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Negating an Ordering Relation

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1 Introduction

This paper is concerned primarily with the interaction between *until* and overt negation. In the literature, one trend of analysis classifies *until* as a special negative polarity item (NPI) which, contrary to all other temporal expressions considered sensitive to polarity, is subject to further aspectual restrictions. This is the treatment proposed in (Karttunen 1974, Linebarger 1980, Vlach 1993) *inter alia*. According to such a treatment, the contrast in (1) is explained by considering *until* an NPI, and ruling out (1b) as licensing failure. The absence of contrast in (2) is then accounted for by postulating two different words, a durative and a punctual *until*, and by imposing extra requirements on the type of verb with which the latter, i.e. the NPI, must cooccur.

- (1) a. He did not awake until the alarm went off.
b. *He awoke until the alarm went off.
- (2) a. She did not sleep until the sun rose.
b. She slept until the sun rose.

Several points make this analysis unattractive. The main weakness, acknowledged by Karttunen himself, is that, following his terminology, it leaves open the question of what causes the impression of a shift in ‘focus’ between examples (1a) and (2b), or (1b) and (2b). A further weakening point is that the common practice to split up items considered of negative polarity into a polarity sensitive part and a non-polarity sensitive one², at least in this case, produces a lexical ambiguity which is not supported by clear semantic arguments. No explanation is provided for the similarities between the two ‘different’ *untils*. Finally, as noted above, this item has to be given special status, with constraints that don’t apply to any other NPI in general, or polarity time adverb in particular, e.g. *yet*.

Another trend of analysis, that could be referred to as the tense and aspect analysis, (see Klima 1964, Smith 1975, Mittwoch’s 1977 reply to Karttunen, Hitzeman 1991 and references therein), treats *until* as a unique element. Although there are noticeable differences among these analyses, their characterization of *until* as a durative adverbial rests on the crucial assumption that negated eventualities³ are duratives.

¹Thanks go to Elisabet Engdahl, Sheila Glasbey and Janet Hitzeman for discussions and comments.

²*Any* offers a clear example in point.

³We use *eventuality* as a cover term for all aspectual types, following (Bach 1986).

The proposal put forward herein has points in common and in contrast with both trends. We argue against the double-*until* approach, showing that a unified treatment of *until* is possible once it is recognized that this item is an ordering operator, and that the characteristics of the instantiators of its arguments affect the felicity of the relation. We analyse *until* as a binary operator which orders its arguments, A and B, without imposing selectional restrictions on them. The operator is sensitive to the properties of the instantiations of its arguments, and the restrictions observed in the distribution of this item are derived from general conditions of compatibility between the roles imposed by *until* on its arguments and the characteristics of the eventualities instantiating them. The observation that the roles of arguments A and B are asymmetric enables us to account for the differences in the possible instantiators of each argument, as well as to explain the behaviour of the ordering with respect to negation.

We further argue that *until* is sensitive also to the polarity of the sentence inasmuch as it is able to interact directly with negation. This interaction produces a complex operator, obtained by function application of negation to the functor *until*. As a result, the original ordering is reversed. The impression that the perspective moves between (1a) and (1b), or (2a) and (2b), follows from B's identifying either the end or the beginning of A, depending on the direction of the order. The issue of the characterization of negated eventualities remains independent from the analysis proposed here.

2 *Until* as a binary operator

In her paper on aspect and adverbials, Hitzeman introduces a treatment of the prepositions heading temporal adverbials as binary operators. The idea is to treat these adverbials as operators that take eventualities as arguments. This allows her to keep the perspective of the analysis on the properties of the eventualities, rather than on the properties of their intervals. With respect to this point, Hitzeman highlights the relevance of the distinctions between eventualities with well-defined and poorly-defined termination points. She observes that the primary function of temporal adverbials is to order events, and derives from there the relevance of their borders in the assessment of the relation. She also shows that this type of analysis applies to temporal adverbials in general. With respect to *until*, she claims that it is an instance of the schema [**A** **P_i** **B**], where the phrases **A** and **B** introduce two events into the discourse, and **P_i** is a preposition of class *i*, i.e. a preposition that orders the events in one of the three modes classified as ‘prepositioning’, ‘postpositioning’ or ‘concurrency’. In particular, the order imposed is prepositioning, and it is imposed on the intervals over which the eventualities are true. She argues that previous treatments fail to characterise durativity in an adequate manner, because accomplishments like eating a sandwich in example (3), her example (4), have duration, but are unsuitable instantiations for argument A.

- (3) *Joe ate a sandwich until noon.

In order to exclude example (3), she adds the constraint that the interval identified by A must have poorly-defined termination point. We note that this constraint produces the correct partitioning among durative eventualities, as far as (3) is concerned, but is unable to account for the ill-formedness of (4), where the first of the two intervals ordered by *until* indeed has a poorly-defined termination point.

(4) *Days until Daniel arrived.

Were this case excluded by the definition of *until* as operator ordering eventualities, examples (6a) and (6b) below would also be predicted to be ill-formed, which they are not. Were it excluded by requiring a clause in A, the ill-formedness of (5) would still remain unaccounted for.

(5) *It was days until Daniel arrived.

On the contrary, we consider the roles for the two arguments of *until* to be asymmetric. *Until* temporally locates the eventuality instantiating argument A, i.e. it assigns A an *event time* in a reichenbachian analysis, by establishing an anaphoric relation between its termination point and the information provided by B. Hence, A must be eventuality denoting, because it contains the ‘entity’ which is to be mapped. Argument B contributes a point in time, independently from its being instantiated by an expression of time or an eventuality. As a matter of fact, Hitzeman usually refers to the eventuality in A and a well-defined point within B, hence introducing in practice the asymmetry not acknowledged in theory.

Since *until* is sensitive to the characteristics of the instantiators of its arguments, it is sensitive to the existence of a prominent point in the instantiation of B, with no need of imposing selectional restrictions on B. The instantiation of A, e.g. his walking in (6) stops at B, e.g. *three* in (6a), or a point in it when B is instantiated either by an expression denoting an interval, e.g. *the morning* in (6b), or an eventuality occurring over it; the point is the beginning in the ingressive reading of his feeling tired in (6c), or the end in the culminative process of her building him a house in (6d). A schematic representation of the operator and its arguments is provided in (7), similar to the schema adopted by Hitzeman.

- (6)
- a. He walked until three.
 - b. He walked until the morning.
 - c. He walked until he felt tired.
 - d. He walked until she built him a house.

(7) A UNTIL B

Were the relation established by *until* to be defined on the basis of the primitive relationships between intervals t_i identified by (Allen 1984:129), it would be analogous to FINISHES(t_1, t_2), where interval t_1 , i.e. the interval where the eventuality in A is mapped, shares the same end as t_2 , provided by B, but begins before t_2 begins.

Interval t_2 would be required to have coinciding beginning and end, because *until* uses a point in B for the mapping. Whenever argument B is instantiated by an expression denoting an interval or an eventuality describing it, this interval t_3 either fully contains t_2 , or it shares with it the same beginning or end, depending on the characteristics of the instantiation of B. This gives us a unified analysis for *until* as temporal connective and preposition.

Hitzeman says that the prepositional object of *until* must “introduce an eventuality true over an interval which is or contains a well-defined termination point” (Hitzeman 1991:113). It is not made clear how to reconcile the constraint on the termination point with the role of B as providing information on the stopping point of A. The stopping point of A and the termination point of B cannot be forced to coincide, as shown by example (6c). On the contrary, once B’s identifier function has been established, because of its sensitivity, *until* exploits the characteristics of the instantiators of its arguments, by selecting the prominent point in B, with no need of imposing more precise selectional restrictions. In this way, example (6c) can be reconciled with (6d) in a unified treatment. The preference for B contributing its end in sentence (6d) is due to its being an accomplishment. The contribution of the beginning in (6c) is due to the fact that the ingressive reading of a stative is the one that makes it possible to identify a specific point in an homogeneous eventuality.

In (8a), her sleeping lasts up to the calling from the butler. Argument A is instantiated by a process and the example is grammatical. Example (8b), where argument A is instantiated by an instantaneous event is ruled out. *Until* introduces a stopping point for the eventuality in A, and this point cannot coincide with its well-defined termination point, because it must be freely identified by any suitable instantiation of B. Hence the suitability of duratives in A.

- (8) a. She slept until the butler called her.
 b. *He awoke until the butler called him.

Since it is the atelicity of the eventuality in A that is required, the verb *clap* in (9) can be interpreted only as doing many claps. Similarly, *dance* in (10) means doing many dances or an endless one.

- (9) He clapped until his hands were sore.
 (10) She danced until the sun rose.

It might seem that non-punctual telics are a counterexample to the generalisation proposed, see the acceptability of (11a). However, it has to be noted that her painting the ceiling is potentially ambiguous. The telic interpretation is that she painted the whole ceiling, but another interpretation, where the painting is an open process, is also available. This is the interpretation used in (11a). The acceptability of (11d) confirms the existence of an atelic interpretation, as required by the semantics of *for* phrases. The function of *all* in (11b) is to add a boundary, like what *up* does in (11c), hence the marginality of these sentences.

- (11) a. She painted the ceiling until three.
 b. *She painted all the ceiling until three.
 c. *She painted up the ceiling for two hours.
 d. She painted the ceiling for two hours.

The atelicity in A is obtainable also via unbound iteration of the eventuality, cf. (12). The whole iteration, composed of discrete entities, instantiates argument A. For instance, in the case of (12), the bare plural in either subject or direct object position allows infinite reinstantiations of one participant, i.e. free recursion.

- (12) a. Guests arrived until midnight.
 b. She wrote letters until she fell asleep.

Of course, free recursion can be obtained by adding an expression of time that overtly expresses unbounded repetition, see for instance (13).

- (13) The polling was repeated several times until a consensus was reached.

If the recursion is limited to a precise number of times, for instance because one of the arguments of the predicate is to be instantiated a fixed amount of times, the sentence is ill-formed, see (14) and (15a). In the case of (15b), the sentence is marginal in its cumulative reading, where the group of competitors as a whole ran three laps, or the total running was of three laps. Instead, it is acceptable in the distributive reading, where each competitor ran three laps, and they did it one after the other.

- (14) *Three guests arrived independently until midnight.
 (15) a. *She ate five sandwiches until noon.
 b. Competitors ran three laps until noon.

Similarly, the collective reading is not available in example (16).

- (16) Many guests arrived until midnight.

Finally, it was noted that argument B can be instantiated by expressions of time, or by eventualities. However, not any eventuality is a suitable instantiator of B. The instantiator of B must provide an identifiable point, hence the ill-formedness of example (17) with a stative reading of B. The example is acceptable only in the reading where his staying at his mother's is interpreted as an event. For analogous reasons, (18) is well-formed only with an inchoative reading of B. The same must be said for activities, cf. example (19).

- (17) Daniel studied until he stayed in his mother's house.
 (18) Daniel studied until he was sleepy.

(19) Daniel waited until Louise ran.

In case B is instantiated by a durative verb like *last*, which is atelic and non distributive, i.e. the eventuality cannot be said to happen at every subinterval, no point in B can be selected and the relation cannot be imposed. The ill-formedness of (20) is accounted for without referring to presuppositional properties, (cf. Karttunen 1974:289).

(20) *Daniel drank until the party lasted.

3 The complex operator

Considering the fact that *until* is a connective, from the formal point of view, overt negation *not* is predicted to occur freely in either clause connected by this item. This section and the following discuss why this prediction is not borne out, and, in particular, how negation affects the sentences in which it occurs.

The analysis put forward rests on the idea that *until* is able to interact directly with negation. This capacity constitutes the polarity facet of the sensitivity of *until*. The interaction is possible giving the type compatibility of the operators, i.e. *until* is an ordering operator and overt negation is an order reverser. The configuration in (21) represents the main way in which they interact.

(21) A [\neg UNTIL] B

In this situation, a second consequence of the asymmetric roles of A and B discussed above becomes apparent. The configuration in (21) is a case of function application of negation to the ordering operator. The result is a complex operator which has the characteristics of the simple one, with the difference that the ordering relation is reversed. Now B marks the beginning of A. Negation occurs in argument A and complements the interval where A is mapped. This complementation can be performed because the argument to which negation applies denotes in a domain for which complements are defined. Crucial for this order inversion is the referential function of argument B. The new relation is evaluated from the transition point between the original interval and its complement. This makes it possible to reverse the order with a single occurrence of negation. The relation is now $\text{STARTS}(t_1, t_2)$ (Allen 1984:129), where interval t_1 share the same beginning as t_2 but ends after t_2 ends, see (22).

(22) Daniel did not eat a sandwich until his mother arrived.

Because of their new relative positions, the requirements on the arguments might be modified: B must identify a point in time which is the beginning of A, so A must possess a clearly identifiable beginning. The characteristics of the terminating point of the eventuality instantiating A are no longer a pertinent issue. The constraint on B remains the same, as shown by the ill-formedness of example (23), where the eventuality in B does not contain a prominent point.

(23) *Daniel did not drink until the party lasted.

Precisely because A can be instantiated by an instantaneous event, and the constraint of coinciding beginning and end always holds for t_2 , the relation may happen to be $EQUAL(t_1, t_2)$, (Allen 1984:129), where t_1 and t_2 are the same interval.

Finally, the perspective has not been changed, i.e. it is still A which is the eventuality that has to be mapped, but, as said, it is to be situated on the interval beginning at the point individuated by B. Hence, the shift in perspective already noted in the literature, cf. (Karttunen 1974) among others.

The idea of function application of *not* to another element is not entirely new. Our complex functor bears some similarities to a proposal made by Hoeksema (1986) with respect to the interaction of *not* with the quantifier *all*. Hoeksema argues that the monotonicity of the generalized quantifier *not all students* can be accounted for compositionally if one adopts the structure $[[not\ all]\ students]$, with a complex determiner, rather than $[not\ [all\ students]]$ where the negation modifies the NP.

Let us go back to examples (1) and (2), repeated here as (24) and (25). It can be seen that our proposal accounts for the judgements of (24) with respect to the question of the aspect of the verb, because the event of his awakening has a well-defined termination point, so it cannot occur as a first element of the ordering, see (24b).

- (24) a. He did not awake until the alarm went off.
b. *He awoke until the alarm went off.

- (25) a. She did not sleep until the sun rose.
b. She slept until the sun rose.

In addition to accounting for the distribution of *until*, our treatment accounts also for the distribution of the readings of the verbs. There is no need to invoke a presupposition of his awakening in (24a), because its effective occurrence follows from A being the eventuality to be ordered. The ingressive reading of *sleep* in (25a), and its absence in (25b), are explained because only in (25b) is her sleeping first in the ordering. In example (25b) the right border is relevant for the assessment of the relation, whereas the ingressive reading focuses on the left border, i.e. the inception. The ingressive reading in (25a) is predicted because B identifies the beginning of the interval occupied by A.

The presence of the ingressive reading in (25a) is unexpected in analyses that characterise *until* as a durative adverbial. This reading is impossible to obtain if negation is treated as an operator that returns a durative when applied to an eventuality, cf. Moens (1987), where the functional content of negation is described as a sort of constant function that coerces the input into a unique aspectual type.

The ingressive reading of *sleep* in (26) is due to the fact that the border of B identifies the end of the interval occupied by A. As argued with respect to example (6c), this is the only possible reading, because this is the only one that allows the selection of a prominent point in B.

(26) She sang until the baby slept.

Similarly, the verb *clap* in (27a) can have the meaning of *striking the palms together once* or of *starting to applaud*, because A is second in the ordering. In (27b) A is first in the ordering, and *clap* has the durative meaning of *applaud*.

- (27) a. He didn't clap until everybody was ready.
b. He clapped until everybody was ready.

Negation reverts the direction of the ordering, and, as downward monotone operator, controls the movements of A, preventing it to move backwards. Thus, if the constraint imposed by B is somewhat relaxed, and A is allowed to slide a little, it can only move forwards, which explains the contrast in (28), already noted in (Karttunen 1974). A comparison between (28) and (29) shows that here in the case of the operator *until*, as it was the case in the discussion of the generalized quantifier *not all students* in (Hoeksema 1986), the different directions of inference can be accounted for compositionally.

(28) The princess didn't wake up until 9 $\left\{ \begin{array}{l} \text{at the earliest.} \\ \text{*at the latest.} \end{array} \right.$

(29) The princess slept until 9 $\left\{ \begin{array}{l} \text{*at the earliest.} \\ \text{at the latest.} \end{array} \right.$

A word should be added with respect to examples (30) and (31). They do not constitute a counterexample to the previous statement on the monotonicity of A UNTIL B, because what is highlighted in (30)⁴ and (31) is the monotonicity of the argument B and not of the whole. So, (30) shows the effect of negation, whereas (31) shows the lack of monotonic properties of argument B. The difference between (29) and (31) is that in the former the modifiers affect the relation directly, whilst in the latter they affect the instantiation of B, and only indirectly the relation.

- (30) a. She didn't wake up until at least 9.
b. *She didn't wake up until at most 9.

- (31) a. She slept until at least 9.
b. She slept until at most 9.

Before continuing the analysis of *until* in sentences containing negation, it is useful to review some positions in the literature.

Although there are similarities between Hitzeman's treatment and ours, for instance *until* is always considered an operator and the characterisation of negation as a complementation function is central in both, there are also significative differences in what such a function applies to. Hitzeman (1991:115) assumes that negation takes

⁴Example (30a) is taken from (Mittwoch 1977).

scope over the compound *until B*, and claims that the interval selected for placing A in the negated case is the closed complement of the interval identified by the compound. Negation is applied to a compound which is constituted by a binary operator and the second of its argument. It is neither a functor nor a function. From the fact that it is the eventuality in A, and not the negated eventuality, that is mapped in the complement interval (Hitzeman 1991:117) it follows that A is outside the scope of negation. But then, the constraint on A being instantiated by an eventuality with poorly-defined termination point forces Hitzeman to assume that, in cases such as (24b), negation also applies to the eventuality instantiating A in order to perform the aspectual class conversion required for obtaining an atelic event. This is to say that the same occurrence of negation has two effects, one outside and one inside A, namely selecting a complement interval and performing an aspectual transformation. This is also to say that the effect of negation on the instantiation of A is taken into account only for the purposes of the restriction on A, and not with respect to the whole relation.

Finally, by taking a closed complement of the interval identified by the adverbial phrase, the point identified by B is predicted to be always outside it. As shown in (24a) and (25a), this position is too strong. The awakening may take place right at the ringing of the alarm, i.e. the relation is reverted, and it is not just a case of complementation.

In approaches like (Karttunen 1974), the alteration in the ordering is assumed to come from inference. Our proposal presents the advantage that nothing needs to be added to ensure that A will actually occur at the switching point, as shown by the unacceptability of (32).

- (32) *He did not sleep until three, when he gave up and made himself a cup of coffee.

Example (32) constitutes evidence against the assumption that the shift in perspective is produced by inference. In fact, sentence (32) would require an appeal to presupposition, in the sense of non defeasible inference, in order to account for the ungrammaticality. However, it will be discussed how such an appeal would cause us problems in the case of a sentence like (36) below. Further evidence against an explanation in terms of inference is provided by the observation that the interpretation of sentence (33a) is as paraphrased in (33b) and not as (33c). From all sentences in (33) it can be inferred that the eventuality in A occurs at B and not before. Inference alone cannot explain the contrast observed. Sentence (33c) is the paraphrase of (33d).

- (33) a. Daniel did not sleep until midnight.
 b. Not until midnight did Daniel sleep.
 c. Until midnight Daniel did not sleep.
 d. Daniel kept not sleeping up to midnight.

The preposing of the *until B* phrase in (33b) and (33c) moves the focus of the sentence from the eventuality in A to the interval selected by B. In (33c), the adverbial

phrase is outside the scope of the matrix clause, and the interval focussed upon is the original one. In (33b), it is within the scope of the matrix clause and the negation in it, and the focussed interval is the complement.

4 Other relations

Negation can interact with *until* in several ways. It can interact with it directly, in what could be seen as a scope narrowed to the sole functor, more indirectly by taking wide scope over the function, or by applying to one of its arguments, a kind of narrow scope. In the latter case it can negate either of the arguments.

We have already discussed one case in which negation interacts with *until*. A second way of interacting, mainly induced by stress, is when negation applies to the whole function. In this case, it has scope over the whole proposition rather than scope over its own clause. It affects the truth value of the relation and not the ordering. This is one case of what the literature calls metalinguistic negation, (cf. (Horn 1989) for an extensive study). It expresses a denial of the truthfulness of the relation established by *until* on its arguments. This case may be represented by the configuration in (34). In this respect, there is no difference between metalinguistic or contrastive (McCawley 1991) use of negation, see (35).

(34) $\neg [A \text{ UNTIL } B]$

- (35) a. He DIDN'T sleep until two.
 b. *He DIDN'T awake until two.
 c. He didn't sleep until TWO, but until THREE.
 d. He didn't SLEEP but RUN until two.

Configuration (34) is particularly relevant in the discussion about whether the situation of A holding after B is the result of an inference. Example (32) suggests that such an inference should not be defeasible. However, postulating a presupposition would run one into troubles with respect to (36), where the inference is not only not 'obligatory', but also not possible. Example (36) contains an instance of an atelic non distributive verb. Therefore, the eventuality of the party's lasting cannot be placed by referring to its left border, which makes it unsuitable for being the second element of the order. This rules out an interpretation of sentence (36) according to configuration (21), but still allows one according to configuration (34).

(36) The party didn't last until midnight.

The functor *until* can also take 'wide scope' over the negation. This situation is realized as the configuration in (37).

(37) $[\neg A] \text{ UNTIL } B$

The configuration in (37) is the one generally assumed in the literature, and is required for the aspectual class conversion. In our treatment, this configuration is generally available, as marked case. It may be the only available, or simply acquire prominence in cases where negation is ‘captured’ inside A, so to speak. In case there is a negative polarity expression in A, the idiomatic reading is available if the NPI is licensed, whereas, if negation combines with *until* and situates a lifting a finger event, only the literal reading is possible, see example (38).

(38) He did not lift a finger until the teacher scolded him publicly.

Mutatis mutandis, the absence of variation in (39) show that, in order to get non specific reading, an indefinite is also able to force negation to apply within A.

- (39) a. He didn’t say a single word until the end of the evening.
 b. He didn’t say another word until the end of the evening.

Configuration (37) is also favoured by the presence of a universal quantifier in argument A. As usual, *everybody* tends to outscope the negation, and this results in the different preferred interpretations for (40a) and (40b), which share the same context.

- (40) a. Everybody did not eat cakes until the end of Lent.
 b. Daniel did not eat cakes until the end of Lent.

Next, there is the case of inversion, see (41), which makes the interpretation of the sentence according to configuration (37) at least as plausible as (21). As argued above, preposing allows *until* to escape the effect of negation, which is left to affect argument A.

(41) He promised to buttress his claim with evidence, and until then Daniel won’t believe him.

Then, pragmatic reasons may conflict with the interpretation according to configuration (21). In this case, the one according to configuration (37) acquires prominence, see (42).

(42) Daniel did not marry until he died.

Finally, we come to the hole in the distribution of negation anticipated at the beginning of section 3. This is a subcase of configuration (43).

(43) A UNTIL [\neg B]

A negation in B does not modify the ordering, because B provides a reference point and not an interval to be ordered. However, it affects the relation inasmuch as, negating the truth value of the predicate in B makes it impossible to identify a point for the mapping, see the ill-formed sentences in (44).

- (44) a. *He kept harassing her on the phone until she did not answer it.
 b. *We had a correspondence until she did not write to me.

The analysis proposed does not refer to ‘negated’ eventualities, i.e. the duration of the not happening of an eventuality, but to eventualities standing in various relations. This position holds with respect to argument A as well as argument B. The presence of an egressive marker like *any more*, which forces negation to apply to the interval described by the eventuality in B, and alters the selection of the prominent point from the switch between negative and positive phase, to the switch between positive and negative phase, improves the status of the sentences. In (45), the cessation of the eventuality in B is the point used by *until*, which is precisely what is made explicit by the presence of *any more*.

- (45) a. He kept harassing her on the phone until she did not answer it any more.
 b. We had a correspondence until she did not write to me any more.

It has been argued so far that, in the case of the complex operator, a point in B individuates the beginning of A. However, there seem to be two types of examples where this situation is not clearly attested. One case is presented in (46), from (Karttunen 1974). Sentence (46) is not interpreted as saying that Nancy got married the very moment she met Henry.

- (46) Nancy did not marry until she met Henry.

However, this example is more a case where it is difficult to identify the relevant point, than a true counter-example. We agree with Karttunen who says that *meet* has to be taken with a particular interpretation. Indeed, as shown by the unacceptability of (47a) and (47b), *meeting* is to be interpreted as *getting acquainted with* rather than *bumping into* a person. Sentence (47c) has been included because it shows an interesting change in interpretation with respect to (46). In fact, (46) implicates that *Nancy* eventually married *Henry*, whereas this implication is a great deal weaker in (47c). Our explanation is that in (47c) the second meeting with Henry provides just a point for mapping Nancy’s getting married. In (46), the meeting is a complex event which indirectly supplies an instantiation for the role of patient of the verb *marry*.

- (47) a. *Nancy did not marry until she first met Henry.
 b. *Nancy did not marry until she last met Henry.
 c. Nancy did not marry until she met Henry for the second time.

The second type of example contains a verb of phase transition in argument A. In this respect, it may be worth considering the issue of the preparatory period of A in the assessment of the point identified by B.

- (48) He did not finish his degree until he went to live on his own.

5 Further research

Our treatment does not require the stipulation of any operations or assumptions special for the case. The combination of the two operators is a case of function application of negation to *until*. The semantics of the compound is a function of the semantics of its constituents and the way these constituents are combined. The nature of scalar reverser of negation is a point largely studied in connection with polarity phenomena, (cf. Fauconnier 1975, Ladusaw 1979).

The analysis has interesting ramifications for other languages. In (Tovena 1994), we discuss the Italian connective *finché* ('until/for as long as'), and the Hungarian correlating counterpart *addig...amíg*. The treatment is basically the same. The different lexical properties of the Italian and Hungarian elements with respect to the English one, expressed as a different characterisation of argument B—namely the elimination of the constraint of identity between beginning and end of the interval—result in a broader set of combinations with negation. For the former two connectives, these combinations correspond to the similar variations in interpretation. The approach allows us also to explain what causes occurrences of expletive negation in subordinate clause. From a preliminary study, an extension of the analysis to the Russian expression *poka* and the Hindi correlating expression *jab tak...tab tak*, both showing the 'until/for as long as' variation in interpretation, seems possible.

Another ramification that will have to be explored is whether the analysis can be extended also to cases where *until* cooccurs with downward entailing operators other than overt negation. The case of sentences containing other types of negative items, e.g. *nothing* or *no*, in the matrix clause, see (49) and (50) seems relatively straightforward.

(49) Nothing appeared on the screen until Louise pressed the green button.

(50) Tom ate no potatoes until he was sixteen.

It might be possible to treat these examples as cases of function application of the negation with *until*, because this would require the usual lexical decomposition of the negative quantifier into negative and quantificational parts—prior to the function application itself— shown in (51).

(51) $\forall x [\text{potato}(x) \rightarrow \neg \text{UNTIL}(\text{Tom ate } x, \text{Tom was sixteen})]$

However, the properties of downward monotonic scales will have to be exploited more explicitly in order to account for cases like (52), corresponding to (3.117) from (Smith 1975). Examples (53) and (54), respectively his (3.118) and (3.119), are more likely instances of configuration (37).

(52) Ernie was too busy to leave until after the dam broke.

(53) Ernie was afraid to leave until his lawyer came.

(54) He forbid her to leave until the police arrived.

In the very final phase of writing this article, the recent contribution by (Declerck 1995) came to our notice. We do not have the possibility of discussing it in depth, but a few points need to be made, because of the seeming similarity between the two approaches. Both works refer to the compound *not...until*, but it seems that the similarities go little further than that. Declerck's paper is concerned only with *until* in cooccurrence with overt negation, and analyses it as a 'stereotyped unit' (Declerck 1995:54). As a result, the adverb is split into two, one item occurring as component of the idiom, and the other in positive and some negative contexts, e.g. with metalinguistic negation. Because of the standard definition of idiom, as complex expression of reduced analysability and modifiability, the questions of why and how negation gets together with *until* discussed at length in our paper do not arise in his analysis. It is interesting to notice that the approach to negative polarity discussed in (van der Wouden 1994), who argues in favour of close connections between NPI and collocations, minimizes the advantages Declerck ascribes to his approach with respect to the polarity trend of analysis.

On the one hand, negation is required to provide a particular contribution, for the idiom to be recognized as such, (Declerck 1995:64ff). On the other one, in order to account for the presumption of lateness that forms part of the interpretation of certain sentences, Declerck (1995:73) refers to the semantic contribution of the *until* component of the idiom. Thus, if it is possible to trace back the features of the meaning of the idiom to its particular components, the characterisation as an idiom is relevant precisely as covert stipulative answer to the questions tackled in our analysis.

The claim that *not...until* is a discontinuous idiom is buttressed by a comparison with the corresponding French expression *ne...que* (Declerck 1995:59), which is said to differ inasmuch as it applies to all kinds of scales. This is a weak analogy, since the two expressions translate different strategies. As the standard (55a) and colloquial (55b) show, the French expression conveys a fixed perspective on the scale. Since the ordering does not have to be reverted, *ne* is enough to control the left border of the eventuality in A, preventing it from sliding back beyond B. The presence of full negation sets the truth value of the relation to false, see (55c).

- (55)
- a. La jeune fille n'a téléphoné qu'à 8 heures.
'The girl did not phone until 8.
 - b. La jeune fille a téléphoné qu'à 8 heures.
'The girl did not phone until 8.
 - c. La jeune fille n'a pas téléphoné qu'à 8 heures.
'The girl did not phone only at 8.

Declerck (1995:53) appeals to the notion of 'actualization', a presupposition triggered by restrictive particles, in order to account for cases like (32) above, which shows that the eventuality in A must hold at the point identified by B. In our analysis, the change in the direction of the order caused by negation explains the 'veridicality' of *until*. It is also possible to distinguish the use of *until* in configuration (21) from that of *before*. So, although both (56a) and (56b) are compatible with the situation were

the party started at nine, only (56b) is compatible with a party having started at ten. In fact, B indicates the first point of A.

- (56) a. The party did not start until nine.
 b. The party did not start before nine.

The presence of a ‘factive’ and a ‘counterfactual’ reading of *before* (Heinämäki 1972) might be reduced to the fact that *before* identifies a point on the time axis without distinguishing between which of the branches stemming from that point will be or is the actual one, thinking in terms of possible worlds.

6 Summary

Our proposal of a unified account for the behaviour of *until*, allowing this operator to interact with negation, can be considered as a way of putting together the two trends of analysis discussed in the literature, without taking in the burden of their special assumptions.

We are sympathetic with the idea of negation interacting with *until*, proposed by approaches based on negative polarity. The main differences are that we do not postulate a split into two lexical items; and that instead of a ‘passive’ relation between the two operators, as in licensing, we propose an ‘active’ relation, as in function application. The notion of sensitivity referred to in this work is a more comprehensive reformulation of the traditional notion and involves the whole semantics of the item.

We subscribe to the idea of a unique *until*, common in approaches more concerned with aspectual facts. The main difference here is that we let negation interact with *until* rather than with the verb, which means we can avoid the complex issue of negated eventualities. As a result, our proposal can account for distributional and interpretational data, without requiring special assumptions.

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