possibility of binding in the same way. However, unlike pronouns, *another N* has lexical content and shows scope ambiguity. These observations have led us to recognize two kinds of indices — anaphoric and categorial. This basic idea was implemented in a categorial theory of binding, which assumes transparent model-theoretic interpretation. Finally, just like pronouns, some remaining problems for the binding of *another N* in donkey sentences were suggested to be treated on the discourse level.

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[8] One thing to be remembered at this point is that we eventually need to treat the scope ambiguity. Probably, as Roberts (1987) did, we may adopt "scope index" in the sense of Williams (1986), which specifies the scope at S-structure. But as Roberts herself admits, this seems equivalent to overlapping different levels of grammar.

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