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C. LEXICAL AND INFERRED MEANINGS FOR SOME
TIME ADVERBS

One major result of recent semantic investigations is that the interpretation of a sentence cannot be completely specified in either deep or surface structure simply by combining the lexical readings of its constituents. The combinatorial reading for a sentence is often subject to processes, some formal and some dependent on knowledge of the world, which extend, restrict, or totally change the meaning. In this report we shall attempt to specify some of these processes as they apply to sentences containing certain time adverbials, such as until, before, during and throughout.

Under most circumstances the sentences (1a) and (2a) are interpreted as synonymous, but the differential acceptability of (1b) and (2b) shows that the basic meanings of the (a) sentences cannot be identical.

- (1) a. Before the arrival of the rebel army, the government forces controlled the town.
b. During one period before the arrival of the rebel army, the government forces controlled the town.
- (2) a. Until the arrival of the rebel army, the government forces controlled the town.
b. *During one period until the arrival of the rebel army the government forces controlled the town.¹

The contrast between (1b) and (2b) suggests that until has the lexical reading (3), while before has the lexical reading (4), and sentence (2b) is ungrammatical because the meaning of until contradicts the meaning of during one period.

- (3) until = at all times prior to NP
(4) before = at some time(s) prior to NP
(where NP is the object of the adverb phrase).

If these readings are roughly correct, then we have a simple explanation for the fact that until is only grammatical in sentences with non point-action interpretations. Sentence (5a) would be unacceptable because the meaning of until contradicts the meaning of die, a point-action verb which in this context cannot be interpreted as repetitive. This contradiction stands out if we construct the reading for the sentence, as in (5b).

- (5) a. *John died until dawn.
b. John died at all times prior to dawn.

As (6b) shows, the corresponding sentence with before contains no contradiction in the reading. This explains why before is not restricted to non point-action environments.

- (6) a. John died before dawn.
 b. John died at some time prior to dawn.

We have shown that before and until must be given distinct lexical readings, but the problem of explaining the apparent synonymy of (1a) and (2a) remains. Both sentences appear to mean that the government forces controlled the town right up to the arrival of the rebel army, but only the sentence with until has this interpretation by virtue of the lexical readings of its parts. The before sentence is interpreted as synonymous with the until sentence by virtue of an inference or implicature. The way in which such an inference can be distinguished from the basic meaning of a sentence is that it can be canceled in the appropriate context. Thus (7) is anomalous because the second sentence contradicts the lexical reading of the first; but (8) is acceptable because here the second sentence merely cancels an inference normally made from the first.

- (7) *Until he died John was sick with pneumonia, but he was cured of it, and died of something else.
 (8) Before he died, John was sick with pneumonia, but he was cured of it, and died of something else.

The rule of implicature which accounts for the apparent synonymy of some before and until sentences might be stated as follows:

- (9) If a sentence containing an adverb with an existential quantifier in its lexical representation asserts that a durative action or state occurs in a specific time period, then the action or state is presumed to have occurred throughout the period, context permitting. In other words, context permitting, existential quantifiers in time adverbs are reinterpreted as universal quantifiers.²

In addition to before, rule (9) applies to the adverb during. This accounts for the synonymy of sentences like (10) and (11).

- (10) The government forces occupied the town during the battle.
 (11) The government forces occupied the town throughout the battle.

The differential acceptability of (12) and (13) demonstrates that throughout, like until, contains a universal quantifier in its lexical representation while during, like before, contains an existential quantifier.

- (12) *John died throughout the night.
 (13) John died during the night.

There is another rule of inference, similar to (9), which operates on sentences with before (and during), but this inference also operates on until (and throughout). Sentences (1a) and (2a), for example, seem to mean not only that the government forces controlled the town right up to the arrival of the rebel army, but also (14).

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(14) When the rebel army arrived, the government forces lost control of the town.

In both (1a) and (2a), however, this meaning is not basic but only implicated. The implicature of (14) can be explicitly canceled, as in (15).

(15) $\left\{ \begin{array}{l} \text{Before} \\ \text{Until} \end{array} \right\}$ the arrival of the rebel army, the government forces controlled the town. Then when they arrived the rebels decided not to attack so the government was able to hold on.

Similarly, (10) and (11) suggest (16) but that suggestion can be canceled, as in (17):

(16) The government forces stopped occupying the town at the end of the battle.

(17) The government forces occupied the town $\left\{ \begin{array}{l} \text{during} \\ \text{throughout} \end{array} \right\}$ the battle and kept on occupying it for two weeks afterward.

The rule of implicature which gives (14) and (16) might be stated as (18):

(18) If a durative action or state occurs in a specified time period, then, context permitting, the action or state is presumed to end at the end of the period.

One immediate result of Principle (18) is that it allows us to explain the semantic interpretation of sentences like (19) which contain the not until construction.

(19) Not until noon did John wake up.

Sentence (19) appears on first reading to be synonymous with (20), but the differential acceptability of (21) and (22) shows that although (19) suggests (20) it does not entail (20) and so cannot be synonymous with it.

(20) John woke up at noon.

(21) *John woke up at noon. In fact, he only woke up at 3 P. M.

(22) Not until noon did John wake up. In fact he only woke up at 3 P. M.

What (19) does entail (and perhaps presupposes) is (23), a fact shown by the self-contradictoriness and consequent unacceptability of (24).

(23) John woke up.

(24) *Not until noon did John wake up. In fact, he didn't wake up at all.

In addition to what it implicates and entails, (19), of course, asserts (25).

(25) John didn't wake up at any time before noon.

In fact, except for the entailment of (23), (19) is synonymous with (26). Sentence (27) shows that (26) does not entail (23), since that entailment would make (27) self-contradictory, which it is not.

(26) Until noon John didn't wake up.

(27) Until noon John didn't wake up. In fact, he didn't wake up at all.³

Principle (18) gives a direct explanation for why both (19) and (26) seem to mean (20). According to (18), the state of John's not waking up is presumed to end at noon, as in (20). The presumption seems somewhat stronger in (19) than in (26), but this is so because part of the presumption given by (18) is already an entailment of (19) (namely, that John did wake up) so that the speaker of (19) is committed by logic to a stronger statement than is the speaker of (26).

One question which is immediately raised by the postulation of principles like (9) and (18) is their status in the theory of grammar. At this point there seem to be two ways of treating the rules, either as instances of the operation of Grice's conversational maxims⁴ or as independent semantic principles that cannot be derived simply from the assumption that the speaker of a sentence is trying to communicate efficiently.

In Grice's view, the participants in a conversation ordinarily assume that they are engaged in a cooperative enterprise with an accepted purpose and direction. Therefore they behave and expect their partner(s) to behave according to the following cooperative principle:

(28) Make your contribution to the conversation such as to advance its accepted purpose or direction.

From this principle Grice derives four categories of conversational maxims, those of quantity, quality, relation and manner. The maxims can be summarized as follows:

(29) Quantity

- a. Don't give too little information.
- b. Don't give too much information.

(30) Quality-Try to speak the truth.

- a. Don't lie.
- b. Don't make statements for which you have insufficient evidence.

(31) Relation-Be relevant.

(32) Manner-Be easy to understand.

- a. Avoid obscurity and ambiguity.
- b. Be brief and orderly.

It would be a simple matter to make principle (18) follow from maxim (29a). Sentences like (1a), (2a), (10), and (11) say that an action occurred in the period covered by the time adverbial but not what happened otherwise. Under the assumptions that the speaker ordinarily will know if and when the action stopped and also that this information will

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usually be relevant to the conversation, it follows that the sentences violate (29a). If we interpret the sentences according to (18), the violation is eliminated. A consequence of the use of the maxims, however, is that they require that interpretations according to (18) not exist in certain contexts. If a speaker uses sentences like (1a), (2a), (10), and (11) when he does not know when the action ended but only that it overlapped the period specified in the adverb phrases, then the addition of an interpretation according to (18) violates (30b) by committing the speaker to saying more than he has evidence for.

It follows that sentences with time adverb phrases ought to be interpreted according to (18) if the speaker can be presumed to know the temporal bounds of the action he is describing but not in the absence of such a presumption. Thus, the sentences of (33) all suggest that the action was coterminous with the time period marked by the adverb phrase.

- (33) a. John slept $\left\{ \begin{array}{l} \text{during} \\ \text{throughout} \end{array} \right\}$ the movie.
b. The baby cried while the record player was on.
c. Tom was a rebel from the time he was thirteen.
d. John sang well $\left\{ \begin{array}{l} \text{before} \\ \text{until} \end{array} \right\}$ his recent illness.

The sentences of (34), on the other hand, should not carry interpretations according to (18) because the contents of these sentences suggest that the speaker has no knowledge of the limits of the action or state described.

- (34) a. $\left\{ \begin{array}{l} \text{Throughout} \\ \text{During} \end{array} \right\}$ the time I was watching the game, John played well.
b. The child cried constantly while I was observing it.
c. John was a good musician from the time I started listening to him.
d. John played quietly $\left\{ \begin{array}{l} \text{before} \\ \text{until} \end{array} \right\}$ I left the house.

As Grice's maxims would predict, sentences (34a) and (34b) do not carry the suggestion that the action in the sentences ended at the end of the time period given by the adverb phrases. With sentences (34c) and (34d), however, the case is different. These sentences, contrary to what would follow from Grice's maxims, do suggest that the action is coterminous with the end of the time period marked by the adverb phrase. This behavior of (34c) and (34d) is evidence that a rule which is more than an instance of Griceian conversational implicature is needed to account for inferences associated with at least some time adverbs. In its application to adverbs like before, until, and from, (18) seems to be independent of the conversational context and to be a substantive

semantic process in its own right. A first approximation to accounting for the differences among the sentences of (34) would be to say that the postulation of rule (18) as an independent semantic process is necessary for time adverbs with the following semantic feature in common: Their object noun phrases constitute a boundary point of the time period that they describe. For time adverbs whose objects are time periods as wholes rather than boundary points, a Griceian treatment seems adequate. Unfortunately, the underlying reason for this difference remains obscure.

If the use of Grice's maxims to account for (18) is problematic, using them to account for (9) is more so. As Grice points out, expressions with the same basic meaning must have the same conversational implicatures, since the conversational maxims refer to general properties of communication and not to peculiarities of particular words or expressions. In this instance all time expressions containing the existential quantifier should be subject to (9). As the sentences of (35) show, however, time expressions with the explicit existential quantifier some are not normally interpreted with some read as all.

- (35) a. The government forces occupied the town during some of the battle.
 b. At some times before the arrival of the rebel army, the government forces controlled the town.

If (9) were an instance of conversational implicature, then the sentences with explicit existential quantifiers would be subject to it just as are sentences with the existential quantifiers hidden in the time adverbs. The obvious inapplicability of (9) to (35a) and (35b) demonstrates, therefore, that (9) is not attributable to conversational implicature.

In addition to these objections to using the notion of conversational implicature to account for the specific principles (9) and (18), there is a more general argument against the possibility of using that notion to explain any similar semantic process. The argument is that Grice's maxims are so general and vague that inferences that are not actually made in speech can be derived from sentences by conversational implicature just as readily as inferences that are made. This being the case, Grice's maxims have no explanatory force, whatever their heuristic value. One clear example of such false conversational implicature goes as follows.

A sentence like "John ate the apple" is taken to mean "John ate at least some of the apple," by conversational implicature. If the speaker had meant that the whole apple was eaten, then he would have said, "John ate all of the apple" in order not to violate the maxim of Quantity (29a) by giving too little information. Since he left out the word "all", he must have been obeying the maxim of Quality (30b) and avoided saying more than he knew. Therefore, all that the speaker was saying is that at least part of the apple was eaten.

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Of course, the inference normally made from "John ate the apple," is in actual fact the one ruled out above, namely that John ate the whole apple; and this inference can also be derived from the maxims. The reasoning starts by saying that the speaker would have said "John ate at least some of the apple" if that were all he knew (by 30b). Since he left out the qualifying phrase, he must have meant to convey that the whole apple was eaten. Otherwise he would have been giving too little information. Obviously, a theory that accounts for what exists and for what does not exist with equal ease can provide no explanations.⁵

Perhaps a more promising way of integrating Principles (9) and (18) into semantic theory is Geis and Zwicky's notion of "invited inference."⁶ They point out that if-then sentences like (36a) tend to be interpreted as if they were biconditionals like (36b).

(36) a. If John comes, I will cheer.

b. If John comes, I will cheer and if John doesn't come, I won't cheer.

In other words, ordinary language conditionals invite the inference of their converses. Principle (18) can be seen as a special case of this sort of invited inference. Sentences containing time adverbs can be stated as conditionals and forming the converses of these conditionals gives the same result as applying (18). Thus the converse of (37a) is (38a) and the result of applying (18) to (37b) is (38b). Clearly, the sum of (37a) + (38a) is synonymous with (37b) + (38b).

(37) a. If t was before noon, then John was asleep at t.

b. John slept until noon.

(38) a. If t wasn't before noon, then John wasn't asleep at t.

b. John stopped sleeping at noon.

Geis and Zwicky believe that there are other principles of invited inference besides "conditionals become biconditionals," two of which they mention in their paper. The fact that (18) is a special case of one principle of invited inference suggests that the principle (9) should also be seen as a principle of invited inference. We look for still more such principles.

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Footnotes and References

1. This sentence would be grammatical with commas around the until phrase, but then the sentence would have a different structure. The until phrase would be an appositive phrase and not part of the object of during. With this structure the sentence is no longer unacceptable because it is no longer self-contradictory.
2. This principle applies at least to the following time adverbs: before, during, between, while and after. The semantics of time adverbials is dealt with from an entirely different point of view by M. Geis in "Time Prepositions as Underlying Verbs," Papers of the Chicago Linguistics Society, Vol. 6, pp. 235-249. His treatment, however, does not deal with any of the issues we are concerned with here.