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Chapter 10
The polarity sensitivity of reactive intensifiers in Japanese and English

1 Introduction

Intensifiers are pervasive in language and play an important role in conveying information about degree. However, there are many different types of intensifiers, and their meanings and polarity sensitivities are complex.[1] Even if they appear to be the same word, they can have different meanings and distributional patterns.

For example, the Japanese intensifiers *totemo* 'very' and *zenzen* 'at all' have intensification meaning and usually (as normal intensifiers) serve as a positive polarity item (PPI) and a negative polarity item (NPI), respectively:

(1) a. *Kono hon-wa totemo* {*omosiroi* / **omosiroku-nai*}.
this book-TOP very interesting / interesting-NEG
'lit. This book is {very interesting/not very interesting}.'
b. *Okane-ga zenzen* {*nai* /**aru*}.
money-NOM at all NEG.exist /exist
'lit. I {don't have/have} money at all.'

Totemo in (1a) is a PPI because the sentence becomes unnatural if there is a negative marker *nai*. In contrast, *zenzen* in (1b) is an NPI because it cannot appear in a positive environment.

1 In the seminal work in this field, Bolinger (1972) uses the term "intensifier" for any device that scales a quality, whether up or down or somewhere between the two. He then distinguishes four classes of intensifiers according to the region of the scale that they occupy, that is, boosters (upper part of scale; e.g., *perfect*, *terribly*), compromisers (middle of the scale; e.g., *rather*, *fairly*), diminishers (lower part of the scale; e.g., *a little*) and minimizers (lower end of the scale; e.g., *a bit*, *an iota*). In this paper, I use the term "intensifier" for expressions that indicate that a target has a high degree on a scale.

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However, *totemo* and *zenzen* have discourse usages whose distributional patterns are from the opposite of those of *totemo/zenzen* in (1) in terms of polarity. *Totemo* is used in a negative environment, while *zenzen* is used in a positive environment, as shown below:

(2) A: *Asita-made.ni siage-ru koto-wa deki-masu-ka?*
tomorrow-by finish-Non.PST NMLZ-TOP can-PRED.POLITE-Q
'Can you finish it by tomorrow?'
B: *Asita-made.ni siage-ru-nado watasi-ni-wa totemo*
tomorrow-by finish-Non.PST-EVAL I-to-TOP TOTEMO
deki-masen.
can-NEG.POLITE
'Finishing it by tomorrow is impossible.'
(Implication: I am emphasizing the impossibility.)

(3) A: *Kaoiro warui-kedo daijoobu-desu-ka?*
face.color bad-but OK-PRED.POLITE-Q
'You look pale. Are you OK?'
B: *Zenzen daijoobu-desu.*
ZENZEN OK-PRED.POLITE
'I am *zenzen* OK.'

The crucial point is that *totemo* in (2) and *zenzen* in (3) are used in a reactive fashion. Building on the discussions of *totemo* and *zenzen* in Sawada (2017, 2019) and related studies, I will argue in Sections 2 and 3 that although both the regular non-reactive uses and reactive uses share the same scalar meaning, their distribution patterns are quite different and we need to posit the discourse sensitivity to explain the distributions. That is, reactive *totemo* (=2B) intensifies the degree of impossibility of a given proposition *p* in the context where *p* is expected; in addition, the reactive *zenzen* (=3B) appears in a positive environment and intensifies the degree of gradable predicate *P* in situations where *P* is not expected to be true with respect to the individual in question.

I will propose that there is a polarity item – a reactive polarity item in natural language – whose meanings and uses are different from ordinary polarity items.

I provide a concise definition by descriptively defining the term reactive polarity item as follows:[2,3]

(4) Definition of reactive polarity item (descriptive): A reactive polarity item is an item whose meaning refers to the prior discourse or expectations of the interlocutors and whose distribution is thus constrained by the discourse.

Although it may seem that polarity items with reactive characteristics are idiosyncratic phenomena specific to Japanese *totemo* and *zenzen*, this paper argues that reactive polarity items also exist in English. In Section 4, I will show that English *possibly* has both a speaker-oriented adverb (e.g., Ernst 2009) and an intensifier use (Greenbaum 1969), and the former behaves as a regular PPI, while the latter behaves as a reactive NPI:

(5) a. *Possibly, I can't do that.* (PPI)
b. *I can't possibly do that.* (NPI)

It has been argued that the intensifier use of *can't possibly* is an instance of modal concord (e.g., Anand and Brasoveanu 2010; Huitink 2012). Following Grosz (2010), I will argue that modal concord is a phenomenon of degree modification; I will argue that *possibly* is an expressive NPI intensifier, which intensifies the degree of *can't* under the situation where the at-issue proposition *p* (without a negative modal) is expected, similar to the case of the Japanese reactive NPI *totemo*.

In Section 5, I will also show that the English *totally* displays a similar phenomenon. There are two uses of *totally*: the semantic and pragmatic uses (Irwin 2014; Beltrama 2018). The semantic *totally* is neutral in terms of polarity in that it can appear both in the positive and negative environments, while pragmatic *totally* is a PPI; when it receives a pitch accent, it is used in a reactive fashion (Irwin 2014; Beltrama 2018):

(6) a. (Semantic *totally*)
The glass is (not) totally full.

2 I thank Stephanie Solt for the valuable comment regarding the descriptive definition.

3 Sawada (2021) introduces the notion of reactive attitudinal NPIs. He argues that it has the pragmatic function of an objection to a proposition that is salient in discourse or utterance situation. Reactive attitudinal NPIs can be considered a subtype of reactive polarity items.

b. (Pragmatic *totally*)
John: *Luke didn't get married at 25*.
Kim: *No! What are you talking about! He TOTALLY got married at 25*.
(Beltrama 2018: 31)

At the end of Section 5, I will compare pragmatic *totally* (with a pitch accent) with Japanese reactive *zenzen* and show that although they differ in terms of modification structure and distribution patterns, they are similar in terms of discourse moves.

This paper clarifies that there are discourse-sensitive polarity items whose distribution patterns are not constrained by syntactic or semantic mechanisms (e.g., Ladusaw 1980; Giannakidou 1998) but rather by expression-specific reactive functions.

2 Japanese *totemo*

In this section, we first investigate the two types of Japanese intensifier *totemo*: the ordinary semantic *totemo* and the reactive attitudinal (discourse-oriented) *totemo,* and clarify their meanings/uses and polarity sensitivity.

2.1 The ordinary intensifier *totemo* (property intensifying use)

The regular semantic *totemo* can combine with various kinds of gradable predicates to intensify their degrees at the at-issue (semantic level):

(7) a. *Kono kooen-wa totemo hiroi.*
this park-TOP very large
'This park is very large.'
b. *Kono syoosetu-wa totemo omosiroi.*
this novel-TOP very interesting
'This novel is very large.'

The meaning of ordinary *totemo* is at-issue because a denial can target the meaning triggered by the ordinary semantic *totemo*:

(8) A: *Anata-no heya totemo hiroi-desu-ne.*
you-GEN room very large-PRED.POLITE-PRT
'Your room is very large, isn't it?'
B: *Iya totemo hiroi-wake.de.wa.nai-desu.*
No very large-it.is.not.the.case.that
'No, it is not very large.'

Here B is challenging A's idea that the room is very large.

In terms of polarity sensitivity, this kind of *totemo* serves as a PPI in that it cannot appear in the corresponding negative sentence:

(9) a. **Kono kooen-wa totemo hiroku-nai.*
this park-TOP very large-NEG
'lit. This park is not very large.'
b. **Kono syoosetu-wa totemo omosiroku-nai.*
this novel-TOP very interesting-NEG
'lit. This novel is not very interesting.'

It is important to note that regular semantic *totemo* can appear in a negative sentence if there is a contrastive *wa* or if the negation is the external negation *wake.dewa.nai* 'it is not the case that' as given above:

(10) a. *Kono kooen-wa totemo hiroku-wa nai.*
this park-TOP very large-CONT NEG
'This park is not [very large]$_{CT}$.'
b. *Kono syoosetu-wa totemo omosiroku-wa nai.*
this novel-TOP very interesting-CONT NEG
'This novel is not [very interesting]$_{CT}$.'

(11) a. *Kono kooen-wa totemo horoi- wake.dewa.nai.*
this park-TOP very large-it.is.not.the.case.that
'It is not the case that this park is very large.'
b. *Kono syoosetu-wa totemo omosiroi-wake.dewa.nai.*
this novel-TOP very interesting-it.is.not.the.case.that
'It is not the case that this novel is very interesting.'

This tendency is generally observed among PPIs. As Szabolcsi (2004) observes, some PPI can occur within the immediate scope of clausemate negation if the latter is construed as an emphatic denial:

(12) *He found something.*
Wrong! He DIDn't / DID NOT find something. (√*not* > *some*)
(Szabolcsi 2004: 413)

As Szabolcsi also mentions, emphatic denial in (12) can be analyzed as metalinguistic negation (e.g., Horn 1989) in that the speaker is correcting an (existing) assumption. This is also true for (10) and (11) in Japanese. For example, sentences (10a) and (11a) are natural in a situation where someone says that the park is very large and the speaker is negating/correcting the person's description that it is very large.

Let us now analyze the meaning of semantic *totemo* formally based on example (7a). I assume that semantic *totemo* has the following meaning (As for type, *e* is the type of entity, *t* is the type of truth value, *i* is the type of time, *s* is the type of world, G^a is an abbreviation for type $\langle d^a,\langle e^a,\langle i^a,\langle s^a,t^a\rangle\rangle\rangle\rangle$, and *d* is a type for degree. The superscript *a* stands for an at-issue type. This type is used to calculate an at-issue meaning, and as we will see below, it is distinct from the type for conventional implicature):

(13) (Semantic *totemo*)
a. $[\![\text{totemo}_{\text{SEM}}]\!]$: $\langle G^a,\langle e^a,\langle i^a,\langle s^a, t^a\rangle\rangle\rangle\rangle$
$= \lambda G\lambda x\lambda t\lambda w.\exists d[d>!!\text{STAND}_G \wedge G(d)(x)(t)(w)]$
b. The function of $totemo_{\text{SEM}}$: emphasis

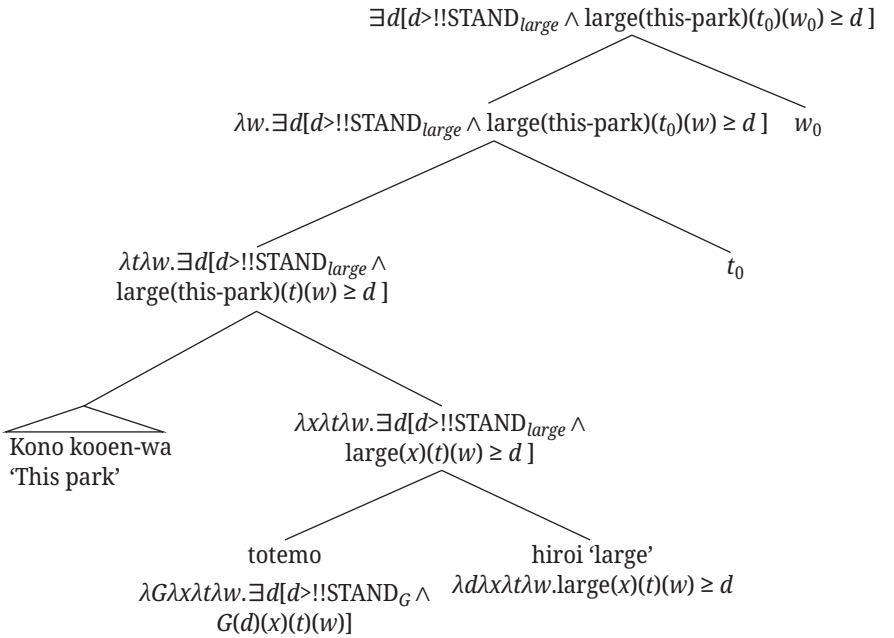
The semantic *totemo* denotes that the degree of target *x*, with respect to the scale associated with *G*, is much greater than a standard at *t* in *w*. ">!!STAND" means "much greater than a standard" (Kennedy and McNally 2005). Note that in this paper, I assume that semantic *totemo* lexically specifies that it has a function of emphasis. This explains why negation does not appear. If *totemo* co-occurs with negation, the sentence becomes unemphatic, with mismatch between *totemo*'s function and the entire sentence. This is different from the NPIs *amari* 'all that' and *sonnani* 'all that', which have a high scalar meaning (just like semantic *totemo*), but are used in the negation context and have the pragmatic function of attenuation/understating in the sense of Israel (1996, 2004).

Compositionally, semantic *totemo* combines with a regular gradable predicate. Regarding the meaning of this gradable predicate, I posit that it represents the relationships between individuals and degrees (e.g., Kennedy and McNally 2005):

(14) $[\![\text{hiroi}]\!]$: $\langle d^a,\langle e^a,\langle i^a,\langle s^a,t^a\rangle\rangle\rangle\rangle$
$= \lambda d\lambda x\lambda t\lambda w.\text{large}(x)(t)(w) \geq d$

In this approach, we can analyze the meaning of (7a) as follows:

(15) Logical structure of (7a)



Regarding tense and world, in this paper I will treat them as pronouns on par with individuals (Hacquard 2006; Percus 2000).

2.2 The expressive property of the reactive negative *totemo*

Let us now focus on reactive negative *totemo,* which is fundamentally different from the regular intensifier *totemo* in that it must co-occur with a negative modal:

(16) *Sonna koto-wa boku-ni-wa totemo {deki-nai/*deki-ru}.*
such thing-TOP I-to-TOP TOTEMO can-NEG/ can-Non.PST
At-issue: I cannot do that.
CI: I am emphasizing the impossibility.

In terms of meaning, Sawada (2019) claims that reactive negative *totemo* is an expressive that intensifies a degree at the level of conventional implicature (CI).[4] In Gricean pragmatics, CIs are considered a part of the meanings of words, but they are independent of "what is said" (e.g., Grice 1975; Potts 2005, 2007; Horn 2007; McCready 2010; Sawada 2010, 2018a; Gutzmann 2011). Furthermore, CI expressions are speaker-oriented by default (Potts 2007).[5] Typical examples of CIs are expressives as in (17):

(17) a. *That bastard Kresge is famous.*
(Expressive/CI: Kresge is bad, in the speaker's opinion.)
b. *Arthur has lost the blasted key.* (Cruse 1986)
c. *Ouch, I've hit my thumb!* (Kaplan 1999)
d. *It's hot, man.* (McCready 2009)

For instance, the expression *that bastard* in (17a) conveys that the speaker has a negative attitude toward Kresge. This has the property of a CI. This idea is corroborated by the fact that denial cannot target the CI meaning of 'bastard' (see Potts 2005, 2007):

(18) A: *That bastard Kresge is famous.*
At-issue: Kresge is famous.
CI: Kresge is bad, in the speaker's opinion.
B: *No, that's not true!*

(18B) is only denying the at-issue part of (18A).

Furthermore, the fact that *damn* can never be within the scope of logical operators like negation, modal, or conditionals also supports the idea that its meaning is a CI (Potts 2005). For example, the following sentence cannot be read as negating the speaker's disapproval of Sheila's dog:

4 Historically, as many dictionaries state, *totemo* had a concessive meaning such as 'in any case/however you do it', and the adjective/property modifying *totemo* emerged later. Some dictionaries state that the negative reactive *totemo* has a concessive meaning 'in any case/under any circumstance', but Sawada (2018b) claimed that at least in Modern Japanese, negative *totemo* is also a degree intensifier.

5 In the literature, it has been observed that CI expressions can have a non-speaker-oriented interpretation when they are embedded under attitude predicates or intensional operators (see, e.g., Wang et al. 2005; Karttunen and Zaenen 2005; Amaral et al. 2007; Potts 2007; Harris and Potts 2009; Sawada 2018a and references therein).

(19) *It's just not true that Sheila's damn dog is on the couch!*

(Potts 2005: 159)

This simply negates the at-issue part of the sentence; that is, Sheila's dog is on the couch. We can say that negative *totemo* also has the property of a CI. There is considerable evidence to support this idea. First, similar to the case of *damn*, denial cannot target the CI part of *totemo*.

(20) A: *Konnna muzukasii mondai boku-ra-ni-wa totemo*
such difficult problem I-PL-to-TOP TOTEMO
tok-e-nai-yo.
solve-can-NEG-PRT
At-issue: We cannot solve such a difficult problem.
CI: I am emphasizing the impossibility.
B: ??*Iya totemo tok-e-nai-wake.dewa.nai-yo.*
No TOTEMO solve-can-NEG-it.is.not.the.case.that
'No, it is not the case that we cannot *totemo* solve it.'

In this conversation, the speaker of (20B) is challenging the at-issue part of (20A) (i.e., staying up all night is impossible for A), but not the CI part. It would be odd to presume that speaker B is challenging the CI part of (20B) because this would imply that he/she is objecting to A's feeling. In general, we cannot object to a speaker's emotions. It is odd to say "no, that is not true" after someone says "ouch!"

The next bit of evidence for the idea that the emphatic component of the negative *totemo* is a CI is that negative *totemo* cannot be placed under the scope of logical operators like modal, negation, or a past tense. Let us consider this based on an example in which the modal negative sentence with *totemo* is embedded under another modal expression such as *daroo* 'will' which has the meaning of prediction:

(21) *Tetuya-o suru-nado totemo deki-nai-daroo.*
staying.up.all.night-ACC do-EVAL TOTEMO can-NEG-EPI
At-issue: Staying up all night will be impossible for him/her.
CI: I am emphasizing the degree of impossibility.

Here, the meaning of *totemo* does not fall within the scope of *daroo*; that is, the speaker is not saying that there is the possibility of an emphatic emotion toward impossibility. The speaker's emphatic attitude is not within the scope of the epistemic operator *daroo* 'probably.'

Similarly, negative *totemo* cannot be within the semantic scope of negation:

(22) *Tetuya-o* *suru-nado* *totemo* *deki-nai.*
staying.up.all.night-ACC do-EVAL TOTEMO can-NEG
At-issue: Staying up all night is impossible.
CI: I am emphasizing the impossibility.

In (22), there is no reading like "it is not the case that I am emphasizing the possibility."

Finally, this may be descriptive evidence, but negative *totemo* and not semantic *totemo* can be paraphrased by the clearly idiomatic expressive *totemo-ja-nai-ga* 'very-NEG-although':

(23) *Tetuya-o* *suru-nado* {*totemo* /*totemo janaiga*}
staying.up.all.night-ACC do-EVAL TOTEMO/TOTEMO.JA.NAI.GA
deki-nai.
can-NEG
At-issue: Staying up all night is impossible.
CI: I am emphasizing the impossibility.

Although *totemo-jana-ga* contains a negative morpheme and the clause-linker *ga* 'but', they are not interpreted literally. In (23), *totemo-ja-nai-ga* serves to strengthen the impossibility or inability of a given proposition. Note that *totemo-ja-naiga* cannot be used to modify an adjective:

(24) *Koko-wa* {*totemo* /**totemo.ja.nai.ga*} *anzen-desu.*
here-TOP TOTEMO/TOTEMO.JANAI.GA safe-PRED
'It is very safe here.'

Based on these discussions, we can conclude that the emphatic component of negative *totemo* is a CI.

Note that in some cases, *totemo* can be ambiguous between semantic and negative *totemo*.

(25) *Totemo* *takai* *kuruma-wa* *ka-e-nai.*
TOTEMO/very expensive car-TOP buy-can-NEG
Reading 1 (semantic *totemo*): I cannot buy a very expensive car.
Reading 2 (expressive *totemo*): I cannot buy an expensive car.
(CI: I am emphasizing the impossibility.)

In Reading 1 (the semantic reading), *totemo* modifies the adjective *takai*, while in Reading 2 (the negative reading), *totemo* modifies a negative modal phrase *ka-e-nai*.

In the negative reading, there is a mismatch between surface syntax and logical structure in terms of the position of *totemo*.

2.3 The discourse property of the reactive negative *totemo*

We now consider the discourse-pragmatic properties of reactive negative *totemo* in detail. Sensitive to discourse, it is used when the proposition *p* (without a negative modal) is expected to be true:

(26) A: *Kono mondai tok-e-masu-ka?*
this problem solve-can-PRED.POLITE-Q
'Can you solve this problem?'
B: *Iya boku-ni-wa totemo tok-e-masen.*
No I-to-TOP TOTEMO solve-can-NEG.PRED.POLITE
'No, I can't solve this problem.'
(CI: I am emphasizing the inability.)

In this conversation, Speaker A expects Speaker B to solve the problem. Formally, it is an open question, but there is an expectation of a positive answer, and in such a situation, speaker B emphasizes the impossibility of the proposition.[6] From the viewpoint of information structure, *p* is activated and discourse-given.[7] This is supported by the fact that it is unusual to use *ga* in these contexts, which conveys new information:

(27) *Tetuya-{-nado/??-ga}* *totemo* *deki-nai.*
staying.up.all.night-{EVAL/NOM} TOTEMO can-NEG
At-issue: Staying up all night is impossible.
CI: I am emphasizing the inability.

6 Watanabe (2001) observes that negative *totemo* is often used in contexts where the speaker thinks that the at-issue proposition/event is preferable or is necessarily the case.

7 I define an activated proposition as a proposition that is currently under discussion in the discourse or a proposition (radical) that appears in a previous discourse. In the terminology of Dreyer (1996), it is a proposition that is lit up in one's mind. For example, in (26B) whether the speaker can solve the problem is under discussion and the proposition that "I can solve the problem" is activated. For the notion of activation, see Dryer (1996), Larrivée (2012), Zimmermann (2011), and Yoshimoto (this volume).

The discourse particle *nado* in (27) signals that the speaker negatively construes the discourse's given proposition ("to stay up all night"). Crucially, the above asymmetry disappears if we delete negative *totemo*:

(28) *Tetuya-{nado/-ga}* *deki-nai.*
staying.up.all.night-{EVAL/NOM} can-NEG
'Staying up all night is impossible.'
CI: I am emphasizing the inability.

Note that it is not always the listener who expects *p* to be true. As the following example shows, it can be the speaker, not the listener, who expects *p*:

(29) (Context: The speaker is looking at the score of a trial examination and is thinking about whether she/he can pass the entrance exam of a desired university.)
Kibou-suru *daigaku-ni-wa* *totemo* *ukari-soo-ni-nai.*
hope-do university-to-TOP TOTEMO pass-likely-to-NEG
At-issue: It is highly unlikely that I can pass the entrance examination of a desired university.
CI: I am emphasizing the impossibility.
(http://www.gmm.co.jp/maeda.html)

2.4 Analysis of reactive negative *totemo*

Let us now analyze the meaning of reactive negative *totemo*. Based on the idea in Sawada (2014b, 2019), I assume that, as with regular semantic *totemo*, reactive negative *totemo* takes a gradable predicate, which is a negative modal gradable predicate. Compositionally, following Sawada, I assume that reactive negative *totemo* is "mixed content" (e.g., McCready 2010; Gutzmann 2011; Sawada 2014a), taking a negative modal predicate at both the at-issue and CI dimensions while intensifying the degree only at the CI dimension. (M is an abbreviation for type $\langle d^a,\langle P^a,\langle i^a,\langle s^a,t^a\rangle\rangle\rangle\rangle$ and P is an abbreviation for type $\langle i^a,\langle s^a,t^a\rangle\rangle$. The variable G_{MODAL} is a variable for a gradable modal predicate, and p is a variable for a proposition of type $\langle i^a,\langle s^a,t^a\rangle\rangle$):

(30) a. $[\![\text{totemo}_{\text{REACT.NEG}}]\!]$: $\langle M^a, \langle P^a, \langle i^a,\langle s^a,t^a\rangle\rangle\rangle\rangle \times \langle M^a, \langle P^a, i^a,\langle s^a,t^s\rangle\rangle\rangle\rangle$
$= \lambda G_{MODAL}\lambda p\lambda t\lambda w.\ \exists d[d > \text{STAND}_{G.MODAL} \wedge G_{MODAL}(d)(p)(t)(w)]$
$\blacklozenge\lambda G_{MODAL}\lambda p\lambda t\lambda w.\ \exists d'[d' >!!\text{STAND}_{G.MODAL} \wedge G_{MODAL}(d')(p)(t)(w)]$
(where $\max(G_{MODAL}) = 0$, p is activated in discourse and p is expected)
b. Function of the reactive *totemo*: Emphasis

The left side of ♦ is an at-issue domain, and the right side of ♦ is a CI domain. In the CI component, there are also requirements that for the maximum degree of G_{MODAL}= 0, *p* is activated in discourse and expected.

Let us consider how the meaning of the sentence with negative *totemo* can be computed based on the following example:

(31) (*Watasi-wa*) *tetuya-o* *suru-nado* *totemo* *deki-nakat-ta.*
I-TOP staying.up.all.night-ACC do-EVAL TOTEMO can-NEG-PST
At-issue: Staying up all night was impossible.
CI: I am emphasizing the impossibility.

The important point of this analysis is that a negative modal expression as a whole (i.e., modality plus a negative element) behaves as a single gradable predicate. This is supported by the fact that a measure phrase and degree modifiers can directly modify the negative modal expressions *deki-nai* and *soo-ni nai*:

(32) a. *100%* *deki-nai.*
100% can-NEG
'It is 100% impossible'
b. *Sonna* *koto* *zettai* *deki-nai.*
that thing absolutely can-NEG
'lit. That thing is absolutely impossible.'

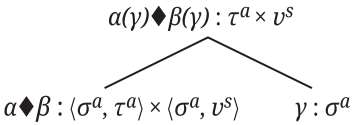
(33) *Sonna* *kikai-wa* *zettai* *ki-sooni* *nai.*
such opportunity-TOP absolutely come-likely NEG
'Such an opportunity is highly unlikely to ever come along.'

Then how can we analyze the meaning of the gradable modal predicate? In this paper, I will analyze the meaning of gradable modal predicate by assuming that these represent relationships between propositions and degrees just like ordinary gradable predicate (e.g., Kennedy and McNally 2005). For example, the denotations of negative modal predicate (G_{MODAL}) such as *deki-nai* 'impossible' and *soo-ni-nai* 'unlikely' have the following meanings (cf. Lassiter (2011); Klecha (2012)):

(34) a. $[\![\text{deki-nai}]\!]$: $\langle d^a,\langle P^a,\langle i^a,\langle s^a,t^a\rangle\rangle\rangle\rangle = \lambda d\lambda p\lambda t\lambda w.\text{impossible}_{ABIL}(p(t))\ d \text{ in } w$
b. $[\![\text{soo-ni-nai}]\!]$: $\langle d^a,\langle P^a,\langle i^a,\langle s^a,t^a\rangle\rangle\rangle\rangle = \lambda d\lambda p\lambda t\lambda w.\text{unlikely}(p(t)) \geq d \text{ in } w$

Negative *totemo* is then combined with a negative modal expression using mixed application (McCready 2010; Gutzmann 2011):

(35) Mixed application



(Based on McCready 2010: 20)

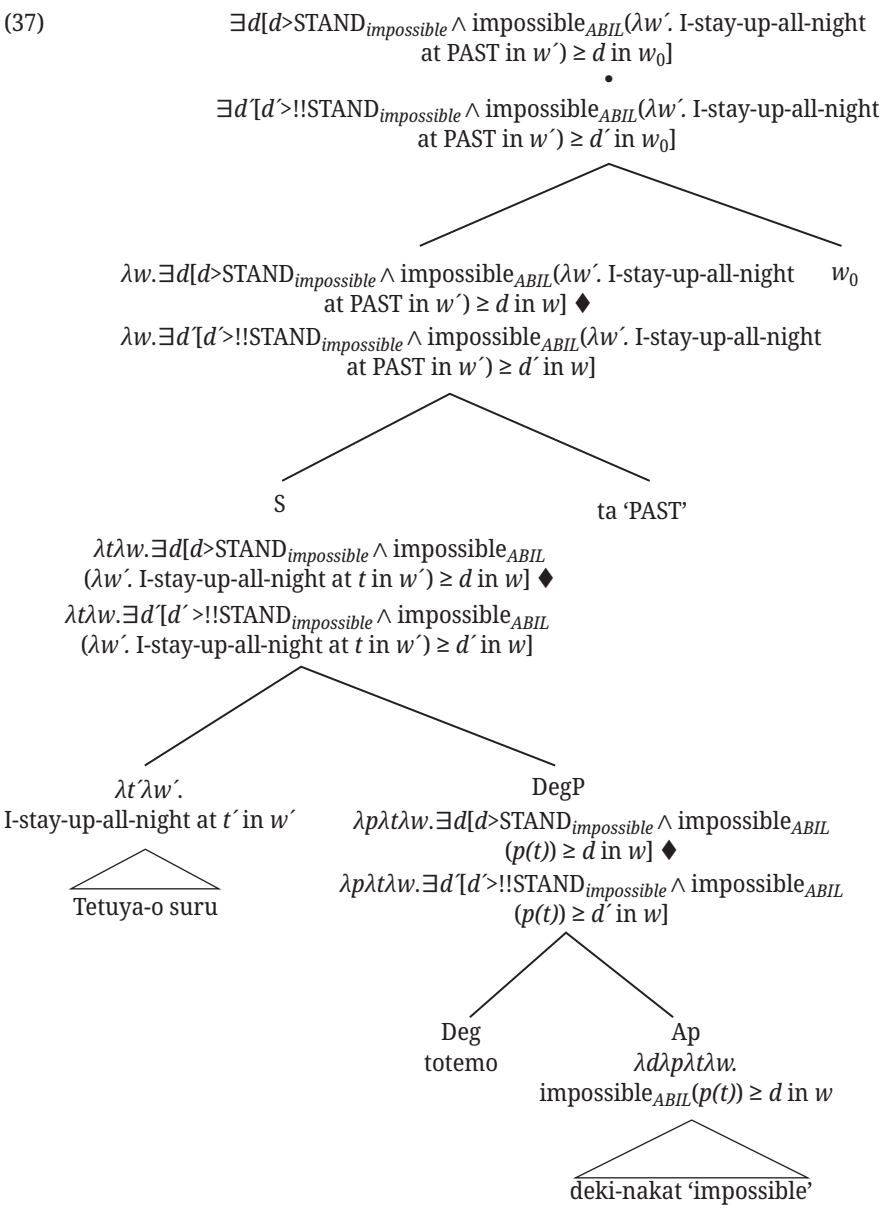
Superscript *a* stands for an at-issue type, and superscript *s* stands for a shunting type. Superscript *s* is used for the semantic interpretation of CI involving an operation of shunting (cf. Potts's (2005) CI application). Following McCready (2010), I will also assume that the following rule applies for the final interpretation of the CI part of mixed content:

(36) Final interpretation rule:
Interpret $\alpha \blacklozenge \beta : \sigma^a \times t^s$ as follows: $\alpha : \sigma^a \bullet \beta : t^s$

(Based on McCready 2010)

The following figure illustrates a part of a semantic derivation of (31). (In the logical structure the topic phrase *watasi-wa* 'I-TOP' is not represented, but we can understand that the subject of the sentence is *watasi* 'I' even if there is no topic marking phrase. Also, the negative evaluative particle *nado*, which has a non-at-issue meaning, is omitted in the structure.):

(37)


∃d[d>STAND$_{impossible}$ ∧ impossible$_{ABIL}$(λw´. I-stay-up-all-night at PAST in w´) ≥ d in w_0]
•
∃d´[d´>!!STAND$_{impossible}$ ∧ impossible$_{ABIL}$(λw´. I-stay-up-all-night at PAST in w´) ≥ d´ in w_0]
λw.∃d[d>STAND$_{impossible}$ ∧ impossible$_{ABIL}$(λw´. I-stay-up-all-night at PAST in w´) ≥ d in w] ♦
w_0
λw.∃d´[d´>!!STAND$_{impossible}$ ∧ impossible$_{ABIL}$(λw´. I-stay-up-all-night at PAST in w´) ≥ d´ in w]
S
ta 'PAST'
λtλw.∃d[d>STAND$_{impossible}$ ∧ impossible$_{ABIL}$ (λw´. I-stay-up-all-night at t in w´) ≥ d in w] ♦
λtλw.∃d´[d´>!!STAND$_{impossible}$ ∧ impossible$_{ABIL}$ (λw´. I-stay-up-all-night at t in w´) ≥ d´ in w]
λt´λw´. I-stay-up-all-night at t´ in w´
Tetuya-o suru
DegP
λpλtλw.∃d[d>STAND$_{impossible}$ ∧ impossible$_{ABIL}$ (p(t)) ≥ d in w] ♦
λpλtλw.∃d´[d´>!!STAND$_{impossible}$ ∧ impossible$_{ABIL}$ (p(t)) ≥ d´ in w]
Deg
totemo
Ap
λdλpλtλw. impossible$_{ABIL}$(p(t)) ≥ d in w
deki-nakat 'impossible'

The question is why reactive negative *totemo* must appear in a negative modal sentence and cannot appear in a positive modal sentence:

(38) a. **Sonna koto boku-ni-wa totemo deki-ru.*
such thing I-to-TOP TOTEMO can-Non.PST
'lit. I *totemo* can do such a thing.'
b. **Ame-wa totemo yami-soo-da.*
rain-TOP TOTEMO stop-seem-PRED
'lit. The rain *totemo* seems to stop.'

Following Sawada (2017), I assume that G_{MODAL} must be a negative gradable modal predicate because the negative *totemo* presupposes that the maximum degree of G_{MODAL} is 0 in terms of probability, as represented in the parenthetical part in (39):

(39) $\max(G_{MODAL}) = 0$

If a given G_{MODAL} is a positive modal gradable predicate like *arier*u 'likely', then its maximal degree will be 1 (i.e., 100 percent). Therefore, the sentence becomes infelicitous. However, if a modal predicate is negative, its maximal degree will be 0 (i.e., 0 percent). Thus, the resulting sentence is well formed (see Sawada (2017) for a detailed discussion on the polarity sensitivity of negative *totemo*.)

Thus far, we have considered examples with *totemo*, where there is an explicit negative modal expression. However, *totemo* can also be combined with pseudo-modal expressions, which are semantically related to modality. The word *muri* has a negative modal meaning 'impossible'. Literally, *mu* means 'no/zero' and *ri* means 'reason', but it is a single word means 'impossible.' This is a single word (adjective) that can be paraphrased as *deki-nai*:

(40) *Tetuya-nado totemo* {*muri-da* /*deki-nai*}.
staying.up.all.night-EVAL TOTEMO impossible-PRED /can-NEG
At-issue: Staying up all night is impossible.
CI: I am emphasizing the impossibility.

Semantically, *muri* has the same meaning as *deki-nai* 'can-not':

(41) $[\![\text{muri}]\!]: \langle d^a,\langle p^a,\langle i^a,\langle s^a,t^a\rangle\rangle\rangle = \lambda d\lambda p\lambda t\lambda w.\text{impossible}_{ABIL}(p(t)(w)) = d$

Furthermore, ability-related verbs such as *toora-nai* 'pass-not', *ukara-nai* 'past-not' and *maniau* 'meet' can also be combined with negative *totemo* (Osaki 2005, Sawada 2019):

(42) *Ima-no* *seiseki-de-wa* *siken-ni-wa* *Totemo* {*toora* /*ukara*}
now-GEN grade-PRED-TOP exam-to-TOP TOTEMO pass /pass
-nai-yo.
NEG-PRT
At-issue: You will not be able to pass the exam with your current grades.
CI: I am emphasizing the impossibility.

(43) *Subete-no* *buhin-o* *tuku-ttei-te.wa* *nouki-ni-wa* *totemo*
all-GEN parts-ACC make-TEIRU-if deadline-to-TOP TOTEMO
maniawa-nai.
meet-NEG
At-issue: If we made all the parts, we would not be able to meet the deadline.
CI: I am emphasizing the impossibility of meeting the requirements.

Although *toora-nai/ukara-nai* 'cannot.pass' and *maniawa-nai* 'cannot.meet' do not combine with a modal element, they inherently have a meaning of 'impossible' as part of their lexical meanings.[8]

These examples clearly show that the negative *totemo* does not need to combine with a grammaticalized modal, but can also combine with various expressions that lexically have a modal meaning (although they are not grammaticalized modals.) These data suggest that the dependency between negative *totemo* and a gradable modal is semantic rather than syntactic.

3 The Japanese *zenzen*

In the previous section, we focused on the two types of *totemo*, the regular intensifier *totemo* and the reactive use of *totemo*, and showed that they have different polarity sensitivity and licensing conditions. In this section, we focus on *zenzen* and

8 *Toora-nai/ukara-nai* 'cannot.pass' and *maniawa-nai* 'cannot.meet' are gradable. This is supported by the fact that they can co-occur with a measure phrase such as *100-paasento* '100%':

(i) *Kono-mama-de-wa* *Taro-wa* *100%* {*toora-nai* /*ukara-nai*}.
this-still-PRED-TOP Taro-TOP 100% pass-NEG /pass-NEG
'As it is, he cannot pass the test 100%.'

(ii) *Kono-mama-de-wa* *Taro-wa* *100%* *maniawa-nai.*
this-still-PRED-TOP Taro-TOP 100% make.it.on.time-NEG
'As it is, Taro will not be able to make it 100% in time.'

demonstrate that it has both a negative polarity use and a positive polarity use, as shown in the following examples:

(44) (Semantic *zenzen*)
Kono syoosetu-wa zenzen omosiroku-nai-desu.
this novel-TOP ZENZEN interesting-NEG-PRED.POLITE
'This novel is not interesting at all.'

(45) (Reactive positive *zenzen*)
(Q: I heard that this novel is not interesting. Is it true?)
Iya, zenzen omosiroi-desu-yo.
No ZENZEN interesting-PRED.POLITE-PRT
'It is *zenzen* interesting.'

I will show that, in terms of the pattern of polarity sensitivity, they are mirror images of *totemo*.

3.1 The meaning of the negative *zenzen*: Comparison with *mattaku* 'completely, at all'

Let us first consider the meaning of the negative *zenzen*, 'at all'. In doing so, it will be helpful to consider its meaning through a comparison with *mattaku* 'at all/completely'. The adverbs *zenzen* and *mattaku* are similar in that they both serve to "strengthen" the force of an expressed negation:

(46) (*Watasi-wa*) {*zenzen* /*mattaku*} *okane-ga nai.*
I-TOP ZENZEN/MATTAKU money-NOM NEG.exist
'I don't have money at all.'

In Israel's (1996) typology of NPIs, *zenzen* and *mattaku* correspond to the "emphatic" NPI. They are different from attenuating NPIs (Israel 1996), such as *amari* '(all) that':

(47) *Taro-wa amari okane-ga nai.*
Taro-TOP all that money-NOM NEG.exist
'Taro does not have all that much money.'

Amari is an NPI, but unlike *mattaku* and *zenzen*, it has a pragmatic function of "attenuation" (see also Ido, Kubota, and Kubota (this volume)). In (47), the speaker

says that the actual amount of money does not reach a contextually determined standard (or expected degree), but it is not very different from this standard.

Despite these similarities, some differences exist between *mattaku* and *zenzen*. As Sawada (2008) observes, '*zenzen* not *P*' implies 'a little *P*' but '*mattaku* not *P*' entails 'completely not *P*.' For example, in sentence (48), *zenzen* is natural in a situation where the speaker has a little money, whereas *mattaku* is unacceptable in that situation:

(48) (Context: Taro had spent too much of his student scholarship money on buying books. He realized that he only had $50 left in his account.)
(*Watasi-wa*) {*zenzen* /??*mattaku*} *okane-ga* *nai.*
I-TOP ZENZEN /MATTAKU money-NOM NEG.exist
'I don't have money *zenzen/mattaku*.'

In this context, sentence (48) with *zenzen* is natural, but not with *mattaku*.

Several diagnostics can be used to distinguish between the two adverbs. The first has to do with implicit comparisons (Sapir 1944; Kennedy 2007; Sawada 2009). In implicit comparison, the truth-value of the proposition in the main clause is determined relative to the standard of comparison, which is introduced in the adverbial/adjunct clause, implying that the proposition in the main clause is not (necessarily) true if it is evaluated from a contextually determined standard (ordinary norm). In Japanese, *kurabe-tara* pertains to an implicit comparison:

(49) (Context: Taro spent $500 on shopping and Mary spent $100.)
Taro-ni *kurabe-tara* *Mary-wa* *okane-o* *tukawa-naka-tta.*
Taro-to compare-if Mary-TOP money-ACC use-NEG-PST
'Compared to Taro, Ziro didn't use money.'
→ Mary spent some money. (implicature)

In (49) the truth-value of the proposition that "Mary didn't use money" is evaluated relative to Taro, and there is a positive implicature that "Mary spent some amount of money."

Crucially, *mattaku* cannot appear in implicit comparison, but *zenzen* can:

(50) (Context: Taro spent $500 on shopping and Mary spent $30.)
Taro-ni *kurabe-tara* *Mary-wa* *okane-o* {*zenzen* /??*mattaku*}
Taro-to compare-if Mary-TOP money-ACC ZENZEN/MATTAKU
tukawa-nakat-ta.
use-NEG-PST
'Compared to Taro, Ziro didn't use money *zenzen/mattaku*.'
→ Mary spent some money. (implicature from *zenen*)

The second diagnostic has to do with partial negation. A negative sentence with *zenzen* can precede a partial negation with *mattaku*, but not vice versa, as shown in (51):

(51) a. *Taro-wa zenzen benkyoo-si-nai.*
Taro-TOP ZENZEN study-do-NEG
'Taro does not study *zenzen*.'
→Taro studies a little. (implicature)
Mattaku-to iu wake.de.wa.nai-ga.
MATTAKU-as say it.is.not.the.case-although
'Although it is not the case that (he does not study) at all (completely).'

b. *Taro-wa mattaku benkyoo-si-nai.*
Taro-TOP MATTAKU study-do-NEG
'Taro does not study at all.' (=completely zero).'
 # Zenzen-to iu-wake.de.wa.nai-ga.
ZENZEN-as say-it.is.not.the.case-though
'Although it is not the case that (he does not study) *zenzen*.'

In (51a), the flow of discourse is natural. However, if we exchange the order of *zenzen* and *mattaku,* as in (51b), the result is odd. The partial negation *'Zenzen/ mattaku to iu wake de-wa nai'* conveys that "Taro studies a little," which conflicts semantically with a negative sentence with *mattaku*, but not with *zenzen*.

What does this mean theoretically? I would argue that Japanese adverbial polarity items are lexicalized into two types: absolute and relative.

(52) a. *Zenzen* is relative in that '*zenzen* not-*P*' conveys that the given degree is "far removed" from a contextually determined standard (expected degree).

b. *Mattaku* is an absolute polarity item in that '*mattaku* not-*P*' conveys that the given degree corresponds to the minimum endpoint of a scale and it is not context sensitive.

Since negative *zenzen* only says that the current degree is far removed from the standard, it is possible that the degree of the target can be non-zero. I assume that the negative sentence that *zenzen* triggers can induce a positive implication that the target has a low degree:

(53) "*x* is *zenzen* not *P*" (*P* = gradable predicate)
Scalar component: The degree of *P* with respect to *x* is "far" removed from the contextually determined standard of *P*.
Implication: *x* has a low degree of *P*.

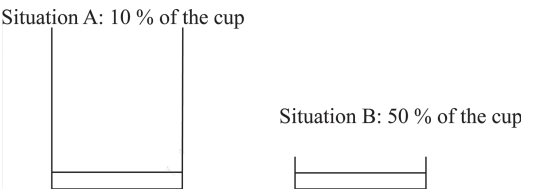
In contrast, '*mattaku* not *P*' denotes that the actual degree with respect to *P* is the minimum endpoint of a scale (zero point). Therefore, '*mattaku* not *P*' does not induce a positive implicature. It entails "completely not *P*."

Let us consider this problem based on the following example:

(54) *Zenzen* *mizu-ga* *nai.*
ZENZEN water-NOM NEG.exist
'There is no water at all.'

Imagine the following two situations. In each situation, there is 100 ml of water in a cup.

(55)



Although the amount of water is the same in both situations, sentence (54) is natural for Situation A but odd for Situation B. This is because of the distance component of *zenzen*. The point is that sentence (54) implies that there is a bit of water. I argue that the positive meaning is a conversational implicature derived from the Maxim of Quantity/Q-Principle, "Say as much as you can." '*Mattaku* not *P*' is stronger than '*Zenzen* not *P*'; thus, by saying '*zenzen* (not-*P*)', it conversationally implies that "it is not the case that *mattaku* (not-*P*)."

The idea that the positive implicature is conversational is supported by the fact that it is cancelable:

(56) Cancelability test

a. *Kinoo-wa* *zenzen* *nemur-e-na-katta.*
yesterday-TOP ZENZEN sleep-can-NEG-PAST
'I could not sleep *zenzen* yesterday.'
(Implicature → I slept a little.)

b. *Toiuka* *mattaku* *nemur-e-na-katta.*
I.mean MATTAKU sleep-can-NEG-PAST
'I mean, I could not sleep at all (completely).'
(= I slept zero minutes.)

Furthermore, the fact that the positive implicature is reinforceable also supports the idea that it is a conversational implicature:

(57) *Kinoo-wa zenzen nemur-e-nakat-ta.*
yesterday-TOP ZENZEN sleep-can-not-PAST
'I could not sleep *zenzen*.'
Mattaku-to iu wake.de.wa.nai-ga.
MATTAKU-as say it-is-not-though
'Although it is not the case that I did not sleep at all (completely).'

3.2 Formal analysis of the negative *zenzen*

Based on the above discussion, let us consider the meaning of negative *zenzen* in a compositional fashion using the following example:

(58) *Kono hon-wa zenzen omosiroku-nai.*
this book-TOP ZENZEN interesting-NEG
'This book is not interesting at all.'

I propose that the negative *zenzen* has the following denotation and pragmatic function.

(59) a. $[\![\text{zenzen}_{\text{NEG}}]\!] = \lambda G\lambda x\lambda t\lambda w.\ \exists d[d <!!\ \text{STAND}_{DIM,G} \wedge G(d)(x)(t)(w)]$
b. The function of *zenzen*$_{\text{NEG}}$: emphasis

Negative *zenzen* denotes that there is some degree that it is far less than a contextually determined standard of the dimension (DIM) posited in *G*. Note that there are several important assumptions behind this analysis. First, negative *zenzen* needs to combine with a negative gradable predicate. This is because of the function of the emphasis. If the negative *zenzen* co-occurs with a positive gradable predicate, then the sentence with the negative *zenzen* will not trigger an emphatic meaning. If there is no negation, it will only mean "there is a degree such that it is less than a standard by a large amount." Second, in this paper, I will assume that the negative particle *nai* is not a sentential negation but serves as a "local" negation, as in:

(60) a. $[\![\text{omosiroi}]\!] = \lambda d\lambda x\lambda t\lambda w.\ \text{interesting}(x)(t)(w) \geq d$
b. $[\![\text{omosiroku-nai}]\!] = \lambda d\lambda x\lambda t\lambda w.\ \neg(\text{interesting}(x)(t)(w) \geq d)$

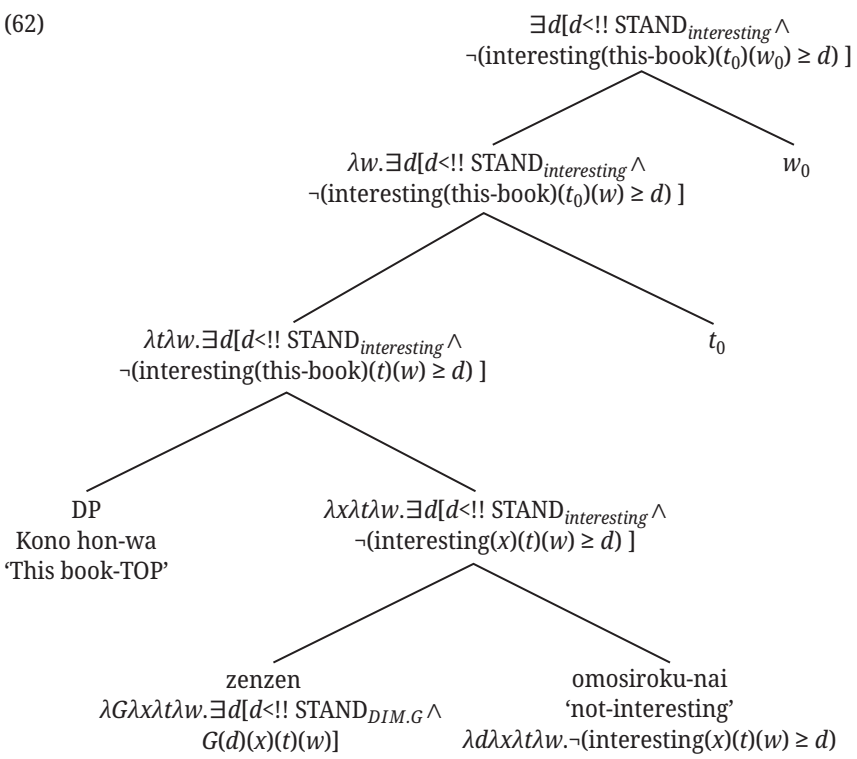
Note that the standard posited in the negative *zenzen* is the standard of dimension (DIM) associated with *G*. Namely, in this paper, I assume that *omosiroi* and *omosiroku-nai* share the same dimension. Following previous studies on scalarity, I define the scale as follows:

(61) The ontology of scale ⟨ D; >; DIM ⟩ where D is a set of points, > is a total ordering on D, and DIM is a dimension (e.g., Bartsch and Vennemann 1973; Bierwisch 1989; Kennedy 2007; Kennedy and McNally 2005; Solt 2015).

In this view, the standards of *omosiroi* 'interesting' and *omosiroku-nai* 'not interesting' are the same. Although *omosiroku-nai* 'not interesting' is a negative adjective, the dimension of the adjective is interestingness.

In this approach, we can analyze the meaning of sentence (58) as follows:

(62)



Thus, how can we analyze the case (63)?

(63) *Mizu-ga* *zenzen* *nai.*
water-NOM ZENZEN NEG.exist
'There is no water at all.' (Implicature: There is a little bit of water.)

Recall that this sentence does not mean that there is zero amount of water, but that the amount of water is far below the standard. I assume that *nai* behaves as a gradable predicate (e.g., Morita 1989).[9] In other words, *nai* as a predicate in the existential sentence is different from the affix *nai* that attaches to a verb stem (e.g., *ika-nai* 'not go'), in that the former is an independent word whereas the latter is a dependent word. Note that I assume that the gradable adjective *nai* is decomposed into ¬ and the gradable use of *aru* 'exist.' Interestingly, the antonym of the adjective *nai* is the verb *aru* 'exist', which is also a gradable predicate. (64) shows part of the semantic derivation in (63):

(64) a. $[\![\text{zenzen}_{\text{NEG}}]\!] = \lambda G\lambda x\lambda t\lambda w.\ \exists d[d <!!\ \text{STAND}_{DIM.G} \wedge G(d)(x)(t)(w)]$
b. $[\![\text{nai}]\!] = \lambda d\lambda x\lambda t\lambda w.\ \neg(\text{exist}(x)(t)(w) \geq d)$
c. $[\![\text{zenzen}_{\text{NEG}}]\!]\ ([\![\text{nai}]\!]) = \lambda x\lambda t\lambda w.\ \exists d[d <!!\ \text{STAND}_{exist} \wedge \neg(\text{exist}(x)(t)(w) \geq d)]$
d. $[\![\text{zenzen}_{\text{NEG}}]\!]\ ([\![\text{nai}]\!])([\![\text{mizu}]\!]) = \lambda t\lambda w.\exists d[d <!!\ \text{STAND}_{exist} \wedge \neg(\text{exist}(\text{water})(t)(w) \geq d)]$

9 The following simple negative sentence is also interpreted as a relative adjectival sentence:

(i) (Context: the speaker is planning to pay for his/her apartment.)
Okane-ga *nai.*
money-NOM NEG.exist
'I don't have money.'

In this context, (i) does not mean 'I have zero amount of money.' Instead, it means that 'the actual amount of money is less than a contextually determined standard'.

The idea that the adjective (predicative) *nai* 'not.exist' is gradable is supported by the fact that it can be modified by various degree modifiers aside from *zenzen* 'at all' and *mattaku* 'at all'. For example, attenuating NPI *amari/sonnani* 'that much' can also combine with the predicative *nai* (see (47)).

Regarding the semantics of the simple sentence with the predicative *nai*, I assume that the unmodified *nai* (which has the same conjugation as a normal adjective) (of type $\langle d, \langle e,t\rangle\rangle$) combines with a 'null degree morpheme' *pos* whose function is to relate the degree argument of the adjectives to an appropriate standard of comparison (Cresswell 1977; von Stechow 1984; Kennedy and McNally 2005, among others). (ii) shows the semantic derivation for the sentence (i):

(ii) a. $[\![\text{nai}]\!] = \lambda d\lambda x.\ \neg(\text{exist}(x) \geq d)$
b. $[\![\text{pos}]\!] = \lambda G\lambda x.\ \exists d[d \geq \text{STAND}_{\text{DIM.G}} \wedge G(d)(x)]$
c. $[\![\text{pos}]\!]\ ([\![\text{nai}]\!]) = \lambda x.\ \exists d[d \geq \text{STAND}_{exist} \wedge \neg(\text{exist}(x) \geq d)]$
d. $[\![\text{pos}]\!]\ ([\![\text{nai}]\!])\ ([\![\text{okane}]\!]) = \exists d[d \geq \text{STAND}_{exist} \wedge \neg(\text{exist}(\text{money}) \geq d)]$

What about the meaning of *mattaku*?

(65) *Mizu-ga* *mattaku* *nai.*
water-NOM MATTAKU NEG.exist
'There is no water at all.' (There is not a drop of water)

I assume that the denotation of *mattaku* has a universal meaning and the sentence can be analyzed as in (66) (the semantic derivation for tense and world are omitted):

(66) a. $[\![\text{mattaku}_{\text{NEG}}]\!] = \lambda G\lambda x\lambda t\lambda w.\forall d[d<\text{STAND}_{DIM.G} \rightarrow G(d)(x)(t)(w)]$
b. Function of *mattaku*: emphasis

(67) a. $[\![\text{mattaku}_{\text{NEG}}]\!] = \lambda G\lambda x\lambda t\lambda w.\forall d[d<\text{STAND}_{DIM.G} \rightarrow G(d)(x)(t)(w)]$
b. $[\![\text{nai}]\!] = \lambda d\lambda x\lambda t\lambda w.\ \neg(\text{exist}(x)(t)(w) \geq d)$
c. $[\![\text{mattaku}_{\text{NEG}}]\!]([\![\text{nai}]\!]) = \lambda x\lambda t\lambda w.\forall d[d<\text{STAND}_{exist} \rightarrow \neg(\text{exist}(x)(t)(w) \geq d)]$
d. $[\![\text{mattaku}_{\text{NEG}}]\!]([\![\text{nai}]\!])([\![\text{mizu}]\!]) = \lambda t\lambda w.\forall d[d<\text{STAND}_{exist} \rightarrow \neg(\text{exist}(\text{water})(t)(w) \geq d)]$

3.3 The reactive (positive) *zenzen*

After clarifying the meaning of the negative *zenzen*, this section investigates the meaning of reactive (positive) *zenzen*. Although it implies intensification, as the name suggests, it appears in a positive environment and is reactive: It reacts to the previous utterance and conveys that contrary to the previous thought, the target has a high degree:

(68) A: *Kono syoosetu omosiroku-nai-desu-yone?*
this novel interesting-NEG-PRED.POLITE-PRT
'This novel is not interesting, right?'
B: {*Zenzen*/**mattaku*} *omosiroi-desu-yo.*
ZENZEN/MATTAKU interesting-PRED.POLITE-PRT
'It is {*zenzen*/**mattaku*} interesting.'

(69) A: *Kaoiro* *warui-kedo* *daijoobu-desu-ka?*
face.color bad-but OK-PRED.POLITE-Q
'You look pale. Are you OK?'
B: {*Zenzen*/**mattaku*} *daijoobu-desu.*
ZENZEN/MATTAKU OK-PRED.POLITE
'I am {*zenzen*/**mattaku*} OK.'

(70) A: *Koko-no* *Raamen* *amari* *oisiku-nai-to* *kii-ta-do* *doo?*
here-GEN ramen all that tasty-NEG-that hear-PST-but how
'I heard that the ramen in this restaurant is not that tasty. What do you think?
B: {*Zenzen* /**mattaku*} *oisii-desu-yo.*
ZENZEN /MATTAKU tasty-PRED.POLITE-PRT
'It is {*zenzen*/**mattaku*} tasty.'

In the above examples, the speaker uses positive *zenzen* to correct or object to the previous utterance made by the addressee (Arimitsu 2002).

Furthermore, positive *zenzen* can also be used to react to and correct the speaker's own previous beliefs (see also Noda 2000):

(71) *Koko-no* *raamen* *oisiku-nai-to* *omo-ttei-ta-kedo*
here-GEN ramen tasty-NEG-that think-TEIRU-PST-but
zenzen *oisii.*
ZENZEN tasty-PRED
'I thought the ramen in this place is not tasty, but it is *zenzen* tasty.'

Because of the function of overturning negative existing assumptions, the positive *zenzen* cannot be used in an out-of-the-blue context (Arimitsu 2002; Odani 2007; Sawada 2008):

(72) (Out-of-the-blue context, conversation between a speaker and a hearer)
#Kore *zenzen* *oisii-yo.*
this ZENZEN tasty-PRT
'This is *zenzen* tasty.'

However, we can use positive *zenzen* in an out-of-the-blue (without previous discourse) context, if we posit a mirative context where the speaker has just realized that it is tasty, contrary to the speaker's expectations:

(73) (Mirative context: The speaker is eating ramen and is surprised that it is very tasty (contrary to expectations)
Kore *zenzen* *oisii!*
this ZENZEN tasty
'It is *zenzen* tasty.'

Because of its reactive nature, positive *zenzen* is sensitive to the question under discussion. It is not natural as an answer to a neutral question or to a confirmation question that checks the affirmative proposition *p* (Arimitsu 2002):

(74) Neutral question (how-question)
A: *Koko-no raamen doo-desu-ka?*
here-GEN ramen how-PRED.POLITE-Q
'How is the ramen here?
B: ??*Zenzen oisii-desu.*
ZENZEN tasty-PRED.POLITE
'It is *zenzen* tasty.'

(75) Confirmation question (checking *p*)
A: *Koko-no raamen oisii-desho*?
here-GEN ramen tasty-PRED-Q-confirm
'The ramen here is tasty, right?'
B: ??*Hai zenzen oisii-desu.*
Yes ZENZEN tasty-PRED.POLITE
'Yes, It is *zenzen* tasty.'

Thus, unlike negative *zenzen*, positive *zenzen* is used in a situation where *p* is expected to be not *p*. In this paper, I define the meaning of the positive *zenzen* as having both a presupposition and an intensified meaning (the underlined part is a presupposition):

(76) a. $[\![\text{zenzen}_{\text{REACT.POS}}]\!] = \lambda G\lambda x\lambda t\lambda w$: $\underline{\text{expected}(\exists d'[d' < \text{STAND}_{DIM.G} \wedge G(d')(x)(t)(w)])}$. $\exists d[d >!! \text{STAND}_{DIM.G} \wedge G(d)(x)(t)(w)]$
b. Function of the positive *zenzen*: emphasis

Note that the positive *zenzen* does not simply deny the previous assumption/expectation but also conveys that the given target is far removed from a contextually determined standard. (This component is similar to the scalar component of the negative *zenzen*, although there is a difference between high and low.) In this sense, it is different from the counter-expectational use of *hutuuni*. *Hutuuni* 'normally' can be used reactively and signals that the proposition assumed in the previous utterance/expectation is false (see Imoto 2011; Sato, Imai and Michihata 2021):

(77) (Context: The speaker has assumed that this ramen is not tasty but realized that it is tasty.)
Kono raamen hutuuni oisii.
this ramen HUTUUNI tasty
'This ramen is *hutuuni* tasty.' (Presupposition: I thought it would not be tasty.)

However, because the counterexpectational (reactive) *futuuni* does not have a high scalar meaning, it cannot be used in situations where the given degree is high.

(78) (Context: The speaker thought that the ramen was not good, but found out that it was actually extremely tasty.)
Kono raamen {?*hutuuni*/*zenzen*} *oisii.*
this ramen HUTUUNI/ZENZEN tasty
'This noodle is {?*hutuuni/zenzen*} delicious.'
(Expectation: This noodle is not delicious.')

4 English intensifier *possibly*

In the previous section, we discussed the reactive use of NPI *totemo* in Japanese. In this section, we will focus on English *possibly* and show that it also has a reactive NPI usage.

First, *possibly* has a (non-reactive) usage to express a low probability.

(79) a. *Possibly she will come here.*
b. *Possibly he smokes a pipe.* (Greenbaum 1969: 149)
c. *Possibly, she can't be reached at home.* (Hoye 1997: 146)

This type of *possibly* is a sentential adverb (often called a speaker-oriented adverb (Bellert 1977; Nilsen 2014; Ernst 2009) and has the characteristic of PPI. As the following sentences show, if it is put immediately after negation, the sentences become ill-formed (Nilsen 2014; Ernst 2009):

(80) a. *Stanley possibly ate his Wheaties.*
b. **Stanley didn't possibly eat his Wheaties*. (Nilsen 2014: 823)

(81) **Jospin didn't possibly win.*
(cf. *It is not possible that Jospin won.*) (Nilsen 2014: 823)

However, when *possibly* appears after *can/could*, it functions as an intensifier and behaves as an NPI, as shown below:

(82) a. *I can't possibly do that.*
b. *I can't possibly tell you that!* (Oxford Learner's Dictionary)
c. *I couldn't possibly do my family shopping there.* (BNC)
d. *They can't possibly be happy.*
e. *They can't possibly leave early.* (Greenbaum 1969: 148)

Descriptively, *possibly* emphasizes that something definitely cannot happen or be done, or definitely cannot be true. In the literature, this type of *possibly* is often analyzed as a phenomenon of modal concord (Anand and Brasoveanu 2010; Huitink 2012). In this section, I will argue that *can't possibly* is not an instance of a modal concord. Rather, it is a special kind of expressive NPI that reacts to the contextually salient proposition *p* and intensifies the unlikelihood/impossibility of *p* at the level of conventional implicature, which is similar to the Japanese negative *totemo*.[10]

10 Note that in a surface form it is not easy to identify that the intensifier *possibly* is an NPI based on positive vs. negative sentences. As the following example shows, *possibly* can appear in both positive and negative sentences:

(i) a. *I can't possibly solve the problem.*
b. *I can possibly solve the problem.*

However, it should be considered that *possibly* in (ia) and (ib) are lexically different. That is, *possibly* in (ia) is a reactive intensifier, while *possibly* in (ib) is an epistemic modal. The epistemic modal *possibly* does not have a co-occurrence restriction with *can/could*, can appear in various syntactic environments, and does not have a reactive property. Furthermore, it is worth noting that the difference between the reactive intensifier *possibly* and the epistemic *possibly* arises in the interpretation of the question. When the reactive intensifier *possibly* appears in an interrogative sentence, it is interpreted as a rhetorical question, while when the normal epistemic *possibly* appears in an interrogative sentence, it is often interpreted as a request (especially in the form *can/could you*):

(ii) a. *How can you possibly spend so much money on a present?* (rhetorical question)
(Conveyed meaning: You can't possibly spend so much money on a present.)
(*possibly* = reactive intensifier)
b. *Can you possibly take care of my dogs for a few days?* (request)
(*possibly* = epistemic *possibly*)

4.1 Previous studies on the intensifier *possibly*

This section briefly shows previous studies of the intensifier *possibly*.

4.1.1 Greenbaum (1969)

First, Greenbaum observes the important contrast difference between the ordinary *possibly* and the intensifier *possibly*. In addition, he observes that the intensifier *possibly* is positioned immediately after the negative particle. If we move *possibly* elsewhere in the sentence, *possibly* is not interpreted as an intensifier and corresponds to "it is possible that" (Greenbaum 1969).

(83) *They* {*can't, couldn't*} *possibly leave early.* (Greenbaum 1969: 148)

(84) a. *Possibly they can't leave early.*
b. *They possibly can't leave early.*
c. *They can possibly not leave early.*
d. *They can't leave early, possibly.* (Greenbaum 1969: 148)

Greenbaum (1969) also observes that the intensifier may collocate with *can* or *could* and with auxiliaries other than *can* or *could*; *possibly* is normally unacceptable even if they are positioned immediately after the negative particle:

(85) * *They won't possibly leave early.* (Greenbaum 1969: 148)

Note that negation and *possibly* do not need to be in the same clause (no clause-mate condition):

(86) *I didn't think they could possibly leave early.* (Greenbaum 1969: 148)

4.1.2 Quirk et al. (1985)

Quirk et al. (1985) also observe different interpretations of *possibly* depending on its location; significantly, they paraphrase intensifier *possibly* with *any* and view the intensifier *possible* as a minimizer:

(87) a. *They can't possibly leave now. (minimizer)*
= *They can't under any circumstances leave now.*

b. *They possibly can't leave now.*
= *It is possible that they can't leave now.* (Quirk et al. 1985: 600)

4.1.3 Hoye (1997)

Hoye (1997) focuses on the modification structure of sentences with NPI *possibly*:

(88) a. *Possibly, she can't be reached at home.*
b. *She can't possibly be reached at home.* (Hoye 1997: 146)

Hoye (1997) paraphrases (88a) as "it is possible that she cannot be reached at home." By contrast, he paraphrases (88b) as "it is impossible to reach her at home." Hoye (1977: 146) claims that *possibly* in (88a) is an S-adverb (sentence adverb), which expresses the speaker's commitment to the content of the complete utterance and modifies the sentence as a whole, while *possibly* in (88b) is a VP adverb that serves to reinforce or intensify the negated modal within its scope of modification.

4.1.4 A modal concord view of *can't possibly*

In recent years, researchers have analyzed the interpretations of *possibly* based on the notion of modal concord. Modal concord is a phenomenon whereby the combination of a modal adverb with a modal auxiliary seems to be interpreted as if only a single modal operator is expressed (Halliday 1970; Geurts and Huitink 2006; Zeijlstra 2007; Anand and Brasoveanu 2010; Huitink 2012; Ernst 2009). Observe the following examples:

(89) a. *You may possibly have read my little monograph upon the subject.*
b. *Power carts must mandatorily be used on cart paths where provided.*
(Geurts and Huitink 2006)

According to Geurts and Huitink (2006), the preferred interpretation of (89a) is the concord reading, which says that the speaker considers it possible that you have read his monograph, not the cumulative one, according to which he thinks it is possible that it is possible that you have done so. Similarly, (89b) expresses that there is an obligation to use power carts, not that it is obligatory that there is an obligation to use power carts.

Huitink (2012) claims that when *possibly* is placed after *can't*, *possibly* and *can* are interpreted as if there is only a single modal operator:[11]

(90) a. *I can't possibly eat any more.* (concord)
b. *You possibly can't eat any more.* (iterative)

(Huitink 2012: 413)

Huitink claims that while (90a) prefers a concord reading, (90b) is naturally read as an estimation of the chance that the addressee is not able to eat anymore. (90b) is an iterative reading in which the *can* and *possibly* both contribute a modality.[12]

4.2 NPI *possibly* is a reactive expressive intensifier

Although the previous literature often considers the intensifier *possibly* as being concerned with modal concord, I will argue that it should not be analyzed as a phenomenon of modal concord. I will argue that the intensifier use of *possibly* is an expressive intensifier (non-at-issue), and that it intensifies the degree of negative modal at the level of CI. In this sense, the intensifier *possibly* is quite similar to reactive negative *totemo* in Japanese.

There are several pieces of evidence that the emphatic component of the intensifier *possibly* is a CI. First, the meaning triggered by *possibly* cannot be challenged. Compare (91) and (92):

(91) A: *Can you solve the issue?*
B: *No, I can't possibly solve the issue.*
C: *No, that's not true. There is no reason you can't solve the issue.*

11 von Fintel and Heim (2001) do not use the term "modal concord" but make the following comments in the footnote: "We don't include the example (i) *John isn't possibly infected, which is ungrammatical, for unknown reasons. Another mysterious fact is that (ii) John can't possibly be infected actually means "it is not the case that it is possible that . . ." (which is what (i) would be expected to mean), as if it contained only one possibility operator rather than two" (von Fintel and Heim 2001).

12 Anand and Brasoveanu (2010) consider that the adverb falls in the scope of the negation in (90a) but not in (90b), as the negation on *can* inverts its force, that is, turns it from a possibility operator into a necessity operator, which makes it incompatible (for concord purposes) with a possibility adverb.

(92) A: *Can you solve the issue?*
B: *No, I can't possibly solve the issue.*
C: *No, that's not true. # There is no reason you can't* [*possibly*]$_F$ *solve the issue.*

Although (91C) is natural, (92C) is unnatural.

Second, the emphatic component of *possibly* cannot interact with negation:

(93) a. *There is no reason I can't solve the issue.*
b. *#There is no reason I can't possibly solve the issue.*

(93b) sounds a bit strange because the speaker is emphasizing the impossibility using *possibly* in the embedded clause, while simultaneously denying it in the main clause using 'there is no reason'. The oddness in (93b) makes sense if we consider that the meaning triggered by *possibly* is expressive (CI). The speaker's attitude in the main clause and the expressive meaning conveyed by *possibly* do not match. Note that (93b) may be natural if someone says "you can't possibly solve the issue," and the speaker reacts to it negatively. In that case, the speaker is quoting someone's idea (e.g., "Taro cannot possibly solve the issue"), and *possibly* is not anchored to the speaker.

4.3 The reactive property of expressive *possibly*

An important point is that expressive *possibly* has a reactive property:

(94) Expressive *possibly* intensifies the degree of impossibility of a proposition which is expected/desired to be true, and *p* is activated in discourse.

To use the intensifier *possibly*, a previous utterance is required:

(95) A: *Can you stay up all night?*
B: *No, I can't possibly stay up all night.*

(95B) reacts to expectations such as "I stay up all night."

As the following example shows, the intensifier *possibly* cannot be used in the out-of-the-blue context:

(96) (Out-of-the-blue-context)
 # I can't possibly stay up all night.

One puzzling point is that the sentence with the intensifier *possibly* can be natural, not just as a reply to the Yes-No question, but also as a reply to a *how* question:

(97) A: *Can you use javascript?*
B: *No, I can't possibly use javascript.*

(98) A: *How likely is it that you can use javascript?*
B: *I can't possibly use javascript.*

The fact that (98B) is natural as an answer to the *how* question may be strange if we consider that *possibly* is non-at-issue. However, (97B) and (98B) are natural only in the context of requesting (Patrick Elliott, personal communication). In (97), A's question is not a question about B's capacity. Similarly, in (98), A's question is only natural if it is interpreted as asking how likely it is for B to fulfill their request. Thus, (98B) does not answer the *how* question literally.

Note that this kind of restriction does not arise if we delete *possibly*:

(99) A: *Can you use javascript?*
B: *I can't use javascript.*
B': *I can't possibly use javascript.*

The question in (99A) is ambiguous between a question about ability and a request and (99B) can be compatible with both readings. However, (99B') is only compatible with the request reading (Patrick Elliott, personal communication).

4.4 Analysis of the reactive expressive *possibly*

Let us analyze the meaning of the reactive expressive *possibly*:

(100) a. *I can't possibly do such a thing.*
b. *Konna koto watasi-ni-wa totemo deki-nai.*
such thing I-to-TOP TOTEMO can-NEG
'I can't possibly do such a thing.'

Just as Japanese negative *totemo* emphasizes the degree of *deki-nai* 'can't', reactive expressive *possibly* is emphasizing the degree of *can't.* The underlying assumption here is that modals are semantically similar to gradable adjectives (Grosz 2010; Lassiter 2011; Klecha 2012). It seems that the moral expression "can't" is gradable and semantically equivalent to "impossible."

(101) *I really can't do that!*

Can't has the following denotation and, building on Sawada's analysis of negative *totemo*, I assume that *possibly* is "mixed content" (e.g., McCready 2010; Gutzmann 2011; Sawada 2014a), taking a negative modal predicate at both the at-issue and CI dimensions while intensifying the degree only at the CI dimension:

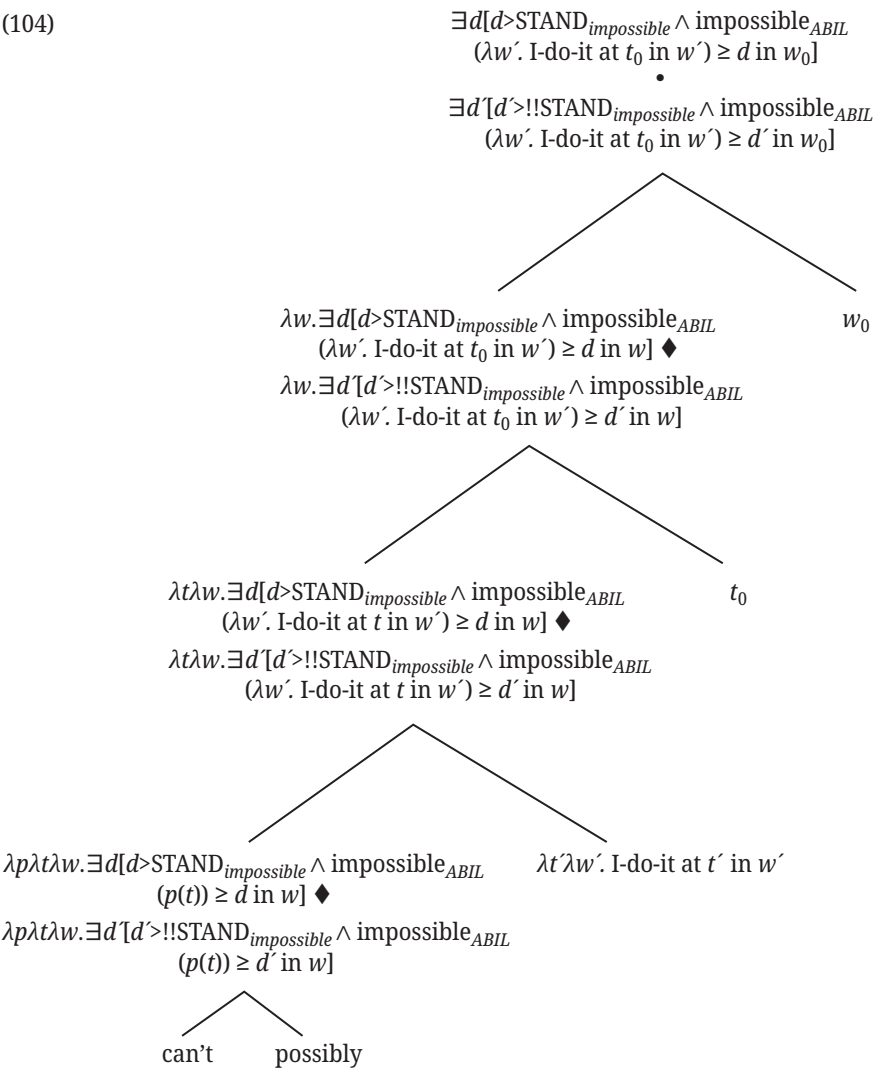
(102) $[\![\text{can't}]\!]$: $\langle d^a,\langle P^a,\langle i^a,\langle s^a,t^a\rangle\rangle\rangle\rangle$ =
$\lambda d\lambda p\lambda t\lambda w.\text{impossible}_{ABIL}(p(t)) \geq d$ in w

(103) a. $[\![\text{possibly}_{\text{REACTIVE}}]\!]$: $\langle G^a, \langle P^a,\langle i^a,\langle s^a,t^a\rangle\rangle\rangle\rangle \times \langle G^a, \langle P^a,\langle i^a,\langle s^a,t^s\rangle\rangle\rangle\rangle$
$= \lambda G_{MODAL}\lambda p\lambda t\lambda w.\exists d[d{>}\text{STAND}_{G.MODAL} \wedge G_{MODAL}(d)(p)(t)(\text{w})]\blacklozenge$
$\lambda G_{MODAL}\lambda p\lambda t\lambda w.\ \exists d'[d'{>}!!\text{STAND}_{G.MODAL} \wedge G_{MODAL}(d')(p)(t)(w)]$
(where G_{MODAL} = *can't/couldn't*, p is activated in discourse and p is expected)
b. The function of $possibly_{\text{REACTIVE}}$ = emphasis

The left side of ♦ is an at-issue domain, and the right side of ♦ is a CI domain. In the CI component, there are also lexical requirements that G_{MODAL} is either *can't* or *couldn't*, p is activated in discourse, and p is expected. Since the intensifier *possibly* basically can only co-occur with *can't* or *couldn't*, we need to stipulate such a constraint in the lexical entry.

The following figure shows the logical structure of the sentence "I can't possibly do it":

(104)



We have so far considered the case where the reactive intensifier *possibly* co-occurs with a negative modal predicate. However, the reactive intensifier *possibly* can appear in a question as well, and when it is used in a question it is interpreted as a rhetorical question. Observe the following examples:

(105) (Rhetorical question, reactive expressive)
How can you possibly do such a thing?
(Implicit meaning: you can't possibly do such a thing.)

(106) (Ordinary *possibly*/hedge expression)
Could you possibly lend me the textbook?

(105) is naturally interpreted as a rhetorical question whereas (106) involves a use of *possibly* that is either ordinary or else a hedge used for politeness.[13] The question is how we can analyze the meaning of *possibly* in a rhetorical question. Although this is still a speculation, I would like to consider that *possibly* in (105) is intensifying the implied negative predicate "can't." (105) is conventionally implying that "you can't possibly do such a thing" and *possibly* is interacting with "can't" at the implicature level.

5 English *totally*

As a final case study, in this section we will look at the meanings/uses of English *totally*. As is the case in *totemo*, *zenzen*, and *possibly*, previous studies have mentioned that *totally* has both semantic and discourse-pragmatic usages. Building on the discussion in Irwin (2014) and Beltrama (2018), I will show that these two types of *totally* differ in meaning and distribution, and that discourse pragmatic *totally* behaves as a reactive PPI when it receives a pitch accent (i.e., TOTALLY). We will also compare reactive TOTALLY and reactive positive *zenzen* and show that although there is a similarity between them, there are also some differences in terms of meaning and modification structure.

5.1 *Totally* as a regular degree adverb

Let us first look at the regular semantic *totally*. As Beltrama (2018) observes, the semantic *totally* is neutral regarding polarity in that it can appear in both positive and negative environments:

(107) a. *The bus is totally full.*
b. *I totally agree with you.* (Beltrama 2018: 1)

(108) a. *The bus is not totally full.*
b. *I don't totally agree with you.* (Beltrama 2018: 3)

13 I thank Thomas Grano for the variable discussion regarding this point.

In this respect it is different from the regular semantic *totemo* 'very', which behaves as a PPI (see Section 2.1).

Regarding the meaning of semantic *totally*, following Kennedy and McNally (2005), I assume that semantic *totally* has the following denotation (*S* stands for a scale):

(109) $[\![\text{totally}]\!] = \lambda G \lambda x . \exists d [d = \max(S_G) \wedge G(d)(x)]$
(Based on Kennedy and McNally's (2005: 369) analysis of *completely*)

Regarding pragmatic function, semantic *totally* is unspecified and can be used for both emphasis and attenuation.

5.2 TOTALLY as a reactive intensifier

Let us now turn to the meaning and use of pragmatic *totally*. Unlike semantic *totally*, pragmatic *totally* is a positive polarity item, as noted by Irwin (2014), McCready and Schwager (2009), and Beltrama (2018) (all caps indicate pitch stress):

(110) *You {should/*shouldn't} totally clock on that link! Its's awesome.*
(Beltrama 2018: 220–221)

(111) a. *I TOTALLY hate Jamie's new boyfriend.*
b. **I don't TOTALLY hate Jamie's new boyfriend.*
(OK on manner reading of totally) (Irwin 2014: 62)

Furthermore, outside of the polarity perspective, it has been observed that pragmatic *totally* can only appear in limited environments. For example, McCready and Schwager (2009) observe that pragmatic *totally* can appear in assertions, advice imperatives, or rhetorical questions, but cannot appear in exclamatives, command imperatives, or wh-exclamatives:

(112) a. *Ilaria is totally coming to the party.* (assertion)
b. A: *Should I go to the party?*
B: *Totally go, dude!* (advice imperative)
c. [Said to a lazy colleague] (rhetorical question)
Who totally didn't do their work yesterday?
(McCready and Schwager 2009)

(113) a. **What a big car John totally bought!* (exclamatives)
b. **Totally get ready for school right now!* (command imperative)
c. **Who totally went to the party?* (information seeking question)
(McCready and Schwager 2009)

Regarding the meaning of pragmatic/expressive *totally*, McCready and Schwager (2009) propose that it conventionally implicates that the speaker is maximally epistemically committed to their justification for their use of the proposition (the information of tense and world are omitted):[14]

(114) [[totally-sup]]: $\langle t^a, t^c \rangle$
= λp. [the speaker is maximally epistemically committed to herjustification for her use of p] (McCready and Schwager 2009)

Beltrama (2018) investigates the environment in which pragmatic *totally* arises from the perspective of discourse structure and claimed that pragmatic *totally* is used only in discourse moves that allow for the possibility of not adding p to the Common Ground of the conversation – that is, subjective, outlandish, and responsive assertions. He also claims that pragmatic *totally* signals that the speaker believes that there should be no option other than adding p to the CG.

In the above, we considered the meaning of pragmatic *totally* and the environment in which it occurs, but it is important to note that when the pragmatic *totally* receives a pitch accent, it has a reactive function (Irwin 2014; Beltrama 2018):

(115) Dionne: *Hello? There was a stop sign.*
Cher: *I TOTALLY paused.* (Based on Irwin 2014)

Beltrama (2018) claims that TOTALLY is sensitive to the nature of the previous move in discourse. If the previous utterance is a question or a negative assertion ("not p"), the sentence with TOTALLY is natural, but if the previous utterance is a simple assertion p, TOTALLY is not licensed:

14 Superscript c stands for a CI type, and Potts (2005) assumes that the expression with this type is interpreted based on a so-called CI application, which takes an at-issue element as its argument and produces a CI. Crucially in this application, the at-issue element is simultaneously passed up to the above node (see Potts (2005) for the detailed type system and interpretation rule).

(116) a. John: *Did Luke get married at 25?* (Question whether *p*)
Kim: *Yes, he TOTALLY got married at 25.*
b. John: *Luke didn't get married at 25.* (¬*p*)
Mark: *No! What are you talking about! He TOTALLY got married at 25.*
c. John: *Luke got married at 25.* (Asserts *p*)
Kim: # *Yes! He TOTALLY got married at 25.* (Beltrama 2018: 249)

Beltrama (2018) uses the idea of Verum Focus to analyze the reactive *TOTALLY*. Verum Focus is a particular kind of focus that emphasizes the polarity of the proposition in contrast to an antecedent with different polarity (Hohle 1992; Romero and Han 2004; Gutzmann and Castroviejo 2011). The point to note here is that the yes–no question does not have polarity exactly opposite to *p*, but there is a kind of contrast: The yes-no question denotes the set of its answers, that is, {*p*, *not p*}, and "not *p*" in the set contrasts with *p* in *TOTALLY*(*p*).

5.3 Comparison with reactive *zenzen*

In the previous section, I showed that English *totally* also has a reactive attitudinal usage. In this section, we briefly compare pragmatic *TOTALLY* and reactive (positive) *zenzen*.

Given that pragmatic *TOTALLY* and reactive *zenzen* are similar in that they signal that there is a contrast in polarity between the at-issue proposition and the proposition assumed in the previous utterance in terms of polarity. However, there are several differences between them. First, reactive *TOTALLY* is a sentential modifier, while reactive (positive) *zenzen* is a degree adverb that combines with a gradable predicate (including gradable adjective, gradable verbs).

Second, unlike reactive *TOTALLY*, positive *zenzen* does not need to receive stress. This suggests that reactive *zenzen* has nothing to do with Verum Focus.

Finally, reactive *TOTALLY* can be used as a reply to a non-biased question, while reactive *zenzen* cannot:

(117) Question (= non-biased)
A: *Koko-no raamen doo?*
here-GEN ramen how
'How is this ramen?'
B: *??Zenzen oisii-yo.*
ZENZEN tasty-PRT
'It is *zenzen* tasty.'

(118) Question (= biased)
A: *Koko-no raamen amari oisiku-nai-to kii-ta-do doo?*
here-GEN ramen all that tasty-NEG-that hear-PST-but how
'I heard that the ramen in this restaurant is not that tasty. What do you think?
B: *Zenzen oisii-yo.*
ZENZEN tasty-PRT
'It is *zenzen* tasty.'

This point contrasts with the pragmatic *TOTALLY*, which can be used as a reply to both unbiased and biased questions (Beltrama 2018):

(119) a. Kim: *Did Luke get married at 25?* (Unbiased)
Alex: *#He REALLY did!*
Alex: *√He TOTALLY did!*
b. Kim: *Are you sure that Luke got married at 25?* (Epistemically biased)
Alex:*√He REALLY did!*
Alex:*√He TOTALLY did!* (Beltrama 2018: 253)

Interestingly, *REALLY* is only natural for epistemically biased questions (See also Romero and Han 2004). In this respect, *REALLY* is more similar to positive *zenzen*.

6 Conclusion

In this chapter, I examine the reactive and non-reactive usage of scalar adverbs and intensifiers in Japanese and English, with a particular focus on *totemo*, *zenzen*, *possibly*, and *totally*, and argue that significant differences exist between the two with respect to meaning and polarity sensitivity (distributional patterns). The differences between the two can be summarized as follows:

(120) a. *totemo* < non-reactive (PPI, emphatic, property-oriented); reactive (NPI, emphatic, modality-oriented)
b. *zenzen* < non-reactive (NPI, emphatic, property-oriented); reactive (PPI, emphatic, property-oriented)
c. *possibly* < non-reactive (PPI, attenuating, modality-oriented); reactive (NPI, emphatic, modality-oriented)

d. *totally* < non-reactive (neutral in terms of polarity, emphatic/attenuating, property-oriented)
reactive (PPI, emphatic, proposition-modifying)

Non-reactive polarity items are not sensitive to discourse structure, measuring degree at the semantic level. For example, non-reactive *totemo* 'very', *zenzen* 'at all', and *totally* measure the degree of the attribute of the gradable predicate, while the non-reactive *possibly* only measures the possibility of the proposition at the semantic level. In this study, I assumed that their licensing environments derive from their lexical meanings and functions. For example, *totemo* 'very' in non-reactive use denotes a high degree meaning, and has a pragmatic function of emphasis. Thus, it cannot appear in negative sentences (when used in negative sentences, it does not give rise to "emphasis," instead implying attenuation). The NPI *zenzen* 'at all' also functions to express emphasis, but has the lexical meaning of "less than a standard by a large amount," and can only express the meaning of emphasis when co-occurring with negation. As for the non-reactive *possibly*, it is a sentential modifier and has a pragmatic function of attenuation; thus, it behaves as a PPI and cannot be in the semantic scope of negation. Semantic *totally* is neutral with respect to polarity and can express an emphatic meaning in a positive environment, or an attenuating meaning in a negative sentence. Thus, we can say that their polarity sensitivity/distribution is regulated in terms of their lexical meaning/function and their interaction with operators in the sentence.

In contrast, reactive polarity items are sensitive to discourse structure, and their polarity properties are determined by their relation to the proposition in the previous context. Reactive *totemo* and *possibly* behave as NPIs, emphasizing the impossibility of the proposition in a context where it is expected to be true. In contrast, reactive *zenzen* and emphatic *TOTALLY* behave as PPIs, emphasizing the truth of a proposition/degree of a property in a context where they are not expected to be false/expected to be below a standard. Thus, the polarity sensitivity of reactive polarity items comes from the reversal of expectation and the exact direction of reversal is item specific; it can be a reversal of a positive expectation or a reversal of a negative expectation). From the perspective of speech acts, this kind of reversal can be viewed as an objection to an already established assumption and may be related to a kind of metalinguistic objection.

I hope this paper has clarified that polarity-sensitive items exist, whose distribution patterns are not regulated by syntactic or semantic mechanisms such as negation and downward-entailing operators/non-veridical operators such as conditional, questions, and modal (e.g., Ladusaw 1980; Giannakidou 1998), but rather

constrained because of its pragmatic function of objection to a previous utterance/ already established assumption.

Finally, I would like to consider the relationship between non-reactive polarity item and reactive polarity item in terms of scalarity. In this paper I demonstrated that reactive and non-reactive polarity items are different in terms of function. However, in terms of scalarity, they share the same scalar component. For example, the reactive use of *totemo* and *zenzen* have the same scalar meaning of "greater than a standard by a large amount" as the non-reactive *totemo* 'very'/ *zenzen* 'at all.' Furthermore, the reactive *totally* and the regular non-reactive *totally* share the scalar meaning of 'maximum.' This suggests that scalarity is ubiquitous and can be used in a multidimensional fashion (Sawada 2010, 2018).

One puzzling point is the relationship between ordinary *possibly* and intensifier NPI *possibly*. In this paper, I considered that the former is a PPI to express low probability and the latter is an NPI to emphasize improbability at the non-at-issue level. Intuitively, they do not seem to share the same pragmatic function, i.e., the former has an attenuating function, while the latter has an emphatic function. Is there any similarity between the two in terms of scalarity? Although no relationship is evident between the two in terms of scale structure, I would like to consider that historically they have had a similarity. Originally, the intensifier NPI *possibly* may have behaved as a minimizer (Quirk et al. 1985) with a low degree. If interpreted in the scope of negation like the usual minimizer *a bit*, the sentence created a flavor of emphatic denial. However, since *possibly* developed as an expressive and could no longer enter the scope of negation, it came to emphasize the degree of *can't/couldn't*. This is just a speculation and more detailed investigation is necessary for how intensifier *possibly* developed.

In the future, a more detailed discussion of the relationship between reactive and non-reactive polarity is necessary in terms of polarity sensitivity as well. Considering the phenomenon of Japanese and English intensifiers, the polarity sensitivity of secondary reactive intensifier is inversely related to that of the corresponding non-reactive use of the intensifier.[15] For example, while non-reactive normal *totemo* 'very' and *possibly* are PPIs, reactive *totemo* and *possibly* are NPIs. As for *zenzen*, the non-reactive *zenzen* is an NPI, but the reactive *zenzen* is a PPI. For *possibly*, the non-reactive *possibly* does not have polarity (i.e., it can appear in both positive and negative environments), while the reactive *possibly* is an NPI. Thus, they seem to divide the labor in terms of polarity sensitivity. It appears that the different polarity sensitivities clarify the functional properties of each, but the phenomenon of reversal of polarity sensitivity and its motivation require further investigation.

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