Adverbial Quantification, Complex Conditionals, and Focus*

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Introduction

So-called donkey-sentences like the one in (1) raise many important issues for the syntax and semantics of natural language quantification.

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

The most influential account of donkey sentences was pioneered by David Lewis (1975), Hans Kamp (1981), and Irene Heim (1982). Its main ingredients are: (i) Indefinites are not existential quantifiers as traditional logic maintained; instead they are interpreted as restricted free variables. (ii) These variables can be bound by an "adverb of quantification" (Lewis' term), such as *often* in (1); these adverbs are unselective binders which can bind all free variables in their scope. (iii) The donkey pronouns are also bound by this unselective binder. (iv) *If*-clauses in general serve to supply the domain of such unselective quantifiers.

Our example donkey-sentence (1) will then receive the logical form and the paraphrase in (2).

(2) a. $\text{Often}_{x,y}$ [a farmer(x) ∧ a donkey (y) ∧ x owns y] [x beats y]
b. "Many pairs x,y such that x is a farmer, y is a donkey, and x owns y are such that x beats y".

The literature on adverbial quantification is plentiful and the Lewis-Kamp-Heim account is by no means the last word. The architect of a theory of adverbial quantification has many important decisions to make. Very roughly and recklessly put, at each choice point the theory could go towards more syntax or more semantics/pragmatics. Let me sketch four issues that have been focal points of the theoretical debates. (i) What kind of things are quantified over? Following Lewis (1975), many researchers assume that adverbial quantifiers quantify over tuples of restricted variables. The alternative, initially more intuitive, is to assume quantification over something like situations (events, times, states of affairs, circumstances, conditions, whatever). (ii) What is the nature of indefinite noun phrases? In the Lewis-Kamp-Heim approach they serve to introduce and restrict

*The title chosen here differs from the much less appropriate title of the abstract submitted to SALT II ("Conditional Restrictors and (Un)Selective Binding"). This paper is a preliminary report on ongoing research which is supposed to culminate in a significant part of my dissertation. Some of this material was presented in an earlier form at WCCFL XI (von Fintel 1992). A much better paper would have resulted if I had had more time to take into account the arguments and proposals of Manfred Krifka's SALT II paper (Krifka 1992), which covers some of the same ground as mine. While engaged in this research, I have enjoyed the inestimable help of Barbara Partee, Angelika Kratzer, Veena Dwivedi, Hotze Rullmann, Paul Portner, and Sue Tunstall. All mistakes are mine.

free variables. A situation-based approach may be compatible with the more conservative view that they are existential quantifiers. (iii) What is the nature of donkey pronouns? In the Lewis-Kamp-Heim approach they are bound variable pronouns dependent on the unselective quantifier. A situation-based approach would have to take recourse to the E-type account which treats donkey pronouns as disguised definite descriptions. (iv) How is the domain of the adverbial quantifier determined? This question doesn't really arise with nominal quantifiers whose common noun directly gives the appropriate domain. With adverbial quantifiers we have what, following Diesing (1990) and Krifka (1992), could be called the problem of "semantic partition". There is more to be said here than the usual assumption that *if*-clauses are designated devices for restricting quantifiers. Things are more complicated: material from the matrix clause can be quantified over, and not all the material in an *if*-clause has to be quantified over (this is known as the "proportion problem"). Researchers have attempted to get at the roots of semantic partition from different angles. There are syntax-based proposals, especially the theory of Molly Diesing (1990) and Angelika Kratzer (1989a). There are pragmatics-based proposals; for example, Berman (1987) seems to go in this direction. And there are focus-based proposals (Rooth 1985, 1989, Krifka 1992, von Fintel 1992a).

At this point, we need new considerations and new data to evaluate the performance of the various theories. What kind of new data might there be? Henriëtte de Swart (1992) and Cleo Condoravdi (1992) both discuss types or uses of noun phrases that had not been considered before in the donkey literature. The avenue that I am exploring in current research is to investigate other adverbial clause-types beyond the usual *if*/*when*-clauses and their interaction with quantification.[1]

In this paper, I will present and analyze data concerning the availability of donkey-anaphora with indefinites in complex conditionals (*unless*, *only if*, *even if*). Throughout, I will hold certain assumptions constant which I lay out in Section 1. Roughly, I adopt Heim's (1990) "semanticky" situation-based approach to adverbial quantification that treats indefinites as existential quantifiers and takes donkey pronouns to be E-type pronouns. Within this framework, I briefly propose a semantics for complex conditionals (Section 2), and sketch an account of why indefinites in complex conditionals are generally not available for donkey-anaphora (Section 3). In the central part of the paper, I then investigate the respective roles of focus and syntactic scoping in the derivation of the domain of adverbial quantifiers. In Section 4, I show how focus can make indefinites in complex conditionals available for donkey-anaphora after all. And finally in Section 5, I explore the respective bragging rights of focus and syntactic scoping.

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[1]Lycan (1984) and Geis (1985) are the only references that I am aware of that have similar ambitions. On the whole, they do not seem to take into account the foral semantic literature on adverbial quantification.

1. The Framework Assumed

The Lewis-Kamp-Heim account of donkey-sentences sketched in the introduction breaks with tradition in many respects: especially with its new type of unselective binding and the unorthodox view of indefinites as introducers of free variables rather than as existential quantifiers. As mentioned there, a more conservative approach would treat the adverb as quantifying over one variable only: events, times, or situations, states of affairs, circumstances, conditions, whatever we want to call it.[2] Such an account may also rescues the traditional intuition that indefinite noun phrases have existential force. The most sophisticated version of this line of research is represented by Berman (1987) and Heim (1990) who suggest that adverbs of quantification quantify over situations. They adopt the framework of situation semantics developed by Angelika Kratzer (1989b) to handle problems of counterfactual reasoning.[3] There situations are parts of possible worlds and propositions are reconstructed as sets of situations (intuitively, those situations in which the proposition is true).

Modulo the interpretation of the pronouns and some refinements, this gives (1) the logical form in (3).

(3) a. Often$_S$ [$_S$ a farmer owns a donkey] [$_S$ he beats it]
b. "Many situations in which there is a farmer and there is a donkey that the farmer owns are such that he beats it."

What can we do with the pronouns in the matrix clause? The situation-based approach takes recourse to the theory of pronouns as disguised definite descriptions (Cooper 1979, Evans 1980). Let me be non-committal as to any specific implementation of the E-type approach (for some discussion of the choices see Heim 1990, Neale 1990, and Chierchia 1991). The logical form for (1) is then amended to (4).

(4) a. Often$_S$ [$_S$ a farmer owns a donkey] [$_S$ the farmer beats the donkey]
b. "Many situations in which there is a farmer and there is a donkey that the farmer owns are such that the farmer beats the donkey."

One last modification has to be made. In her dissertation, Heim had argued very forcefully against the E-type construal of donkey pronouns using among others her now famous sage plant example, a conditional version of which is given in (5).

(5) If someone buys a sage plant here he usually buys eight others with it.

The problem of course is that there won't be a unique sage plant that the definite description hidden in the E-type pronoun can felicitously refer to. The situation-based account has an answer to this problem. Berman (1987) suggested having the

[2] An early proposal along these lines was made by Greg Stump (1981, 1985).
[3] At this point, I will not attempt any comparison with the "West Coast" theory of situation semantics (Barwise & Perry 1983, etc.).

adverb quantify solely over the minimal elements in the set of situations supplied as its first argument. The quantificational adverb *always*, for example, will take two sets of situations and will demand that all the miminal situations in the first set are part of a situation in the second set. The new paraphrases for the sage-plant example and for our stock example are given in (6).

(6) a. "Most of the minimal situations in which someone buys a sage plant here are part of a larger situation in which that someone buys eight other sage plants with the one in the minimal situation."
b. "Many of the minimal situations in which there is a farmer and there is a donkey that the farmer owns are are part of a larger situation in which the farmer beats the donkey."

Since we plan to integrate all sorts of conditionals into the picture, we need to be clear about what conditionals are doing in adverbially quantified sentences. The conventional wisdom is that *if*-clauses provide the domain of quantification, they restrict the adverb of quantification. I would like to spell this out in a way that can be extended to account for other types of conditionals.

First, I will assume that adverbs of quantification denote relations between sets of situations. That is, adverbs of quantification can be treated as quantifiers in the tradition of generalized quantifier theory (for detailed discussion the reader is referred to Schwarzschild 1988, 1990, and de Swart 1991). For example, *always* will denote the subset relation (modified to allow for Berman's minimality trick).

The first argument of the quantifier is special. Adopting a suggestion by Mats Rooth (1985, 1989, 1991), I assume that the first argument of an adverb of quantification is a free variable C that can be restricted in various ways: explicitly by an *if*-clause, or implicitly by accommodating presupposed material.[4]

The second argument of the adverbial quantifier is supplied by the matrix clause minus the adverb. The general schema for the interpretation of adverbially quantified sentences with a restrictive *if*-clause is given in (7). Example (1) is now analyzed as in (8).[5]

(7) **if** R Q [C] [M] = Q [C ∩ R] [M] =
Q-many of the minimal situations in C ∩ R are part of a situation in M.

R:	the antecedent proposition used to restrict C
Q:	the interpretation of the adverb of quantification
C:	the set of currently relevant circumstances
M:	the interpretation of the main clause minus the adverb

[4]Assuming C to be a variable over sets of situations is a simplification. Angelika Kratzer (1978) has shown that the first argument, the conversational background in her terminology, is actually of a higher type. Non-trivial issues are at stake here and this is one of the most pressing needs for further elaboration.

[5]Another issue that I skirt here concerns the question of compositionality of the treatment in (11). Obviously, the conditional opertaor here magically operates inside the internal structure of the expression it combines with syntactically.

(8) a. [**if** (∃x ∃y (farmer(x) owns donkey(y))],
many [C] [the farmer beats the donkey].

b. "Many of the minimal situations in the set of currently relevant situations in which there is a farmer and there is a donkey and the farmer owns the donkey are part of a larger situation in which the farmer beats the donkey."

2. The Semantics of Complex Conditionals

Next we will have to specify what exactly the different kinds of complex conditionals (*unless*, *only if*, *even if*) mean.

2.1 *Unless*

What about *unless* under this perspective? In numerous textbooks and grammars we can find the traditional view that *unless* is equivalent to *if...not*. A typical example like (9a) is paraphrased by (9b).

(9) a. I will leave *unless* Bill calls soon.
b. I will leave *if* Bill does*n't* call soon.

Taken together with the semantics for *if* as marking a restrictive operator on the domain of an adverbial quantifier, this would suggest that *unless* is a subtractive or exceptive operator on quantifiers. Something along the lines of (10) seems called for. The example in (9a) then gets a paraphrase as in (11)

(10) **unless** R, Q [C] [M] = Q [C - R] [M]

(11) "All of the minimal situations in the set of currently relevant situations except the ones in which Bill calls soon are part of a larger situation in which I leave." (modulo modality and tense)

In von Fintel (1991) I discussed in some detail the advantages of this approach to the meaning of *unless*, which can be traced back to Geis (1973). I argued there not only that *unless* is a subtractive operator on quantifier domains, but also that there is an additional implicature: the *unless*-clause states the only exception to the quantified proposition. The *except*-paraphrase employed in (11) almost captures that ingredient. As far as I can see, this uniqueness implicature does not interact with donkey-anaphora, which is why I will ignore this complication here.

2.2 Focus Adverbs + *If*

The guiding principle in our dealings with *only if*- and *even if*-conditionals will be that in them the focus adverbs *only* and *even* have the same meaning that they have in cases where they are attached to non-conditional statements. That is we should be able to take a semantics for the focus adverbs *only* and *even* and

combine it with a semantics for *if*-clauses and get as a result a satisfactory analysis of *only if* and *even if*-conditionals.[6]

As far as the semantics of focus is concerned, I will stay fairly informal at this point and trust that my suggestions here can be spelled out in more detail in either Rooth's (1985, 1989, 1991) alternative semantics or the structured propositions approach of Krifka (1991, 1992) and others. All we need to assume for now is that focussing evokes a set of relevant contrasts to the focussed item. There are relevant contrasts to individuals, to properties, to propositions, etc. The sentence *JOHN stole the book* evokes a set of relevant contrasts to John, presumably other possible culprits. The sentence *John SWIMS* evokes a set of relevant contrasts to swimming, perhaps other exercise activities. The sentence *The SUN'S shining* might evoke a set of relevant contrasts to the proposition that the sun is shining, perhaps other possible weather conditions. I will use the following notation: $X \approx \alpha$ to mean that X is a relevant contrast to the denotation of the expression α. For example, $X \approx$ **John** means that X is a relevant contrast to the denotation of *John*, presumably someone named John.

2.3 *Only + If = Only If*

The semantics I will assume for *only* is this: it asserts that the focussed item is the only one from the set of relevant contrasts that can be truthfully combined with the rest of the sentence. There is in addition an implicature that the sentence without *only* is true.[7] For a sentence like (12a) this will give us roughly the semantics in (12b).

(12) a. John only SWIMS.
b. $\forall X_{\approx \textbf{swim}}$: X(**j**) → X=**swim**
Implicature: John swims.

That is, (12a) will be true iff the only property comparable to swimming that truthfully applies to John is swimming itself: if John does anything it all, it is only swimming. In addition, it is implicated that John does in fact swim.

What happens when we combine this with our semantics for conditionals? What is the meaning we get for (13)?

(13) Only if you help me will I do the dishes.

Let us assume for now that what is focussed in (13) is the complement of *if*, that is the clause *you help me*. What we get is (14).[8]

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[6]In this I agree with the sentiments expressed by Lycan (1991). An early attempt at analyzing *only if* into *only* and *if* can be found in McCawley (1974).

[7]This is the standard treatment as argued for by Horn (1969).

[8]The inner quantifier in (OJ) represents the universal quantification over situations triggered by the modal *will*. Note that the semantics proposed here seems to predict that *only if*-conditionals will be uncomfortable with left-monotone increasing adverbial quantifiers. The reason is that they will make it almost impossible for there to be a uniquely adequate restrictor set. I will leave detailed discussion of this for a future occasion.

(14) $\forall X_{\approx \textbf{you help me}}$: $\forall$(C$\cap$X,**I do the dishes**)$\rightarrow$X=**you help me**
Implicature: If you help me, I will do the dishes.

What (14) says is that the only circumstance in which I will do the dishes is one in which you help me.

2.4 *Even + If = Even If*

The semantics I will assume for *even* is this: it implicates that there is a property from the set of relevant contrasts to the focussed item that was more likely to be able to be truthfully combined with the rest of the sentence than the focussed item itself.[9] For a sentence like (15a) this will give us the semantics in (15b).

(15) a. John even SWIMS.
b. John swims.
Implicature: $\exists X_{\approx \textbf{swim}}$: **swim**(**j**) $<_p$ X(**j**)

That is, (15a) will be true iff John swims. There is an additional implicature that there is a property comparable to swimming that was more likely true of John than swimming itself.

What happens when we combine this with our semantics for conditionals? What is the meaning we get for (16)?

(16) Even if you help me I won't do the dishes.

Let us again assume that what is focussed is the complement of *if*, that is the clause *you help me*. What we get is (17).

(17) If you help me I won't do the dishes.

Implicature:
$\exists X_{\approx \textbf{you help me}}$: **no**(C$\cap$**you help me**,**I do the dishes**)
$<_p$ **no**(C$\cap$X,**I do the dishes**)

The implicature of (17) is that there are circumstances other than your helping me in which it is even more likely that I won't do the dishes.

3. Complex Conditionals and Donkey-Anaphora

We now embark on our investigation of the interaction of complex conditionals and donkey-anaphora. The first observation is that in general the possibility of donkey-anaphora seems severely limited with complex conditionals. The crucial data are given in (18) and (19).

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[9]The proper semantics for *even* is in much more dispute than the one for *only*. Some of the relevant references are: ... I am staying at a fairly superficial level of analysis at this point and hereby apologize to the true connoisseurs.

(18) a. If a farmer owns a donkey, he often beats it.
b. {*Unless / *Even if} a farmer owns a donkey, he often beats it.
c. {*Only if / *If and only if} a farmer owns a donkey, does he often beat it.

(19) a. If anyone objects, I will talk to him.
b. {*Unless / *Even if} anyone objects, I will talk to him.
c. {*Only if / *If and only if} anyone objects, will I talk to him.

Our theory should not be too successful in deriving the illformedness of donkeys with complex conditionals, however. The data in (20) show that if material in the conditional other than the indefinite is focussed the indefinite can serve as the antecedent for a donkey pronoun in the matrix.

(20) a. {Unless / Even if} a farmer is RICH, he shouldn't beat his donkeys.
b. {Only if / If and only if} a farmer is RICH, should he beat his donkeys.
c. {Unless / Even if} you {*own / √OWN} a donkey, you shouldn't beat it.
d. {Only if / If and only if} you {*own / √OWN} a donkey, should you beat it.

The challenge for the general theory of donkey-anaphora and for the semantics of conditional clauses then is to explain (i) the general unavailability of donkey-anaphora in complex conditionals and (ii) the possibility of donkey-anaphora in special circumstances. In this section, I will lay out why donkey-anaphora is generally impossible with complex conditionals. In the Section 4, I will turn to the cases in (20).

3.1 *Unless*

Why do *unless*-clauses not allow donkey anaphora? It is important to realize at this point that within the framework assumed here the availability of donkey-anaphora is not a question of syntactic or semantic scope. Instead, the operative question is: *Is there an appropriate entity in the antecedent situation to refer back to with a disguised definite description*? Consider now the contrast in (21).

(21) a. If anyone objects, I will talk to him.
b. *Unless anyone objects, I will talk to him.

Take (21a). The donkey pronoun *him* in the main clause is interpreted as an E-type pronoun, as a disguised definite description, something like *the man who objects* or *the objector*. This interpretation meshes successfully with the meaning of the rest of the sentence, which as a whole can be paraphrased as "All of the

minimal situations in which someone objects are part of a larger situation in which I will talk to the objector".

The analysis for (21b) with the *unless*-conditional will be something like (22).

(22) a. $\forall$(C-{s| $\exists$x (x objects in s)}) (I talk to the objector)

b. "All of the minimal situations in the set of currently relevant situations except the ones in which someone objects are part of a larger situation in which I talk to the objector".

This is patently nonsensical. In a situation where no one objects there is no objector to talk to. More precisely, the E-type pronoun carries an existence presupposition: simply that in each of the cases considered there exists an objector. The *unless*-clause on the other hand removes exactly those situations where there is an objector from the domain of quantification. The presupposition of the E-type pronoun therefore cannot be fulfilled. (21b) then is deviant because of a presupposition failure.

3.2 'Only if'

What is wrong with (23)?

(23) *Only if someone objects will I talk to him.

(24) a. $\forall X_{\textbf{=someone objects}}$: $\forall$(C$\cap$X,**I talk to the objector**) $\rightarrow$X=**someone objects**

b. "The only type of situation comparable to ones where someone objects which is such that in all of those situations I talk to the objector are those in which someone objects".

Of course, (24b) is kind of hard to parse. But a moment of reflection will reveal that our sentence (23) asserts as a whole what is already presupposed by one of its parts. The E-type prounoun *him*, interpreted as 'the one who objects', already presupposes that all of the situations under consideration are such that there is an objector. Saying that the only situations in which I will talk to the objector are such that someone objects in them is dangerously redundant. Is this enough to make this as ungrammatical as it is? This is what Robert Stalnaker has to say:

> "The boundaries determined by presuppositions have two sides. One cannot normally assert, command, promise, or even conjecture what is inconsistent with what is presupposed. Neither can one assert, command, promise or conjecture what is itself presupposed. There is no point in expressing a proposition unless it distinguishes among the possible worlds which are considered live options in the context." (Stalnaker 1972: 388)

This would mean that there is no point in uttering (23). But is that enough to make it ungrammatical? After all, we all are guilty of making useless utterances every now and then without therefore being classified as incompetent speakers of English. The argument in the case of (23) would have to be that it is structurally pointless, in some sense of 'structurally'. The issue is a vexing one and recurs frequently in semantic accounts of ungrammaticality.[10] In the absence of a better account for the illformedness of (23) I will rest my case for now.

3.3 *Even If*

What's wrong with (25)? According to our semantics, (25) will have the implicature in (26).

(25) *Even if anyone objects I will talk to him.

(26) $\exists X_{=\textbf{someone objects}}$: **all**(C∩**someone objects**,**I talk to the objector**)
$<_p$ **all**(C∩X,**I talk to the objector**)

This implicature is nonsensical. The set of relevant contrasts to anyone's objecting will presumably be made up of alternative situations in which no one objects. None of those can be more likely to be such that I will talk to the one who objects than the ones in which someone actually does object. Again, the E-type pronoun already presupposes that all the situations considered contain an objector, hence a set of contrasting situations where no one objects will be useless. And again, we have to resort to vigorous hand-waving to get from this built-in pragmatic anomaly to the ungrammaticality of (26).

4. Focus-Induced Constraints on Domains

We will now have to deal with the data in (20), which show that if material in the conditional other than the indefinite is focussed the indefinite can serve as the antecedent for a donkey pronoun in the matrix. How come?

(20) a. {Unless / Even if} a farmer is RICH, he shouldn't beat his donkeys.

b. {Only if / If and only if} a farmer is RICH, should he beat his donkeys.

c. {Unless / Even if} you {*own / √OWN} a donkey, you shouldn't beat it.

d. {Only if / If and only if} you {*own / √OWN} a donkey, should you beat it.

[10] A prominent example is Barwise & Cooper's (1981) attempt of reducing the definiteness effect in existential sentences to a presupposition clash, cf. the criticism in Keenan (1987). Similarly, von Fintel (1992) motivates the co-occurrence restrictions of exceptive operators by the observation that the ungrammatical collocations would automatically result in contradictions. See Ladusaw (1986) for some general discussion of 'semantic filtering'.

4.1 *Unless*

Here's my story. What is the difference between the cases where donkey anaphora is unavailable and those where it is o.k.? Let us meditate on the specific contrast in (27).

(27) Unless you $\begin{Bmatrix} *\text{own} \\ \sqrt{\text{OWN}} \end{Bmatrix}$ a donkey, you shouldn't beat it.

Why should stress on the verb make it possible that the object is available as an antecedent for a donkey pronoun? After all, *unless* will still remove all the situations where you own a donkey. Where is the donkey that *it* refers back to?

The intuition I will develop is that the focus on the verb signals that we are contemplating alternative relations between you and a donkey, and we are saying that none of those except the ones that are owning relations entitle you to beating it. The donkey will exist in all the situations considered. Hence the donkey pronoun is licit.

Assume that, following Rooth (1985 etc.), in the interpretation of *you OWN a donkey*, we compute not only the ordinary denotation $[\![$ *you own a donkey* $]\!]^o$, but also the set of relevant contrasts to the ordinary denotation, call it $[\![$ *you OWN a donkey* $]\!]^p$. In terms of our earlier notation this will turn out to be the set $\{X: X \approx [\![$ *you own a donkey* $]\!]^o\}$.

What use is this set? Well, it seems to be the set of alternatives being talked about. A natural move now would be to say that the first argument C of the adverbial quantifier modified by the *unless*-conditional is identified with or restricted to this set of alternatives. The proposal is seen in (28).

(28) **unless** $[\![R]\!]^o$, $Q\,[C]\,[M] = Q \mid C - [\![R]\!]^o \mid [M]$

Focus-induced constraint: $C \subseteq [\![R]\!]^p$

If the donkey is supposed to exist in every situation in $[\![R]\!]^p$, we have to be very careful about what to admit into the set of relevant contrasts to the owning-relation. If we consider all possible binary relation between a person and a donkey there will be lots and lots of those and in particular many that do not entail the existence of the donkey. For example, this is a binary relation between me and a donkey: "living in the same century as an artist who painted a picture of". This problem is discussed in by Rooth (1991). For our stock example, that means that the domain of quantification will have to be all those situations that contain you standing in an owning-type relation (borrowing/leasing/renting/etc.) to a donkey. From now on, I will assume that $[\![R]\!]^p$ is the set of relevant contrasts, however that is computed.

4.2 *Only If* and *Even If*

The explanation of the contrasts in (29) runs along the same lines.

(29) a. Only if you $\left\{\begin{matrix}\text{*own} \\ \surd\text{OWN}\end{matrix}\right\}$ a donkey, should you beat it.

b. Even if you $\left\{\begin{matrix}\text{*own} \\ \surd\text{OWN}\end{matrix}\right\}$ a donkey, you shouldn't beat it.

The evoked set of alternative situations to your owning a donkey will be comprised solely of situations where there is in fact a donkey that is owned/borrowed/leased. Hence, the E-type pronoun *it* will succesfully refer.

4.3 A Mystery: Narrow CN-Focus

Consider the contrast in (30), which should be read under narrow focus on the common noun *donkey* as indicated by the context sentence.

(30) Farmers around here in New England are pretty nice to their pack animals.

a. Only if a farmer owns a DONkey does he beat it.
b. Even if a farmer owns a DONkey he doesn't beat it.
c. ??Unless a farmer owns a DONkey he doesn't beat it.

d. Only if it's a DONkey that a farmer owns does he beat it.
e. Even if it's a DONkey that a farmer owns he doesn't beat it.
f. ?Unless it's a DONkey that a farmer owns he doesn't beat it.

Under the intended interpretation the focus on the common noun should evoke a contrast set of pack animals. The E-type pronoun should be able to refer to the pack animal that a farmer owns. It seems that this is indeed available with the *only if-* and *even if*-conditionals. But something still obstructs the successful pack animal-anaphora with *unless*-clauses. This is a mystery to me.

4.4 Focus and *If*-Conditionals: The Proportion Problem

Does the semantics of *if* have to be focus-conscious, too? There are suggestions in the literature that say yes. The question arises in the context of the so-called 'proportion problem', which is a serious problem for the unselective binding approach to donkey anaphora. The crucial observation is that there is a prominent reading of (31) that does not quantify over farmer-donkey pairs but over donkey-owning farmers. The empirical test consists in judging whether a very rich farmer owning hundreds of donkeys would tip the balance. The consensus is that there is a reading where it doesn't matter how many donkeys a farmer owns: we are just quantifying over donkey-owners.

(31) If a farmer owns a donkey, he is happy.

The problem is of course that any unselective approach would have the higher operator bind both indefinites in the restrictive *if*-clause, thus predicting that (31) is counting farmer-donkey pairs. A way of selecting the correct quantifiees is needed.

There are quite a variety of ideas on the market on how to deal with this selection problem. Kratzer (1989a) and Diesing (1990) suggest that only indefinites that can be scrambled outside the VP can be captured.[11] Chierchia (1991) appeals to a process of topic-selection, so far unreduced to other mechanisms. All of these bear a close relation to focus phenomena. Let me sketch how a focus-sensitive semantic rule for conditionals would fare with the proportion problem.[12]

Within a situation-based approach, the task boils down to finding a principled way of deriving the set of situations specified in (32), from Heim (1990), as the domain of quantification.

(32) {s: ∃x[x is a farmer in s &
∃s'[s ≤ s' & ∃y[y is a donkey in s' & x owns y in s']]]}

The minimal situations in the set of situations in (32) will contain a farmer and not much else. All of them will be extendable into bigger situations containing donkeys that the farmer owns. Any of the farmers quantified over will therefore be donkey-owners. But the number of donkeys owned plays no role for the evaluation of the quantified statement. The desired farmer-donkey asymmetry is achieved. Heim (1990) derives (32) via syntactic manipulations at LF. Can we get the same result by using the focus story?

Let's assume, maybe not too recklessly, that there is focus on the verb phrase in the asymmetric reading of (31).[13] The input to the semantics therefore will be (33).

(33) If a farmer [owns a donkey]$_F$, he is happy.

Try this on for size. The presupposition value for the complement of *if* will be all the situations containing a farmer where the farmer has some property in the contrast class of donkey-owning. Now, we could say that this set is pared down further by making sure that all these situations are **part** of a situation where the farmer owns a donkey. This will weed out all the non-donkey-owning farmers. But the domain of quantification are still just situations with a farmer and some property. This will mean that the adverb will in fact quantify over farmers, The proposal in (34) is what we seem to need. Sentence (31) under the asymmetric reading will be interpreted as in (35).

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[11] Diesing only applies the account to indefinites in the matrix, while Kratzer extends the mechanism to tackle the proportion problem.

[12] At this point, a comparison with the related approach proposed in Krifka (1992) is called for but cannot yet be offered.

[13] This assumption needs to be investigated in detail by looking at different verb classes and different focus assignments.

(34) **if** $[\![R]\!]^{o}$ Q [C] [M] = Q [C ∩ {s | ∃ s'(s' ≥ s & s' ∈ $[\![R]\!]^{o}$)}] [M]

Focus-induced constraint: C ⊆ $[\![R]\!]^{p}$

(35) "All of the minimal situations in the set of currently relevant situations in which there is a farmer with some property of the donkey-owning type and which are part of a situation in which there is a farmer who owns a donkey are part of a larger situation in which the farmer is happy."

We have a problem. The unfocussed existential quantifier *a farmer* from the *if*-clause will be interpreted twice, once in $[\![R]\!]^{p}$ and once in $[\![R]\!]^{o}$, Note the double occurrence of "there is a farmer..." in the paraphrase in (35). There is no guarantee that we are talking about the same farmer. In effect, any farmer will be in the domain of quantification as long as there is one donkey-owning farmer in the world. How can we make sure that only donkey-owning farmers are considered? Heim had no problems with this, since in her LF-approach there was no second occurrence of the existential quantifier. Instead, there was a trace interpreted as a bound variable. The more purely semantic account that we are pursuing here has no such option.

What we need is a relation between the farmer-situations quantified over and the farmer-donkey-owning situations that is stronger than the mere part-of relation. Within the machinery of situation semantics there is in fact such a stronger relation. Not only can we say that a proposition is true in a situation (s∈p), but we can also construct a notion of a situation being a fact that makes a proposition true, which is somewhat stronger. Building on that notion we can then use a more selective part-of relation which does the right thing for our problem. Angelika Kratzer (1990, 1991) gives the definition in (36).

(36) *Facts that make propositions true*
If s is any situation and p any proposition, then s is a fact that makes p true iff for all s' such that s' ≤ s and s' ∉ p, there is an s" such that s' ≤ s" ≤ s, and s" is a minimal situation in which p is true.

Essentially, this definition ensures that a fact that makes a proposition true does not contain any situation that doesn't contribute to the truth of the situation, it doesn't contain any irrelevant stuff. That is what we needed. The non-donkey-owning farmers do not contribute to the truth of "there is a farmer who owns a donkey". So they can be filtered out. The amended semantics for *if* is given in (37) and sentence (31) gets the paraphrase in (38).

(37) **if** $[\![R]\!]^{o}$ Q [C] [M] = Q [C ∩ {s | ∃ s'(s' ≥ s &
s' is a fact that makes $[\![R]\!]^{o}$ true)}] [M]

Focus-induced Constraint: C ⊆ $[\![R]\!]^{p}$

(38) "All of the minimal situations in the set of currently relevant situations in which there is a farmer with some property of the donkey-owning type and which are part of a larger situation which is a fact that makes it true that there is a farmer who owns a donkey are part of another larger situation in which the farmer is happy."

We have now successfully mimicked Heim's situation-based approach to the proportion problem in a way that uses focus-induced presupposition accommodation rather than LF-maneuvers.[14]

4.5 Back to 'Unless'

The focus-sensitive semantics for *unless* formulated earlier in (28) did not make reference to the elaborate notion of a fact making a proposition true. Can we harmlessly incorporate this into the meaning of *unless* in order to achieve a uniform schema for the interpretation of conditionals? Is (39) adequate?

(39) **unless** $[\![R]\!]^{o} Q\,[C]\,[M] = Q \mid C - \{s \mid \exists s'(s' \geq s \,\&$ s' is a fact that makes $[\![R]\!]^{o}$ true)$\} \mid [M]$

At the moment, I can't see anything wrong with (39).

5. The Relation Between Focus and Scoping

After having developed a fairly successful theory of how complex conditionals and donkey-anaphora interact, it is time to see what these facts tell us about the roots of semantic partition.

5.1 Focus and IP-Internal Scrambling

The crucial innovation of my account is that focus-induced contrast sets are used to restrict the domain of quantification in such a way that donkey-anaphora is made possible. Can this effect of making indefinites in complex conditionals available for donkey anaphora be achieved in a more syntactic way?

Gennaro Chierchia (1991) proposes that only indefinites that are topics are captured by adverbial quantifiers. That seems to be on the right track, see also Barbara Partee's (1991) work on the connection between topic-focus articulation and quantification. We can see my proposal as an implementation of this general idea. But there could of course be more syntactic reflexes of topic-hood that may play a more primary role. Chierchia himself just takes topic-marking as a primitive in his system, deferring discussion. Let's do some of the required work.

Molly Diesing (1990) and Angelika Kratzer (1989a) have devised a system which postulates an asymmetry between material inside the verb phrase and material higher than the verb phrase. Since they close off the VP by an operation

[14] Again, this is not the place to compare the focus-based approach to the LF-approach. Also, we will have to ignore for the moment the criticisms of the situation-based approach put forward in Chierchia (1991).

of existential closure, only indefinites that find themselves outside the VP at the crucial level (LF) remain unscathed and can be captured by a higher quantifier. Maybe we can mentally associate the VP-material with the notion of focus and the higher material with topic-hood.

Let us look at an example.

(40) Unless you $\begin{Bmatrix} *\text{own} \\ \sqrt{\text{OWN}} \end{Bmatrix}$ a donkey, you shouldn't beat it.

Assuming for the time being that we can establish a connection between focus on the verb and LF-scrambling of the object, the LFs for the sentences in (40) will look somehow like the ones in (41).

(41) a. should [unless you $\exists_X$[VP own a donkey$_X$]] [you not beat it$_X$]
b. should$_X$ [unless you a donkey$_X$ [VP own x]] [you not beat it$_X$]

The unscrambled indefinite object in (41a) gets bound off by the VP Existential Closure and cannot be captured by the quantifier *should*. In (41b), the object has scrambled and can get bound by the quantifier and the donkey pronoun is licensed too.

Superficially, this may look right, but look closer. The indefinite is still inside the *unless*-clause. And *unless* has a distinctly negative meaning. However we want to express the meaning of *unless* in this framework (it would have to subtract tuples of variable length I guess), it seems that as long as the indefinites are buried inside the *unless*-clause they won't be able to restrict the quantifier. I think that the correct LF for the well-formed sentence in (40) should be as in (42).

(42) should$_X$ [a donkey$_X$ [unless you own x]] [you not beat it$_X$]

Very well, but how did the indefinite escape the *unless*-clause? Not by syntactic movement! Like other adverbial subordinators, *unless* creates a hefty barrier against syntactic movement as (43) demonstrates.

(43) *Who will you call Kim if/when/unless/although/because you see t?

It seems then that the cases of defocussed indefinites in complex conditionals presented here offer a strong argument that focus-induced restrictions of adverbial quantifiers cannot be reduced to syntactic processes.

5.2 Deep Embeddings

Angelika Kratzer pointed out to me a type of example that can be used to show that the focus-story I have told does need to be supplemented with a scoping mechanism of some sort. Consider the data in (44).

(44) a. Unless you are absolutely sure that you OWN a donkey, you shouldn't beat it.
b. Unless you know the person who OWNS a donkey, you shouldn't beat it.
c. Unless you are wondering whether you might BUY a donkey, you shouldn't look it in the mouth.

Here, the set of relevant alternatives clearly won't be such that all of them guarantee the existence of a donkey. For example, the set of situations where you are absolutely sure that you own a donkey or are borrowing a donkey or are leasing a donkey does not invariably entail the existence of such a donkey. You may be mistaken.

It seems to me that to be grammatical the sentences in (AK) have to be read with a *de re*-interpretation of the donkey. The most popular account for *de re*-readings is of course based on scoping. What we have to do then is to scope the indefinite *a donkey* to right under *unless*. This should be possible since the islands here are of the weak sort. Compare the essentially grammatical examples of extraction out of these contexts in (45).

(45) a. ?This is a donkey that I'm absolutely sure that I own.
b. ?This is a donkey that I know the person who owns.
c. ?This is a donkey that I'm wondering whether I might buy.

Now, quite possibly the scoping is not available on the first parse of the sentences in (44). We could perhaps say that it is the existence presupposition of the E-type pronoun that triggers the scoping.

It seems then that the data in (44) offer a strong argument that the effect of syntactic scoping on the domain selection of adverbial quantifiers cannot be entirely reduced to focus phenomena. Taken together, the results presented here argue for a peaceful co-existence of the focus effects and the syntactic mechanisms. Neither can be entirely reduced to the other.

Left open is the plausible conception that in the unmarked case the two phenomena are highly correlated. Defocussing an item is then correlated with it taking a syntactic position outside of the typical focus domain, the VP. This whole area is under active investigation and promises fruitful results for the syntax and semantics of quantification.

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