

THE INGREDIENTS OF DEFINITENESS AND  
THE DEFINITENESS EFFECT\*

Keenan (1987) observed that trivial determiners built from basic existential determiners (e.g., *either zero or else more than zero*) are allowed in *there*-insertion contexts, and that trivial determiners built from basic non-existential determiners (e.g., *either all or else not all*) are not. This result is unexpected under the analyses of *there*-sentences proposed in Barwise and Cooper (1981), Higginbotham (1987), and Keenan (1987). I argue that the class of NPs barred from the postverbal position of *there*-sentences (strong NPs) is correctly characterized in presuppositional terms, as suggested in de Jong and Verkuyl (1985) and Lumsden (1988). According to this characterization, strong NPs share one of the defining components of definiteness proposed in Heim (1982), namely the Descriptive Content Condition (DCC). How to derive the prohibition against strong NPs in *there*-insertion contexts (definiteness effect) from the fact that strong NPs meet the DCC is not obvious, however. I argue that accounting for this prohibition involves regarding the XP-coda in [*there be* NP XP] as providing the contextual domain for the interpretation of the postverbal NP.

1. INTRODUCTION

A semantic account of contrast (1)–(2), often referred to as the “definiteness effect” (DE), must accomplish tasks (i)–(ii):

- (1) a.??There is every student in the garden.  
       b.??There are all students in the garden.  
       c.??There is the student in the garden.  
       d.??There are most students in the garden.
- (2) a. There is a student in the garden.  
       b. There are three students in the garden.  
       c. There are no students in the garden.
- (i) It must provide a semantic definition of the class of NPs which are allowed in postverbal position of *there*-sentences.
- (ii) It must show how the DE can be derived from this semantic definition and the interpretation of *there*-sentences.

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Following Milsark (1974, 1977), I'll use the term *weak determiners/NPs* to refer to determiners/NPs allowed in the postverbal position of *there*-sentences, and the term *strong determiners/NPs* to refer to determiners and NPs barred from that position. My account of the DE is based on the semantic definition of strong NPs proposed in de Jong and Verkuyl (1984), de Jong (1987), and Lumsden (1988). In the first part of this paper, I argue that this definition is more adequate than any other which has been proposed so far. If I am right, task (i) above has been taken care of. How to derive the DE from this definition is not obvious, however; several problems arise. The second part of the paper is an attempt to overcome these problems and thus to accomplish task (ii). The main claim on which my derivation of the DE is based is that the relation between the XP-coda (the phrase *in the garden* in (1)–(2)) and the postverbal NP is not one of predication: the XP-coda contributes to determining the interpretation of the postverbal NP.

## 2. TWO KNIVES TO CUT DOWN THE NUMBER OF ANALYSES OF THE DEFINITENESS EFFECT

In this section, I introduce two tests of adequacy for accounts of the DE.

### 2.1. *The First Knife: Keenan's Test*

Keenan (1987) observed that *there*-sentences discriminate between complex determiners like *either zero or else more than zero* and *either all or else not all*:

- (3) There were either zero or else more than zero students at the party.
- (4) ?? There were either all or else not all students at the party.

Sentences (3)–(4) thus suggest the following adequacy test for analyses of the DE:

#### *Keenan's Test*

An account of the distribution of NPs in the postverbal position of *there*-sentences must explain why contrast (3)–(4) arises.

This test poses a challenge for any attempt to derive the DE from the model-theoretic properties of the denotations of determiners. Here's why. Determiners denote functions from sets to families of sets (generalized quantifiers): Which function does the complex determiner *either all or else not all* denote? Presumably, the following:

- (a) In every model and in every situation, *either all or else not all* denotes the function which maps each set A onto the family of sets which either include or else do not include A.

According to (a), the denotation of *either all or else not all* maps each set onto the power set of the domain, since for each set A it is always the case that any set either includes or else does not include A. Meaning assignment (a) predicts correctly that sentence (5) below is true if and only if the set of things at the party either includes or else does not include the set of students.

- (5) Either all or else not all students were at the party.

Now, consider the complex determiner *either zero or else more than zero*. Presumably, the following holds:

- (b) In every model and in every situation, *either zero or else more than zero* denotes the function which maps each set A onto the family of sets whose intersection with A contains either zero or else more than zero members.

Assignment (b) predicts correctly that (6) below is true if and only if the intersection of the set of entities at the party with the set of students is either empty or nonempty.

- (6) Either zero or else more than zero students were at the party.

But, for each set A it is always the case that the intersection of A with any set is either empty or nonempty. Thus, from (a) and (b) follows (c):

- (c) In every model and in every situation, the determiners *either zero or else more than zero* and *either all or else not all* denote the same function, the function which maps each set onto the power set of the domain.

Thus, if (a) and (b) are correct, it seems that the distribution of post-verbal NPs in *there*-sentences cannot be derived from the model-theoretic properties of the denotations of determiners alone: the determiners *either zero or else more than zero* and *either all or else not all* have the same denotation in all models, and yet only one of them is allowed in *there*-sentences.

## 2.2. *The Second Knife: The Syntax of the Coda*

Barwise and Cooper (1981), Keenan (1987), and Lumsden (1988) have provided convincing syntactic evidence for this claim:

*NP-XP Analysis of the Coda*

Sometimes, the material following the verb (or coda) of English *there*-sentences is not a single NP, but an NP followed by a separate constituent.<sup>1</sup>

This analysis of the coda of *there*-sentences is motivated by the fact, noted originally by Barwise and Cooper, that in (7) the material following the verb cannot be analyzed as a single NP, since, as (8) shows, it cannot occur in canonical NP positions:

- (7) There are two students who object to that enrolled in the course.  
 (8) ?\* Two students who object to that enrolled in the course came in.

Further syntactic evidence showing that sometimes the coda of *there*-sentences is not a single constituent is provided by Keenan's observation that, in some cases, the coda cannot be relativized, as (9b) shows:

- (9) a. Don't worry, John will help himself to whatever there is in the fridge.  
 b. \*Don't worry, John will help himself to [whatever in the fridge] there is.

Contrast (9) is explained if the PP *in the fridge* does not form an NP constituent with *whatever*. Following Keenan, I'll refer to the separate constituent which may follow the NP in *there*-sentences as the XP-constituent (where X can be P, A, etc.). I conclude that the syntactic evidence reviewed in this section provides a further adequacy test for accounts of the DE: an adequate account of the DE must be compatible with the NP-XP analysis of the coda.

### 3. AN EVALUATION OF SOME PREVIOUS ACCOUNTS OF THE DEFINITENESS EFFECT

The accounts I discuss in this section have provided valuable insights concerning the class of NPs that can appear in the postverbal position of *there*-sentences. Some of these insights will be preserved in my account. Here, however, I want to point out some problems for these proposals which motivate a different line of investigation.

<sup>1</sup> Barwise and Cooper adopt a bare-NP analysis of the coda, but they also provide evidence that this assumption is problematic. Huang (1987) has argued that the postverbal material of Chinese existential sentences should also be analyzed as having the form [NP XP].

3.1. *Milsark (1974, 1977)*

According to Milsark, the determiners that occur in the postverbal position of *there*-sentences (or weak determiners) are cardinality markers (number words), items whose function is “to express the size of the set of entities denoted by the nominal with which they are construed” (1977: 23). Milsark’s explanation of why only cardinality markers are allowed in *there*-sentences is this. While determiners like *every*, *all*, *most*, *the* are quantificational, cardinal determiners are not. Since *there be* is an existential quantifier, a *there*-sentence containing a postverbal quantified NP “would have two quantifications on the NP . . . [which] should certainly be expected to be anomalous” (p. 24). On the other hand, if the postverbal NP is non-quantificational, as in the case of number words, no double quantification on the NP occurs and thus no anomaly arises.

The issue of how exactly cardinal determiners should be characterized is of vital importance for Milsark’s proposal. Recent work by Higginbotham (1987) and Lappin (1988) has provided a more precise characterization of this class. However, Milsark’s original proposal has been observed by various authors (see von Stechow 1980, Heim 1987, Higginbotham 1987) to run into trouble with sentences like (10), which are not analyzable in terms of widest scope existential quantification as Milsark would have it.

- (10) There is no justice.

There is another problem with Milsark’s approach. Heim’s (1982) analysis of contrast (11a–b) is based on the assumption that the boldfaced NPs in (11a) are inherently quantificational and the boldfaced NPs in (11b) are not:

- (11)a. \*If **every man/most men/all men** own(s) a donkey, he/they beat(s) it.  
 b. If a **man/some man** owns a donkey, he beats it.

Notice, however, that NPs of the form  $[_{NP} \textit{no} N']$  do not support donkey anaphora while NPs of the form  $[_{NP} \textit{the} N']$  do:

- (12)a.??If no man<sub>i</sub> owns a donkey, he<sub>i</sub> beats it.  
 b. If the farmer<sub>i</sub> we met owns a donkey, he<sub>i</sub> beats it.

Thus, if Heim is right, *no* is quantificational and *the* is not. And so Milsark’s account incorrectly predicts *no* to be barred from, and *the* to be allowed in, postverbal position in *there*-sentences. In other words, the distinction between quantificational and nonquantificational NPs, as it emerges from the study of donkey anaphora, does not coincide with the distinction between weak and strong NPs.

### 3.2. Barwise and Cooper (1981)

According to Barwise and Cooper (henceforth B&C), the NPs barred from postverbal position in *there*-sentences are those NPs whose determiner is either negative or positive strong:

A determiner is *positive/negative strong* iff it denotes a function  $f$  from sets to families of sets such that for every set  $A$  in the domain of  $f$ ,  $A$  belongs/does not belong to  $f(A)$ .

Intuitively, this means that, if a determiner  $D$  is positive or negative strong, the truth-value of statements of the form ‘ $DA$  is/are  $A$ ’ should not depend on the model. For example, *every* is strong in B&C’s sense and *some* is not, since the truth of “Every man is a man” does not depend on the model, but the truth of “Some man is a man” does.<sup>2</sup>

B&C explain the distribution of NPs in *there*-sentences by assuming the following interpretation rule:

*B&C’s Semantics for There-Sentences*

A sentence of the form ‘*there be NP*’ means that the domain of discourse is a member of the generalized quantifier denoted by the NP.

Given that natural language determiners denote conservative functions,<sup>3</sup> it follows as a theorem from B&C’s semantics that *there*-sentences whose postverbal NPs have strong determiners are either trivially true or trivially false (true in all models in which the denotations of these NPs are defined or false in all such models). Thus, the ill-formedness of the sentences in (1) above is accounted for by the fact that it is strange to utter trivial truths or falsities.

B&C’s account runs into at least three major problems. First, as Keenan (1987) pointed out, the fact that a sentence is tautological does not mean it’s ill-formed. For instance, according to B&C, (1a), repeated here, is ill-formed because it is tautological. But (3) is also tautological, yet it is acceptable:

- (1) a.??There is every student in the garden.
- (3) There were either zero or else more than zero students at the party.

<sup>2</sup> “Some man is a man” is true if there are men in the domain and false otherwise.

<sup>3</sup> A function  $f$  from sets to families of sets is *conservative* iff for each set  $X$  and  $Y$  in the domain of  $f$ ,  $X \in f(Y)$  iff  $X \cap Y \in f(Y)$ . A relation  $f$  between sets is conservative iff for each  $X$  and  $Y$  for which  $f$  is defined,  $f(X, Y)$  iff  $f(X, X \cap Y)$ .

The same point is illustrated by the contrast between (1a) and (13):

(1) a.??There is every student in the garden.

(13) Every student in the garden exists.

B&C's semantics assigns the same truth-conditions to (1a) and (13). Thus, by B&C's reasoning, we should expect (13) to be deviant the way (1a) is, contrary to what is the case. Secondly, B&C's account does not pass Keenan's test, since *either all or else not all* and *either zero or else more than zero* are both positive strong NPs in B&C's sense. Thus, B&C incorrectly predict that both (3) and (4), repeated here, should be ruled out:

(3) There were either zero or else more than zero students at the party.

(4) ?? There were either all or else not all students at the party.

Finally, B&C's semantics assumes the bare-NP analysis of the coda argued against in section 2.2 above, and thus is based on a problematic assumption, as B&C themselves recognize.

### 3.3. Keenan (1987)

Keenan makes the following claim concerning the distribution of postverbal NPs in *there*-sentences:

#### *Keenan's Thesis*

The class of NPs which can occur in postverbal position of existential *there*-sentences is the class of *existential NPs*.

An *existential NP* is an NP which is either a basic existential NP or is formed from basic existential NPs by Boolean combinations (conjunction, disjunction, negation). A *basic existential NP* is an NP formed by an existential determiner and the appropriate number of common noun phrases (CNPs). Existential determiners are defined as follows:

An *existential determiner* is one which is either a syntactically basic determiner denoting an existential function or a complex determiner built up from basic determiners denoting existential functions by Boolean combinations, or by composition with adjective phrases, or by the exception determiner operator.<sup>4</sup>

<sup>4</sup> Determiners that are formed by the exception determiner operator are determiners of the form *D . . . but X*, as in (i):

(i) No student but John left early.

An *existential function* is a function  $f$  from sets to families of sets such that for every set  $A$  and every set  $B$ ,  $B \in f(A)$  iff the universal property  $\in f(A \cap B)$ .

Intuitively, a determiner  $D$  denotes an existential function iff sentences of form (E) are valid (where  $N_1$  and  $N_2$  are set-denoting expressions):

(E)  $DN_1$  is/are  $N_2$  iff  $DN_1$  who is/are  $N_2$  exist(s).

According to (E), *some* denotes an existential function, since (14) is valid:

(14) Some students are vegetarian iff some students that are vegetarian exist.

On the other hand, *every* does not denote an existential function, since (15) is not valid:

(15) Every student is vegetarian iff every student who is vegetarian exists.

Notice that existential determiners are not defined by Keenan as determiners that denote existential functions. Keenan requires that existential determiners be either syntactically simple determiners denoting existential functions or complex determiners built up from simple determiners that denote existential functions. He needs to define existential determiners in this more elaborate way for the following reason. Consider contrast (3)–(4) again:

(3) There were either zero or else more than zero students at the party.

(4) ?? There were either all or else not all students at the party.

Suppose we define existential determiners simply as determiners that denote existential functions. Then, both *either zero or else more than zero* and *either all or else not all* would be existential determiners since they denote existential functions.<sup>5</sup> By Keenan's thesis, it would follow that both these

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Determiners that are formed by composition with adjectives are determiners like the italicized one in (ii):

(ii) *Most liberal and all conservative* delegates voted for Smith.

<sup>5</sup> We can see that both of these determiners denote an existential function in this way. We know that *either all or else not all* denotes the function which maps each set onto the power set of the domain. Thus, for every set  $A$  and every set  $B$ ,  $B \in$  [[either all or else not all]] ( $A$ ), and  $B \in$  [[either all or else not all]] ( $A \cap B$ ). Thus, *either all or else not all* denotes an existential function. But *either zero or else more than zero* and *either all or else not all* denote the same function in all models. Thus, *either zero or else more than zero* denotes an existential function as well.



determiners are thus allowed in the postverbal position of *there*-sentences, which is incorrect. According to Keenan's definition of the notion existential determiner, on the other hand, *either zero or else more than zero* is existential, since it is formed from simple existential determiners, while *either all or else not all* is not existential. Thus, contrast (3)–(4) follows from Keenan's thesis.

The semantics Keenan assumes for *there*-sentences is this:

*Keenan's Semantics for There-Sentences*

$[_{VP[there]} be NP XP]$  is true in  $M$  iff  $[[XP]]_M \in [[NP]]_M$

From this semantics, the following theorem can be derived:

A sentence of the form '*there be NP XP*' is logically equivalent to a sentence of the form '*NP XP exist*' iff the determiner of the NP is always interpreted by an existential function.

I see two main problems with Keenan's account. First of all, Keenan provides no explanation of why only existential NPs are allowed in postverbal position of *there*-sentences. Take (1a) again, for instance:

(1) a.??There is every student in the garden.

Keenan's analysis provides no reason to rule out (1a) on syntactic grounds, while Keenan's semantics provides a perfectly good interpretation for (1a) by assigning it the same interpretation as (16):

(16) Every student is in the garden.

What Keenan's analysis does is predict the equivalence stated in the theorem above, but this leaves us with the problem we started out with, namely the problem why (1a) is deviant. Indeed, Keenan fails to give a reason for the ill-formedness of (4) as well. Thus, Keenan's analysis of *there*-sentences does not pass Keenan's test.<sup>6</sup>

There's another problem. By adopting the definition of existential determiner reported above, Keenan succeeds in characterizing the class of existential determiners in such a way as to classify *either zero or else more than zero* as existential and *either all or else not all* as nonexistential. Paired with Keenan's thesis this predicts correctly that *either zero or else more than zero* should be allowed in *there*-sentences and *either all*

<sup>6</sup> Keenan is aware that he is giving no explanation of contrast (1)–(2) and contrast (3)–(4): 'I am not claiming (much less explaining) that existential *there*-sentences with nonexistential NPs are ungrammatical. I claim only that such expressions, if grammatical, are not understood on an existence assertion reading.' (Keenan 1987: 299)

or else not all should not be. But even if the right class of NPs is individuated by Keenan's definition, his way of characterizing this class cries out for an explanation: why is the class of complex determiners allowed in *there*-sentences individuated on the basis of the simple determiners they consist of rather than simply on the basis of the denotation of the complex determiners? Again, Keenan gives no answer to this question.

### 3.4. Higginbotham (1987)

According to Higginbotham, the NPs allowed in postverbal position of *there*-sentences are the NPs with determiners of adjectival character. The notion 'determiner of adjectival character' is defined as follows:

A determiner is of *adjectival character* iff it denotes a function  $f$  from pairs of sets to truth-values such that there is a function  $h$  from sets to truth-values such that for every set  $X$  and  $Y$ ,  $f(X, Y) = h(X \cap Y)$ .

It may be shown that a natural language determiner is of adjectival character iff it is symmetric, that is, iff it denotes a function  $f$  such that for every set  $X$  and every set  $Y$ ,  $f(X, Y) = f(Y, X)$ .<sup>7</sup> According to this definition,

<sup>7</sup> It is not hard to prove that, for natural language determiners, the adjectival condition and the symmetry condition are equivalent. Suppose the following holds:

- (i)  $f$  is adjectival
- (ii)  $f(A, B) \neq f(B, A)$

From (i) it follows that there is a function  $h$  such that (iii) holds:

- (iii)  $f(A, B) = h(A \cap B)$  and  $f(B, A) = h(B \cap A)$

From (ii)–(iii) and the properties of equality it follows that  $h(B \cap A) \neq h(A \cap B)$ , which is impossible. Thus, if  $f$  is the function denoted by an adjectival determiner,  $f$  is symmetric.

Now, suppose (iv) and (v) hold:

- (iv) For every set  $X$  and  $Y$ ,  $f(X, Y) = f(Y, X)$
- (v)  $f$  is not adjectival

From (v) it follows that (vi) holds, since, if (vi) were false,  $f(X, Y)$  would depend only on  $X \cap Y$  for each set  $X$  and each set  $Y$ , and thus  $f$  would be adjectival.

- (vi) There are sets  $X, Y, Z, R$  such that  $X \cap Y = Z \cap R$  and  $f(X, Y) \neq f(Z, R)$ .

Let  $A \cap B = C \cap D$  and  $f(A, B) \neq f(C, D)$ . By conservativity (CONS) (cf. fn. 3) and (iv),  $f(A, B) = f(A, B \cap A) = f(B \cap A, A) = f(B \cap A, B \cap A)$ . Since  $B \cap A = A \cap B = C \cap D$ , it follows that  $f(A, B) = f(C \cap D, C \cap D)$ . By the properties of  $\cap$ ,  $f(C \cap D, C \cap D) = f(C \cap D, C \cap (C \cap D))$ . By CONS,  $f(C \cap D, C \cap (C \cap D)) = f(C \cap D, C)$ . Thus,  $f(A, B) = f(C \cap D, C)$ . By (iv),  $f(C \cap D, C) = f(C, C \cap D)$ , and by CONS,  $f(C, C \cap D) = f(C, D)$ . Thus  $f(A, B) = f(C, D)$ , contradicting the assumption that  $f(A, B) \neq f(C, D)$ .

determiners like *some*, *one*, *two*, *three* are of adjectival character, determiners like *every* and *most* are not. Higginbotham proposes the following account of why only adjectival determiners are allowed in *there*-sentences. Let's say this:

If D is a determiner and n a cardinal number with the property (A), then n is a *threshold* for D:

(A) n is such that for all models M, for every set X and every set Y included in the universe of discourse E, if  $|X \cap Y| = n$ , then  $\llbracket D \rrbracket_M(X)(Y) = 1$ .

According to this definition, the set of thresholds for the determiner *a* is the set of n such that  $n \geq 1$ . Determiners like *every*, on the other hand, will have no thresholds, since there is no number n such that for every model M, for every set X and every set  $Y \subseteq E$ ,  $\llbracket \text{every} \rrbracket_M(X)(Y) = 1$  if  $|X \cap Y| = n$ .<sup>8</sup> Now, determiners are interpreted as relations among sets, or, which is equivalent, as functions from sets to families of sets. Let's assume that, in addition to their standard interpretations, some determiners may be assigned another kind of interpretation, what we may call the *absolute interpretation*:

#### *Absolute Interpretation of Determiners*

Let D be a determiner and K a nonempty set of cardinal numbers which are thresholds for D. The absolute interpretation of D is a function f from sets to truth-values such that, for each set X:

$$f(X) = \begin{cases} 1 & \text{if } |X| \in K \\ 0 & \text{otherwise} \end{cases}$$

According to this definition, *every* cannot be assigned an absolute interpretation, since there are no thresholds for *every*. Now, Higginbotham assumes that *there*-sentences are interpreted according to this rule:

#### *Higginbotham's Semantics for There-Sentences*<sup>9</sup>

$$\llbracket \text{there be } [_{NP} D N'] \rrbracket_M = 1 \text{ iff } \llbracket D \rrbracket_M(\llbracket N' \rrbracket_M) = 1$$

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f(C, D). Thus, if f is the function denoted by a symmetric natural language determiner, f is adjectival.

<sup>8</sup> We may see why *every* has no threshold by this intuitive reasoning. Take the sentence *every man runs* and a model M in which there are exactly three men. In M, it is possible to specify a number n such that, if n things are both men and run, then *every man runs* is true: such a number is 3. But it is not the case that for every model M, if three things are both men and run, then *every man runs* is true.

<sup>9</sup> Later on in his paper, Higginbotham revises this analysis to account for *there*-sentences with verbs other than *be*. The postverbal NP, however, is still regarded as an expression of type *t* in the final analysis, which is what counts for the purposes of my discussion.

By these truth-conditions, postverbal NPs in *there*-sentences denote truth-values and determiners in these NPs denote functions from sets to truth-values. Thus, the determiners in postverbal NPs of *there*-sentences must have absolute interpretations, so that they can combine with N'-denotations and yield truth-values. The ill-formedness of (1a), then, is a consequence of the fact that *every* cannot get an absolute interpretation:

- (1) a. ??There is every student in the garden.

Now the problems. Higginbotham's truth-conditions for *there*-sentences are based on the bare-NP analysis of the coda, an assumption which, as we saw in section 2.2, is problematic. But there is another problem with his proposal. According to Higginbotham, the determiners that can occur in the postverbal position of *there*-sentences are the determiners of adjectival character. We know that the class of adjectival natural language determiners coincides with the class of symmetric natural language determiners. Given that natural language determiners are conservative, however, the class of symmetric natural language determiners may be shown to coincide with the class of natural language determiners denoting existential functions in Keenan's sense.<sup>10</sup> Thus, Higginbotham's characterization of the class of weak NPs predicts incorrectly that *either all or else not all* should be allowed in *there*-sentences, since *either all or else not all* denotes an existential function:

- (3) There were either zero or else more than zero students at the party.
- (4) ?? There were either all or else not all students at the party.

The incorrect prediction that (4) should be acceptable is also preserved by Higginbotham's derivation of the DE, since the determiner *either all or else not all*, like *either zero or else more than zero*, has a nonempty set of thresholds: every cardinal number is a threshold for it. Thus, Higginbotham's derivation of the DE predicts that the determiners in (3) and (4) should both admit absolute interpretations and be acceptable in *there*-sentences. Consequently, Higginbotham's account of the DE, like B&C's and Keenan's, fails Keenan's test.

<sup>10</sup> The observation that, for conservative determiners, the symmetry condition and the existential condition are equivalent is found in Keenan (1987: 317). A proof is given in Lappin (1988: 997).

## 4. THE INGREDIENTS OF DEFINITENESS

4.1. *Answering Milsark's Question*

The name “definiteness effect” for contrast (1)–(2) originates from the hypothesis that NPs barred from postverbal position of *there*-sentences are, in some sense, definite. However, as Milsark (1977) observed, the attempt to derive the distribution of NPs in *there*-sentences from a prohibition against definite NPs runs into the difficulty of explaining in which sense NPs barred from *there*-sentences are definite:

*Milsark's Question*

In which sense are universally quantified NPs like *every student*, and, more generally, NPs barred from postverbal positions of *there*-sentences, definite? What is it that these NPs have in common with NPs traditionally regarded as definite, like *the students*?

This difficulty induced Milsark to give up the characterization of strong NPs as definite and to attempt reconstructing the strong/weak distinction through the notions quantificational/nonquantificational. In this section, I argue that Milsark's decision to abandon the hypothesis that strong NPs are, in some sense, definite was premature. Heim (1982) has suggested that there are two related, but not interdeducible, components to definiteness, what she calls the Familiarity Condition (FC) and the Descriptive Content Condition (DCC):

*Definiteness According to Heim (1982)*

*Familiarity Condition (FC)*: The discourse referents of definite NPs must be already familiar at the time when these NPs are uttered.

*Descriptive Content Condition (DCC)*: Definite NPs presuppose their descriptive content.

In Heim's system, universally quantified NPs turn out to be indefinite, since they fail to meet the FC, that is, they introduce novel discourse referents. The assumption that universally quantified NPs introduce novel discourse referents is needed to prevent the quantifier *everyone* from binding the pronoun *her* in (17):

- (17) Everyone who gave a cat to her got it back.

This avoids the incorrect prediction that (17) should allow a reading

synonymous with “Everyone who gave a cat to anyone got it back.”<sup>11</sup> There is, however, a property of definite NPs which is shared by universally quantified NPs and, more generally, by NPs barred from the postverbal position of *there*-sentences. The DCC requires the context of utterance of NPs of the form  $[_{NP_i} \text{DET}^{[+def]} N'_i]$  to entail that the set denoted by  $N'$  include the individual assigned to index  $i$  by the contextually given variable assignment  $g$ .<sup>12</sup> For example, the context of utterance of  $[_{NP_i} [_{\text{DET}^{[+def]} the}] [_{N'_i} cat_i]]$  must entail that the set of cats include the individual assigned to  $i$  by  $g$ . Thus, the DCC entails that definite NPs have the characteristic property P:

(P) The set denoted by  $N'$  is presupposed to be nonempty.

Examples (18)–(21) from Lumsden (1988) show that NPs barred from the postverbal position of *there*-sentences share property P with definite NPs:<sup>13</sup>

(18) ?? There is/are the/every/all/most/both/all the mistake(s).

- (19)a. If you find the mistake, I'll give you a fine reward.  
 b. If you find every mistake, I'll give you a fine reward.  
 c. If you find all mistakes, I'll give you a fine reward.  
 d. If you find most mistakes, I'll give you a fine reward.  
 e. If you find both mistakes, I'll give you a fine reward.  
 f. If you find all the mistakes, I'll give you a fine reward.

Indeed, the interpretation of the strong NPs in (19) is characterized by the expectation of the hearer that the set of mistakes is not empty. No such presupposition needs to arise for NPs allowed in the postverbal position of *there*-sentences:

(20) There is/are a/some/three/zero/many/a lot of/no mistake(s).

- (21)a. If you find a mistake, I'll give you a fine reward.  
 b. If you find some mistake, I'll give you a fine reward.  
 c. If you find three mistakes, I'll give you a fine reward.  
 d. If you find zero mistakes, I'll give you a fine reward.  
 e. If you find many mistakes, I'll give you a fine reward.  
 f. If you find a lot of mistakes, I'll give you a fine reward.  
 g. If you find no mistakes, I'll give you a fine reward.

<sup>11</sup> See Heim (1982: 355).

<sup>12</sup> Heim assumes that at LF each NP bears a referential index (representing the discourse referent introduced by the NP), and that this index percolates down to the lexical head.

<sup>13</sup> This presupposition of strong NPs was originally pointed out by B&C. B&C's derivation of the DE, however, was based on a different property of strong NPs, as we saw in section 2.2.

The data in (18)–(21) suggest thus the following answer to Milsark's question:

*Answer to Milsark's Question*

NPs barred from the postverbal position of *there*-sentences, unlike NPs allowed in the same position, share with definite NPs the presupposition that the set denoted by N' is not empty.

4.2. *Back to Keenan's Puzzle*

This answer to Milsark's question is based on the claim that the class of strong NPs is characterized in presuppositional terms:

(22) *Presuppositional Characterization of Strong NPs*

NPs barred from the postverbal position of *there*-sentences, unlike NPs allowed in this position, presuppose that the set denoted by N' is not empty.

As Lumsden's evidence in (18)–(21) shows, (22) correctly identifies NPs like *the/every/all/the/most/both/mistake(s)* as strong, and NPs like *alsome/three/zero/many/a lot of/no mistake(s)* as weak. The presuppositional characterization of strong NPs has also been argued for in de Jong and Verkuyl (1985) and de Jong (1987). There is further evidence, in addition to the one provided by these authors, that (22) is on the right track. Let's consider again the determiners *either all or else not all* and *either zero or else more than zero*, which Keenan brought to our attention. These determiners, as we saw, differ in their ability to occur in *there*-sentences:

(3) There were either zero or else more than zero students at the party.

(4) ?? There were either all or else not all students at the party.

If (22) is correct, we should expect them to differ in their presuppositions. In particular, we should expect *either all or else not all*, unlike *either zero or else more than zero*, to presuppose that the set denoted by the N' with which they combine is not empty. The prediction is borne out. Intuitively, (24) carries the presupposition that the set of mistakes is not empty, but (23) does not:

(23) If you find either zero or else more than zero mistakes, I'll give you a fine reward.

(24) If you find either all or else not all mistakes, I'll give you a fine reward.

Notice that (22), besides identifying correctly the class of NPs barred from the postverbal position of *there*-sentences, also explains (unlike Keenan's account) why the acceptability of complex determiners in the postverbal position of *there*-sentences depends on the basic determiners they consist of. Given the plausible hypothesis that presuppositions are projected by lexical items, complex determiners should carry the same presuppositions as the basic determiners they consist of. Thus, if these basic determiners carry the presupposition that the set denoted by the N' is not empty, the complex determiner will also carry this presupposition, and thus an NP with this complex determiner should not be allowed in the postverbal position of *there*-sentences according to (22). This is why (22) yields the prediction that *either all or else not all students* and *either zero or else more than zero students* should pattern differently in *there*-sentences.

## 5. DERIVING THE DEFINITENESS EFFECT: SOME UNSUCCESSFUL ATTEMPTS

I still have not explained why NPs carrying the presupposition that the set denoted by N' is not empty should be barred from the postverbal position of *there*-sentences. What is it that goes wrong when an NP carrying this presupposition occupies this position? In the next two sections, I discuss some possible answers to this question.

### 5.1. *First Try*

One possible explanation of the DE based on the presuppositional characterization of strong NPs is as follows. Consider (25) and (26):

(25) There is a king of France.

(26) ??There is the king of France.

Sentence (25) asserts the existence of a king of France. On the basis of (25), one might conjecture that the role of *there*-sentences is that of predicating the property of existing of the denotation of the postverbal NP. Since the NP *a king of France* does not presuppose the existence of a king of France, an utterance of (25) need not presuppose what (25) asserts. The postverbal NP in (26), however, presupposes the existence of a king of France. Thus, an utterance of (26) asserts nothing more than what it presupposes, and this is why (26) is deviant.<sup>14</sup>

<sup>14</sup> As far as I understand, this analysis of the DE was suggested, among others, by Lumsden (1988).



This account of the DE runs into a problem with (27)–(28):

(27) The king of France is a king of France.

(28) The king of France exists.

Examples (27)–(28) are cases in which the presupposition of the subject NP entails the content of the whole assertion. Yet, (27)–(28) are more acceptable than (29):

(29) ??There is the king of France.

According to the analysis of the DE we are considering, however, (27)–(28) should be ruled out exactly for the same reason (29) is ruled out.

The account under consideration also raises some questions in connection with *there*-sentences whose coda is not analyzed as a bare NP. For example, the material following the verb in (30) must be analyzed as in (31):

(30) ??There is the student who objects to that enrolled in the course.

(31) ??There is [<sub>VP</sub> [<sub>NP</sub> the student who objects to that] [<sub>XP</sub> enrolled in the course]]

How does the proposed analysis of the DE work in this case? This analysis doesn't rule out (30) because it is uninterpretable. What should be wrong with (30), according to this analysis, is that the content of (30) is entailed by the presupposition of the postverbal NP. But what is the content of (30)? If we assume with Keenan that the XP is predicated of the postverbal NP, then the XP *enrolled in the course* should be predicated of the NP *the student who objects to that*, and (30) should have the same content as (32):

(32) The student who objects to that is enrolled in the course.

Thus, in order for the presupposition of the postverbal NP in (30) to entail the content of (30), the NP *the student who objects to that* must presuppose the content of (32). But how can this be, given that the phrase *enrolled in the course* is not even part of the NP? If, on the other hand, we do not assume that the XP-constituent is predicated of the postverbal NP, then one is entitled to ask: what is the semantic role of the XP in *there*-sentences?

## 5.2. Second Try

The first problem with the approach laid out in section 5.1 shows that the DE cannot be derived simply from the presupposition of strong NPs together with general conversational principles such as “Do not assert what is already

presupposed.” Examples (27)–(29) suggest that there must be something specific to *there*-sentences which is in conflict with the presupposition of strong NPs. Grice (1975) introduced the notion of conventional implicature to denote those presuppositions which have been grammaticized, i.e., presuppositions that are part of the conditions of use of lexical items and syntactic constructions, and are not derived from the truth-conditional meanings of these items and constructions by general conversational maxims. The presupposition of strong NPs described in (22) may be seen as a conventional implicature in Grice’s sense. Conventional implicatures carried by a particular lexical item or syntactic construction are often treated as *felicity conditions* for the use of that item or construction, i.e., as requirements imposed by that item or construction on contexts appropriate for its use.<sup>15</sup> An expression  $\alpha$  is assumed to denote in a context  $c$  only if  $c$  meets the felicity conditions of  $\alpha$ . A possible hypothesis about the DE is that the deviant character of strong NPs in *there*-sentences is due to a conflict between the felicity conditions of *there*-sentences and the presupposition (i.e., the felicity conditions) of strong NPs. For brevity’s sake, I’ll say that a context  $c$  entails a proposition  $p$  whenever the common ground of  $c$  (i.e., the set of assumptions shared by the conversational participants in  $c$ ) entails  $p$ . Suppose now that *there*-sentences are characterized by the following felicity conditions:

- (33) *Felicity Conditions of There-Sentences (tentative formulation)*  
*There*-sentences are felicitous only in contexts which entail neither that the set denoted by the  $N'$  of the postverbal NP is empty nor that it is nonempty.

The ill-formedness of (29) may then be explained as follows.

- (29) ??There is the king of France.

Strong NPs require that the context entail the denotation of the  $N'$  to be nonempty. However, a context which satisfies this requirement cannot meet the felicity conditions of *there*-sentences in (33). Thus, there is no appropriate context for a sentence like (29); its felicity conditions cannot be met. This is why (29) is deviant. Notice that this proposal avoids the difficulty posed by (27)–(28) for the first try, since the deviant character of (29) is traced back to a grammaticized presupposition specific to *there*-constructions.

This analysis of the DE still runs into problems with *there*-sentences whose coda cannot be analyzed as a bare NP. Consider conversation (34):

<sup>15</sup> See, for example, Heim (1982, 1983).

- (34) A: The students who object to that will come to the meeting tomorrow.  
 B: There are some students who object to that enrolled in the course.

Imagine that, by the time B utters his line, the assertion made by A has been incorporated in the common ground, and is thus assumed to be true by the participants in the conversation. In this case, the context of utterance for B's sentence entails that the set of students who object to that is not empty. Since the phrase *enrolled in the course* does not form a constituent with the complex noun *students who object to that*, we are forced to analyze B's sentence as in (35):

- (35) There are [<sub>VP</sub> [<sub>NP</sub> some [<sub>N'</sub> students who object to that]] [<sub>XP</sub> enrolled in the course]]

The felicity conditions for *there*-sentences in (33) thus require that the context of utterance of B's sentence do not entail that the set of students who object to that is nonempty. Since the context of utterance of B's sentence does entail this set to be nonempty, we should expect B's sentence to be infelicitous in this conversation. Yet, no suggestion of infelicity arises.

Conversation (34) suggests that the felicity conditions for *there*-sentences proposed in (33) are incorrect. Indeed, in view of (34), it would seem that the felicity conditions in (36) are a more suitable candidate:

- (36) *Felicity Conditions of There-Sentences (revised formulation)*  
*There*-sentences are felicitous only in contexts which entail neither that the intersection of the set denoted by the *N'* of the postverbal NP with the set denoted by the XP is empty nor that it is nonempty.

According to (36), an appropriate context for *there*-sentences must be neutral as to the emptiness of the intersection of the denotation of the *N'* of the postverbal NP with the denotation of the XP.<sup>16</sup> For example, applied to B's sentence, whose structure was given in (35), these conditions require that the context be neutral as to the emptiness of the intersection of the set of students who object to that with the set of individuals enrolled in the course. Thus, conversation (34) does not pose a problem for the revised felicity conditions in (36), since the context of utterance of B's sentence entails only that the set of students who object to that is nonempty. Notice, however, that while the revised formulation (36) of the felicity conditions

<sup>16</sup> The case in which the XP is empty may be regarded as a degenerate case in which the denotation of the XP is the universal property. I come back to this point later on.

of *there*-sentences avoids the problem posed by (34), it no longer allows us to derive the DE. Consider (1a) again:

(1) a.??There is every student in the garden.

According to the account of the DE we are considering, (1a) should be deviant because of a conflict between the felicity conditions of strong NPs and the felicity conditions of *there*-sentences. Since (1a) allows analysis (1a'), the revised conditions in (36) require that the context be neutral as to the emptiness of the set of students in the garden.

(1) a'.??There is [<sub>VP</sub> [<sub>NP</sub> every [<sub>N'</sub> student]]] [<sub>XP</sub> in the garden]]

This is compatible with the requirement imposed by the felicity conditions of the strong NP *every student* that the context of utterance of (1a) entail that the set of students be nonempty. Thus, no conflict arises for (1a'), and (1a) is incorrectly predicted to be acceptable.

Finally, this second analysis of the DE also runs into problems with *there*-sentences whose coda is a bare NP. Consider (37):

(37) There are some mistakes. Indeed, there are five mistakes.

The context of utterance of the second sentence in (37) entails that the set of mistakes is not empty, since the first sentence in the discourse has informed us of that. Thus, the account presented in this section predicts incorrectly that the second sentence in (37) should not be appropriate once the first sentence has been uttered.

## 6. DERIVING THE DEFINITENESS EFFECT

In section 5, we have seen that deriving the distribution of NPs in *there*-sentences from the presupposition of strong NPs is no simple matter. Should we give up attempting to produce this derivation? The presuppositional characterization of strong NPs gives a rather striking result in connection with Keenan's test, which suggests the attempt is worth pursuing further. In the next pages, I am going to argue that the problems I described for deriving the DE from the presuppositional definition of strong NPs arise from an inadequate understanding of the semantics of *there*-sentences, in particular, of the semantic role of the XP-coda. Before doing so, however, I need to take a detour in the land of NP interpretation.

### 6.1. Contextual Domains

It has often been observed that quantified sentences of natural languages are understood as quantifying over contextually furnished subsets of the

domain of discourse. For example, sentence (38) is naturally understood as saying that every student belonging to a certain contextually furnished set was at the party, and not as saying that every student in the universe was at the party.

(38) Every student was at the party.

A formal semantics for natural languages must be able to incorporate this insight concerning the interpretation of universally quantified sentences. The semantic framework I assume is the one developed by Heim (1982, chap. 2; 1987). In this framework, interpretation is a two-step process: S-structures are mapped onto LF-structures by construction rules, and LF-structures provide the input for the interpretation rules. In Heim (1982), NPs are obligatorily adjoined to S by an NP-raising rule. In order to account for narrow scope readings, Heim (1987) suggests that NPs may also be interpreted *in situ*. This means that LFs may now contain chunks (a)–(d), where  $NP_i$  has the form (c)–(d):

(a)  $[_S NP_i VP]$

(b)  $[_{VP} V NP_i]$

(c)  $[_{NP_i} \text{every } N'_i]$

(d)  $[_{NP_i} a(n) N'_i]$

The interpretation rules for (a)–(d) are given below (I follow Heim in treating  $N'_i$  as an open formula):

$S_S$ :  $\llbracket [_S NP_i VP] \rrbracket_{M,c}^g = \llbracket [NP_i] \rrbracket_{M,c}^g (\llbracket [VP] \rrbracket_{M,c}^g)$

$S_{VP}$ :  $\llbracket [_{VP} V NP_i] \rrbracket_{M,c}^g = \llbracket [V] \rrbracket_{M,c}^g (\llbracket [NP_i] \rrbracket_{M,c}^g)$

$S_{\text{every}}$ :  $\llbracket [_{NP_i} \text{every } N'_i] \rrbracket_{M,c}^g = \{X \subseteq E \mid \{x \in E \mid \llbracket [N'_i] \rrbracket_{M,c}^{g[x/i]} = 1\} \subseteq X\}$

$S_{\text{an}}$ :  $\llbracket [_{NP_i} a(n) N'_i] \rrbracket_{M,c}^g = \{X \subseteq E \mid g(i) \in X \text{ and } \llbracket [N'_i] \rrbracket_{M,c}^g = 1\}$

In these rules, as in the other LF interpretation rules, the interpretation function  $\llbracket \_ \rrbracket$  is relative to a context, a model, and a variable assignment. We may think of a context as an n-tuple including, among other things, the following ingredients:

*Ingredients in a Context c*

cg(c) a set of propositions representing the assumptions shared by the participants in the conversation in c, or *the common ground of c*

g(c) a function that assigns a value to free variables in LF structures

The observation that quantified sentences are always evaluated with respect to a contextually furnished subset of the universe of discourse may easily be incorporated in this way. Let's assume that, in addition to the above parameters, contexts also specify subsets of the universe of discourse:

D(c) a set  $\subseteq E$ , the domain associated with the context  $c$

The desired restriction on the interpretation of (38) may now fall out of the assumption that in any given context  $c$ , the interpretation function  $\llbracket \cdot \rrbracket_{M,c}^g$  assigns as denotations sets that are built out of  $D(c)$ . In particular, NP interpretations will be generated via these rules:

$S_N$ :  $\llbracket [N_i \alpha] \rrbracket_{M,c}^g = 1$  iff  $g(i) \in f(\alpha) \cap D(c)$

For any non-logical constant  $\alpha$ ,  $f(\alpha) \subseteq E$ .

The NP *every student* will thus have this denotation:

$\llbracket \text{student}_i \rrbracket_{M,c}^g = 1$  iff  $g(i) \in \{x \in E \mid x \text{ is a student and } x \in D(c)\}$

$\llbracket \text{every student}_i \rrbracket_{M,c}^g = \{X \subseteq E \mid \{x \in E \mid x \text{ is a student and } x \in D(c)\} \subseteq X\}$

It follows that (38) is true in a context  $c$  just in case the set of entities at the party includes the set of students in the contextually furnished set  $D(c)$ .

Notice, by the way, that the presupposition associated with strong NPs is also understood as relative to the contextually furnished domain  $D(c)$ . To return to an earlier example, suppose I want you to proofread a paper of mine and I tell you:

(19)b. If you find every mistake, I'll give you a fine reward.

When I say "every mistake" in this context, I mean every mistake in my paper. Thus, the contextually furnished domain relevant for interpreting (19b) will not contain mistakes that are not in my paper. The presupposition carried by the strong NP *every mistake* is also about this contextually furnished set: in the context at hand, (19b) presupposes that the set of mistakes *in my paper* is not empty, and not that somewhere, in some paper other than mine, there are mistakes. This fact follows from the semantics adopted here and from the presupposition of strong NPs in (22): in the context we described, the head noun *mistakes* denotes the set of mistakes in my paper; thus the presupposition carried by the strong NP *every mistake* that the set denoted by the  $N'$  is not empty will be the presupposition that the set of mistakes *in my paper* is not empty.

### 6.2. *Intuitive Sketch of the Derivation of the Definiteness Effect*

In section 5.2, I suggested the formulation of the felicity conditions of *there*-sentences in (36):

- (36) *Felicity Conditions of There-Sentences*  
*There*-sentences are felicitous only in contexts which entail neither that the intersection of the set denoted by the N' of the postverbal NP with the set denoted by the XP is empty nor that it is nonempty.

Whenever no XP-constituent is present, I assume that the common ground must be neutral about the nonemptiness of the intersection of the denotation of the N' of the postverbal NP with the domain of discourse. The presupposition of strong NPs in (22) may now be expressed as follows in terms of felicity conditions:

- (39) *Felicity Conditions of Strong NPs*  
 NPs whose determiner is *every/the/both/all/etc.* are felicitous only in contexts whose common ground entails that the denotation of their N' is not empty.

In section 5.2, I also pointed out, however, that these two sets of felicity conditions are not sufficient to derive the DE. For LF (1a') no conflict seems to arise between the felicity conditions of *there*-sentences in (36) and the felicity conditions of strong NPs in (39).

- (1) a' ??There is [<sub>VP</sub> [<sub>NP</sub> every [<sub>N'</sub> student]]] [<sub>XP</sub> in the garden]]

The felicity conditions of *there*-sentences require that the context of utterance of (1a') do not entail that the set of students in the garden is nonempty. This is compatible with the requirement imposed by the strong NP *every student* that the context entail that the set of students is nonempty. Thus, conditions (36) and (39) seem to provide no clue as to what causes the deviancy of (1a'). In drawing this conclusion, however, I have implicitly assumed that the XP-constituent plays no role in the interpretation of the postverbal NP. Indeed, if the XP-constituent in (1a') is predicated of the postverbal NP, as in (40), there seems to be no reason why (36) and (39) should be in conflict.

- (40) Every student is in the garden.

In (1a'), however, the XP *in the garden* is not in canonic predicative position as in (40). This lends some plausibility to the hypothesis that, from a semantic standpoint, the role of the XP-constituent is not that of being

predicated of the postverbal NP. I suggest instead that the semantic role of the XP is the following:

(41) *Semantic Role of XP-Coda*

The denotation of the XP provides the contextual domain for the interpretation of the postverbal NP.

Given the felicity conditions of strong NPs in (39), this assumption will have the consequence that (1a') is appropriate only in contexts in which the set of students in the garden is assumed to be nonempty. But the felicity conditions of *there*-sentences require that an appropriate context for (1a') do not entail that the set of students in the garden is nonempty. Thus, (1a') imposes contradictory requirements on what an appropriate context for its utterance should be.

I still need to deal with the problem posed by (37):

(37) There are some mistakes. Indeed, there are five mistakes.

The felicity conditions for *there*-sentences I assumed require the context of utterance of *there*-sentences whose coda is a bare NP to be neutral as to the emptiness of the set denoted by N'. Applied to the second sentence in (37) this seems to imply that an appropriate context of utterance for that sentence should be neutral about the existence of mistakes. But discourse (37) is felicitous, despite the fact that the set of mistakes is entailed to be nonempty by the context at the time when the second sentence is uttered.

The source of the problem here is the assumption that number words like *five* are located in the specifier position of NP and thus lie outside N'. Milsark (1977) pointed out that number words act semantically like cardinality predicates on the set denoted by the noun with which they combine.<sup>17</sup> In terms of recent theories of plurals, we may see number words like *five* as combining with a set A to yield the subset of A whose members are pluralities made up by five atoms. Besides allowing an adjectival interpretation in this sense, number words have been noticed to display adjectival behavior from a syntactic point of view as well, as shown by (42)–(44):

(42) The five boys left.

(43) Those five boys left.

(44) The boys are five.

<sup>17</sup> More recently, the existence of an adjectival interpretation of numerals has been argued for by Hoeksema (1983) and Partee (1988).



These facts have prompted some authors to suggest that number words do not occupy the specifier position of NP and that they are dominated instead by a nonmaximal projection of N, the way adjectives are.<sup>18</sup> According to this analysis, cardinal NPs like *five students* are NPs with an empty specifier position with the number word *five* dominated by N':

$$[_{NP_i} [_{SPEC} \emptyset] [_{N'_i} \text{five students}_i]]$$

Notice that, since this analysis claims that the specifier position of cardinal NPs is empty, it predicts that cardinal NPs have no quantificational power of their own in Heim's (1982) sense. If Heim's account of donkey anaphora is correct, we should thus expect that cardinal NPs, like indefinite NPs whose specifier is semantically inert for the purposes of interpretation, should support donkey anaphora. As Reinhart (1987) has observed, this prediction is borne out:

- (45) Every vampire who invited three guests for dinner was through with them by midnight.

Under this analysis of cardinal NPs, moreover, discourse (37) is no longer in conflict with the felicity conditions for *there*-sentences in (36). These felicity conditions now require the context of utterance of the second sentence in (37) to be neutral about the existence of pluralities consisting of five mistakes. This requirement is met, since the first sentence entails only that there are mistakes.

### 6.3. Formal Implementation

#### 6.3.1. The Mapping from S-Structure to Logical Form

I assume with Keenan that *there*-sentences like (25) and (35) have the S-structures in (25') and (35'), respectively:<sup>19</sup>

<sup>18</sup> Lyons (1984) and Reinhart (1987) have made the more radical suggestion that all weak determiners are dominated by the highest non-maximal projection of N.

<sup>19</sup> For simplicity, I'm omitting the INFL node in (25'), (35'). A fuller representation of the kind in (i) plays a role in accounting for the behavior of negation in *there*-sentences.

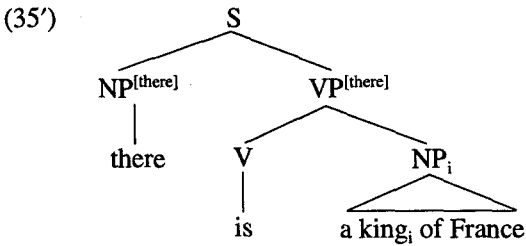
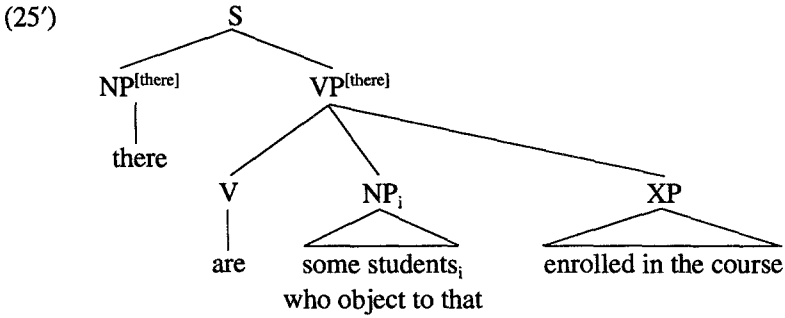
- (i)  $[_{INFL} \text{INFL VP}^{[there]}]$

The assumption that negation is in INFL, together with the assumption that postverbal NPs in *there*-sentences are interpreted *in situ*, may explain the lack of ambiguity of (ii) noted by Williams (1984):

- (ii) There isn't a man in the garden.

(25) There is a king of France.

(35) There are some students who objects to that enrolled in the course.



Sentences (1a) and (2a–c) are ambiguous between the bare-NP analysis and the NP-XP analysis (depending on whether the phrase *in the garden* is analyzed as part of the NP or as a separate XP).

(1) a.??There is every student in the garden.

- (2) a. There is a student in the garden.  
 b. There are three students in the garden.  
 c. There are no students in the garden.

Following Heim (1987), I'll assume that postverbal NPs in *there*-sentences are interpreted *in situ* at LF, i.e., in the position they are found in at S-structure. This assumption is supported by the lack of a wide scope reading of the indefinite in (47), contrasting with the presence of a wide scope reading in (46):

(46) Ralph believes that someone is spying on him.

(47) Ralph believes that there is someone spying on him.

The fact that postverbal NPs in *there*-sentences are interpreted *in situ* at

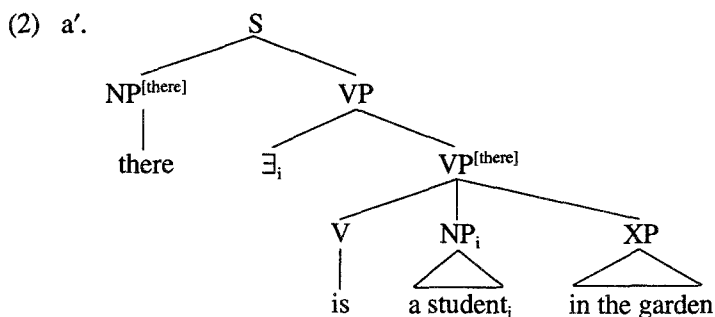
LF may either follow from Williams's (1984) assumption that *there* is a scope marker, or, if Heim (1987) is right, from the fact that traces fall in the class of strong NPs. In the present account, the latter assumption would mean that traces should have the property of strong NPs in (39). I'll come back to this issue in discussing the interpretation of proper names and pronouns. Since in *there*-sentences indefinite NPs are interpreted *in situ*, the higher type denotation introduced in section 6.1 is selected:

$$\llbracket [_{NP_i} \text{ a student}_i] \rrbracket_{M,c}^{\#} = \{X \subseteq E \mid g(i) \in X \text{ and } \llbracket [\text{student}_i] \rrbracket_{M,c}^{\#} = 1\}$$

This interpretation is consistent with Heim's (1982) claim that indefinite NPs like *a student* have no quantificational force of their own. We may generalize the rule for indefinites in section 6.1 by adopting the following rule for CN-headed NPs whose SPEC is empty or invisible for the purposes of semantic interpretation:<sup>20</sup>

$$(48) \quad \llbracket [_{NP_i} [_{SPEC} \emptyset] [N_i]] \rrbracket_{M,c}^{\#} = \{X \subseteq E \mid g(i) \in X \text{ and } \llbracket [N_i] \rrbracket_{M,c}^{\#} = 1\}$$

In the spirit of Heim (1982), I'll assume an operation of existential closure adjoining an unselective existential quantifier to  $VP^{[there]}$ . The LF corresponding to (2a) (in the NP-XP analysis) will thus be (2a')



By contrast, in the LF for the deviant (1a), where the postverbal NP *every student* is quantificational, the unselective existential quantifier will be vacuous for the purposes of interpretation.

(1) a.?? There is every student in the garden.

<sup>20</sup> In this analysis, NPs like *three students* have thus the following interpretation:

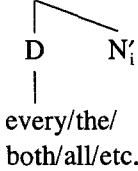
$$\llbracket [_{NP_i} \text{ three students}_i] \rrbracket_{M,c}^{\#} = \{X \subseteq E \mid g(i) \in \llbracket [\text{students}] \rrbracket_{M,c}^{\#} \ \& \ g(i) \text{ is made up of three atoms} \ \& \ g(i) \in X\}$$

### 6.3.2. Felicity Conditions for Strong NPs

I assume that the lexical entries of *every*, *the*, *both*, *all*, etc. contain information projecting the following felicity conditions for NPs quantified with these determiners:

FC<sub>strong NPs</sub>:

$[[NP_i]]_{M,c}^g$  is defined only if  $cg(c)$  entails that  $[[N']]_{M,c}^g \neq \emptyset^{21}$



### 6.3.3. Felicity Conditions for VP<sup>[there]</sup>

The felicity conditions in (36) may be imposed directly on VP<sup>[there]</sup>. I'll break these felicity conditions into two rules to account, respectively, for the case in which the coda has the form NP-XP and for the case in which it is a bare NP:

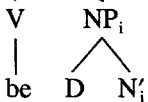
FC1<sub>there</sub>:

$[[VP^{[there]}]]_{M,c}^g$  is defined only if neither  $cg(c)$  entails  $[[XP]]_{M,c}^g \cap [[N']]_{M,c}^g \neq \emptyset$  nor  $cg(c)$  entails  $[[XP]]_{M,c}^g \cap [[N']]_{M,c}^g = \emptyset$



FC2<sub>there</sub>:

$[[VP^{[there]}]]_{M,c}^g$  is defined only if neither  $cg(c)$  entails  $E \cap [[N']]_{M,c}^g \neq \emptyset$  nor  $cg(c)$  entails  $E \cap [[N']]_{M,c}^g = \emptyset$



According to these rules, (2a) is felicitous only in contexts in which the intersection of the set of students with the set of individuals in the garden is not assumed to be empty or nonempty before the sentence is uttered.

<sup>21</sup> More precisely,  $cg(c)$  is required to entail that  $\{x \in E \mid [[N'_i]]_{M,c}^{g(x)} = 1\} \neq \emptyset$ . For ease of exposition, I'll keep referring to the set denoted by  $N'$  as  $[[N']]_{M,c}^g$ .

(2) a. There is a student in the garden.

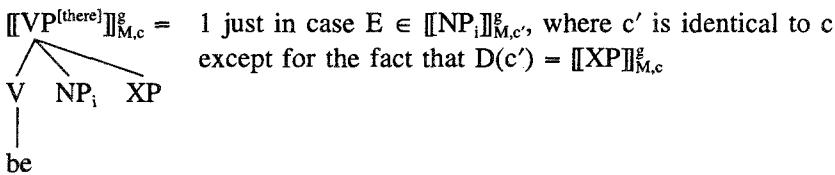
Sentence (25), on the other hand, is predicted to be felicitous only in contexts in which the intersection of the denotation of *king of France* with the domain of discourse *D* is not entailed to be empty or nonempty at the time the sentence is uttered.

(25) There is a king of France.

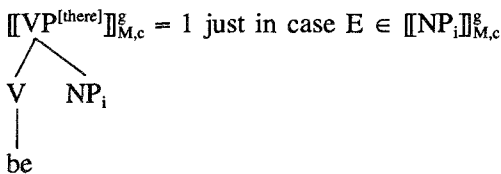
6.3.4. *Truth-Conditions for There-Sentences*

My semantics for *there*-sentences assigns to them truth-conditions equivalent to those of B&C. I assume with Keenan that *there* is an expletive element and that the bearer of the truth-value is the VP. Thus, a *there*-sentence will be true just in case its VP denotes the truth-value 1. Again, I break the truth-conditions of *there*-sentences into two rules to deal, respectively, with *there*-sentences whose coda has the NP-XP structure and with *there*-sentences whose coda is a bare NP:

S1<sub>VP[there]</sub>:

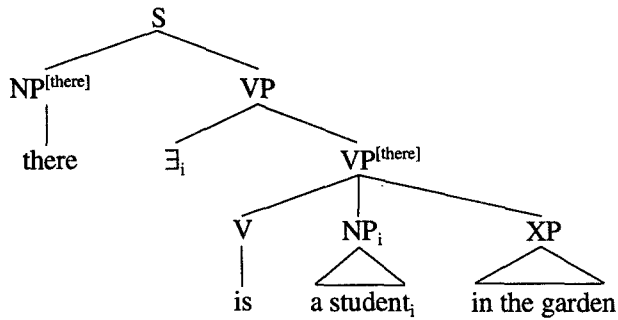


S2<sub>VP[there]</sub>:



No particular provision is needed to interpret  $[\exists_i VP^{[there]}]$ , since, given our assumption that  $VP^{[there]}$  denotes a truth-value, the truth conditions of  $[\exists_i VP^{[there]}]$  are defined as usual in terms of the existence of an assignment to the variable *i* which satisfies the embedded formula. These rules predict that LF (2a'), repeated below, is true relative to a context *c* and a model *M* just in case there is an individual *a* such that  $E \in [[_{NP_i} \text{ a student}_i]]_{M,c'}^{g'}$ , where  $g' = g^{[i/a]}$  and *c'* is identical to *c* except for the fact that  $D(c') = [[XP]]_{M,c}^g$ .

(2) a'.



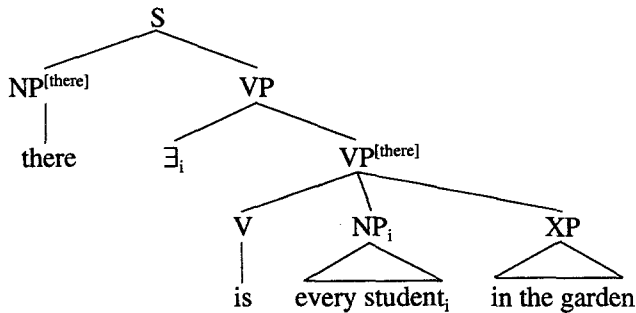
Thus (2a') is true only if there is an individual *a* such that the domain of discourse belongs to the set of sets whose intersection with the set of students in the garden includes *a*. Namely, (2a') is true only if there is a student in the garden. On the other hand, the LF corresponding to (25) is true only if the domain of discourse contains a king of France.

Concerning (1a), its deviancy is derived as follows.

(1) a.??There is every student in the garden.

Given the semantic rules for VP<sup>[there]</sup>, LF (1a') will denote in  $M, c$  if and only if NP<sub>i</sub> denotes in  $M, c'$ , where  $c'$  is the same as  $c$  except that  $D(c')$  is the set of individuals in the garden.

(1) a'.



But according to the felicity conditions for strong NPs, NP<sub>i</sub> denotes in  $M, c'$  iff  $cg(c')$  entails that  $[[N']_{M, c'}^{\exists} \neq \emptyset$ . Given the way  $c'$  is defined, it follows that NP<sub>i</sub> denotes in  $c'$  only if  $cg(c')$  entails that  $\{x \mid x \text{ is a student and } x \in [[XP]_{M, c'}^{\exists}\} \neq \emptyset$ . In other words, NP<sub>i</sub> will denote in  $c'$  only if the common ground of  $c'$  entails that the set of students in the garden is not empty. Since the common ground of  $c'$  is the same as the common ground of  $c$ , if  $c'$  entails that the set of students in the garden is not empty, then  $c$  also does. Thus, NP<sub>i</sub> will denote in  $M, c'$  only if  $cg(c)$  entails that

$\{x \mid x \text{ is a student and } x \in \llbracket \text{XP} \rrbracket_{M,c}^{\xi} \} \neq \emptyset$ . That is,  $\text{NP}_i$  will denote in  $c'$  only if the set of students in the garden is entailed to be nonempty by the common ground of  $c$ . It follows that (1a') will denote in  $M,c$  only if the set of students in the garden is entailed to be nonempty by the common ground of  $c$ . But the felicity conditions of  $\text{VP}^{\text{[there]}}$  require  $c$  not to have such an entailment. Thus, a conflict is generated by the felicity conditions of  $\text{VP}^{\text{[there]}}$  and the felicity conditions projected by the strong NP in (1a').

## 7. PROBLEMS AND REFINEMENTS

This account of the definiteness effect raises some questions, which call for some refinements. I discuss these questions and refinements in the next three sections.

### 7.1. Context Sets Again

My interpretation rules require that (i) the XP-coda of *there*-sentences provide the contextual domain for the interpretation of the postverbal NP, and that (ii) all constituents of the postverbal NP be evaluated with respect to this restricted domain. For example, if  $D(c')$  is the domain provided by the XP, then the NP *a student wearing gloves* must be interpreted as follows:

$$\begin{aligned} \llbracket \llbracket \text{NP}_i \text{ a } \llbracket \text{NP}_j \text{ student}_i \text{ wearing gloves}_j \rrbracket \rrbracket_{M,c}^{\xi} = \{X \subseteq E \mid g(i) \in X \text{ and} \\ \llbracket \llbracket \text{NP}_i \text{ student}_i \text{ wearing gloves}_j \rrbracket \rrbracket_{M,c}^{\xi} = 1 \} = \{X \subseteq E \mid g(i) \in X \\ \text{and } g(i) \in f(\text{student}) \cap D(c') \text{ and } g(j) \in f(\text{gloves}) \cap D(c') \text{ and} \\ g(i) \text{ wears } g(j) \} \end{aligned}$$

While (i) is an intended result of the analysis, (ii) is not, and it leads to inadequate predictions. For example, (i) and (ii) together predict that, since there are no rivers on this floor, (49) is false.<sup>22</sup>

(49) There is an office from which one can see a river on this floor.

In the previous discussion, I assumed that LFs get semantic values relative to contexts of utterance, and that the context of utterance specifies, among other things, a subset of the domain of discourse which provides the relevant domain of interpretation for the NPs in the LF (cf. section 6.1):

$D(c)$  a set  $\subseteq E$ , the domain associated with the context  $c$

This means that, if an LF contains  $\text{NP}_i, \dots, \text{NP}_j$  and the LF is evaluated

<sup>22</sup> This problem was pointed out to me by I. Heim and A. Kratzer.

relative to  $c$ , the domain of interpretation for  $NP_i, \dots, NP_j$  is provided by the same context set, namely  $D(c)$ . In other words, an implicit assumption of the account developed so far is that the contextual domain is singled out at the level of sentence utterance (or higher) and that the subconstituents of sentential utterances are interpreted with respect to the same domain. Independently of the problem my analysis of *there*-sentences faces here, there are good reasons to think that this assumption is incorrect. Consider (50):

- (50) The English love to write letters. Most children have several pen pals in many countries.

Westerståhl (1985) has pointed out that the natural interpretation of the second sentence in (50) requires that *most* be restricted to Englishmen and *several* be not. Westerståhl's solution to this problem consists in allowing different contextual domains for different NPs. This is accomplished in his system by allowing NPs to be translated according to template (a)–(b), where  $X$  is a contextually interpreted set variable and  $\alpha', \beta'$  are translations of  $\alpha$  and  $\beta$ :

- (a)  $[[_{\text{DET}} \alpha] [_{\text{N}'} \beta]]$   
 (b)  $\alpha'^X \beta'$

Translations of type (b) are interpreted as in (c):

- (c)  $[[\alpha'^X \beta']] = [[\alpha']] ([X] \cap [[\beta']])$

Once NP interpretations are relativized in this way, (50) is no longer problematic, since different NPs in the same sentence may be interpreted relative to different domains. Notice that Westerståhl's theory does not tell us *how* these different domains are chosen. The task of determining how context sets are chosen cannot be the burden of the semantic theory alone, since the choice of NP domains may be affected by factors like world knowledge, the need to preserve discourse coherence, etc.; thus the principles that lead to the choice of particular domains should not be regarded as part of linguistic rules.

Westerståhl's solution may be incorporated in the framework I'm assuming by letting the  $n$ -tuple which models the context of utterance provide a contextual domain for each NP. Given a discourse containing NPs with referential indices  $i, \dots, j$ , an appropriate context of utterance will provide a function which assigns a set to each of these NPs:

- $D_i(c)$  a set  $\subseteq E$ , the domain for  $NP_i$  in the context  $c$   
 ...  
 $D_j(c)$  a set  $\subseteq E$ , the domain for  $NP_j$  in the context  $c$



Following Westerståhl (1985: 49), I assume that, in the absence of information to the contrary, there is a default choice for context sets which equates them to the universe of the model. Since each NP is now interpreted relative to a potentially different domain, the truth-conditions given in section 6.3.4 for *there*-sentences should be restated as follows (again, I'm assuming that, if no XP is present, the contextual domain for the NP is determined by c):

$S_{1_{VP[there]}}$  (revised):

$$\begin{array}{l} \begin{array}{c} \text{[[VP}^{[there]}]]_{M,c}^g \\ \swarrow \quad \downarrow \quad \searrow \\ \text{V} \quad \text{NP}_i \quad \text{XP} \\ | \\ \text{be} \end{array} = 1 \text{ just in case } E \in \text{[[NP}_i]]_{M,c}^g, \text{ where } c' \text{ is identical to } c \\ \text{except for the fact that } D_i(c') = \text{[[XP]]}_{M,c}^g \end{array}$$

For each referential index  $i$ , the interpretation rules for  $N_i$  will assign denotations built out of  $c(D_i)$  (cf. section 6.1):

$S_N$  (revised):

$$\text{[[N}_i \alpha]]_{M,c}^g = 1 \text{ iff } g(i) \in f(\alpha) \cap D_i(c)$$

The felicity conditions for strong NPs and for  $VP^{[there]}$  remain unchanged.<sup>23</sup>

Once we introduce these modifications, (50) can be accounted for along the lines suggested by Westerståhl, since the NPs *most children* and *several pen pals* in (50) may now be interpreted with respect to different domains. We also have a solution to the problem raised by (49). The LF representation for (49) is given in (49').<sup>24</sup>

$$(49') \quad [{}_s \text{ there } \exists_i [{}_{VP} \text{ is } [{}_{NP_1} \text{ an } [{}_{N_i} \text{ office}_i [{}_s \text{ from which}_i \exists_j [{}_1 \text{ one see } [{}_{NP_j} \text{ a river}_j i]]]]] [{}_{XP} \text{ on this floor}]]]$$

The problem with (49') was that, if we take the XP *on this floor* to restrict the interpretation of  $NP_i$  and of its constituents, then the  $N'$   $[{}_{N_i} \text{ office}_i \text{ from which}_i \exists_j [{}_1 \text{ one see } [{}_{NP_j} \text{ a river}_j i]]]$  would be false for any value assigned to the variable  $i$ , since no rivers are found on floors. Thus,  $NP_i$  would denote the empty set, and (49') would be predicted to be false, since  $E$  does not

<sup>23</sup> Since verbs do not carry referential indices, the extension of  $V$  relative to a model and a context is specified relative to the universe of discourse:

$$\text{[[V]]}_{M,c} = f(V)$$

$$f(V) \subseteq E$$

<sup>24</sup> For simplicity, I ignore the intensional dimension introduced by the modal *can*.



must entail that the set of students in the garden is not empty. And, as we saw, this requirement is in conflict with the one imposed on (1a') by the felicity conditions of *there*-sentences.<sup>26</sup>

### 7.2. Logical Truths

Logical truths raise some problems for the account I propose. Consider (51):

(51) There is [<sub>NP</sub> no one who is not in Stanford] [<sub>XP</sub> in Stanford]

My felicity conditions for *there*-sentences require that an appropriate context for the utterance of (51) should be neutral about the emptiness of the set  $\{x \in E \mid x \text{ is in Stanford and } x \text{ is not in Stanford}\}$ . However, since no  $x$  can be in Stanford and not in Stanford, any common ground should entail this set to be empty. Thus, my felicity conditions for  $VP^{[there]}$  predict incorrectly that (51) should be deviant in any context of utterance.

A different example raising a similar problem is (52).<sup>27</sup>

- (52)a. There are four students in the garden.  
 b. Thus, there are three students in the garden.

Since (52a) entails (52b), an utterance of (52b) is necessarily true relative to any common ground to which the proposition expressed by (52a) has been added. Again, this predicts that (52) should be infelicitous, since by the time the proposition expressed by (52a) has been added to the common ground, the set of plural individuals made up by three students in the garden is entailed to be nonempty.

Before I address the problem posed by (51)–(52), an observation is in order concerning my way of modelling felicity conditions up to now. According to the characterization in section 6.1, the common ground is a set of propositions representing the set of assumptions shared by the conversational participants. A set of propositions  $A$  entails a proposition  $p$  iff it is impossible for all the propositions in  $A$  to be true and for  $p$  to be false. Felicity conditions of lexical items or constructions are stated as requirements that the common ground have (or lack) certain entailments.

<sup>26</sup> The conclusion that the XP-coda provides the domain of interpretation of the postverbal NP was arrived at independently in Comorovski (1991) and Zucchi (1992). Comorovski's evidence for this conclusion comes from the behavior of partitives in existential sentences. Her account of existential sentences, however, assumes Barwise and Cooper's explanation of the definiteness effect. I leave the matter of whether her analysis of partitives can be restated in my account of the definiteness effect for further investigation.

<sup>27</sup> The problem posed by (52) was pointed out to me by S. Peters, C. Condoravdi, and R. Schwarzschild.

Independently of my analysis of *there*-sentences, this way of modelling felicity conditions may be argued to be problematic.

- (53) If you catch the CIA agent involved in overthrowing the U.S. government, you'll get a reward.

An utterance of (53) indicates that the conversational participants are taking for granted that there is a CIA agent involved in overthrowing the U.S. government, and not simply that, independently of their realizing it, the existence of such a CIA agent follows from assumptions they share. Yet, if felicity conditions are stated in terms of what the common ground entails, the fact that the existence of such a CIA agent follows from their shared assumptions is sufficient to meet the felicity conditions of (53). A way of avoiding this problem is to view felicity conditions as requirements that certain propositions belong (or do not belong) to the common ground, rather than as requirements on what the common ground entails. Since the conversational participants often fail to realize implications of their shared beliefs, the set of propositions that make up the common ground is presumably not closed under the entailment relation, that is, it is not the case that for any proposition *p* in the common ground, if *p* entails *q*, then *q* is also in the common ground. If felicity conditions are stated in terms of what propositions belong to the common ground, their satisfaction is correctly predicted to depend on what assumptions the conversational participants effectively share, and not on what is entailed by these assumptions. According to this view, the felicity conditions for strong NPs given in section 6.3.2 should thus be restated in this way:

FC<sub>strong NPs</sub> (revised):

$[[NP_i]]_{M,c}^E$  is defined only if the proposition that  $[[N']]_{M,c}^E \neq \emptyset$  belongs to  $cg(c)$ <sup>28</sup>

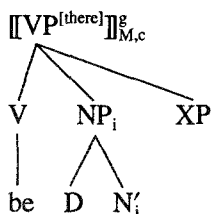
$\swarrow$   
 $\searrow$   
 D     $N'_i$   
 |  
 every/the/both/all/etc.

In order for (53) to be felicitous, the assumption that a CIA agent trying to overthrow the U.S. government exists is now correctly required to be part of the set of assumptions shared by the conversational participants. If this approach is correct, a reformulation along the same lines is also in order for the felicity conditions of *there*-sentences given in section 6.3.3:<sup>29</sup>

<sup>28</sup> More precisely,  $cg(c)$  is required to include the proposition that  $\{x \in E \mid [[N_i]]_{M,c}^{[w]} = 1\} \neq \emptyset$ .

<sup>29</sup> Only the bare-NP case is given here; the felicity conditions for NP-XP codas also need to be reformulated in a similar fashion.

FC1<sub>there</sub> (revised):



is defined only if neither the proposition that  $[[XP]]^g_{M,c} \cap [[N']^g_{M,c} \neq \emptyset$  belongs to  $cg(c)$  nor the proposition that  $[[XP]]^g_{M,c} \cap [[N']^g_{M,c} = \emptyset$  belongs to  $cg(c)$

Now let's go back to the problem posed by (51)–(52). Discourses like (51)–(52) may be used to remind the hearer of some obvious inferences that she or he has failed to recognize. This is clearly the case, for example, in (54)–(55):<sup>30</sup>

- (54) There is no one who is not in Stanford in Stanford, you fool!
- (55) There are four students in the garden. Thus, there are three students in the garden, you fool!

Whenever (54) is uttered, the common ground obviously fails to include that the set of individuals in Stanford and not in Stanford is empty, since the function of (54) is precisely to remind the hearer of this fact. And when the second sentence in (55) is uttered, the common ground does not include the proposition that three students are in the garden, since, again, this is precisely what the second sentence suggests the hearer has failed to realize. In this case, therefore, neither (54) nor (55) are infelicitous according to the conditions I assumed. However, this observation is insufficient to solve the problem posed by (51)–(52), since these discourses are still acceptable if the hearer is already aware that (51) is logically true and that (52a) entails (52b). This fact is what remains to be explained if *there*-sentences have the felicity conditions I suggest.

It seems to me there are plausible reasons for thinking that, in these cases, the conversational participants are able to accept (51) and (52b) although the context fails to satisfy their felicity conditions. Intuitively, the felicity conditions of a sentence constrain how its truth-conditional content can affect the common ground. For example, the felicity conditions associated with the pseudo-cleft sentence *It is John that solved the problem* constrain how its truth-conditional content (the proposition that John solved the problem) can increment the information in the common ground: they tell us that this sentence is not supposed to add the information that someone solved the problem; rather, this information must be already in the common ground by the time the sentence is uttered. What this sentence is supposed

<sup>30</sup> I owe these examples to G. Nunberg.

to add is that the individual who solved the problem, and whose existence is already assumed, is John. Similarly, the felicity conditions of *there*-sentences constrain how their truth-conditional content is meant to affect the information in the common ground, by adding the previously missing information that the intersection of the N' denotation with the XP denotation is not empty. In any context in which the conversational participants are already aware that (51) is logically true, however, an utterance of (51) fails to affect the common ground, since it adds no new information. This provides a reason why they may disregard that the felicity conditions of (51) are not met: if (51) fails to affect the common ground, the fact that the common ground doesn't meet its felicity conditions becomes unimportant, since felicity conditions are constraints on how the common ground can be affected. The same point may be made for discourse (52). Whenever the conversational participants are aware that (52a) entails (52b), they may disregard that the common ground fails to meet the felicity conditions imposed by (52b), since (52b) fails to add information to the common ground.

Introducing the possibility that the felicity conditions of *there*-sentences may be violated without making the discourse deviant raises the issue why examples like (1a), whose ill-formedness was also derived from the felicity conditions of *there*-sentences, cannot be rescued:

(1) a. ??There is every student in the garden.

Clearly, saying that the conversational participants may ignore the violations involved in (51) and (52b) cannot amount to saying that felicity conditions are simply irrelevant for tautological discourses, since (56) is both tautological and deviant according to my account of the meaning of *there*-sentences:

(56) ??There is [<sub>NP</sub> everyone who is in Stanford] [<sub>XP</sub> in Stanford]

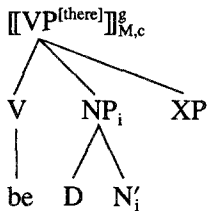
Notice, however, that my account draws an important distinction here. As we saw, both for (51) and for (52b), the grammar generates felicity conditions which, under appropriate circumstances, can be met. The felicity conditions of (51) will be met in any context in which the conversational participants fail to realize a certain implication of their shared beliefs, i.e., when the proposition that no one is in Stanford and is not in Stanford is not in the common ground. The felicity conditions of (52b) are satisfied whenever the common ground fails to entail the existence of three students in the garden. The conditions (1a) and (56) impose on the common ground, however, can never be met. (1a) requires that the information that the set of students in the garden is nonempty be, and at the same time be not, in

the common ground. (56) requires that the common ground should include, and at the same time fail to include, the information that the set of individuals in Stanford and not in Stanford is nonempty. While it is possible that a set of propositions  $X$  fails to include propositions entailed by  $X$ , no proposition (indeed, nothing) can belong and at the same time not belong to the same set. Thus, for (1a) and (56), unlike for (51) and (52b), the grammar fails to generate consistent felicity conditions. This difference is responsible for the fact that (1a) and (56), unlike (51) and (52), are deviant.

### 7.3. Compositionality

The felicity conditions for *there*-sentences in 6.3.3, repeated below, are not compositional:

FCI<sub>there</sub>:



is defined only if neither  $cg(c)$  entails  $[[XP]]_{M,c}^g \cap [[N']_{M,c}^g \neq \emptyset$  nor  $cg(c)$  entails  $[[XP]]_{M,c}^g \cap [[N']_{M,c}^g = \emptyset$

They are not, since the felicity conditions of  $VP^{[there]}$  are not a function of the interpretation of its immediate constituents  $V$   $NP_i$   $XP$ , but depend also on the interpretation of the  $N'$  embedded in the postverbal  $NP$ .

These conditions cannot be abandoned in favor of the simpler requirement that the interpretation of  $VP^{[there]}$  be contingent on the context of utterance:

$[[VP]^{[there]}]_{M,c}^g$  is defined only if neither  $cg(c)$  entails  $[[VP]^{[there]}]_{M,c}^g = 1$  nor  $cg(c)$  entails  $[[VP]^{[there]}]_{M,c}^g = 0$

This reformulation does recover compositionality, but at the price of losing the account of contrast (3)–(4), since the property of being contingent on the context of utterance fails to discriminate between (3) and (4). In particular, given that any context of utterance entails (3), (3) is incorrectly predicted to be deviant by such contingency requirement.

(3) There were either zero or else more than zero students at the party.

(4) ?? There were either all or else not all students at the party.

The approach to the felicity conditions of  $VP^{[there]}$  suggested in the previous

section does not help here. Suppose we require that neither the proposition expressed by  $VP^{[there]}$  nor its negation be in the common ground at the time  $VP^{[there]}$  is uttered. The felicity conditions of strong NPs and the truth-conditions of  $VP^{[there]}$  would require in this case that, in order for (4) to be acceptable, the information that the set of students at the party is nonempty must be in the common ground. The contingency requirement imposed by the felicity conditions of  $VP^{[there]}$ , on the other hand, would require that the common ground do not include the information that either all or else not all students at the party exist. But these are compatible, and under appropriate circumstances simultaneously satisfiable, requirements. Thus, (4) is incorrectly predicted to be acceptable.

According to the felicity conditions in section 7.2, stated in terms of  $N'$  denotations, sentence (4), unlike sentence (3), requires the information that the set of students in the garden is nonempty to belong and at the same time not to belong to the common ground, thus leading us to expect that (4), unlike (3), should be deviant. I don't know how to keep this result without referring to the denotation of the  $N'$  in the felicity conditions of *there*-sentences. I'll argue, however, that a compositional reformulation of my felicity conditions for *there*-sentences is possible and does not require introducing any novel device in the grammar.

The need to recover  $N'$  meanings for discourse interpretation does not arise only for the purpose of analyzing *there*-insertion contexts.  $N'$  anaphora shows that  $N'$  meanings must be available for discourse interpretation after NP meanings are computed:

(57) Most deliveries were on time. Some weren't.

In the framework I assume, anaphoric relations are dealt with via discourse referents, and discourse referents are identified with referential indices at LF. The  $N'$  anaphora in (57) is thus naturally analyzed here by letting NPs carry referential indices corresponding to  $N'$  denotations. Following Napoli (1985), Chao (1987), and Abney (1987), I assume that NPs traditionally analyzed as involving an empty  $N'$  contain pronominal determiners and no empty heads:<sup>31</sup>

(a) [<sub>NP</sub> most]

(b) [<sub>NP</sub> most [<sub>N'</sub> deliveries]]

I assume that both NP-types exemplified in (a)–(b) carry additional

<sup>31</sup> Abney analyzes NPs lacking  $N'$ s as DPs without embedded NPs. I ignore this aspect of his analysis since it is irrelevant for the purpose of my discussion.





## 8. EXTENSIONS

8.1. *Proper Name and Pronouns*

So far I have concentrated on NPs headed by common nouns. However, the DE shows up with proper names and pronouns as well, as (58) and (59) show:

(58) ?? There is John in the garden.

(59) ?? There is he in the garden.

My account can be extended to proper names and pronouns if we assume that the interpretation of these NPs is also relative to a contextually furnished domain. This assumption has the advantage of providing a uniform explanation of the DE and I see no counterindication for it. I adopt the following interpretation rule for N dominating a pronoun or a proper name:

$$S_{N[\text{pro}/\text{name}]}: \llbracket [N_i[\text{+pro}/\text{+name}] \alpha] \rrbracket_{M,c}^g = 1 \text{ iff } g(i) \in f(\alpha) \cap D_i(c)$$

According to this rule, all Ns, including proper names and pronouns, denote sets (Ns which dominate pronouns or names denote singleton sets).<sup>34</sup> Full NPs headed by proper names and pronouns will denote generalized quantifiers of this sort:

$$S_{NP[\text{pro}/\text{name}]}: \llbracket [N_i N_i'[\text{+pro}/\text{+name}]] \rrbracket_{M,c}^g = \{X \subseteq E \mid g(i) \in X \text{ and } \llbracket N_i' \rrbracket_{M,c}^g = 1\}$$

The felicity conditions associated with  $N^{[\text{+pro}/\text{+name}]}$  will include the following requirement:

$$FC_{N[\text{pro}/\text{name}]}: \llbracket [N_i[\text{+pro}/\text{+name}] \alpha] \rrbracket_{M,c}^g \text{ is defined only if } cg(c) \text{ entails that } \llbracket \alpha \rrbracket_{M,c}^g \neq \emptyset$$

It follows that NPs headed by proper names and pronouns impose on the common ground the same condition as NPs whose  $N'$  is a sister to a strong determiner: the denotation of the  $N'$  must be entailed to be nonempty by the common ground. Thus, proper names and pronouns are ruled out from the postverbal position of *there*-sentences for the same reasons other strong NPs are ruled out.<sup>35</sup>

<sup>34</sup> This assumption is implicit in Heim's (1982: 236) treatment of proper names and pronouns. Heim assumes that proper names are represented at LF as open formulae with names acting as predicates. Pronouns are represented as conditions of the form 'male(i)', 'female(i)', etc. Heim explicitly assumes that pronouns and names meet the Descriptive Content Condition.

<sup>35</sup> If we assume that traces are interpreted in the way pronouns are interpreted and that they are subject to the same felicity conditions as pronouns, we predict that traces will also be barred from the postverbal position of *there*-sentences. See Heim (1987) for a discussion of the consequences of this prediction.

8.2. *Verbs Other Than Be*

*There*-sentences occur in English also with verbs other than *be*:

- (60) There arrived a man in the garden.  
 (61) There remained a man in the garden.  
 (2) a. There is a student in the garden.

Since the DE is observed with these verbs as well, as (62)–(63) show, it is natural to ask how my account of the DE can be extended to these cases.

- (62) ??There arrived every man in the garden.  
 (62) ??There remained every man in the garden.

In order to provide an answer, I need to modify some of the assumptions I've made so far. Up to now, I have assumed that the verb *be* in *there*-sentences provides no semantic contribution to the meaning of  $VP^{[there]}$ . Following Higginbotham (1983: 108), I'll now assume instead that *be* denotes the universal property (as in *God is*). I'll assume, moreover, that the XP-coda has a predicate modifier interpretation, namely, it denotes a function that applies to predicate denotations to yield predicate denotations. For example, the denotation of *in the garden* applied to the property denoted by the verb *arrived* will yield the property of arriving in the garden, applied to the *be* in (2a) will yield the property of being an individual in the garden. My analysis of *there*-sentences may now be recast in this way:

The contextual domain for the interpretation of the postverbal NP in *there*-sentences is determined by the complex property denoted by  $[[XP]]_{M,c}([[V]]_{M,c})$ . A sentence of the form  $[_S \text{there } [_{VP^{[there]}} V NP_i XP]]$  is true in a context *c* and a model *M* iff the domain of discourse belongs to  $[[NP_i]]_{M,c'}$ , where *c'* is identical to *c* except for the fact that  $D_i(c') = [[XP]]_{M,c}([[V]]_{M,c})$ .

Intuitively, this means that (60), for example, is analyzed as the assertion that a man that arrived in the garden exists (i.e., is in the domain of discourse). Sentence (2a), on the other hand, will receive an interpretation equivalent to the one given in section 6.3.4, namely, (2a) will be true if and only if a man in the garden is in the domain of discourse.

Formally, felicity conditions and truth-conditions for  $VP^{[there]}$  are restated as follows:

$S1_{VP^{[there]}}$ :

$[[[_{VP^{[there]}} V NP_i XP]]]_{M,c}^g = 1$  just in case  $E \in [[NP_i]]_{M,c'}$ , where *c'* is identical to *c* except for the fact that  $D_i(c') = [[XP]]_{M,c}^g([[V]]_{M,c}^g)$

S2<sub>VP[there]</sub>:

$[[[VP[there] V NP_i]]]_{M,c}^g = 1$  just in case  $E \in [[NP_i]]_{M,c}^g$ , where  $c'$  is identical to  $c$  except for the fact that  $D_i(c') = ([[V]]_{M,c}^g)$

FC1<sub>there</sub>:

$[[[VP[there] V_{[NP_i D N_i]} XP]]]_{M,c}^g$  is defined only if neither  $cg(c)$  entails  $[[XP]]_{M,c}^g \cap ([[V]]_{M,c}^g) \cap [[N']]_{M,c}^g \neq \emptyset$  nor  $cg(c)$  entails  $[[XP]]_{M,c}^g \cap ([[V]]_{M,c}^g) \cap [[N']]_{M,c}^g = \emptyset$

FC2<sub>there</sub>:

$[[[VP[there] V_{[NP_i D N_i]}]]]_{M,c}^g$  is defined only if neither  $cg(c)$  entails  $[[V]]_{M,c}^g \cap [[N']]_{M,c}^g \neq \emptyset$  nor  $cg(c)$  entails  $[[V]]_{M,c}^g \cap [[N']]_{M,c}^g = \emptyset$

## 9. OPEN PROBLEMS AND CONCLUSIONS

There is a class of determiners that do not fit naturally into the account proposed here: the determiners that denote existential functions but are not cardinal in Higginbotham's sense, i.e., those determiners which denote an existential function according to definition (a) but fail to meet the defining condition of cardinal determiners in (b):

- (a)  $f$  is existential iff for every set  $A$  and  $B$ ,  $B \in f(A)$  iff  $E \in f(A \cap B)$ .
- (b)  $D$  is a cardinal determiner iff there is a nonempty set  $K$  of natural numbers such that for every model  $M$  and every set  $A$ ,  $B \subseteq E$ ,  $B \in [[D]]_{M,c}(A)$  iff  $|A \cap B| \in K$ .

One such determiner is *more male than female*.<sup>36</sup> My formulation of the felicity conditions for VP<sup>[there]</sup> predicts incorrectly that discourse (64) should be infelicitous, since the context of utterance of the second sentence in the discourse entails that the set of students is not empty:

- (64) There were some students at the party. Indeed, there were more male than female students at the party.

<sup>36</sup> The complex determiner *more male than female* denotes an existential function, since it is always true that more male than female students are at the party iff more male than female students that are at the party exist. This determiner is not cardinal, though, since there is no set  $K$  of cardinal numbers given independently of the cardinality of the set of students such that more male than female students are at the party iff for some  $n \in K$ ,  $n$  things are students at the party.

Since *more male than female* is not cardinal, I cannot overcome this difficulty by treating it as a cardinality predicate restricting the set of students. In order to allow (64) in the present account, I have to restrict the felicity conditions for VP<sup>[there]</sup> proposed in section 6.2 in such a way that they do not apply to determiners that are existential but not cardinal. This is unfortunate, since it is not clear what motivates this stipulation. How to account naturally for these determiners thus remains an open problem for my analysis. The evidence discussed in this paper suggests, however, that the presuppositional characterization of strong NPs yields the most accurate predictions concerning which NPs are allowed in *there*-sentences. This seems to me to indicate that the line of investigation proposed here, which tries to derive the DE from a conflict originated by the presuppositions of strong NPs, is worth pursuing.

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