Modes of Scalar Reversal in Japanese

OSAMU SAWADA
University of Chicago

1. Introduction[1]

Sentence (1) with *yoppodo*/*kaette* implies that the opposite of the 'at issue' commitment (entailment) is normally true, as shown in (1) (PRED.POL stands for a polite form of the predicate):

(1) {*Kaette*/*yoppodo*} Okinawa-no   hoo-ga   Tokyo-yori suzushii
    REVERSAL   Okinawa-GENI   way-NOM Tokyo-than cool
   -desu.
   -PRED.POL
   Semantics (at-issue): It is cooler in Okinawa than in Tokyo.
   Implicature: Generally, it is cooler in Tokyo than in Okinawa.

In (1) the usual ranking of Okinawa relative to Tokyo on the scale of coolness is reversed.

The purpose of this paper is to investigate the conventional implicature (CI) and scalar properties of the Japanese adverbs *yoppodo* and *kaette* and clarify the modes of 'reversal' from the standpoint of the semantics-pragmatics interface. This paper mainly argues the following three points. First, I argue that the implicatures induced by *kaette* and *yoppodo* are conventional and have a generic meaning (Carlson 1982; Krifka et al. 1995, among many others). That is, the 'at issue' proposition in (1) is true only in a specific (context-dependent) situation.

Second, I argue that there are two modes of scalar reversal: 'individual' (target-standard) reversal and 'polarity' reversal. *Kaette* has both modes, but *yoppodo* has only one mode: individual reversal. I will provide formal analyses for the two modes of reversal using Potts' (2005) theory of CI.

Finally, I argue that there are degrees of individual reversibility. I propose that *kaette* is a 'weak' reversal adverb while *yoppodo* is a 'strong' reversal adverb, due to the difference between the strength of the illocutionary force of the objection created by these words. It will be shown that the scalar reversal adverbs are *expressives*.

2.   Pragmatics of *Kaette* and *Yoppodo*

As we saw in section 1, sentences with *yoppodo/kaette* imply that the opposite of the 'at issue' commitment (entailment) is normally true. This section considers the status of the implicature.

2.1. Implicature of *Kaette/Yoppodo*: Not Conversational

It is relatively clear that the implicature in (1) is not conversational. Conversational implicatures are cancelable and non-detachable (Grice 1975, 1989). As the following test shows, the implicature is not cancelable:

(2) (Utterance after (1))
   # Demo, ippantekini Okinawa-no   hoo-ga   Tokyo-yori   suzushii
     but   generally   Okinawa-GENI way-NOM Tokyo-YORI cool
     -desu.
     -PRED.POL
     'But generally, it is cooler in Okinawa than in Tokyo.'

Furthermore, as the examples in (3) show, the implicature is detachable in the sense that the same semantic content is expressible in a way that removes (detaches) the inference:

(3) a. {*Kaette/Yoppodo*} Okinawa-no   hoo-ga   Tokyo-yori   suzushii.
       REVERSAL   Okinawa-GENI way-NOM Tokyo-than cool
       Semantics (at-issue): 'It is cooler in Okinawa than in Tokyo.'

Implicature: 'Generally, it is cooler in Tokyo than in Okinawa.'

b.?? Okinawa-no hoo-ga Tokyo-yori suzushii.
   Okinawa-GENI way-NOM Tokyo-than cool
   'It is cooler in Okinawa than in Tokyo.'

(3b) does not have a reversal meaning, although (3a) does.[2] Based on the above tests, it is possible to assume that the implicature of *kaette* and *yoppodo* is not conversational.

2.2. Implicature of *Kaette* and *Yoppodo*: Conventional

Next, let's consider the possibility that the implicature in (1) is conventional. Potts (2005: 11) offers a four-part definition of a conventional implicature (CI): (a) CIs are part of the conventional meaning of the words; (b) CIs are commitments, and thus give rise to entailments; (c) these commitments are commitments of the speaker[3]; and (d) CIs are logically and compositionally independent of 'what is said.'

It seems that the 'implicature' in (1) satisfies these conditions. Condition (a) is satisfied since the reversal meaning is associated with the lexical items. Conditions (b) and (c) are also met. As we will see later, a speaker uses *kaette/yoppodo* in a sentence when he/she wants to object to a previously established assumption. Thus, the speaker commits himself/herself to the truth of his/her holding attitude. Finally, condition (d) also seems to be satisfied. In order to confirm this, let us observe the following conversation:

(4) (Context: It is really hot in Tokyo today.)
   A: {Kaette/yoppodo}Okinawa-no hoo-ga Tokyo-yori suzushii-
     REVERSAL Okinawa-GENI way-NOM Tokyo-than cool-
     desu.
     PRED.POL
     Semantics (at-issue): It is cooler in Okinawa than in Tokyo.
     Implicature: Generally, it is cooler in Tokyo than in Okinawa.

   B: Sore-wa choto ii-sugi-desu.
     that-TOP a little say-excess-PRED.POL
     'That is a bit much.'

Here, speaker B only denies the 'at issue' meaning that 'it is cooler in Okinawa than in Tokyo'. He/she is not denying the implicature that, 'Generally, it is cooler in Tokyo than in Okinawa.' On the assumption that only what is

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[2] Strictly speaking, the 'at issue' proposition in (3a) and the proposition in (3b) can be different because the 'at issue' proposition in (3a) is true only in a specific context.

[3] Potts (2007) amends this condition, saying that the perspective encoded in the expressive aspects of an utterance is often but not always that of the speaker. He then adopts Lasersohn's (2005) notion of a 'contextual judge.'

said in a sentence is targeted by denial (McCready 2007: 310), it follows that CI content is not part of 'what is said.'

Based on the above discussion, I would like to assume that the implicature of the sentences with *kaette* and *yoppodo* is conventional.[4]

3. Scalar Reversal and Genericity

Sentence (1) becomes odd if the reversal adverb is deleted, or if the target (Okinawa) and the standard (Tokyo) are interchanged, as in (5) and (6):

(5) ?? Okinawa-no   hoo-ga   Tokyo-yori suzushii.
     Okinawa-GENI way-NOM Tokyo-than cool
     Semantics (at-issue): 'It is cooler in Okinawa than in Tokyo.'

(6) ?? {*Kaette*/*Yoppodo*} Tokyo-no   hoo-ga   Okinawa-yori suzushii.
     REVERSAL   Tokyo-GENI way-NOM Okinawa-than cool
     Semantics (at-issue): It is cooler in Tokyo than in Okinawa.
     CI: 'Generally, it is cooler in Okinawa than in Tokyo.'

(5) is odd because it conflicts with the general geographical knowledge that it is cooler in Tokyo than in Okinawa. (6) is odd because it implies that 'normally, it is cooler in Okinawa than in Tokyo.' As Watanabe (1987, 2002) observes, a proposition that is construed as 'common sense' cannot co-occur with *yoppodo*. The same is true with *kaette*.

I propose that the meaning of 'genericity' (Carlson 1982, Krifka et al. 1995, among many others) is embedded within the CI of *kaette* and *yoppodo*. Descriptively, the genericity of the CI can be represented as in (7):

(7) {*Kaette*/*yoppodo*} (x is A-er than y)
     Imply$\rightarrow$ GEN [s, x, y;] (in (x & y, s); y is A-er than x in s)

GEN is a generic operator. The implicature part of (7) can be read as 'in situations that contain x and y, usually, y is A-er than x.' Since the GEN operator is embedded in the domain of CI, the proposition 'x is A-er than y' in (7) is true only in 'special' (non-stereotypical) contexts.

4. Modes of Scalar Reversal

Let us now consider modes of scalar reversal. I argue that there are two kinds of scalar reversal: individual reversal and polarity reversal. It will be shown that *kaette* has two modes of reversal, while *yoppodo* has only one mode, individual reversal.

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[4] A different view holds that CIs are a myth (Bach 1999). According to this approach, what is considered to be a CI of *kaette/yoppodo* is actually a part of 'what is said', and a sentence with *kaette/yoppodo* has two different propositions.

4.1. Individual Reversal vs. Polarity Reversal

We can define each mode of reversal as follows:

(8) a. *Individual reversal* (IR): Reversal is 'individual reversal' iff the opposite meaning (i.e. the implicature) of a given proposition is achieved by interchanging the target of comparison (i.e. the subject) and the standard of comparison (i.e. the object of *yori*).
  b. *Polarity reversal* (PR): Reversal is polarity reversal iff the opposite meaning (i.e. the implicature) of a given proposition is achieved by reversing the meaning of the gradable predicate (e.g. from *slow* to *fast*).

Kaette has two modes of reversal— individual reversal and polarity reversal— while *yoppodo* has only one mode— individual.[5] Unlike example (1), the following sentence with *kaette* has two kinds of CI. (Notice that here *kaette* is placed in front of the gradable predicate *suzushii*):

(9) Okinawa-no   hoo -ga   Tokyo-yori *kaette*   suzushii.
   Okinawa-GENI way-NOM Tokyo-than REVERSAL cool
   Semantics (at-issue): 'It is cooler in Okinawa (than in Tokyo).'
   a. CI: Generally, it is cooler in Tokyo than in Okinawa.   (IR)
   b. CI: Generally, it is hotter in Okinawa than in Tokyo.   (PR)

In (9a), the implicature is achieved by interchanging the target (Okinawa) with the standard (Tokyo). In (9b), on the other hand, the implicature is achieved by changing the gradable adjective *suzushii* 'cool' to *atsui* 'hot'. (Note that in the above example, I have abbreviated individual reversal as IR and polarity reversal as PR.)

  Yoppodo is different from *kaette* in that it only has one mode of scalar reversal, individual reversal, as in the following example:

(10) Okinawa-no   hoo-ga   Tokyo-yori *yoppodo*   suzushii.
    Okinawa-GENI way-NOM Tokyo-than REVERSAL cool
    Semantics (at-issue): It is cooler in Okinawa than in Tokyo.
    CI: Generally, it is cooler in Tokyo than in Okinawa.   (IR)

Notice that although the IR and the PR seem to be logically the same, the ways in which they are derived are different. Furthermore, they do not necessarily have the same meaning. For example, let us compare two cold places, Siberia and Alaska. The sentence *it is colder in Siberia than in Alaska* and the sentence *it is hotter in Alaska than in Siberia* seem not to be the same in meaning. The former sentence implies that both places are cold,

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[5] Note that the adverbs *kaette/yoppodo* are different from English adverbs like *unusually* and *unexpectedly* in that the former can only appear in sentences that involve degree/scalarity.

while the latter sentence implies that both places are hot (and therefore sounds odd).[6] In the following three sections, we will consider the differences between the two modes of reversal.

4.1. Evidence that *Yoppodo* Does Not Have a Polarity Reversal Mode

In the previous section, I claimed that *yoppodo* has only one mode, individual reversal mode. There are at least two kinds of evidence to support the idea that *yoppodo* does not have a polarity reversal mode.

First, as Watanabe (1987, 2002) argues, *yoppodo* cannot appear in a simple sentence with a bare adjective, as in (11). ((11) with *yoppodo* is natural if it is interpreted as an intensifier):

(11) Koko-wa   {*kaette*/?? *yoppodo*} abunai-desu.
  here-TOP   REVERSAL   dangerous-PRED.POL
  Semantics: 'It is dangerous here.'
  CI: Generally, it is safe here.

Second, it is impossible to contrast a gradable predicate with its antonym by using *dokoroka* 'far from' with *yoppodo*:

(12) [Okinawa-no   hoo-ga   Tokyo-yori <u>atsui]</u> dokoro-ka {kaette/
  Okinawa-GENI way-Nom Tokyo-than hot   far from   REVERSAL
  * yoppodo}   <u>suzushii</u>.
   REVERAL cool
  'Far from being hotter, it is cooler in Okinawa than in Tokyo.'

It is difficult to contrast *atsui* 'hot' with *suzushii* 'cool/cold' by using the conjunction *dokoro-ka* 'far from' with *yoppodo*.

4.2. Position of Reversal Adverbs

The position of the adverbs is sensitive to modes of reversal. If the reversal adverbs and a gradable predicate are not adjacent, there can only be individual reversal, as shown in:

(13) *Kaette/yoppodo* Okinawa-no   hoo -ga   Tokyo-yori suzushii.
  REVERSAL   Okinawa-GENI way-NOM Tokyo-than   cool
  Semantics (at-issue): 'It is cooler in Okinawa than Tokyo.'
  CI: Generally, it is cooler in Tokyo than in Okinawa.

4.3. 'NP-*no hoo-ga*' vs. the Topic Marker *-wa*

It is also important to notice that the element that attaches to a subject plays a role in determining the mode of reversal. There are two kinds of elements that can attach to a subject in a reversal context: *no hoo-ga* 'GENI way-

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NOM' and the topic marker *wa*. The phrase *no hoo-ga* is attached to a subject when a speaker is selecting one of two choices. That is, *no hoo-ga* is just like the phrase '*the A-er of the two*' in English.[7] This construction fits the mode of individual reversal well, because the essence of individual reversal is reversing a given ranking by interchanging two NPs. This, however, does not mean that *no hoo-ga* does not work with polarity reversal. Thus, the polarity reversal reading of (9) becomes salient if we posit a previous context, such as someone asking the speaker, *Okinawa no hoo-ga Tokyo yori atsui yone?* 'It is hotter in Okinawa than in Tokyo, right?'

It is also important to note that unlike *-no hoo-ga*, the topic marker *-wa* cannot be used in individual reversal:

(14) {Yoppodo/kaette} jisui　　　{??-wa /-no hoo-ga}　　gaisyoku
　　　REVERSAL　　self-cooking　-TOP/-GENI way-NOM eating out
　　　-yori takaku-tsuku.
　　　-than high-settle
　　　Semantics: 'Cooking at home costs more than eating out.'
　　　CI: 'Generally, eating out costs more than cooking at home.' (IR)

The reason why (14) with the topic marker *wa* is odd is that, although the topic marker *wa* forces us to construe *jusui* 'self-cooking' as topical, the individual reversal does not force us to construe it as topical. Recall that the essence of individual reversal is to interchange the target of comparison with the standard of comparison. *Jisui* was originally the standard of comparison.

Notice, however, that (15) with *kaette* is natural. This is because *kaette* in (15) can function as a polarity reversal adverb:

(15) Jisui **-wa**　　　　gaisyoku-yori {kaette/ ??yoppodo} takaku-tsuku
　　　self-cooking-TOP eating out-than REVERSAL　　　high-settle
　　　Semantics: 'Cooking at home costs more than eating out.'
　　　CI b: *'Usually, eating out costs more than cooking at home.' (IR)
　　　CI a: 'Usually, cooking at home costs less than eating out.'　(PR)

Polarity reversal only affects the adjectival part of the sentence, so the topic marker *wa* can be used. (15) with *yoppodo*, on the other hand, is odd because *yoppodo* does not trigger polarity reversal. If *wa* in (15) is replaced by *no hoo ga*, *kaette* and *yoppodo* can induce individual reversal:

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[7] Unlike *wa*, *no hoo-ga* seems to contain a comparative meaning. Even if the *yori* phrase/clause is not pronounced, we can still get the comparative meaning 'x is the A-er':
(i) Jisui-no　hoo-ga　　takaku-tsuku.
　　Self-GEN　way-NOM　high- settle
　　'(Between the two alternatives), cooking at home costs more.'

(16) Jisui-**no**　　　　**hoo-ga**　gaisyoku-yori　{kaette/yoppodo}
　　　selfcooking-GENI　way-NOM eating out-than　REVERSAL
　　　takaku-tsuku.
　　　high-settle
　　　Semantics: 'Cooking at home costs more than eating out.'
　　　CI b: 'Usually, eating out costs more than cooking at home.' (IR)
　　　CI a: 'Usually, cooking at home costs less than eating out.'(PR, *kaette*)

5. Logic of Conventional Implicature in Reversal Adverbs

This section analyzes the CI of the reversal adverbs in a formal way. Descriptively, we can say that *yoppodo* is a 'sentential adverb', which semantically scopes over an entire sentence and exchanges the target of comparison with the standard of comparison. *Kaette*, on the other hand, is lexically ambiguous between a sentential adverb and an adjective-modifying adverb. How can we explain the two modes of reversal? I will use Potts' (2005) theory of CI to analyze the interface between the semantics and pragmatics of *yoppodo* and *kaette*.

5.1. CI Application (Potts 2005)

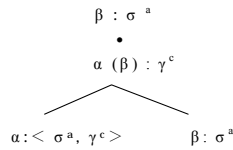Potts (2005) proposes the following rule, called CI application, which is shown in Figure 1:

$$\beta : \sigma^a$$
$$\bullet$$
$$\alpha\,(\beta) : \gamma^c$$

$$\alpha : \langle\, \sigma^a,\ \gamma^c\,\rangle \qquad \beta : \sigma^a$$

Figure 1: CI application

Figure 1 shows that α that is of type $\langle\sigma^a, \gamma^c\rangle$ takes β of $\langle\sigma^a\rangle$ and returns $\langle\gamma^c\rangle$. The superscript ^{c} stands for CI and the superscript ^{a} stands for 'at issue.' Notice that β is consumed twice. The bullet $\bullet$ is a metalogical device for separating independent lambda expressions. This rule ensures that the at-issue dimension is always insensitive to the presence of adjoined CI operators (Potts 2005: 65).

5.2. Logic of CI in Individual Reversal

Let us first consider the case of individual reversal in (17):

(17) Okinawa-no　　　hoo-ga　　Tokyo-yori　*kaette/yoppodo*　suzushii.
　　　Okinawa-GENI　way-NOM　Tokyo-than　REVERSAL　　　cool
　　　Semantics (at-issue): 'It is cooler in Okinawa than in Tokyo.'
　　　CI a: Generally, it is cooler in Tokyo than in Okinawa. (IR)
　　　CI b: Generally, it is <u>hotter</u> in Okinawa than in Tokyo. (PR, *kaette*)

We are now focusing on CI a. Recall that the essence of IR is to reverse the ordering of x and y:

At issue: $\lambda f_{<e, <e,t>>} \lambda y \lambda x. f(y)(x)$

(18)   Individual reversal

CI: $\lambda f_{<e, <e,t>>} \lambda y \lambda x. GEN [x, y, s;] (x and y are in s; f(x)(y) in s)$

Before looking closely at the mechanism of the logic of IR in (17), let us briefly consider the semantics of comparison and gradable adjectives. Although there are various approaches for the semantics of comparison, in this paper, I follow the assumption that the relation 'greater than' is expressed by a comparative morpheme (e.g. von Stechow 1984). Although there is no overt comparative morphology in (17), I posit a null comparative morpheme, MORE (e.g. Beck et al. 2004, Kennedy in press), as shown in Figure 2:[8]
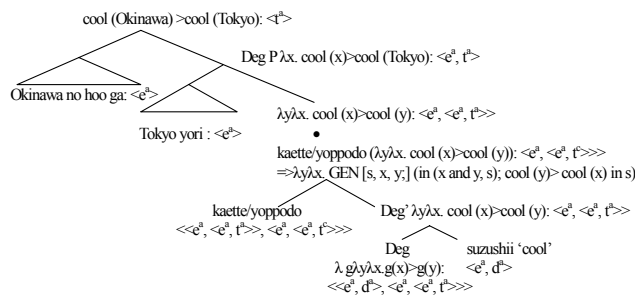

Figure 2

As for the semantics of gradable adjectives, I will analyze them as measure functions (type $<e^a, d^a>$) (e.g. Bartsch and Vennemann 1972, Kennedy 1999). For example, the adjective *suzushii* 'cool' is a function from the subset of the domain of individuals that have some temperature value to degrees of temperatures.

The denotations of the null comparative morpheme and the adjective *suzushii* are represented as follows: [9]

(19) a. ⟦MORE$_{invisible}$⟧ $= \lambda\, g\lambda y\lambda x.g(x){>}g(y)$

   b. ⟦suzushii⟧ $= \lambda x.\, cool\,(x)$

Now let us consider the logic of individual reversal. As we can see in Figure 1, the reversal adverbs *kaette/yoppodo* take the 'at issue' meaning $<e^a, <e^a, t^a>>$ and return $<e^a, <e^a, t^c>>$. Notice that the CI meaning in Figure 2 is incomplete. We need to continue a computation in order to get a 'pro-positional' CI, i.e. $<t^c>$. In this paper I assume that the incomplete CI (i.e. $<e^a, <e^a, t^c>>$) is calculated separately from, but in exactly the same fashion as, the corresponding 'at issue' material (i.e. $<e^a, <e^a, t^a>>$). This means that Tokyo and Okinawa are consumed twice, i.e. in the 'at issue' dimension and the CI dimension.[10] (20) shows the lexical entry of *kaette/yoppodo* that induces individual reversal:

(20) Lexical entries of *yoppodo/kaette$_1$* (individual reversal):
   ⟦yoppodo/kaette$_1$⟧ $=$ the function from $<e^a, <e^a, t^a>>$ to $<e^a, <e^a, t^c>>$ iff in the environment ⟦yoppodo/kaette$_1$⟧ $(\lambda y\lambda x.\ g\,(x) > g\,(y))$, it conventionally implies '$\lambda y\lambda x.$ GEN [s, x, y;] (in (x & y, s); g (y) > g(x) in s).'

Note that if the adverbs in (17) appear in the initial position of a sentence, we need to posit a scrambling in the logical structure, as in Figure 3:
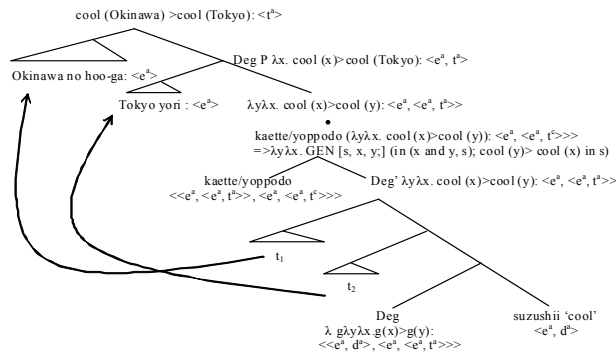

Figure 3

[9] Here, I follow the assumption that the standard of comparison in Japanese is type <e>, i.e. individual comparison rather than degree comparison (Kennedy 2007a, in press).
[10] I need to formalize this idea more clearly. I would like to leave this issue for future research.

There are several steps involved in Figure 3. First, *Okinawa no hoo-ga* and *Tokyo yori* are raised above the reversal operator *kaette/yoppodo*. Then the reversal operator reverses the ordering of the two variables x and y. Finally, *Okinawa no hoo-ga* and *Tokyo yori* are saturated separately in the 'at issue' dimension and the CI dimension. According to this analysis, *kaette* and *yoppodo* are not focus-sensitive operators like *even*, which focuses on an explicit element (e.g. Tokyo) and creates alternatives.[11]

## 5.3. Logic of CI in Polarity Reversal (PR)

Next, let us consider the logic of CI in polarity reversal. Recall that the essence of polarity reversal is to flip the meaning of gradable adjectives. We showed that (i) *kaette*, but not *yoppodo*, has this mode of polarity reversal, and (ii) the polarity reversal use of *kaette* can appear in both comparatives and adjectival sentences. There seem to be two possible explanations of polarity reversal CI. Approach A considers that *kaette* is placed above a degree morpheme, while Approach B considers that it is placed below it.

5.3.1. Approach A: Two Lexical Items for the Polarity Reversal Adverb

This approach assumes that the reversal adverb appears above the degree morpheme at LF. According to this view, the lexical entry of *kaette* (PR) in comparatives can be described as in (21):

(21) Lexical entry of *kaette₂* (polarity reversal in comparatives):
$\llbracket$ kaette$_2$ $\rrbracket$ = the function from $<<e^a, <e^a, t^a>>$ to $<e^a, <e^a, t^c>>$ iff in the environment $\llbracket$ kaette$_2$ $\rrbracket$ ($\lambda y \lambda x.$ $g^{+(-)}(x) > g^{+(-)}(y)$), it conventionally implies '$\lambda y \lambda x.$ GEN [s, x, y;] (in (x & y, s); $g^{-(+)}(x) > g^{-(+)}(y)$ in s).'[12] (+ means 'positive' polarity and – means 'negative' polarity)

Figure 4 shows the logical structure of (20) with the CI of polarity reversal:

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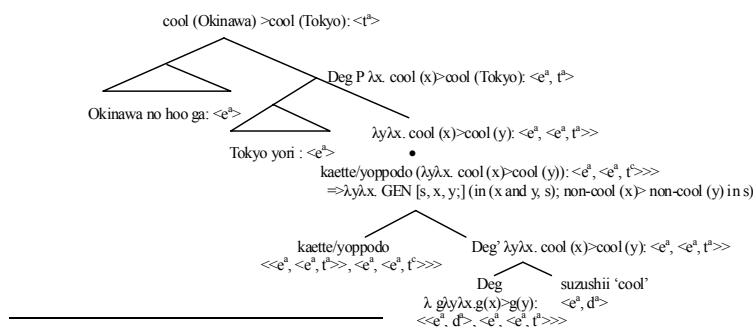
11 Here, I do not posit a variable binder λ 'right below' the moved phrases. This analysis is different from Heim and Kratzer's (1998) analysis of (quantifier) raising, in which a trace has a type <e>. See also Heim (1985), Bhatt and Takahashi (in press), and Kennedy (2007a).

12 It is also possible to formalize the polarity reversal by using negation: $\llbracket$ kaette$_2$ $\rrbracket$ ($\lambda y \lambda x.$ g (x) >g (y)), it conventionally implies '$\lambda y \lambda x.$ GEN [s, x, y;] (in (x & y, s); ¬g (x) > ¬g (y) in s).'

Figure 4

Importantly, the polarity reversal use of *kaette* can also appear in a simple sentence with a gradable adjective:

(22) Koko-wa   *kaette*   abunai-desu.
    Here-TOP   REVERSAL dangerous-PRED.POL
    At issue: 'It is dangerous here.'
    CI: Generally, it is safe here.

Here, I assume that unmodified APs actually contain a null degree morpheme *pos* ($<<e^a, d^a>, <e^a, t^a>>$) whose task is to derive a property of individuals. *Pos* relates the degree argument of the adjectives to an appropriate standard of comparison **STAND** (e.g. Kennedy 2007b), as shown in:

(23) $\lambda g \lambda x.\ g\,(x) \geq$ STAND (g)

Now let's consider the mechanism of the polarity reversal. In this approach, the lexical entry of *kaette* in (22) must be distinguished from that in (21):

(24) Lexical entry of *kaette₃* in an adjectival sentence:
    $[\![$kaette₃$]\!]$ = the function from $<<e^a, t^a>>$ to $<e^a, t^c>>$ iff in the environment $[\![$kaette₂$]\!]$ ($\lambda x.\ g^{+(-)}(x) >$ STAND (g)), it conventionally implies '$\lambda x.$ GEN $[s, x;]$ (in (x, s); $g^{-(+)}(x) >$ STAND (g) in s).'

Figure 5 shows the logical structure of (22):

dangerous (here) > STAND (dangerous): $<t^a>$
Koko 'here' λ**x. dangerous (x)** $\geq$ **STAND (dangerous):** $<e^a, t^a>$
$<e^a>$ $\bullet$
      kaette (λ**x. dangerous (x)** $\geq$ **STAND (dangerous)):** $<e^a, t^c>$
      =>λ**x. GEN [s,x;] (in (x,s); safe (x)** $\geq$ **STAND (safe) in s)**
    kaette: λ**x. dangerous (x)** $\geq$ **STAND (dangerous):**$<e^a, t^a>$
  $<<e^a, t^a>, <e^a, t^c>>$
               Deg   A
               Pos   abunai 'dangerous'
  $\lambda g \in D <e^a, d^a> \lambda x.\ g(x) \geq$ STAND (g): $\lambda x.$ dangerous(x): $<e^a, d^a>$
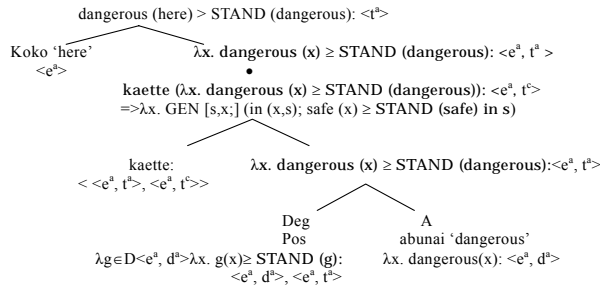 $<e^a, d^a>, <e^a, t^a>$

Figure 5

In this approach, we end up positing two kinds of *kaette* for polarity reversal.

5.3.2 Approach B: One Lexical Item for the Polarity Reversal Adverb

There is an alternative approach to the logic of PR that posits only one lexical entry for the PR use of *kaette*. In this approach, the PR use of *kaette* is directly combined with a gradable predicate. Since *kaette* is placed below

the degree morpheme (i.e. MORE or Pos), we do not need to posit two kinds of lexical items depending on the environment in which it appears. (25) shows the denotation of the polarity reversal use of *kaette*:

(25) Lexical entry of *kaette* in polarity reversal
⟦kaette$_3$⟧ = the function from $<<e^a, d^a>>$ to $<e^a, d^c>>$ iff in the environment ⟦kaette$_2$⟧ ($\lambda z. A^{+(-)}(z)$), it conventionally implies 'λz. GEN [s, z;] (in (z, s); $A^{-(+)}(z)$) in s.'

(25) can be used both for examples of comparatives and for adjectival sentences. For example, Figure 6 shows the logical structure of the PR of (17):
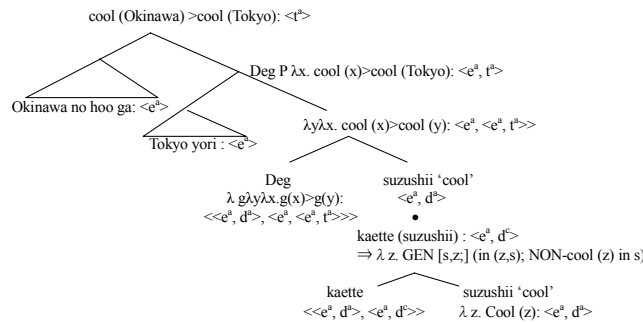

Figure 6

This approach seems to be more economical than Approach A, because there is only one lexical entry for the polarity reversal use of *kaette*. However, there is a problem with Approach B: the CI meaning is not relational. The polarity reversal CI meaning in (17) must be 'generally, it is hotter in Okinawa than in Tokyo.' However, since the null comparative morpheme cannot take type $<e^a, d^c>$, it is impossible to derive the CI meaning, which has a comparative meaning. Approach A does not have a problem in this respect, because *kaette* is placed above the degree morpheme. Although Approach A may not be economical, I consider it preferable.

6. Degree of reversibility in individual reversal

Finally, let us consider the degree of reversibility. As Watanabe (1987, 2002) argues, *yoppodo* is used when a speaker wants to object to a previously established judgment.[13] *Kaette* can also be used in this manner, but the illocutionary force of the objection is not as strong as that expressed by *yoppodo*. I propose that there are degrees of reversibility in target-standard

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[13] More specifically, Watanabe argues that the speaker uses '*yoppodo* (x is A-er than y)' in order to object to the previous judgment that 'y is A' or that 'y is A-er than x.'

reversal. Specifically, *yoppodo* is a 'strong reversal' adverb, while *kaette* is a 'weak reversal' adverb:

(26) Degree of reversibility (in IR): Strong reversal > Weak reversal
              yoppodo   *kaette*

It may be possible to formalize the degree of reversibility depending on how the speaker positively or negatively construes the previously established judgment (Potts 2007). The preceding discussion suggests that there are two kinds of parameters for the scalar reversal adverbs: mode of scalar reversal and degree of reversibility.[14]

7. Conclusion

This paper investigated the conventional implicature (CI) and scalar properties of the Japanese adverbs *yoppodo* and *kaette* and clarified the modes of 'reversal' from the standpoint of the semantics-pragmatics interface.

I argued that the 'at issue' entailment of a sentence using *kaette/yoppodo* is true only in a particular context. As for scalar reversibility, I proposed that there are two modes of scalar reversal: 'individual' reversal and 'polar' reversal. *Kaette* has both modes, but *yoppodo* has only one mode: 'individual' reversal. I provided formal accounts for each mode of scalar reversal using Potts' theory of CI. Finally, I argued that there are degrees of individual reversibility: *kaette* is a 'weak' reversal adverb, while *yoppodo* is a 'strong' reversal adverb. I hope this paper will contribute to the study of the interface between semantics and pragmatics.

In a future study, I would like to pursue a more refined explanation for the logic of scalar reversal CI. I would also like to investigate scalar reversal CIs from a cross-linguistic perspective.

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14 There is one more reversal adverb in Japanese: *mushiro*. *Mushiro* is just like *kaette* in that it has two modes of reversal, 'individual reversal' and 'polarity reversal', and is a weak reversal adverb in terms of the degree of reversibility. However, *mushiro* can also co-occur with 'metalinguistic' comparison:
(i) Taro-wa   sensei-to iu-yori   {mushiro/*kaette/*yoppodo}   gakusya-da.
    Taro-TOP teacher-as say-than   METALINGUISTIC ADVERB scholar-PRED
    'Taro is more a scholar than a teacher.'
There is no reversal implicature in (i). Even if we delete *mushiro*, the meaning does not change. I therefore regard *mushiro* in (i) as a different kind of adverb: a metalinguistic adverb.

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