Negation and Presupposition in Situation Semantics*

Ik-Hwan Lee
(Yonsei University, Seoul, Korea)

0. Introduction.

The purpose of the present paper is to provide a proper semantics of so-called "external" negation within the framework of the situation semantics introduced in Barwise & Perry(1983) and its subsequent works such as Cooper (1984, 1988), Barwise & Peters (1987), etc. Of particular concern here is presuppositions of negative sentences.
Thus, in this paper, sentences of the following type will be discussed.

(1) The present king of France is wise.
(2) The present king of France is not wise.

The theory to be developed on the basis of these sentences will be claimed to be cross-linguistically applicable.
For this purpose, the paper is organized as follows: In section I we discuss the semantic distinction between internal negation and external negation in language such as English and Korean. In section II, we will discuss the semantic ambiguity of the sentential negation. In section III, we examine Seuren's(1988) recent account of negation and presupposition within the framework of a formal semantics. In section IV, an alternative account will be provided in terms of the theory of situation semantics. A summary and conclusion will be given in section V.

I. Internal Negation and External Negation.

In English the notion of semantic sentential negation, or propositional negation, is discussed,examining sentences of the following types.

(3) Not every student passed the examination.
(4) A child hasn't been born in this town.
(5) It is not true that Mary likes John.

Semantically, negation in each of the above sentences has the whole sentence under its scope. In (4), the negation word *not* has a wide scope reading over the existential quantifier *a (child)*. It is not possible to interpret the sentence in (4) as the meaning of the sentence in (6).

(6) There is some child who has *not* been born in the town.

In (5), the phrase 'it is not true' is a metalinguistic expression which is intended to represent the semantic aspect of sentential negation. Thus, the propositional sentence itself, as given in (7) below, comes within the scope of negation.

(7) Mary likes John.

Like this, in English the negation word *not* semantically has a proposition within its scope. This fact, however, does not show that English has syntactic structure of sentence negation.In English, it is considered that there is no one to

one correspondence between semantic and syntactic sentential negation(Geach 1980[1972]:75; Katz 1977:238; Barwise & Perry 1983:138; Cooper 1988:49; Horn 1989:467,477,487). Thus, such a semantic sentential negation is represented by translating the syntactic constituent negation into appropriate logical forms. For example, in (3) the negative noun phrase *not every student* is considered to be the negation of the universally quantified noun phrase *every student*. In (4) syntactically the verb phrase is negated, but it is interpreted as negating the quantified noun phrase *a child*. As already noted, in (5) the phrase *it is not true* is a metalinguistic expression (Cooper 1988:50). In other words, in English semantic sentential negation is obtained from syntactic constituent negation.

Consequently, in English many works on negation discuss the semantic ambiguity of constituent negation. As simple examples, look at the following sentences. [For convenience' sake, sentences given in (5) and (7) are repeated here.]

(7) Mary likes John.
(8) Mary does *not* like John.
(9) Mary *dislikes* John.
(5) *It is not true* that Mary likes John.

Here (8) is a natural syntactic structure as negation of (7). Semantically, however, (8) is ambiguous and can be interpreted either as (9) or as (5). These two readings may be represented as follows, along with the representation of (7) as (7)' (Kroch 1975:102).

(7)' Like (Mary, John)
(9)' ¬ Like (Mary, John)
(5)' ¬ [Like (Mary, John)

Here, (9)'and (5)' are logically different. (5)', a sentential negation, is conceptually weaker than (9)', a verbal negation. To put it logically, (7)' and (5)' are in a contrary relation, while (7)' and (9)' are in a contradictory relation.[1] Like this, the verbal negation, a kind of constituent negation, can be semantially ambiguous. Traditionally, the contradictory negation has been termed Internal Negation, and the contrary negation External Negation.[2]

A similar phenomenon can be observed in the following data.

(10) John couldn'*t* solve *many* of the problems.
(11) John couldn'*t* solve *all* of the problems.
(12) All of the problems were *not* difficult.

Although there are differences in grammaticality judgments, it is generally agreed that these sentences give rise to semantic ambiguity (Lasnik 1975[1972]:24,32,40; Jackendoff 1972:352f; Kroch 1975:65-67). That is, these are syntactic verbal negation, but semantically they can be interpreted either as internal negation or as external negation with respect to the quantified phrases.The interaction between the quantifier and the negation word *not* may be represented as follows.

(13) [=10] a. Internal Negation: **MANY (NOT)**
            b. External Negation: **NOT (MANY)**
(14) [=11] a. Internal Negation: **ALL (NOT)**
            b. External Negation: **NOT (ALL)**
(15) [=12] a. Internal Negation: **ALL (NOT)**
            b. External Negation: **NOT (ALL)**

<Ik-Hwan Lee/ 3>

On the basis of these facts we can conclude that in English the syntactic verbal negation in many cases can have the semantic ambiguity of internal negation and external negation.

On the other hand, contrary to Horn's (1985:163) unclear conclusion, Korean has syntactic constructions semantically corresponding to sentential negation. Look at the sentences in (16) and (17).

(16) a. 철수- 가 미자-를 안 좋아한- 다.
   Chelswu-ka   Mica-lul   an   cohahan-da.[3]
   Chelswu-Subj Mica-Acc   NOT   like   Decl
   'Chelswu does not like Mica.'

   b. 철수- 가 미자-를 좋아하-지 않는- 다.
   Chelswu-ka   Mica-lul   cohaha-ci   annun- da.
   Chelswu-Subj Mica-Acc   like   Comp NOT do-Decl
   'It is not that Chelswu likes Mica.'

(17) a. 모든 소녀- 들- 이 철수- 를 안 좋아한- 다.
   motun sonye-tul-i   chelswu-lul   an   cohahan-da.
   all   girls-   Subj Chelswu-Acc   NOT   like-   Decl
   'All girls do not like Chelswu.'

   b. 모든 소녀- 들- 이 철수- 를 좋아하-지 않는다.
   motun sonye-tul-i   chelswu-lul   cohaha-ci   annun- da.
   all   girls-   Subj Chelswu-Acc   like-   Comp not-do-Decl
   'It is not that all girls like Chelswu.'

Syntactically, (16a) and (17a) are VP-negation, while (16b) and (17b) are S-negation. Considering this fact and other related problems, I (Lee 1989) proposed two rules, namely VP-negation and S-negation, which were formulated within the framework of the possible world semantics in the Montague tradition, as in (18) and (19).

(18) NEGATION: SYNTACTIC RULES:
   S13. VP-NEG (Verb phrase negation):
      If $\alpha \in P_{IV}$, then $F_{13}(\alpha) \in P_{IV}$.
      Here, $F_{13}(\alpha) = ani + \alpha$.
      Condition: α does not include another negation particle 아니 (ani 'not').
   S14. S-NEG (Sentential negation):
      If $\phi \in P_t$, then $F_{14}(\phi) \in P_t$.
      Here, $F_{14}(\phi) = \phi' + ci\text{-}aniha\text{-}ta$.
      Condition: ϕ' is obtained from ϕ by deleting the sentence ender 다
      (ta)and changing the final verb into its root form.
(19) NEGATION: SEMANTIC TRANSLATION RULES:
   T13. $F_{13}(\alpha) \rightarrow [\lambda x [\neg \alpha'](x)]$[4]
   T14. $F_{14}(\phi) \rightarrow [\neg [\phi']]$

In Lee(1989), using these rules, I demonstrated the detailed derivation and translation of the sentences in (16). There it was assumed that similar rules might be postulated for the treatment of English negation. It was also noted that sentential negation would pose some problems for the recently developed theory of situation semantics. There, however, I did not try to give a detailed account of negation in terms of situation semantics. The present paper attempts to postulate appropriate rules of external (or, sententail) negation within the theory of situation semantics. Before doing that we will first discuss the problems which need to be explained in the treatment of external negation.

<Ik-Hwan Lee/ 4>

II. Problems of Sentential Negation.

The problem is that the rules (S13, S14 and T13, T14) given in (18)-(19) are not fine-grained enough to account for all the semantic phenomena arising from the externally negated sentences. More specifically, the above rules cannot appropriately handle the semantics of the so-called presuppositions. Let us examine the classical Russell sentences in (1)-(2) [repeated here, for convenience].

(1) The present king of France is wise.
(2) The present king of France is *not* wise.

According to Russell(1905), by uttering sentence (1) the speaker asserts three things as paraphrased in (20).

(20) a. There exists a king of France.
     b. The king of France is unique in the world.
     c. The king of France has the property of being wise.

These three assertions can be represented as in (21).

(21) $\exists x$ (KoF(x) $\wedge$ $\forall y$ (KoF (y) $\leftrightarrow$ [y = x]) $\wedge$ Wise(x))

In this analysis, one can say that the sentence in (1) is definitely false in the present world because there is no entity in this world that can be truthfully said to be, at present, the king of France. As for the negated sentence in (2), Russell claims that it is ambiguous between internal negation and external negation, which can be represented in logical formulas as in (22) and (23), respectively.

(22) INTERNAL NEGATION: $\exists x$ (KoF(x) $\wedge$ $\forall y$ (KoF (y) $\leftrightarrow$ [y = x]) $\wedge$ $\neg$ Wise(x))
(23) EXTERNAL NEGATION: $\neg$ $\exists x$ (KoF(x) $\wedge$ $\forall y$ (KoF (y) $\leftrightarrow$ [y = x]) $\wedge$ Wise(x))

In the external negation, (23), the negation operator is prefixed to the positive form of (21). In the internal negation, (22), it is shown that it is possible to insert the negation operator in other positions in (21). It is generally agreed that human speakers prefer the reading of this internal negation. In the internal negation (22), (20a) and (20b) are preserved and only (20c) is negated. On the other hand, in the external negation, (23), logically the existential import is negated, i.e. (20a) and (20b). [To put it in other researchers' terms, in (22) the so-called presuppositions are preserved, while in (23) they are negated.]
As is well known, in the Frege(1892)-Strawson(1956) approach, it is claimed that (22) is the only possible reading of the negative sentence (2). That is, in their approach the so-called external negation is not recognized. In the approach, the positive sentence in (1) is not analyzed as (20). It is claimed that only (20c) is asserted by (1),and that (21a) and (20b) are claimed to be just presupposed.The positive sentence in (1) is not formalized as in (21). They claim that when the presupposition fails, in opposition to Russell, the sentence is truthvalueless. Thus, in their approach, the only appropriate logical form is (22).
Recent works on the subject of negation (e.g., Kroch 1975, Horn 1985,1989 Linebarger 1987, Seuren 1988, etc.) agree that external negation is ambiguous depending on whether the so-called presuppositions are negated or not. The rules given in the previous section do not properly account for this semantic phenomena [5] The rule S14-T14 in (18) and (19), respectively, can treat the simple sentential

233

<Ik-Hwan Lee/ 5>

negation, which is usually referred to as *Denial*. The notion of denial reading of external negation may be defined as follows (cf. Kroch 1975, Horn 1985,1989; Linebarger 1987, etc.).

(24) DENIAL READING OF EXTERNAL NEGATION:
The sentence [not [S]] does not directly comment on the state of affairs but instead denies the truth of the statement S previously uttered or implied. Sentence-external negation can be paraphrased as "The sentence S is not true".(Kroch 1975)[6]

The translation rule T14 explains this aspect of external negation. It, however, cannot account for other semantic phenomena concerning presupposition. In the following section we will examine Seuren's (1988) recent account of the presupposition phenomena. After that we will devise a theory of situation in order to account for the phenomena within the framework of situation semantics.

III. Negation of Presupposition.

Concerning presuppositons, Seuren(1988:182) notes two cases, as cited in (25).

(25) a. Presupposition-Preserving Case: In certain constructions negation cannot cancel presuppositions but has to preserve them.
b. Presupposition-Cancelling Case: In other constructions the only negation possible is the presupposition-cancelling one.

According to this observation, it is not the case that presuppositions may be cancelled. Instead, in some cases presuppositons are preserved, while in other cases they are necessarily cancelled. Thus, negation of presuppositions cannot be treated in a uniform way. In other words, external negation itself is ambiguous, hence any rules of external negation should be postulated in such a way as to reflect this semantic aspect of presuppositions. To make this point clear, Seuren(1988:190) cites the following sentences.

(26) a. It is NOT sad that she died so young: she is still very much alive.
b. He doesn't hate SOME of his friends: he hates them ALL.
c. No Johnny, aunt Bessie isn't "SPLITTIG" tomorrow, she is LEAVING.

In (26a), a factive presupposition is denied. In (26b) a scalar implicature is corrected. In (26c) a stylistic or sociolinguistic inappropriateness is straightened out. Like this, denials arising from external negation do not seem to form a single natural class. This fact supports the observation that the rules S14 and T14 do not correctly account for the semantic aspects of external negation.

Concerning the negation word *not* Seuren claims that it is semantically ambiguous. He says, "...in my analysis, *not* is LOGICALLY, and hence TRUTH-CONDITIONALLY, and hence SEMANTICALLY, ambiguous". He makes a distinction between a minimal negation ($\sim$) and a radical negation ($\approx$). A minimal negation preserves presuppositions, while a radical negation cancels them. To complete his logic, he postulates three truth-values, as summarized in (27).

(27) a. TRUE: written 1: All the truth conditions are fulfilled.
b. MINIMALLY FALSE: written 2: Presuppositional conditions are fulfilled, but not the assertion conditions.

234

<Ik-Hwan Lee/ 6>

c. RADICALLY FALSE: written 3: Not even presuppositional conditions are
   fulfilled.

Seuren's theory is compared with the classical bivalent logic as in (28).

(28)

Assert	M-N	R-N	Classic
P	~ P	≃ P	¬ P
1	2	2	2
2	1	2	1
3	3	1	1

Fig 1. Seuren's truth table, compared with classical negation.

Now let us look at our earlier examples with Seuren's analysis in mind. [Examples
are repeated here.]

(1) The present king of France is wise.
(2) The present king of France is *not* wise.
(20) a. There exists a king of France.
     b. The king of France is unique in the world.
     c. The king of France has the property of being wise.
(21) $\exists x$ (KoF(x) $\wedge$ $\forall y$ (KoF (y) $\leftrightarrow$ [y = x]) $\wedge$ Wise(x))
(22) INTERNAL NEGATION: $\exists x$ (KoF(x) $\wedge$ $\forall y$ (KoF (y) $\leftrightarrow$ [y = x]) $\wedge$ ¬ Wise(x))
(23) EXTERNAL NEGATION: ¬ $\exists x$ (KoF(x) $\wedge$ $\forall y$ (KoF (y) $\leftrightarrow$ [y = x]) $\wedge$ Wise(x))

In Seuren's terms, (22) is a minimal negation, and hence minimally false. (23)
becomes a radical negation when either [[KoF(x)] and [$\forall y$ (KoF (y) $\leftrightarrow$ [y = x])]]
does not hold, in addition to the falsity of [Wise(x)]. Seuren does not consider a
situation in which the assertion holds while presuppositions fail. It is of course
difficult to imagine such a situation. Thus, when presuppositions fail the assertion
can also be assumed not to hold. We may compare logics of Russell, Strawson, and
Seuren as follows.

(29)

Case		Russell	Strawson	Seuren
1	Assertion: T Presuppositions: T	T	T	T
2	Assertion: F Presuppositions: T	F	F	M-F
3	Assertion: F Presuppositions: F	F	Valueless	R-F

Fig 2. Comparison of negation of presupposition: Russell, Strawsn, and Seuren

As can be seen in Fig.2, Seuren has refined the assignment of truth values, in
accounting for negation of presuppositions. In Case 1. there is no difference. In

235

<Ik-Hwan Lee/ 7>

Case 2, there is no difference between Russell and Strawson, but Seuren assigns the value of Minimally False. In Case 3, the classical difference between Russell and Strawson is depicted. Furthermore, we can see that Seuren's position is closer to Russell than to Strawson. Thus, we can conclude that Seuren basically adopts Russell's logic and revises it in such a way as to add a fine distinction between Case 2 and Case 3. By doing so, he succeeds in distinguishing the semantic difference between Case 2 and Case 3. This policy is similar to Strawson's, but their value assignments are quite different. Semantically, Seuren's analysis is sound since it does not use such unfounded notion as Valueless. Thus, we can conclude that Seuren has been successful in providing a fine-grained semantics for the analysis of negation and presupposition within the traditional model-theoretic formal framework.

Seuren (1988), however, does not give any account of the data given in (26)[repeated here, for convenience].

(26) a. It is NOT sad that she died so young: she is still very much alive.
     b. He doesn't hate SOME of his friends: he hates them ALL.
     c. No Johnny, aunt Bessie isn't "SPLITTING" tomorrow, she is LEAVING.

It seems to me that (26a) and (26b) may be categorized into Case 3 in Fig.2 above. Concerning (26a),there seems to be no problem at all with this treatment. (26b), however,may cause a problem, if we consider the conveyed meaning to be a scalar implicature. If, however, we take this implicature as a conventional one, then it can be treated in the same way. If this is correct, then we are left with (26c). The problem involved in (26c) is purely pragmatic or stylistic, the explanation of which seems to lie beyond the limit of truth-conditional semantics that is assumed in this paper. In the following section, we will examine an alternative semantic theory, i.e., situation semantics, and see if the theory can properly handle all the data considered so far in this paper.

IV. Situations and External Negation.

In this section a recent version of situation semantics is briefly discussed, as it relates to the semantics of external negation. In particular, it will be examined whether the problems of negation of presuppositions may be treated in situation semantics better than in the Seuren-type formal semantics.

In situation semantics (Barwise 1989:236), situations (or, s's) are taken to be more basic than facts and other states of affairs (or, $soas$). In the theory of situations negative states of affairs are recognized, and it is further assumed that soas are not always persistent. It is noted that every state of affirs σ has a negation $\neg\sigma$

In situation semantics, declarative sentences are not talked about as being true or false. They are regarded as describing situations. As mentioned above, situations are basic objects which among other things support certain facts. The support relation is represented as in (30).

(30) $s \models \sigma$.

This means that the situation s supports($\models$) the fact σ. Facts are situation-theoretic objects. Facts are represented as in (31).

(31) a. $\langle\!\langle l,$ like, Mary, John; 1$\rangle\!\rangle$
     b. $\langle\!\langle l,$ like, Mary, John; 0$\rangle\!\rangle$

Let us consider these facts in connection with the sentences in (7) through (10) above.[repeated here, for convenience, together with their psudo-logical forms].

<Ik-Hwan Lee/ 8>

(7) Mary likes John.
(8) Mary does *not* like John.
(9) Mary *dislikes* John.
(5) *It is not true* that Mary likes John.
(7)' **Like (Mary, John)**
(9)' ¬ **Like (Mary, John)**
(5)' ¬ **[Like (Mary, John)**

We talk of sentences describing a situation when a certain fact is supported by the situation. Thus the semantic rules are stated in such a way that the statements in (32) are TRUE.

(32) a. *Mary likes John* describes situation *s*
        iff *s* |= 《 *l*, like, Mary, John; 1》 .
     b. *Mary does not like John* describes situation *s*
        iff *s* |= 《 *l*, like, Mary, John; 0》 .

Here, (32a) reflects the relation between (7) and (7)', while (32b) explains the relation between (8)[its (9)-reading] and (9)'. This means that (32) provides the semantics of a positive sentence and its VP-Negation counterpart. More specifically, the semantic rules do not say anything about the S-Negation of (8), i.e. the reading given in (5). This is the sentential negation, or external negation of the sentence in (8).

In an earlier version of situation semantics (Barwise & Perry 1983), we see the observation reproduced in (33).

(33) "The simplest form of negation in English is verb phrase negation, rather than sentence negation. Compare:

[2] A DOG WASN'T BARKING.

with

[3] IT IS NOT TRUE THAT A DOG WAS BARKING.

In [3] there is an embedded sentence, while in [2] there is none. The type of negation in [2] can easily be handled if VP rules are assumed, as has already been indicated in an earlier section. But sentence negation is a complicated matter, not one we take up in detail here. If I say "A dog is not barking," this can describe any factual situation in which some dog is not barking at the location referred to. <u>However, if I say "It's not true that a dog is barking,"</u> <u>my new utterance *doesn't mean that. Indeed, to ask what situation I am*</u> <u>*describing seems to miss* the mark. Rather it seems that my utterance, if</u> <u>informative, serves primarily to preclude certain types of situations, namely,</u> <u>those with barking dogs."</u> (Barwise & Perry 1983:138; Underline inserted:IHL)

In a recent version of the theory (Barwise & Peters 1987; Barwise 1989), however, an attempt is made to accomodate sentential negation,which was regarded as 'complicated matter' in the earlier work, as I underlined in their observation quoted in (33). Their(Barwise & Peters 1987:14) rules are cited in (34).

(34) VP-NEGATION: (*s* |= ¬ *σ*): This asserts that the dual (i.e., contradictory counterpart) of *σ* holds in *s*.
(35) S-NEGATION: ¬ (*s* |= *σ*): This asserts that *σ* fails to hold in *s*.

237

The semantic rule in (34) is a generalized and restated version of (32b), namely a VP-negation. (35) is a new semantic rule which seems to be intended to account for external negation. In situation semantics external negation is simply taken to be a denial of the proposition. This position seems to be clear in the following claim.

(36) "...Indeed for most situations s there will be basic states of affairs σ
    containing as constituents objects with which neither proposition $(s \mid= \sigma)$ nor
    $(s \mid= \neg \sigma)$ are true." (Barwise 1989:235, fn.21)

This is exactly the denial reading of a sentence, as discussed in the previous sections. This rule seems to correctly capture the intuition that we quoted in (24) above, whish says: "The sentence [not [S]] does not directly comment on the state of affairs but instead denies the truth of the statement S previously uttered or implied. Sentence-external negation can be paraphrased as 'The sentence S is not true'".[8]

This rule, however, is not fine-grained enough to account for the different semantic phenomena that an S-negation may give rise to. We may observe two kinds of problems. First, the rule cannot capture the fact that the semantic ambiguity of the negation word *not* is actually a matter of presuppositions of the sentence. In particular, the rule does not pick out such a semantic distinction as the one given in (29) above. According to the situation theory, the Case 2 in (29), i.e. presupposition preserving case, will be treated as a simple case of VP-negation, namely rule (34). On the other hand, the Case 3 in (29), i.e. presupposition-cancelling case, will be simply treated as a case of denial and handled by the rule in (35). Negation rules of any theory, however, must be able to capture this phenomenon of negative sentences.

Second, concerning the denial meaning of external negation, the rule in (35) cannot capture the semantic differences among the sentences given in (26). [repeated here, for convenience].

(26) a. It is NOT sad that she died so young: she is still very much alive.
    b. He doesn't hate SOME of his friends: he hates them ALL.
    c. No Johnny, aunt Bessie isn't "SPLITTING" tomorrow, she is LEAVING.

Since the rule in (35) takes the external negation operator as a single denial operator, it cannot but treat the above three external negation cases as a single natural class, which is not correct, as we have already observed.

To resolve these problems, I propose that the external negation rule in (35) be revised as in (37).

(37) S-NEGATION (Revised): $(s \mid= \langle\!\langle l, \neg (\sigma^{\bullet} \wedge \sigma^P) \rangle\!\rangle)$
    Here, $\sigma^{\bullet}$ means the asserted proposition of σ and σ^P
    means the presupposition of σ. σ^P may be more than one.

This revised rule provides the following value assignments.

<Ik-Hwan Lee/10>

(38)

Case	$\sigma^\bullet$	σ^P
1	F	T
2	F	F

Fig. 3. Possible values of $\sigma^\bullet$ and σ^P.

Comparing Fig. 3 in (38) with Fig. 2 in (29), we can see that Case 2 of (29) corresponds to Case 1 in (38), and Case 3 in (29) to Case 2 in (38). This is exactly the expected result. The revised rule can appropriately handle the ambiguity of the negation word *not*, as it has scope interactions with presuppositions of the sentence. When we need to consider a set of presuppositions of a sentence, We can easily include the set of presuppositions by the mechanism of conjunction. we can also represent which one of the conjoined presuppositions is negated by a similar method of the table representation of (38). This can be an efficient way to accommodate the semantic difference among the sentences given in (26) above.

Furthermore, the revised rule has important conceptual significance. In (24), in section II above, we quoted a definition of the denial reading of external negation. In notes 6 and 8, it was mentioned that the position taken in the definition would be partly rejected. Actually, the definition does not seem to correctly describe the denial meaning of external negation. Particularly, in the definition, the phrase "...does not directly describe..." does not seem to be correctly defining the denial reading. As is expressed in Barwise's comment, cited in (36) above, a speaker is actually describing a situation in which a proposition is neither true nor false. The revised rule correctly reflects this aspect of the denial reading by making a situation support relevant facts.

Let us reanalyze the data discussed above in terms of the revised rules. Look at the sentences in (2) and in (20).[repeated here, for convenience].

(2) The present king of France is *not* wise.
(20) a. There exists a king of France.
    b. The king of France is unique in the world.
    c. The king of France has the property of being wise.

According to the rule given in (37), (20c) is $\sigma^\bullet$ and (20a) and (2b) constitute the set of σ^Ps. Thus, the meaning of sentence (1), repeated here, is represented as in (39).

(1) The present king of France is wise.
(39) The meaning of sentence (1):
    a. $\sigma^\bullet$: (20c)
    b. σ^P: (20a) $\wedge$ (20b)

Now, the semantic rule of external negation is formulated as in (40).

(40) EXTERNAL NEGATION: *The present king of France is not wise* describes situation s
    iff $s \models \langle\!\langle l, \neg \exists x (Wise(x) \wedge [KoF(x) \wedge \forall y (KoF (y) \leftrightarrow [y = x])]) \rangle\!\rangle$.[9]

In addition to this rule, we can easily formulate a semantic rule of internal negation for the sentence, as in (41).

239

(41) INTERNAL NEGATION: *The present king of France is not wise* describes situation s
iff $s \models \langle\!\langle l, \exists x (\neg \text{Wise}(x) \wedge [\text{KoF}(x) \wedge \forall y (\text{KoF} (y) \leftrightarrow [y = x])]) \rangle\!\rangle$.

The rules in (40) and (41) may be rewritten as in (42) and (43), respectively, which are more in the form of situation semantics.

(42) EXTERNAL NEGATION:
The present king of France is not wise describes situation s
iff $s \models \langle\!\langle l, \exists x [\text{KoF}(x) \wedge \forall y (\text{KoF} (y) \leftrightarrow [y = x])](b); 0 \rangle\!\rangle$ and
$\langle\!\langle l, \exists x (\text{Wise}(x))(b); 0 \rangle\!\rangle$.[7]

(43) INTERNAL NEGATION:
The present king of France is not wise describes situation s
iff $s \models \langle\!\langle l, \exists x [\text{KoF}(x) \wedge \forall y (\text{KoF} (y) \leftrightarrow [y = x])](b); 1 \rangle\!\rangle$ and
$\langle\!\langle l, \exists x (\text{Wise}(x))(b); 0 \rangle\!\rangle$.

This completes a revision of negation rules of situation semantics, so that they may properly account for the relevant data.

V. Summary and Conclusion.

The purpose of the present paper was to provide a proper semantics of external negation within the framework of situation semantics. Of particular concern was to account for the interactions between the negation word *not* and presuppositions of the sentence. To this end, in section I, the syntactic and semantic distinction between internal and external negation was made and discussed in detail. In particular, an attempt was made to provide rules of negation in terms of the traditional formal semantics. In section II, problems of sentential negation were discussed. Simple denial reading and other presupposition cancelling cases were examined. In section III, external negation was discussed with reference to the ambiguity of the negation word *not*. Particularly, presupposition-preserving and presupposition-cancelling cases are separately examined. In section IV, in accounting for the observed semantic phenomena of negation in situation semantics, a revision of previous rules was proposed. It was shown the revised rules effectively handled negation of presuppositions.

To conclude, I hope to have shown that, with a minor revision of rules, situation semantics can provide a set of rules not only for internal negation but also for external negation. The present paper, however, is not conclusive on the matter of theory evaluation. Not only the formal semantics of Seuren-type but also the revised situation semantics were shown to be able to appropriately handle the semantic aspects of external negation. It is hoped that a further study will investigate other aspects of grammar in order to provide a more comprehensive theory evaluation.

Notes

*This is the written version of the paper I presented at the Sixth Japanese-Korean Joint Workshop on Formal Grammar Theory, held at Sophia University, Tokyo, Japan, on December 26-28, 1989. I would like to thank Professors Akira Ikeya, Arata Ishimoto, Akira Ishikawa, Hisashi Komatsu, Chungmin Lee, and Byung-Soo Park, for their helpful criticisms and comments. I am also grateful to Ms. In-Young Jhee for her help in preparing an earlier version of this paper.

[1]That is to say, although (7)' and (5)' cannot both be true, they can both be

<Ik-Hwan Lee/12>

false. On the other hand, (7)' and (9)' can neither be true nor both be false.

[2]In Barwise & Peters' (1987) term, Internal Negation may be termed as 'Complement', while External Negation may be termed as "Dual'.

[3]Abbreviations: Subj = Subject Particle; Acc = Accusative Particle; Decl = Declarative Particle; Comp = Complementizer

[4]Here, the translated expression [¬ α'] functions as asingle predicate, which corresponds to its positive predicate[α']. This way we can account for such pairs as *button-unbutton, happy-unhappy*, etc.

[5]As will be discussed shortly, the most recent version of negation rules in situation semantics (Barwise & Peters 1987) has exactly the same problem. The rules will examined in section IV below.

[6]This position, however, will be partly rejected in section IV below.

[7]We may think of another situation, as depicted in the following:

The present king of France is not wise describes situation *s*
iff *s* |= 《*l*, ∃x [KoF(x) ∧ ∀y (KoF (y) ↔ [y = x])](b); 0》 and
　　 《*l*, ∃x (Wise(x))(b); 1》 .

This, however, is an impossible situation. Once the first part does not hold the second part is automatically supposed not to hold, either. Therefore, (42) is the only possible situation picking up the reading of external negation.

[8]As observed in note 6 above, this position will be partly rejected shortly.

[9]This is a schematic representation of the rule.

References

Barwise, Jon & John Perry.(1983) *Situations and Attitudes*, MIT Press, Cambridge, MA.
Barwise, Jon & Stanley Peters.(1987) *Lectures on Situation Theory and Situation Semantics*, CSLI, Stanford University, Stanford, CA.
Cooper, Robin. (1984) " Sentence Negation in Situation Semantics," *CLS*, 20, Chicago University, Chicago.
Cooper, Robin. (1987) *Introduction to Situation Semantics*, LSA Summer Institute course textbook, Stanford University, Stanford, CA.
Cooper, Robin. (1988) "Facts in Situation Theory: Representation, Psychology, or Reality?" in Kempson, ed. (1988), 49-62.
Englebretsen, G. (1981a) *Logical Negation*, Van Gorcum, Assen, Netherlands.
Englebretsen, G. (1981b) *Three logicians: Aristotle, Leibniz, and Sommers and the Syllogistic*, Van Gorcum, Assen, Netherlands.
Frege, G. (1974[1892]) "On Sense and Reference," in F. Zabeeh, et al., eds.(1974), 117-41.
Frege, G, (1952[1919]) "Negation," in P. Geach & M. Black, eds.(1952). *Translations from the Philosophical Writings of Gottlob Frege*, Blackwell, Oxford.
Geach, P.T. (1980[1972]) *Logic Matters*, U of California Press, Berkeley.
Horn, Laurence R. (1985) "Metalinguistic Negation and Pragmatic Ambiguity," *Language* 61;1, 121-74.

<Ik-Hwan Lee/13>

Horn, Laurence R. (1989) *A Natural History of Negation*, Chicago University, Chicago. Press.

Jespersen, O. (1917) *Negation in English and Other Languages*, Lunos, Bianco, Gobenhagen.

Karttunen, Lauri & Stanley Peters. (1979) "Conventional Implicature,"in Oh & Dinneen, eds. *Syntax and Semantics*, 10, Academic Press, New York.

Katz, J. (1977) *Semantic Theory*, Harper & Row, New York.

Keenan, E. & L. Faltz. (1985) *Boolean Semantics for Natural Language*. D. Reidel, Dordrecht-Holland.

Kempson, Ruth, ed. (1988) *Mental Representations: The Interface between Language and Reality*, Cambridge University Press, Cambridge.

Kroch, A. (1975[1974]) *The Semantics of Scope in English*, Indiana U Linguistics Club, Bloomington, Ind.

Kuno, S. (1980) "The Scope of Question and Negation in Some Verb-Final Languages," *CLS*, 20, 155-69.

Ladusaw, William. (1979) *Polarity Sensitivity as Inherent Scope Relations*, Ph.D. Dissertation, University of Texas, Austin.

Lasnik, H. (1975[1972]) *An Analysis of Negation in English*. Indiana U Linguistics Club, Bloomington, Ind.

Lee, Ik-Hwan (1989) "A Semantic Analysis of Korean External Negation," A paper presented at the first congnitive science conference: 'Man and Machine and Language', Oct. 5-6, 1989, Korea Advanced Institute of Science and Technology.

Linebarger, Marcia C. (1987) "Negative Polarity and Grammatical Representation," *Linguistics & Philosophy*, 10, 325-87.

Montague, R. (1974) "The Proper Treatment of Quantification in Ordinary English," in R. Thomason, ed. (1974), 247-71.

Olson, Kenneth Russell. (1987) *An Essay on Facts*. CSLI, Stanford University.

Russell, B. (1974[1905]) "On Denoting," in F. Zabeeh, et al. eds. (1974), 141-59.

Seuren, Pieter A.M. (1985). *Discourse Semantics*. Basil Blackwell, England.

Seuren, Pieter A.M. (1988) "Presupposition and Negation," *Journal of Semantics*. 6:175-226.

Strawson, P.F. (1974[1956]) "On Referring," in F. Zabeeh, et al. eds. (1974), 159-93.

Thomason, R., ed. (1974) *Formal Philosophy: Selected Papers of Richard Montague*, Yale U Press, New Haven.

Zabeeh, F., E.D. Klemke, and A. Jacobson, eds. (1974) *Readings in Semantics*, U Illinois Press, Urbana.

Ik-Hwan Lee
Department of English, Yonsei University
Seoul 120-749, KOREA

Bitnet address: IHLEE@KRYSUCC1