Negation in Discourse

By Satoshi Ohashi

1. Introduction

In this essay I would like to look into various functions played by two contrasting propositions in discourse, which are symbolically expressed as p and ¬ p (not p). The logical contrast between the two propositions is referred to as negation. The use of this term might cause some to erroneously assume that I am embarking on another syntactic study of negative sentences. They have been extensively studied by many scholars, especially with respect to syntactic properties such as the scope of negation. My main concern, however, is not with the syntactic phenomena of negative sentences. Here, I am more interested in how we can explain heterogeneous cases in which negation is considered to be in operation in our understanding of the text. What I attempt here is to classify the various cases into certain types and to define the relationship between them.

For this purpose, it is necessary to turn to such notions as entailments, pragmatic presuppositions, conventional implicatures and conversational implicatures.[1] The reason for employing these notions is that negation is not necessarily established between two propositions which are explicitly realised in the text: in many cases we have to achieve the logical contrast between p and ¬ p by presuming that one or both of the propositions are implicitly expressed in the original sentences. Another important notion to be employed is that of possible worlds. In many cases, as we will see, negation is identified across two possible worlds: the proposition p is asserted in one possible world and the proposition ¬ p in the other.

2. Clearing the ground

Before we start discussing each case where negation is in operation, it is essential to define the notion of negation in relation to other confusing

notions: sentences and utterances. In this essay, negation is understood as the logical contrast between two propositions which are respectively represented as p and ¬ p. It is important to note that negation only refers to this logical relation between two propositions, and it does not say anything about the possible world in which they are asserted. This means that propositions by themselves are not either true or false: they are not endowed with any truth value until they are asserted in some possible world. Thus, we can pick out any proposition and talk of another proposition which establishes negation with it, with no consideration about whether they are asserted in any possible world. It is similar to the situation where a student is asked to make a sentence of the opposite meaning to another sentence which is presented out of context in a grammar drill.

A sentence is defined as the linguistic realisation of a proposition, and usually we regard negation as a relationship between two sentences. As they are just the linguistic realisation of propositions, they are also neutral with respect to the possible world in which they are asserted: they are not assigned any truth value.

As we will see later, a mechanical insertion of the lexical item *not* into an affirmative sentence does not necessarily result in its logical opposite. However, we usually consider negative sentences to be produced in this manner. For this reason, we are inclined to think that negative sentences invalidate or deny their affirmative counterparts. It should be emphasised that this is not the case. As mentioned above, sentences by themselves have not been endowed with any truth value: neither an affirmative sentence nor a negative sentence is true or false. Neither of them invalidates or denies the other. In this sense, when we are regarding p and ¬ p as sentences, they are compatible. The function of denying or invalidating other information is related to the notion of utterance, which we now turn to.

If sentences are asserted in some possible world and are given truth value, they are looked upon as utterances. The importance of this distinction between the notions of sentence and utterance is stated by Levinson as follows:

The distinction between sentence and utterance is of fundamental
importance to both semantics and pragmatics. Essentially, we
want to say that a sentence is an abstract theoretical entity
defined within a theory of grammar, while an utterance is the
issuance of a sentence, a sentence-analogue, or sentence-
fragment, in an actual context.   (1983: 18)

Levinson's explanation continues, and on the basis of the views presented by
such philosophers as Strawson (1950) and Stalnaker (1972), he states as
follows:

...it is not sentences but rather utterances that make any definite
statements, and thus can sensibly be assigned truth conditions. ...
truth conditions must be assigned to utterances, i.e. sentences
with their associated contexts of utterance, not to sentences alone
(or if one likes, truth conditions include context conditions).

(ibid. 20)

Context conditions here corresponds to what I have so far referred to as
possible worlds: only in possible worlds can sentences be asserted and
assigned their truth value.

The distinction between sentences and utterances has a conspicuous
significance to our discussion of negation. When we think of the logical
contrast between two utterances, rather than between two sentences, we are
considering two contrasting possible worlds: a possible world in which p is
asserted and the other possible world in which ¬ p is asserted. P and ¬ p as
utterances cannot coexist in the same possible world without causing
contradiction: if one is true in a possible world, the other is necessarily false
in the same possible world. That is to say, one of the propositions must be
invalidated or denied by the other.

As was stated at the outset, here I am essentially concerned with
negation in discourse, that is, the logical contrast between two utterances,
although in many cases they are only implicitly expressed in the text. It

follows that it is essential for me to define some types of contrast between two possible worlds. This will be attempted in the rest of the essay.

3. Internal negation

In this section, a type of negation which I will call internal negation is introduced. The logical contrast between p and ¬ p of this type of negation does not cause any contradiction in our understanding of discourse because the two propositions are considered to be asserted in different possible worlds. This type of negation is inferred, for example, from sentences including so-called change of state verbs, which might be understood as describing a shift from a situation indicated as p to another indicated as ¬ p or the other way around. (1) is a sentence including a change of state verb *stop*:

(1) He stopped smoking.

This sentence means that there was a shift in the situation from the one where he was smoking to the other where he was not smoking. If we let p stand for *he was smoking*, it is explained as a shift from p to ¬ p. Obvious as it is, it is important to notice that if (1) is true, both p and ¬ p are true without causing any contradiction. This compatibility is not attributed to the fact that both p and ¬ p are retrieved from one and the same sentence, for the same point holds true in (2), in which p and ¬ p are expressed in different sentences uttered by different participants:

(2) A : He was smoking yesterday.
 B : Well, this morning, he wasn't.

What is common between (1) and (2) is that there is a difference in time between p and ¬ p: p is followed by ¬ p in chronological order. (In (2), it is explicitly shown by *yesterday* and *this morning*.) This means that both p and ¬ p can be true with no contradiction in the same text, if one temporally follows the other. This prompts us to construe different points in time as

representing different possible worlds. States of affairs are different at different moments.

Rescher and Urquhart (1971) present in their system of temporal logic the statement-forming operator R which can produce new statements from some temporally indefinite statement S by specifying the time at which S is realised. When S is realised at a particular moment t_1, it is represented by R $t_1(S)$, which is read as S is realised at the moment t_1. In the same way, $Rt_2(S)$ and $Rt_3(S)$ mean that S is true at the moments t_2 and t_3. T_1, t_2 and t_3 are regarded as discrete points located in this order on the time line. Using a variable t, we can express this as $Rt(S)$, in which t is substituted by any moment on the time line: t_1, t_2, t_3 ...and infinitum. If we let $Rt(S)=1$ denote that S is realised at time t and let $Rt(S)=0$ denote that S is not realised at time t, then we can see $Rt(S)$ as a function of t, all the elements of which are assigned values of either 1 or 0. 1 represents true and 0 not true or false. Thus, with respect to any point in time, we can tell whether or not S is realised[2].

We can explain (2), for example, in terms of these notions. The function $Rt(S)$ denotes that the temporally indefinite statement *he is smoking* is realised at t. If we represent *yesterday* as t_1 and *this morning* as t_2, presuming that the two points in time are in sequence with no other points between them, they are respectively assigned values 1 and 0 by the function $Rt(S)$. It is this contrast between the different points in time with respect to the value which is assigned to them that we considered to be a case of negation.

In logic, a proposition is often regarded as corresponding to a function from possible worlds to truth-values. Possible worlds will be explained as different arguments of a domain which is mapped onto a range comprising only two values, 1 and 0, or true and false, by a function represented by a proposition. According to this view, the possible worlds in the above case are different points in time. The function might be expressed in an ordinary language as *he is smoking at some time t*. These points might be illustrated by the diagram below:

Figure 1 possible worlds   truth-values
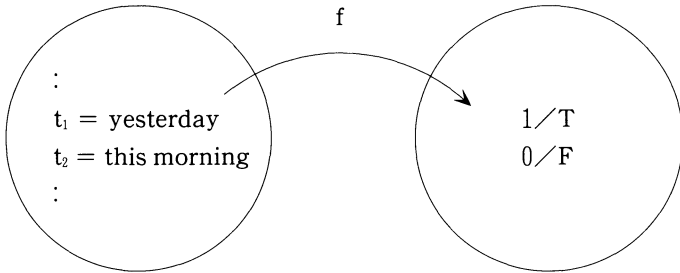
f = He is smoking at t

  Apart from the concept of time, the concept of space is most naturally expected to be another indicator of possible worlds. We can, indeed, repeat almost the same discussion in (3):

 (3) A: It's raining here in Tokyo. How about in Kagoshima?
    B: Well, it's not raining here.

In (3), Tokyo and Kagoshima are the arguments which are assigned different values 1 and 0 by the function which might be expressed as a spatially indefinite statement *it's raining in some place x*. We may say that Tokyo and Kagoshima indicate different possible worlds.

  The same logical operation, however, presents some cases in which the arguments of the domain are not naturally regarded as indicators of possible worlds. This point might be shown in (4):

 (4) Tom read three out of ten books on the list.

An interpretation of (4) is that the subset comprising the three books which were read by Tom is included in the domain of all ten books. Therefore, with respect to the subset, we can say that Tom read all the books, whereas with respect to the complement of the subset, that is, the other seven books, we can say that Tom did not read any books. The question is whether we can see this as another case of negation, or whether the subset and its

complement are construed as possible worlds. This question might be reduced to whether we can see each book as an indicator of a possible world.

What distinguishes (4) from (2) and (3) can be seen clearly if we think of the characteristic function of the subset relative to the domain. It might be expressed as *x is read by Tom*, in which *x* is a variable to be substituted by each argument of the domain. In (2) and (3) we can extract propositions *he is smoking* or *it is raining* from the relevant functions by excluding the variables of time and space. In (4), on the other hand, the exclusion of the variable *x* from the function only leaves *is read by Tom*, which cannot be regarded as a proposition. The contrast identified in (4) is not between two propositions, but between two pieces of information which might be expressed as *is read by Tom* and *is not read by Tom*. If we stick to the view that it is between two propositions that negation holds, the contrast found in (4) is not regarded as a case of negation, and accordingly each book cannot be regarded as an indicator of a possible world.

On the other hand, in (5) we might be able to identify a case of negation and each book is regarded as an indicator of a possible world:

(5) Tom found some interesting points only in three out of ten books on the list.

The characteristic function of the subset comprising the three books relative to the domain of the ten books might be expressed as *Tom found some interesting points in some book x*, from which we could exclude the variable and still obtain a proposition *Tom found some interesting points*. If we regard this proposition as p and its logical opposite $\neg$ p, p is true with respect to the subset of the three books and $\neg$ p is true with respect to the other books. It might be said that books in this case are similar to the concept of place or space where Tom did or did not do the action.

All the cases of negation which have been discussed in this section are understood to hold between two utterances. All the propositions between which negation holds are asserted in some possible worlds, and therefore some truth value has been assigned to them. In (2) and (3) both p and $\neg$ p

were explicitly asserted, but in other cases both or one of them had to be inferred from the original sentences. This fact, however, does not affect the points we have made, because those implicit propositions were not arbitrarily constructed: in the case of (1) p might be explained as a presupposition and ¬ p as an entailment of the original sentence, and in the case of (5) both p and ¬ p might be explained as entailments of the original sentence. By assuming the validity of these semantic and pragmatic notions as commonly explained in the literature, we might be allowed to regard the implicit propositions as asserted in some possible world as well as the explicit ones. Anyway, it is not so difficult to think of corresponding explicit expressions as we did for (1) in constructing (2).

As two contrasting propositions cannot coexist in the same possible world, two different possible worlds have to be postulated in which p and ¬ p are respectively asserted. In (1) and (2) the two possible worlds are regarded as indicated by different points in time, and in (3) and (5) they are indicated by differences in space or its related concept. However, it is essential to notice that the contrasting possible worlds discussed here are still compatible in another larger possible world or they are actually two of its components. *Yesterday* and *this morning* together constitute some period of time in a possible world, Tokyo and Kagoshima are two places in a possible world, and the three books in which Tom found some information and the seven books in which he didn't constitute a larger whole of ten books, which can be another possible world.

The notion of possible worlds in another possible world might be better illustrated by rewriting the function from time into truth values which we presented for (2) as (*he is smoking at some time t*) *in the real world*. It explicitly states that we are talking about some time in the real world: we are talking about *yesterday* and *this morning* in the real world. This point might be shown in Figure 2 which is meant to depict this type of negation:

Figure 2　　　　　　The real world

$t_1 =$ yesterday　p

$t_2 =$ this morning　$\neg p$

p = He is smoking

$\neg p$ = He is not smoking
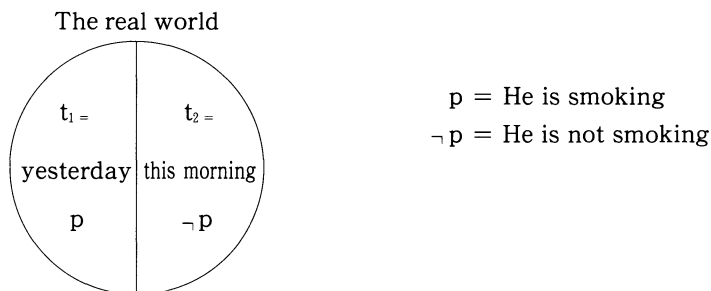
It might be concluded that negation discussed in this section is understood as a contrast between two internal possible worlds in a larger one. This is why I refer to the negation of this type as *internal negation*, which is distinguished from another type of negation which we turn to in the next section.

4. External negation

In the previous section, internal negation was explained as a contrast between two possible worlds which were regarded as two components of a larger possible world. The type of negation with which we are concerned here is also regarded as a contrast between two possible worlds, but of a different kind. (6) is an example in which this type is identified:

(6) Tom is smoking, but he shouldn't be.

If we look upon the proposition *Tom is smoking* as p, we can interpret (6) as a contrast between two possible worlds, that is, the real world in which p is asserted and the hypothetical world in which $\neg p$ is asserted.

As in the case of internal negation, it is possible to think of this type of negation in terms of a mathematical function. The function maps the domain comprising possible worlds of various kinds, such as the real world and a hypothetical world, onto the range comprising only two values, 1 and 0, or true and false. In order to explain the negation in operation in (6), for example, we might be able to think of a function which is expressed as (7):

(7) Tom is smoking in some possible world x.

When x is substituted by the real world, it is assigned the value 1, and when x is substituted by the hypothetical world, it is assigned the value 0.

The hypothetical world which is in contrast with the real world might be explicitly shown by a hypothetical clause as in (8), which was taken from a script of a film:

(8) Boolie: Where's that new vacuum cleaner I bought over here?
　　Idella : In the closet.
　　(Boolie looks L. to Hoke following behind him.)
　　Boolie: She won't touch it.
　　Idella : I would <u>if it didn't give me a shock every time I come near it.</u>

(my underline)

(Screenplay, Driving Miss Daisy, 1991:17)

Boolie's second utterance asserts ¬ p (Idella won't touch the vacuum cleaner) in the real world, and Idella's reply asserts p in the hypothetical world indicated by the *if*-clause.

This type of negation often causes a kind of frustration because it is usually related to an ideal situation, hope, wish, obligation, expectation and so on which are negatively contrasted with reality. Because of this characteristic, it often appears in some types of written text, such as editorials and letters in newspapers, in which some problem is presented. (9) is an example of such cases:

(9) Ten years ago, five years ago, two years ago the US government and its *allies* could have avoided their vulnerability by introducing energy efficiency policy in their own industries. But they chose instead to shore up the oil industry and deplete a non-renewable energy source still further and, in so doing, continue their dependence on notoriously changeable repressive regimes.

(The Guardian: January 1, 1991)

In the first sentence of (9), *could have avoided* indicates that the sentence is counterfactual, and we can assume the contrast between the real world and the hypothetical world.

　　Negation of this kind might be explained as a manifestation of the frustration which is raised in the mind of the encoder of the hypothetical information: in spite of his belief in the validity of a proposition, he cannot help admitting that it is not true in the real world. All he can do is to assert it in a hypothetical world as a wish, obligation, ideal situation and so on. In this sense, in his understanding at least, p and ¬p are compatible with each other without one completely invalidating the other. If p is true in the real world, however, ¬p is only true outside this world. We might as well, for this reason, refer to this type of negation as external negation, in contrast to internal negation discussed in the previous section. External negation might be diagramatically depicted as follows:

Figure 3　　　　　　　The encoder's understanding

The real world　　　　　The hypothetical world

p　　　　　　　　　¬p
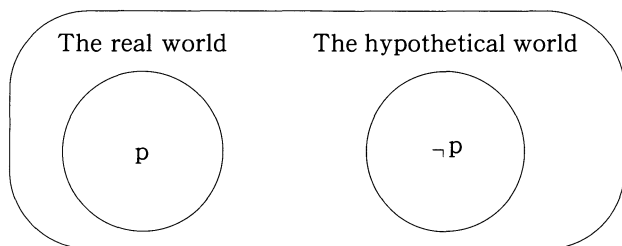
This diagram shows that we can construe both of the real and hypothetical worlds as some aspects of the encoder's understanding. Considering this fact, we might be able to rewrite the function that we presented in (7) as (*Tom is smoking in some possible world x*) *in the encoder's understanding*.

　　It should be added here that although *think*-information as opposed to *know*-information is generally considered to be a typical type of hypothetical information, in some cases it cannot be in contrast with *know*-information in external negation. To illustrate this point, (10) might be useful:

(10) a. I wish Osaka were the capital of Japan.
  b. Osaka should be the capital of Japan.
  *c. I think that Osaka is the capital of Japan.
  d. But it isn't.

In (10), d can follow a and b, but not c, although *Osaka is the capital of Japan* is expressed as a kind of hypothetical information in all of them. This lack of parallelism is due to a kind of conversational implicature which is referred to as a clausal implicature by Levinson (1983). He simplifies Gazder's (1979) formulation of the same notion as follows:

> Clausal implicatures: If S asserts some complex expression p which (i) contains an embedded sentence q, and (ii) p neither entails nor presupposes q and (iii) there's an alternative expression r of roughly equal brevity which contains q such that r does entail or presuppose q; then, by asserting p rather than r, S implicates that he doesn't know whether q is true or false, i. e. he implicates Pq & P¬q.　　　　　　　　　　(1983: 136)

In this quotation, S stands for the speaker and Pq & P¬q is read as possibly q and possibly not q. In terms of (10), c corresponds to p and its embedded sentence *Osaka is the capital of Japan* corresponds to q. The alternative expression r might be expressed in this case as *I know that Osaka is the capital of Japan*. By saying c rather than saying this sentence, the speaker implicates that it is possible that Osaka is the capital of Japan and that it is possible that Osaka is not the capital of Japan. This neutrality about the truth value of q is in contradiction with the definiteness of d, which asserts that q is false. This means that whereas in saying a and b the speaker asserts that q is true in the hypothetical worlds, in saying c he simply talks about the real world with no commitment to its truth value.

5. Interpersonal negation

　　The type of negation we now turn to is referred to as interpersonal

negation because the logical contrast is basically considered to be held between two different persons: the encoder of the proposition p and the encoder of ￢p. In this respect, it is different from external negation which was regarded as a type of negation holding between two possible worlds in one and the same person's understanding. An important point to be noted about negation of this type is that the opposite propositions which are attributed to different encoders are being asserted in the same possible world about which the encoders are talking. As the oposite propositions cannot coexist in the same possible world, one of them must be invalidated: a proposition p or ￢p is asserted in a possible world by an encoder but its truth value is invalidated by its opposite proposition encoded by the other encoder. This process of invalidation is referred to as denial. The diagram below might be useful to illustrate these points:

Figure 4

encoder A　　encoder B

a possible world

p ⟷ ￢p
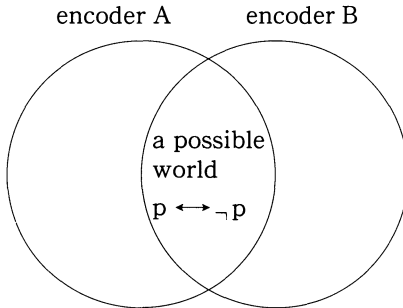
One example of interpersonal negation can be seen in the following conversation:

⑾　Boolie: Mama, you had the car in the wrong gear.
　　Daisy : I did not !

(Screenplay, Driving Miss Daisy 1991: 7)

This conversation is interpreted as a contrast between the two participants. Boolie is the encoder of p, which is expressed as *Daisy had the car in the wrong gear* and Daisy denies it by saying ￢p.

Interpersonl negation can also be explicated in terms of a mathematical function. It might be explained as mapping the domain comprising different encoders onto the range comprising only two values, 1 and 0 or true and false. The function which explains the case of negation in (11) might be described as *Daisy had the car in the wrong gear in x's understanding*. If the variable x is substituted by the argument Boolie, it is assigned the value 1 or true, whereas if x is substituted by Daisy, it is assigned the value 0 or false.

In (12)a the contrast between the encoders are expressed in one sentence, of which two contrasting propositions are presented as in (12)b:

(12)　a I disagree with you about raising Tom's allowance[3].

　　　b p: We are going to raise Tom's allowance.

　　　　¬ p: We are not going to raise Tom's allowance.

In (12)a, *you* and *I* are asserting opposite propositions about the same possible world, that is, their future. As only one of the propositions can be true in the same possible world, *I* is denying *your* p by presenting ¬ p. However, presenting only ¬ p is often not enough to invalidate p, because from the viewpoint of the encoder of p it is only another opinion of which truth value has not been confirmed. In other words, presenting ¬ p is only the first step in the process of denial or invalidation of the opposite proposition. This prompts a further development of discourse, until one of the propositions is totally invalidated[4]. The encoder, for example, refers to a fact or reality in order to verify his proposition as in (13), which is a conversation between Daisy and Hoke who are arguing about the right way to a department store called Piggly Wiggly:

(13)　Hoke :...turn around now

　　　Daisy : (overlaps) Turn back, I said. I've been driving to the Piggly Wiggly since they put it up and opened it for business.

　　　Hoke : Yassam ... I ...

　　　Daisy : This isn't the way!

　　　Hode : Yessum, it is!

Daisy : Go back! Go back this minute.

Hoke : Miss Daisy, look, look! Yonder's the Piggly Wiggly! See?

(my underline)

(Screenplay, Driving Miss Daisy, 1991: 30)

In this conversation, Hoke's last utterance verifies his proposition *it is* (*the way to Piggly Wiggly*) by referring to the fact.

So far we have discussed some examples of interpersonal negation. Here, for better understanding of the notion, it might be useful to discuss it from another point of view: in the rest of this section some cases are discussed which are not regarded as this type of negation.

It is often stated that negation presupposes its positive counterpart. Although the term negation is confusingly used as synonymous with a negative sentence or proposition here, there is no problem in this statement as long as it is interpreted as meaning that between two propositions p and ¬p, p always precedes ¬p in mental perception. In order to imagine that some situation is not the case, first we must be able to imagine that the situation is the case. However, this should not be confused with saying that asserting ¬p in a possible world presupposes that p has also been asserted in the same possible world. When we are trapped in this confusion, we are confusing negation between two sentences with that between two utterances in the sense of these words we defined in Section 2. The fact that we can think of a logical opposite to any sentence does not mean that a negative utterance always denies its positive counterpart. In other words, the presence of a negative sentence in discourse does not necessarily mean that denial is in operation. In (14), for example, the subordinate clause explicitly shows that the listener has also asserted the content of the main clause:

(14) As you know, he isn't good at mathematics.

This means that there is no contrast between two encoders in this sentence, and therefore, it is not a case of interpersonal negation and denial is not in

operation.

Another type of negative utterance which is not related to a contrast between two encoders might be exemplified by (15), when it is uttered as part of an informal description of Mary to the listener who has never seen her:

(15)   As for her looks, Mary is not pretty.

If Mary's looks is presented as a new topic, the listener is presumed to be neutral with respect to whether or not she is pretty. Therefore, we cannot see a contrast between two encoders in this sentence.

6. Various means of denial

In the previous section, the notion of denial was introduced and explained as a process in which a proposition asserted by an encoder was invalidated by another encoder. It was noted that the process of denial was in many cases not perfected by presenting only a logical opposite to the original one. In this section, we will see how an encoder can invalidate the original proposition apart from by means of presenting its logical opposite. Before discussing the ways in which this is achieved, it is necessary to clarify what logically opposite propositions are.

The logical contrast between p and ¬ p found in negation is often identified with the contrast between two sentences, of which the negative form is accomplished by inserting *not, n't* or some other negative element in the positive form by means of a proper grammatical operation, as seen in the pair (16):

(16)   a He read the books on the reading list.   p
        b He didn't read the books on the reading list.   ¬ p

The application of this simple procedure, however, requires some caution on our part, because we might end up wigh such a pair as (17):

(17)　a He read several books on the reading list.

　　　b He didn't read several books on the reading list.

In predicate logic, these sentences might be respectively expressed as (18)a and b, if we show *several* as an existential quantifier[5]:

(18)a　　$\exists x(Fx \ \& \ Gx)$

　b　　$\exists x(Fx \ \& \ \neg Gx)$

　　　　　　　$\langle Fx = x$ is a book on the reading list, $Gx =$ he read $x\rangle$

In (18)b the existential quantifier is outside the scope of negation. The reason for this is that although *several* is to the right of *not* in (17)b, it is not influenced by the negation, and (17)b can be roughly paraphrased as follows:

(19)　There are several books which he didn't read on the reading list.

Thus, (17)b, which is a negative sentence simply achieved by inserting *not* in (17)a, is not its negation. The negation of (17)a is logically expressed as (20), of which linguistic realisation might be one of the expressions of (21):

(20)　　$\neg \exists x(Fx \ \& \ Gx)$

(21)a　He didn't read any books on the reading list／

　b　There are no books which he read on the reading list／

　c　It is not the case that he read several books on the reading list.

The logical opposite of (17)b, in turn, is expressed as (22)a, which is logically equivalent to (22)b:

(22)a　　$\neg \exists x(Fx \ \& \ \neg Gx)$

　b　　$\forall x(Fx \supset Gx)$

　　　　$a \equiv b$

One of the linguistic realisations of (22) might be (23):

(23) He read all the books on the reading list.

The fact that we can identify the logical opposite of each sentence in this way is not surprising at all. It is more interesting, however, to notice that some sentences which are not logically opposite to an original sentence seem to be able to deny it in some way in conversation. For example in the following sequence, B's second sentence can be any of the sentences a-e:

(24)　A : He read several books on the reading list.
　　　B : It is not true.
　　　　a He didn't read any books on the reading list.
　　　　b He read many books on the reading list.
　　　　c He read all the books on the reading list.
　　　　d He read only one book on the reading list.
　　　　e He didn't read several books on the reading list.

This might not be surprising, if we notice that all the sentences in question express the ratios of the books he read to those he didn't which are different from that expressed in A's satement. In order to show this point, the figure below might be useful:

Figure 5
(24)　A : ＋ ＋ ＋ － － － － － － －
　　　B : It is not true.
　　　　a － － － － － － － － － －
　　　　b ＋ ＋ ＋ ＋ ＋ ＋ ＋ － － －
　　　　c ＋ ＋ ＋ ＋ ＋ ＋ ＋ ＋ ＋ ＋
　　　　d ＋ － － － － － － － － －
　　　　e － － － ＋ ＋ ＋ ＋ ＋ ＋ ＋

〈This figure is meant to show various ratios of books which he read (represented as ＋) to those he didn't (represented as －), when the number of books on the reading list is assumed to be ten. For the purpose of explication, *several* is taken to be equal to three here.〉

As we have seen, (24)a is the logical opposite of (24)A, and therefore, negation can hold between them. But how can we explain the other sentences which are intuitively interpreted as a kind of negation although they cannot be represented as ¬p of the original sentence? The answer lies in the notions of pragmatic presuppositions, conversational implicatures and entailments which add some implicit meanings to the original sentence. It is such implicit meanings of (24)A that the sentences (24)b-e negate.

As for (24)b and c, they are in logical opposition to the conversational implicatures of (24)A which might be respectively expressed as (25) and (26):

(25)　He didn't read many books on the reading list.
(26)　He didn't read all the books on the reading list.

The meanings expressed in these sentences are not logically deduced from (24)A. From a logical point of view, (24)A is only about the several books that he read: it is not concerned with the rest of the books, which may or may not have been read by him. Therefore (24)A in Figure 5 might be more suitably depicted as follows:

Figure 6
　(24)　A: + + + ? ? ? ? ? ? ?
　(? denotes either + or −.)

In ordinary use of the sentence, however, (24)A implies (25) and (26), which are a type of conversational implicature. Conversational implicatures of this type are referred to as scalar implicatures by scholars such as Levinson (1983). They are based on a linguistic scale which consists of a set of contrasting expressions of the same grammatical category 'which can be arranged in a linear order by degree of *"informativeness"* or semantic strength.' One example of such scales is 〈all, most, many, some, a few〉. Levinson mathematically defines the notion of scalar implicature as follows:

Scalar implicatures: Given any scale of the form 〈$e_1, e_2, e_3, ... e_n$〉, if a

spesker asserts $A(e_2)$, then he implicates $\neg A(e_1)$, if he asserts $A(e_3)$, then he implicates $\neg A(e_2)$ and $\neg A(e_1)$, and in general, if he asserts $A(e_n)$, then he implicates $\neg (A(e_{n-1}))$, $\neg (A(e_{n-2}))$ and so on, up to $\neg (A(e_1))$.   (1983: 133)

(In this definition, A stands for a sentential frame in which each contrasting item is inserted.)

The lexical item *several*, like *some*, is presumed to be a member of the scale that might be represented as ⟨all, most, many, several, a few⟩. By asserting (24)A, therefore, the encoder (speaker) implicates (25), (26) and some other negative sentences including an item of greater informativeness. It is implicatures of this kind that (24)b-c deny. If we represent (25) and (26) as p's, (24)b-c are $\neg$ p's.

As for (24)d, it establishes a case of negation with an entailment of (24)A. Generally speaking, each item in a linguistic scale entails those of less informativeness. *Several* is semantically defined as more than a few and entails more than two and more than one, which in turn entails not only one. Thus, (24)A is considered to entail, for example, (27):

(27)   He didn't read only one book on the reading list.

It is this entailment that is denied by (24)d.

The difference between the denial of conversational implicatures exemplified by (24)b-c and that of entailment exemplified by (24)d is that logically speaking, the former does not contradict the original sentence, whereas the latter does. As was shown in Figure 6, (24)A is neutral with respect to the group of books which are not being talked about. If some or all of these books are also found to have been read, then we can say that he read many or all of the books as in (24)b-c. On the other hand, (24)d contradicts what has once been asserted explicitly. It says that the books which he claimed to have read have actually not been read. This difference can be illustrated by the contrast in the following sentences:

(28)　a He read several books on the reading list, in fact many of them.

　　　b He read several books on the reading list, in fact all of them.

　＊c He read several books on the reading list, in fact only one of them.

(28)a-b show the defeasibility of conversational implicatures, which is related to the fact that (24) b-c do not logically contradict (24) A. Whereas conversational implicatures are defeasible, entailments which are logically deduced from the original sentence cannot be cancelled as is shown in (28)c.

　　What should be added here is that if the logical expression (18)a, $\exists x$ (Fx & Gx), is linguistically translated as (29), it does not entail (27), and for that matter, neither (25) nor (26).

(29)　He read at least one book on the reading list.

This fact dramatically illustrates the great discrepancy between logic and natural language: in logic, there are only two quantifiers, that is, universal and existential quantifiers, whereas in natural language there are many lexical items such as many, most, several, some, and few. For lack of a logical quantifier for expressing *several*, we represented it as $\exists$ in the logical interpretation of (17)a, but the meaning of the existential quantifier is much closer to that of *at least one*.

　　As for (24)e, it was shown to be a logical opposite of (23). When it is in relation to (24)A in the conversation, however, it results in reversing the ratio of the books which he read to those which he didn't, as is illustrated by the contrast between (24)A and (24)e in Figure 5. This might be better understood in relation to the notion of pragmatic presuppositions. Between (24)A and (24)e, there is some information which has been taken for granted, that is, a pragmatic presupposition, which might be expressed as (30):

(30)　He did x several books on the reading list.

　　　(x is a variable for some kind of action to the books)

On the basis of this presupposition, (24)A substitutes *read* for x, whereas (24)e

substitutes *not read* for x, denying A's assertion. The logical contrast in this case, therefore, can be reduced to the contrast between these substitutes. As it is not between two propositions, it cannot be regarded as a case of negation in the sense of the term we have defined.

The notion of pragmatic presupposition is also useful to explain (24)a-d from another point of view. For example, we can interpret (24) A as substituting *several* for x in the presupposition expressed in (31):

(31) He read x books on the reading list.
  (x is a variable for quantifiers and numerals)

We can say that (24)a denies the presupposition itself in that it denies the existence of the book he read, and (24)b-d are regarded as replacing *several* respectively with *many, all* and *only one*[6].

In (24), there is another sentence that we have not touched upon so far, which is repeated in (32) below:

(32) A : I read several books on the reading list.
  B : It is not true.

B's utterance denies A's, but in a very different way from the sentences we have discussed so far. If we think of it in terms of negation, we have to presume that its logical opposite *it is true* is implied by A's utterance. It is obvious, however, that the notions of pragmatic presupposition and conversational implicature do not explain such implication. B's utterance is actually considered to deny that a rule for a successful performance of illocutionary act has been observed. Searle (1969: 65) presents four types of rule which the speaker abides by to perform illocutionary act successfully. One of them is named the essential rule. The essential rule for an act of statement is that the proposition must represent the actual state of affairs. In (32), if A is abiding by the essential rule, it might be presumed that in saying the sentence, he is virtually stating that it is true. B's utterance denies this claim and aborts the act of statement intended by A. The negation in

operation here, therefore, is not specific to the original sentence, but concerned with a general communicational rule.

Thus, in conversation, a sentence might be followed by various kinds of sentences which deny the original sentence but cannot be looked upon as its logical opposites. This complex phenomenon cannot be properly explicated while our observation is restricted to the literal meanings of the original sentence. In order to explain it, we have to identify some implicit information. It might be conversational implicatures, pragmatic presuppositions and entailments of the original sentence, or some general principles governing communication.

7.　Conclusion

In this essay an attempt has been made to define the functions played by two logically opposite propositions in discourse, which are represented as p and ¬ p. The logical contrast between the two propositions has been referred to as negation. It has been claimed that at least three types of negation are identified, which are respectively referred to as internal, external and interpersonal negations. Now, it has become clear that the definition of each type relies on the incompatibility of two opposite propositions in the same possible world. Whether the propositions are explicitly realised as part of the text or not, the presence of negation in discourse implies that two different possible worlds can be postulated in which each of the propositions is asserted. Based on this view, negation can ultimately be reduced to the contrast between two possible worlds.

The notion of two possible worlds in contrast might be better understood, if we think of a mathematical function which maps a domain comprising possible worlds onto its range comprising values of 1 and 0, or true and false. When a possible world is assigned the value 1 and another possible world is assigned the value 0, some type of negation is in operation. The function related to internal negation is expressed in a formula as follows:

(33)　p at some time x

(p is some proposition. x is a variable for different points in time)

or

p in some place x

(x is a variable for different points in space)

This function means that different points in time or in space can be considered to be different possible worlds in which p and ¬ p are each asserted. The two contrasting possible worlds, however, are compatible in a larger possible world without contradiction: Tokyo and Kagoshima, for example, are compatible in one and the same possible world, that is, in the real world. As the two possible worlds are within another larger one, this type of negation is referred to as internal negation.

The function related to external negation is expressed in the formula as follows:

(34) p in some possible world x

(x is a variable for different possible worlds)

The arguments substituting x of this function are items, such as the real world and a hypothetical world. If p is asserted in the real world, ¬ p is asserted in its outside, for example, in the hypothetical world of wish. By virtue of this feature, this type of negation is referred to as external negation in contrast to the previous type. Just as two different points in time or space are components of a larger possible world in internal negation, so are the two possible worlds compatible in one encoder's understanding in external negation, though the contrast gives rise to a kind of frustration.

The third type of negation is referred to as interpersonal negation and the function related to it is as follows:

(35) p in the understanding of encoder x

(x is a variable for different encoders)

In this type of negation different encoders are eventually regarded as

possible worlds of a kind. It is typically explained as a situation in which two encoders have different opinions about something in the real world. This mades it necessary to deny or invalidate one of the propositions. Various ways in which denial is achieved have been discussed in the last section.

With all three types of negation understood in this way, it is interesting to notice that the functions (33)-(35) are not mutually exclusive. Actually, they constitute a general description of the world in which any proposition is assigned its truth value, which is expressed as follows:

(36)　p at some time w, in some place x, in some possible world y, in the understanding of some encoder z.

It might be concluded that the various types of possible world which we have discussed so far are actually only some aspects of this whole expression, which might be regarded as the possible world in its broadest sense. Propositions are assigned their truth value only if the variables w, x, y and z are all specified. This might be a more precise explanation of the notion of utterances than just saying that they are sentences which are asserted in some possible world, as we defined it in Section 2. Here, the notion of possible worlds has been defined more precisely. As for our three types of negation, only one of the variables of (36) is left unspecified in each type, and two arguments substituting it are assigned different values.

Notes
1. These notions are more or less taken for granted in this essay, though there has been a lot of controversy about them in the literature. My interpretation of them is mainly based on Levinson (1983).
2. I owe my understanding of this temporal logic to the explanation of the theory by Miller, G.A. and Johson-Laird, P. N. (1976: 114-21).
3. Though I haven't yet compiled any comprehensive lists of linguistic items which signal each type of negation, it might be useful, for the moment, to associate each type with one word: *stop* is to be associated with internal negation, *wish* with external negation, and *disagree* with

interpersonal negation.

4. One of the typical developments is explained as a discourse pattern called *correction* by Winter, E.Q.(1977: 29). In the pattern, the invalidated information is replaced by the correct information in an operation called corrective replacement.

5. See Kroch, A.S.(1975) for the veiw that *some*, *several*, *many* and others are repesented by the existential quantifier ∃. Ota's report about this view is in (1980: 263).

6. The presupposition can be regarded as a function which maps the domain comprising various quantifiers onto the range comprising two values, true and false. For example, *several* is assigned a value false and *only one* true. However, for the same reason presented in (4), the quatifiers cannot be regarded as a kind of possible world. It is queer to say that in a possible world indicated by *several, he read x books in the reading list* is false, or to say that in another possible world indicated by *only one*, the same information is true. The contrast between *he read x books in the reading list* and *he didn't read x books in the reading list* cannot be seen as a case of negation between two propositions. The replacement of *several* by *only one*, however, requires that one of the three types of negation so far discussed be in operation:

> Last week he read several books, but this week he read only one.
>
> (internal)
>
> He read several books, but he wishs he had read only one.
>
> (external)
>
> A: He read several books.
> B: Well, he read only one book actually.   (interpersonal)

> * He read several books, but actually he read only one.

Replacements of this type suggest that we can establish a case of negation by supplying the implicit ¬ p, which is in this case expressed as *it is not the case that he read several books*.

Bibliography

Allwood, J., Andersson, L-G. and Dahl, O. (1977) *Logic in linguistics*. Cambridge: Cambridge University Press.

Austin, J.L. (1962) *How to do things with words*. Oxford: Clarendon Press.

Brown, G. and Yule, G. (1983) *Discourse Analysis*. Cambridge: Cambridge University Press.

Brown, P. and Levinson, S.C. (1978) *Politeness*: *Some universals in language usage*. Cambridge: Cambridge University Press.

Cole, P. (ed.) (1981) *Radical Pragmatics*. New Yourk: Academic Press.

Coulthard, M. (1977) *An Introduction to Disourse Analysis*. London: Longman.

Crombie, W. (1985) *Process and Relation in Discourse and Language Learning*. Oxford: Oxford University Press.

Davison, D. and Harman, G. (eds.)(1972) *Semantics of natural language*. Dordrecht: Reidel.

Gazdar, G. (1979) *Pragmatics*: *Implicature, Presupposition and Logical Form*. New York: Academic Press.

Grice, H.P. (1975) "Logic and conversation" In Jackson, F.(1991: 155-75)

Jackson, F. (ed.)(1991) *Conditionals*. Oxford: Oxford University Press.

Kroch, A.S. (1975) *The Semantic Scope in English*. Reprodued by the Indiana University Linguistics Club.

Leech, G. (1983)*Principles of Pragmatics*. London: Longman.

Levinson, S.C. (1983)*Pragmatics*. Cambridge: Cambridge University Press.

Lyons, J. (1977) *Semantics*, Vol. 2. Cambridge: Cambridge University Press.

McCarthy, M. (1991) *Discourse Analysis for Language Teachers*. Cambridge: Cambridge University Press.

Miller, G.A. and Johnson-Laird, P.N. (1976) *Language and Perception*. Cambridge, Massachusetts: Harvard University Press.

毛利可信(1980)『英語の語用論』大修館書店

太田朗(1980)『否定の意味』大修館書店

Quirk, R., Greenbaum, S., Leech, G. and Svartvik, J. (1972) *A Grammar of Contemporary English*. London: Longman

Rescher, N. and Urquhart, A. (1971)*Temporal logic*. New Yourk: Springer-Verlag.

Searle, J.R. (1969) *Speech Acts*. Cambridge: Cambridge University Press.

Strawson, P.F. (1950) "On referring." *Mind*,59,320-44.

Stalnaker, R.C. (1972) *Pragmatics*. In Davison and Harman(1972: 380-97)

Uhry, A. (1991) *Screenplay: Driving Miss Daisy*. Tokyo: FOUR-IN Creative Products Corp.

Winter, E.Q. (1977)"A clause relational approach to English texts: a study of some predictive lexical items in written discourse." *Instructional Science* 6.1.

Winter, E. Q. (1982) *Towards a contextual grammar of English: the clause and its place in the definition of sentence*. London: George Allen & Unwin.