

## E-TYPE ANAPHORA AS NP-DELETION\*

This paper argues that donkey pronouns should be construed as definite articles, followed by an NP sister which has undergone deletion in the phonology. So *Every man who owns a donkey beats it* is claimed to share a Logical Form with *Every man who owns a donkey beats the donkey*, which means the same. There is independent evidence for assimilating pronouns to determiners, and for NP-deletion; so this theory explains E-type anaphora without postulating any special entity ('E-type pronoun') for the purpose. Since NP-deletion, like other ellipsis, requires an antecedent, this theory also explains the requirement for a "formal link" between donkey pronoun and antecedent, which standard E-type theories find difficult to account for. Other empirical advantages of this theory include its ability to explain the pattern of strict and sloppy identity displayed by donkey sentences with phonologically reduced continuations. It is shown that Bach-Peters sentences, quantificational subordination, and paycheck sentences can also be dealt with on the present approach.

## 1. INTRODUCTION

1.1. *The Proposal in Brief*

Pronouns, on the face of it, can be interpreted in at least two ways. They can be variables, either bound or referential; or they can be definite determiners of various kinds, including definite articles, as pointed out in a classic paper by Postal (1966) on the basis of examples such as (1) and (2).

- (1) You troops will embark but the other troops will remain.
- (2) *German*
- |                                |                            |
|--------------------------------|----------------------------|
| a. Hans sieht <b>den</b> Mann. | b. Hans sieht <b>den</b> . |
| Hans sees the man              | Hans sees him              |

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There are more details below in section 1.2 on the evidence which suggests that pronouns should at least occasionally be assimilated to determiners in their semantics and syntax.

In addition to these uses, the currently popular E-type analysis of donkey anaphora and related phenomena (Evans 1977; Cooper 1979) claims that pronouns can be disguised definite descriptions.<sup>1</sup> For example, in one recent version of this account, Heim and Kratzer (1998:290–293) propose that pronouns can spell out LF fragments of the kind in (3).

$$(3) \quad [\text{the } [R_{\langle 7, \langle e, et \rangle \rangle} \text{ pro}_{\langle 1, e \rangle}]]$$

(Heim and Kratzer have a rule stipulating that DPs which consist of a definite article followed by nothing but unpronounced items are spelled out as pronouns.) If we are dealing with Geach's classic (1962) example (4),<sup>2</sup> the relation variable  $R_{\langle 7, \langle e, et \rangle \rangle}$  will be assigned the salient relation *donkey-owned-by* by the variable assignment created by the context. The individual variable *pro* will be bound by the subject, and the whole sentence turns out to be true if and only if every individual  $x$  such that  $x$  is a man who owns a donkey beats the donkey owned by  $x$ .

$$(4) \quad \text{Every man who owns a donkey beats it.}$$

The same truth conditions are obtained by other versions of the E-type approach, such as those which view pronouns as able to be interpreted in the semantics as the value of a contextually salient function  $f$  applied to an argument  $x$  (Heim 1990). In such an approach  $x$  will be bound; and, in the standard example (4),  $f$  would be that function which maps each individual  $x$  in the domain to the unique donkey owned by  $x$ . Complications, such as uniqueness presuppositions, have sprung up already, of course. But I will not have anything to say about them here.

My concern is rather to view this theory from the standpoint of the other ways in which pronouns can be interpreted. There is of course a certain lack of economy, since a theory which posits a separate category of E-type pronouns adds a third member to the list. Furthermore, given the

<sup>1</sup> This paper will work basically within the E-type framework of Heim (1990), using situation semantics to neutralize the unwelcome uniqueness presuppositions that afflicted previous E-type accounts. It will not attempt to argue against Discourse Representation Theory (Kamp 1981; Heim 1982) and related work, such as Dynamic Montague Grammar (Groenendijk and Stokhof 1991, 1990; Chierchia 1995). For such an argument, see Elbourne forthcoming b; for some recent work corroborating the view of donkey pronouns as disguised definite descriptions, see Sauerland forthcoming.

<sup>2</sup> Actually, Geach's example was *Any man who owns a donkey beats it* (1962:§72), but this has been tacitly emended ever since, presumably because people working on donkey anaphora have enough on their minds already without adding free-choice *any* to their troubles.

work which seeks to assimilate pronouns to determiners, it seems that we might be missing a generalization if we adopt the E-type analysis, in the following sense. Take (3). It consists of a definite article and some material providing a function of type  $\langle e, t \rangle$  for the definite article to take as its argument. But we already have reason to believe that pronouns can be interpreted as definite articles, following Postal. We would reduce donkey anaphora and related phenomena to something we already have to acknowledge, then, if we could say that in these cases the semantic contribution of the donkey pronoun is just a definite article, and the equivalent of the material following *the* in (3) is obtained some other way.

I suggest, then, that optionally in English  $[[it]] = [[the]]$ . (The same goes for the other third person pronouns.) We know, furthermore, that NPs can undergo PF deletion in the environment of an identical NP, as in (5) (Perlmutter 1970; Jackendoff 1968, 1971).

- (5) My shirt is the same as his.

Combining these two simple ideas, we see that there could have been deletion of *donkey* after *it* in (4), and that *it* here could mean the same as *the*. This would mean that (4) would share an LF with (6).

- (6) Every man who owns a donkey beats the donkey.

Since (6) does indeed mean the same as (4), it seems that this is an option worth exploring. In fact my claim in this paper is that E-type pronouns can quite generally be viewed as being definite articles followed by an NP which is deleted in the phonology. For ease of reference, I call this the *NP-Deletion Theory*.<sup>3</sup>

This paper is structured as follows. The Introduction continues with some further remarks on the tools I will be using. I then concentrate for a while on accounting for donkey anaphora: in section 2 it is shown that the current

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<sup>3</sup> This proposal is related to but distinct from that of von Stechow (1994), who suggests that at LF pronouns can be rewritten as  $[_{DP} \text{the } [f_i^n[v_j \dots v_n]]]$ , where  $f_i^n$  is a variable of the type of an  $n$ -place function with range of type  $\langle e, t \rangle$ , and where  $v_j \dots v_n$  are variables of the appropriate types (von Stechow 1994:156). Von Stechow proposed in his dissertation that all quantifiers have a hidden "resource domain argument" which intersects with the overt restrictor, implementing the covert narrowing of the domain of quantification produced by pragmatic factors; so the LF-fragment above can naturally be regarded as the expected semantic representation of the definite article on his view. The crucial difference between his proposal and mine, then, is the origin of the function of type  $\langle e, t \rangle$  which forms the sister to the definite article in the semantics: von Stechow has it be a contextually salient function assigned to the variable  $f$  in the normal way. See section 3 for an argument against this. The present proposal is also closely related to ones made by Heim (1990), Gardent (1991), and Hardt (1999).

proposal can obtain the correct truth conditions for donkey sentences, in particular the characteristic covariance without c-command; and in sections 3, 4, and 5, I examine various ways in which conventional E-type analyses encounter problems with donkey anaphora, and try to show that the NP-Deletion Theory improves upon them. In section 6, I examine the other types of sentence in which linguists have posited E-type pronouns, and show how the NP-Deletion Theory deals with these data. In section 7, I discuss and dismiss some objections which have already been made to the NP-Deletion Theory. I conclude that there is no need for a separate category of E-type pronouns: the hypothesis that pronouns can be interpreted as determiners is all that is needed to account for the data traditionally taken as motivating the existence of the E-type interpretation.

### 1.2. *The Assimilation of Pronouns to Determiners*

There are various possible hypotheses which assimilate pronouns and determiners. Postal (1966) maintains that pronouns in English are always determiners, and that a phonologically null noun like *ones* follows them when they appear to stand alone. (He points to dialectal forms like *we uns* and *you uns* as evidence for this idea.) A weaker hypothesis, which is sufficient for my purposes here, says that pronouns can optionally be interpreted as determiners. They would thus be ambiguous between individual variables and determiners, as suggested above.

To argue that personal pronouns in English are a kind of definite article, Postal used examples like those in (7), (1) (repeated here as (8)), and (9), where pronouns appear in determiner position.<sup>4</sup>

- (7) a. we Americans  
b. us linguists  
c. you Communists  
d. (*dialectally*) them guys, they Sassenachs
- (8) You troops will embark but the other troops will remain.
- (9) We Americans distrust you Europeans.

It does not seem plausible to analyze these DPs as involving appositive constructions, as Postal (1966) already pointed out. In particular, there is no sign of or requirement for the characteristic “comma intonation” associated with apposition in sentences like (10).

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<sup>4</sup> We can add that *me* could be used in the same way in Early Modern English. Cf. Shakespeare, *Love's Labour's Lost*, Act 4 Scene 3 line 204, “That you three fools lacked me fool to make up the mess.”

(10) You, troops, will embark.

It seems likely, then, for example, that *you* in (9) has a denotation something like the following function of type  $\langle e, e \rangle$ .<sup>5</sup>

(11)  $\lambda f: f \in D_{\langle e, t \rangle} \ \& \ f(\text{addressee}) = 1. \ \sigma x.f(x) = 1$

The idea is that in saying (9) the speaker is asserting that Americans (either all Americans, or a contextually salient subset) distrust Europeans (again, either all of them or a relevant subset), and presupposing that he or she is American and that the addressee or addressees are European. This is what (11) is designed to accomplish. In a sentence like (8), the context changes quickly, so that before the other troops are mentioned they are not sufficiently salient to be included in the sum on the right-hand side of the first period in (11).

Further evidence for the two hypotheses which assimilate pronouns and determiners is found crosslinguistically in those languages where there is formal similarity or even identity between third-person pronouns and determiners, as in (12) and (13).

(12) *German*

- a. Hans sieht **den** Mann.  
Hans sees the man  
'Hans sees the man.'
- b. Hans sieht **den**.  
Hans sees him  
'Hans sees him.'

(13) *Classical Greek*

- a. **hē** de gunē apēlthen.  
the but woman left  
'But the woman left.'
- b. **hē** de apēlthen.  
she but left  
'But she left.'

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<sup>5</sup> The  $\sigma$  operator is taken over from the work of Godehard Link, and yields the sum of the specified individuals, where sums are plural individuals and hence entities of type  $e$  (Link 1983, 1984). The addressee could be a plural individual in the same sense. The semantics given here will have to be tentative, however, until we work out why this use of pronouns is restricted to the plural ones in English.

There is now a rich tradition of work showing that other empirical and conceptual advantages can be obtained from assimilating pronouns and determiners.<sup>6</sup> Although there are no overt pronominal uses for third-person singular pronouns in English, I submit that it is not a large step to believe that these pronouns too can sometimes have the semantics of a determiner. In particular, then, I propose that they sometimes have the same denotation as *the* (give or take  $\phi$ -features<sup>7</sup>), and that donkey sentences are one environment where this happens.<sup>8</sup>

### 1.3. NP-Deletion

NP-deletion, in the guise of N'-deletion, has been around for a long time, at least since Perlmutter (1970) and Jackendoff (1968, 1971). These authors gave examples like the following.

- (14) a. Bill's story about Sue may be amazing, but Max's is virtually incredible.  
 b. I like Bill's wine, but Max's is even better.

With the advent of the DP-hypothesis, which I follow here, the name was changed to NP-deletion, for obvious reasons (Saito and Murasugi 1989; Lasnik and Saito 1992).

Under what circumstances is NP-deletion possible? There seem to be two conditions under which it is allowed. The first, most obviously, is when there is a linguistic antecedent, as in the examples we have seen so far.<sup>9</sup> The second is when the deictic aid can be invoked of something in the imme-

<sup>6</sup> Prominent references include Stockwell, Schachter and Partee (1973), Abney (1987), Longobardi (1994), Uriagereka (1995), and Noguchi (1997).

<sup>7</sup> The  $\phi$ -features are simply obtained by agreement with the NP sister. Irene Heim points out to me that the idea of *he, she, it* being used as definite articles when there is no overtly following NP, but the featureless *the* being used when the NP is pronounced, is reminiscent of the division between strong and weak adjectival endings in German: the strong endings, which make more distinctions in case and  $\phi$ -features than the weak ones, are used when there is no accompanying article whose endings would otherwise supply this information.

<sup>8</sup> Obviously, we need some kind of rule ensuring that we do not get things like *\*he boy* for *the boy* in English (as opposed to languages like German and Classical Greek, where, in effect, we *do* get this). This could be quite a low-level rule, as far as I can see. Perhaps we should follow those morphologists who posit "late insertion" of phonological features (Beard 1966; Halle and Marantz 1993) and say that the definite article in English is spelled out as a pronominal form when there is NP-deletion and as *the* when there is not. Compare the surely superficial difference between *mine, yours, hers, ours, theirs*, used when there is NP-deletion, and *my, your, her, our, their*, used otherwise. See Yang (1999), where exactly this rule is posited for English for independent reasons.

<sup>9</sup> There are some further remarks on this topic in section 7.2.2.

diate environment. For example, a visitor being enthusiastically leaped upon by his host's dog might nod at it and say, "Mine does just the same," even if no mention has been made of the word *dog*.<sup>10</sup> It is not possible, however, to reconstruct a suitable NP from the linguistic context alone if it has not actually occurred explicitly. In the following discourse, for example, the second sentence is impossible, even though the relation expressed by the word *husband* has been made contextually salient by the first sentence.

(15) Mary is married. \*And Sue's is the man drinking the Martini.

This fact will be of some importance later on, when we examine the problem of the so-called "formal link" between donkey pronoun and antecedent (section 3).

It is not my purpose in this paper to explain why NP-deletion should be constrained in exactly this way, and I will offer no more than a few speculative remarks. I suspect that there is no unified explanation for the two conditions just described, and that two different processes are involved. The type of NP-deletion which has a linguistic antecedent is obviously parallel to VP-ellipsis, which is widely accepted to be possible only when there is a linguistic antecedent (Hankamer and Sag 1976). NP-deletion in the absence of a linguistic antecedent would rely on some extralinguistic reconstruction by the hearer of what must be meant by the speaker; this explains the fact that it seems to be limited to cases where there is some immediate cue in the physical environment, which is indicated by some physical gesture for the greatest felicity to result. Any harder task, presumably, would produce the feeling of mental stretching which one has upon hearing (15).

Moving away from the global conditions under which NP-deletion is possible, there is also the question of what can make up the immediately adjacent linguistic material. Specifically, one sometimes hears the claim that the deleted NP must be preceded by a genitive phrase, as in (14) (Saito

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<sup>10</sup> Lasnik and Saito (1992:160–161) claim that NP-deletion is like VP-ellipsis in that it always requires a linguistic antecedent. (The corresponding demonstration for VP-ellipsis was made by Hankamer and Sag (1976).) They reject the possibility of aid from the immediate physical environment of the sort which I allow. In their example, Lasnik and Saito are in a yard which is filled with barking domestic canines. Neither has spoken. They claim that it is distinctly odd for Lasnik to begin a conversation at this point by saying, "Harry's is particularly noisy," meaning that Harry's dog is particularly noisy. On the other hand, they go on, it is perfectly felicitous for him to make that comment if Saito has just said something like, "These dogs keep me awake at night with all their barking." I fear I must dispute their data, however. In an informal poll of six native speakers of English, all six found the first, allegedly bad, conversational opener quite felicitous.

and Murasugi 1989). As far as I can tell, however, this is much too strong. Consider the data in (16).

- (16) a. Sue only bought two books, but Mary bought **at least three**.  
 b. Most movies bore Mary, but she does like **some**.  
 c. Many unicorns were in the garden, but Mary only noticed **a few**.  
 d. Most MIT students build robots, and **all** watch Star Trek.  
 e. The boys came to the party; **each** gave a present to the birthday girl.  
 f. The twins showed up too; **both** began to criticize the food.  
 g. Mary tried to corral the unicorns, but **many** escaped.  
 h. Some students are morning people, but **most** are not.  
 i. I don't like either woman; **neither** knows much about Star Trek.  
 j. Many Athenians went to Sicily, but **few** returned.  
 k. Two heads are better than **one**.  
 l. \* Two heads are better than **no**.  
 m. i. \* Sue only bought one book, but Mary bought **every**.  
 ii.\* More than one Athenian went to Sicily, and **every** returned.  
 n. i. \* I wanted to read the best book in the store, so I though **the**.  
 ii.\* The giant wanted to eat the children, but **the** escaped.  
 o. i. \* I wanted to read a book, so I bought **a**.  
 ii.\* I expected a bird to fly through the mead hall, and **a** did.

After this quick survey, then, it looks like NP-deletion is possible after every determiner except *no*, *every*, *a*, and *the* (cf. Lobeck 1995:42–45). But it has been argued for some time that, under certain conditions at least, *one* and *a* are phonological variants of the same lexical item (Perlmutter 1970; Stockwell et al. 1973). I espouse the theory of Stockwell et al. (1973:70–71), according to which the word is realized as *one* under the same conditions as those under which *your* is realized as *yours*, that is, when there is no NP following overtly; otherwise it is *a/an*. This means that NP-deletion in the environments in (16o) is indeed possible, but the sentences are realized as in (17).

- (17) a. I wanted to read a book, so I bought **one**.  
 b. I expected a bird to fly through the mead hall, and **one** did.

Under theories like this, there are of course environments where surface *one* does not derive from the indefinite article.



I suppose that the same thing happens with *no* and *the*. The surface forms *no* and *none* seem to be in complementary distribution, with the conditioning environment being that which we have already seen: the presence or absence of a phonologically realized NP sister. And of course we have seen reasons above to believe that the definite article might be realized sometimes by the phonological forms which we call pronominal. This means that NP-deletion in the environments in (16l) and (16n) would actually produce the sentences in (18) and (19).

(18) Two heads are better than **none**.

(19) a. I wanted to read the best book in the store, so I bought **it**.  
 b. The giant wanted to eat the children, but **they** escaped.

The question now arises whether forms like *they* in (19b) are systematically ambiguous between determiner readings and referential pronoun readings. This may be the case, as far as I can see. Compare the systematic ambiguity which standard approaches admit between E-type and referential readings for pronouns.

The determiner *every*, on this view, would be the only one which genuinely does not allow NP-deletion after it. It has at least one other strange property in addition, namely the inability to appear in partitive constructions such as those in (20).

(20) a. All of the boys gave a present to Mary.  
 b. Each of the boys gave a present to Mary.  
 c. \*Every of the boys gave a present to Mary.

It is notable that figuring in partitive constructions involves appearing with no phonologically overt NP sister, just like NP-deletion. But I will not attempt to investigate here why this word should behave in this manner.<sup>11</sup>

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<sup>11</sup> I am unconvinced by the theory of Lobeck (1995:85–96). Her general claim is that ellipsis is licensed in a position if it is governed by a head which bears strong morphology, the latter being defined as “productive morphological realization of features from which a significant proportion of the referential content of non-arbitrary *pro* is recovered” (Lobeck 1995:15). The behavior of *every* is explained by positing a “strong” feature [partitive], which indicates the ability of a determiner to take part in a partitive construction: determiners apart from *every* have it, and thus license ellipsis of their NP complements, while *every* does not. This is entirely *ad hoc*, however, and indeed self-contradictory: the new feature simply does not fit the definition of “strong” morphology which is used elsewhere in Lobeck’s book.

## 2. THE TRUTH CONDITIONS OF DONKEY SENTENCES

## 2.1. Example with If-Clauses

Following Berman (1987), I assume that quantificational adverbs (including the silent variant of *always* found in multi-case conditionals) impose the structure in (21) on their LFs.

$$(21) \quad [[\text{always}_{s_1} \text{ if } \alpha]_{s_2} \beta]$$

Thus predicates in the restrictor receive one situation variable, predicates in the nuclear scope a different one. The semantic interpretation rule (22) makes use of this difference (cf. Berman 1987; Heim 1990).

$$(22) \quad \llbracket [[\text{always}_{s_1} \text{ if } \alpha]_{s_2} \beta] \rrbracket^g = \text{True iff for every minimal situation } \mathbf{s}_1 \text{ such that } \llbracket \alpha \rrbracket^{g s_1 s_1} = \text{True, there is a situation } \mathbf{s}_2 \text{ such that } \mathbf{s}_1 \leq \mathbf{s}_2 \text{ and } \llbracket \beta \rrbracket^{g s_1 s_1 s_2 s_2} = \text{True.}$$

I am assuming that there are situation variables in object language representations. The superscripts in this rule indicate that in the calculation of truth conditions the corresponding metalanguage situation variables (indicated by boldface) must be put in in place of the object language ones. For the standard example (23), we will have something like (24) at LF.

$$(23) \quad \text{If a man owns a donkey, he always beats it.}$$

$$(24) \quad \llbracket [[\text{always}_{s_1} \text{ if a man}(s_1) \text{ owns}(s_1) \text{ a donkey}(s_1)]_{s_2} \text{ he } \underline{\text{man}}(s_1) \text{ beats}(s_2) \text{ it } \underline{\text{donkey}}(s_1)] \rrbracket.$$

Following Heim (1990:146), I suppose that definites in the consequent referring to entities introduced in the antecedent will have the situation variables of predicates in the antecedent; if we take seriously the situation semantics view that situations are part of the way we think about the world and represent our thoughts in language (Kratzer 1989), then this is no more mysterious than our choosing to use the word *donkey* when we want to talk about donkeys.<sup>12</sup> The underlined occurrences of *man(s<sub>1</sub>)* and *donkey(s<sub>1</sub>)* will

<sup>12</sup> Note that I say “no more mysterious.” It is of course plenty mysterious how we manage to choose the word *donkey* when we want to talk about donkeys. According to Heim (personal communication), the original motivation for this practice was examples like (i).

(i) If a donkey is lonely, it talks to another donkey.

Here the uniqueness presupposition generated by *it* is not satisfied if we employ the variable for the extended situations defined in the apodosis for both *it* and *another donkey*. Things work out, however, if *it* can have the situation variable of the smaller situations defined in the protasis, since in those there is no other donkey.

be subject to deletion at PF, and will be marked in some way at LF so that the LF-identity condition can be enforced.

Applying (22) to (24), we obtain the truth conditions in (25). The pronouns *he* and *it* have their determiner meanings here.

- (25) For every minimal situation  $s_1$  such that there is an  $x$  such that  $x$  is a man in  $s_1$  and there is a  $y$  such that  $y$  is a donkey in  $s_1$  and  $x$  owns  $y$  in  $s_1$ , there is a situation  $s_2$  such that  $s_1 \leq s_2$  and the unique  $u$  such that  $u$  is a man in  $s_1$  beats in  $s_2$  the unique  $z$  such that  $z$  is a donkey in  $s_1$ .

These truth conditions are intuitively correct. Note in particular that there is covariance between men and donkeys. The covariance is now achieved solely by means of situation variables (as Heim has already done for some examples (1990:146)), not by individual variables. A desirable consequence of this change will be explored in section 4.

## 2.2. Donkey Sentences with QP and Relative Clause

There are various possible rules for quantifiers like *every* in the situation semantics literature. (See Kratzer 1989 for some discussion.) In this paper I will just employ the following simple rule, which is loosely based on Heim's (1990) use of situation semantics for the analysis of donkey anaphora.

- (26)  $\llbracket \llbracket \text{every}_{s_1} \alpha \rrbracket_{s_2} \beta \rrbracket^s = \text{True}$  iff, for every pair of an individual  $x$  and a minimal situation  $s_1$  such that  $x \in \llbracket \alpha \rrbracket^{s_1}$ , there is a situation  $s_2$  such that  $s_1 \leq s_2$  and  $x \in \llbracket \beta \rrbracket^{s_1, s_2}$ .

Our standard example will have the structure in (27) at LF.<sup>13</sup>

- (27)  $\llbracket \llbracket \text{every}_{s_1} [\text{man}(s_1) [\text{who}_1 [\text{a donkey}(s_1) 2[\text{t}_1 \text{ owns}(s_1) \text{ t}_2]]]] \rrbracket_{s_2} \text{beats}(s_2) \text{ it } \text{donkey}(s_1) \rrbracket$

Applying our rule (26), we obtain for this example the truth conditions in (28).

- (28) For every part of an individual  $x$  and a minimal situation  $s_1$  such that  $x$  is a man in  $s_1$  and there is a  $y$  such that  $y$  is a donkey in  $s_1$  and  $x$  owns  $y$  in  $s_1$ , there is a situation  $s_2$  such that  $s_1 \leq s_2$  and  $x$  beats in  $s_2$  the unique  $z$  such that  $z$  is donkey in  $s_1$ .

<sup>13</sup> I follow Heim and Kratzer (1998) in assuming that movement creates a binder index which occupies a separate node, the immediate sister of the structure targeted by movement. Thus in (27) the adscript 2 is interpreted as a lambda operator which binds the trace indexed 2.

These are intuitively correct. Notice the similarity between the truth conditions in (28) and the truth conditions for the corresponding donkey sentence with a conditional and an *always* (25). This is entirely appropriate. The two sentences are superficially (i.e. syntactically) different, but they contain universal quantification over situations of the same kind.

We have seen, then, that it is possible to obtain the correct truth conditions for donkey sentences using only theoretical postulates that are independently justified, without resorting to E-type pronouns.<sup>14</sup> Considerations of theoretical economy require us to favor such an analysis, if its empirical coverage is no worse than that of its less parsimonious rival, which seems to be the case. In the next three sections of this paper, moreover, I explore areas where the present analysis is arguably empirically superior to the E-type analysis.

### 3. THE PROBLEM OF THE FORMAL LINK

#### 3.1. *The Problem*

As has been discussed extensively in previous literature, the E-type analysis has difficulty in distinguishing between pairs of sentences like those in (29) and (30) (Heim 1982:21–24, 80–81, 1990:165–175).

- (29) a. Every man who has a wife is sitting next to her.  
 b. ?\* Every married man is sitting next to her.
- (30) a. Someone who has a guitar should bring it.  
 b. ?\* Some guitarist should bring it.

In the terms of the version of E-type pronouns sketched in (3), utterance of (29b) should make salient the relation  $[\lambda x.\lambda y.y \text{ is married to } x]$ , which would suffice to yield an E-type denotation for *her*: the sentence would be able to be paraphrased, “For all  $x$  such that  $x$  is a married man,  $x$  sits next to the unique  $y$  such that  $y$  is married to  $x$ .” The sentence has no such reading, however, creating a problem for the E-type strategy. Heim, following Kadmon (1987:259), dubs this the problem of the “formal link” between donkey pronoun and antecedent (Heim 1990:165): intuitively, *a wife* in (29a) seems to be acting as the antecedent to *her*, and (29b) is bad because here there is no such antecedent to which the donkey pronoun can be linked. In general, there seems to have to be an NP antecedent from which an E-type pronoun can derive its descriptive content.

<sup>14</sup> We could keep *E-type pronoun* as a descriptive term, of course. I mean that we need no separate theoretical entity to deal with the relevant phenomena.

### 3.2. *Previous Solutions*

There seem to be two routes that one could in principle take: one could keep the apparently problematic idea that E-type pronouns obtain their descriptive content by containing a variable over functions, or one could reject it in favor of a syntactic procedure that extracts a predicate or predicates from the surrounding linguistic material in a mechanical fashion. The first strategy is used by Chierchia (1992) and the second by Heim (1990). Both face problems of their own, as we will see.

#### 3.2.1. *Keeping the Variable over Functions*

The trouble with keeping the variable over functions is that, in order for the facts to be accounted for, a constraint must be imposed to the effect that this variable can only take on a value which is based, somehow, on the denotation of a noun phrase in the context. This is what Chierchia does, when he introduces the following principle (Chierchia 1992:159):

- (31) In a configuration of the form  $NP_i . . . it_i$ , if  $it_i$  is interpreted as a function, the range of such functions is the (value of the) head of  $NP_i$ .

(He further needs to ensure that E-type pronouns *must* be coindexed with an NP, otherwise there would be nothing to prevent one not being so indexed and picking up the ‘married-to’ relation on the basis of the occurrence of *married* in (29b).) This kind of constraint does the job, of course, but at the cost of pure stipulation. Given a theory in which E-type pronouns denote functions from individuals to individuals, it does not fall out naturally that the range of these functions should be determined by some NP in the linguistic environment, as opposed to a scenario in which some functions are available to be used because they are suggested by the semantic values of other types of words in the linguistic environment, or because they are contextually salient in some other way. Compare the case of referential pronouns: contextual salience alone is enough to provide a value for these free variables.

#### 3.2.2. *Using a Syntactic Procedure*

The advantage of using a syntactic procedure is that we account naturally for the restriction to NPs. Making a free variable over functions only look at NPs is a strange thing to do; making a syntactic procedure target a par-

ticular category label, however, is eminently natural. That is just the kind of thing that syntactic procedures do.

The difficulty is in making the necessary procedure natural and, if possible, independently justified. I think it is fair to say that these desiderata have not been met by the solution proposed in Heim (1990). Heim proposes that NPs are freely indexed, thus allowing NPs to be the antecedent of pronouns by being coindexed with them; then a pronoun whose antecedent is not definite and does not have scope over it is rewritten according to the transformational rule in (32).

$$(32) \quad X \ S \ Y \ NP_i \ Z \Rightarrow \begin{matrix} 1 & 2 & 3 & 4+2 & 5 \\ 1 & 2 & 3 & 4 & 5 \\ \text{conditions: } & 4 \text{ is a pronoun} \\ & 2 \text{ is of the form } [{}_s \ NP_i \ S] \\ & & & & 6 \quad 7 \end{matrix}$$

Thus a copy of the antecedent (term 6) plus its sister (term 7) is inserted in the position of the pronoun. Heim assumes the material is Chomsky-adjoined to the pronoun. Thus (32) converts (33) into the LF in (34).

$$(33) \quad [\text{every}_{x_1} [\text{man}(x_1) \text{ that } [[a_{x_2} \text{ donkey}(x_2)]_2 [x_1 \text{ owns } x_2]]]]_1 \\ [x_1 \text{ beats it}_2]$$

$$(34) \quad [\text{every}_{x_1} [\text{man}(x_1) \text{ that } [[a_{x_2} \text{ donkey}(x_2)]_2 [x_1 \text{ owns } x_2]]]]_1 \\ [x_1 \text{ beats } [it_2 [[a_{x_2} \text{ donkey}(x_2)]_2 [x_1 \text{ owns } x_2]]]]]$$

We furthermore need a semantic rule to give the right interpretation to the sequence  $[it_2 [[a_{x_2} \text{ donkey}(x_2)]_2 [x_1 \text{ owns } x_2]]]$ . The rule that accomplishes this is in (35).

$$(35) \quad [[it \ [[\text{Det}_x \alpha] \beta]]]^g = \text{the unique } x \text{ such that } [[\alpha]]^{g \setminus x} = [[\beta]]^{g \setminus x} = \text{True} \\ (\text{undefined if there is no such individual})$$

With this machinery in place, we can see that we no longer predict an E-type reading for (29b) and similar examples. (29b) simply does not meet the structural description for (32).

As Heim points out (1990:171), this is an approach to E-type pronominalization that is reminiscent of those theories of VP-ellipsis which have material copied and inserted at the site of the empty VP (Sag 1976; Williams 1977). It is thus in fact very similar to the theory advocated in this paper. The similarities between our two approaches might be thought to extend even to the claim that third-person pronouns can be interpreted in the same way as the definite article: the rule in (35) is syncategorematic and does not specify a particular semantic contribution for the pronoun, but what

intuitive plausibility the production of the definite description has derives from the fact that pronouns, like definite articles, are definite.

Heim's solution is very similar to some ideas arrived at contemporaneously but independently by Neale (1990). It is perhaps not necessary to go into all the details of Neale's system here. Briefly, he translates sentences into a formal language RQ, a modification of first-order logic which includes restricted quantifiers, and then calculates the truth conditions of these RQ translations. The crucial rule he uses for donkey sentences is (36) (Neale 1990:182–183).<sup>15</sup>

- (36) If  $x$  is a pronoun that is anaphoric on, but not c-commanded by, a non-maximal quantifier ' $[Dx: Fx]$ ' that occurs in an antecedent clause ' $[Dx: Fx] (Gx)$ ', then  $x$  is interpreted as '[the  $x: Fx \ \& \ Gx$ ]'

Take (37) and the RQ translation of its subject' (38).

- (37) Every man who bought a donkey vaccinated it.  
 (38) [every  $x$ : man  $x \ \& \ [a \ y$ : donkey  $y] (x \text{ bought } y)$

The antecedent clause for the pronoun *it*, anaphoric on *a donkey*, is (39). Applying (36) to the pronoun, therefore, we get (40).

- (39) [a  $y$ : donkey  $y] (x \text{ bought } y)$   
 (40) [the  $y$ : donkey  $y \ \& \ x \text{ bought } y]$

This means that the RQ translation of the whole sentence (37) is (41).

- (41) [every  $x$ : man  $x \ \& \ [a \ y$ : donkey  $y] (x \text{ bought } y)] ([\text{the } y$ : donkey  $y \ \& \ x \text{ bought } y] (x \text{ vaccinated } y))$

This seems to get the truth conditions correct. Moreover, even though Neale does not explicitly mention the problem of the formal link, it is evident that the sentences we want to rule out do not meet the structural description in (36), because in subjects like *every married man* and *some guitarist* there is no antecedent clause of the form ' $[Dx: Fx] (Gx)$ '. So we can see Neale's system as another solution to the current problem, albeit perhaps an unintentional one.

It can be seen that these solutions of Heim and Neale, although they have the advantage of being syntactic procedures (one on the object language,

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<sup>15</sup> A non-maximal quantifier is one whose semantics does not involve exhaustiveness on some definition. Examples of maximal quantifiers, according to Neale, are *all*, *every*, and *the*.

the other on the metalanguage), cannot be said to be particularly natural and are not independently justified. They are complicated procedures which come into play only in the case of E-type pronouns, with the specific intention of arriving at the right interpretation for these pronouns. Although they arguably achieve the right results in the end, they do not seem to be particularly explanatory, therefore.

This is not to say that no solution using a syntactic procedure could work. I advocate a procedure that might broadly be called syntactic in the next section.

### 3.3. *The Solution According to the NP-Deletion Theory*

The theory that donkey anaphora is NP-deletion has a simple and natural way of explaining (29) and similar contrasts. We have seen above in section 1.3 that, in the absence of any cue in the immediate physical environment, NP-deletion requires a linguistic antecedent, just like VP-ellipsis. There is a suitable linguistic antecedent in (29a), namely *wife*. There is no suitable linguistic antecedent in (29b). No more need be said. Note that this solution uses an independently needed mechanism, and falls out naturally from the rest of the theory of donkey anaphora, in a way that the previous syntactic solutions do not.

## 4. DONKEY SENTENCES AND STRICT/SLOPPY IDENTITY

### 4.1. *A New Problem for the E-type Analysis*

The NP-deletion theory of donkey anaphora can claim another empirical advantage over standard E-type analyses when it comes to dealing with certain VP-elliptical continuations of donkey sentences. This data has not been examined before, to my knowledge.

Standard E-type analyses claim that E-type pronouns give covarying readings because they contain a bound individual variable. One variant (Heim and Kratzer 1998) has the variable be present at LF, producing a VP that looks like (42). Another (Cooper 1979) has the pronouns be syntactically simplex and introduces a bindable variable in their denotations. But whatever choices are made about LF, the denotation of a VP containing an E-type pronoun ends up like the one in (43).

$$(42) \quad [t_{\langle 1,e \rangle} \text{ beats } [\text{the } [R_{\langle 7, \langle e, et \rangle} \text{ pro}_{\langle 1,e \rangle}]]]]$$

$$(43) \quad \lambda x.x \text{ beats the unique } z \text{ such that } z \text{ is a donkey owned by } x$$



Given this denotation, we then predict that a continuation sentence with a type *e* subject and VP-ellipsis (or a downstressed VP) will have a sloppy reading. We do not need to commit ourselves to any particular theory of VP-ellipsis in order to see this. All that is necessary is that the rules which directly or indirectly determine the availability of strict and sloppy readings should make reference to the denotation of the antecedent VP (or some constituent containing the antecedent VP). This seems virtually unavoidable, and is certainly the case in recent influential treatments such as those of Rooth (Rooth 1992; Fox 2000:85) and Schwarzschild (Schwarzschild 1999; Tomioka 1997). Given this one basic assumption, we then only have to look at (44).

- (44) a. In this town, every farmer who owns a donkey beats the donkey he owns, and the priest *beats the donkey he owns* too.  
 b. In this town, every farmer who owns a donkey beats the donkey he owns, and the priest does too.

The antecedent VP *beats the donkey he owns* spells out as closely as possible in idiomatic English the denotation in (43). Its own denotation will certainly be equivalent to (43). We just have to observe now that the two sentences in (44) have sloppy readings: they can be read as presupposing that the priest has a donkey and stating that he beats it. But now notice the prediction: the sentences in (44) have sloppy readings; the VPs of these sentences have denotations equivalent to the postulated VP-denotations of donkey sentences; distribution of strict and sloppy readings relies on the denotations of the antecedent VPs; so we predict, if we believe standard E-type accounts, that donkey sentences followed by elliptical continuation sentences with type *e* subjects should have sloppy readings.

We will now examine the data relevant to this prediction, and show it to be false.<sup>16</sup> Consider the pair of sentences in (45).

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<sup>16</sup> I do not examine the corresponding examples with a generalized quantifier as the subject of the ellipsis sentence (as in (i)), because it seems that there is no trouble on any theory in arriving at their attested sloppy readings.

- (i) In this town, every farmer who owns a donkey beats it, and every priest who owns a donkey does too. (sloppy, strict)

We need only suppose that *beats it* in the first sentence can serve as antecedent for ellipsis of *beats it* in the second, which is then interpreted normally. This extends to sentences like (ii).

- (ii) In this town, every farmer who owns a donkey beats it, and every priest does too. (sloppy, strict)

We need only suppose that *who owns a donkey* is understood (by ellipsis or accommodation) after *priest*, and this is reduced to the last case.

- (45) a. In this town, every farmer who owns a donkey beats the donkey he owns, and the priest *beats the donkey he owns* too. (sloppy, strict)
- b. In this town, every farmer who owns a donkey beats it, and the priest *beats it* too. (\*sloppy, strict)

Sentence (45a) repeats (44a). In (45b) we have a donkey sentence followed by a sentence with subject of type e and a repeated, phonologically reduced version of the VP of the first sentence. Given (43), we predict that a sloppy reading will be possible. But (and this is an extremely sharp judgment) it is not possible. Note that we cannot explain the lack of a sloppy reading in (45b) by appealing to any difficulty in accommodating the presupposition that the priest owns a donkey, because we have no trouble accommodating the identical presupposition in (45a); and standard E-type analyses claim that (45a) is identical to (45b) in all relevant respects.<sup>17</sup>

The corresponding pair of sentences with VP-ellipsis instead of phonological reduction is in (46).

- (46) a. In this town, every farmer who owns a donkey beats the donkey he owns, and the priest does too. (sloppy, strict)
- b. In this town, every farmer who owns a donkey beats it, and the priest does too. (?\*sloppy, strict)

Exactly the same contrast surfaces.<sup>18</sup> The same judgments are obtained, and similar comments apply, when we investigate conditional sentences, as in (47) and (48).

<sup>17</sup> Note that in a simple example of a sloppy reading like *John talks to his dog and Bill does too*, we have no difficulty going along with the supposition that Bill owns a dog. (45a) behaves just the same as simpler examples.

<sup>18</sup> The only difference here is that a minority of native speakers do report a sloppy reading in (46b). Most speakers I have obtained judgments from, however, find that the sloppy reading is impossible here. Given the fact that the judgment in (45b) is very sharp and is shared by all speakers, I think the best way to make sense out of the apparent dialect divergence over (46b) is to say that those who report a sloppy reading of this sentence are engaging in some extralinguistic reconstruction of what they think might be meant. (This kind of thing goes on all the time, of course, to a certain extent.) The process would be similar to that which takes place when speakers are confronted with (i).

- (i) Every farmer who owns a donkey beats it, and the same can be said of the priest.

Here there seems to be a process of working out what is meant by *the same* (beating the farmers' donkeys? beating the donkeys he owns?) which is rather conscious. I conjecture that some speakers engage in a similar process when confronted with the admittedly unlovely (46b). The judgment which reflects the nature of VP-ellipsis, then, is that of the majority of speakers, namely that a sloppy reading is not possible.

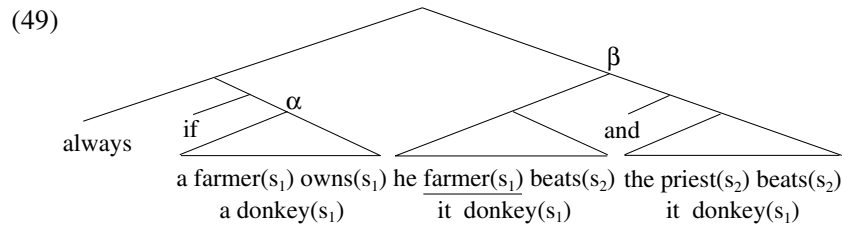
- (47) a. In this town, if a farmer owns a donkey he beats the donkey he owns, and the priest *beats the donkey he owns* too. (sloppy, strict)  
 b. In this town, if a farmer owns a donkey he beats it, and the priest *beats it* too. (\*sloppy, strict)
- (48) a. In this town, if a farmer owns a donkey he beats the donkey he owns, and the priest does too. (sloppy, strict)  
 b. In this town, if a farmer owns a donkey he beats it, and the priest does too. (?\*sloppy, strict)

Sloppy readings do not seem to be possible in these sentences.<sup>19</sup> This falsifies the prediction we made earlier. The standard E-type analysis cannot be correct.

#### 4.2. A Solution Using the NP-Deletion Theory

##### 4.2.1. The Solution for Examples with If-Clauses

The LF structure of our example (47b) is presumably that in (49). The continuation with the phonologically reduced VP simply forms part of the consequent of the conditional.<sup>20</sup> The nodes marked  $\alpha$  and  $\beta$  in this tree correspond to the  $\alpha$  and  $\beta$  of the interpretation rule in (22). Applying (22) to the resulting structure, we obtain the truth conditions in (50).



<sup>19</sup> There is in fact one more complication in the data, which I will examine in section 4.2.3.

<sup>20</sup> This type of structure is presumably possible whenever the same quantificational adverb is understood in both sentences. It would not be possible if the reduction sentence introduces a new quantificational adverb, as in (i).

- (i) If a farmer owns a donkey he always beats it, and usually the priest *beats it* too.

In this paper I will not attempt to deal with sentences like (i), which might involve telescoping (Poesio and Zucchi 1992) or other ill-understood mechanisms. For simplicity of exposition, I will concentrate on (49). What I have to say is by no means intended to be the last word on the problem of cross-sentential binding.

- (50) For every minimal situation  $s_1$  such that there is an  $x$  such that  $x$  is a farmer in  $s_1$  and there is a  $y$  such that  $y$  is a donkey in  $s_1$  and  $x$  owns  $y$  in  $s_1$ , there is a situation  $s_2$  such that  $s_1 \leq s_2$  and the unique  $x'$  such that  $x'$  is a farmer in  $s_1$  beats in  $s_2$  the unique  $z$  such that  $z$  is a donkey in  $s_1$  and the unique  $u$  such that  $u$  is a priest in  $s_2$  beats in  $s_2$  the unique  $v$  such that  $v$  is a donkey in  $s_1$ .

These truth conditions are intuitively correct. In particular, the donkeys beaten by the priest are the ones defined in the situations  $s_1$ , and thus belong to the farmers. The only matter still potentially problematic is the status of the priest or priests who figure in the truth conditions. The example is most naturally read as talking about only one priest, the priest who serves the town. But the truth conditions do not necessitate this, and in fact leave open the possibility that there could be many priests, covarying with the farmers. I actually do not think this is problematic, because this reading does exist for the sentence, although it is marginal: one has to imagine that we are talking about an extremely religious neighborhood, with one priest stationed in every farmhouse. Compare (51), where there is obvious covariance in the denotation of the subject of the ellipsis sentence.

- (51) If a farmer owns a donkey he beats it, and his wife does too.

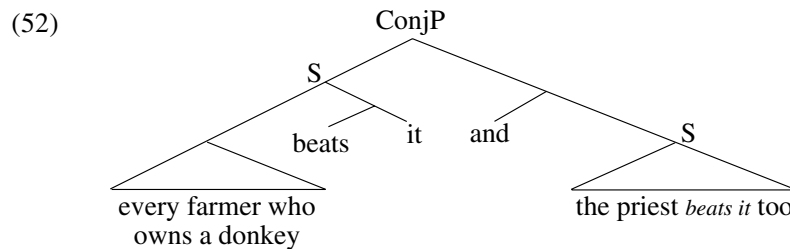
It is entirely appropriate, then, that the truth conditions leave this matter vague: in the religious neighborhood scenario, we can take the priest in each extended situation  $s_2$  to be the priest stationed in the farmhouse of the farmer in each situation  $s_1$ ; but if we know that such a scenario is unlikely, then we can imagine the priest in each situation  $s_2$  to be the same person each time, the priest of the town, or some other contextually salient priest.

One might object at this point that, although it does follow from (49) that the correct truth conditions will be obtained, we have simply begged the question in (49) by assuming that the situation variable will be  $s_1$  on the occurrence of *donkey* in the second conjunct of the consequent. But in fact our theory gives us very little choice in this matter. Recall that the semantics for quantificational adverbs which we have adopted from Berman (1987) imposes the indexing implied by (21) and (22) on sentences of this type. The only exception to this which we have allowed, following Heim (1990:146), is that definites in the consequent referring to entities introduced in the antecedent have the situation variables assigned to predicates in the antecedent. It is by this principle that  $s_1$  is a possible indexing for the occurrence of *donkey* in the second conjunct of the consequent in (49). We see, then, that the only possible alternative to  $s_1$  on this word is  $s_2$ .

But this produces truth conditions exactly equivalent to those in (50). The reason is that, given our interpretation rule (22), the situations  $s_2$  must be extensions of the situations  $s_1$ , which means that any entities introduced in  $s_1$  will also be present in  $s_2$ . So when we introduce a set of situations  $s_1$ , each of which contains exactly one donkey, and then talk about the unique donkey in the situations  $s_2$ , extensions of  $s_1$ , this donkey must be the same as the donkey in each  $s_1$ . So on all legitimate indexings of (49), the priest ends up beating the donkeys of the farmers, as desired.

#### 4.2.2. The Solution for Examples with QP and Relative Clause

The problem in interpreting relative clause donkey sentences plus continuations with ellipsis or phonological reduction is the following: on the surface at least, the ellipsis/reduction sentence cannot simply be part of the nuclear scope of the quantificational structure, as with conditional donkey sentences. Rather we must have a structure like that in (52).



There is no reason according to anything we have seen so far to think that the second conjunct will be interpreted by our interpretation rule (26) at all. And yet this is clearly necessary for the correct truth conditions to be obtained: the *it* in the continuation must be bound by the subject QP *every farmer who owns a donkey* in order for the interpretation to be obtained whereby the denotation of *it* covaries with the farmers.

It looks, then, as if we need the QP *every farmer who owns a donkey* to raise and adjoin to the whole ConjP. But this seems immediately to run foul of the Coordinate Structure Constraint (CSC) of Ross (1967), which forbids movement of or out of a conjunct. The CSC is exemplified by such crashingly bad sentences as those in (53) and (54), where movement has taken place overtly.

- (53) a.\* Which surgeon did Kim date *t* and a lawyer?  
 b.\* Which surgeon did Kim date a lawyer and *t*?
- (54) a.\* Which surgeon did Kim date friends of *t* and a lawyer?  
 b.\* Which surgeon did Kim date a lawyer and friends of *t*?

More importantly for the present discussion, there is also evidence that the CSC holds at LF, forbidding QR of a conjunct or out of a conjunct (Lakoff 1970; Rodman 1976; May 1985). This is shown in (55).

- (55) a. A student likes every professor.  
        $(\exists > \forall, \forall > \exists)$   
       b. A student [[likes every professor] and [hates the dean]].  
        $(\exists > \forall, *\forall > \exists)$

When *every professor* is in a conjunct, in (55b), it cannot raise at LF and have scope over *a student*.

It would seem, then, that we cannot resolve our difficulty by having *every farmer who owns a donkey* in (52) raise at LF and bind into the second conjunct. But actually there does exist evidence that such movement is possible in limited circumstances. Ruys (1993) has observed that, when there is a variable in the second conjunct that needs to be bound, a QP in the first conjunct *can* raise at LF. (Fox 2000:49–53 also discusses this point.) Compare (56a) = (55b) with (56b).

- (56) a. A student [[likes every professor] and [hates the dean]].  
        $(\exists > \forall, *\forall > \exists)$   
       b. A (different) student [[likes every professor<sub>1</sub>] and [wants her<sub>1</sub> to be on his committee]].  
        $(\exists > \forall, \forall > \exists)$

In the absence of any one contextually salient female, *her* must be bound to be interpreted, and Ruys proposes that the CSC can be violated at LF precisely in order to bind variables in the second conjunct in this way.<sup>21</sup> This, then, is a very good parallel for the situation which is presented to us by (52): in the absence of any one contextually salient non-human individual, the *it* of the continuation sentence needs to have a covarying interpretation put upon it; and this can be done by construing it as a donkey

<sup>21</sup> Sabine Iatridou (personal communication) has questioned this principle, pointing out that it is difficult if not impossible to have *him* bound by *every man* in (i).

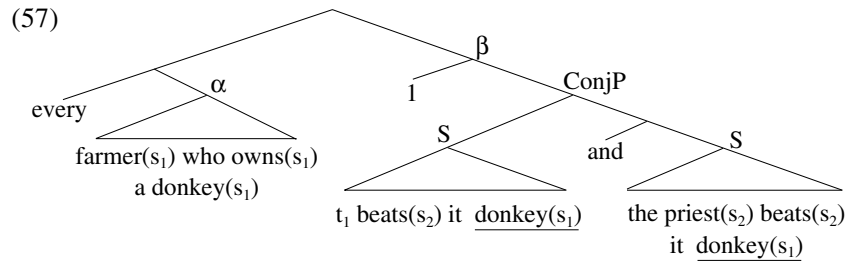
- (i) Every man kissed Mary and Mary kissed him.

I agree with the judgment, but I would point out that with more context binding into the second conjunct becomes possible:

- (ii) Every man who entered her office kissed Mary and then Mary kissed him before he left.

In constructing (ii), I strove to create a context that favored the interpretation that Mary's kissing was interspersed with the men's kissing. The difficulty in obtaining the bound interpretation in (i) seems to be connected to the difficulty of construing it this way.

pronoun (i.e., a determiner) and having the subject of the first conjunct raise and bind the situation variable of the following (phonologically null) NP. We end up with the structure in (57) at LF. The nodes marked  $\alpha$  and  $\beta$  correspond to the constituents marked like this in our interpretation rule (26). We could once more have the situation variables on the two occurrences of *donkey* within ConjP be  $s_2$ ; the same truth conditions would result, as explained above.



Applying (26) to (57), we obtain the truth conditions in (58).

- (58) For every pair of an individual  $x$  and a minimal situation  $s_1$  such that  $x$  is a farmer in  $s_1$  and there is a  $y$  such that  $y$  is a donkey in  $s_1$  and  $x$  owns  $y$  in  $s_1$ , there is a situation  $s_2$  such that  $s_1 \leq s_2$  and  $x$  beats in  $s_2$  the unique  $z$  such that  $z$  is a donkey in  $s_1$  and the unique  $u$  such that  $u$  is a priest in  $s_2$  beats in  $s_2$  the unique  $v$  such that  $v$  is a donkey in  $s_1$ .

Again, the correct strict reading is obtained.

This concludes the main part of the discussion of the problem of donkey sentences and continuations with phonologically reduced VPs. It can be seen that in the analysis of this data the theory that donkey anaphora is NP-deletion scores a significant empirical point over the E-type analysis.

#### 4.2.3. *Some Related Data*

In the interest of strict accuracy, we should note that there is a further complication in the judgments given by speakers on strict and sloppy identity in continuations of donkey sentences with VP-ellipsis or phonologically reduced VPs. In the examples used above in section 4.1, the type  $e$  subject of the continuation sentence was not a member of the set denoted by the NP in the QP subject of the donkey sentence. It is an interesting fact that when it *is* a member of this set, sloppy readings suddenly become available, as we see in (59).<sup>22</sup>

<sup>22</sup> I am grateful to Kai von Fintel for this example.

- (59) a. Almost every student who was awarded a prize accepted it, but  
the valedictorian didn't *accept it*. (sloppy, ?strict)
- b. Almost every student who was awarded a prize accepted it, but  
the valedictorian didn't. (sloppy, ?strict)

We can tell that membership by the second subject in the set denoted by the NP of the first is indeed an important factor by means of the following (admittedly awkward) minimal pair. (Father Giles is the priest of the town being described.)

- (60) a. In this town, almost every farmer who owns a donkey beats it,  
but Father Giles doesn't *beat it*. (\*sloppy, ?strict)
- b. In this town, almost every farmer who owns a donkey beats it,  
but Farmer Giles doesn't *beat it*. (?sloppy, ?strict)

What should we make of these facts?

I think that the answer to this puzzle lies in people's ability to accommodate presuppositions about situations. Specifically, I propose that the sentences in (59) can have the LFs in (61).

- (61) [[almost every<sub>s<sub>1</sub></sub> [student(s<sub>1</sub>) [who<sub>1</sub> [a prize(s<sub>1</sub>) 2[t<sub>1</sub> was  
awarded(s<sub>1</sub>) t<sub>2</sub>]]]]]]<sub>s<sub>2</sub></sub> accepted(s<sub>2</sub>) it prize(s<sub>1</sub>)]  
[[the<sub>s<sub>3</sub></sub> valedictorian(s<sub>3</sub>)]<sub>s<sub>4</sub></sub> did not accept(s<sub>4</sub>) it prize(s<sub>3</sub>)]

The occurrence of *prize(s<sub>3</sub>)* in the second sentence naturally creates the presupposition that the situation defined in the “restrictor” (here, the NP complement of *the*) contains a prize (which is not explicitly mentioned). We can accommodate the presupposition in this case. It is evidently the previous mention of students being awarded prizes which facilitates this: we have been presented with a set of situations  $s_1$ , each of which contains just a student, a prize, and the former's being awarded the latter; when we hear “but the valedictorian . . . ,” since we know that valedictorians are a kind of student, it is easy to suppose that the situation being introduced by these words is a situation of the same type as those just mentioned. More technically, we suppose that the situation introduced by “but the valedictorian . . .” is an extension of one of the situations in the set just mentioned.<sup>23</sup> We are aided in this accommodation by the pragmatics of *almost every . . . but*: there is an expectation that if someone has said that almost all members of a certain set have some property and then says that some-

<sup>23</sup> None of the situations  $s_1$  of the first sentence contain anything except a student, a prize, and the former's being awarded the latter; they are the minimal such situations, and hence do not contain other information, like whether any of the students is a valedictorian.



thing which could be a member of that set does not have that property, then the latter comment is an explanation of why we have to say “almost every” and not the stronger “every”. In the case at hand, then, a prize and the information that the valedictorian was awarded the prize are imported for free into the situation introduced by “but the valedictorian . . .”. Precisely parallel comments are applicable to (60b). Things are different, however, with sentences like (60a). Here, since the first situations include only farmers, donkeys, and owning relationships, it is impossible to construe the situation introduced by “but Father Giles . . .” as being of this type, given that Father Giles is a priest. There is no other knowledge available to the listener to suggest that Father Giles might have a donkey. And so the presupposition necessary for a sloppy reading is not accommodated.

Note that, given this analysis, the situation introduced into the truth conditions by the LF-fragment [ $\text{the}_{s_3}$  valedictorian( $s_3$ )] is not actually the *minimal* situation which contains the valedictorian. We must admit some flexibility into our theory and enable the situations quantified over to be the minimal ones which satisfy the conditions imposed by the overt linguistic material of the restrictor and also, in addition, contain some extra information which has been accommodated. I will not attempt to produce a formal version of such a theory here. But I would draw attention to the following parallel, which also suggests that we cannot maintain a theory in which it is always strictly speaking the minimal situations which we count.

It has been remarked that situation semantic analyses of the type I have been using reintroduce the proportion problem into the analysis of donkey anaphora. Consider (62).

(62) If a farmer owns a donkey he is usually rich.

As Heim (1990:150) remarks, the most salient and possibly the only reading of this sentence claims that most donkey-owning farmers are rich. But a semantics based on quantification over the minimal situations in which the antecedent is true claims that most minimal situations in which a farmer owns a donkey are part of situations in which the farmer is rich. And this makes a wrong prediction. Imagine a scenario with 100 farmers in which 99 farmers own one donkey each and are poor, while the hundredth owns 200 donkeys and is rich. Intuitively, (62) is false in such a scenario. But our semantics predicts that it will be true. The reason is that 200 of the minimal situations in which there is a farmer and a donkey he owns are part of situations in which that very farmer is rich; while only 99 such minimal situations extend to ones in which the farmer is poor.

Now one attractive solution to this problem is that given by Berman

(1987), who says that quantification over situations, like quantification over other domains, is a context-dependent affair. So it is possible that we sometimes exclude certain situations from our universe of discourse. Here, for example, we exclude situations which contain a farmer and some but not all of his donkeys. As Heim (1990:151) says, we might “view the donkey supply of each farmer as an unstructured and indivisible lump.” This then would solve the proportion problem for examples like (62). There would be only 100 minimal situations in which there is a farmer and a donkey he owns, and of these 99 would not be part of extended situations in which the farmer is rich. So (62) comes out false, as desired. Obviously there is much work to be done to determine what conditions render what situations unavailable to be quantified over. (For some discussion of the whole problem, see Heim 1990:148–158.) But if this approach does prove to be fruitful, we have a parallel for the conclusion reached above, that the situations quantified over need not necessarily be the minimal ones which fulfill the condition given by the overt linguistic restrictor. We need to integrate our situation semantics with a sophisticated pragmatics which will tell us what situations the context renders available at what time.

##### 5. THE PROBLEM OF INDISTINGUISHABLE PARTICIPANTS

As Heim (1990:147–148, 157–158) points out, a serious problem is raised for the E-type analysis by sentences such as (63).

(63) If a bishop meets another bishop, he blesses him.

In the version of the E-type analysis entertained in the early parts of Heim’s 1990 paper, for example, *he* and *him* would be represented at LF as two functions  $f^1(s)$  and  $f^2(s)$  respectively, where  $s$  ranges over minimal situations of the type defined in the protasis. But what can these functions actually be?  $f^1(s)$ , for example, cannot be the function which to each  $s$  assigns the unique bishop who meets a bishop in  $s$ , since there can be no such function, there being no such unique bishop in any of the salient situations  $s$ . The problem is that the two participants in the minimal situations defined by the protasis in (63) are indistinguishable.

Neale (1990:245–247) obtains the right truth conditions for examples like this by translating the E-type pronouns as restricted quantifiers of the form [whe  $x$ :  $Fx$ ], where  $F$  is constructed by his normal rules, especially (36), and the semantics for the new quantifier is as follows: [whe  $x$ :  $Fx$ ]( $Gx$ ) is true iff  $|\mathbf{F} - \mathbf{G}| = 0$  and  $|\mathbf{F}| \geq 1$ . So the consequent in (63) would receive the RQ translation in (64).

- (64) [whe  $x$ : bishop  $x$  & [a  $y$ : bishop  $y$  &  $y \neq x$ ] ( $x$  meets  $y$ )] ([whe  $y$ : bishop  $y$  &  $y \neq x$  &  $x$  meets  $y$ ] ( $x$  blesses  $y$ ))

To paraphrase: for every  $x$  such that  $x$  is a bishop and there is a  $y$  such that  $y$  is a bishop and  $x$  is not identical to  $y$  and  $x$  meets  $y$ , and for every  $z$  such that  $z$  is a bishop and  $z$  is not identical to  $x$  and  $x$  meets  $z$ ,  $x$  blesses  $z$ . This certainly seems to capture the truth conditions of the above example. One is left feeling a bit uneasy, however. The essential move here is to make pronouns numberless, standing for quantifiers meaning ‘every  $z$  such that  $Fz$ ’ or ‘whatever  $x$  were  $F$ ’. We might ask whether this is not just doing violence to the facts. The pronouns in question *do* have number features, whose distinctive content we intuitively recognize quite plainly.

To sharpen this criticism, let us consider how Neale could possibly account for the presence and value of number features on these pronoun-quantifiers. (He does not tell us himself.) Presumably the number features (and other  $\phi$ -features) on each pronoun must be present by agreement with its antecedent. It is difficult to see where else they could come from, since in the syntax on Neale’s account a donkey pronoun does not have an NP sister. (Contrast the NP-Deletion Theory.) But then we would expect, for example, (65a) to be grammatical.

- (65) a.\*If a bishop meets more than one parishioner at once, he blesses him.  
 b. If a bishop meets more than one parishioner at once, he blesses them.

The pronoun *him* in (65a) has the same number feature as its antecedent *more than one parishioner*, and yet the sentence is ungrammatical. It is unclear how Neale can account for this. (The semantics surely cannot help, since (65a) and (65b) will receive exactly the same RQ translation on this theory.) Likewise, it is unclear how the grammatical (65b), with its clash of formal number features, is to be dealt with. On the NP-Deletion Theory, on the other hand, the contrast in (65) falls out naturally: the  $\phi$ -features on the pronouns are derived by agreement with their phonologically null NP sisters; and the singular [*him* parishioner( $s_1$ )] in (65a) is ruled out because it incorrectly implies that there is just one parishioner in each of the situations  $s_1$  defined in the protasis. This distinction seems to be collapsed in Neale’s theory, however.

I am not inclined to adopt the solution of Neale (1990), then, ingenious though it is. On the other hand, I think that we can make some progress on the problem of indistinguishable participants by means of the NP-

Deletion Theory. Note that the NP-Deletion Theory claims that (63) must have the same LF as either (66a) or (66b).

- (66) a. If a bishop meets another bishop, the bishop blesses the bishop.  
 b. If a bishop meets another bishop, the bishop blesses the other bishop.

These two sentences, although slightly stilted, are grammatical and have the same meaning as (63); so the prediction of the NP-Deletion Theory is fulfilled. But notice what has now happened. The two sentences in (66) do not involve donkey pronouns, and yet it is evident that if we can account for their grammaticality we can immediately account for the grammaticality of (63), under the NP-Deletion Theory. So the problem of indistinguishable participants is not a problem about pronouns in particular. It is a problem concerning the semantics of the definite article.

Here is a speculation about what might actually be going on. I believe, although I will not argue the point at length in the present paper, that the semantics of the definite article is not such that there is always an explicit claim of uniqueness or exhaustiveness with respect to the set denoted by the NP sister. Examples like those in (66) are cases in point. So is (67), which we would easily accept as a felicitous opening to a newspaper article.

- (67) Amnesty International, the human rights group, claims in a new report that . . .

Here it is obvious that the writer is not presupposing that Amnesty International is the only human rights group in the world. Now the normal strategy for justifying uniqueness as part of the semantics of the definite article in the face of examples like this is to say that the context is somehow narrowed down sufficiently for the uniqueness presupposition to be justified. This strategy works passably well in cases like (68).

- (68) Amnesty International and Greenpeace made an unusual joint declaration today. The human rights group had been monitoring . . .

Here, Amnesty International is the only human rights group in the set {Amnesty International, Greenpeace}, and it might reasonably be argued that the contextually salient individuals have been reduced to this set by the first sentence. (Alternatively, if (68) comes out of the blue, like (67), we might want to say that the set of salient individuals has been *built up*

to consist of exactly this set.) But I do not accept that the occurrence of the phrase *Amnesty International* at the start of (67) serves immediately to establish the set of salient individuals as being exactly {Amnesty International}, in the manner required. If this were the case, we would expect a version of (67) in which the supposed uniqueness claim was spelled out explicitly to be felicitous. This is not the case, however, as (69) demonstrates.

- (69) Amnesty International, the only entity which is a human rights group, claims in a new report that . . .

This would not be a happy beginning to a newspaper article. Apart from decrying the academic jargon *entity*, one is left wondering at the reporter's ignorance of the other human rights groups in the world.

I will not pursue this line of inquiry further in the present paper. (The semantics for the definite article on which it relies is the focus of work in progress.) To recap, the NP-Deletion Theory enables us to reduce the problem of (63) to the task of accounting for the grammaticality of the sentences in (66), which we would have to do anyway. It is to be preferred, then, to the E-type analysis, which has no evident means of reducing this problem to any problem concerning normal, overt definite descriptions. It is plausible that work on the semantics of the definite article will shed light on this question.

## 6. THE OTHER USES FOR E-TYPE PRONOUNS

So far this paper has concentrated exclusively on donkey anaphora, for the very good reason that the majority of the work on E-type pronouns seems to be concerned with this particular manifestation of them. But there are of course other types of sentence in which linguists have posited the existence of these pronouns, and it remains to be shown that the approach being advocated can deal with these too. I will take the following to be an adequate sample: Bach-Peters sentences, quantificational subordination, and paycheck sentences.<sup>24</sup>

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<sup>24</sup> It is sometimes claimed that so-called "modal subordination," as in (i), could also be dealt with by means of E-type pronouns (Heim 1990).

- (i) John wants to catch a fish. He hopes I will grill it for him.

I have not seen any analysis spelling this out in detail, however, and I suspect that the task would be of considerable complexity. I leave this problem for further research. Meanwhile, see Roberts (1989, 1996) for discussion of modal subordination.

### 6.1. *Bach-Peters Sentences*

Bach and Peters observed that there is no way in which both pronouns in sentences like (70) can be bound at the same time (Bach 1970). Either *every pilot who shot at it* c-commands *him* or *the MiG that chased him* c-commands *it*, but not both.

(70) Every pilot who shot at it hit the MiG that chased him.

Jacobson subsequently proposed that these sentences be handled by having the first pronoun, *it* in (70), be derived from a full DP, *the MiG that chased him* (Jacobson 1977).

The same solution can be maintained under the theory that E-type pronouns are in fact definite articles. We simply suppose that an NP *MiG that chased him* has been deleted by NP-deletion after the definite article *it*, as illustrated in (71). We thus predict that (70) means exactly the same as (72), which is correct.

(71) Every pilot who shot at it MiG that chased him hit the MiG that chased him.

(72) Every pilot who shot at the MiG that chased him hit the MiG that chased him.

Note that the “antecedent” for NP-deletion does not literally come before the deleted phrase on this occasion. This is unproblematic, since it is easy to construct examples of uncontroversial NP-deletion where the same thing happens, as in (73). If we start with the same underlying sentence and use NP-deletion to erase the second NP instead of the first, we end up with (74), which also means the same as (70), in accordance with our hypothesis.

(73) His is the same as my shirt.

(74) Every pilot who shot at the MiG that chased him hit it.

There is no problem, then, in accounting for Bach-Peters sentences on the NP-Deletion Theory.

### 6.2. *Quantificational Subordination*

As the term is normally used in the literature,<sup>25</sup> quantificational subordination is the phenomenon exhibited by (75) (Heim 1990:139).

<sup>25</sup> Gawron (1996:249) uses the term *quantificational subordination* to refer to an example in which a pronoun is in the scope of a quantificational adverb whose restrictor is understood from material in the previous sentence. But this in my view falls under what Roberts

- (75) Most books contain a table of contents. In some, it is at the end.

It is immediately evident that examples like this pose no problem for the NP-Deletion Theory. We only have to suppose that NP-deletion has taken place twice in the second sentence of (75), the antecedents being in the previous sentence. This second sentence, then, is predicted to have the same LF as (76).

- (76) In some books, the table of contents is at the end.

And, as predicted, (76) means exactly the same as the second sentence in (75). If there is any problem at all here, then, it is not one which concerns the interpretation of pronouns.

### 6.3. *Paycheck Sentences*

The use of E-type pronouns to analyze paycheck sentences is one of their oldest applications, dating back to Cooper's (1979) paper. The classic example is from Karttunen (1969):

- (77) The man who gave his paycheck to his wife was wiser than the man who gave it to his mistress.

To the supposition that there is a problem here, one might object that the paycheck of the man who gave his paycheck to his mistress has become contextually salient, meaning that it could just be picked up by a referential pronoun. The following variant of the sentence, introduced by Cooper (1979:77), makes the problem explicit, however.

- (78) John gave his paycheck to his mistress. Everybody else put it in the bank.

Here we are faced with the familiar problem of covariance without c-command. Cooper solves the problem in the normal way by treating *it* as a definite description meaning 'the paycheck of *x*', with the individual variable bound by *everybody else*.

Let us now see how the NP-Deletion Theory handles this case. At first there seems to be a problem in that *his* in *his paycheck* is in [Spec, DP], according to contemporary syntactic accounts (Abney 1987). This would

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(1989, 1996) calls *modal subordination*, since I follow those who analyze quantificational adverbs as involving quantification over situations. Gawron ultimately analyzes his example by means of a dynamic logic, which is to say a logic which includes dynamic binding along the lines of Groenendijk and Stokhof (1991) and related work.

mean that the NP deleted in the second sentence of (78) could consist of at most the word *paycheck*, which would seem to give no basis for the necessary covariance.

One could explore two options at this stage. One would be to take advantage of situation semantics and see if a situation variable on *paycheck* could give the desired effect, as we saw earlier with donkey anaphora. There would be a problem then, however, in that, using the rule in (26) in a mechanical way, we arrive at the truth conditions in (79) for the second sentence of (78).

- (79) For every pair of an individual  $x$  and a minimal situation  $s_1$  such that  $x$  is a person in  $s_1$  and  $x \neq \text{John}$  in  $s_1$ , there is a situation  $s_2$  such that  $s_1 \leq s_2$  and  $x$  put-in-the-bank in  $s_2$  the unique  $z$  such that  $z$  is a paycheck in  $s_1$ .

That is, there is no explicit material in the restrictor of the determiner *every* indicating that there are paychecks in the situations  $s_1$ , even though this would be required for the reading we obtain. A possibility, however, is that the necessary presupposition is accommodated: as we saw in the examples of phonologically reduced continuations of donkey sentences which we examined in section 4, it is possible sometimes for listeners to mentally import things into the “minimal” situations  $s_1$  when there are explicit clues that this construal of the situations is being presupposed. In section 4.2.3, we examined discourses in which the type  $e$  subject of the sentence which succeeded the donkey sentence was a member of the set denoted by the NP of the QP subject of the donkey sentence (example (59)). This relation was evidently sufficient to enable the hearer to assume that the type  $e$  subject was in a situation similar to the minimal situations of the preceding quantificational structure, even when there was no explicit indication of this in its own sentence. Returning to the current example, it seems that one could make a case for a similar state of affairs obtaining: the *everyone else* implicitly leads the hearer to think of a group of people receiving paychecks of which both John and everyone else are members. In fact the relation is exactly the same as that which holds between the two subjects in (59): the only difference is that in (78) the type  $e$  subject comes first and the quantificational one second. It seems entirely possible, then, that the covariance is achieved in this way.

The second option which we should explore is that the *his* in *his paycheck* is in fact within NP at LF. Let us assume that, in those cases where NP-deletion is licensed by a linguistic antecedent (see section 1.3), the process of verifying that a suitable antecedent is present takes place at LF, as has been argued to be the case in the related phenomenon of VP-ellipsis. Then



we could have the individual variable *his* as part of the deleted material in the second sentence of (78), and the necessary covariance could be achieved by having this bound by *everybody else*. Roughly, then, the relevant structure at LF would be like that in (80).

- (80) John gave [<sub>DP</sub> the [<sub>NP</sub> paycheck of him]] to his mistress.  
 Everybody else put [<sub>DP</sub> it [<sub>NP</sub> paycheck of him]] in the bank.

We see that there is an antecedent for the deleted NP *paycheck of him*, and that straightforward variable binding in the second sentence achieves the attested reading.

What reason do we have to believe that possessive DPs can be within the NP they modify at LF? A related view has in fact been held for a long time on the basis of distributional evidence. In *Knowledge of Language*, Chomsky draws attention to the following paradigm (Chomsky 1986:188).

- (81) a. a book of John's  
 b. that book of John's  
 c.\* the book of John's  
 d. the book of John's that you read  
 e.\* John's book that you read  
 f. John's book

As Chomsky says, NPs like *book of John's* cannot appear with the definite article, unless a further postnominal restrictor such as *that you read* is present also. Alongside this gap in the paradigm, there are phrases like *John's book*, which, furthermore, has exactly the same meaning as the missing option (81c). The data suggest, then, that (81f) might be derived from an underlying form like that in (81c). This, of course, is an argument that the possessor *originated* inside the NP, not that it is interpreted there; but given the frequent availability of reconstruction, we have reason to believe that the phrase could appear in a lower position at LF too.

For a direct semantic argument about where possessors like *John's* are interpreted, I draw upon recent work by Larson and Cho (1999), who examine the ambiguity of DPs like *John's former house* and *John's old car*. The former phrase, for example, can refer either to the object which John owns which was formerly a house (the "N-modifying reading" of *former*) or to the house which John used to own (the "POSS-modifying reading"). Larson and Cho plausibly explain this ambiguity as structural, depending on the order in which the elements in possessive DPs combine with each other in the semantics. Very informally, if *former* is the first thing to compose with *house*, we get a former house, something that was once a house; add *John's* and we have the object of this kind owned by John,

and the N-modifying reading above. But if *John's* is the first thing to compose with *house*, we get a house owned by John; add *former* and we have something which was formerly a house owned by John, and the POSS-modifying reading above. (The reader is referred to Larson and Cho's 1999 paper for a technical implementation.) The point of relevance for the analysis of paycheck sentences is that in order for *John's* to compose with *house* before *former* does, it is most plausibly in a low position, within NP. We have every reason to believe, then, that something like (80) could indeed show the relevant structure in paycheck sentences, which means that the covariance is achieved simply by *his* being bound by *everybody else*.<sup>26</sup>

## 7. SOME OBJECTIONS

In this section I analyze some apparently problematic cases which have been brought to my attention. I do not in fact think that they constitute serious objections to the NP-Deletion Theory, but they do highlight the fact that there is a lot that we still don't know about some of the topics dealt with in this paper.

### 7.1. Weak Readings

For reasons I do not quite understand, some commentators have objected to the NP-Deletion Theory on the grounds that it could not deal with so-called weak readings of donkey sentences. The point is as follows. With some donkey sentences, we have the intuition that it is being asserted that the owners of the donkeys execute their depraved wishes upon all of their donkeys; an example is (82) (Heim 1990:151).

- (82) If a farmer owns a donkey, he deducts it from his taxes.

This is the strong reading (or the  $\forall$ -reading, in the terminology of Chierchia (1992)). In some donkey sentences, however, our intuitions tell us that some

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<sup>26</sup> Before we leave this topic, it is worth noting that forms like *a book of John's* and *that book of John's* pose a difficulty for one aspect of the specific proposal that Larson and Cho (1999) present. They have *John's car* derive from the underlying structure in (i).

- (i) [<sub>D</sub> THE [<sub>PP</sub> [<sub>NP</sub> car] [<sub>P'</sub> TO [<sub>DP</sub> John]]]]

Here, TO is an abstract morpheme indicating possession, and THE is the (semantic features of the) definite article; *John* raises to [Spec, DP] and TO incorporates into THE, 's being the spell-out of TO + THE. We see, however, that 's is quite possible even when the determiner is *not* THE.

of the animals have a lucky escape. The stock example is (83) (Pelletier and Schubert 1989; Chierchia 1992), where it is clearly not being asserted that anyone put *all* their dimes in the meter.

- (83) Everyone who had a dime put it in the meter.

This is the weak reading (Chierchia's  $\exists$ -reading). It is claimed that if donkey pronouns have the semantics of a definite these non-exhaustive readings are not expected.

This view rests upon an inadequate assessment of the semantics of definiteness, however. Let us see how the NP-Deletion Theory fares in these cases by testing the prediction that it makes, that the corresponding sentences with explicit definite descriptions will also have weak readings. Some relevant examples are in (84).

- (84) a. Everyone who had a dime put the dime in the meter.  
 b. Everyone who has a credit card will pay their bill with the credit card.

While these examples are perhaps slightly awkward, they are clearly grammatical, and they clearly do *not* imply that anyone put all their dimes in the meter or will pay with all their credit cards. There is no problem here, then, for the NP-Deletion Theory. It claims that (83) has the same LF as (84a), and the meanings of the two sentences are indeed identical.

This is not to say that there is no problem here at all. The semantics for *every* given in (26) does indeed predict *prima facie* that (84a) should mean that everyone put all their dimes in the meter. It is just that the problem is not a problem with the NP-Deletion Theory *per se*. I will not make a serious attempt to solve it here. Let me just record my suspicion that the solution will lie in the pragmatics of the individuation of "minimal" situations. As remarked above in section 4.2.3 in connection with the proportion problem, it sometimes seems that we individuate situations rather coarsely. In the present case, we seem to assume for some reason that the meter in question requires no more than one dime per person. Given this, there is then no point in individuating situations so finely that there is one for each pair of a person and a dime they possess, for all such dimes, since only one dime per person is relevant. For each person, we only consider a situation which contains them and a representative dime, as it were, namely the dime that they do in fact put in the meter. More than this I cannot say at the moment.

7.2. *Split Antecedents*7.2.1. *Donkeys and Disjunction*

Consider (85) and (86), which were first brought to my attention by Bernhard Schwarz. (See Groenendijk and Stokhof 1991:88; Stone 1992; and Chierchia 1995:71 for similar examples.)

(85) If Mary sees a donkey or a horse, she waves to it.

(86) If Mary sees John or Bill, she waves to him.

According to the NP-Deletion Theory, there must have been deletion of an NP after *it* in (85). But what could the antecedent possibly be? In order to get the meaning to come out right, we presumably need something like *donkey or horse*. (“If Mary sees a donkey or a horse, she waves to the donkey or horse.”) But this is nowhere to be found. The nearest we have is *a donkey or a horse*, but this is not an NP but a disjunction of two DPs. Things seem, if possible, to be even worse with (86),<sup>27</sup> where there are not even any words that we would ordinarily feel comfortable putting after a definite article in English at all.

A similar difficulty exists with conjunction, of course, in a case like (87).

(87) If Mary sees a donkey and a horse, she waves to them.

But naturally the corresponding example with *John and Bill* creates no problems, because there the pronoun could be referential.

This difficulty is interesting, in that it provides a new twist to the much-discussed problem of how to constrain the descriptive content of E-type pronouns. Examples like (29) seem to show that the normal E-type theories are too lax in what they allow. But examples like (85) and (86) caution us against going too far the other way: we need to strike a very fine balance.

7.2.2. *Ellipsis, Disjunction, and Conjunction*

I claim, however, that the NP-Deletion Theory already has within it the necessary flexibility to deal with these disjunction facts. All we need do is revise some implicit and unfounded assumptions about the nature of “NP-deletion”, and the problem presented by (85) and (86) begins to dissolve.

It has actually been known for some time, though the fact is usually passed over in an embarrassed silence, that VP-ellipsis, or something that

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<sup>27</sup> This example comes from Stone (1992); Stone discusses it in order to argue the superiority of the E-type analysis over its DRT rival.

looks very much like it, is possible when the antecedent is discontinuous and distributed over the two halves of a disjunction or conjunction. The observation goes back at least to Webber (1978); and there is a discussion of the phenomenon by Fiengo and May (1994:195–200).

Let us first consider (88) and (89), which are taken from Fiengo and May (1994).

- (88) What an inconvenience! Whenever Max uses the fax or Oscar uses the Xerox, I can't.
- (89) I did everything that Mary did. Mary swam the English Channel, and Mary climbed Kilimanjaro, and I did, too.

Notice that the VP understood for (88) is “use the fax or use the Xerox,” and the VP understood for (89) is “swam the English Channel and climbed Kilimanjaro.” However, there is no constituent matching these in the previous linguistic environment. In both cases, the linguistic environment provides exact matches for each disjunct or conjunct individually, but no constituent with them both conjoined in the way they are understood at the ellipsis site.

We might pause here to consider what might possibly be the explanation of this phenomenon, even though for my present purposes the explanation of it is less important than its existence. On this point, in fact, I am content to admit total bafflement; I wish merely to point out that the only explanation I have read is inadequate. Fiengo and May in the passage cited above are not entirely explicit, but they seem to be operating under the assumption that in these cases there are three separate operations of reconstruction or copying (1994:200, note 7): the two antecedent VPs are separately copied and inserted at the ellipsis site, and the conjunction *and* or *or* is copied and put in there too. In this way, the VP disjunction or conjunction which we understand is supposed to be built up in stages from material overtly present.

This cannot be the correct story, however, because there are examples of this phenomenon which do not include *and* or *or*. Take (90) and (91), for example, which are simple variants of the examples we have just seen.

- (90) Max is always using the fax. Oscar is always using the Xerox. I can't, of course, when they are.
- (91) Mary swam the English Channel. Mary climbed Kilimanjaro. I did, too.

In (90), we understand “use the fax or use the Xerox” after *can't* and “using the fax or using the Xerox” after *they are*; in (91), we understand

“swam the English Channel and climbed Kilimanjaro.” We understand exactly the same VP disjunctions or conjunctions, that is, even though the words *and* and *or* are not present. It seems that we have the ability simply to supply these words between VPs for which there are overt antecedents. This fact presumably will have consequences for our theories of VP-ellipsis, indicating that any theory which relies only on a literal-minded process of copying or deletion under identity is too strict; but it is not the purpose of this paper to pursue these implications.

The discussion so far has been of VP-ellipsis, which is of course not directly relevant to the NP-Deletion Theory of donkey anaphora. As far as I know, no-one has previously pointed out that an exact analogue to the phenomenon just described can in fact be observed in NP-deletion too. Once one thinks about it, however, examples are not hard to construct:

- (92) Mary needs a hammer or a mallet. She’s hoping to borrow Bill’s.  
 (93) Mary needs a hammer and a mallet. She’s hoping to borrow Bill’s.

In (92), we understand “Bill’s hammer or mallet”; in (93), we understand “Bill’s hammer and mallet”. For what it’s worth (and we will see an application of this in section 7.2.4, in fact), we can also observe that here too we do not actually need an overt *and* or *or* in order to obtain these readings:

- (94) I think Mary needs a hammer. No, wait, maybe John needs a mallet . . . In any case, they’re going to borrow Bill’s.  
 (95) Mary needs a hammer. John needs a mallet. They’re going to borrow Bill’s.

Again, I have no explanation for these data. I am merely pointing out that so-called NP-deletion is characterized by them.

### 7.2.3. *An Explanation for the Disjunction Difficulty*

It is obvious now that at least the first and third of our tricky examples no longer present any difficulty.

- (96) If Mary sees a donkey or a horse, she waves to it.  
 (97) If Mary sees John or Bill, she waves to him.  
 (98) If Mary sees a donkey and a horse, she waves to them.

Sentence (96) is in fact precisely parallel to (92). Just as we understand “Bill’s hammer or mallet” in (92), so we understand “the donkey or horse”

in (96), with the postulated definite article meaning for *it*. And (98) is exactly parallel to (93), in the same way. Since one must admit cases of reconstruction of disjunctions and conjunctions of NPs from split antecedents in cases of uncontroversial (i.e., donkey-free) NP-deletion, there is no harm whatsoever in positing them in other alleged cases of NP-deletion, even if one is entirely baffled, as in the present instance, by how they come about. In fact, since this phenomenon is indubitably a property of NP-deletion, it would be a point *against* my theory if there were *no* examples like (96) and (98).

It is admittedly more difficult to deal with (97), even with the insight to be gleaned from section 7.2.2. But the following does not seem like an extravagant account of the problem. There is in fact a substantial amount of evidence that proper names can sometimes be predicates. We know that in some languages, for example, proper names are commonly preceded by the definite article, as in German *der Hans*. (Other languages that spring to mind in this connection are Spanish and Classical Greek.) There are two accounts of this to be found in the literature. The first is a type-shifting principle that converts entities of type *e* to the property of being identical with them.<sup>28</sup> So *Hans* in German would have as its denotation either the person Hans or the property  $[\lambda x.x = \text{Hans}]$ ; the latter, of course, is necessary in *der Hans*. Semanticists have also postulated this operation for languages like English, where proper names usually cannot be preceded by a definite article; von Fintel, for example, develops a semantics for exceptive *but* according to which its complement must be a set, meaning that the normal type *e* denotation of *John* in (99) must be raised in this manner (von Fintel 1993:128).

(99) Every student but John attended the meeting.

Positing this operation for English, then, we can suppose that at the alleged ellipsis site in (97) it is possible to construct the predicates  $[\lambda x.x = \text{John}]$  and  $[\lambda x.x = \text{Bill}]$ , on the basis of the previous occurrences of *John* and *Bill*; and *or* can be understood there by whatever mechanism it is understood in the examples in section 7.2.2. This makes (97) parallel to (96): while in the one case we have, “waves to the donkey or horse,” in the other case we have, “waves to the (person) identical with John or (person) identical with Bill.”

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<sup>28</sup> I am not sure of the origin of this idea. For theoretical discussion, see van Benthem (1995), who does not doubt the existence of the operation but finds it impossible to fit into his otherwise elegant theory of what type-shifting operations are available (given a Categorical Grammar framework that makes heavy use of such operations).

The second account of the predicational uses of names is that of Burge (1973), modified by Larson and Segal (1995:351–355). According to this account, proper names are always predicates meaning ‘entity called X’. So *John*, for example, means ‘entity called ‘John’’. Something like this is surely necessary to account for usages like those in (100).

- (100) a. There are two Aristotles.  
 b. Which Aristotle do you mean?  
 c. I meant that Aristotle.  
 d. The Aristotle standing over there?  
 e. No, the other Aristotle.

Burge suggests that this meaning is the only meaning we need posit for proper names. Conventional uses as in *John saw Mary* would result from these predicates being combined with a phonologically null demonstrative like *that*. Larson and Segal (1995:354–355) basically support this view, but give good evidence to suggest that the phonologically null determiner is a definite article, not a demonstrative. For one thing, this allows unification of the English facts with the crosslinguistic constructions like *der Hans*. But whatever the case may be with regard to the determiner, and whether or not we want to have the proper names in *John saw Mary* be (modified) predicates, it is clear that the facts in (100) and others like them give powerful support to the hypothesis that proper names can sometimes mean ‘entity called X’. We can suppose, then, that this meaning is the one understood at the ellipsis site in (97), and the problem is solved: we would have, “waves to the entity called ‘John’ or entity called ‘Bill’.”

#### 7.2.4. *Another Split Antecedent*

It is worth pointing out that the explanation given for (98) generalizes to one other type of sentence which at first sight seems impossible to deal with on the NP-Deletion Theory. An example is (101).<sup>29</sup>

- (101) If a man has a wife who owns a donkey, he always loves them.

Many speakers can interpret this example to mean, “. . . he loves his wife and her donkey,” although for a few people it is distinctly awkward. Again, the question is how this is possible on the NP-Deletion Theory. And the answer is that the examples we have looked at give us reason to believe that NP-ellipsis can sometimes take the form of supplying in the ellipsis site a

<sup>29</sup> This example was brought to my attention by Alexander Williams at WCCFL 19.



conjunction of two NPs from the linguistic environment, even when the word *and* does not actually occur. (See example (95).)

Thus we assume that (101) has the LF in (102) and, analogously with (25) above, the truth conditions in (103).

(102) [[always<sub>s<sub>1</sub></sub> if a man(s<sub>1</sub>) has(s<sub>1</sub>) a wife(s<sub>1</sub>) who owns(s<sub>1</sub>) a donkey(s<sub>1</sub>)]<sub>s<sub>2</sub></sub> he man(s<sub>1</sub>) loves(s<sub>2</sub>) them [wife(s<sub>1</sub>) and donkey(s<sub>1</sub>)]]

(103) For every minimal situation  $s_1$  such that there is an  $x$  such that  $x$  is a man in  $s_1$  and there is a  $y$  such that  $y$  is a wife who owns a donkey in  $s_1$  and  $x$  has  $y$  in  $s_1$ , there is a situation  $s_2$  such that  $s_1 \leq s_2$  and the unique  $u$  such that  $u$  is a man in  $s_1$  loves in  $s_2$  the wife and donkey in  $s_1$ .

Thus there seems to be no particular difficulty raised by this example for the NP-Deletion Theory of donkey anaphora.

### 7.3. Tomioka Sentences

Another apparent problem for the NP-Deletion Theory is posed by examples like the following, which were first discussed by Tomioka (1997:193, 1999).<sup>30</sup>

(104) Every police officer who arrested a murderer insulted him, and every police officer who arrested a burglar did too.

Interestingly, this sentence has a sloppy reading: roughly, every police officer who arrested a murderer insulted the murderer he arrested and every police officer who arrested a burglar insulted the burglar he arrested. The problem for the current theory is this: I am committed to having the first VP in (104) have the LF in (105); but then it might be thought that ellipsis, however it works, should end up producing the same meaning for the elided VP as that which is yielded by (105); and that would incorrectly have the second set of police officers insulting murderers.

(105) [insulted [him murderer]]

<sup>30</sup> Generally speaking, Tomioka sentences are conjunctions of sentences characterized as follows: the first sentence has a VP which, firstly, contains an E-type pronoun, and, secondly, serves as antecedent for an elided VP in the following sentence in such a way that the descriptive content of the pronoun understood in the elided VP comes from the second sentence, not the first. I am grateful to Dan Hardt, Bernhard Schwarz, Satoshi Tomioka, and an anonymous *NALS* reviewer for independently advising me of the relevance of these sentences to my theory.

Previous versions of the E-type analysis, meanwhile, do not have this trouble. Tomioka (1997, 1999) points out that versions which rely on a contextually salient relation to supply the descriptive content of the E-type pronoun can use the relation which obtains between people and people they arrest; informally, the antecedent VP would then mean something like, “insulted the person he arrested,” and the sloppy reading is correctly obtained if the elided VP means this too.

We can tell that Tomioka’s explanation cannot be correct, however, by repeating the test that we used in section 4.1, the interpretation of elliptical continuations with type e subjects. Consider the examples in (106) and (107), assuming that Officer Jones did arrest someone but did not arrest a murderer.

- (106) a. Every police officer who arrested a murderer insulted the person he arrested, and Officer Jones *insulted the person he arrested* too. (sloppy, strict)  
 b. Every police officer who arrested a murderer insulted him, and Officer Jones *insulted him* too. (\*sloppy, strict)
- (107) a. Every police officer who arrested a murderer insulted the person he arrested, and Officer Jones did too. (sloppy, strict)  
 b. Every police officer who arrested a murderer insulted him, and Officer Jones did too. (\*sloppy, strict)

If the antecedent VPs in (106b) and (107b) could behave for ellipsis in the same manner as the antecedent VPs in (106a) and (107a), which is the hypothesis under consideration, we would expect the elided or down-stressed VPs in these pairs of sentences to have the same range of interpretations. They do not, however. So *insulted him* cannot behave for ellipsis in the same manner as *insulted the person he arrested*, contrary to what Tomioka’s explanation requires.

But how does the NP-Deletion Theory deal with examples like (104)? Again, by pointing out that the prediction it makes is fulfilled: sentences isomorphic to (104) with uncontested NP-deletion instead of an E-type pronoun also allow sloppy readings. In order to see this, however, it will be convenient to alter the example slightly, since the indefinite *a murderer* in (104) is singular, while those determiners that allow NP-deletion after them generally take plural NPs. Let us examine (108).

- (108) Every police officer who arrested some murderers insulted them, and every police officer who arrested some burglars did too.

Like (104), this has a sloppy reading. The sentence is not problematic, however. Consider the sentences in (109).

- (109)      Every police officer who arrested some murderers insulted  
                  . . .  
                  a. at least three  
                  b. some  
                  c. a few  
                  d.? most  
                  e. one  
                  . . . and every police officer who arrested some burglars did  
                  too.

These sentences too have sloppy readings. Thus there is no difficulty in supposing that NP-deletion is responsible for (108) meaning that every police officer who arrested some murderers insulted those murderers, and every police officer who arrested some burglars insulted those burglars. So Tomioka sentences are not problematic for the NP-Deletion Theory of E-type anaphora; in fact they are predicted to exist by this theory.

There are two loose ends to tie up. Firstly, it seems as if the sentences in (109) in fact have two readings which could be characterized as sloppy. In one, every police officer who arrested some murderers insulted some of the murderers he arrested, and analogously for the people who arrested burglars. In the second, every police officer who arrested some murderers insulted some murderers, but the set of insulted murderers could be disjoint from the set of arrested murderers. This ambiguity can easily be accommodated by the general approach adopted in this paper: assuming the normal type of determiner meanings with situation semantics, and thus a distinction between minimal situations  $s_1$  for the restriction and extended situations  $s_2$  for (at least the verbal predicate of) the nuclear scope, the first reading is forced by having the situation variable on the elided *murderers* in the first sentence be  $s_1$ , so that the murderers insulted in  $s_2$  have to have figured in the minimal situations containing a police officer and the murderers he arrested. If the elided *murderers* in the first sentence has situation variable  $s_2$ , however, there is no such restriction, and we get the second reading above.

The second comment is that the examples in (109) are simply analogues in the realm of NP-deletion of a phenomenon that has already been observed and discussed with respect to VP-ellipsis. The following examples are taken from Hardt (1999) and Schwarz (2000). ((111) is attributed to Carl Pollard.)

(110) When John had to cook, he didn't want to. When he had to clean, he didn't, either.

(111) I'll help you if you want me to. I'll kiss you even if you don't.

Take (110). This seems to mean that when John had to cook he didn't want to cook, and when he had to clean he didn't want to clean. This is in spite of the fact that, since the matrix VP of the first sentence means "didn't want to cook," straightforward ways of theorizing about VP-ellipsis would have the matrix VP of the second sentence mean the same thing. Let us note the parallel between (110) and (109). Both contain two sentences which themselves contain subordinate clauses: Embedded  $S_1$ , Matrix  $S_1$ , Embedded  $S_2$ , Matrix  $S_2$ . In Matrix  $S_2$ , there is an ellipsis site, whose antecedent appears to be in Matrix  $S_1$ , but this antecedent in Matrix  $S_1$  itself contains an ellipsis site, with the antecedent in Embedded  $S_1$ . Instead of understanding the ellipsis site in Matrix  $S_2$  as we would if we simply supplied all the material we understand in the antecedent in Matrix  $S_1$ , we understand the ellipsis site in Matrix  $S_2$  as if it contained the material from the antecedent in Matrix  $S_1$  as it would be if its own ellipsis site was filled in not from an antecedent in Embedded  $S_1$  but from one in Embedded  $S_2$ . It is as if the larger ellipsis captures the nature of the dependency or link between the ellipsis site in the antecedent and this smaller ellipsis site's antecedent, and this dependency is copied (or whatever) into the ellipsis site in Matrix  $S_2$ . One is reminded of Fiengo and May's (1994) notion of a  $\beta$ -occurrence of an anaphoric element, which is such (roughly) that the dependency between it and its antecedent will be copied in ellipsis. But this is not the place to discuss this intuition, or the mechanisms that Hardt and Schwarz propose to deal with this problem. Whatever the correct treatment of (110) turns out to be, there is a good chance that it will be extendable to deal with (109) and, if I am correct, (108).

## 8. CONCLUSION

My primary concern in this article is reductive: since the process of recovering the descriptive content of an E-type pronoun displays exactly the same possibilities and restrictions that NP-deletion does, we should not assume that these are separate mechanisms, but should rather identify them. Concomitantly, we should assume that E-type pronouns are actually definite articles. Such an analysis has a number of empirical advantages over standard E-type accounts. These advantages include ways of dealing with the following issues: the problem of the formal link between donkey pronoun and antecedent; the pattern of strict and sloppy readings shown

by donkey sentences with phonologically reduced continuations of various kinds; and the problem of indistinguishable participants.

I contend, however, that even if the empirical coverage of the theory advocated in this paper was exactly the same as that of previous theories, there would still be reason to prefer it, simply because it does away with the theoretical entity 'E-type pronoun'. The analysis presented here is obviously a direct descendant of the E-type approach, in that I claim that where on the surface we see pronouns we actually have definite descriptions, in the relevant constructions. But it achieves this result without postulating a separate category of E-type pronouns. Instead, we only use resources which have independent justification, in particular NP-deletion and the interpretation of pronouns as determiners.

There is obviously a question of the extent to which it is worth generalizing the analysis given here, if it is successful in its present domain. The existence of E-type pronouns seemed to be an insuperable obstacle to Postal's (1966) contention that all third-person pronouns were to be interpreted as definite articles. With this obstacle removed, it is tempting to resurrect that hypothesis, since the crosslinguistic formal identity between definite articles and pronouns would then be explained. There would also be just one interpretation for all uses of pronouns, a pleasing unification. I will not attempt to explore this strong hypothesis in the present paper, however, but will rather leave it for future research. (See Elbourne forthcoming a for a first pass.)

For the moment, let us be content with concluding that there are no such things as E-type pronouns.

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