Decomposing the Japanese Deontic Modal *hoo ga ii*

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1 Introduction

It is well known that modals in English have unspecified modal flavors but specified modal forces. The English modal *must*, for instance, has the unspecified modal flavors (deontic or epistemic) but has the specified modal force (universal):

(1) a. All Maori children must learn the names of their ancestors.
(Deontic / ∀)

b. The ancestors of the Maoris must have arrived from Tahiti.
(Epistemic / ∀)
(Kratzer 1977: 338)

Based on these observations, Kratzer (1977, 1981) makes the following proposals:

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(2) a. Modals have specified modal forces, but they are sensitive to two components, a modal base and an ordering source.

b. Their unspecified modal flavors are ascribed to the differences of these two components.

Rullmann et al. (2008), however, point out that in St’át’imcets (Lillooet Salish), modals have specified modal flavors but unspecified modal forces. The modal *k’a*, as shown below, has the specified modal flavor (epistemic) but the unspecified modal forces (∃ or ∀):

(3) The Epistemic Modal *k’a*
t’cum k’a kw s-John
win(MID) INFER DET NOM-John
‘John must / may have won.’ (Rullmann et al. 2008: 339)

To capture the varying modal forces, Rullmann et al. (2008) propose the semantics of this modal as in (4):

(4) $[\![k'a]\!]^{c,w}$ is only defined if c provides an epistemic modal base B.
$[\![k'a]\!]^{c,w} = \lambda f_{\langle st,\, st\rangle}.\lambda p_{\langle st,\, st\rangle}.\forall w'[\, w' \in f(\mathrm{B}(w)) \rightarrow p(w')\,]$
(Rullmann et al. 2008: 340)

The modal specifies its modal base but its modal force depends on how many accessible worlds the choice function f selects. If the choice function selects the set of all the accessible worlds, the modal force is equivalent to the English strong modal (=∀). If the choice function selects a subset of them, the modal force is equivalent to the English weak modal (=∃). In this way, Rullmann et al.’s (2008) analysis can capture the variable quantificational force of this modal.

With the typological differences in mind, let us turn to modals in Japanese, which behave in a different way from those in English and St’át’imcets. As Kaufmann and Tamura (2020) point out, Japanese modals in general have specified modal forces and flavors:

(5) a. *-ni tigai na-i*
Kare-wa sake-o nomu-ni tigai na-i.
he-TOP sake-ACC drink-DAT mistake NEG-NPAST
‘He must drink alcohol.’ (Epistemic / ∀)

b. *-nakere-ba nara-na-i*
Kare-wa sake-o noma-nakere-ba nara-na-i.
He-TOP sake-ACC drink-NEG-COND become-NEG-NPAST
‘He must drink alcohol.’ (Deontic / ∀)

c. *kamosirena-i*
Kare-wa sake-o nomu kamosirena-i.
he-TOP alcohol-ACC drink.NPST may-NPST
‘He may drink alcohol.’ (Epistemic / ∃)

d. *-te mo ii*
Kare-wa sake-o non-de mo ii.
he-TOP sake-ACC drink-GER also good
‘He may drink alcohol.’ (Deontic / ∃)

For example, the Japanese modal *-ni tigai na-i* in (5a), which is roughly translated as the epistemic *must*, has the universal modal force and the epistemic flavor. Among Japanese modals, we focus on the deontic modal *hoo ga ii*:

(6) Kimi-wa basu-de iku hoo ga ii.
you-TOP bus-by go *hoo* NOM good
‘It is better for you to go by bus. / You should go by bus.’

According to Narrog (2009: 86), *hoo ga ii* is a deontic modal, and expresses that “a certain state-of-affairs is more desirable than another one.”

The question is how we analyze this modal. Given the general characteristics of Japanese modals, it seems that Rullmann et al.’s (2008) strategy can be extended to *hoo ga ii*: This modal specifies not only its modal flavor, as in modals of St’át’imcets, but also its modal force. There is, however, an important characteristic of Japanese modals. Unlike modals in English and St’át’imcets, they are not single lexical items but complex expressions. In fact, the sequence *hoo ga ii* can be separated by an adverb such as *zettaini* ‘definitely’:

(7) Kimi-wa basu-de iku hoo ga zettaini ii.
you-TOP bus-by go *hoo* NOM definitely good
‘It is definitely better for you to go by bus.’

Thus, we take a different route from Rullmann et al.’s (2008) analysis. We decompose the Japanese deontic modal *hoo ga ii* into its parts, *hoo*, *ga* and *ii*, and derive its meaning based on these parts. This is the central aim of this paper.

The structure of this paper is as follows. In section 2, we introduce the assumptions of these parts and demonstrate that the correct truth conditions can be derived based on them. In section 3, we first point out that the particle *ga* cannot be replaced by other particles in *hoo ga ii* and explain why these combinations are impossible. Section 4 concludes this paper.

2 Proposal: Decomposing *hoo ga ii*

We propose that the deontic modal *hoo ga ii* should be decomposed into three parts, *hoo*, *ga*, and *ii*. In what follows, we will show that the reasonable assumptions of these parts and combinations thereof lead to the appropriate meaning of this modal.

2.1 The semantics of *ii* 'good'

Let us start with the gradable adjective *ii* 'good'. We adopt the measure function analysis of gradable adjectives (Kennedy 2007b), according to which they denote a measure function that takes an individual as its argument and returns a degree on a relevant scale. Take, for example, the gradable adjective *tall*, which is associated with the height scale, as shown below:

(8) $[\![\textit{tall}]\!] = \lambda x.\lambda w.\ \text{height}(x)(w)$ $\langle e, sd \rangle$

Suppose that John is 180cm tall in the actual world $w_@$. In that case, *tall* takes *John* and $w_@$, and returns the degree *180 cm* (i.e. $[\![\textit{tall}]\!](\textit{John})(w_@) = 180\text{cm}$).

Gradable adjectives, however, cannot directly combine with subject arguments, because that leads to wrong truth conditions for sentences with the unmodified, positive form of them (e.g. *John is tall*). To remedy this problem, we need the covert degree morpheme *pos*, which introduces the standards for them (see Cresswell 1976):

(9) $[\![\textit{pos}]\!] = \lambda P_{\langle e,\, sd \rangle}.\lambda x.\lambda w.P(x)(w) \geq \text{STANDARD}(P)(C)$

In (9), the function STANDARD takes a gradable adjective P and a comparison class C (objects of comparison) and returns the standard for P based on C. As shown below, this null degree morpheme enables us to derive the correct truth conditions:

(10) a. John is tall.

b. $[\![\textit{pos tall}]\!]$
$= \lambda x.\lambda w.\text{height}(x)(w) \geq \text{STANDARD}(\text{tall})(C)$

c. $[\![\textit{John is pos tall}]\!]$
$= [\![\textit{pos}]\!]([\![\textit{tall}]\!])([\![\textit{John}]\!])$
$= \lambda w.\text{height}(\text{John})(w) \geq \text{STANDARD}(\text{tall})(C)$

According to the above truth conditions, (10a) is true in a world w iff the degree of the height of John in w is greater than or equal to the standard for tallness based on C.

We apply the measure function analysis to the predicate *ii* ‘good’. In the case of *hoo ga ii*, however, this adjective combines with not individuals but propositions. Hence, we modify the semantics as follows:

(11) $[\![ii]\!] = \lambda p_{\langle s,\, t\rangle}.\ \lambda w.\textsc{goodness}(p)(w)$ $\langle st, sd\rangle$

(11) says that the gradable adjective *ii* is a measure function that takes a proposition p and a world w, and returns the degree of the goodness of p in w. Accordingly, we also modify the semantics of *pos* as follows:

(12) $[\![pos]\!] = \lambda P_{\langle st,\, sd\rangle}.\lambda p.\lambda w.\ P(p)(w) \geq \textsc{standard}(P)(C)$
$\langle\langle st, sd\rangle, \langle st, st\rangle\rangle$

This null morpheme combines with the gradable adjective *ii* and returns the predicate of propositions, whose degree of goodness is greater than or equal to the standard for goodness based on C:

(13) $[\![pos\ ii]\!] = \lambda p.\lambda w.\ \textsc{goodness}(p)(w) \geq \textsc{standard}(\text{good})(C)$ $\langle st, st\rangle$

2.2 The morpheme *hoo*

Now let us move on to the morpheme *hoo*, which is basically used with comparative sentences:

(14) John-no-hoo-ga Mary-yori se-ga takai.
John-GEN-*hoo*-NOM Mary-than height-NOM high
‘John is taller than Mary.’ (Matsui and Kubota 2012: 6)

Matsui and Kubota (2012) point out that the comparative with *hoo* needs a special context:

(15) a. Q1: Which is taller, John or Mary?
John-no-hoo-ga Mary-yori se-ga takai.

b. Q2: Is John tall?
#John-no-hoo-ga Mary-yori se-ga takai.

c. Q3: How tall is John?
#John-no-hoo-ga Mary-yori se-ga takai.
(Matsui and Kubota 2012: 6)

As shown above, the comparative with *hoo* can be used only when two contextually salient individuals (here, *John* and *Mary*) are contrasted, as in Q1. In addition, these individuals are identical to the comparison class, or the objects

of comparison (in the above example, *John* is compared with *Mary*). Based on these observations, Matsui and Kubota (2012) propose the following semantics of *hoo*:

(16) $[\![hoo]\!] = \lambda x\colon x \in C \wedge |\ C\ | = 2.\ x$, where C is the contrastive alternative set (Matsui and Kubota 2012)

The above semantics says that the morpheme *hoo* takes an individual x and introduces the two presuppositions: (i) x is a member of the contrastive alternative set C and (ii) the cardinality of C is two. Note that the contrastive alternative set and the comparison class are the same by default.

However, the above analysis cannot be applied to *hoo ga ii*, since the morpheme *hoo* in this case is combined with a proposition. For this reason, we modify the above semantics as follows:[1]

(17) $[\![hoo]\!] = \lambda p_{\langle s,\, t\rangle}.\lambda w.\ \partial(p \in C \wedge |C| = 2) \wedge p(w)$ $\langle st, st\rangle$

According to the revised semantics, *hoo* is an identity function and it introduces the presuppositions that the proposition p is a member of the contrastive alternative set C and its cardinality is two.

2.3 The particle *ga*

It is well known that the particle *ga* has at least two readings: neutral descriptions and exhaustive interpretations. As pointed out by Kuno (1973), among others, the particle *ga* tends to have the exhaustive interpretation when it is used with a stative predicate:

(18) a. Non-stative Predicate
Taro-ga ki-ta.
Taro-NOM come-PAST
'Taro came. / Only Taro came.'
(Neutral Description / Exhaustive Interpretation)

b. Stative Predicate
Taro-ga genki-da
Taro-NOM fine-COP
'$^{??}$Taro is fine. / Only Taro is fine.'
($^{??}$Neutral Description / Exhaustive Interpretation)

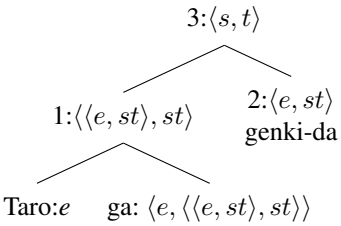
1. We adopt the ∂-operator from Beaver (2001): The materials inside this operator designate presuppositions.

The particle *ga* in *hoo ga ii* is used with the stative predicate *ii* 'good'. Hence, we assume that the particle *ga* encodes exhaustivity and has a semantics akin to *only* except that the truth of the prejacent is not presupposed but asserted:

(19) $[\![ga]\!] = \lambda x.\lambda P_{\langle e,\, st\rangle}.\lambda w.P(x)(w)$
$\wedge\, \forall y\, [\, y \in \text{ALT}_C(y) \wedge y \neq x \rightarrow \neg P(y)(w)]$

The following is a sample derivation for *Taro-ga genki-da* 'Taro is happy':

(20) a.



b. $[\![1]\!]$
$= [\![ga]\!]([\![Taro]\!])$
$= \lambda P.\lambda w.P(\text{Taro})(w) \wedge \forall y\, [\, y \in \text{ALT}_C(y)$
$\wedge\, y \neq \text{Taro} \rightarrow \neg P(y)(w)\,]$

c. $[\![2]\!]$
$= \lambda x.\lambda w.$ x is fine in w

d. $[\![3]\!]$
$= [\![1]\!]([\![2]\!])$
$= \lambda w.$ Taro is fine in $w \wedge \forall y\, [\, y \in \text{ALT}_C(y)$
$\wedge\, y \neq \text{Taro} \rightarrow y$ is not fine in $w\,]$

The particle *ga* in *hoo ga ii*, however, does not combine with an individual but a proposition. Hence, we modify the above semantics as in (21).[2]

(21) $[\![ga]\!] = \lambda p_{\langle s,\, t\rangle}.\lambda Q_{\langle st,\, st\rangle}.\lambda w.\ Q(p)(w)$
$\wedge\, \forall q[\, q \in \text{ALT}_C(p) \wedge q \neq p \rightarrow \neg Q(q)(w)]$

2.4 Deriving truth conditions

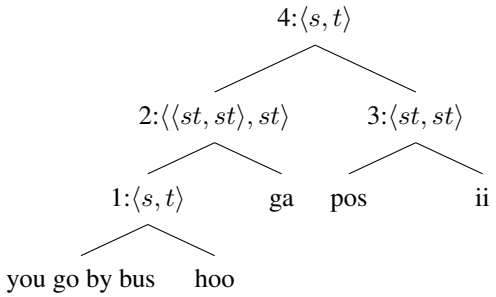
Now we are in a position to analyze *hoo ga ii*. The semantics of its parts introduced above leads to the following truth conditions:

2. The generalized, type-flexible version is below:

(i) $[\![ga]\!] = \lambda P_{\alpha}.\lambda Q_{\langle \alpha,\, st\rangle}.\lambda w.Q(P)(w) \wedge \forall R[\, R \in \text{ALT}_C(P) \wedge R \neq P \rightarrow \neg\, Q(R)(w)\,]$

(22) Kimi-wa basu-de iku hoo ga ii (=(6))

a.



b. $[\![1]\!]$
$= [\![hoo]\!]([\![you\ go\ by\ bus]\!])$
$= \lambda w.\partial$(you-go-by-bus $\in C \wedge \mid C \mid = 2) \wedge$ you go by bus in w

c. $[\![2]\!]$
$= [\![ga]\!]([\![1]\!])$
$= \lambda Q.\lambda w.\ \partial$(you-go-by-bus $\in C \wedge \mid C \mid = 2) \wedge Q(\lambda$w. you go by bus in $w)(w) \wedge \forall q[\ q \in \text{ALT}_C$(you-go-by-bus) $\wedge\ q \neq p \rightarrow \neg\ Q(\lambda$w. you go by bus in $w)(w)\ ]$

d. $[\![3]\!]$
$= [\![pos]\!]([\![ii]\!])$
$= \lambda p.\lambda w.$ GOODNESS$(p)(w) \geq$ STANDARD$(good)(C)$

e. $[\![4]\!]$
$= [\![2]\!]([\![3]\!])$
$= \lambda w.\ \partial$(you-go-by-bus $\in C \wedge \mid C \mid = 2)$ (=(i))
$\wedge$ GOODNESS(you-go-by-bus)$(w) \geq$ STANDARD$(good)(C)$ (=(ii))
$\wedge \forall q[\ q \in \text{ALT}_C$(you-go-by-bus) $\wedge\ q \neq$ you-go-by-bus
$\rightarrow$ GOODNESS$(q)(w) <$ STANDARD$(good)(C)]$ (=(iii))

f. Truth Conditions
(6) is defined only when the proposition *you go by bus* is a member of the contrastive alternative set C and the cardinality of C is two. (=(i)) If defined, (6) is true in a world w iff the degree of the goodness of the proposition *you go by bus* in w is greater than or equal to the standard for the goodness based on C, (=(ii)) and for every proposition q, if q is a member of C and q is not equal to the proposition *you go by bus*, then the degree of the goodness of q in w is smaller than the standard for goodness based on C (=(iii)).

The above truth conditions are equivalent to saying that the prejacent p (=*you go by bus*) is good and its alternative q is not good, resulting in the interpreta-

tion that it is better for you to go by bus. This in turn means that the prejacent *you go by bus* is more desirable than the alternative. Hence, our analysis successfully captures the intuitive meaning of *hoo ga ii* based on the semantics of its parts.

Here is a summary of our claim. The morpheme *hoo* ensures that the members of the contrastive alternative set C are the prejacent p and its alternative q. The standard for goodness is calculated based on the comparison class, which is identical to the contrastive alternative set C. The particle *ga* asserts that the degree of the goodness of the prejacent p is greater than or equal to the standard based on C (i.e. p is good) and the degree of the goodness of its alternative q is smaller than the standard based on C (i.e. q is not good). In other words, p is better than q. This captures the intuitive meaning of *hoo ga ii*, "a certain state-of-affairs is more desirable than another one" (Narrog 2009: 86). Thus, we can derive the deontic meaning of *hoo ga ii* from the semantics of its parts and clarify why this modal has such a meaning.

2.5 Predictions

Before closing this section, let us consider the predictions of our analysis. As noted above, the existence of *hoo* requires that two propositions, the prejacent and its alternative, should be taken into account in using *hoo ga ii*. This in turn predicts that in a context where more than two propositions are at issue, we cannot use *hoo ga ii*. As the examples below indicate, this prediction is borne out:[3]

(23) a. Context 1: We have **two** options to go to the stadium: by bus and by train. We are discussing which option to choose:
Kimi-wa Basu-de iku hoo ga ii. (=(6))

b. Context 2: We have **three** options to go to the stadium: by bus, by train, and on foot. We are discussing which option to choose:
#Kimi-wa Basu-de iku hoo ga ii. (=(6))

In Context 1, we are considering two propositions, *you go by bus* and *you go by train*, which satisfies the presupposition induced by *hoo*. In Context 2, on the other hand, another proposition, *you go on foot*, is taken into account, which violates the presupposition. Thus, the infelicity arises.

The presupposition leads to another prediction. The existence of *hoo* requires that one alternative proposition should exist. This predicts that when the prejacent denotes a trivial proposition, the use of this modal is infelicitous, because we cannot imagine its alternative proposition. The following example is a case in point:

3. Some speakers may think that (23b) is not infelicitous. In that case, we speculate that they group two alternatives as one, and the presuppositions induced by *hoo* are satisfied.

(24) #Tikyuu-wa marui hoo ga ii.
the.earth-TOP round *hoo* NOM good
'It is better for the earth to be round.'

In the above example, we have to consider the alternative to *the earth is round*, such as *the earth is square*, *the earth is flat*, and so on. However, these alternatives, given our world knowledge, cannot be true, and we cannot evoke an appropriate alternative. Hence, the above example cannot satisfy the presupposition of *hoo*, resulting in its infelicity.

3 Composition with other focus particles

As shown in the above discussion, the particle *ga* encodes a meaning similar to the focus particle *only*. This raises the question of whether other focus particles can be used with *hoo* and *ii* and the resulting phrases can express modal meanings. In fact, as Kaufmann and Tamura (2020) point out, other Japanese deontic modals tend to utilize focus particles and the gradable adjective *ii*:

(25) a. Kare-wa sake-o non-de mo ii.
he-TOP sake-ACC drink-GER also good
'He may drink alcohol.' (Deontic / ∃)

b. Kare-wa sake-o non-de wa ike-nai.
he-TOP alcohol-ACC drink-GER CT bad
'He must not drink alcohol.' (Deontic / ∀)

In the above examples, the focus particles *mo* (= also) and *wa* (= contrastive topic) are used with *ii* and the resulting combinations express deontic meanings. The following examples, however, indicate that these focus particles cannot replace *ga* in *hoo ga ii*:

(26) a. The Focus Particle *mo*
#Kimi-wa basu-de iku hoo mo ii.
you-TOP bus-by go *hoo* also good

b. The Focus Particle *wa*
#Kimi-wa basu-de iku hoo wa ii.
you-TOP bus-by go *hoo* CT good

In what follows, we will explain why the above combinations are impossible.

3.1 The general constraint on the stanards for gradable adjectives

To rule out the illicit combinations, the general constraint on the standards for gradable adjectives plays a crucial role:

(27) The General Constraint on the Standards for Gradable Adjectives
The standard of comparison should partition the adjective's domain into two non-empty extensions, positive and negative extensions.
(see Klein 1980; Kennedy 2007a; Sawada 2009)

Let us illustrate how this constraint works by using Figure 1:

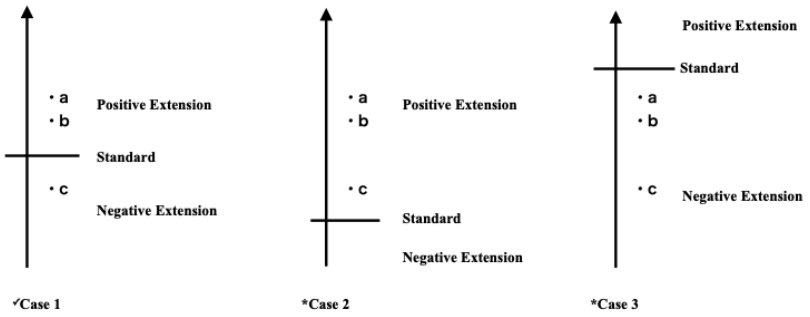


FIGURE 1

In Figure 1, the comparison class C consists of the three members a, b, and c ($C = \{ a, b, c \}$). In Case 1, the positive extension includes a and b and the negative extension includes c. Hence, the standard in this case properly partitions the comparison class into two non-empty sets and satisfies the general constraint above. In Cases 2 and 3, on the other hand, either the positive extension or the negative extension is empty, and the standards in these cases violate the general constraint. As is clear from this, the general constraint on the standard of comparison restricts how the standard is chosen.

In the case of *ga*, the semantic contribution of this particle and the general constraint above are compatible with each other:

(28) Kimi-wa bas-de iku hoo ga ii (=6)
$[\![(6)]\!]$
$= \lambda w.\ \partial(\text{you-go-by-bus} \in C \wedge | C | = 2)$
$\wedge\ \text{GOODNESS}(\text{you-go-by-bus})(w) \geq \text{STANDARD}(\textit{good})(C)$
$\wedge\ \forall q[\ q \in \text{ALT}_C(\text{you-go-by-bus})$
$\wedge\ q \neq \textit{you-go-by-bus} \rightarrow \text{GOODNESS}(q)(w) < \text{STANDARD}(\textit{good})(C)\ ]$

In this example, the standard of comparison is calculated based on the comparison class C, which consists of p (= the prejacent) and q (= its alternative). The general constraint on the standard of comparison requires that p should

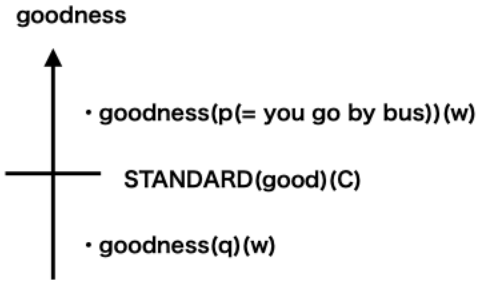


FIGURE 2

be good and q should not be good. In the case of *ga*, this constraint is satisfied, since its exhaustive meaning ensures that p is good and q is not good, as shown in Figure 2. Hence, the general constraint on the standard of comparison does not lead to any problem. Below, we demonstrate that this constraint is incompatible with the meanings induced by *mo* and *wa*.

3.2 Composing with *mo* or *wa*

Let us first consider the case with *mo* 'also'. As shown in (29), the contribution of this particle is to add the presupposition that at least one alternative is true:

(29) The Semantics of *mo* 'also'
$[\![mo]\!] = \lambda p_{\langle s,t\rangle}.\lambda Q_{\langle st,st\rangle}.\lambda w.\ \partial(\ \exists q[\ q \in \text{ALT}_C(p) \wedge q \neq p \wedge Q(q)(w)])$
$\wedge\ Q(p)(w)$

This is in conflict with the general constraint on the standard of comparison:

(30) #Kimi-wa basu-de iku hoo mo ii
$[\![(26a)]\!] = \lambda w.\partial\ (\textit{you-go-by-bus} \in C \wedge |C| = 2 \wedge \exists q[\ q \in \text{ALT}_C \wedge$
$q \neq \textit{you-go-by-bus} \wedge \text{GOODNESS}(q)(w) \geq \text{STANDARD}(\text{good})(C)) \wedge$
$\text{GOODNESS}(\textit{you-go-by-bus})(w) \geq \text{STANDARD}(\text{good})(C)$

The morpheme *hoo* ensures that the standard of comparison is calculated based on the contrastive comparison class C, which consists of p (= the prejacent) and q (= its alternative). The general constraint on the standard of comparison requires that p should be good and q should not be good. However, the insertion of *mo*, which encodes an additive meaning as in (29), requires that q is also good (see Figure 3). These two requirements cannot be compatible, thus leading to the infelicity.

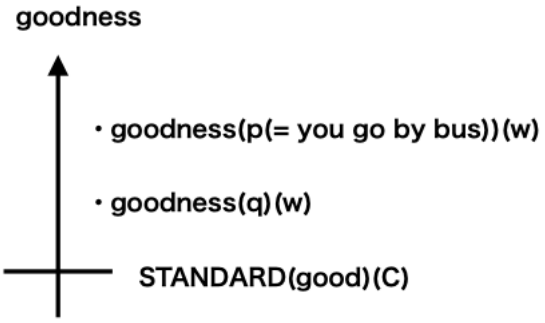


FIGURE 3

The general constraint on the standard of comparison is also incompatible with the semantic contribution of the focus particle *wa*. According to Hara (2006), the contrastive topic marker *wa* implicates that the stronger alternative can be false:

(31) Let *w* be a world variable, *sp* the speaker, F the focus-marked elements, B the background, R: restriction.
CON(*w*)(*sp*)(B(F))

a. asserts: B(F)(*w*)

b. presuppose: $\exists F'[\ [F' \in R\ ]\ \&\ [B(F') \Rightarrow B(F)]\ \&\ [B(F) \not\Rightarrow B(F')]]$
(There exists B(F′)) which is stronger than B(F))

c. implicates:$\exists w'[\ w' \in Dox_{sp}(w)][B(F')(w') = 0]$ $(=\Diamond\neg(B(F')))$

(Hara 2006: 29)

The insertion of *wa* is problematic, because this particle induces uncertainty implicatures: The speaker is uncertain about whether the alternative *q* is good or not. However, the general constraint on the standard of comparison requires that *p* should be good and *q* should not be good. These are in conflict, resulting in its infelicity.

4 Conclusion

In this paper, we decompose the Japanese deontic modal *hoo ga ii* into its parts and demonstrate that its intuitive meaning can be derived based on the semantics of its parts. In addition, we clarify why *ga* cannot be replaced by *mo* or *wa* in *hoo ga ii*. If we extend this strategy to other modals in Japanese such as *-te mo ii* 'may', *-te wa ikenai* 'must not', and so on, it enables us to grasp what are possible building blocks of modal meanings and the combinations thereof.

Our approach also poses an interesting question about the relative strength of Japanese deontic modals. In our analysis, they do not lexically specify their modal forces as in English. Hence, we need another way to determine their relative strength. As noted above, they tend to utilize the gradable adjective *ii* and focus particles. Our speculation is that their relative strength is determined by the interaction of alternatives (or comparison classes) with the meanings induced by their focus particles (e.g. additivity or exhaustivity). We hope that our future research leads to further understanding of typological differences of modals and semantic universal (von Fintel and Matthewson 2008).

References

Beaver, D. I. 2001. *Presupposition and Assertion in Dynamic Semantics*. Stanford, CA: CSLI Publications.

Cresswell, M. J. 1976. The semantics of degree. *Montague Grammar*, ed. P. Barbara, 261–92. New York: Academic Press.

von Fintel, K. and L. Matthewson. 2008. Universals in semantics. *The Linguistic Review* 25(1-2): 139–201.

Hara, Y. 2006. *Grammar of Knowledge Representation: Japanese Discourse Items at Interfaces*. Doctoral Dissertation, University of Delaware.

Kaufmann, M, and S. Tamura. 2020. Japanese modality-possibility and necessity: prioritizing, epistemic, and dynamic. *Handbook of Japanese Semantics and Pragmatics*, eds. W. M. Jacobsen and Y. Takubo, 537–85. Berlin: de Gruyter.

Kennedy, C. 2007a. Modes of comparison. *Proceedings from the Annual Meeting of the Chicago Linguistic Society* 43: 141–65.

Kennedy, C. 2007b. Vagueness and grammar: the semantics of relative and absolute gradable adjectives. *Linguistics and Philosophy* 30(1): 1–45.

Klein, E. 1980. A semantics for positive and comparative adjectives. *Linguistics and Philosophy* 4(1): 1–45.

Kratzer, A. 1977. What 'must' and 'can' must and can mean. *Linguistics and Philosophy* 1(3): 337–55.

Kratzer, A. 1981. The notional category of modality. *Words, Worlds, and Context*, eds. H. J. Eikmeyer and H. Rieser, 38–74. Berlin: de Gruyter.

Kuno, S. 1973. *The Structure of the Japanese Language*. Cambridge, MA: MIT Press.

Matsui, A. and Y. Kubota. 2012. Comparatives and contrastiveness: semantics and pragmatics of Japanese *hoo* comparatives. *Proceedings of Formal Approaches to Japanese Linguistics* 5: 126–39.

Narrog, H. 2009. *Modality in Japanese: The Layered Structure of the Clause and Hierarchies of Functional Categories*. Amsterdam: John Benjamins.

Rullmann, H., L. Matthewson and H. Davis. 2008. Modals as distributive indefinites. *Natural Language Semantics* 16(4): 317–57.

Sawada, O. 2009. Pragmatic aspects of implicit comparison: an economy-based approach. *Journal of Pragmatics* 41(6): 1079–103.