Traditionally it has been held that sentences with until involve a time span. The main sentence should be a durative expression: it should be about something that takes place over an interval of time. The role of the until-phrase is to indicate how long that interval is. It has been observed that, at least on the surface, there is no single syntactic feature that all durative sentences have in common. The durative aspect can arise in a number of ways. Some examples are given in (1).

(1) (a) The princess slept until the prince kissed her.
   (b) John studied the piano until he got married.
   (c) Bill was writing a novel until he became an actor.
       (cf. "Bill wrote a novel . . .")
   (d) Guests arrived until midnight.
       (cf. "A guest arrived . . .")
   (e) The princess didn't wake up until the prince kissed her.
       (cf. "The princess woke up . . .")

In (1a) the durative aspect is due to sleep being an activity verb. Generic sentences, such as (1b), are inherently durative, so are sentences with the progressive be, as (1c), and iterative sentences such as (1d). Finally, a sentence which fails all these other criteria may nevertheless contain until in case it is negated, as shown in (1e). This is the type of sentence that I will pay most attention to in this paper.

A number of people have suggested that negation should be regarded as a durative verb. On this analysis, (1a) and (1e) are virtually synonymous. The only difference would be that (1a) describes the princess' state in positive terms while (1e) characterizes it negatively: sleeping vs. not-waking-up. Alternatively, it has been suggested that until in examples like (1e) is not the same durative until that occurs in the first four examples. There would be a second until, a negative polarity word. Furthermore, it would not be durative but punctual: it could only be used to locate events in time. According to the first way of thinking, the ungrammaticality of "The princess woke up until 9" is due to the lack of durativity; according to the second conception, the sentence is bad because the punctual until does not have the negative context it requires.

There has been a lot of discussion of these matters in the literature. The one-until theory which entails treating negation as a durative predicate, goes back at least to the OED. It has recently been promoted by Klima (1964), Smith (1970), and Heinnmäki (1974). The other view that there are two untils is often taken
in connection with arguments for a rule of Negative Transportation. See R. Lakoff (1969), Lindholm (1969), Horn (1971, 1972). This is the rule that supposedly accounts for the grammaticality of sentences such as (2) by moving the negation from the complement up to the main sentence.

(2) I don't think the princess woke up until the prince kissed her.

The disagreement about the proper analysis of until comes down to the question of what the scope of negation is in sentences such as (1e). If there is only one until, the durative one, then (1e) must have a structure where negation has narrow scope, as shown in (3a). But if the grammaticality of (2) is due to Neg-Transportation, then negation in (1e) must have wide scope, as in (3b). This in turn commits us to the view that there is a punctual until.

(3) (a)

```
S       ADV
     /     /
   NOT   UNTIL
      /     /
S      S
  the princess woke up  the prince kissed her
```

(b)

```
S       ADV
     /     /
   NOT   UNTIL
      /     /
S      S
  the princess woke up  the prince kissed her
```

There is an irreconcilable conflict here. The until-phrase in (1e) should be in the scope of negation if until is a negative polarity word, but it should be outside the scope of negation in order to modify a durative sentence. Even if we take the view that Neg-Transportation is not a syntactic rule, the facts still suggest that (1e) has the structure of (3b). We can see this clearly by comparing (2) with (4a).

(4) (a) I don't think many people came.
   (b) Not many people came.
   (c) Many people didn't come.

By uttering (2) the speaker implicates (1e), by uttering (4a) he implicates (4b), where negation is the outermost formative, not
(4c). Any simple explanation which gives us the correct implicature in (4) would not work in case of (2) unless we select (3b) with wide scope negation as our representation for (1e).

The one-until theory which assumes the structure in (3a) is probably the more popular one at this time. I am going to argue against it. It will try to establish that the correct structure of (1e) is (3b). I will adopt, with some modifications, Lindholm's (1969) suggestion that the non-durative until is basically the same as before (contra Geis 1970), but I will also try to establish what is different about them. However, before going on to discuss my own proposal, I will look at some of the motivations that underlie the one-until theory. It seems to me that the arguments that have been presented in its favor are less conclusive than what they might seem at first.

The one-until theory claims that negation makes everything durative. Even if a sentence is of the achievement or accomplishment type (Vendler 1967), its negation is durative. In addition to the facts about until, this would also explain the distribution of certain other time expressions, such as those formed with as long as, and for. Consider the examples in (5), (6), and (7).

(5) (a) The investigation will continue until all the questions have been answered.
    (b) The investigation will continue as long as there are unanswered questions.
    (c) The investigation will continue for two more years.

(6) (a) The investigation will not end until all the questions have been answered.
    (b) The investigation will not end as long as there are unanswered questions.
    (c) The investigation will not end for two more years.

(7) (a) *The investigation will end until all the questions have been answered.
    (b) *The investigation will end as long as there are unanswered questions.
    (c) *The investigation will end for two more years.

In (5), the adverbials formed with until, for, and as long as indicate how long the investigation continues. The contrast between (6) and (7) seems to show that negation brings with it the durative aspect that time adverbials of this sort require.

However, there are facts which go against this idea. Consider the examples in (8) which I owe to W. Cantrall.

(8) (a) The princess slept to 9 o'clock.
    (b) *The princess woke up to 9 o'clock.
    (c) *The princess didn't wake up to 9 o'clock.
The time adverbial to 9 o'clock in (8a) is clearly durative, it indicates how long the princess slept. As we would expect, (8b) with a punctual verb is ungrammatical, but so is (8c). In this case negation does not seem to make the sentence durative as the one-until theory requires. Another failure of the same sort is given in (9).

(9) (a) How long did the princess sleep?
(b) *How long did the princess not wake up?

As the examples in (10) show, while combines with durative sentences to form expressions that designate stretches of time. Note that (10c) should be grammatical if it is really the case that an achievement sentence becomes durative when it is negated. As (10b) shows, it is not the presence of negation as such that makes (10c) bad. The same facts hold for expressions formed with during the time (when).

(10) (a) I washed the dishes while you slept.
(b) I washed the dishes while you were not in the kitchen.
(c) *I washed the dishes while you didn't wake up.

The data in (8), (9), and (10) indicate to me that there is no clear factual support for the position that negation is a durative predicate which is the central thesis of the one-until theory. In the following I will try to show that there are a number of syntactic facts that force us to recognize the existence of a punctual negative polarity until. Consider first the examples in (11) which are similar to those discussed by Horn (1972).

(11) (a) The princess slept until 9 \{\at the latest \} \{\at the earliest\}.
(b) The princess didn't wake up until 9 \{\at the latest \} \{\at the earliest\}.

Horn's grammaticality judgements are unquestionably correct, but the data seem hard to interpret at first. Fortunately there are other similar cases where the until in (11a) and the until in (11b) go their separate ways. Consider the data in (12), (13), and (14).

(12) (a) The princess slept only until 9.
(b) *The princess didn't wake up only until 9.

(13) (a) The princess slept until 9 \{\or more \}.
(b) *The princess didn't wake up until 9 \{\or more \}.

(14) (a) The princess slept until 9 and beyond.
(b) *The princess didn't wake up until 9 and beyond.
These examples show rather clearly that, in the (a) sentences above, until 9 designates the end point of an interval which in principle could have lasted longer, as in (12a), or which may in fact have lasted longer, as in (13a) and (14a). The impossibility of qualifying any of the (b)-sentences above in this manner seems to indicate that there until 9 does not mark the endpoint of any interval. Instead it designates the time when the event in question took place. If we look at Horn's examples in (11) in this light, they begin to make some sense, although I am still puzzled by the fact that at the latest and at the earliest play such different roles.5

Smith (1970) and others have commented on the ambiguity of sentences such as (15).

(15) The princess didn't sleep until 9.

The one-until theory claims that the two interpretations of (15) differ with respect to scope of negation. On this analysis, (15) could have either the structure (16a) or (16b).

(16) (a)

```
(16a) corresponds to the analysis given to (1e) in (3a). Since sleep is durative, (15) can also be analyzed as in (16b). Because of the punctuality of wake up, (1e) cannot have the corresponding structure in (3b). Hence (15) is ambiguous while (1e) is not.

This is a very seductive, indirect argument for representing (1e) as in (3a), but I believe it is mistaken. With respect to (15), it seems to me that its syntactic structure is essentially that of (16b) on both readings. The ambiguity is due to something else than the scope of negation. Consider (17).

(17) I don't think the princess slept until 9.

(17) can conversationally implicate (15) in either of its two readings. This fact we have no natural explanation for unless
negation in (15) has wide scope under both interpretations. The ambiguity of (15) is due to the fact that many seemingly stative sentences, such as "the princess slept" also admit a punctual, inchoative interpretation: "the princess began to sleep". Unfortunately, it is not clear where and how that distinction is to be made formally. In certain environments, the inchoative reading is the only one available. For example, this is the case in adverbial phrases formed with before, after, or either kind of until. In (18), the phrase "the princess slept" picks out the moment at which the princess fell asleep.

(18) The frog waited until the princess slept.

On the other hand, (19) seems ambiguous in that it permits both an inchoative and an accomplishment reading of "the princess slept".

(19) The princess slept before the Queen left the room.

That is, (19) could mean that the princess fell asleep before the Queen departed or it could mean that she took a nap.

The clearest evidence that it is this aspectual ambiguity that is involved in (15) emerges from similar sentences with verbs like stay, remain, and last. These verbs are exclusively durative since their presuppositional properties preclude any inchoative interpretation. With such verbs, examples of the sort in (18) are ungrammatical, and those of the kind in (15) are unambiguous. This is shown in (20).

(20) (a) *The frog waited until the party lasted.
(b) The party didn't last until morning.

(20b) makes sense only as a negation of "the party lasted until morning".

I conclude from this that the ambiguity in (15) has nothing to do with the scope of negation, it hinges on the possibility of taking "the princess slept" either in a durative or in an inchoative sense. The facts about (17) suggest that negation in (15) has wide scope under both readings, that is, (16b) is the correct structure in both cases.

Let us now consider the semantics of the two untils. As the examples in (12)-(14) show, a durative until-phrase indicates the minimum length of an interval. For (21) to be true, Nancy must have remained a spinster at least until 1974.

(21) Nancy remained a spinster until 1974.

In addition (21) suggests that Nancy got married in 1974 but this is a matter of conversational implicature, not something that follows from the truth conditions for (21). There is nothing
semantically anomalous about examples like (22).

(22) Nancy remained a spinster until she died.

Contrary to what the one-until theory predicts, there appears to be a difference between the durative and the punctual until in this respect. Compare (23) with (22).

(23) ?Nancy didn't get married until she died.

Unlike (22), (23) conflicts with the understanding that only living people can marry. I take this to mean that, in contrast to (21) and (22), (23) and (24) commit the speaker to the view that Nancy eventually entered matrimony.

(24) Nancy didn't get married until 1974.

It is interesting to observe that (24) with before instead of until would carry no such commitment. Furthermore, (23) with before would not be at all strange or contradictory. Consider also the two examples in (25).

(25) (a) I won't marry you until my mother dies.
    (b) I won't marry you before my mother dies.

By uttering (25a), I commit myself to marrying you when my mother dies. By uttering (25b) I may well create a strong expectation on your part that I will do just that, but strictly speaking I have not promised anything.

In all of the examples above, the role of the until-phrase is not to pick the precise moment at which something takes place. It marks the beginning of an interval during which the event must transpire. In case the time expression is something that sounds precise, like "until 9 o'clock", we are led to believe that this interval is short. However, in a case such as (25a) and (26) it is easy to see that the stretch of time on which the event is to be located is in principle open-ended.

(26) Nancy didn't marry until she met Henry.

(26) does commit the speaker to the view that Nancy eventually got married but it leaves open the possibility that this may have taken months or years of courtship. Note that this is not something peculiar to until but applies to many other time adverbials as well. Consider (27)

(27) I will marry you when my mother dies.

(27) is a promise to marry but it sets no date for the wedding. After my mother's death, how long can I postpone the marriage without breaking the promise? This is a question to be decided
in a court of law, not at a linguistic meeting. Back to the semantics of until. A statement with the punctual until gives rise to two kinds of inferences. (28) commits the speaker to both (29a) and (29b).

(28) The princess didn't wake up until 9.

(29) (a) The princess didn't wake up before 9.
(b) The princess woke up at 9 (or shortly thereafter).

We would like to know now what the inferences from (28) to (29a) and (29b) are based on. Are they entailments or is there a presuppositional relation involved?

The usual negation test for distinguishing presuppositions from entailments cannot be applied directly because of polarity problems: (28) has no natural negation. However, we can use the test indirectly by constructing sentences that presuppose the falsity of (28). In that way we can determine what the negation of (28) would mean if we were able to construct it. Consider (30a) and (30b).

(30) (a) I wish the princess hadn't woken up until 9.
(b) If the princess hadn't woken up until 9, the Queen would have been much happier than she was.

Both (30a) and (30b) contain (28) in a subjunctive form and thus presuppose its falsity. What assumption does the speaker have to make to satisfy this presupposition? It appears that, in assuming the falsity of (28), one assumes the truth of (31), which in turn is the negation of (29a).

(31) The princess woke up before 9.

Our problem with the punctual until comes down to this: how can we explain that (28) commits the speaker to the view that the princess woke up at 9 (or shortly thereafter) while its negation would commit him to the view that she woke up before 9?

The situation with the durative until is somewhat different. Consider the examples in (32).

(32) (a) I wish the princess had slept until 9.
(b) I wish the princess had slept only until 9.

Unlike (30a), (32a) does not commit its speaker to the view that the princess woke up sometime before 9. This can be seen in (32b) where the effect of adding only is to suggest that she in fact slept longer. This is one more difference between the durative and the punctual until.

I will now outline my proposal for the punctual until. The basic idea is this: there are different ways of drawing inferences from utterances. Some of the inferences we feel entitled to are
based on knowing the logical form of the sentence that was spoken, some of them are presuppositional inferences based on the knowledge of the kind of situation in which we would be entitled to say such a thing, and finally there are inferences that arise from the interplay between these two kinds. I propose that the inference from (28) to (29b) is of this third variety and that the inference from (28) to (29a) is a matter of logical form.

Now to the specifics. I assume that the logical form of (28) is the same as that of (29a), schematically as in (33).

\[
(33) \text{NOT}(A \text{ BEFORE } T)
\]

In other words, as far as plain truth conditions go, the punctual until is indistinguishable from before. This was also suggested by Lindahl (1969). It seems to me that this is the only way to make (29a) a logical consequence of (28) and to ensure that (31) follows from the falsity of (28).

The remaining problem is to explain what makes until different from before, that is, how does it come about that (28) also commits the speaker to (29b)? Note that (29b) as such cannot be a presupposition of (28). If it were, it would also be presupposed by the sentences in (30). Nevertheless, I believe that the inference from (28) to (29b) is in part based on a pragmatic presupposition contributed by the lexical item until. What is that presupposition?

It seems to me that the essence of the punctual until is lateness. In saying (28) I presume that the princess woke up and I let it be understood that this could have (or perhaps should have) happened earlier. The time period picked out by the until phrase is at the very end of the time stretch on which I would have expected the princess to have woken up. The problem is to find a way to express this idea formally. There probably are better ways of doing it, but the most convenient for me here is to phrase it as a disjunctive expression. The presuppositional properties of the punctual until are given schematically in (34).

\[
(34) \text{A sentence of the form "NOT}(A \text{ until } T)\text{" where until corresponds to BEFORE in logical form pragmatically presupposes (Karttunen 1974) }
\]

\["A \text{ BEFORE } T \lor A \text{ WHEN } T"\]

In case of (28) this means the following. In uttering (28) the speaker should assume something like (35).

\[
(35) \text{Either the princess woke up before 9 or she woke up when it got to be 9.}
\]

The idea is that the time period beginning at 9 o'clock is the very last cut of the time stretch during which we would have expected this event to occur. She was late.

We have now explained why it seems legitimate to infer both
(29a) and (29b) from (28). First of all, (28) and (29a) have the same logical form, that is, their truth conditions are identical. Secondly, by using until instead of before we bring in the presupposition in (35). (28) is admissible only in contexts where (35) is presumed. By uttering (28) the speaker thus commits himself to both (29a) and (35). The conjunction of these two expressions constitutes a Disjunctive Syllogism with (29b) as its conclusion. In other words, (29b) follows in part from what (28) asserts, in part from what it presupposes. All of this is summarized in (36) in a schematic form.

(36) English sentence: "A not until T"

Logical Form: \( \{ \neg(A \text{ BEFORE } T) \} \upharpoonright \{ \neg A \text{ WHEN } T \} \)

Presupposition: \( \{ A \text{ BEFORE } T \lor A \text{ WHEN } T \} \)

In addition to explaining something about the English until, the above analysis gives rise to some interesting cross-language observations. I cannot go into any detail here but I will try to give you some idea of what I have in mind.

First of all, in arguing that there are two untils in English, I was trying to prove something that to me, as a native speaker of Finnish, seemed obvious at the outset. Finnish, German, Latin and many other languages have one word that corresponds to the durative until in English but which cannot be used to translate the punctual until (Finn. saakka, kunnes, Ger. bis, Lat. ad). They may or may not have a word corresponding to the punctual until. Spanish on the other hand is like English in having one word, hasta, which does double duty just like until. Let us compare English, Finnish, and German. Their relationship is outlined in (37).

(37) \[
\text{until} \quad \begin{array}{c}
\text{kunnes, saakka (Finn.)} \\
\text{ennenkuin}
\end{array} \quad \begin{array}{c}
\text{bis (Ger.) DURATIVE} \\
\emptyset \\
\text{FUNCTUAL (NEG. POL.)}
\end{array}
\]

Unlike Finnish, German has no word that would correspond to the negative polarity until. However, in German there is a corresponding positive polarity word, erst. Consider the examples in (38) and their English translations.

(38) (a) Die Prinzessin wachte erst um 9 Uhr auf.
    'The princess didn't wake up until 9'
    (*Die Prinzessin wachte nicht erst um 9 Uhr auf.)
(b) Ich wünschte die Prinzessin wäre erst um 9 Uhr aufgewacht.
    'I wish the princess had not woken up until 9'

If one could translate (38a) directly to English, it would come out something like "the princess woke up only at 9". Note that, just
like its English translation, (38b) commits its speaker to the view that the princess woke up before 9 while (38a) entails that she woke up at 9. What I would like to suggest for German is that the temporal erst carries the same kind of presupposition we attributed to the punctual until in (34). However, the logical form of (38a) is the same as that of "the princess woke up at 9". In other words, in the logical form of (38a) there is nothing that would directly correspond to erst. Its only function is to bring in the presupposition of lateness.

Finnish is an interesting language in this respect because it is nicely symmetric. Not only is there a negative polarity word which corresponds to the punctual until, there is also a positive polarity word which is the exact equivalent of German erst. Consider the examples in (39).

(39) (a) Prinsessa ei herännyt ennenkuin yhdeksältä.  
"The princess didn't wake up until 9'  
(b) Prinsessa heräsi vasta yhdeksältä.  
"Die Prinzessin wachte erst um 9 Uhr auf'  

As far as I can see (39a) and (39b) are perfectly synonymous in Finnish. They both commit the speaker to the view that the princess woke up at 9 and carry the same suggestion of lateness. Under our analysis, the logical forms of (39a) and (39b) are different; however, ennenkuin and vasta have the same presuppositional properties and the resulting set of inferences is also the same.

It would be interesting to know whether the kind of analysis I am suggesting here could be adapted for other suppletive polarity doublets, such as yet/already and anymore/still. Note that these items appear in mutually exclusive sentences while ennenkuin and vasta give synonymous pairs, as in (38). It would also be interesting to know whether there are other languages which have both a positive polarity erst and a negative polarity until, or whether Finnish just happens to be an exceptionally perfect language in this respect.
Footnotes

* Many of the observations and ideas in this paper I owe to Orvokki Heinämaa. I thank her for letting me make use of them. Since we came to somewhat different conclusions, she bears no responsibility for my mistakes. I am also grateful to Frances Karttunen for enlightening me on the subtleties of English, and to C. L. Baker, William Cantrall, Thomas Godfrey, Michael Stewart, and Theo Venneman for their helpful comments.

1 In the following type of cases, an until-phrase modifies a durative sentence which does not appear in the surface structure: "I lent Harry my bicycle until tomorrow", "They promised us nice weather until Sunday". See McCawley (1973) for discussion.

2 One of Klima's examples (1964, p. 289) seems to show that conjunction reduction does not distinguish between durative and punctual until-phrases: "The nurse came in at five o'clock, until which time the patient had remained calm and hadn't even opened her eyes once". I am not sure whether this is a counterexample to the two-untils theory espoused here.

3 It may be of some interest that for two more years in (5c) and (6c) translate differently into Finnish: vielä kaksi vuotta vs. vielä kahteen vuoteen. The latter expression is a negative polarity construction which can only modify punctual sentences. Much of the same kind of argument that is given here for distinguishing between two kinds of until-phrases could be given for recognizing two types of time adverbials formed with for (NB. *The princess woke up for two years.).

4 Durative and negated punctual sentences also differ in what syntactic amalgams they give rise to. Consider the following:

The princess slept you can't guess how long.

*The princess didn't wake up you can't guess how long.


5 I also do not completely understand what at least does in sentences such as "The following forecasts will not be totally discredited until at least the Forth of July" (Newsweek, April 22, '74, p. 70).

6 As Geis (1970) points out, there are some striking syntactic differences between before and until. For example, before-clauses are reducible in a manner characteristic of comparatives: "I won't leave before you (do)" but not "*I won't leave until you'. Secondly, before-clauses can appear in connection with measure phrases while until-clauses cannot: "John didn't arrive five hours before Bill came" but not "*John didn't arrive five hours
until Bill came”. It seems to me that these facts have little bearing on the analysis presented here. Unlike the punctual until, which is a purely temporal operator, before is also used as a locative preposition, hence it can appear in a much wider range of syntactic constructions. See Heinmäki (1974) for a critique of Geis’ theory which relates until to end and before to earlier than.

7 I am aware that (34) does not adequately represent the presumption of lateness associated with the punctual until. Whatever the correct formulation of this presupposition is, it should at least entail the formula in (34). By developing this idea further, we should be able to find an explanation for facts such as the following:

(i) until OK - before awkward (examples from Michael Stewart): "After her accident, the princess didn’t leave the castle until (/?before) she was 20 years old". Here before suggests that the princess never left the castle before her 20th birthday. This conflicts with the after-phrase which puts a limit on how far into the past the relevant time period extends.

(ii) before OK - until awkward: "The president’s plane hadn’t even come to a full stop before (/?until) the band began to play". What is missing here is, of course, the presumption of lateness: the plane wasn’t late, it was the band that started playing too soon.

8 Theo Venneman pointed out to me that there are constructions in German which can be looked upon as incipient punctual usage of bis: "Die Prinzessin wachte nicht auf, bis ich sie um 9 Uhr weckte (/?bis 9 Uhr)" 'The princess didn’t wake up until when I woke her up at 9 o'clock'. This is possible only when bis is followed by a sentence.

9 Both erst and vasta translate into English as only in sentences such as

Die Prinzessin ist erst 9 Jahre alt.
Princessa on vasta 9 vuotta vanha.
The princess is only 9 years old.

There is a puzzling fact about this non-temporal use of erst/vasta/only. (38b) and its Finnish counterpart, "Toivoisin että Prinsessa oli selviytynyt vasta 9:ltä" 'I wish the princess hadn't woken up until 9', commit the speaker to the view that the princess woke up before 9. It is suprising that "Toivoisin että Prinsessa olisi vasta 9 vuotta vanha" and its German and English counterpart, 'I wish the princess were only 9 years old', commit the speaker to the assumption that the princess is more than 9 years old. This seems counterintuitive. Given the facts about the temporal erst/vasta, one would expect the last sentence to mean that the princess' age is less than 9 years. There must be an explanation for this.
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