0. Introduction

Kamp and Heim intended this proposal to compete with and replace various earlier treatments of the same phenomena, including a family of related proposals by Evans (1977, 1980), Cooper (1979), and others, which in contrast to (i)–(iv) made the following more traditional assumptions:

(i) a non-existential, quantifier-free treatment of indefinites,
(ii) a treatment of anaphoric pronouns as plain bound variables,
(iii) a treatment of quantificational determiners and the conditional operator as capable of binding multiple variables, and
(iv) a provision for default existential generalization of free variables.

(i'), (iii'), and (iv') are, of course, just the standard assumptions from which (i), (iii), and (iv) departed.

For the sake of brevity, I will refer to Kamp and Heim’s proposal and variants thereof as ‘DRT analyses’, and to Evans’s, Cooper’s, and similar proposals as ‘E-Type analyses’. (‘DRT’ abbreviates ‘Discourse Representation Theory’; the term ‘E-Type’ is loosely borrowed from Evans.) Let me caution, however, against unintended interpretations of these labels, especially the first one. If the term ‘DR Theory’ suggests to you primarily the thesis that there is a level of representation (so-called Discourse Repre-
sentation Structure or DRS) which has certain formal properties, is derived by rules of a certain kind from syntactic surface structure, and is the input to modeltheoretic semantic interpretation, please suspend these associations here. Implementation in a framework that employs DRSs is neither necessary nor sufficient for an analysis to qualify as a ‘DRT analysis’ in the sense of this article. Besides the particular version of Kamp (1981), there are DRT analyses of indefinites and anaphora that are implemented in Montague Grammar (Heim 1979), in the Revised Extended Standard Theory (REST) plus a standard modeltheoretic semantics (Heim 1982, ch. 2), in REST plus context change semantics (Heim 1982, ch. 3), and many other existing or conceivable implementations. I lump them all together here insofar as they share the features (i)–(iv). ‘E-Type analyses’ likewise have been and could be implemented in a variety of different ways, even in a framework that employs DRSs. But again, I am not interested in these differences, but only in the assumptions (i')–(iv').

The purpose of this article is to reconsider the empirical and theoretical motivation for (i)–(iv). To see whether these innovations were really necessary, and if not, at what cost they could have been avoided, I will explore an alternative: stick to the more traditional assumptions (i')–(iv') and try to make an E-Type analysis work at least as well or better.

1. Sketch of the basic E-type analysis

The basic E-Type analysis that I want to take as a starting point could be implemented in numerous different ways. For concreteness, here is one possibility: Assume run-of-the-mill Logical Forms (LFs), scopally disambiguated by a rule like Quantifier Raising (QR). QR leaves a variable in the extraction site and an identical variable appears as subscript on the determiner of the moved NP. For intensional examples, assume each predicate to have extra argument slots for world and time. Pronouns are treated as follows: Use a set of n-place functor variables $f_1^n$, $f_2^n$, etc., for $n \geq 0$. These range over functions whose arguments are n-tuples in $(A \cup W \cup T)^n$ and whose values are individuals in A. (A, W, and T are the domain of individuals, set of worlds, and set of times, respectively.) These functions may be partial in that their domain need not be the set of all n-tuples of the appropriate type. Notice that, for $n = 0$, an n-place

---

1 The labels become less applicable with some of the more recent work, such as Berman (1987) and Kadmon (1987). While these are proposals based on the DRT analysis, they incorporate important features of competing analyses. I am not referring to these when I speak of shortcomings of ‘the DRT analysis’ in this paper. See also Note 9.
functor variable is just a plain individual variable, and we may write $x_i$ for $f^0_i$. The semantics of pronouns consists of one stipulation only: A pronoun is represented at LF as a term of the form $f^n(v_1, \ldots, v_n)$, where $n \geq 0$ and $v_1, \ldots, v_n$ are variables of the appropriate type (i.e., individual, world, or time variables). Interpretation is straightforward, with the proviso that free variables refer to contextually salient entities of the appropriate type.

This is not the occasion to examine the full range of examples where an E-Type analysis of pronouns applies successfully. I think (1)–(4) are a representative sample.

1. The man who gave his paycheck to his wife was wiser than the one who gave it to his mistress. ('paycheck sentence')
2. Most books contain a table of contents. In some, it is at the end. ('quantificational subordination')
3. John thinks that he will catch a fish, and he hopes I will grill it tonight. ('modal subordination')
4. Every man that owns a donkey beats it. ('donkey sentence')

The treatments for such examples that I have in mind are basically those proposed by Cooper (1979),\(^2\) except that I distinguish presupposition from content, a distinction he doesn't make explicitly (see below). Cooper's work predates more recent studies of modal and quantificational subordination by Roberts (1987; 1988), where detailed attention is given to the way in which the disambiguation of the pronoun depends on or affects the implicit restrictions on quantifiers and operators that take scope over it. (For example, some in (2) is read as "some of the books with a table of contents", and hopes in (3) is interpreted with respect to a modal base\(^3\) consisting of John's beliefs.) I think that the results of this recent work fit naturally into a refined E-Type approach, but I don't argue this here. Only example (4) lies within the scope of the present article, and this I will now use to highlight some general features of the E-type analysis.

To keep the presentation orderly, I first consider a variant of (4) that is simpler in a certain respect.

---

\(^2\) See also Partee (1978). Cooper and Partee use the term 'pronoun of laziness' rather than 'E-Type pronoun'.

\(^3\) In the sense of Kratzer (1981).
(5) Every man that owns exactly one donkey beats it.

The LF representation for (5) under the intended reading looks roughly as in (6).

(6)

Every and exactly one are assumed to receive their standard quantificational interpretations here, binding the respective $x$'s and $y$'s in their scopes. Since the scope of exactly one donkey is no wider than the relative clause, the it could not possibly have been represented as a bound variable $y$. Instead it is represented as composed of the free function variable $f$ applied to the bound individual variable $x$.

What (6) means depends on what $f$ refers to. We said above that free variables refer to contextually salient entities of the appropriate type. So $f$ refers to a contextually salient function from individuals to individuals. In the reading we have in mind, it is the following function $f$.

(7) $f: \{x: x$ is a man and owns exactly one donkey} $\rightarrow A

\begin{align*}
    f(x) & \mapsto \text{the unique donkey that } x \text{ owns}
\end{align*}

The top line indicates the domain and codomain of the function, the bottom line defines $f(x)$ for arbitrary $x$ in the domain.

We assume that this particular function $f$ will be salient at the time when the listener of (5) processes the pronoun it, for reasons having to do with her immediately preceding processing of the earlier part of the
sentence. In a nutshell, the listener has just been told to contemplate a set of men who each own exactly one donkey. Each man in this set is, per definition of the set, associated with a unique donkey he owns; in other words, the way this set has been defined draws immediate attention to the function which associates each of its elements with the unique donkey it owns. Therefore this function is a natural candidate for the reference of the upcoming pronoun.

Notice that the function \( f \) that has thus been made salient is not defined on the entire domain of individuals, or even on the smaller domains of all men or of all men owning donkeys. As far as the listener has been informed, at any rate, she has no reason to assume that the existence of a unique association between individuals and donkeys they own extends beyond a proper subset of the donkey-owning men. Since the function \( f \) is only partial, it follows that the formula \( x \text{ beats } f(x) \) does not have a well-defined truth value for every variable assignment \( g \) that has \( g(f) = f \). If \( g(x) \) is outside the domain of \( g(f) \), \( [x \text{ beats } f(x)]^g \) is undefined. But luckily, this will not prevent us from determining a determinate truth value for the utterance of (6) as a whole. Given the semantics of every, (6) has the following truth conditions. \( (g_{\lambda a} \) is the variable assignment that assigns \( a \) to \( x \) and is otherwise just like \( g \).

\[\begin{align*}
(8) \quad (6) \text{ is true if } [x \text{ beats } f(x)]^{g_{\lambda a}} = \text{True for all } a \text{ such that } \\
[\text{man}(x) \text{ that exactly one } y \text{ donkey}(y) \text{ [x owns y]}]^{g_{\lambda a}} = \text{True;} \\
(6) \text{ is false if } [x \text{ beats } f(x)]^{g_{\lambda a}} = \text{False for any } a \text{ such that } \\
[\text{man}(x) \text{ that exactly one } y \text{ donkey}(y) \text{ [x owns y]}]^{g_{\lambda a}} = \text{True.}
\end{align*}\]

The truth value of \( x \text{ beats } f(x) \) under assignments \( g' \) that don’t bear out (9)

\[\begin{align*}
(9) \quad [\text{man}(x) \text{ that exactly one } y \text{ donkey}(y) \text{ [x owns y]}]^{g'} = \text{True}
\end{align*}\]

never affects the truth value of (6), and therefore the fact that \( x \text{ beats } f(x) \) may receive no truth value at all under some such assignments is irrelevant. (What has been sketched in this paragraph ought to fall out from a general theory of presupposition projection.)

Things are a little more complicated with our original sentence (4):

\[\begin{align*}
(4) \quad \text{Every man that owns a donkey beats it.}
\end{align*}\]

The LF for (the intended reading of) (4) is identical with (6) up to the occurrence of \( a_y \) in the place of \( \text{exactly one}_y \). If there is to be any salient function for the variable \( f \) to refer to here, and if that function is supposed to have been made salient solely because the listener has understood the initial portion of the sentence, it is presumably once again the function \( f \)
defined in (7). But how does the listener know this time that such a function is well-defined for the entire domain for which it is needed to ensure a determinate truth value for the sentence, i.e., that it is well-defined for the whole extension of the \( N' \) man that owns a donkey? There might, after all, be men in this extension that own more than one donkey. If so, and if \( g(f) = f' \), there will be individuals \( a \) for which \( [x \text{ beats } f(x)]_{x=a} \) is undefined but which we cannot ignore when we assess the truth value of (4).

To avoid this possibility, so the story goes, the listener of (4) will have to accommodate an assumption that prevents it. There are basically three assumptions that could be accommodated that would serve this purpose: Either (i) assume that there aren't any men who own more than one donkey. Or (ii) assume that such men are not in the intended domain of the quantifier every on this particular utterance occasion. Or, finally, (iii) assume that the speaker had a somewhat different function \( f' \) in mind as the referent of \( f \) in (7) that first came to mind; for example, the function \( f' \) that assigns to each donkey-owning man the donkey he owns and has in his stable (as opposed to others that he owns, but keeps rented out to other people). Possibility (iii) will arise only if the context of utterance contains appropriate clues to suggest it. The other two possibilities are generally available. To use a couple of pieces of current terminology: (i) amounts to accommodating the presupposition that every man owns at most one donkey. When (ii) applies, the interpretation of the pronoun has indirectly affected the 'domain selection' for the quantifier every. In Heim (1983), I referred to (i) as 'global’ and to (ii) as ‘local accommodation’ of a presupposition.

The E-Type analysis implies that sentences like (4) cannot be interpreted unless one of these strategies of accommodation applies. This means, in other words, that the E-Type analysis is committed to the claim that pronominal anaphora always forces some kind of uniqueness presupposition: Presupposed is whatever it takes for the function \( g(f) \) to be well-defined at least over the domain that is relevant to determine a truth value for the utterance as a whole. It is this commitment to uniqueness presuppositions that Heim (1982) and other DR theorists perceive as the Achilles heel of the E-Type analysis. More about this below.

Excursion: Before I move on to the main concerns of this article, let me point out that the particular version of the E-Type analysis that I have chosen here is not subject to an objection that Kadmon (1987), crediting Landman (p.c.), raises against the version of Cooper (1979). For Cooper, the general shape of the LF-representation of a pronoun is \( \lambda P \exists x \forall y[R(x_1, \ldots, x_n, y) \leftrightarrow x = y] \land P(x) \), a Russellian definite descrip-
tion. Here the free variable whose reference is to be determined by contextual salience is \( R \), a relation variable. That \( g(R) \) is in effect not just a relation but moreover a function comes in as part of the truth conditions, not as a matter of presupposition. As Landman and Kadmon observed, this leads to intuitive inadequacies when the pronoun is embedded, and especially striking inadequacies when it is under negation or in the antecedent of a conditional. The point is familiar from the usual discussions about purely Russellian versus presuppositional analyses of definite descriptions: In compound sentences the existence and uniqueness condition associated with the definite article shows a different 'projection' behavior than entailments of the asserted content.

Kadmon’s complaint could have been answered even at the time of Cooper’s writing, simply by translating Cooper (1979) into the framework of Karttunen and Peters (1979). The version of the E-Type analysis that I sketched above is meant to fit into another general treatment of presupposition and presupposition projection, this one a treatment in terms of truth value gaps (and other denotation gaps). Details aside, what matters is that, somehow or other, the existence and uniqueness conditions assuring the well-definedness of an appropriate function be given the status of a presupposition, not that of a contribution to truthconditional content. We thereby avoid not only the inadequacies that Kadmon mentions, but also protect ourselves against a problem regarding sentences like (3) above: Contrary to what a literal application of Cooper’s proposal would predict, (3) does not imply intuitively that John hopes to catch a fish. (It is even compatible with his hoping that he won’t catch one, perhaps because he thinks that we will then eat steak, which he prefers to seafood in any form, even grilled.) Let me just assert here without argument that this problem can be avoided by exploiting the fact that E-Type pronouns induce presuppositions. – End of excursion.

2. Avoiding unwelcome uniqueness presuppositions in conditionals

As Kratzer (1978, p. 260) and Kadmon (1987) observe, a ‘bare’ conditional (one which contains no overt operator for the if-clause to restrict) can be understood either as involving a covert necessity operator (generally epistemic), or as involving a covert adverb of quantification (QAdv) roughly equivalent to generally or always. Kadmon introduces the terms

---

4 Kadmon (1987, p. 265), her example (187).
5 See also Heim (1982, p. 84) for a presuppositional reinterpretation of Cooper’s analysis.
'one-case' and 'multi-case' conditional for these two readings. She proceeds to argue that, as long as one sticks to one-case conditionals, there aren't really any problems for E-Type analyses and the uniqueness presuppositions they are committed to. For example, an E-Type analysis for the pronoun in the one-case conditional (10) is unobjectionable.

(10) If (it is true that) a man walked in, then (it must be true that) he is still in here.

The E-Type analysis under consideration here would make this true, roughly, if for all (epistemically accessible) worlds $w$ such that some man walked in in $w$, the unique man that walked in in $w$ is still in here in $w$. If there are any epistemically accessible worlds in which multiple men walked in, then these must be ignored for the purposes of interpreting this sentence. As Kadmon puts it, (9) “is about the possibility that exactly one man walked in” (1987, p. 228). To the extent that we are persuaded by her, then, one-case conditionals are no obstacle to our defense of the E-Type analysis.

How about multi-case conditionals, though? These are the kind that seem to raise the biggest headaches for E-Type analysts. In Heim (1982), I presented (11) as a particularly blatant counterexample for Evans.

(11) If a man is in Athens, he is not in Rhodes.

There I considered treating the conditional as material implication, as universal quantification over times, and as conditional necessity. Depending on which of these treatments was chosen, more or less relativized uniqueness implications came out. But even in the weakest case, (11) still was predicted to presuppose that at any time in any given world, there is exactly one man in Athens. Since this is clearly counterintuitive, I concluded that the E-Type approach had to be abandoned.

This conclusion rests on a premise that may be questioned (and already had been questioned at the time of my writing), namely that conditionals like that in (11) involve quantification over worlds and/or times. If they do, then an E-Type analysis indeed produces impalatably strong uniqueness presuppositions. But perhaps the implicit universal quantification in (11) ranges over something different, say 'situations' or 'cases'. Then an E-Type analysis applied to (11) would predict something like the following meaning: 'In every case (situation) where there is a man in Athens, the unique man that is in Athens in that case (situation) is not in Rhodes'. This presupposes that, for each case (situation) where there is a man in Athens, there is a unique man in Athens. We still have a uniqueness presupposition here, but it is no longer an intuitively objectionable one.
All it takes for it to be true is that each man in Athens constitute a separate case (situation) of a man being in Athens.

My response to this alternative in Heim (1982) went roughly as follows: Granted that Evens can accommodate examples like (11) if conditionals quantify over 'cases'. But what are 'cases'? There is one place in the literature where the notion is explicated more precisely, and that is Lewis (1975). For Lewis, a 'case' is just an n-tuple of individuals. For instance, the 'cases' quantified over in (11) are all the 1-tuples consisting of a man in Athens, and the 'cases' quantified over in (12) are all the pairs of a farmer and a donkey he owns.

\[ (12) \quad \text{If a farmer owns a donkey, he beats it.} \]

However, if it is just these n-tuples of individuals that we are quantifying over in these conditionals, then the pronouns can be treated as ordinary bound variable pronouns – no need then for an E-Type analysis. This, of course, was Lewis's conclusion and the starting point for the DRT analysis that I then proceeded to develop. I didn't give separate consideration to the possibility of quantifying over 'situations' rather than 'cases'. The notion of a 'situation' didn't seem any clearer inherently than that of a 'case' and, for all I knew, would probably come to the same thing when made precise.

More recently, the idea that multi-case conditionals quantify over situations has been revived in the context of an explication of the notion of 'situation' which is, at least on the face of it, quite different from Lewis's notion of a 'case'. Berman (1987) relies on a version of situation semantics developed by Kratzer (1986). There a situation is a part of a world. Let us take a closer look at Berman's analysis of multi-case conditionals and what it implies for the tenability of an E-Type analysis and the concomitant uniqueness presuppositions. (I am not trying to be faithful to Berman's paper here; his purposes are somewhat different from mine, and I borrow from him eclectically.)

Berman's basic idea is that a sentence like (13)

\[ (13) \quad \text{If a man is from Athens, he (always) likes ouzo.} \]

- where the QAdv always may or may not be overt - has the following truth conditions: For every minimal situation s in which there is a man who is from Athens, there is an extended situation s' such that the unique man from Athens in s likes ouzo in s'. We can implement this basic idea in the following way: Suppose QAdv's (including the silent variant of always that we find in bare multi-case conditionals) enter into LFs of the form \([QAdv_{s1} \text{if } S]_{s2} S\). s1, s2, ... are variables ranging over situations.
We assume that each predicate has an additional argument place for a situation; e.g., \textit{man}(s) has as its extension the set of men that are part of the situation \( s \). All the predicates in the \textit{if}-clause restricting the QAdv are relativized to \( s_1 \), whereas those inside the nuclear scope (= matrix clause) are relativized to \( s_2 \). For example, sentence (13) would have an LF representation as in (14), putting off momentarily the representation of the pronoun.

\[(14) \text{always}_s \text{if } \left[ [a_x \text{man}(s_1)(x)] [x \text{is-from-Athens}(s_1)] \right] s_2 [\text{he likes-ouzo}(s_2)] \]

The semantics for the QAdv is as follows:

\[(15) [[\text{always}_s \text{if } \alpha]]_{s_2 \beta} = \text{True} \text{ iff } \min \{s_1: [[\alpha]]_{g s_1^1 s_1} = \text{True} \} \subseteq \{s_1: \exists s_2: s_1 \preceq s_2 \& [[\beta]]_{g s_1^1 s_1, s_2^2 s_2} = \text{True}\} \]

Here \( s_1, s_2 \) are situations, \( \preceq \) is the part-of relation between situations, and \( \min S \) (were \( S \) is a set of situations) is the set of minimal elements in \( S \). 'Minimal' is defined in terms of \( \preceq \): \( \min S = \{s \in S: \neg \exists s' \in S [s' \prec s \& s' \neq s]\} \).

The LF for the intended reading of (13) is (16).

\[(16) \text{always}_s \text{if } \left[ [a \text{man}(s_1)(x)] [x \text{is-from-Athens}(s_1)] \right] s_2 \text{if}(s_1) \text{likes-ouzo}(s_2) \]

In the intended reading, \( f \) refers to a partial function from situations to men, namely that function which to each situation in its domain assigns the unique man who is from Athens in that situation. Its domain includes only those situations for which such a man exists uniquely; for any others it is undefined. (16) thereby receives adequate truthconditions, even though a \textit{man} is treated as an ordinary existential quantifier. Notice that a \textit{minimal} situation in the set (17) will always contain exactly one man.

\[(17) \{s_1: [[[a_x \text{man}(s_1)(x)] [x \text{is-from-Athens}(s_1)]]]_{g s_1^1 s_1} = \text{True}\} \]

For even though there may be situations in (17) which contain more than one man from Athens, they will fail to be minimal: they have subsituations involving only one man that are also in (17). The sentence says that every such minimal situation is also in the set (18).

\[(18) \{s_1: \exists s_2: s_1 \preceq s_2 \& [[[f](s_1) \text{likes-ouzo}(s_2)]]_{g s_1^1 s_1, s_2^2 s_2} = \text{True}\} \]

Given the restricted domain of \( g(f) \), this set is not well-defined as a subset of the whole universe of situations. It is, however, well-defined if we restrict our attention to the minimal situations in (17), and therefore the truth value of the whole sentence is determinate.
Notice that there is no problem if additional men from Athens are mentioned in the consequent, as in (19).

(19) If a man is from Athens, he (always) knows another man from Athens.

The LF-portion corresponding to the consequent here is something like (20).

(20) \[s_2[a_v [\text{man-from-Athens}(s_2)(y) \& y \neq f_1(s_1)]
\[f_1(s_1) \text{ knows}(s_2)y]].\]

The trick is that \(s_2\) is allowed to properly include \(s_1\) and thereby to contain additional men beyond the unique man of \(s_1\). In this manner, we can also treat sage-plant examples like (21).

(21) If someone buys a sage plant here, she (always) buys eight others along with it.

Again, the trick is that, while minimal situations of a person buying a sage plant will only involve a single sage plant each, the truth of the sentence requires merely that each such minimal situation \(s\) be part of a bigger situation \(s'\) such that \(s'\) includes additional sage plants aside from the unique sage plant of \(s\).

Letting QAdverbs quantify over minimal situations has made it possible to maintain an analysis of pronouns that is committed to uniqueness presuppositions, because it ensures that these uniqueness conditions will come out weak enough to be harmless. So weak, in fact, that it is hard to see how one could possibly come up with counterexamples. Yet there is one type of example\(^6\) which seriously challenges the empirical correctness of even these seemingly innocuous uniqueness conditions. Consider the first sentence in (22).

(22) If a man shares an apartment with another man, he shares the housework with him. (Whereas if a man shares an apartment with a woman, he expects her to do everything.)

This is a multi-case conditional, and \textit{he} and \textit{him} are donkey-pronouns, which our present analysis will represent at LF as \(f^1(s)\) and \(f^2(s)\) respectively, where \(s\) ranges over minimal situations in which a man shares an apartment with another man. But what functions are \(f^1\) and \(f^2\) supposed

\(^6\) (23) is attributed to Hans Kamp, who seems to have pointed out examples of this kind and their theoretical significance on many occasions. (22) is inspired by an example that Jan van Eijck brought up at the workshop in Stuttgart.
to refer to? \( f^1 \) cannot be the function which to each \( s \) assigns the unique man in \( s \) who in \( s \) shares an apartment with another man, since there is no such function: for each situation \( s \) (in the domain of the implicit universal QAdv), there are two men with this property. Yet no other function seems to have been made salient. Contrary to what we predict, (22) is acceptable and has clear truthconditions – in fact, just the truthconditions that it receives unproblematically under the DRT-analysis. Let me dub this the “problem of indistinguishable participants”. It is actually more widespread than our choice of example (22) reveals. Consider (23).

(23) If a bishop meets another man he blesses him.

Let he and him again be represented as \( f^1(s) \) and \( f^2(s) \) respectively. Here \( f^1(s) \) ought to be the unique bishop in \( s \), and \( f^2(s) \) the unique man that meets a bishop in \( s \). For most situations in the domain specified by the if-clause, these functions are well-defined – but not for all. Situations where one bishop meets another bishop contain no unique bishop and no unique man meeting a bishop. Yet such situations are intuitively covered by the generalization that (23) expresses: we clearly understand (23) to imply that when two bishops meet they will bless each other. Such examples present a serious challenge to the enterprise I am engaged in here. I will return to them below.

So far all our examples contained overt or covert universal QAdverbs, but the analysis generalizes easily to those of other quantificational forces, for instance:

(24) \[ \text{[[more-often-than-not}_{s_1} \text{ if } a]_{s_2} \beta]]^s = \text{True} \iff \min\{s_1: \alpha_{s_1} \beta_{s_1} = \text{True}\} \cap \{s_1: \exists s_2: s_1 \leq s_2 \land [\beta_{s_1} \beta_{s_2} = \text{True}]\} > \frac{1}{2} \min\{s_1: \alpha_{s_1} \beta_{s_2} = \text{True}\}\]

Let’s apply this to example (25).

(25) If a woman lives with a cat, more often than not she talks to it.

Leaving open for the moment how we represent the pronouns, the LF will look as in (26).

(26) more-often-than-not\(_{s_1}\)
\( a_{s_1} \) woman\( (s_1)(x) \) \( a_{s_1} \) cat\( (s_1)(y) \) \( x \) lives-with\( (s_1)y \) \( s_2 \) she talks-to\( (s_2) it \)

While the set of \( s_1 \) satisfying \( [a_{s_1} \text{ woman}(s_1)(x)] [a_{s_1} \text{ cat}(s_1)(y)] [x \text{ lives-with}(s_1)y] \) as a whole may contain many situations where there are multiple women living with cats and/or multiple cats that the same woman
lives with, this will never be the case with any of the minimal situations in this set. All the minimal situations will contain exactly one woman and exactly one cat, quite regardless of how many women living with cats there are and of whether the relation between the women and the cats they live with is a function or a mere relation. It is therefore unproblematic to represent she and it as $f_1(s_1)$ and $f_2(s_1)$ respectively, with $f_1$ referring to the function that maps each $s$ to the unique woman living with a cat in $s$, and $f_2$ referring to the function that maps each $s$ to the unique cat that a woman lives with in $s$. The resulting truth conditions require the talk-to relation to hold in a majority of the woman-cat-pairs that stand in the live-with relation. This is Kadmon’s ‘symmetric reading’. (Notice that even though we have other choices in disambiguating the pronouns, including the choice of using for it a two-place function that maps pairs $(s, x)$ of a situation and a woman to the cat that $x$ lives with in $s$, this doesn’t really lead to any new readings.)

A sceptical question arises at this point: Is this analysis really different from the DRT analysis? In particular, does the notion of a ‘situation’ that it employs differ substantively from Lewis’s explication of a ‘case’ as an $n$-tuple of individuals? The similarities are certainly striking: By restricting the QAdverb’s range to situations that are minimal, we have made sure that there are always just as many situations in this range as there are $n$-tuples of the relevant sort. And the existential quantification over extended situations that we built into the interpretation of the consequent (= the QAdv’s nuclear scope) is reminiscent of the stipulation in the DRT analysis that existential closure applies to indefinites in this domain. So our situation-based E-Type analysis of multi-case conditionals, as developed so far, might well be equivalent in its coverage and predictions to the DRT analysis it replaces. Subtle differences might emerge when we spell it out, but none are apparent at this level of sketchiness.

3. The problem of asymmetric readings in conditionals

The situation-based analysis of multi-case conditionals that I have sketched so far mimics the DRT-analysis remarkably well in its predictions. So well, in fact, that it runs into the same problems. In particular, it runs into the proportion problem.7 This problem arises most strikingly in donkey sentences of the relative clause variety (which we are putting off until

---

7 Rooth (1987) discusses this as the problem of ‘farmer-donkey asymmetries’. Approaches to the problem are also found in Root (1986), Bäuerle and Egli (1985), Kadmon (1987), and others. Kadmon dubbed it the ‘proportion problem’.
Section 4 below), but it also shows up with multi-case conditionals, as extensively argued by Kadmon.

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

Under its most salient (perhaps even its only?) reading, (27) says that the majority of donkey-owners among the farmers are rich. (I treat usually here as meaning the same as more often than not, abstracting away from any modal flavor in its meaning.) Intuitively, (27) is falsified by the following scenario: There are a total of 100 farmers, 99 of whom own exactly one donkey each and are poor, whereas the 100th farmer owns 200 donkeys and is rich. Unfortunately our current situation-based analysis predicts only a reading which is true in this situation. In this respect, it is exactly like the DRT-analysis, which has been justly criticized for this reason.

To see why the problem arises, look at the truthconditions our analysis assigns to (27): A majority of the minimal situations s in which a farmer owns a donkey are contained in situations s' in which the unique farmer in s is rich. Minimal situations in which a farmer owns a donkey presumably include only one farmer-donkey pair each. A situation with, say, a farmer and two donkeys he owns does constitute a situation in which a farmer owns a donkey; but it isn't a minimal such situation, since it has two proper subsituations each of which is also a situation in which a farmer owns a donkey. Therefore there are exactly as many minimal situations in which a farmer owns a donkey as there are pairs of a farmer and a donkey he owns. In the scenario we chose above, there are 299 such pairs and hence 299 such minimal situations. Of these 299 minimal situations, 200 contain a rich farmer and only 99 a poor one. Hence (27) ought to be true, contrary to intuitive judgment.

How might we go about solving this problem within our situation-based analysis of multi-case conditionals? I know of two proposed solutions, one by Berman (1987), the other by Kadmon (1987).

According to Berman, we should not blame the trouble with (27) on the semantic analysis we have presented so far; it's our simple-minded assumptions about pragmatics that were at fault: We took it for granted that the QAdverb in (27) ranges over an essentially unrestricted set of situations. But quantification in natural language is generally a context-dependent affair, and we should expect this to apply to quantification over situations just as much as it applies to quantification over other kinds of individuals. Suppose (27) is uttered in a context where we take into consideration only a subset of the actually existing situations in which a farmer owns a donkey. For example, suppose we leave out of consider-
ation any situations which contain a farmer together with some but not all of his donkeys. In other words, we view the donkey-supply of each farmer as an unstructured and indivisible lump and acknowledge only situations that include or exclude it as a whole. Within such a limited range of situations, a situation in which a rich farmer owns 200 donkeys will count as a minimal situation of a farmer owning a donkey. Even though objectively it is composed of smaller situations of this type, those smaller situations will not prevent it from being minimal if our contextually restricted universe excludes them. But then there are only 100 minimal situations which verify the antecedent of (27), and 99 of them involve poor farmers, so that (27) is correctly predicted false.

In effect, Berman suggests that sentences like (27) are, as sentences, very vague. Their truth conditions depend heavily on how the domain of situations is delimited on each occasion of utterance. We may be considering a fine-grained domain which contains a separate situation for each donkey owned, or else we may be considering a coarse-grained domain where the borderlines of situations never cut between animals of the same owner. Interpreted relative to the fine-grained domain, (27) will be true in the scenario we have described, and interpreted relative to the coarse-grained one it will be false.

Berman's proposal thus implies that (27) can be read as counting farmers (and hence as false in our scenario), but could also be read as counting farmer-donkey pairs (hence true in the same scenario) if only the context of utterance were appropriate. Intuitively, the latter option seems at first unavailable for this sentence. This could be a problem for Berman's approach unless we can supplement it with a suitable story about the contextual factors and pragmatic mechanisms that influence the delimitation of the relevant domain of situations. While neither Berman nor anyone else I know of has spelled out such a story so far, there are some helpful observations and suggestions in Bäuerle and Egli (1985) and in Kadmon (1987).

Bäuerle and Egli offer the following empirical generalization: What the QAdv quantifies over depends on which of the indefinites in the antecedent are picked up by anaphoric elements in the consequent. For example, usually in (27) quantifies over donkey-owning farmers because there is a he linked to a farmer in the consequent, but no it that picks up a donkey. (27) thus contrasts with (28) and (29).

(28) If a farmer owns a donkey, he usually deducts it from his taxes.
(29) If a drummer lives in an apartment complex, it is usually half empty.
According to Bäuerle and Egli, *usually* quantifies over farmer-donkey pairs in (28) and over apartment complexes inhabited by drummers in (29), since both indefinites are picked up anaphorically in (28) and only *an apartment complex* is picked up in (29). This means that these sentences have the following truthconditions: (28) is true iff a majority of the farmer-donkey pairs where the farmer owns the donkey are such that the farmer deducts the donkey from his taxes. For example, if the rich farmer in our scenario above deducts all his 200 donkeys from his taxes while none of the 99 poor farmers deduct theirs, (28) is true. (29) is true iff a majority of the complexes where a drummer lives are half empty. For example, (29) is true if there are 99 half-empty complexes with just one drummer each and one full complex with 200 drummers.

As Kadmon points out, the empirical accuracy of Bäuerle and Egli's generalization is questionable. There are other factors besides the number of anaphoric links involved in determining the truthconditions of such sentences. For instance, topic-focus structure, as marked by sentence stress, seems to play a role too. Compare the following two usages of (29). (Capitalization represents stress.)

(30) Do you think there are vacancies in this apartment complex?  
Well, I heard that Fulano lives there, and if a DRUMMER lives in an apartment complex, it is usually half empty.

(31) Drummers mostly live in crowded dormitories. But if a drummer lives in an APARTMENT COMPLEX, it is usually half empty.

(30) favors the reading that Bäuerle and Egli predict. But (31) is quite easily read as a claim about statistical tendencies regarding drummers, and as such would be falsified by the fact that 200 out of 299 apartment-dwelling drummers live in a fully occupied complex, quite regardless of how many different complexes they are spread over. Even our original example (27) can be read in such a way that the scenario we imagined would verify it:

(32) Donkeys that belong to peddlers generally are in miserable shape, whereas those that belong to farmers mostly have a comfortable life. The reason is that, if a FARMER owns a

---

8 Things are a little more complicated insofar as Bäuerle and Egli also take into account readings where the adverb is interpreted in a temporal sense and thus binds (possibly among other variables) a time variable. I am restricting myself to atemporal readings.
donkey he is usually rich (and uses tractors and other modern equipment for the hard work on his farm).

The reader is referred to Kadmon (1987) for further examples and discussion. Kadmon’s generalization is that a multi-case conditional with two indefinites in the antecedent generally allows three interpretations: one where the QAdv quantifies over pairs, one where it quantifies over instances of the first indefinite, and one where it quantifies over instances of the second.

Returning to Berman’s proposal now, his approach is consistent with Kadmon’s basic generalization that multi-case conditionals are generally neutral among a variety of interpretations. It remains to be seen whether it also lends itself as a basis for attempts to explain why one reading is preferred over others in many examples. Let me speculate very briefly on one aspect of this question, namely what connection there might be between the presence of anaphoric pronouns in the consequent and the way we are inclined to individuate situations in the interpretation of the antecedent.

When a pronoun appears in the consequent, it is interpretable under the E-Type analysis only if there is a salient function that yields a unique value for each of the situations in the domain the QAdv quantifies over. Sometimes, whether such a function is readily available depends on how finely situations are being individuated. Consider, for instance, the pronoun *it* in (28). To interpret it, we need a function that picks out a unique donkey for each minimal contextually relevant situation in which a farmer owns a donkey. If we individuate situations so coarsely that multiple donkeys owned by the same farmer are lumped together, then we cannot find such a function, because some situations contain multiple (equally salient) donkeys. How do we help ourselves then? One option is to accommodate the assumption that there are no farmers with more than one donkey in our universe of discourse. (In other words, we accommodate a uniqueness presupposition.) Another option is to expand our domain of situations by individuating them more finely, finely enough, that is, for each farmer-donkey pair to constitute its own situation. This will ensure that the minimal situations verifying the antecedent each have a unique donkey in them, and once again we have a function available to interpret the pronoun.

The latter option illustrates how the presence of the pronoun may exert indirect pressure on us to read the sentence as counting farmer-donkey-pairs rather than farmers. This reasoning, if correct, explains one half of Bäuerle and Egli’s generalization: If $n$ of the indefinites in the antecedent...
are picked up anaphorically in the consequent, the QAdv quantifies over k-tuples where \( k \geq n \). We do not predict, however, that \( k \leq n \), i.e., that we couldn’t quantify over k-tuples for \( k > n \) even though there are only \( n \) anaphoric links. To get this as well, we might appeal to some kind of least-effort principle: always go for the most coarsely individuated domain of situations that you can get away with.

All this must remain very tentative, however. Since we have learned from Kadmon’s discussion that Bäuerle and Egli’s generalization doesn’t hold without exception, we don’t want to be too successful in predicting it. Berman’s essentially pragmatic approach might be just flexible enough to predict a mere tendency which could be overridden by other factors. However, I don’t have a clue at this point how the role of these other factors should be viewed from his perspective. For instance, why should topic-focus structure have any effect on the way we tend to individuate situations?

Let us now turn to an alternative to Berman’s suggestion, due to Kadmon (1987). (As with Berman’s ideas, I take the liberty of misrepresenting Kadmon’s to suit my purposes.9) As we just saw, Kadmon also takes the empirical fact to be that a sentence like (27) is preferably interpreted as quantifying over donkey-owning farmers and has a secondary interpretation where it quantifies over farmer-donkey pairs. But while Berman sees this as a matter of vagueness, Kadmon thinks it is a genuine ambiguity, in fact a structural ambiguity on the level of LF (for her: DRS). Transposed into the present version of the situation-based analysis of multi-case conditionals, we could mimic her proposal as follows.

In the only reading our original situation-based analysis of multi-case conditionals could predict for (27), the adverb \textit{usually} quantifies over the minimal elements of the following set of situations (see above):

\[
\{ s : \exists x \exists y [ x \text{ is a farmer in } s \land y \text{ is a donkey in } s \land x \text{ owns } y \text{ in } s ] \}
\]

This, of course, yields the reading where we are, in effect, counting farmer-donkey pairs, hence not the intuitively salient reading. Suppose

9 Neither Berman nor Kadmon contemplates a return to the existential analysis of indefinites and an E-Type analysis of donkey-pronouns; this is my agenda, not theirs. However, what they propose is similar enough to be faced with analogous problems, and therefore I can borrow suggestions for solutions from them. To forestall misunderstandings, I want to make it quite clear that the analyses that are actually endorsed in Berman (1987) and Kadmon (1987) are not themselves under scrutiny in this article. (As I cautioned in note 1, these proposals are not meant when I speak of ‘the DRT analysis.’) I don’t discuss Berman’s proposal at all, and I refer to Kadmon’s proposal only in the last paragraph of Section 5.
now (27) has an alternative analysis under which usually quantifies over the minimal elements of a slightly different set:

(34) \{s: \exists x[x \text{ is a farmer in } s \& \\
\exists s'[s \leq s' \& \exists y[y \text{ is a donkey in } s' \& x \text{ owns } y \text{ in } s']]\}\}

(34) is the set of those situations that contain a farmer and are extendable to situations that contain a donkey which that farmer owns. Of course, all the situations in (33) are also in (34), but (34) additionally contains some situations that are ‘too small’ to be in (33). Situations in (33) must include a donkey, but those in (34) need not; they only need to be parts of situations which do.

Consider now the minimal elements of each of these sets. Those of (33) correspond essentially to pairs of a single farmer and a single donkey he owns. In the scenario we have been using to illustrate the proportion problem, there will be 299 different minimal elements in the set (33). The minimal situations in (34), on the other hand, correspond to (single) donkey-owning farmers; there will be one such minimal element of (34) for each such farmer, 100 different ones in all in our scenario.

Kadmon proposes that the antecedent clause of (27) is three ways ambiguous. It can pick out the set (33), the set (34) or, as a third possibility, the set (35).

(35) \{s: \exists y[y \text{ is a donkey in } s \& \\
\exists s'[s \leq s' \& \exists x[x \text{ is a farmer in } s' \& x \text{ owns } y \text{ in } s']]\}\}

These three sets yield three different interpretations for (27) as a whole. All three interpretations are of the form (36):

(36) Most minimal \(s\) in ... are extendable to \(s'\) such that the unique farmer in \(s\) is rich in \(s'\).

Depending on whether “...” is (33), (34), or (35), we get truth conditions which require a majority of farmer-donkey pairs, a majority of donkey-owning farmers, or a majority of farmer-owned donkeys. The second option, \(\ldots = (34)\), gives the intuitively salient reading of (27) and thereby the solution to the proportion problem.

What remains to be done to complete this version of Kadmon’s proposal is to specify how the three interpretations (33)–(35) are associated systematically with a single syntactic surface structure. Kadmon herself proposes a modification to Kamp’s DRS construction algorithm, to the effect that an indefinite NP optionally introduces a subordinate box. The corresponding semantic rule introduces an existential quantifier which binds this in-
definite. We can do something analogous: stipulate that at LF, an S node is optionally prefixed by a subscripted situation variable, and interpret the resulting structures as follows.

\[(37) \quad [s \varphi]^s = \text{True iff } \exists s'[g(s) \equiv s \& [\varphi]^{s[s']} = \text{True}].\]

For example, two LFs for (27) would be (38) and (39).

\[(38) \quad \text{usually}_{s_1} \text{if } [[a_x \text{ farmer}(s_1)(x)][[a_y \text{ donkey}(s_1)(y)][x \text{ owns}(s_1)y]]\]
\[s_2[f'((s_1) \text{ is-rich}(s_2)),\]

\[(39) \quad \text{usually}_{s_1} \text{if } [[a_x \text{ farmer}(s_1)(x)][[a_y \text{ donkey}(s_1)(y)][x \text{ owns}(s_1)y]]\]
\[s_2[f'((s_1) \text{ is-rich}(s_2)),\]

(38) receives the interpretation corresponding to (33), and (39) the one corresponding to (34). (38) is true in our scenario, and (39) is false. Kadmon calls (38) a 'symmetric' and (39) an 'asymmetric' construal of (27).

Kadmon is in the same position as Berman insofar as she predicts multiple interpretations for conditionals with several indefinites and needs to rely on a supplementary account of the reasons why specific examples often have a preferred reading. The rationale that I gave above in connection with Berman's proposal for why the presence or absence of anaphoric pronouns in the consequent should have the disambiguating effect observed by Bäuerle and Egli applies equally well here: If we choose to disambiguate the antecedent of (28) as in (39) rather than as in (38), we may not be able to interpret the pronoun \textit{it}, because there may then not be a unique donkey per minimal situation that verifies the antecedent. We can arrive at an interpretation anyway if we accommodate a uniqueness assumption, i.e., that no farmer in the universe of discourse owns more than one donkey. (As Kadmon puts it, asymmetric readings in sentences where all indefinites are picked up anaphorically in the consequent have uniqueness presuppositions – see Kadmon (1987) for more discussion of the data.) Alternatively, if we don't want to accommodate a uniqueness presupposition, we have to reinterpret the sentence by choosing the symmetric construal in (38) instead. So the need to interpret a pronoun may exert indirect pressure to choose a symmetric reading, in conformity with one half of Bäuerle and Egli's generalization.

Why the absence of the pronoun in (27) should lead us to favor (39) over (38) is harder to see.\(^{10}\) Asymmetric construals appear to be the unmarked case; unless under pressure to do otherwise, we prefix the

\(^{10}\) Thanks to Nirit Kadmon and an anonymous reviewer for pointing out a mistake in the draft version of this paragraph.
situation subscript to the scope of every indefinite. The disambiguating role of focus also remains to be accounted for. Very roughly, destressed indefinites tend to take scope outside the domain of a subscripted situation-variable, stressed ones inside. Further speculation about the nature of this correlation would have to presuppose some theory of focus.

There are further differences between Berman's and Kadmon's proposals that would be interesting to explore. One prediction that Kadmon makes, but Berman doesn't, is that the availability of different asymmetric readings should correlate with that of different scope-orders for multiple quantified NPs. For example, it is generally easier to give the subject scope over the object than vice versa. It should therefore also be easier to get interpretation (34) for the antecedent of (27) than interpretation (35), since (35) can be obtained only if a donkey takes wider scope than a farmer. I refer the reader to Kadmon (1987) for examples and discussion bearing on this and related points. For our purposes here it is not so important to choose between a pragmatic approach along the lines of Berman and a more syntactic one in the spirit of Kadmon. We primarily want to know whether there is any credible way at all of handling the proportion problem within the situation-based semantics of multi-case conditionals that our E-Type analysis seemed to necessitate.

Kadmon's device of representing asymmetric readings by means of subordinate domains of existential quantification may also seem promising for the problem of indistinguishable participants that we observed with (22) and (23) in Section 1. Exploiting this new option, we can choose the following LF representation for (22):

\[
\text{(40) } \text{always}_{s_1} \left( \begin{array}{l}
\text{if } [(a_x \text{man}(s_1)(x)] \text{sl} [[a_y \text{man}(s_1)(y) \& y \neq x)] [x \text{shares-an-apt-with}(s_1)y]] \\
\text{s}_2[f^1(s_1) \text{helps}(s_2)f^2(s_1)].
\end{array} \right)
\]

It is now possible to find two functions for the interpretation of \( f^1 \) and \( f^2 \) respectively:

\[
\text{(41) } g(f^1): \{s: s \text{ is a minimal situation} \begin{array}{l}
\text{which contains a man } x \text{ and} \\
\text{is contained in a larger} \rightarrow A \\
\text{situation where } x \text{ lives with} \\
\text{another man} \\
\text{s} \rightarrow \text{the unique man in } s
\end{array} \}
\]

\[
\text{(41) } g(f^2): \{s: \text{the same domain as } g(f^1) \begin{array}{l}
\text{same domain as } g(f^1) \\
\rightarrow A \\
\text{s} \rightarrow \text{the unique man that the} \\
\text{unique man in } s \text{ lives with}
\end{array} \}
\]
This gives us a coherent interpretation, but I am not confident that it is right. If it were, there should be independent confirmation that such sentences require an asymmetric construal. In particular, there should be uniqueness effects and, with quantifiers like *usually*, truth-conditional effects. (22) for instance should presuppose that every man (within the relevant range) has at most one male roommate. I doubt that it does. Other examples reinforce my suspicions.

(42) If a man has the same name as another man, he usually avoids addressing him by name.

(42) also doesn't presuppose that each man has at most one namesake. Does it have asymmetrical truthconditions? I am unsure about the relevant judgments. Suppose, for instance, there are 100 Johns, all of whom avoid addressing all others by name. Moreover there are 200 men with names other than 'John', each of whom shares his name with exactly one other man, and none of whom mind addressing each other by name. If (42) could only be construed asymmetrically, it should be false here: only the Johns satisfy the consequent, and they are a minority. On a symmetrical construal (as predicted possible by the DRT analysis), on the other hand, (42) should be true: all 9,900 ordered pairs of Johns satisfy the consequent, and only the 200 pairs of identically named non-Johns falsify it. Perhaps someone else will come up with pertinent examples where judgments are sharper. For the time being, I conclude that indistinguishable participants remain problematic for our E-Type analysis.

Apart from indistinguishable participants, what I hope to have shown in this section can be summed up as follows: There is at least one credible way, and perhaps even two, of elaborating a theory based on assumptions (i')–(iv') so that it will handle multi-case conditionals in their asymmetric as well as their symmetric readings, yet without lapsing back into unwelcome uniqueness presuppositions.

4. Problems in examples with relative clauses

So far we have looked only at conditional donkey sentences, not at those involving relative clauses. At first sight, the relative clause examples give particularly strong evidence in favor of a traditional analysis with existential indefinites and E-type pronouns, and against the DRT analysis. This is because they clearly have unambiguously asymmetric readings and hence pose the proportion problem in a particularly blatant way. A sentence like (43) unambiguously counts donkey-owning farmers rather than farmer-donkey pairs and is definitely false in our scenario above with the one rich and 99 poor farmers.
(43) Most farmers who own a donkey are rich.

More subtle judgments also indicate that the symmetric interpretation provided by the DRT analysis is on the wrong track here. Rooth (1987) notes that (4) and (44) are not judged fully equivalent, which the DRT analysis predicts them to be.

(4) Every man that owns a donkey beats it.

(44) Every donkey that is owned by a man is beaten by him.

Presented with a situation where one man owns ten donkeys and beats nine of them while every other man beats every donkey he owns, informants often hesitate to judge (4) false, but they have no such qualms with (44).

A traditional analysis, of course, has no problem at all with (43). The indefinite is an existential quantifier with scope inside the relative clause, and there is just no way to get anything but the correct ‘asymmetric’ truthconditions in the first place. Since there is no pronoun, the donkey-problem doesn’t arise here. (4) and (44) are a little more challenging, but combined with an E-Type analysis of the pronoun, an existential analysis of the indefinite predicts the judgment that Rooth observed: Assuming that each donkey has a unique owner, (44) comes out false. (4), by contrast, is truthvalueless, since the only salient function available for the interpretation of *it* is the function that maps a man to the unique donkey he owns, but the domain of this function is only a proper subset of the range of *every*.

So far so good. As is well known, however, the E-Type analysis for relative clause examples has been attacked as well. First, it fails to predict that people confidently judge (4) true in a situation where some men own several donkeys and every man beats all of his donkeys. Notice that this judgment is not fully explained as the result of accommodating a restriction to men with a unique donkey. If the ‘true’-judgment for (4) in this situation were simply a consequence of *ignoring* the men with several donkeys, it should not depend at all on how these men treat their donkeys. In other words, it should have the same status as the judgment that (4) is true when the owners of unique donkeys beat them but the owners of multiple donkeys treat them well. Yet the former judgment is considerably more confident than the latter, a difference that shouldn’t exist under the E-Type analysis. – Second, the E-Type analysis precludes sage-plant examples like (45) or (46) from being true under any circumstances.

(45) Every woman who bought a sage plant here bought eight others along with it.
Most people who owned a slave owned his children and grandchildren too.

In Heim (1982) I found these defects severe enough to justify throwing out the E-Type analysis and starting from scratch with something new, the DRT analysis. Now I want to reconsider this decision. After all, the defects of the DRT analysis seem at least as severe, and perhaps there are ways of amending and defending the E-Type analysis that have been overlooked.

Kadmon offers something that promises to help us out. She argues that the predictions of the E-Type analysis are correct after all and appearances to the contrary can be explained away. I quote what she says about example (45) (1987, p. 367).

I believe that speakers accept this example because it can’t make any difference to truth conditions which sage plant the pronoun it stands for, out of all the sage plants that a buyer x bought (for each buyer x). Given an individual who bought at least one sage plant, there are two possibilities: (i) She bought at least nine plants. In that case, no matter which of these plants you pick, it is true that she bought eight others along with it. (ii) She bought eight plants or less. Then, no matter which plant you pick, it is false that she bought eight others along with it. In short, for every sage-plant buyer x, the property that x bought eight other plants along with it holds either of all of x's plants or of none.

We might say that the speaker invariably assumes that the sage plant is unique per choice of buyer, but leaves the choice of unique plant undetermined, since it makes no difference to truth conditions.

If Kadmon is right here, we can uphold the basic semantic analysis provided by the E-Type approach. That analysis predicts (45) to have a determinate truth value only with respect to a variable assignment which assigns to the function variable in the LF representation of it a particular function from sage-plant buyers to sage plants. We have been dismissing this prediction as counterintuitive because we took it to imply that (45) could be used felicitously only in contexts where one such function was maximally salient. Kadmon's point is that we don't have to take it to imply this. We can alternatively assume that the context of utterance needs to furnish values only for those free variables whose interpretation can make a difference to the truthvalue of the sentence. When all assignments to a given variable lead to the same truthvalue, no contextually furnished assignment is needed to make the utterance felicitous and capable of truth and falsity.11

11 Mats Rooth (p.c.) observes that Kadmon subjects the sage plant example to a kind of supervaluation treatment. Consider the following analogy: Why is If this is green, it is green true even when the referent of this happens to fall in the vagueness margin between green and brown? The supervaluationist answer is: because this sentence would be true under all
This is an appealing idea because it permits us to dispose of the counterexamples to the E-Type analysis without really modifying or complicating it. Notice that it also explains why (4) is solidly true rather than of dubious truthvalue when everyone beats all of his multiple donkeys. Here, too, Kadmon can blame the judgment on the fact that, given the situation described, the sentence would be true no matter which you choose among the various functions from donkey-owners to donkeys owned.

Unfortunately, however, there are cases where Kadmon’s approach fails. (47) is an example from Rooth (1987).

(47) No parent with a son still in high school has ever lent him the car on a weeknight.

(47) is intuitively falsified by the existence of a single parent-son pair where the son is in high school but has been given the car on a weeknight. It makes no difference at all to this judgment whether this son has a brother that is also still in high school. Suppose Mary has two boys in high school, John and Bill. She has lent the car to John but never to Bill. Suppose further no other parent has lent the car to any of their high school sons. (47) is clearly false then. But under the E-Type analysis, where him would be represented as \( f(x) \), it does make a difference which function we assign to \( f \): If it is a function that maps Mary to John, (47) winds up false, but if it is a function that maps Mary to Bill, it winds up true. In this case, Kadmon predicts that our judgments should be more insecure than they are.

Other than Kadmon’s proposal, I don’t know of any attempts to reconcile the E-Type analysis or a conservative variant thereof with the apparent absence of uniqueness presuppositions in (at least some) donkey sentences with relative clauses. It would be premature, however, to conclude that the DRT analysis scores a point here. It gets around the uniqueness effect by making the quantificational determiner (QDet) on the relative’s head bind the indices of indefinites in the relative clause, so that any pronouns in the matrix linked to these indefinites can be treated as bound variable pronouns. But this immediately brings on another problem: If the QDet most in (43) binds the donkey-variable as well as the farmer-variable, then it quantifies over farmer-donkey-pairs instead of over farmers. In other words, the price the DRT analysis pays for avoiding uniqueness presuppo-

possible resolutions of the vagueness. Similarly, why is the sage plant sentence (45) true even when no particular function is meant? Kadmon answers: because it would be true under all competing resolutions of the reference of the function variable.
sitions is the proportion problem, and on balance it is therefore no better off than the E-Type analysis.

So what are we to do? Is there any way at all to generate asymmetric truth conditions while avoiding uniqueness presuppositions? Well, I know of one. A number of authors, including Bäuerle and Egli (1985), Root (1986), Rooth (1987), and Reinhart (1987), have advocated variants of the following strategy. Suppose we view donkey sentences with relatives as involving not one but two quantifying operators. One is the QDet, and this binds only the variable corresponding to the head noun; the other is an implicit quantifier of sometimes universal, sometimes existential force, and this binds the indefinite and pronouns anaphoric to it. The following semi-formal paraphrases for some of these sentences help to get across the intuitive idea.

(48) Every man who owns a donkey beats it.

\[\sim\]

for every man who owns a donkey: for every donkey he owns: he beats it

(49) Most people that owned a slave also owned his offspring.

\[\sim\]

for most people that owned a slave: for every slave they owned: they also owned his offspring

(50) No parent with a teenage son lends him the car.

\[\sim\]

for no parent with a teenage son: for any teenage son he or she has: he or she lends him the car

In each case I have italicized the two quantifiers that I spoke of above. The first is simply the QDet, the second is universal in (48) and (49) and existential in (50). The indefinite which antecedes the donkey-pronoun shows up twice in these paraphrases: once inside the restriction on the QDet, where it acts as an ordinary narrow-scope existential, and another time as restricting the second quantifier. (The remainder of the relative clause is likewise duplicated.) The paraphrases reveal how this approach manages to reconcile truthconditional asymmetry with absence of uniqueness presuppositions: In the restriction on the QDet, the head noun and the indefinite clearly don’t play symmetrical roles; quantification there is over donkey-owning men rather than over men-donkey pairs. Yet the donkey-pronoun is a bound variable, as in the DRT-analysis, and since the quantifier binding it is universal or existential, multiple instantiations are not precluded.
There are two big questions about this kind of approach: One is whether there is any principled way of predicting the force of the implicit secondary quantifier. Rooth (1987) has some pertinent observations, but there seems to be no real explanation. The second question is how to implement the analysis without ad hoc maneuvers in either the syntax or the semantics. If the paraphrases in (48)–(50) are to be more or less what these sentences look like at LF, then semantic interpretation is straightforward, but the route from the syntax to these LFs isn’t. The authors that have pursued this type of analysis have generally opted for the other horn of the dilemma: keep the LFs close to the surface and put the fancy footwork into the semantic interpretation rules. For instance, one can define, for arbitrary QDets $\alpha$, a pair of ‘double’ quantifiers $\alpha \forall v_1, \ldots, v_n$ and use these to interpret LFs essentially identical to those familiar from standard versions of the DRT analysis. This is spelled out in the literature. To illustrate very briefly, (51) gives the semantics for the double quantifier $most_x \forall_y$. This rule applies to a simple LF like (52) and yields exactly the truth conditions of our paraphrase in (49).

$$[[most_x \forall_y \xi] \varphi]^p = \text{True} \quad \iff$$
$$\left\{ x : \left[ y : [\xi]^s_{x \forall x, y/y} = \text{True} \right] \subseteq \left[ y : [\varphi]^s_{x \forall x, y/y} = \text{True} \right] \right\} >$$
$$\left\{ x : \exists y : [\xi]^s_{x \forall x, y/y} = \text{True} \right\},$$

(52) $most_x \forall_y [people(x) & [slave(y) & [x owned y]]]$

[x also owned y’s offspring].

An approach along these lines, then, is the best solution currently available to the problem of avoiding both inadequately symmetrical truth conditions and unwelcome uniqueness presuppositions in donkey sentences of the relative clause variety. The version just sketched (like the versions in the works I have drawn on), presupposes a non-quantificational analysis of indefinites: see the representation of a $slave$ in (52), where $y$ remains free within the relative clause and gets bound only by the double quantifier in the determiner position of the head noun. However, this is not essential. If we want to maintain the classical, uniformly existential treatment of indefinites, we can still implement essentially the same solution. The only difference is that we should then take the secondary quantifier to quantify over situations. In other words, we should then think in terms of paraphrases like the following.

(53) Most people that owned a slave also owned his offspring.

$\approx$

for $most$ people that owned a slave:

for $every$ case (minimal situation) $s$ where they owned a slave:
they also owned the offspring of the slave that they owned in

His now has to be an E-Type pronoun rather than a bound variable
pronoun, because its antecedent is an existential quantifier whose scope
is confined to the relative clause. Being an E-Type pronoun, it carries a
uniqueness presupposition. But this uniqueness presupposition is relati-
vized to minimal situations and therefore harmless.

To give a glimpse of the technical execution, (54) would be the semantic
rule replacing (51) above, and (55) the kind of LF it is supposed to
interpret.

(54) \[\text{most}_{x, s_1} \phi\] \[\text{also owned}(s_2, f(x, s_0')')\]

If the function variable \(f\) in the E-Type representation for \(\text{his}\) refers to
the function \(f\) below, we get the intended reading.

(56) \(f: \langle x, s_1 \rangle: s_1 \text{ is a minimal situation in which } x \text{ is a person and owns a slave} \rightarrow \text{A unique slave that } x \text{ owns in } s_1\)

To elaborate beyond this sketch would be tedious and beside the point,
at least for my present purposes. There has not been a really insightful
resolution of the tension between excessive uniqueness presuppositions
and the proportion problem. What ad hoc treatments there are can also
be implemented in a theory using existential indefinites, E-Type pronouns,
and quantification over situations. The unexciting conclusion is that the
relative clause variety of donkey sentences throws no new light on the
comparative merits of DRT versus E-Type approaches to anaphora. To
be sure, we could not have known this at the beginning of this section.
Had Kadmon's approach to the sage plant examples been viable, our
verdict would have been quite different. In that event there would have
been a rather strong reason to prefer the E-Type analysis developed in
this article over alternatives that incorporate and build on the innovations
of the DRT analysis. Unadorned by the complications that are necessiated
only by those examples which defy Kadmon, an existential indefinite plus
E-Type treatment of the relative clause examples would definitely have been simpler and more natural than a DRT treatment amended to handle the proportion problem.

5. The ‘formal link’ between pronoun and antecedent

Berman (1987) and Kadmon (1987) have provided me with much of what I needed to defend a more conventional alternative to the innovations of the DRT analysis. Yet neither of them is advocating a return to unambiguously existential indefinites and E-Type pronouns. Both rather formulate their proposals as refinements of the DRT analysis and retain the variable analysis of indefinites and the treatment of donkey-pronouns as bound variable anaphora. Why? Berman doesn’t address the issue, but Kadmon (1987, ch. 7) offers some, albeit sketchy, comments on how her approach differs from the views of Evans and Cooper and why it should be preferred. Kadmon’s discussion is directed at the particular proposals of Evans (1977, 1980) and Cooper (1979); I will restrict myself to the points that carry over to the variant developed here. As far as I can see, there is only one thing that Kadmon would find wrong with the approach I have been pursuing in this article: My E-Type analysis, like Cooper’s, “fails to establish a formal link between the pronoun and antecedent” (1987, p. 259). Let us scrutinize what exactly this means and how it bears on the theory comparison we are engaged in.

The problem that Kadmon perceives is basically one of overgeneration. Cooper’s and the present version of the E-Type analysis rely very heavily on extragrammatical (i.e., pragmatic or psychological) factors to determine the interpretations of pronouns: all that is supposed to matter is which functions are sufficiently salient when the pronoun is processed. But there are data which seem to point to the existence of tighter and somehow more ‘syntactic’ limitations on the range of readings that actually emerge. For instance, Heim (1982, pp. 21–24 and 80–81) tried to argue that theories like Cooper’s could not distinguish between (57) and (58).

(57) Every man who has a wife sits next to her.
(58) *Every married man sits next to her.

The fact to be explained is that (58) cannot be used to convey the reading that we naturally get for (57). For a proponent of our E-Type analysis, the reason can’t be that an appropriate LF for (58) isn’t generated

---

12 This means I can disregard Kadmon’s complaint that Evans and Cooper build the uniqueness condition into the asserted content instead of recognizing its presuppositional status. See Section 1 above.
by the grammar. Both sentences have grammatical LFs in which her is represented as \( f(x) \), with \( x \) the variable bound by the subject NP and \( f \) a free function variable. So the difference must have to do with what functions are available as referents for \( f \) when these two sentences are uttered. Apparently the function mapping husbands to their wives is readily available when (57) is uttered, but not when (58) is uttered. How does it become available in the case of (57)? Presumably as a result of the listener's hearing and understanding the phrase \( \text{man who has a wife} \). Now why doesn't hearing and understanding \( \text{married man} \) have the same effect? After all, the two phrases mean the same, so understanding one should put the listener into the same psychological state as understanding the other. Hence the pronouns in (57) and (58) should have exactly the same range of available readings. Since they do not in fact, I concluded in Heim (1982) that psychological salience of an appropriate function is not sufficient for a pronoun to receive an anaphoric reading; certain formal properties of the preceding text seem to be relevant as well.

It should be noted that this is not just a problem with the present treatment of E-Type pronouns, but also with the treatment of referential pronouns that we have been taking for granted here. (59) and (60) likewise display the contrast of (57) and (58) above.

(59) \hspace{1cm} \text{John has a wife. She is sitting next to him.}
(60) \hspace{1cm} \text{John is married. ??She is sitting next to him.}

Suppose \( \text{she} \) is represented as a simple free individual variable. In (59), but not in (60), this variable can easily refer to John's wife, suggesting that uttering \( \text{John has a wife} \) makes John's wife salient but uttering \( \text{John is married} \) doesn't. How can this be, given that the two convey exactly the same information to the hearer?

A defender of Cooper's approach to referential and E-Type pronouns might not find this objection all that persuasive. After all, just because two phrases mean the same it hardly follows that listeners processing them run through identical sequences of psychological states. Quite to the contrary, it is plausible that awareness of the relevant function occurs at a much shallower level of understanding in the processing of \( \text{man who has a wife} \) than it does in the processing of \( \text{married man} \). Suppose this is so, and suppose further that disambiguation and reference resolution for pronouns takes place at an early stage in parsing. Then the contrast between (57) and (58) (and similarly (59) and (60)) could find a psychological explanation and we could leave our semantics just as it is.

Unfortunately, there are other examples which make this line of defense less likely to succeed. Why, for instance, is it impossible to read \( \text{it} \) in (61) as 'its successor'?
(61) Speaking of the successor-function, every number is smaller than it.

If an explicit reference to a function such as that in the first part of (61) is not suited to make that function highly and instantly salient, then what is? (Perhaps one might say that the function here has been made salient 'under the wrong kind of description', in a sense to be made precise; I won't pursue this further.) So we do have reason to suspect that a theory which relies so heavily on pragmatics and psychology will predict more readings for pronouns than they actually have.

There is another related problem. Notice that the LFs which I have assumed for sentences with anaphoric pronouns do not represent any formal relation (such as coindexing, sameness of variables) between the pronoun and its antecedent. In fact, if this approach is right, it is a bit of a mystery why we call a certain NP in the text preceding the pronoun its 'antecedent'. The meaning of the whole preceding sentence is involved in telling the listener that a certain function exists and in making it salient; the indefinite NP which we call the 'antecedent' does not appear to play a special role in this any more than the surrounding parts of speech.

This is unsatisfactory not only because it fails to provide an explication of our pretheoretical talk of anaphors and antecedents. It is bad for more theory-internal reasons as well, as pointed out by Sells (1986). To the best of our current conception of the place of semantics in grammar, there are generalizations that we cannot express unless we have access to a level of representation\(^\text{13}\) which displays antecedent-pronoun relations, including those in E-Type anaphora. Sells discusses several such generalizations, the simplest of which pertains to the interpretation of non-restrictive relative clauses:

(62) The relative pronoun of a non-restrictive relative must be interpreted as anaphoric to the head NP where the relative clause is attached, not some other NP in the sentence.

(62) implies, for instance, that (63) and (64) do not share a reading.

(63) John talked to Bill, who was at home.
(64) John, who was at home, talked to Bill.

\(^\text{13}\) This does not have to be a syntactic level of representation in a narrow sense of syntax. It could be LF (even if one thought there was no other motivation for such a level than that it facilitates the statement of compositional rules of semantic interpretation), or it could be DRS. It doesn't even really have to be a representation in the strict sense, but could be a sufficiently structured set-theoretic construct. What matters is that it be a construct that both is semantically explicit enough to disambiguate anaphoric relations and still reflects enough of the syntactic properties of the sentence to state the generalizations in question.
In the light of this obvious generalization, consider (65).

(65) Every chess set comes with a spare pawn, which is taped to the top of the box.

(65) has exactly one reading, and it is a reading in which which is interpreted as an E-Type pronoun whose 'antecedent' is a spare pawn. Why is this reading allowed under generalization (62)? Presumably because a spare pawn happens to be the head NP on which the relative clause appears. But this means that, at the level where (62) must be met, we must be able to read off what the antecedent of which is. An LF of the sort I have been assuming will not do, because it would represent which as $f(x)$, with $f$ a free variable and no indication of how its contextually supplied value is related to the interpretation of the NP a spare pawn. We may, of course, assume that the two NPs are coindexed, but this would solve the problem only if we could spell out principles for the semantic interpretation of indexed structures in such a way that coindexing forces the intended reading. The problem with the present version of the E-Type analysis is precisely that it neither supplies, nor indeed leaves any room for, such principles. What we have here is a simple but, I think, cogent argument against any theory which generates E-Type anaphoric readings for pronouns without coindexing (or otherwise formally relating) the pronoun and its antecedent.

A similar kind of argument might be made with respect to feature agreement between antecedent and pronoun. By and large, anaphoric pronouns, including those that are E-Type, must agree with their antecedents in number, gender, and person. For instance, even though (67) can describe the same situations in which (66) is true, the apparently optional plural features on pronoun and antecedent cannot be chosen and omitted independently of each other.

(66) Most people who own a gun never use it.
(67) Most people who own guns never use them.
(68) ??Most people who own a gun never use them.
(69) *Most people who own guns never use it.

To express the pertinent feature matching constraint, we seem to need access to a representation that displays syntactic information (e.g., features) as well as anaphora relations, including those that are semantically E-Type. In other words, our present analysis, which doesn't establish any formal link between E-Type pronouns and their antecedents, is again in trouble. However, I don't want to place much weight on this argument here, since it raises complex issues beyond the scope of this article. For
one thing, there are some instances of what seem to be anaphoric relations where number features don't match:

(70) Almost every child got a cookie. They ate them right away.

And even where agreement is obligatory, many theoreticians believe that this can be made to follow indirectly from the inherent semantics of person, gender, and number features. All I can say here is that, if E-Type anaphora is subject to any genuinely syntactic agreement constraints, then this probably militates against the pragmatic approach I have been developing.

A final difficulty along the same general lines has to do with anaphoric NPs like the former and the latter. When these NPs are used in the place of pronouns, they have a disambiguating effect. (72) has only one of the two readings of (71).

(71) When a cat bites a rat, it kills it.
(72) When a cat bites a rat, the latter kills the former.

It is quite plain intuitively how this disambiguating effect comes about: These NPs have built into them an explicit instruction to select the leftmost or rightmost of two potential antecedents. But how are we to describe this in a theory which implies that the selection of an antecedent is not required or even pertinent for the interpretation of the anaphor?

In sum, Kadmon's point is well-taken. An E-Type approach to donkey anaphora which represents pronouns by free function variables referring to contextually salient functions runs into some serious problems. The problems I have mentioned here all seem somehow caused by the fact that this analysis generates intuitively anaphoric interpretations for pronouns without there being any direct connection between the interpretation of the pronoun and that of its intuitive antecedent. If this is the correct diagnosis, where should we look for a remedy?

Not all existing versions of the E-Type analysis rely as heavily on pragmatics as Cooper's and mine. Evans (1977), in particular, differs explicitly:

... It seems necessary to state the wellformedness rule for E-Type pronouns in terms of the occurrence of a specific kind of syntactical antecedent; a purely semantic criterion would not be able to explain the differing acceptabilities of:

John has a wife and she hates him.
*John is married and she hates him.

(Evans 1977, 147; emphasis in original)

According to his own proposal, as well as that of Parsons (1978), E-
Type pronouns are syntactically linked to their antecedents, and their interpretation is completely fixed by this link and the semantic rules of the grammar. Such a ‘grammatical’ version of the E-Type analysis seems to be what we need to overcome the problems with the ‘pragmatic’ version considered so far. So let us take a closer look at this alternative.\(^\text{14}\)

Suppose we eliminate the option of representing a pronoun as a functor-argument complex. Instead we construct LFs as follows. First, we freely index NPs. Pronouns not coindexed with anything are then represented as free variables and interpreted deictically (in a fairly narrow sense – we are no longer trying to subsume anaphora under deixis). Those coindexed with an antecedent are treated in three different ways: If the pronoun is in its antecedent’s scope, it becomes a bound variable. If the antecedent is definite (i.e., a name, pronoun, demonstrative or definite description), the pronoun is replaced by a copy of the antecedent. Finally, if the antecedent is not definite and doesn’t have scope over the pronoun, the pronoun is rewritten according to the following transformational rule:

\[
(73) \quad \text{X SY NP, Z} \Rightarrow 1 \ 2 \ 3 \ 4 + 2 \ 5 \\
\text{conditions: 4 is a pronoun} \\
\text{2 is of the form} \ [s \ \text{NP,} \ S] \\
\text{6 7}
\]

This rule reconstructs the material comprising the antecedent (= term 6) and the antecedent’s scope (= term 7) into the position of the pronoun (= term 4). For example, it converts (74) into (75). (I assume that 2 is Chomsky-adjoined to 4 so that the two together form an NP.)

\[
(74) \quad \text{[every}_{x_1} \text{[man}(x_1) \text{ that} \text{[[a}_{x_2} \text{ donkey}(x_2)]_2 \text{[}x_1 \text{ owns} \ x_2\text{]]],_1 \text{[}x_1 \text{ beats} \ it_2\text{]]]}
\]

\[
(75) \quad \text{[every}_{x_1} \text{[man}(x_1) \text{ that} \text{[[a}_{x_2} \text{ donkey}(x_2)]_2 \text{[}x_1 \text{ owns} \ x_2\text{]]],_1 \text{[}x_1 \text{ beats} \ [it_2 \text{ [[a}_{x_2} \text{ donkey}(x_2)]_2 \text{[}x_1 \text{ owns} \ x_2\text{]]]]].}
\]

The intended interpretation of the augmented pronoun \(\text{[it}_2 \text{ [[a}_{x_2} \text{ donkey}(x_2)]_2 \text{[}x_1 \text{ owns} \ x_2\text{]]}\) is, of course, that of the definite description \(\text{the donkey} \ x_1 \text{ owns}\). Here is the semantic rule that accomplishes this:

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

\(^{14}\) The implementation that follows resembles Parsons (1978) more closely than Evans (1977). There are several non-trivial differences, most of which I will not address.
(Notice that the determiner is completely ignored in the interpretation; I let (73) copy it along only because it would be more cumbersome to write a structural description that excludes it.) (75) illustrates an intrasentential application of (73), but this rule is meant to apply across sentence boundaries in discourse as well. It amounts to a treatment of E-Type pronominalization that is much like the Sag-Williams-approach to VP Deletion and other ellipsis constructions.15

An analysis along these lines seems suited to avoid the objections against the pragmatic version. For instance, pairs like man who has a wife and married man are easily distinguished now: the latter simply doesn’t meet the structural description of (73), so no E-Type reading for a subsequent pronoun will be generated. Likewise, there is simply no way to generate the unwelcome reading for (61). Obligatory anaphora requirements such as those discussed by Sells also become more tractable. For instance, if coindexing is obligatory in certain configurations (such as between relative pronoun and head NP) this will ensure the right reading for (65). Feature agreement requirements are easy to impose, if desired: simply stipulate that coindexed NPs have matching features (but recall the caveat above). How exactly to treat the former, the latter remains unclear; but here too it seems fair to suspect that a theory which relates E-Type pronouns syntactically to their antecedents will have less difficulty.

Before we recommend substituting the present grammatical version of the E-Type analysis for our earlier pragmatic version, we should clarify some points and consider some possible criticisms. First, why did we reserve (73) for non-definite antecedents and make separate arrangements for definite ones? The reason is that (73) is not suited to generate the right readings for paycheck-sentences such as (1), repeated here.

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

The it here means ‘his paycheck’, and not ‘his paycheck which he gave to his wife’. Generally, pronouns with definite antecedents allow a reading where the pronoun is equivalent to a repetition of the mere antecedent, whereas (73) generates readings where the whole antecedent-containing sentence enters into the interpretation of the pronoun. Parsons (1978) and Evans (1977) also made this distinction. Evans, in fact, reserves the term ‘E-Type pronoun’ to those derived by (73) and contrasts them explicitly with ‘genuine pronouns of laziness’, which are equivalent to repetitions of their antecedents.

---

Second, the semantic rule (76) is too narrow as it stands: it works only when the antecedent is a singular count NP. The E-Type pronouns \textit{it} and \textit{they} in (77) and (78) should denote the maximal portion of water that Mary drank and the maximal group of cookies she ate.

\begin{align*}
(77) & \quad \text{Mary drank some water. It was luke-warm.} \\
(78) & \quad \text{Mary ate some cookies. They were very sweet.}
\end{align*}

How exactly this is accomplished should not preoccupy us here, however. Whatever is the right treatment of mass and plural definite descriptions will work here too.

Third, some examples that our earlier pragmatic approach arguably could have accommodated now don't seem to fit anywhere. These are of different types, including the following two.

\begin{align*}
(79) & \quad \text{Every student turned in a paper. They were all identical.} \\
(80) & \quad \text{A: A man jumped off the cliff.} \\
& \quad \text{B: He didn't jump, he was pushed.}
\end{align*}

\textit{They} in (79) is anaphoric on \textit{a paper}, but it means 'the papers that the students turned in', and not, as (73) would derive, 'the papers that \(x\) turned in'. (If we require syntactic number agreement for coindexing, then (73) won't apply at all; but there is a problem even if we waive this requirement.) The best we can do to treat \textit{they} is to represent it as a free variable and take it to refer deictically to the papers that the students turned in. If this works, it is because those papers have somehow been made salient by the previous discourse. But then we are back to analyzing referential anaphoric pronouns as deictic, and besides, we still can't deal with (81).

\begin{align*}
(81) & \quad \text{Each time every student turned in a paper they were all identical.}
\end{align*}

Strawson's famous example (80) raises similar issues. \textit{He} is anaphoric on \textit{a man}, yet doesn't mean 'the man that jumped off the cliff', which is the reading that (73) would give rise to. We are reduced to saying that \textit{he} is a deictic pronoun that refers to the man that speaker A believed to have jumped off the cliff. But again, there are variants with a higher quantifier where this won't help.

\begin{align*}
(82) & \quad \text{A: Every time I was there, a man jumped off the cliff.} \\
& \quad \text{B: I bet that in most cases he didn't jump but was pushed.}
\end{align*}

Note that our old approach was flexible enough to accommodate such cases: we could have represented the pronoun as \(f(x)\) and assumed that \(f\)
refers to a function which maps each relevant occasion \( x \) to the man that a thought jumped off the cliff at \( x \).

Fourth, isn't it necessary to restrict (73) so that only certain types of NPs in certain contexts can be E-Type antecedents? The unrestricted version I have given applies to examples like (83) and (85), deriving the LFs (84) and (86), even though there are no anaphoric readings available intuitively.

\[
\begin{align*}
(83) & \quad \text{John owns no sheep}_1 \text{ and Harry vaccinates them}_1. \\
(84) & \quad \text{no sheep}_x \left[ \text{John owns } x \right]. \\
& \quad \text{Harry vaccinates } \left[ \text{them } \left[ \text{no sheep}_x \left[ \text{John owns } x \right] \right] \right] \\
(85) & \quad \text{John doesn't own a car}_1, \text{ and he drives it}_1 \text{ on Sunday} \\
(86) & \quad \left[ \text{not } \left[ \text{a car}_x \left[ \text{John owns } x \right] \right] \right]. \\
& \quad \text{and he drives } \left[ \text{it } \left[ \text{a car}_x \left[ \text{John owns } x \right] \right] \right] \text{ on Sunday.}
\end{align*}
\]

Readers of Evans (1977) will recall that he uses these examples to motivate two well-formedness conditions on anaphoric links between an E-Type pronoun and an antecedent. If we follow him, shouldn't we add analogous conditions on the applicability of (73)?

Evans's two conditions are these: (a) The antecedent determiner must be 'existential in force' (1977, p. 113). (b) The antecedent-containing sentence (= term 2 in (73)) must be 'affirmatively embedded' relative to the minimal sentence that contains the pronoun (1977, pp. 145–6). The definitions of 'existential in force' and 'affirmatively embedded' are roughly as follows:

\[
\begin{align*}
(87) & \quad \text{A Det } \delta \text{ is existential in force iff } \left[ \delta, \varphi \right] \psi \text{ entails } \exists u \left[ \varphi \land \psi \right]. \\
(88) & \quad \sigma \text{ is affirmatively embedded in } \Sigma \text{ relative to } \sigma' \text{ iff } \\
& \quad \Sigma^{\sigma'/[u=a]} \land \neg \Sigma^{\sigma'/[a+a]} \text{ entails } \sigma, \\
& \quad \text{where } \Sigma \text{ is a formula, } \sigma \text{ and } \sigma' \text{ are occurrences of subformulas of } \Sigma, \text{ and } \Sigma^{\sigma'/\varphi} \text{ is the result of replacing } \sigma' \text{ in } \Sigma \text{ by } \varphi.
\end{align*}
\]

(a) serves to exclude the anaphoric link in (83), on the grounds that no is not existential. (b) is meant to distinguish, e.g., (85) above from the minimally different (89), where anaphora is okay (1977, p. 145).

\[
(89) \quad \text{Either John doesn't own a donkey or he keeps it very quiet.}
\]

Notice that \( [[\text{John doesn't own a car and } a = a] \land \neg [\text{John doesn't own a car and } a \neq a]] \) is equivalent to \( \text{John doesn't own a car} \), which doesn't entail \( \text{John owns a car} \). Hence \( \text{John owns a car} \) is not affirmatively embedded with respect to \( \text{he drives it on Sundays} \) in (85). On the other hand, \( [[\text{either John doesn't own a donkey or } a = a] \land \neg [\text{either John doesn't own a donkey or } a \neq a]] \) is equivalent to \( \neg [\text{John doesn't own a donkey}] \), which
entails *John owns a donkey*. Hence *John owns a donkey* is affirmatively embedded with respect to *he keeps it very quiet* in (89).

While we certainly need some account of what prevents anaphora in (83) or (85), it would be very unappealing to have to stipulate such elaborate semantic restrictions on the operation of rule (73). Fortunately, we don’t need to follow Evans in this respect: the antecedency relations he rules out by means of (a) and (b) are already ruled out as presupposition failures. For example, look at the LF (84): \[ \text{them[no}_x \text{ sheep[John owns} x\text{]]} \]
is, by our intended semantics, equivalent to ‘the sheep John owns’. But if the first conjunct *John owns no sheep* is true, this fails to denote. Likewise, (86) will rule itself out because the truth of the first conjunct *John doesn’t own a car* precludes the existence of a well-defined value for \[ \text{it [a}_x \text{ car [John owns} x\text{]].} \] (89), by contrast, is okay, since the truth of a disjunction doesn’t require that its left disjunct be true, and if it is false there can be a well-defined referent for \[ \text{it [a}_x \text{ donkey [John owns} x\text{]]}. \] As far as I can see, other examples covered by Evans’s (a) and (b) are similarly attributable to presupposition failure. This appeal to a presuppositional explanation has admittedly remained a bit sketchy. I think it can be backed up properly by an explicit account of presupposition projection under the various connectives, but for this I must refer the reader elsewhere.\footnote{For a recent survey, see Soames (1988). Evans’s conditions (a) and (b) are, if you will, an ad hoc treatment of presupposition and presupposition projection, and as such they become superfluous when his analysis of E-Type anaphora is recast in a framework which includes a systematic theory of presupposition.} The upshot of this discussion, then, is that (73) can remain in its current unrestricted version: the antecedent may be located anywhere and have any determiner you like.

More questions will certainly come up as one tries to spell out this grammatical version of the E-Type analysis beyond the present sketch. But I hope to have made plausible, at least, that it is a viable alternative to the pragmatic version and escapes Kadmon’s objections to the latter. Of course, it is in some respects less appealing. Especially bothersome are the stipulative details of rule (73), which do not seem reducible to more general principles. We should therefore be careful not to overlook alternative proposals in the literature that get around this defect. Are there any?

At first sight, the answer is ‘yes’: Kadmon’s own proposal, a refined descendant of the DRT analysis, appears to meet the objections against the pragmatic E-Type analysis without reverting to the stipulative reconstruction or interpretation rules of Parsons (1978) or Evans (1977). From
the original DRT-analysis, it preserves the treatment of donkey pronouns as variables co-bound with their antecedents, so there is clearly a formal relation between antecedent and anaphor. Yet it captures the uniqueness and asymmetry predictions of E-Type analyses. But first appearances are deceptive here. Like other DRT-based analyses, Kadmon’s proposal resorts extensively to accommodation. In fact, only a subset of the donkey sentences are really treated by simply identifying the pronoun with the variable introduced by the antecedent. Something more roundabout is required wherever asymmetric readings show up. For instance, the antecedent *a cat* in (90) or in the equivalent, asymmetric, reading of (91) is bound by a narrow scope existential quantifier and hence the variable it introduces is not accessible to the pronoun *it*.

(90) Most women who own a cat talk to it.

(91) If a woman owns a cat she usually talks to it.

Kadmon assumes that a rule of accommodation applies here, which copies an LF-chunk containing the antecedent and its scope into the sentence containing the pronoun (1987, pp. 332–3). Only then is it possible to identify the pronoun non-vacuously with the referential index of *a cat*. This accommodation process is very similar in its effect to the transformational copying rule (73) above. Perhaps the only difference is that it is never formulated as an explicit rule. But this is hardly a virtue. If we say nothing precise about where accommodation is possible and how it can apply, we have not explained any more than the pragmatic E-Type analysis why, e.g., a previous occurrence of *married* doesn’t license an insertion of *x’s wife*, thereby providing an antecedent for a subsequent *she*. Once we start spelling out the formal preconditions for accommodation in Kadmon’s DRT-based theory, I suspect we may end up with something not significantly different from the pedestrian rules of Evans and Parsons.

Acknowledgements

This article is an elaboration of a talk given under the tendentious title ‘Anaphora without DR Theory’ on December 11, 1987 at a workshop on Discourse Representation Theory in Stuttgart. A draft titled ‘E-Type pronouns in 1987’ was circulated in May 1988. I thank the workshop organizers Werner Frey and Hans Kamp for providing me with the incentive for this work and the opportunity to present it. Feedback from partic-

---

17 See Kadmon (1987) for details.
ipants, in particular Jan van Eijck and Hans Kamp, led to some changes between talk and draft. Comments from two anonymous reviewers, and especially a set of detailed and thoughtful written comments from Nirit Kadmon, persuaded me to make further revisions. Unfortunately, I have not been able to address all the pertinent questions that were raised by these people. I also could not take into account some important recent contributions, especially Neale (1988) and Kratzer (1988). Had I known these before work on the present paper was substantially completed, I would have written something rather different.

REFERENCES

Berman, S.: 1987, 'Situation-Based Semantics for Adverbs of Quantification', in J. Blevins and A. Vainikka (eds.), University of Massachusetts Occasional Papers 12, University of Massachusetts, Amherst.
Parsons, T.: 1978, 'Pronouns as Paraphrases', ms., University of Massachusetts, Amherst.

Dept. of Linguistics
MIT
Cambridge, MA 02139
U.S.A.