Clausal Implicatures of a Disjunction: An Alternative View*

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Song, Jae-gyun. 2005. Clausal Implicatures of a Disjunction: An Alternative View. *The Linguistic Association of Korea Journal, 13*(4), 159-178. The purpose of this paper is to provide an alternative analysis of clausal implicatures of a disjunction that is free from the empirical difficulties faced by Sauerland (2004, 2005) and Gazdar (1979). My account is based on the No Redundancy Principle (NPR), according to which every meaningful expression in a sentence or a text must be non-redundant: Either it must make a contribution to the truth-conditional interpretation, or otherwise its occurrence must be pragmatically licensed. Assuming that the NPR is a rule that regulates all the interpretation processes, I show that the principle provides proper solutions to the problems faced by Sauerland and Gazdar. Especially, it is claimed that it is not clausal implicatures but the NPR that is responsible for the suspension of scalar implicatures and presuppositions.

Key Words: clausal implicatures, disjunction, epistemic, presupposition, scalar implicatures

1. Introduction

As Levinson (2000) points out, clausal implicatures have not been heavily researched since Gazdar's (1979) pioneering work. Recently, however, Sauerland (2004, 2005) proposes a computation system that can account for both the clausal and scalar implicatures of a disjunction. He

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argues that his account of both kinds of implicatures is more satisfactory than Gazdar's (1979), in that it shows in a more clear and uniform way the relation between the two implicatures: while Gazdar posits two distinct computation mechanisms for clausal and scalar implicatures, his own system uniformly derives the two implicatures from Horn scales, and the only difference between clausal and scalar implicatures in his system is just that the latter is epistemically strengthened from the former.

In the present paper, I will focus on clausal implicatures of a disjunction: clausal implicatures of a disjunction *A or B* refer to the epistemic uncertainty inference that the speaker isn't sure whether *A* or whether *B*. For instance, an utterance like "Kai saw Aaliyah or Beyonce." yields the epistemic uncertainty inference that the speaker isn't sure whether Kai saw Aaliyah or whether Kai saw Beyonce.

This paper mainly concerns the following example:

(1) Some of the boys left or all of them left.

Intuitively (1) implicates that some of the boys left, but it isn't certain whether or not all of them left. In addition, the first disjunct of (1) implicates that not all of the boys left, but the whole disjunction lacks this implicature. In this paper, I will show that Sauerland's and Gazdar's theories of clausal implicatures have some empirical difficulties predicting these two facts, and propose an alternative analysis that is free from those flaws.

The plan of this paper is as follows: section 2 summarizes the main aspects of Sauerland's and Gazdar's theories. In section 3, I discuss the empirical problems faced by both. Finally, in section 4, I present my own analysis, and illustrate how it can provide solutions to the problems discussed in section 3.

2. Sauerland's and Gazdar's Theories

In this section, I summarize the main aspects of Sauerland's and Gazdar's proposals on the clausal implicatures of disjunctions that play a role for the present discussion. Let's start with Sauerland's theory.

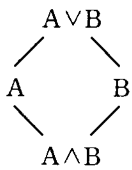
First, Sauerland argues that both clausal and scalar implicatures are derived from Horn scales, which are n-tuples of alternatives $<\alpha_1, \alpha_2, ..., \alpha_n>$ ordered by entailment relation.

Following Soames (1982) and Horn (1989), Sauerland additionally assumes that implicatures come at two levels of epistemic strength: in the first step, primary implicatures of the form "The speaker is *not certain* whether ψ holds." are computed, where ψ is a scalar alternative that asymmetrically entails the assertion. In the second step, primary implicatures are strengthened to scalar implicatures, which Sauerland calls "secondary implicatures", of the form "The speaker is *certain* that ψ does *not* hold." Sauerland employs the K-operator to represent epistemic certainty, and the P-operator for epistemic possibility (Hintikka 1962). Hence, what is implicated first is the primary implicature $\neg K\psi$ rather than the scalar implicature $K\neg\psi$. Scalar implicature $K\neg\psi$ would follow from primary implicature $\neg K\psi$ if we additionally assume that $K\psi \vee K\neg\psi$, i.e. either the speaker is certain that ψ holds or he is certain that *not*-ψ holds, and $K\neg\psi$ does not contradict the conjunction of the primary implicatures and the assertion. Primary and scalar implicatures are defined as in (2a) and (2b), respectively:

(2) a. If ψ is a scalar alternative of ϕ and ψ asymmetrically entails ϕ, then $\neg K\psi$ is a primary implicature of ϕ.
  b. If $\neg K\psi$ is a primary implicature of ϕ and $K\neg\psi$ is consistent with the conjunction of ϕ and all primary implicatures of ϕ, then $K\neg\psi$ is a scalar implicature of ϕ.

Second, Sauerland proposes that the scale of disjunction is the partially ordered scale <A and B, {A, B}, A or B>, as seen in (3) below, instead of the standard scale *<and, or>*:

(3)



Now, let's consider how these two assumptions work with the example in (4) below. Abbreviating *Kai saw Aaliyah* as *A*, and *Kai saw Beyonce* as *B*, we can represent the assertion in (4) as *A or B*. Sauerland's proposal predicts that the primary implicatures of (4) are (5a-c):[1)]

(4) Kai saw Aaliyah or Beyonce.

(5) a. +> ¬KA

b. +> ¬KB

c. +> ¬K(A and B)

d. +> PA (⇔ ¬K¬A)

e. +> PB (⇔ ¬K¬B)

In conjunction with the assertion, the primary implicatures entail furthermore (5d) and (5e), which state that each disjunct must be possible. From *¬KB* in (5b) together with the epistemically modified assertion *K(A or B)*,[2)] it follows that *¬K¬A* (⇔ PA), i.e. *A* is possible. Similarly, *¬K¬B* (⇔ PB) follows from *¬KA* in (5a) and *K(A or B)*. The set of these four primary implicatures, i.e. {P¬A (⇔ ¬KA), PA (⇔ ¬K¬A), P¬B (⇔ ¬KB), PB (⇔ ¬K¬B)}, give rise to the observed inference of epistemic uncertainty that the speaker is not certain whether Kai saw Aaliyah or whether Kai saw Beyonce. As is

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1) Throughout this paper, "+>" and "*+>" indicate "conversationally implicates" and "doesn't conversationally implicate", respectively.

2) The epistemic modification of the assertion follows from the maxim of Quality, "Do not say what you believe to be false"; therefore, the speaker is certain that his assertion is true.

well known, Sauerland's four primary implicatures were called clausal implicatures by Gazdar (1979).

Let's continue to consider which primary implicatures can turn into scalar implicatures. First, $\neg KA$ cannot give rise to the scalar implicature $K\neg A$ because the derived primary implicature $\neg K\neg A$ ($\Leftrightarrow$ PA) contradicts the potential scalar implicature $K\neg A$. In a similar way, $K\neg B$ is blocked. $K\neg(A$ *and* $B)$, however, is consistent with the assertion and all the primary implicatures. So it is realized as an actual scalar implicature and gives the exclusiveness reading of disjunction. The result is summarized in (6):

(6) scalar implicatures of *A or B*:

a. *+> K¬A	(blocked by (5d))
b. *+> K¬B	(blocked by (5e))
c. +> K¬(A and B)	(exclusivity scalar implicature)

This result nicely conforms to our intuition: from the utterance in (4) above, we can have neither "Kai didn't see Aaliyah." nor "Kai didn't see Beyonce." as scalar implicatures. Only the exclusivity scalar implicature "Kai didn't see both Aaliyah and Beyonce." obtains.

On the other hand, Gazdar (1979) proposes for clausal implicatures a computation mechanism distinct from that of scalar implicatures. It roughly goes as follows: clausal implicatures are derived from the embedded clauses of compound sentences. Given a compound sentence ϕ the mechanism yields for each non-entailed and non-presuppositionally induced embedded sentence ψ a set of clausal implicatures $P\psi$ and $P\neg\psi$. For a disjunction *A or B*, this yields {PA, P¬A, PB, P¬B}. On the other hand, scalar implicatures are derived in a difference fashion: given Horn scale $<\alpha_1, \alpha_2, ..., \alpha_n>$, a sentence ϕ containing a weaker expression will invoke the implicature that the speaker is sure that the corresponding inference containing a stronger expression from the same scale does not hold. So given the scale *<and, or>*, the utterance of (4) will implicate *K(Kai didn't see both Aaliyah and Beyonce).*

Sauerland argues that his account of clausal and scalar implicatures are more satisfactory than Gazdar's, in that it shows in a more uniform way the relation between the two implicatures: while Gazdar posits two distinct computation mechanisms for clausal implicature and scalar implicature, his system uniformly derives the two implicatures from Horn scales, and the only difference between the two in his system is that the latter is epistemically strengthened from the former.

3. Flaws of Sauerland's and Gazdar's Theories

In this section, I will discuss some empirical flaws of Sauerland's and Gazdar's accounts of epistemic uncertainty inference. Let's start with Sauerland analysis.

3.1. A Problem with Sauerland's Account

First, consider the example in (7a):

(7) a. Some of the boys left or all of them left.
b. Some of the boys left, but it isn't certain whether or not all of them left.
c. K(SOME) and P(ALL) and P¬(ALL)

Intuitively, (7a) implicates (7b). Abbreviating the first disjunct of (7a) as *SOME*, and the second as *ALL*, (7b) can be represented as (7c). But a problem for Sauerland's system is that it fails to predict the clausal implicatures {P(ALL), P¬(ALL)}. Assuming the partially ordered scale <A and B, {A, B}, A or B> of a disjunction, Sauerland's system predicts *ALL* as the only scalar alternative that asymmetrically entails (7a). The reason is that assertion (7a), abbreviated as *SOME or ALL* is logically equivalent to the first disjunct *SOME*, i.e. *(SOME or ALL)* ⇔ *SOME*, so the first disjunct does not *asymmetrically* entail (7a). On the other hand, the conjunction of both disjuncts, i.e. *SOME and ALL*, is logically equivalent to the second disjunct *ALL*, and *ALL* asymmetrically entails (7a). Hence, only one primary implicature ¬

K(ALL) in (8b) below obtains from the epistemically modified assertion in (8a). However, there is no way to get the other clausal implicature *¬K¬(ALL)* in (8c):

(8) a. K(SOME ∨ ALL) (⇔ K(SOME))
 b. ¬K(ALL) (⇔ P¬(ALL)):
  It's possible that not all of the boys left.
 c. ¬K¬(ALL) (⇔ P(ALL)):
  It's possible that all of the boys left.

Of course, (8b) alone is not enough to predict the epistemic uncertainty inference of (7a) because it is consistent with *K¬(ALL)*, i.e. "It's certain that not all of the boys left."

It is not difficult to figure out what goes wrong with Sauerland's system: his partially ordered scale <A and B, {A, B}, A or B> cannot apply to the cases like (7a) in which one disjunct entails the other. For example, the first disjunct *SOME* of (7a) is logically equivalent to the full disjunction *SOME or ALL*, and therefore, cannot be partially ordered by asymmetrical entailment relation. The second disjunct *ALL* is also equivalent to *SOME and ALL*, the conjunction of the two disjuncts.

On the other hand, Gazdar's account of clausal implicatures, which was briefly mentioned in section 2, doesn't seem to have difficulties predicting the clausal implicatures of (7a): (7a) entails the first disjunct, *SOME*, but doesn't entail the second, *ALL*, so only the second disjunct yields two clausal implicatures {P(ALL), P¬(ALL)}. I will, however, show in the next section that Gazdar's account is not free from some empirical problems.

3.2. A Problem with Both Sauerland's and Gazdar's Accounts

As is well known, Gazdar proposes that if a clausal implicature conflicts with a potential scalar implicature, the latter is suspended. Therefore, Gazdar correctly predicts that (7a), repeated below as (9a), does not scalar-implicates (9b):

(9) a. Some of the boys left or all of them left.
b. Not all of the boys left.
c. It is possible that all of the boys left.

Intuitively, the first disjunct of (9a) implicates (9b), but the whole disjunction (9a) lacks this implicature. The reason is that (9c), one of the clausal implicatures of (9a), suspends the potential scalar implicature (9b).

Gazdar's mechanism, however, has a problem. Gazdar's rule that clausal implicatures take precedence over scalar implicatures does not provide us with any *explanation* for this observable regularity.

But there is a more serious problem with Gazdar's account. As Levinson (2000) illustrates, clausal implicatures are defeasible: for example, in a treasure hunt game when the host says, "I hid the prize either in the attic or the garden," nobody thinks he doesn't know where the prize is. Similarly, if (9a) is uttered by a quiz show host with a subsequent question like "Which one is correct?", then no clausal implicatures arise that he isn't sure whether some of the boys left or all of the boys left. Thus, in this case the clausal implicature (9c) is not generated that will suspend the scalar implicature (9b), so Gazdar's mechanism predicts that (9a) as a whole *does* scalar-implicate (9b). But it is quite obvious that (9a) does *not* implicate (9b) even in this quiz show situation.

Gazdar also stipulates that a potential presupposition is suppressed if it is in conflict with a clausal implicature. Consider the example in (10a):

(10) a. Either John has no wife or his wife is far away.
b. John has a wife.
c. It is possible that John has no wife.

His wife in the second disjunct of (10a) triggers the presupposition in

(10b). But (10a) as a whole does not presuppose (10b). Gazdar argues that (10c), a clausal implicature from the first disjunct, suspends the conflicting potential presupposition (10b).

Gazdar's account, however, seems a bit mysterious because a conversational implicature, which is characteristically cancellable, defeats a presupposition, which is not so easily defeated.

Much worse, just like scalar implicatures the presupposition in (10b) cannot be projected to the whole disjunction even in a situation where the clausal implicature in (10c) does not arise: even if (10a) is uttered by a quiz show host, who sure knows whether John has a wife or not, we can never take for granted that John has a wife.

Next, the problem with Sauerland's system is that it incorrectly predicts that (9a) always gives rise to the scalar implicature (9b). As discussed in section 3.1, since the primary implicature $\neg K \neg (ALL)$ cannot be generated in his system, there is no way to prevent $\neg K(ALL)$ from turning into the scalar implicature $K \neg (ALL)$. Therefore, $K \neg (ALL)$ is generated as the scalar implicature of (9a). The foregoing discussion, however, shows that this implicature never arises in any discourse situations.[3] On the other hand, since Sauerland does not discuss the suspension of presupposition, the question remains how he can account for the fact that (10a) does not presuppose (10b) even in a situation where (10c) is removed.

4. Proposal

In this section, I will first present my own proposal, and then show how it can handle the problematic data we saw in section 3.

4.1. No Redundancy Principle

As a first step to provide solutions to the problems discussed in

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3) For some additional difficulties with Sauerland's accounts of scalar implicatures, refer to Song (2005).

section 3, I propose the following condition on interpretation, which I will call the "No Redundancy Principle" (NRP):

(11) No Redundancy Principle (NRP):
Every meaningful expression in a sentence or a text must be non-redundant: Either it must make a contribution to the truth-conditional interpretation, or otherwise its occurrence must be pragmatically licensed.

The underlying motivation of this constraint seems quite obvious and uncontroversial: why should we utter any meaningful expressions at all if they play no roles in conveying·information? In that case, they are simply superfluous and uninformative. In this regard, I assume that the NRP is a rule that regulates all the interpretation processes. Consider discourses in (12):

(12) a. # John left. And John and Mary left.
b. John and Mary left. Therefore, John left.

Assuming that the information conveyed by the sentences in a discourse is added to the context in order of their utterance, the first conjunct of *And John and Mary left* in (12a) is truth-conditionally redundant after *John left* has already been asserted: the discourse (12a) as a whole is truth-conditionally equivalent to the assertion *John and Mary left.* Thus, the first conjunct does not add any information, which is in violation of the NRP. On the other hand, (12b) as a whole is equivalent to the first sentence *John and Mary left,* which makes the second sentence *Therefore, John left* truth-conditionally redundant. The second sentence is, however, pragmatically non-redundant if we assume that (12b) is uttered, for example, in a logic class to show the entailment relation: the second sentence is *required* in this situation. Thus (12b) is felicitous. Now I turn to my own analysis of clausal implicatures of a disjunction.

4.2. Clausal Implicatures of *A or B*

To begin with, I will briefly introduce the theoretical background of my analysis. Instead of Hinttika's two epistemic operators used by Sauerland, I will adopt some aspects of the theoretical framework of Groenendijk and Stokhof (2001): Groenendijk and Stokhof's system seems to be a better way to illustrate my points, since in their framework an agent's information/epistemic state is an essential component of linguistic meaning. My preference is purely a methodological reason, and the use of Hinttika's epistemic operators would not make any fundamental difference for my analysis.

Groenendijk and Stokhof (2001) define the information state of an agent who is engaged in an informative linguistic exchange as a set of possibilities, where each possibility consists of a possible world and a referent system. A possible world is an alternative way the actual world could be as far as the partial information of the agent goes. On the other hand, a referent system concerns the knowledge pertaining to discourse referents, which are posited to resolve anaphoric links across utterances. Since the information represented by a referent system is not directly relevant to my current discussion, I will assume for the sake of simplicity that a possibility consists of only a possible world. Hence, an information state is identified with a set of possible worlds, viz. a set of epistemic possibilities which are compatible with an agent's information.

Now, I will show how the NRP properly derives the clausal implicatures of the disjunction in (4), repeated below as (13a), which I will abbreviate as *A or B* as before:

(13) a. Kai saw Aaliyah or Beyonce. (= A or B)
b. $\forall i \in s$: $A_i \vee B_i$ (Assertion + Maxim of Quality)

For a speaker to assert *A or B* correctly, it is required that his information state supports it, i.e. that *A or B* is true in every epistemic possibility in his information state, which follows from Grice's Maxim of Quality. This may be represented as (13b) above ("i" and "s" represent a possibility and an information state, respectively.)

However, according to the truth conditions of a disjunction, it will be true iff at least one of its disjuncts is true. Hence, if the speaker is certain about, for example, the first disjunct A, i.e. if his genuine epistemic state is $\forall i \in s{:}A_i$, then it alone can satisfy the truth-conditions in (13b), and B can be ignored. However, presuming that the speaker's certainty of A is enough to guarantee the truth conditions in (13b) necessarily leads to the violation of the NRP: in this case, B makes no contribution to the truth-conditional interpretation, and remains redundant. Let's restate this reasoning process a bit more formally; if the speaker utters (13a) (i.e. $\forall i \in s$: $[A_i \vee B_i]$) and he is also certain that A (i.e. $\forall i \in s$: A_i), the conjunction of the two is just equivalent to $\forall i \in s{:}A_i$, as seen in the equivalence relation in (14) below. This renders the meaningful expression B redundant from the truth conditional interpretation of (13b):

(14) $(\forall i \in s{:}\ [A_i \vee B_i] \wedge \forall i \in s{:}\ A_i) \Leftrightarrow \forall i \in s{:}\ A_i$

This means that if we presume that the speaker is certain that A, i.e. that his information state is $\forall i \in s{:}A_i$ when he asserts that A *or* B, then it necessarily leads to the violation of the NPR. Hence, the NRP forces the inference that the speaker is *not* certain that A. This inference can be represented as (15a) below, which says that there is a possibility in the speaker's information state that A is false. (15a) renders the other disjunct B non-redundant from the interpretation as shown in (15b), which follows from (15a) in conjunction with the assertion (13b). (15b) says that there is an epistemic possibility that A is false and B is true, which in turn entails (15c), i.e. there is a possibility that B is true:

(15) a. $\neg\forall i \in s{:}\ A_i$ ($\Leftrightarrow \exists i \in s\ \neg A_i$)

b. $\exists i \in s{:}\ \neg A_i \wedge B_i$

c. $\exists i \in s{:}\ B_i$

(16) a. $\neg\forall i \in s$: B_i ($\Leftrightarrow \exists_i \in s$: $\neg B_i$])
b. $\exists i \in s$: $\neg B_i \wedge A_i$
c. $\exists i \in s$: A_i
(17) $\neg\forall i \in s$: $A_i \wedge B_i$

In a similar way, the NRP keeps us from presuming that the speaker is certain that *B* when he utters *A or B*. This gives rise to the inference in (16a). (16a) entails (16b) and (16c) in conjunctions with the assertion in (13b). Now we see that (15a, c) and (16a, c) are equivalent to the four primary implicatures of Sauerland, i.e. $P\neg A$, PB, $P\neg B$ and PA, respectively, which are responsible for the uncertainty inference of *A or B*, i.e. the speaker is uncertain whether *A* or whether *B*. Finally note that (15a) and (16a) both entail (17), which is the remaining primary implicature of Sauerland.

Now we are ready to consider how my proposal can account for the problematic cases discussed in section 3.

4.3. Clausal Implicatures of *SOME or ALL*

First, consider (7a) in section 3.1, repeated below as (18a), of which clausal implicatures Sauerland's system fails to predict (As before, the first and the second disjuncts are abbreviated as *SOME* and *ALL*, respectively):

(18) a. Some of the boys left or all of them left.
b. $\forall i \in s$: $SOME_i \vee ALL_i$
c. $\forall i \in s$: $SOME_i$

For a speaker to assert (18a) correctly, it is required that his information state supports it, i.e. that *SOME or ALL* is true in every epistemic possibility in his information state, which may be represented as (18b). However, (18b) is problematic since it necessarily violates the NRP, as it stands: as noted in section 3, the whole disjunction *SOME or ALL* is logically equivalent to the first disjunct *SOME*, because *ALL* entails *SOME*, so (18b) is equivalent to (18c). This makes the second disjunct *ALL* necessarily redundant, which leads to the violation of the NRP.

I suggest that in cases where one disjunct entails the other the NRP forces the disjunct that is logically equivalent to the whole disjunction to get the exhaustification interpretation with respect to the otherwise superfluous disjunct. This is of course a strategy to avoid the NRP. This exhaustification strategy may be generalized as follows:

(19) For any disjunction *A or B*, if *B* entails *A*, reinterpret *A or B* as a logically equivalent disjunction *(A and not-B) or B*.

In case *B* entails *A* in a disjunction *A or B*, the whole disjunction *A or B* is equivalent to the first disjunct *A*. Hence, the other disjunct *B* is necessarily redundant and superfluous, which is a blatant violation of the NRP. By exhaustifying the disjunct *A* into *A and not-B*, the disjunct *B* gets free from necessary redundancy: the whole disjunction *(A and not-B) or B* is logically equivalent to *A*, but neither the first disjunct *(A and not-B)* nor the second disjunct *B* is equivalent to *A*.

In the case of (18b) above, the forced exhaustification renders it reinterpreted as (20a) below, which can be paraphrased as "Only *SOME* (but not *ALL*) is true, or *ALL* is true."

(20) a. $\forall i \in s: (SOME_i \wedge \neg ALL_i) \vee \mathrm{ALL}_i \quad (\Leftrightarrow \forall i \in s: \mathrm{SOME}_i)$
b. $(\mathrm{SOME} \wedge \neg \mathrm{ALL}) \vee \mathrm{ALL} \Leftrightarrow \mathrm{SOME} \vee \mathrm{ALL} \Leftrightarrow \mathrm{SOME}$

Though *(SOME and not-ALL) or ALL* is logically equivalent to both *SOME or ALL* and *SOME*, as shown in (20b), the exhuastification of the first disjunct renders the second disjunct *ALL* free from necessary redundancy, and therefore the necessary violation of the NRP can be avoided: neither disjunct is logically equivalent to the whole disjunction *(SOME and not-ALL) or ALL*, which is in turn equivalent to *SOME*.

Though (20a) can escape the necessary violation of the NRP by the exhaustification strategy, it is still subject to a potential violation of the

NRP in exactly the same way *A or B* is, where *A* and *B* do not entail each other: if the speaker's epistemic state is, for example, just the first disjunct of (20a), i.e. $\forall i \in s$: $SOME_i \wedge \neg ALL(i)$, this information state satisfies the truth-conditions in (20a), regardless of whether or not he believes the second disjunct *ALL*. Thus, the second disjunct is redundant from the interpretation, which is in violation of the NPR. A bit more formally speaking, if we presume that the speaker is certain that *SOME and not-ALL*, i.e. that his information state is $\forall i \in s$: $SOME_i \wedge \neg ALL(i)$ when the truth-conditions of his utterance is (20a), then it necessarily leads to the truth-conditional redundancy of the second disjunct *ALL*, as seen in the equivalence relation in (21) below: in this case, the conjunction of the two amounts to $\forall i \in s$: $\mathrm{SOME}_i \wedge \neg \mathrm{ALL}_i$.

(21) $(\forall i \in s: [(\mathrm{SOME}_i \wedge \neg \mathrm{ALL}_i) \vee \mathrm{ALL}_i] \wedge$
$\forall i \in s: \mathrm{SOME}_i \wedge \neg \mathrm{ALL}_i) \Leftrightarrow$
$\forall i \in s: \mathrm{SOME}_i \wedge \neg \mathrm{ALL}_i$

Hence, the NRP forces the inference that the speaker is *not* certain that *SOME and not-ALL*, which is represented as (22a) below. (22a) says that there is a possibility in the speaker's information state that the first disjunct *SOME and not-ALL* is false. (22a) renders the other disjunct *ALL* non-redundant from the semantic interpretation since (22b) follows from (22a) in conjunction with (20a) above: (22b) says that there is a possibility that *ALL* is true:

(22) a. $\neg \forall i \in s: [\mathrm{SOME}_i \wedge \neg \mathrm{ALL}_i]$ $(\Leftrightarrow \exists i \in s: [\neg \mathrm{SOME}_i \vee \mathrm{ALL}_i])$
b. $\exists i \in s: \mathrm{ALL}_i$

(23) a. $\neg \forall i \in s: \mathrm{ALL}_i$ $(\Leftrightarrow \exists i \in s: \neg \mathrm{ALL}_i)$
b. $\exists i \in s: [\mathrm{SOME}_i \wedge \neg \mathrm{ALL}_i]$

In similar vein, the NRP keeps us from presuming that the speaker is certain that *ALL* when he utters (18a). This gives rise to the inference in (23a) above. (23a) entails (23b) in conjunctions with (20a).

Now we see that (22b) and (23a) together represent the epistemic uncertainty inference of the speaker such that he is not sure whether or not *ALL*. Hence, when the truth-conditions in (20a), and clausal implicatures in (22) and (23) are taken together, (18a) conveys the information that some of the boys left, but it isn't certain whether or not all of them left. and this is the intuitively correct reading of (18a).

4.4. Suspension of Presuppositions and Scalar Implicatures

As pointed out in section 3.2, Gazdar's mechanism makes the incorrect prediction that the potential presupposition in (24b) (=(10b)) can be projected to the whole disjunction, even if no clausal implicatures arise that can cancel the presupposition. But the fact is that (24a) never presupposes (24b):

(24) a. Either John has no wife or his wife is far away.
(Which one is correct?)
b. John has a wife.

In this section, I will show that the NRP provides a proper solution to this problem. If (24a) is uttered by a quiz show host, we know that (24a) does not convey his genuine epistemic state. He just asserts that (24a) is true. Hence, in this case, the NRP should apply not to the epistemic state of the speaker but only to the proposition proper, and the presupposition. If the presupposition (24b) is projected to the whole disjunction in (24a), then it would in effect be equivalent to the unacceptable discourse in (25a) below:

(25) a. # John has a wife and
either John has no wife or she is far away.
b. John has a wife and she is far away.

Notice that (25a) violates the NRP: (25a) is truth-conditionally equivalent to (25b). Thus, the projection of the presupposition (24b) above makes the first disjunct *John has no wife* redundant, which is in violation of the NRP. Note that differently from the epistemic uncertainty cases in sections 4.2 and 4.3, we cannot remove the redundancy by negating the presupposition, i.e. John doesn't have a wife: it makes the second disjunct of (24a) truth-conditionally redundant.[4)]

In a similar fashion, we can also explain why (26a) (=(9a)) as a whole does not implicate (26b) (=(9b)), the implicature of the first disjunct:

(26) a. Some of the boys left or all of them left.
(Which one is correct?)
b. Not all of the boys left.

If (26b) is projected to the whole disjunction in (26a), then it would in effect be equivalent to the unacceptable discourse in (27a) below:

(27) a. # Not all of the boys left and
some of the boys left or all of them left.
b. Not all of the boys left and some of the boys left.

(27a) violates the NRP: (27a) is truth-conditionally equivalent to (27b). Thus, the projection of (26b), the scalar implicature of the first disjunct, to the whole disjunction makes the second disjunct *all of them left* redundant, which is in violation of the NRP. Here also, the negation of the scalar implicature, i.e. all of the boys left, doesn't remove the redundancy: it makes the first disjunct of (26a) redundant.

In conclusion, the foregoing discussion shows that it is not clausal implicatures but the NRP that is responsible for the suspension of

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4) To account for examples like (24a), van der Sandt (1992: 367) proposes a constraint which roughly goes as follows: When a presupposition is projected, it must not entail the negation of any subordinate clauses. Though this constraint makes a descriptively correct prediction, it doesn't seem to provide us with any explanation for why it should be so.

scalar implicatures and presuppositions.

5. Conclusions and Loose Ends

In the present paper, I proposed an analysis of the clausal implicatures yielded by a disjunctive statement. My main claims are summarized as below:

First, I discussed two cases with which Sauerland (2004, 2005) and Gazdar (1979) face empirical difficulties. When one disjunct entails the other, Sauerland's account of clausal implcatures makes a wrong prediction. Also, their theories of clausal implicatures do not explain why scalar implicatures and presuppositions are suspended even if there are no clausal implicatures in conflict with them.

Second, I proposed an alternative account of clausal implicatures based on the No Redundancy Principle (NRP), according to which every meaningful expression must make a contribution to the interpretation. Assuming that the NRP is a rule that regulates all the interpretation processes, I showed that the principle provides proper solutions to the problems faced by Sauerland and Gazdar. Especially, I demonstrated that it is not clausal implicatures but the NPR that is responsible for the suspension of scalar implicatures and presuppositions.

There still remain some loose ends to tie up, though. Among others, I said no word about the clausal implicatures triggered by conditionals. This is partly because it is difficult for me to find a theory of conditionals to comfortably rely on. But if I had readily adopted the somewhat controversial material implication analysis of conditionals (i.e. $(p \rightarrow q) \Leftrightarrow (\neg p \vee q)$), it would not have been too difficult to predict the clausal implicatures.[5)]

Another question I have no definite answer for now is what is the relation between clausal implicatures and scalar ones. Can the NRP also apply to the analysis of scalar implicatures?

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5) That is, clausal implicatures {Pp, P¬p, Pq, P¬q} obtain if we apply the NRP to $(\neg p \vee q)$.

I am closing this paper just noting that all these questions still await further research.

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