

Japanese Implicative Adverbs in an Extended Karttunen-Peters' Framework

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1. Introduction

The notion of conventional implicature, originally advocated by Grice, has been proved to be amenable to the framework of Montague grammar. The first such attempt was made by Karttunen-Peters (1975) and closely followed by the paper by the same authors (1979) and Ik-Hwan Lee's dissertation submitted to the University of Texas in 1979.

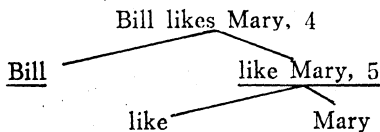
In this paper I will try to describe a class of Japanese implicative adverbs in what I call an extended Karttunen-Peters' framework. Before going into details, it will be necessary to give a rough explanation of the original version by Karttunen-Peters.

Let us take (1), for example, and see how the authors above mentioned are going to describe what they call extension and implicated meaning.

(1) Bill likes Mary.

This sentence is generated by the procedure as represented in (2) below.

(2)



The extension expression of 'like Mary' is quite straightforward. It is compounded only of 'like' and 'Mary', which is equal to 'like' ('Mary'). The extension expression is identical to the simple translation which Montague has provided in PTQ. The extension expression corresponds to what logicians would call the denotation of the phrase, the things which

the phrase is true of. The implicature expression, on the other hand, represents conventional implicatures that a phrase may carry with it. Karttunen-Peters' so-called heritage expression determines how the implicatures of embedded constituents are inherited by the complex phrase which is constructed from them.

Thus, under this approach any phrase α has a form of translation α' as shown in (3), to quote from Lee (1979).

- (3) $\alpha' = \{\alpha^e; \alpha^i\}$ plus α^h when necessary,
 where α^e = extension expression of α ,
 α^i = implicature expression of α ,
 α^h = heritage expression of α .

According to this version, the translation rules are formulated as in (4) and these rules correspond to the syntactic rules.

T 1.a. If α is a basic expression of a category K, then α translates to $\{\alpha^e, \alpha^i\}$, and the value of h is α^h , where α^e , α^i , and α^h are constants of intensional logic of type f(K).

Karttunen-Peters write S 5 and T 5 as shown in (4).

(4) If α is a transitive verb and β is a noun phrase, then $\alpha\beta^?$ is a verb phrase, where $\beta^?$ is the accusative form of β .

Translation: $\{\alpha^e(^A\beta^e); \hat{x}[\alpha^i(x, ^A\beta^e) \wedge \alpha^h(x, ^A\beta^i)]\}$

What the second conjunct of the above formula means is that the implicature of verb phrase 'like Mary' is the conjunction of implicature of 'like' and that of 'Mary'. This is shown as (5) but for technical reasons, it is written like the second conjunct of (4), which is reproduced as (6).

- (5) $\text{like}^i(^AMary^e) \wedge \text{like}^h(^AMary^i)$
 (6) $\hat{x}[\text{like}^i(x, ^AMary^e) \wedge \text{like}^h(x, ^AMary^i)]$

Montague's Rule 4 of PTQ, which is reproduced below as (7) completes the derivation of (1) above, that is, (1) is generated from noun phrase 'Bill' and verb phrase 'like Mary.'

- (7) If α is a t/TV-phrase and β is an IV-phrase, the $\alpha\beta'$ is a t-phrase, where β' is the result of replacing the first verb in β by its third person singular present.

All in all, the extensional expression and the implicature expression of (1) can be represented as (8) and (9), respectively.

- (8) Bill-likes-Mary^e=Bill^e([^]like^e ([^]Mary^e))
 (9) Bill-likes-Maryⁱ=[Billⁱ([^]like^e([^]Mary^e)) \wedge Bill^h(\hat{x} [likeⁱ(x, [^]Mary^e)
 \wedge like^h(x, [^]Maryⁱ)])]

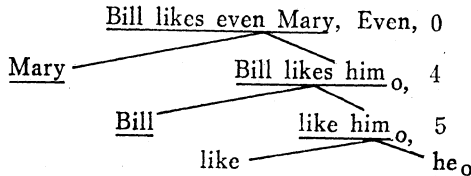
As (8) shows, the extension expression of sentence (1) is a compound of the extension expression of its subject and verb phrase. The second conjunct of the implicature expression (9) shows the conventional implicatures associated with the verb phrase as being inherited by the sentence under the effect of the third expression 'Bill^h', associated with the subject. The first conjunct of the implicature expression represents the conventional implicature contributed by the subject noun phrase 'Bill' by predicating that noun phrases implicature expression of the sense of the verb phrase's extension expression.

Let us turn next to the sentence (10), in which a so-called implicative adverb 'even' is employed.

- (10) Bill likes even MARY.

The syntactic derivation of (10) is represented as (11).

- (11)



The extension expression is straightforward, which may be formulated as

- (12) Bill-likes-even-Mary^e = Mary^e (\hat{x}_0 Bill-likes-him₀^g) \equiv
 Bill-likes-Mary^e \equiv like_{*}^e(b, m)

As (12) shows, as far as the truth conditional aspect of meaning is concerned, the matter is very simple. Since 'even' has no effect on truth conditions, the EVEN rule is essentially a rule of quantification. The implicature expression of (10) is represented as (13) and by virtue of meaning postulate for 'even', the last conjunct of (13) is equivalent to the formula given in (14).

- (13) Bill-likes-even-Maryⁱ = [[Maryⁱ (\hat{x}_0 Bill-likes-him₀^g)
 \wedge Mary^h (\hat{x}_0 Bill-likes-him₀ⁱ)]
 \wedge evenⁱ (\wedge Mary^e, \hat{x}_0 Bill-likes-him₀^g)]

- (14) evenⁱ (\wedge Mary^e, \hat{x}_0 Bill-likes-him₀^g) \equiv
 $[\forall x [* \{ \forall x \} \wedge \neg [\forall x = m] \wedge \text{like}_{*}^e(b, \forall x)]$
 $\wedge \wedge x [[* \{ \forall x \} \wedge \neg [\forall x = m]]$
 $\longrightarrow \text{exceed}^e(\text{likelihood}^e(\wedge \text{like}_{*}^e(b, x)), \text{likelihood}^e(\wedge \text{like}_{*}^e(b, m)))]$

The complex formula of (14) contains existential and scalar implicature of 'even'; what the existential implicature asserts is that 'there are other x under consideration besides Mary such that Bill likes x,' while the scalar implicature is that 'for all x under consideration besides Mary, the likelihood that Bill likes x is greater than the likelihood that Bill likes Mary.'

2. Extended Karttunen-Peters' framework

In Karttunen-Peters(1979) only the sentences where 'even' focuses a noun phrase are discussed, as is shown above. They leave out of consideration such examples of the sort given in (15), where 'even' focuses on a constituent other than noun phrases such as verb, verb phrase, adjective and *if*-clause.

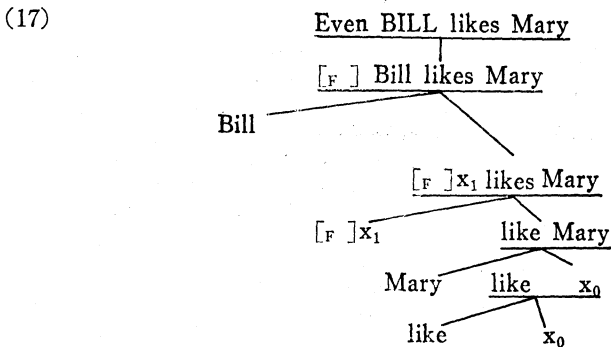
- (15) a. Mary even ADMIRES Bill. (TV focus)
 b. Bill even DRINKS BEER. (IV focus)

- c. Even INFERIOR coffee is expensive. (Adjective focus)
- d. Even IF SHE DOESN'T COME, there will be too many people. (Adverbial clause focus)

The present paper is an attempt to extend the original framework as proposed by Karttunen-Peters for a uniform and consistent treatment of such examples as (10) and (15 a, b, c,) with (d) being excluded for the moment. Since every basic expression is potentially liable to receive a focus in a sentence, it can be a candidate for a potential focus element in a sentence. We can represent such an optional focus as shown in (16). Let us take term phrases as examples.

$$(16) B_T = ([_F \])\text{ Bill}, ([_F \])\text{Mary}, ([_F \])x_1, ([_F \])x_2, \dots$$

As (16) shows, every term phrase has an optional focus element written as $([_F \])$. According to this newly introduced convention, sentence (10) above can be generated as shown in the analysis tree (17).



Here we will tentatively adopt the same syntactic rules as are employed in PTQ. As the analysis tree (17) shows, in the generation of IV phrase 'like Mary' a variable x_0 has no focus element with it, so that the whole phrase 'like Mary' has no focus. In combining x_1 and 'like Mary', the variable has a focus along with it. x_1 is then bounded by a term phrase 'Bill', generating as a result '[_F] Bill likes Mary.' It is into this focus position indicated $[_F \]$ that 'even' is inserted because 'Bill' is a focused NP

in (10). It should be noticed in this derivation that once a focus is chosen in the earlier stage of derivation it is never selected in the later stage of analysis tree, though there are some exceptions as we will see in a moment.

In order to handle such data as (18 a, b, c, d, e,) below in addition to those in (15 a, b, c,) we will provide the following lexicon.

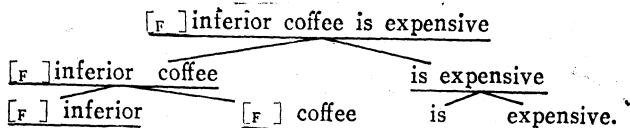
- (18) a. Even inferior COFFEE is expensive. (common noun focus)
- b. Even INFERIOR COFFEE is expensive. (term phrase focus)
- c. John hates Mary even NOW.(adverb focus)
- d. Inferior coffee is even EXPENSIVE.(predicative adjective focus)
- e. Even INFERIOR coffee is expensive.(prenominal adjective focus)

SAMPLE LEXICON

- B_{IV}: ([F]) go, ([F]) die, ([F]) come,
- B_{TV}: ([F]) like, ([F]) admire, ([F]) drink, ...
- B_{CN}: ([F]) coffee, ([F]) wine, ...
- B_{CN/CN}: ([F]) inferior, ([F]) expensive, ...
- B_{I_{AV}}: ([F]) now, ([F]) frequently, ...

Provided with such lexicon, the derivation of sentence (18b), for example, can be represented as follows.

(19) Even INFERIOR COFFEE is expensive



In the derivation of sentences in (15) and (18), the following points must be observed.

1. Even though the choice of focus is optional in each lexical item, one focus element must necessarily be chosen in the generation of a sentence. This we call 'One Focus Per One Sentence Principle.' This is clear in the derivation of sentence (19) above.

2. Insert 'even' in the very position where a focus is selected, since the lexical item to which 'even' is affixed is necessarily an element which receives a focus in a sentence.

3. The generation of NP focus can be taken care of either by a direct generation or by rule of quantification. Sentence (17) shows how an NP focus is generated by the quantification rule.

4. The occurrence of 'even' in other positions than the one immediately before the focused constituent can be handled by some transformational rule. So this problem will not concern us in this paper. The sentence in question is 'Bill, even, likes Mary.'

5. There are two exceptions to the 'Principle of One Focus Per One Sentence Principle.'

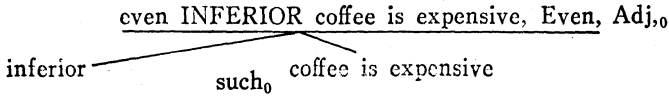
1) If α is a member of B_{TV} , and β is a member of B_T and α and β are of the form $[_F]\alpha$, $[_F]\beta$, respectively, $\alpha \beta$ is of the form $[_F]\alpha\beta$. This we call 'Collapsing of TWO Foci into One Principle.'

2) If α is a member of $B_{CN/CN}$ and β is a member of B_{CN} and are of the form $[_F]\alpha$ and $[_F]\beta$, respectively, then $\alpha \beta$ is of the form $[_F]\alpha\beta$. This is also an instance of the principle mentioned above. The analysis tree (19) shown above is an example in question, where 'inferior' and 'coffee' have a focus.

6. 'Even' is syncategorematically generated once a focus is chosen. Put 'even' in a focus position and erase $[_F]$ and capitalize the following focused element(s) in order to show that the element in question is put a focus.

The new framework can thus take care not only of NP focus but also of a transitive verb, common noun, predicative adjective, and adverb focus. It can be, therefore, claimed that our proposal has a wider applicability than the original version advocated by Karttunen-Perters. For example, in the original framework it was proposed that the instance of adjective focus like (18 e) can be treated by positing adjective variable 'such₀' in the generation of 'Even INFERIOR coffee is expensive.'

(20)



Our revised version can neatly take care of such a case where an adjective occurs in a predicative position like (18d). In the original framework the sentence would have to be generated from such a sentence as (21).

(21) Inferior coffee is such₀ expensive.

3. Implicative and assertive adverbs

3.0. Introduction

According to Ladusaw (1979), there are two classes of sentence adverbs in English: a class of adverbs called assertional adverbs of quantification and another class of adverbs called implicative adverbs of aspect.

sentence adverbs	{	assertional adverbs of quantification: e.g., always, sometimes, never, rarely, usually, ever, ...
		implicative adverbs of aspect: e.g., still, again, already, yet, anymore, ...

The two subclasses of sentence adverbs are classified according to whether or not they contribute to the truth-conditional aspect of meaning. Omitting the details, three criteria for implicative adverbs are proposed by Ladusaw.

- 1) The contribution that the implicative adverbs make remain constant under negation.
- 2) They are not taken to be part of the object of \bar{S} complement verbs.
- 3) They are irrelevant to whether yes/no questions are answered yes/no.

3.1. Subclasses of implicative adverbs of English and Japanese

It was pointed out by Quirk et als (1972), that there is a subclass of

adjunct called 'focusing adjunct', like 'alone', 'merely', 'precisely', 'simply', 'particularly', 'specifically' and the like, and that there are two subclasses of attitudinal adjunct, group I and II, as is shown in Fig. I below. We will not go into detail here but only show the classificatory scheme advocated by Quirk et als (1972).

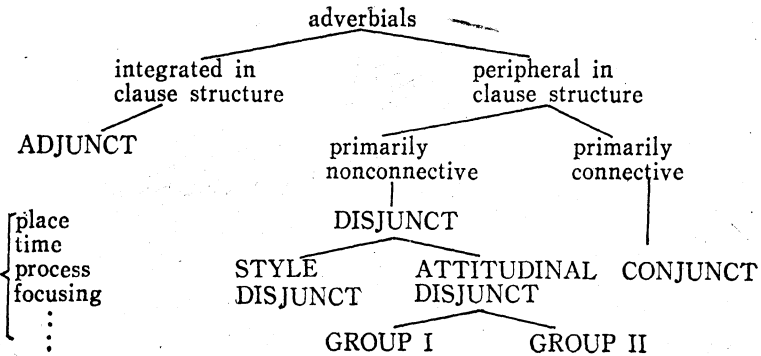
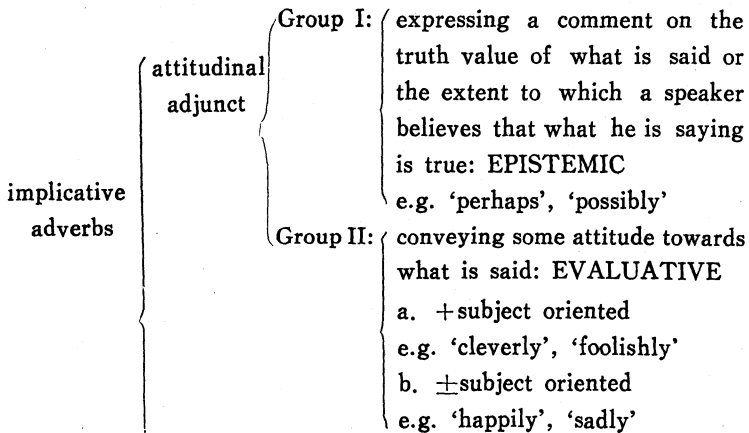


FIG. I

SUBCLASSES OF IMPLICATIVE ADVERBS: attitudinal adjuncts and focusing adjunct



{ focusing adjunct	{ making explicit either that what is being communicated is res- tricted to a part that is focused or that a focused part is an addition e.g. 'alone', 'just'; 'also', 'too'
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Interestingly enough, there are parallel subclasses of implicative adverbs in Japanese.

Implicative adverbs	{ attitudinal adjunct	{ Group I: 'kitto'(surely), 'tabun'(probably)
		{ Group II: a. 'orokanimo' (foolishly), 'zanko- kunimo'(cruelly) b. 'hukonimo' (unfortunately), 'igai- nimo'(unexpectedly)
	{ focusing adjunct	{ Group III: 'sekkaku'(with great effort), 'semete' (at least) { 'tokuni'(especially), 'mochiron'(of course)

Several items from these four classes of Japanese implicative adverbs are chosen and discussed in terms of their implicational meaning they are supposed to have in our extended framework.

4. Syntactic Derivation of Some Japanese Implicative Adverbs and Their Implicative Meaning

In this section we will take up several Japanese adverbs and try to describe the implicative meaning of these adverbs.

4.1. 'yahari'(attitudinal disjunct, Group III)

First we will explain 'yahari' and see how it will be generated syntactically. As we will see the adverb in question can be the focus of the following six constituents of a sentence: subject NP, intransitive verb,

predicate modifier, derived intransitive verb, transitive verb, and object noun phrase. So we will take up each constituent in turn and observe how it will be generated.

4.1.1. Subject NP focus

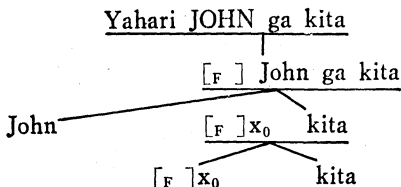
In response to such question as 'dare ga kita ka?' meaning 'who came?', we can say,

(22) Yahari JOHN ga kita (As was naturally expected John came.)

Thus, when someone's coming is presupposed and 'John' is a new information to be conveyed by the speaker, we put 'yahari' just before a focused element in this case 'John'. Or we can simply say,

(23) Yahari JOHN da.

by omitting the old information 'kita' (came). The syntactic derivation of (22) with the focused constituent 'JOHN' may be represented as shown in (24).



It must also be noted that such sentence as 'JOHN mo yahari kita' (also John came besides x, with x determined by a context) has a focus on subject NP as a possible response to a question like 'dare ga x igaini kita ka?' (Who came besides x?)

The generation of (22) or the preceding sentence 'John mo yahari kita' can be taken care of by the following rule, that is, a modified PTQ rule S4. It is by this modified S4 that Japanese subject case markers 'ga' or 'mo' is syncategorematically inserted right after the subject 'John'.

S4: If α is a member of P_T and β is a member of P_{IV} , then $F_4(\alpha, \beta)$ is a member of P_t , where $F_4([\text{F}] \alpha, \beta)$ is of the form ' α ga/mo β '.

Otherwise, $F_4(\alpha, \beta)$ is of the form ' α wa β '.

As we mentioned just now, 'ga' of exhaustive listing conveying a new

information or 'mo' meaning addition, and 'wa' of theme are automatically specified by the choice and non-choice of focus on the subject NP. There remains, however, a problem of how to uniquely determine whether a focused subject NP is followed by 'ga' or 'mo', since the modified S4 rule above cannot unambiguously specify a possible subject case markers either as 'ga' or 'mo'. This specification is impossible without referring to a context such as a preceding question.

4.1.2. IV Focus

Next we will turn to a case where intransitive verb is a focus in a sentence. In response to such question as 'John wa nanio shiyoo to shite itaka?' meaning 'what was John going to do?', we can say,

(25) John wa gakkō e yahari YUKOOTO SHITEITA

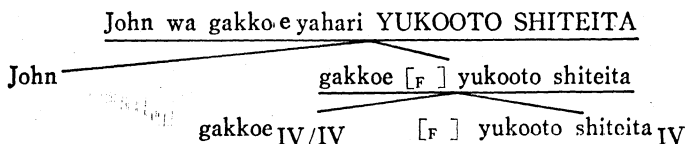
meaning 'John was going to school as was naturally expected'. Or we can simply say,

(26) Gakkō e yahari yukooto shiteita.

by omitting an old information just as in the case of sentence (23) above.

As sentence (26) shows, 'John's going to do something is' an old information, while 'gakkō e yukooto shiteita' meaning 'going to school' is a new information to be communicated by a speaker to a hearer. The generation of (25) is shown in the analysis tree (27).

(27)



4.1.3. IV modifier (IV/IV) focus

IV modifier represented as IV/IV can be a focus of a sentence in such context as

(28) John wa doko e yukooto shiteitano ka?

meaning 'where was John going to go?' In response to such a question we

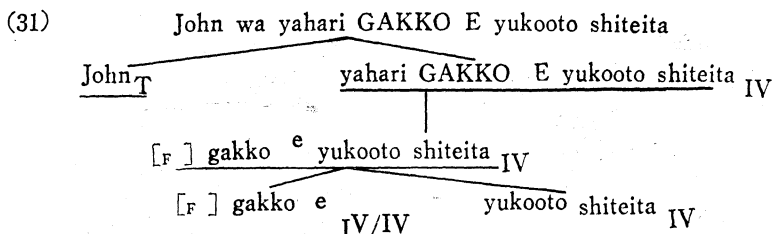
can say,

(29) John wa yahari GAKKO E yukooto shiteita

meaning 'John was going to school' or we can simply say

(30) Yahari GAKKO da.

The syntactic derivation of (29) can be represented as in (31).



It must be pointed out that 'yahari gakkoe yukooto shiteita' (was going to school as was naturally expected) is ambiguous between IV modifier phrase 'gakkoe' focus or the whole intransitive verb phrase 'gakkoe yukooto shiteita' (was going to school) focus because 'yahari' can be interpreted either as modifying only 'gakkoe' or the whole IV phrase. But the preceding context or shortened form like (30) will make the phrase 'yahari gakkoe yukooto shiteita' unambiguous.

4.1.4. Derived IV focus

Not only a basic intransitive phrase but also a derived IV phrase formed from a transitive verb plus object NP can be focused as shown in (32).

(32) John wa yahari HON O YOMOTO SHITEITA

meaning 'John was going to read a book as was naturally expected.' The sentence can be uttered in response to such a question like (33) below.

(33) John wa nanio shiyooto shiteitano ka?

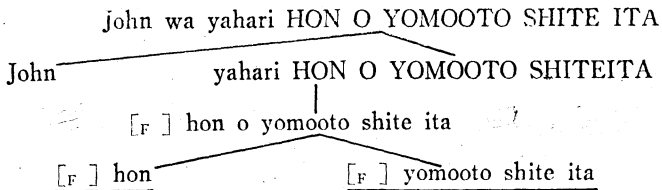
meaning 'what was John going to do?' Instead of (32) we can also say

(34) Yahari hon o yomoto shiteita.

by omitting an old information. The derivation of (32) would be represented

as in (35).

(35) John wa yahari HON O YOMOOTO SHITEITA.



Notice that in generating a derived intransitive phrase, the 'Principle of Collapsing of Two Foci into One' works effectively.

It should be commented in passing that there is no difference between basic IV phrase discussed in the preceding section 4.1.2. and derived IV phrase focus with reference to focus placement. The latter type of focus placement is dealt here only to show how our proposed framework works nicely.

4.1.5. Transitive verb focus

A transitive verb can be focused if preceded by such question as (36).

(36) John wa sono hon o dooshitaka? (What did John do with the book?)

We can say

(37) John wa sono hon o yahari YOMOOTO SHITEITA.

meaning that 'John was going to read the book as was expected.' Or we say simply

(38) Yahari YOMOOTO SHITEITA.

by omitting an old information of the sentence.

4.1.6. Object NP focus

Lastly, we mention the case in which object NP alone will receive a focus. When preceded by a question like

(39) John wa nanio yomooto shiteita ka?

we say

(40) John wa yahari HON O yomooto shiteita.

meaning that 'John was going to read a book,' or we may simply say 'Yahari HON DA' by omitting the old information.

It should be noticed that in all these cases of constituent focus the particle 'yahari' can be placed just before the focused element, so that the focused constituent can be explicitly indicated by the focus marker. The freedom with which the focus marker is placed just before a focused constituent is somewhat different from the corresponding English focus marker like 'expectedly', 'just' or the like. The English equivalents are rather limited in their freedom of occurrence.

4.2. Conventional implicature of 'yahari'

So far we have stated that there are six types of constituent focus: a subject NP, IV(derived and basic), IV modifier, TV, and lastly an object focus. We are now in a position to describe conventional implicatures of the adverb in question.

Before going into details of the problem of implicatures of the adverb in question, it would be necessary to mention briefly how to represent focus-presupposition relation in a sentence. For this purpose λ notation will be helpful. Take sentence (22), for example, which has a focused subject NP. The sentence in question may be represented by using λ notation as (41).

(41) $\lambda x[\text{come}'(x)]$ (John')

We must observe that in this notation 'yahari' is deleted. Let us suppose tentatively that the part bounded by the λ operator is equivalent to a presupposed constituent of sentence (22), and that argument 'John' corresponds to a focused element, that is, a new information. Consequently, all the focused constituents enumerated above may be reformulated as follows.

subject focus: (22) Yahari JOHN ga kita.

(41) $\lambda x[\text{come}'(x)]$ (John')

IV focus: (25) John wa gakko e yahari YUKOOTO SHITEITA.

(42) $\lambda P[\text{John}'(P)]$ (was-going')

IV/IV focus: (29) John wa yahari GAKKO E YUKOOTO SHITEITA.

(43) $\lambda\alpha'$ [John'(was-going')] (to school')

derived IV focus: (32) John wa yahari HON O YOMOTO SHITE ITA.

(44) λQ [John'(Q)] (was-going-to-read-a-book')

TV focus: (37) John wa sono hon o yahari YOMOTO SHITE
ITA.

(45) λP [P(John', the-book')] (was-going-to-read')

object NP focus: (40) John wa yahari HON O yomoto shiteita.

(46) λx [was-going-to-read' (John', x)] (a-book')

Before going into the details of describing the extensional and implicated meanings of 'yahari', let us see what are the precise meanings 'yahari'. There are three senses of 'yahari', which are listed below.

1) 'like the rest', 'too', 'also'

(47) John wa ginkooka da; kare no musko mo yahari ginkooka da.

(47) means that 'John is a banker; his son is another'. In this sense, 'yahari' implicates that one and the same predicate, in this case λx [a-banker'(x)] is true not only of the person named 'John', but also of the person 'his son' in the same real world of a speaker. Notice that we are referring here to the notion of 'speaker's real world' which is one instance of the specification of a possible world.

2) 'still', 'all the same'

(48) John wa yahari imamo Seoul ga sukida.

This means that 'John still likes Seoul.' In this sense 'yahari' implicates that a predicate

(49) λx [like'(John', x)]

is true of argument 'Seoul' in a possible world prior to a speaker's utterance time, as well as in the real world concurrent with the speaker's speech time.

3) 'as expected'

(50) Jikken wa yahari seikooshita.

This means that 'the experiment was a success as we expected.' In this sense 'yahari' implicates that one and the same predicate (51)

$$(51) \lambda P[P(\text{the-experiment}')]]$$

is true of the same argument 'be successful' not only in the real world concurrent with a speech time but also in a speaker's supposed world.

Notice again that in describing the implicature of 'yahari' the fact that any argument is true of a predicate not only in a real world concurrent with a speaker's utterance time but also in other worlds like imaginary world or the one prior to a speech time is very crucial. So, for example, the implicatures of sentence (47) as a whole may be described as shown in (52) below.

$$(52) \text{Kare-no-musuko-mo-yahari-ginkooka-da}^i =$$

$$\begin{aligned} & [[\text{kare-no-musuko}^i (\hat{x}_0 \text{ he}_0\text{-wa-ginkooka-da}^e) \wedge \\ & \text{kare-no-musuko}^h (\hat{x}_0 \text{ he}_0\text{-wa-ginkooka-da}^e)] \wedge \\ & \text{yahari}^i (\text{'kare-no-musuko}^e, \hat{x}_0 \text{ he}_0\text{-wa-ginkooka-da}^e)] \end{aligned}$$

The last conjunct of (52) is equivalent to the formula given in (53) below.

$$(53) \text{yahari}^i (\text{'kare no musuko}^e, \hat{x}_0 \text{ he}_0\text{-wa-ginkooka-da}^e) =$$

$$\begin{aligned} & w_i \Vdash \lambda x [(a\text{-banker}') (x)] (\text{his son}') \wedge \\ & w_i \Vdash \lambda y [(a\text{-banker}') (y)] (\text{he}') \wedge w_i \in W \\ & (W: \text{a set of possible worlds; } w_i: \text{a speaker's real world}) \end{aligned}$$

What the formulation (53) means is that the predicate 'x is a banker' is true of an argument 'his son' in a speaker's real world, that is, the proposition 'His son is a banker' belongs to a possible world w_i which makes that proposition true in that world. The fact that the first and the second conjunct have the same index 'i' with respect to a possible world 'w' means that the two propositions belong to the same possible world. This is schematically represented as (54):

$$(54) w_i \Vdash \neg F(a) \wedge w_i \Vdash \neg F(b)$$

$$(a \neq b; a: \text{his son; } b: \text{he; } F: \lambda x [(a\text{-banker}') (x)])$$

$w_i \in W$ (W : a set of possible worlds))

The following sentence (55), which differs from (47) in lacking the implicative adverb 'yahari', implicates two things arising from the two basic phrases it contains: that 'his son' is a male and that 'a banker' implicated that it is a sort of respectable profession.

(55) Kare no musuko wa ginkooka da (His son is a banker).

So the implicatures of (55) are conjunction of what is introduced by 'his son' and by 'a banker', which are exactly the first and the second conjuncts of (52) above. So the implicature expression of (55) can be represented as (56) below.

(56) male_*^e (his son) \wedge a respectable-profession $_*^e$ (a-banker')

The expressed meaning of (55), which is also the expressed meaning of (52) at the same time, is straightforward. This is shown in (57) below.

(57) a-banker' $_*^e$ (his-son')

In sum, the expressed meaning and the implicatures of (52) is represented as (58).

(58) 1. Kare no musuko wa yahari ginkooka da e .

=a-banker' $_*^e$ (his-son')

2. Kare no musuko wa yahari ginkooka da i .

=male $_*^e$ (his-son') \wedge a-respectable-profession $_*^e$ (a-banker') \wedge (53)

Let us turn to the second meaning of 'yahari', which is roughly equivalent to 'still' or 'all the same' in English. As we have seen with respect to sentence (48), 'yahari' implicates that one and the same argument is true of the same predicate not only in a real world concurrent with a speech time but also in a possible world prior to the utterance time. So the implicature of (48) may be represented as (59).

(59) 1. John wa yahari imamo Seoul ga sukida e .

=Seoul $_*^e$ (\hat{x}_0 John-likes-him $_0^e$)

=like* (John^e, Seoul^e)

1. John wa yahari imamo Seoul ga sukidaⁱ

=[[Seoulⁱ(\hat{x}_0 John-wa-him₀-ga-sukida^e) \wedge

Seoul^h(\hat{x}_0 John-wa-him₀-ga-sukidaⁱ) \wedge

yahariⁱ(John^e, \hat{x}_0 John-wa-him₀-ga-sukida^e)]

1st and 2nd conjunct of (59) 2:

=male* (John') \wedge be-acquainted-with* (John', Seoul') \wedge a big city* (Seoul')

3rd conjunct:

(60) $w_{t_0} \Vdash \lambda x [(like' (John', x))] (Seoul') \wedge$

$w_{t_{-1} < t_0} \Vdash \lambda x [(like' (John', x))] (Seoul')$

Schematically, (60) will be (61).

(61) $w_{t_0} \Vdash F(a) \wedge w_{t_{-1} < t_0} \Vdash F(a)$

t_{-1} : a time prior to a speech time t_0

Next we will discuss the third meaning of 'yahari' (as is expected).

(62) = (50) Jikken wa yahari seikooshita (The experiment was a success as we expected).

Omitting an irrelevant part, let us go to a pertinent part of (62) in terms of implicated meaning. Since (62) has a focus on IV phrase 'was a success', it may be represented as (63).

(63) $\lambda Q [Q(\text{the-experiment}')] (\text{be-a-success}')$

Consequently, the relevant part of implicature meaning of (62), that is, the third conjunct of the implicature expression of (62) may be represented as (64) below.

(64) $w_i \Vdash \lambda P [\text{the-experiment}'(P)] (\text{was-successful}') \wedge$

$w_j \Vdash \lambda P [\text{the-experiment}'(P)] (\text{was-successful}')$

($w_i, w_j \in W$; w_i : the real world concurrent with a speaker's speech time; w_j : the expectant world of the same speaker)

Schematically, (64) will be represented as (65).

$$(65) w_i || - F(a) \wedge w_j || - F(a)$$

In sum, the third conjunct of implicature expression containing 'yahari' can be schematically be summarized as either (66) a or b.

$$(66) a. w_i || - F(a) \wedge w_i || - F(b) \text{ cf. } 53$$

$$b. w_i || - F(a) \wedge w_j || - F(a) \text{ cf. } 61, 64$$

Thus, we can conclude that the particle 'yahari' can be used to implicate that a different argument is true of the same predicate in one and the same possible world, that is, a speaker's real world and that the same argument is true of the same predicate in a different world. In either case a predicate must be the same.

It must be noted in the analysis of implicature meaning of 'yahari', the two key notions have been made a crucial use: one is the extended notion of Karttunen-Peters' framework in order to take care of other constituent foci than NP focus, and the other is the notion of characterization of a possible world. By so making an extensive use of these two notions, we have been fairly successful in describing the Japanese particle 'yahari'.

4.3. 'Sekkaku'

The second example to be given a tentative analysis is 'sekkaku', which has no exact equivalent in English. In a Japanese-English dictionary the following glosses are given as a rough definition of the adverb: 'with much trouble', 'with great pains', 'with special kindness', 'on purpose', 'expressly', and the like but not any gloss has given an exact semantic definition of the particle. I will give in (67) several sentences, where the particle in question is used.

- (67) a. Sekkaku tooi tokoroo oideninattanoni, kare ga huzai de okinodoku desu. (I'm sorry you find him absent after coming all this way.)
 b. Sekkaku aremade ni hone o otte shippai suru to wa, nantoyuu kinodoku na koto da. (What a pity that he should have failed)

after such great labor!)

- c. Sekkaku kimi ga koredakeno shiryoo o atsumeta no dakara, sore o katsuyoo shiyoo. (Since you went to the trouble to gather so much data, let's make a good use of it.)
- d. Sekkaku no kaigi ga omatsuri sawagini owatte shimatta. (The conference of which we expected so much has ended in an empty show.)

It should be observed that no single instance of 'sekkaku' is given a consistent translation in these examples. We must notice, furthermore, that all these sample sentences in which 'sekkaku' is employed consist of two clauses. A clause led by the particle acts as a subordinate clause to another clause acting as a main clause. Let us call the two clauses A and B clause, respectively. Let us take, (67a), for example. 'A' clause, which is led by 'sekkaku', means that 'your coming all this way' is assessed as a valuable thing by a speaker. Such assessment by a speaker is expressed by the particle.

'B' clause, which is a main clause, means that 'therefore his presence is naturally expected but in reality he was not present.' So the speaker comments the situation as a thing to be pitied. It must be noted that the proposition 'therefore his presence is naturally expected' is not expressed in the main clause. What is explicitly expressed is merely that he was absent. Put it another way, what is stated in the subordinate clause is true in the speaker's real world, and furthermore is given a positive evaluation by the speaker. As a natural consequence of what is stated in the subordinate clause, what is implicitly expressed in the main clause is the proposition that his being there is naturally expected but in reality the opposite situation is true. So the speaker comments the given situation as a thing to be deplorable. In other words, his being there is true only in the speaker's optative world but is false in his real world. Therefore, all these should be written in as implicatures of 'sekkaku'.

The second thing to be noticed about this particle is that 'sekkaku' can be used to put a focus on several constituents of a sentence just like 'yahari'

as we observed earlier. The examples are given in (68).

(68) a. subject NP focus:

Sekkaku JOHN ga kita noni, Mary wa inakkatta. (Though John came, Mary was not there.)

b. IV focus:

John ga sekkaku KITANONI, Mary ga inakkatta. (Though John took the trouble to come, Mary was not there.)

c. IV/IV focus:

John wa sekkaku GAKKOE ittanoni, senseiga yasunda. (Though John took the trouble to go to school, his teacher was absent.)

d. derived IV focus:

John ga sekkaku HON O YONDA noni, okaasan wa homete kurenakkata. (Though John read a book, his mother didn't appreciate it.)

e. TV focus:

John wa sono hon o sekkaku YONDA noni, okaasan wa homete kurenakkata. (Though John read the book, instead of throwing it away without reading it, his mother didn't appreciate it.)

f. OBJECT NP focus:

John wa sekkaku SONO HON O yonda noni, okaasan wa homete kurenakkata. (Though John read THE BOOK, instead of a cheapish magazine, his mother didn't appreciate it.)

We have stressed that in the analysis of 'sekkaku' two points must be stressed. To reiterate, the first is that a sentence in which the particle is used consists of a subordinate clause led by 'sekkaku' and a main clause. A proposition expressed by a clause led by the particle is given a positive assessment by a speaker of the sentence, while the main clause is assessed as a matter to be pitied by the same speaker. All these must be included as implicatures of 'sekkaku'.

The second thing we have noticed is the fact that 'sekkaku' can put a focus on six (precisely five, if we exclude the case of derived IV)

constituents of a sentence as the examples in (68) show. In all these examples of (68) a rough translation of the original Japanese sentence is given, but it cannot capture the fine shades of meaning of the Japanese particle according to where the particle is placed. All these two points just mentioned above must be taken into consideration in the description of the implicatures of 'sekkaku'.

Omitting the details and non-pertinent points we can represent the relevant implicature part of sentence (68a) as follows.

- (69) $w_i || -\lambda x[\text{come}(x)](\text{John}) \wedge$
 + evaluative $w_i \{w_i || -\lambda x[\text{come}(x)](\text{John})\} \wedge$
 $w_i || -\text{John is present} \wedge w_x \# -\text{John is present} \wedge$
 —Evaluative $w_i \{w_x \# -\text{John is present}\}$

What this complex string means is as follows:

1. The first conjunct means is that the predicate $\lambda x[\text{come}'(x)]$ is true of 'John', and not of another person in a speaker's perceived reality ' w_i '.
2. The second conjunct means that the first conjunct is given a positive evaluation from a speaker's point of view.
3. The third conjunct means that the proposition that John is present is true in the speaker's optative world.
4. The fourth conjunct means that the same proposition which is true in the speaker's optative world is false in his real world.
5. The fifth conjunct means that the fourth conjunct is given a negative assessment from the speaker's point of view.

Let us take (67d) as another example and see whether our formalization holds true or not. Sentence (67d) has no explicit subordinate clause since 'sekkaku-no kaigi' is a noun phrase consisting of 'sekkaku-no', and 'kaigi' corresponding to 'meeting' in English. Though 'no' in 'sekkaku-no' meaning a noun modifier marker so that the whole phrase 'sekkaku-no kaigi' is a noun phrase as a whole, we interpret that 'sekkaku-no kaigi' has an implicit subordinate clause meaning 'though there was a meeting', which is justified from a native speaker's intuition. Therefore, the noun phrase

means that there was a conference and this fact is a matter to be highly appreciated from a speaker's view point. What the main clause means is that it is therefore naturally expected that the conference would be a fruitful one, though this is not explicitly expressed in the sentence in question. It further means that in reality it ended in an empty show, which is explicitly stated in the sentence.

Consequently, the relevant implicature part of the sentence may be represented as (70).

- (70) $w_i || -\lambda x [\text{have}(\text{they}, x)]$ (a conference) \wedge
 +Evaluative $\{w_i || -\lambda x [\text{have}(\text{they}, x)]$ (a conference) $\}$
 $\wedge w_j ||$ -the conference is fruitful
 $\wedge w_i \not||$ -the conference is fruitful

1. The first conjunct of (70) means that the predicate bound by λ is true of the argument 'a conference'. It should be mentioned that in 'sekkaku-no kaigi', 'kaigi' can be a focus of the implicitly expressed subordinate clause, so that 'a conference' is assigned an argument place in the first conjunct.

2. The second conjunct means that what is expressed in the first conjunct is judged to be a thing to be highly evaluated from a speaker's point of view.

3. The third conjunct means that the proposition that the conference is fruitful is true in the speaker's optative world.

4. The fourth conjunct means that the same proposition represented in third conjunct is false in his real world.

We must notice in this sentence that in contrast to (67a), there is no fifth conjunct which is explicitly expressed, that is, an evaluation of the speaker. But on the whole, the implicatures of 'sekkaku' in both (67a, d) are the same in both occurrences.

4.4. 'igainimo'

As the last example of an implicative adverb, let us take up 'igainimo' meaning 'unexpectedly'. This adverb has the same focusing effect as

'yahari' on the constituents of a sentence in which the particle is used. This is demonstrated in (71) below.

(71) a. Subject NP focus:

Igainimo JOHN ga kita. (It was unexpected of John that he came.)

b. IV focus:

John wa gakko e igainimo ITTA. (It was unexpected of John that he WENT to school.)

c. IV/IV focus:

John wa igainimo GAKKO E itta. (It was unexpected of John that he went TO SCHOOL.)

d. Object NP focus:

John wa igainimo HON O yonda. (Unexpectedly, John read a BOOK.)

e. Sentence focus:

Igainimo, JOHN GA KITA.

It should be noticed that 'igainimo' has a sentence focus, which is not the case with 'yahari'. Let us take (71 d) as an example, and see how the implicature meaning is going to be described.

The implicature of sentence (71 d) may be represented as in (72).

(72) John-wa-igainimo-HON-O-yondaⁱ.

= [a-bookⁱ (\hat{x}_o John-read-him_o^o) \wedge a-book^h (\hat{x}_o John-read-him_o^o) \wedge igainimoⁱ (\wedge John^e, \hat{x}_o John-read-him_o^o)]

The third conjunct of (72) can be rewritten as (73):

(73) $w_i \Vdash \lambda x [\text{read} (\text{John}, x)] (\text{a book}) \wedge$
 $w_j \Vdash \lambda x [\text{read} (\text{John}, x)] (\text{a book})$

(w_i : a speaker's imaginary world; w_j : a speaker's real world concurrent with his speech time)

(73) means that in a speaker's imaginary or suppositional world the argument 'a book' is not true of the predicate $\lambda x [\text{read}' (\text{John}', x)]$, but the

same argument is true of the same predicate in the speaker's real world. This is quite opposite from the implicature expression of 'yahari' as we saw earlier in section 4.2.

There is another difference between 'yahari' in that 'igainimo' can be a focus of the whole sentence as we pointed out above. In the case of the sentence focus like (71 f), the relevant part of implicature expression may be represented as in (74).

(74) $w_{j||} \leftarrow \text{JOHN CAME} \wedge w_{j||} \leftarrow \text{JOHN CAME}$

(w_i : a speaker's imaginary world; w_j : a speaker's real world)

5. Summary

In order to make an extensive description of implicature meaning of a group of Japanese adverbs the two proposals were made. One is to make a revision of Karttunen-Peters' framework in order to handle a wider range of data. The second proposal made in order to take care of the implicative adverbs was an attempt to characterize the notion of a possible world in which a proposition is true or false. In the tradition of orthodox modal logic, the notion is one of the key concept in the whole system but no attempt was made to make a specification of the concept. It was only by linguistics-oriented research such as those of Lakoff and Morgan that the notion was given a concrete specification. In this paper I demonstrated to what extent the specification of the concept of a possible world was of a great use in trying to make a better description of the implicative adverbs of Japanese in our newly extended Karttunen-Peters' framework.

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424 Akira Ikeya

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