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## Exeptive Conditionals: The Meaning of *Unless*

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### Introduction

In this paper I investigate the meaning of one word of English, *unless*, and its theoretical implications. In numerous textbooks and grammars we can find the traditional view that *unless* is equivalent to *if...not*.

- (1) a. I will leave *unless* Bill calls soon.
- b. I will leave *if* Bill doesn't call soon.

There are numerous empirical problems with this alleged equivalence as we will see in the next section. Various authors offer alternative paraphrases: *only if...not* (Quirk et.al. 1972: 746, Clark and Clark 1977: 457), *not...only if* (Fillenbaum 1986: 184), *if and only if...not* (Comrie 1986: 97). This plethora of proposals is especially astonishing considering the fact that there are only eight logically possible binary truth-functions.

The main claim I will defend in this paper is that *unless* cannot be treated as a truth-functional connective. Instead, its semantics has to be assimilated to the meaning given to *if*-clauses in much recent work in formal semantics, where *if*-clauses are interpreted as supplying a

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quantificational operator with a restriction on its domain. The proposal is that *unless* is a subtractive or **exceptive** operator on quantifier domains. Its semantics will be shown to be essentially parallel to that of the exceptive *but* as in (2).

(2) Every student *but* John was present.

The paraphrase of (1a) in (3) should give a feel of how this analysis treats the structure of such sentences.

(3) "All of the currently envisageable circumstances except the ones in which Bill calls soon are such that I will leave."

The analysis I will defend has much in common with the proposals in Michael Geis' pioneering paper (1973) on the differences between *if...not* and *unless*. What I will show in this paper is that Geis' intuitions can be given clear semantic content and new arguments.<sup>1</sup>

The structure of this paper is as follows. First, I will survey the characteristics of *unless*-clauses that set them apart from the blander *if*-conditionals. Then, I proceed to introduce the two main ingredients of my analysis: (i) the view of conditionals as restrictors of quantifiers, (ii) the analysis of exceptive constructions. With this machinery the semantics for *unless* is then formulated in a first approximation. Next, an added complication having to do with an additional implicature, that the exceptional circumstance is the unique exception, is discussed. Speculations and desiderata end the paper.

### The Properties of *Unless*-Clauses

In this section, I will present most of the characteristics which make *unless*-clauses special. Much of this comes from the impressive array of arguments that Geis (1973) uses to discredit the equation of *unless* with *if...not*. The presentation is wholly mine, though.

#### Etymology

Maybe surprisingly to the folk etymologist, the apparent negative prefix *un-* in *unless* is not really there. The Oxford English Dictionary states that *unless* was formed from the adjective *less* and the preposition *on* which "by want of stress" turned into the prefix *un-*. The origin of *unless*-conditionals is put in a negative polarity construction. A negative matrix clause was followed by an *unless*-clause which literally meant "on a less or lower condition, requirement, footing, etc." There seems to be a lingering preference for a negative matrix clause even today, which may just be a historical residue without theoretical significance. But then again...

<sup>1</sup>The exceptive nature of *unless* had been noticed earlier, especially in lexicographic works, presumably inspired by the correspondences between *unless* and explicit exceptives in other languages (e.g. *aufßer* in German). The main gloss in the OED entry on *unless*, for example, reads: "Except. if...not".

*'Unless' is One Word*

One obvious difference between *if...not* and *unless* is that the latter is one word. Geis (1973) had to contend with a then possible analysis where *unless* was really just a late suppletive form inserted for an *if-not* complex. Maybe we can ignore such a possibility given current assumptions (but then again...). Anyway, this superficial difference may be enough to explain a difference in anaphoric behavior of the proposition in the conditional antecedent noted by Geis. Consider the contrast in (4).

- (4) a. I'll leave unless Bill calls soon, in which case I won't leave.  
 b. \*?I'll leave if Bill doesn't call soon, in which case I won't leave.

The anaphoric *in which case* can pick up the antecedent proposition "Bill calls soon" in the *unless*-clause but we cannot ignore the *not* in the negative *if*-clause to get at the same proposition.

*Problems with Donkeys*

Quite in contrast to the observation in (4), it turns out that *unless*-clauses do not participate in certain grammaticized anaphoric processes. According to Abraham (1979), Thorstein Fretheim (1977) noticed that *unless*-clauses do not license a *then*-correlate in the matrix clause.

- (5) a. If you don't call me, (then) I'll call you.  
 b. Unless you call me, (\*then) I'll call you.

It seems then that while the proposition in the *unless*-clause is available for anaphora with *in which case*, within the immediate conditional clause-matrix clause complex the antecedent proposition is not available. Later, I will briefly sketch an explanation for this that is explored in more detail in von Fintel (1992b). Crucially, I relate the absence of a *then*-correlate to the fact that indefinites in an *unless*-clause are normally not available for so-called donkey-binding, which as far as I know has not been noticed in the literature before.

- (6) a. If a farmer owns a donkey, he often beats it.  
 b. \*Unless a farmer owns a donkey, he often beats it.

The explanation of this will have to vary with your favorite theory of donkeys; but the intuitive reason is that the situation described in the *unless*-clause is not connected to the one described in the main clause. In fact, by the very meaning of *unless* the first situation cannot grow into the second one. If the farmer doesn't own a donkey, there won't be any donkey to beat.

*'Unless' and Questions*

There seems to be some sort of suggestion in Geis' paper that there is an incompatibility between *unless* and question-formation. However, there are no relevant data presented. Brée (1985) in his defense of the equivalence of *unless* with *if...not* presents two *unless*-questions from the Brown Corpus.

- (7) a. How can we have a good city unless we respect morality?  
 b. Unless God expected a man to believe the Holy scriptures, why has he given them to him?

He notes that these questions are in fact rhetorical questions but does not elaborate on that observation. I will show later that this is a significant difference between *if...not* and *unless* and proceed to derive it from the final analysis given to *unless*-clauses.

#### *Conjoinability*

Perhaps the most striking difference between *if...not* and *unless* discovered by Geis is the fact that *unless*-clauses cannot be conjoined:

- (8) a. Prof. Arid will pass you in Linguistics 123 if you don't fail the final exam and if you don't make less than a C on your term paper.  
 b. \*Prof. Arid will pass you in Linguistics 123 unless you fail the final exam and unless you make less than a C on your term paper.

Geis sketches an explanation for this observation which will also be available in our analysis. The intuition is that an *unless*-clause states the only exceptional circumstance in which the matrix statement will not be true. Two *unless*-clauses conjoined will then lead to a contradiction.<sup>2</sup>

#### *Modification by 'Only', 'Even', and 'Except'*

As mentioned, Geis proposed that *unless* is really equivalent to *except if* and in a sense that will also be the position I defend. Another argument in favor of this is Geis' observation that *unless* cannot be further modified by *only*, *even*, or *except*. His idea is that this follows if *unless* already includes one of these operators, viz. *except*.

- (9) a. I will leave only/even/except if Bill calls soon.  
 b. I will leave (\*only/\*even/\*except) unless Bill calls soon.

#### **Conditionals as Operators on Quantifier Domains**

We now come to the first of two ingredients that will combine to allow an adequate analysis of the meaning of *unless*-clauses. Recent work in formal semantics has radically re-evaluated the syntactic and semantic status of conditional clauses. In a survey article, Angelika Kratzer (1986) sums up the main tenet of this line of research: "The history of the conditional is the story of a syntactic mistake. There is no two-place *if...then* connective in the logical forms for natural languages. *If*-clauses are devices for restricting the domains of various operators."

<sup>2</sup>A related observation (pointed out to me independently by Sabine Iatridou and Ginny Brennan) is that *unless*-clauses seem conjoinable by *or*:

- (i) I will leave unless Bill calls soon or unless there is going to be free beer.  
 I'm not sure how this can be integrated into the story I will tell later.

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*Some Background*

The intuitive appeal of this view was not lost on possibly its earliest proponent. John Wallis (1699) presented his now famous reduction of conditional judgments to categorical ones, which gave a conditional sentence such as (10a) a logical form as in (10b).

- (10) a. If the sun shines, it is day.  
 b. Every case where the sun shines is a case where it is day.

A little later, David Lewis (1975) discussed sentences of adverbial quantification like (11) and argued that “the *if* of our restrictive *if*-clauses should not be regarded as a sentential connective. It has no meaning apart from the adverb it restricts. The *if* in *always if*....., *sometimes if*....., and the rest is on a par with the non-connective *and* in *between...and*..., with the non-connective *or* in *whether...or*.... or with the non-connective *if* in the *probability that...if*.... It serves merely to mark an argument-place in a polyadic construction.” (p. 11).

- (11) Often, if a farmer owns a donkey, he beats it.

A common denominator of much of the research on these constructions assumes that at the level of representation relevant for interpretation these will all have a so-called tripartite structure consisting of a quantifier, a restriction (primarily supplied by the *if*-clause), and a matrix (the rest). One of the most important questions in the trade is what exactly is being quantified over. The standard account was pioneered by David Lewis (1975), Hans Kamp (1981), and Irene Heim (1982). The 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 the unselective quantifier.

Our example donkey-sentence (11) will then receive the logical form and the paraphrase in (12).

- (12) a.  $\text{Often}_{x,y} [a \text{ farmer}(x) \wedge a \text{ donkey}(y) \wedge x \text{ owns } y] [x \text{ beats } y]$   
 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 Situation-Based Approach*

For the purposes of this paper, I will adopt a different approach to adverbial quantification. The standard account of donkey-sentences 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. A more conservative approach treats the adverb as quantifying over one variable only: events, times, or situations, states of affairs, circumstances, conditions, whatever we want to call it.<sup>3</sup> Such an account 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 (1989) to handle problems of counterfactual reasoning. 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 (11) the logical form in (13).

- (13) a.  $\text{Oftens}_s \text{ } |_s \text{ a farmer owns a donkey} | |_s \text{ he beats it}$   
 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 and Chierchia 1991). The logical form for (11) is then amended to (14).

- (14) a.  $\text{Oftens}_s \text{ } |_s \text{ a farmer owns a donkey} | |_s \text{ the farmer beats the donkey}$   
 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 (15).

- (15) 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

<sup>3</sup>An early proposal along these lines was made by Greg Stump (1981, 1985).

suggested to have the 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 minimal 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 (16).

- (16) 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 part of a larger situation in which the farmer beats the donkey."

### *The Semantics of Conditionals*

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.

Let us adopt a suggestion by Mats Rooth (1985, 1989, 1991) who argues 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.

Slightly more technical, we will say that adverbs of quantification denote a relation between sets of situations. For example, *always* will denote the subset relation (modified to allow for Berman's minimality trick). The first argument of the adverb is a free variable *C* over sets of situations. The second argument of the adverb 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 (17). Example (11) is now analyzed as in (18).

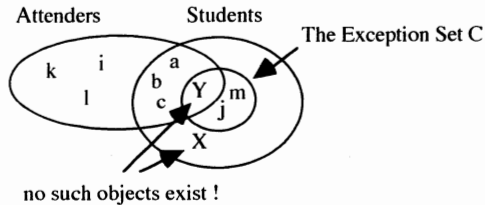
- (17) **if** R, Q | C | | M |  
 = Q | C ∩ R | | M |  
 = Q-many of the minimal situations in C ∩ R are part of a situation in M.

<p>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</p>
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- (23) Every student but John and Mary attended the meeting.



The two clauses in (22) then work together to ensure that C contains all and only the exceptions to the quantificational assertion. The Domain Subtraction clause says that C contains all the exceptions, while the Uniqueness Condition boils down to saying that C contains only exceptions. In sum, a *but*-phrase names the set responsible for the falsehood of a quantified statement. For details of the analysis and further arguments the reader should consult the cited papers. The uniqueness condition will prove useful to us very soon and that should make it easier to understand its impact.

**Finally, the Meaning of ‘Unless’**

We can now reconstruct the traditional intuition equating *unless* with *if...not*. While *if*-clauses restrict the domain of an adverbial quantifier by intersecting with the free variable C, *unless*-clauses would be treated as subtracting from C. We would propose something along the lines of (24) seems called for. The example in (1a) then gets a paraphrase as in (25).

$$(24) \quad \text{unless } R, Q | C | | M \quad \text{(to be revised)}$$

$$= Q | C - R | | M$$

- (25) a. I will leave unless Bill calls soon.  
 b. “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 (1992a), I discuss how this semantics can get us a long way towards explaining the unavailability of donkey-binding of indefinites in *unless*-clauses. What still needs explaining, however, are the facts about the rhetorical flavor of questions with *unless* and the non-conjoinability of *unless*-clauses.

*The Uniqueness Condition in the Meaning of ‘Unless’*

I will now show how treating *unless* parallel to *but* by adopting the uniqueness condition gives us the right predictions. We amend (24) to (26) and the official paraphrase for (1a) now becomes (27).

- (26) = **unless** R, Q |C| |M|  
 = Q |C - R| |M| &  $\forall S (Q |C - S| |M| \Rightarrow R \subseteq S)$
- (27) "(i) 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 and (ii) any other set of exceptional circumstances is bigger than the set of situations where Bill calls soon". (still modulo modality and tense)

*Co-Occurrence Restrictions of 'Uniqueness' Exceptives*

While the main use of the uniqueness condition in the semantics for *but*-phrases in von Fintel (1991, 1992a) consisted in its contribution to the truth-conditions of exceptive statements, it turned out to have beneficial side-effects. We will soon see how it allows an explanation of the conjunction and question facts. Before that, however, we have to discuss its effects on the co-occurrence behavior of exceptives. The crucial observation is that only universal quantifiers, negative or positive, have a unique set of exceptions (if there are any). In the papers on nominal exceptives, I used this fact to motivate/explain the co-occurrence restrictions of *but*-phrases, illustrated in (28).

- (28)  $\left. \begin{array}{l} \sqrt{\text{every}} \\ * \text{most} \\ * \text{many} \\ * \text{some} \\ * \text{three} \\ \sqrt{\text{no}} \end{array} \right\} \text{ student(s) but John attended the meeting.}$

With *unless*-clauses, the situation is a little more confused. It appears that as long as there is no modal in play the same restrictions obtain. Thus, the example in (29) seems degraded.

- (29) #Unless she is really poor, a farmer sometimes owns some donkeys.

However, strangely enough and quite baffling under the perspective of the data with *but*, examples with weak modals (presumably existential quantifiers over worlds) are perfectly fine as (30) suggests.

- (30) I may leave unless Bill calls.

What my account forces me to say is that there is in (30) a higher universal quantifier with scope over *may*, similar to the case in (31) where *unless* operates on the implicit generic quantifier and not on the narrow-scope existential quantifier over times *sometimes*.

- (31) A donkey sometimes kicks its owner, unless it has blue eyes.

What could the higher universal operator be in the case of (30)? Note that (30) is naturally continued as in (32). I think that paraphrasing (30) as in (33) does not do much damage to its semantic structure.

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- (32) ...in which case I (definitely) won't leave.
- (33) "All of the currently envisageable circumstances are such that there is a possibility that I leave in them except the ones where Bill calls, in which I definitely stay".

These speculations will, of course, have to be substantiated by a much more explicit account of how the modal and the putative higher universal interact. For now, I plan to maintain that *unless*-clauses just like *but*-phrases only operate on universal quantifiers.

*The Non-Conjoinability of 'Unless'-Clauses*

As mentioned above, Geis (1973) discovered that *unless*-clauses cannot be conjoined. He already sketched an explanation that essentially involves the uniqueness condition. Consider (34).

- (34) \*I will leave unless Bill calls soon and unless Mary asks me to stay.

If the meaning of *unless* demands uniqueness of the exceptional circumstance then (34) will be a contradiction. Bill's calling soon cannot be the only exceptional circumstance in which I won't leave at the same time as Mary's asking me to stay is also the only exceptional circumstance. In this respect, *unless* behaves exactly alike to *exceptive but* and both differ from the free exceptives (which I argue elsewhere do not incorporate the uniqueness condition). This is illustrated in (35).

- (35) a. \*Every student but Bill and but Mary attended the meeting.
- b. √Except for Bill and except for Mary, every student attended the meeting.

*The Rhetorical Flavor of Questions with 'Unless'*

Another aspect in which *unless* behaves like *but* and in which both differ from free exceptives concerns their behavior in questions. Question with *unless* and *but* are only felicitous under a rhetorical reading, while free exceptives are compatible with a truly informative reading. Consider the contrasts in (36).

- (36) a. !!How can we get there unless Bill drives us?
- b. !!Who could do this but Bill?
- c. Except for Bill, who can I call?

Again, we can employ the uniqueness condition in an account of why only the rhetorical reading is possible in (36a&b).<sup>4</sup> Recall that only universal quantifiers combine felicitously with those exceptives that impose the uniqueness condition. What that means in the context of a question is that

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<sup>4</sup>The rhetorical flavor of questions with *but* was first noticed by Horn and Bayer (1984), the contrast with free exceptives was discovered by Hoeksema (1987), and the explanation using the uniqueness condition was proposed in von Fintel (1992). The connection to *unless* is new to this paper.

there is only a very restricted space of possible answers, which is of course the hallmark of rhetorical questions. For mysterious reasons, which I will leave to experts on rhetorical questions, there is a strong preference for negative answers. So, formally permissible answers to (36b) would be *everybody* or *nobody*, and the final interpretation is that there is only one answer: *nobody*. And the same reasoning can be followed for (36a).

### Outlook on Future Tasks

I have glossed over many important details in order to convey a coherent idea of the main claim that *unless*-clauses are best analyzed as exceptive operators on quantifier domains. Some desiderata for further research are listed here.

- (i) The special problems arising with modal quantification went largely unmentioned, apart from the problem that even weak modals may have an associated higher universal operator. It remains to be seen whether there will be any problem in combining an explicit modal semantics, along the lines of Kratzer's work perhaps, with the proposals for *unless*.
- (ii) Parallel to the cases of restrictive *if/when*-clauses discussed by Carlson (1979) and Farkas and Sugioka (1983), *unless*-clauses can also restrict nominal quantifiers. Problems with anaphora in this type of sentence were already noted by Bosch (1983: 133-141), who discussed the "examination sentences" in (37) without considering the possibility that these *unless*-clauses are restricting a quantifier.

- (37) a. No one will be admitted to the examination, unless he has registered four weeks in advance.  
 b. Unless he holds a valid passport, no one will be allowed into the UK.

This kind of mixed quantification (nominal quantifier plus clausal restrictor) merits much more research.

- (iii) Another of the differences between *if...not* and *unless* noted by Geis (without any convincing explanation) was that *unless*-clauses cannot be counterfactual, as (38) demonstrates.

- (38) a. If you hadn't helped me, I would never have been able to finish on time.  
 b. #Unless you had helped me, I would never have been able to finish on time.

Why these examples should be deviant is unclear. This lack of understanding is exacerbated by the existence of well-formed counterfactual *unless*-clauses discovered by Fujita (1987).

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- (39) 'Unless you had been told to the contrary, you would in all probability have considered her to be in poor circumstances - at any rate to begin with. Who was it exactly who told you that she was well off?' (A. Christie. *The Hound of Death*, Fontana Paperbacks, 1982, p. 91)

Further research will hopefully illuminate this issue.

- (iv) A dauntingly confusing topic concerns the interaction of conditionals with polarity items. Negative polarity items cannot occur in *unless*-clauses, while they are fine in *if...not*-clauses. See Geis' examples in (40).

- (40) a. \*Unless John cares a bit for Mary, he shouldn't marry her.  
b. \*Unless John writes you much, it can only be because he has a broken arm.  
c. \*Harry will be very angry unless Jerry has spoken to Bill yet.  
d. \*Let's not speak to George unless he gave anything to charity this year.

The picture is somewhat complicated by the availability of examples like (41), unnoticed by Geis.

- (41) Unless anyone objects, we will move to the next item on the agenda.

Conversely, positive polarity items are possible in *unless*-clauses and not in *if...not*-clauses. See Geis' examples in (42).

- (42) a. Unless Bill would rather go to New Orleans, we should send him to Boston.  
b. We needn't call a shrink unless Joe is still miserable.  
c. Unless James is far taller than you said he was, he'll never play for the Celtics.

At this point, a lack of expertise and uncertainty about some of the data combine to make me shy away from making any claims about the significance of these facts.

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