Polarity sensitivity and update refusal: the case of the Japanese negative *totemo* 'very'

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Abstract. The Japanese intensifier *totemo* 'very' can intensify the degree of a gradable predicate. However, *totemo* also can intensify a 'negative' modal statement. What is puzzling about the negative *totemo* is that, unlike regular emphatic negative polarity items (NPIs), such as *an inch* and *the least bit*, (i) the negative *totemo* cannot be within the scope of negation, and (ii) it denotes a high rather than low scalar value. I argue that the negative *totemo* is not a logical NPI, which is licensed by negation or downward-entailing/non-veridical operators in the logical structure. Rather, it is an expressive that intensifies the unlikelihood or impossibility of a given proposition and refuses to update the common ground (the context set) with the at-issue proposition. It will be shown that the refusal function of the negative *totemo* forces the at-issue proposition to occur in a negative environment. This paper shows that there are polarity-sensitive expressions, i.e. discourse-oriented polarity items, whose distributions are restricted by their pragmatic functions.

Keywords: intensification, update refusal, polarity sensitivity, expressives, NPI-PPI

1 Introduction

The Japanese intensifier *totemo* 'very' can intensify a degree associated with a gradable predicate:

(1) Kono ie-wa   totemo {ookii/*ookiku-nai.}
     This   house-TOP very   big/big-NEG
     'This house is very big'

This use of *totemo* is a positive polarity item (PPI) because it cannot co-occur with logical negation, as in (1).[1] Interestingly, however, *totemo* also can intensify a negative modal statement:

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[1] Note that if we put the contrastive marker *wa* after *totemo ookiku* 'very big', (1) with negation becomes natural. However, in that case the sentence is interpreted as emphatic/contrastive negation. See Szabolcsi (2004) for the detailed discussions on the properties of PPIs.

(2) a. Tetuya-o   suru-nado totemo   {deki-nai/*dekiru}.
         Staying up all night-ACC do-NADO TOTEMO can-NEG/can
         'Staying up all night is impossible.' (I am emphasizing the impossibility.)

     b. Sonna koto boku-ni-wa totemo   muri-desu.
         Such thing I-to-TOP   TOTEMO impossible-PERF.HON
         'It is impossible for me to do such a thing.'
         (Implication: I am emphasizing the impossibility.) (Ability)

     c. Taro-ga   siken-ni ukaru-nado totemo   {arisooni-nai/*arisoo-da}.
         Taro-NOM exam-in pass-NADO TOTEMO likely-NEG/likely-PRED
         'It is unlikely that Taro will pass the exam.'
         (Implication: I am emphasizing the unlikelihood.) (Epistemic)

     d. Ame-wa   totemo   yami-soo{-ni nai/*-da}.
         Rain-TOP TOTEMO stop-seem-to NEG/PRED
         'The rain do not seem to stop.'
         (Implication: I am emphasizing the unlikelihood.)(Epistemic)

Descriptively, in (2a) and (2b), *totemo* emphasizes a modal statement that is concerned with ability. In (2a), *totemo* emphasizes that "I cannot stay up all night," and in (2b), it emphasizes that "I cannot do such a thing." On the other hand, in (2c) and (2d), *totemo* emphasizes an epistemic modal statement. In (2c), *totemo* emphasizes the modal statement that "Taro is unlikely to pass the exam," and in (2d) it emphasizes the modal statement that "the rain does not seem to stop." [2] The important point of *totemo* in (2) is that it only appears in a negative environment (e.g., Morita 1989; Watanabe 2001). The positive counterparts in (2) are all ill formed. Thus, *totemo* in (2) seems to behave as a negative polarity item (NPI) rather than a PPI. This function is surprising because it means that, depending on the environment, *totemo* can behave as both a PPI and an NPI. In natural language PPIs and NPIs are lexically distinct, and there seems to be no lexical element that behaves as both a PPI and an NPI depending on context.

   However, if we consider the meaning of the negative *totemo* in detail, it has several puzzling and unique properties that ordinary scalar or emphatic NPIs lack. First, unlike

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[2] Note that *totemo* in (2) can be paraphrased by the idiomatic expression *totemo-janai-ga* 'lit. very-NEG-although':

 (i) Tetuya-o   suru-nado {totemo/totemo.ja.nai.ga}   deki-nai.
      Staying up all night-ACC do-NADO TOTEMO/TOTEMO.JA.NAI.GA can-NEG
      'Staying up all night is impossible.'
      (Implication: I am emphasizing the impossibility.)

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

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

typical NPIs, the negative *totemo* never falls within the scope of negation. Second, unlike regular "emphatic NPIs" (e.g., *an inch* or, *the least bit*) (Israel 1996, 2001), *totemo* denotes a high rather than a low scalar value. Is *totemo* in (2) really an NPI? Why is it that *totemo* in (2) has to appear in a negative context?

This paper investigates the meaning of the negative *totemo*, claiming that the negative *totemo* is not a logical NPI which is licensed by negation and downward-entailing or non-veridical operators. Rather, it is a conventional implicature-triggering expression or expressive that intensifies the unlikelihood or impossibility of a given proposition and refuses to update the common ground (the set of mutually accepted or pragmatically presupposed propositions) with the at-issue proposition (the proposition without modality and negation). This study argues that it is the refusal function of the negative *totemo* that forces the at-issue proposition to occur in a negative environment. It shows that there are polarity sensitive expressions (i.e. discourse-oriented NPIs) that are not licensed by a (logical) operator, but are restricted by their not-at-issue or pragmatic function.

This paper is structured as follows. Section 2 details certain puzzling properties of the negative *totemo*. Section 3 shows that these puzzles can be explained if we assume that the negative *totemo* is an expressive or CI. Section 4 analyzes the scalar meaning and refusal function of the negative *totemo* in terms of the theory of information update and multidimensional composition system. Section 5 considers the relationship between the negative *totemo* and modality and shows that not all modal expressions co-occur with the negative *totemo*. It will be shown that the negative *totemo* can be a diagnostic to distinguish between gradable modal expressions and non-gradable modal expressions. Section 6 concludes and makes suggestions for further research.

2 Puzzles

Before proceeding to the semantic analysis of the negative *totemo*, let us observe the puzzling properties of the negative *totemo* with respect to polarity sensitivity by comparing it with typical NPIs.

The first puzzling property of the negative *totemo* is that, unlike typical NPIs, it cannot fall within the scope of negation. To understand this point, let us first consider the general properties of PPIs and NPIs. Descriptively speaking, NPIs are items licensed by negation:[3]

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[3] Note, however, that many NPIs appear in a wide range of contexts beyond negation such as the downward quantifier *few*, the antecedent of a conditional, a question, a *before* clause, etc. For example, the minimizer NPI *give a damn* can appear in the antecedent of a conditional:

(i) If you give a damn about me, you would help me out. (Chierchia 2013: 58)

Researchers have investigated how the distribution patterns of negative polarity items can be theoretically explained. In the current literature, there are two major approaches to polarity sensitivity: the downward-entailing approach (e.g. Ladusaw 1979; Chierchia 2013) and the non-veridicality approach (Zwarts 1995; Giannakidou 1998; 2011).

(3) a. Tom isn't the least bit tired. (NOT > the least bit)
     b. *Tom is the least bit tired.

Licensing normally means that the NPI must be in the local scope of negation.
    On the other hand, PPIs are consistently assumed to be blocked at the local scope of negation:

(4) a. Tom's idea is rather attractive.
     b. *Tom's idea isn't rather attractive. (NOT > rather)

Here, (4) with negation is odd. Let us now consider the polarity sensitivity of the negative *totemo*. If we only look at the distribution pattern, the negative *totemo* looks like an NPI because it cannot arise in a positive environment.[4]

(5) Tetuya-o   suru-nado totemo   {deki-nai/*dekiru}.
     Staying up all night-ACC do-NADO TOTEMO can-NEG/can
     'Staying up all night is impossible.'
     (Implication: I am emphasizing the impossibility.)

    However, it is puzzling that, unlike typical NPIs, the negative *totemo* never falls within the scope of negation. The sentence (5) with negation cannot mean that "it is not the case that I am emphasizing the possibility." Why is it that the negative *totemo* cannot fall under the scope of negation?
    Another puzzling property of the negative use of *totemo* is concerned with its scalar value. Unlike other emphatic NPIs, the negative *totemo* has a high, rather than a low, scalar value. Israel (1996, 2001) proposes that there are four types of scalar polarity items (i.e., emphatic NPIs (e.g., *a wink*, *an inch*, *the least bit*), attenuating NPIs (e.g., *much*, *all that*), emphatic PPIs (e.g., *awfully*, *insanely*), and attenuating PPIs (e.g., *sorta*, *rather*, *somewhat*), and claims that emphatic NPIs have a low scalar value. However, the negative *totemo* has a high scalar value (despite the fact that it has an emphatic function).[5] Why does the negative *totemo* fall outside Israel's typology?

3   The meaning of the negative *totemo* is an expressive

In section 2, we observed that the negative *totemo* is different from usual NPIs in that (i) it is not interpretable within the scope of negation and (ii) it has a high rather than a low scalar value. In this section we will argue that these properties can be explained if we consider that the negative *totemo* is an expressive or conventional implicature (CI)-triggering expression.

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[4] Strictly speaking, the negative *totemo* looks like a strict NPI because it can only arise with a negation. For example, it cannot arise in the antecedent of a conditional:

(i) *Totemo deki-reba, renraku-kudasai.
      TOTEMO can-COND call-please
      'Intended: Please call me if you really can do it.'

[5] As for the semantic use of *totemo*, it naturally corresponds to the "emphatic PPIs" type in Israel's typology.

3.1 The negative *totemo* is an expressive/CI

It is natural to consider that the negative *totemo* is an expressive. Roughly speaking, expressives express a certain type of evaluative attitude or emotion (e.g., amazement, pleasure, likes, and dislikes). The typical examples of expressive are *damn* and *man*:

(6) a. I have to mow the damn lawn. (Potts 2005: 7)
    b. Man, I got an A on my calculus test! (McCready 2009: 675)

Damn in (6a) expresses a speaker's heightened emotion toward the lawn (see Potts 2005, 2007). On the other hand, *man* in (6b) expresses an emotional attitude of the speaker toward the proposition (McCready 2010). We can say that the negative *totemo* is also an expressive:

(7) Tetuya-o   suru-nado totemo   {deki-nai/*dekiru}.
    Staying up all night-ACC do-NADO TOTEMO can-NEG/can
    'Staying up all night is impossible.' (I am emphasizing the impossibility.)

The negative *totemo* is an expressive in that it expresses a speaker's heightened emotion toward a given proposition (the proposition without a modal and negation). That is, it emphasizes that the given proposition is extremely unlikely or impossible. The important property of expressive is that its meaning is anchored to the speaker and the time and place of utterance (Cruse 1986; Kaplan 1999; Potts 2005, 2007). Cruse (1986) explains the property of an expressive as follows:

(8) "Another characteristic distinguishing expressive meaning from propositional meaning is that it is valid only for the utterer, at the time and place of utterance. This limitation it shares with, for instance, a smile, a frown, a gesture of impatience [. . .]" (Cruse 1986: 272).

    For instance, the expression *damn* in the abovementioned sentence has the property of an expressive in that its meaning is anchored to the speaker and the time and place of utterance (Potts 2005, 2007). The same explanation can be made for the negative *totemo*. The negative *totemo* is anchored to the speaker and time and the place of the utterance. In terms of types of meanings, negative *totemo* and other expressives can be classified as a conventional implicature (CI). In Gricean theory, CIs are considered to be part of the meanings of words, but they are independent of "what is said" (e.g., Grice 1975; Potts 2005, 2007; Horn 2007, 2013; McCready 2010; Sawada 2010; Gutzmann 2012). Furthermore, CI expressions are speaker oriented (Potts 2007). One might think that the negative *totemo* is a presupposition rather than a CI. Although there is a theoretical debate regarding the distinction between a presupposition and a CI, this study assumes that it is not a presupposition (at least in a typical sense). It is not something taken for granted between a speaker and a hearer, rather it is the speaker's negative attitude toward an at-issue proposition. Furthermore, the truth condition of the at-issue part can be determined without the expressive meaning of the negative *totemo*. The expressive meaning of the negative *totemo* is not a precondition for determining the truth value of the at-issue part of the given sentence.

3.2 Evidence for the idea that the negative *totemo* is an expressive or a CI

There are several pieces of evidence for the idea that the negative *totemo* is an expressive or a CI.

Denial The first piece of evidence is concerned with denial. As we can see in (19) denial cannot target the CI part of *totemo*:

(9) A: Tetuya-o   suru-nado {totemo/totemo.janai.ga}
        Staying up all night-ACC do-NADO TOTEMO/TOTEMO JANAIGA
        deki-nai-daroo.
        can-NEG-EPI.MOD
        'Probably, staying up all night will be impossible for him/her.'
        (CI: I am emphasizing the degree of impossibility.)
    B: Iya sore-wa uso-da
        No that-TOP false-PRED.
        'No, that's false.'

In this conversation, speaker B is challenging to the at-issue part of (9A) (i.e., staying up all night is impossible), but not to the CI part. It is odd to consider that speaker in B is challenging to the CI part of A's utterance, because, that would mean that he/she is objecting to A's feeling. Generally speaking, we cannot object to a speaker's emotion. It is odd to say "No, that's not true!" after someone says "Ouch!" (Yusuke Kubota, personal communication.) Note that the situation becomes quite different in the case of the semantic *totemo*. The semantic *totemo* is not an expressive. As the following dialogue shows, the meaning of the semantic *totemo* can be challenged by saying (10B):

(10) A: Koko-wa totemo anzen-desu
        Here-TOP very   safe-PRED
        'It is very safe here.'
    B: Iya sore-wa uso-da
        No that-TOP false-PRED.
        'No, that's false.' (It is not the case that this place is very safe.)

This clearly shows that the meaning of the adjective modifying *totemo* is part of "what is said."

Embeddability/scope The second piece of evidence for the idea that the negative *totemo* is independent of "what is said" is that the negative *totemo* cannot be under the scope of logical operators. Let us consider this on the basis of the example in which the modal negative sentence with *totemo* is embedded under another modal expression such as *daroo* 'probably':

(11) Tetuya-o   suru-nado {totemo/totemo.janai.ga}
        Staying up all night-ACC do-NADO TOTEMO/TOTEMOJANAIGA
        deki-nai-daroo.
        can-NEG-EPI.MOD

'Probably, 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 a possibility of an emphatic emotion toward the impossibility. The speaker's emphatic attitude is not within the scope of the epistemic operator *daroo* 'probably.' Note that this phenomenon cannot be observed in the semantic *totemo*. In the following sentence, the meaning of *totemo* falls within the scope of *daroo*.

(12) Taro-wa   totemo isogasii-daroo.
Taro-TOP very   busy-EPI.MOD
'Probably Taro is very busy.'

Let us now consider the case where the sentence with the negative *totemo* occurs in the past tense:

(13) Anna sigoto boku-ni-wa totemo   tae-rare-na-katta.
Such job   I-to-TOP   TOTEMO endure-can-NEG-PAST

At-issue: I could not do that kind of job.
Non-at-issue: I am emphasizing the impossibility of doing the job.

Here, the speaker is not reporting that in the past he or she was emphasizing the impossibility. The speaker's emotion itself is anchored to the utterance situation and it cannot be in the scope of the past tense. On the other hand, in the case of the adjective modifying the use of *totemo*(i.e. the semantic *totemo*), if it is embedded in the past tense, its meaning is within the scope of the past tense:

(14) Kono mise-no   keeki-wa totemo ooki-katta.
This store-GEN cake-TOP very   big-PAST
'This store's cake was very big.'

In (14), the speaker reports that in the past the store's cake was very big. Given the above arguments, we can conclude that the negative *totemo* is a CI or an expressive, and its meaning is logically and dimensionally independent of "what is said."

3.3 Discussions

Let us now revisit the puzzles. Earlier, we observed that unlike typical emphatic NPIs, the negative *totemo* has the following puzzling properties:

(15) a. The negative *totemo* is never within the scope of negation.
      b. The negative *totemo* has a high rather than a low scalar value.

These properties make sense if we consider that the negative *totemo* is an expressive or a CI. First, as for the first property, the negative *totemo* is never within the scope of negation because it is not a logical NPI (which is licensed by negation and downward-entailing operators(e.g., Ladusaw 1980)/non-veridical operators (e.g., Giannakidou 1998)). Rather it is a special type of expressive that conveys a negative speaker's emotion. Note that in the typical emphatic, NPIs contribute to "what is said" because its meaning can be targeted by saying "No, that is not true":

(16) A: There aren't any cookies left.
    B: No, that is not true.

(17) A: Dare-mo paathi-ni ika-na-katta.
      Who-MO party-to go-NEG-PAST
      'No one went to the party.'
    B: Iya sore-wa uso-desu.
      No that-TOP false-PRED.POLITE
      'No, that is false.' (Tom went to the party.)

The denial in (16B) and (17B) can target the NPI segments. Furthermore, as the following examples show, typical NPIs (the minimizer NPI and *mattaku* 'at all') are interpreted within the scope of the modal:

(18) a. Hito-ri-mo   paathi-ni ika-nai-daroo.
     One-CL-even party-to go-NEG-PAST-EPI.MOD
     'Probably not even one person will come to the party.'
  b. Taro-wa   mattaku isogasiku-nai-daroo.
     Taro-TOP at all   busy-NEG-EPI.MOD
     'Probably Taro is not busy at all.'

As for the second property, the negative *totemo* has a high rather than a low scalar value because it does not make use of negation to create an emphatic meaning. In the typical emphatic NPIs, on the other hand, negation plays an important role in creating an emphatic meaning. For example, it has been consistently assumed that the emphatic minimizers NPIs, such as *lift a finger*, denote a minimum degree and it is exhaustified by silent 'even' (See, e.g., Chierchia (2013) and references therein).

(19) He didn't lift a finger to help me.

Roughly speaking, (19) means that "he didn't help even for a minimal degree." The crucial point is that if there is no negation in (19), an emphatic meaning does not arise and becomes infelicitous.

On the other hand, in the case of the negative *totemo*, negation itself is not necessary to create an emphatic meaning. Naturally then, the following question will arise. Why must the negative *totemo* be used in a negative environment? If the emphatic meaning or intensity is created independently from negation, there seem to be no reason for the negative *totemo* to appear in a negative environment. The following section claims that a negative meaning is necessary because it has the pragmatic function of refusing to update the common ground with the at-issue proposition (the proposition without negation and modality). This study demonstrates that it is the refusal function of the negative *totemo* that causes it to occur in a negative environment.

4 Analysis

4.1 Semantic *totemo*

We begin by formally analyzing the meanings of *totemo*. The semantic *totemo* such as (20) intensifies the degree of an adjective at the at-issue or semantic level:

(20) Kono ie-wa   totemo ookii.
     This   house-TOP very   big
     'This house is very big.'

I assume that the semantic *totemo* and the adjective *ookii* 'big' have the following meanings (The superscript *a* stands for an at-issue type):

(21) $[[totemo_{SEM}]] :< d^a, < e^a, < i^a, < s^a, t^a >>>, < e^a, < i^a, < s^a, t^a >>>>=$
$\lambda G_{ADJ} \lambda x \lambda t \lambda w \exists d[d >!!STAND \wedge G(d)(x)(t)(w)]$

(22) $[[ookii]]: < d^a, < e^a, < i^a, < s^a, t^a >>>>=$
$\lambda d \lambda x \lambda t \lambda w.big(x)(t)(w) = d$

The intensifier *totemo* takes a gradable predicate G, denoting 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)(cf. Kennedy and McNally's (2005) analysis of the English *very*). As for the meaning of gradable predicates themselves, this study assumes that they represent relationships between individuals and degrees (Seuren 1973; Cresswell 1976; von Stechow 1984; Klein 1991; Kennedy 2007).

4.2 The negative *totemo*

Let us now investigate the meaning of the negative *totemo*:

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

In (23) the speaker is intensifying the degree of unlikelihood or impossibility of a negative modal predicate at the level of CI. Theoretically, I claim that the negative *totemo* is "mixed content" (e.g., McCready 2010; Gutzmann 2012; Sawada 2014), taking a negative modal predicate in both at-issue and CI levels while intensifying the degree only at the CI level (The left side of ♦ is an at-issue domain, and the right side of ♦ is a CI domain):

(24) $[[totemo_{NEG}]] :<< d^a, < p^a, < i^a, < s^a, t^a >>>>, < p^a, < i^a, < s^a, t^a >>>> \times <<$
$d^a, < p^a, < i^a, < s^a, t^a >>>>, < p^a, < i^a, < s^a, t^s >>>>=$
$\lambda G_{NEG.MODAL} \lambda p \lambda t \lambda w \exists d[d > STAND \wedge G(d)(p)(t)(w)]♦$
$\lambda G_{NEG.MODAL} \lambda p \lambda t \lambda w \exists d[d >!!STAND \wedge G(d)(p)(t)(w)]$ (where $G_{NEG.MODAL}$ is a negative modal predicate.)

The crucial point of this analysis is that the negative modal expression as a whole (i.e., modality plus a negative element) is assumed to be a single gradable predicate. This idea is supported by the fact that they can combine with scalar modifiers/measure phrases:

(25)   a.   100 paasento deki-nai.
           100 percent   can-NEG
           '100 percent impossible'

       b.   Yaya arisoo-ni nai.
           A bit likely-to NEG
           'A bit unlikely'

I assumes that similar to regular adjectives, the negative modal expressions such as *deki-nai* 'impossible' and *arie-nai* 'unlikely' are gradable predicates (cf. Lassiter 2011; Klecha 2012):

(26)   a. $[[deki-nai]] :< d^a, < p^a, < i^a, < s^a, t^a >>>>= \lambda d\lambda p\lambda t\lambda w.impossible_{ABLE}(p(t)(w)) = d$

       b. $[[soo-ni-nai]] :< d^a, < p^a, < i^a, < s^a, t^a >>>>= \lambda d\lambda p\lambda t\lambda w.unlikely(p(t)(w)) = d$

In some cases, the negative *totemo* modifies an expression that inherently has both a negative and modal meaning within the single word:
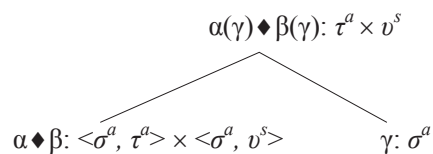
(27)   Sonna koto boku-ni-wa totemo   muri-desu.
       Such   thing I-to-TOP   TOTEMO impossible-PERF.HON
       'It is impossible for me to do such a thing.'
       (CI: I am emphasizing the impossibility.) (Ability)

Muri 'impossible' in (27) has the same meaning as *deki-nai*:

(28) $[[muri]] :< d^a, < p^a, < i^a, < s^a, t^a >>>>= \lambda p\lambda t\lambda w.impossible_{ABILITY}(p(t)(w)) = d$

The negative *totemo* is then combined with a negative modal expression using mixed application (McCready 2010; Gutzmann 2012):

(29)

$$\alpha(\gamma) \blacklozenge \beta(\gamma): \tau^a \times \upsilon^s$$

$$\alpha \blacklozenge \beta: <\sigma^a, \tau^a> \times <\sigma^a, \upsilon^s> \qquad \gamma: \sigma^a$$
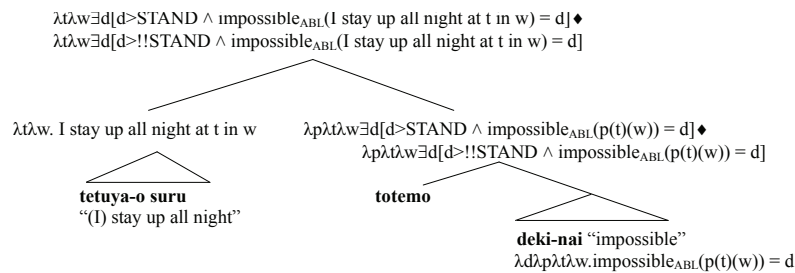
Superscript *a* stands for an at-issue type, and superscript *s* stands for a shunting type. Superscript s is used for the semantic interpretation of CI involving an operation of shunting (cf. Potts's (2005) CI application).

The following figure illustrates part of a semantic derivation of (23):

(30)

$\lambda t \lambda w \exists d[d > \text{STAND} \wedge \text{impossible}_{\text{ABL}}(\text{I stay up all night at t in w}) = d] \blacklozenge$
$\lambda t \lambda w \exists d[d > !!\text{STAND} \wedge \text{impossible}_{\text{ABL}}(\text{I stay up all night at t in w}) = d]$

$\lambda t \lambda w.$ I stay up all night at t in w $\lambda p \lambda t \lambda w \exists d[d > \text{STAND} \wedge \text{impossible}_{\text{ABL}}(p(t)(w)) = d] \blacklozenge$
$\lambda p \lambda t \lambda w \exists d[d > !!\text{STAND} \wedge \text{impossible}_{\text{ABL}}(p(t)(w)) = d]$

tetuya-o suru   **totemo**
"(I) stay up all night"

deki-nai "impossible"
$\lambda d \lambda p \lambda t \lambda w. \text{impossible}_{\text{ABL}}(p(t)(w)) = d$

Finally, the following two-dimensional meanings for the sentence (23) are obtained:

(31)

$$\exists d[d > \text{STAND} \wedge \text{impossible}_{\text{ABILITY}}(\text{I stay up all night at } t_0 \text{ in } w_0) = d)] \qquad \leftarrow \text{at-issue}$$
$$\bullet$$
$$\exists d[d > !!\text{STAND} \wedge \text{impossible}_{\text{ABILITY}}(\text{I stay up all night at } t_0 \text{ in } w_0) = d] \qquad \leftarrow \text{CI}$$
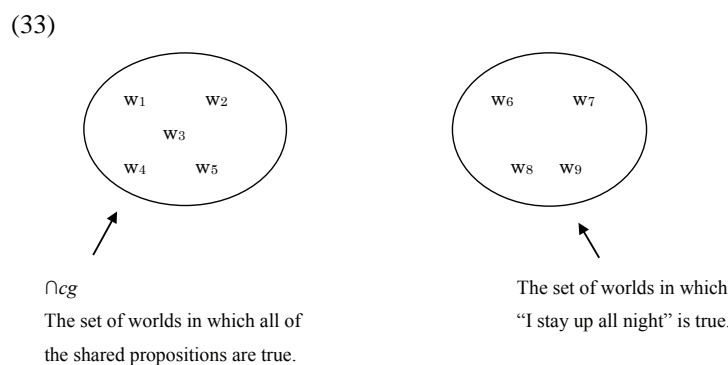
We now consider the question raised earlier: Why must the negative *totemo* be used in a negative environment? I argue that the negative *totemo* must appear in a negative context because it is a special type of negative expressive that signals that the speaker refuses to update the common ground (*cg*) with the at-issue proposition (the proposition without modality and negation). I revise the meaning of the negative *totemo*, as in (32) (∩*cg* is the context set, which is the set of worlds in which all of the shared propositions (*cg*) are true):

(32) (REVISED) $[[totemo_{NEG}]]$ $:<< d^a, < p^a, < i^a, < s^a, t^a >>>>, < p^a, < i^a, < s^a, t^a >>>> \times << d^a, < p^a, < i^a, < s^a, t^a >>>>, < p^a, < i^a, < s^a, t^s >>>> =$
$\lambda G_{NEG.MODAL} \lambda p \lambda t \lambda w \exists d[d > STAND \wedge G(d)(p)(t)(w)] \blacklozenge$
$\lambda G_{NEG.MODAL} \lambda p \lambda t \lambda w \exists d[d > !!STAND \wedge G(d)(p)(t)(w)] \wedge p(t) \cap (\cap cg) = \varnothing$
(where $p(t)$ is the set of worlds in that the tensed proposition $p(t)$ is true (Stalnaker 1978) and ∩*cg* is the set of worlds that are compatible with all of the shared propositions.)

The final part of the CI component conveys that the intersection between the set of possible worlds in which the at-issue proposition is true and the context set is empty. This emptiness triggers a negative emotion of "rejection/refusal." The following situation graphically describes the situation in (23):

(33)

w1   w2   w6   w7
w3
w4   w5   w8   w9

∩*cg*   The set of worlds in which
The set of worlds in which all of   "I stay up all night" is true.
the shared propositions are true.

The above figure shows that there is no world in ∩*cg* in which the at-issue proposition (I stay up all night) is true.

5   Gradable modal predicate and non-gradable modal predicate

We now consider the relationship between modality and the negative *totemo*. So far, we have analyzed the meaning of the negative *totemo* where it co-occurs with ability modal (e.g., Morita 1989; Watanabe 2001 among others) and epistemic modal. However, it is important to notice that not all types of modality expressions can co-occur with the negative *totemo*. As the following examples show, sentential modal expressions such as *kamosirenai* 'may' and *hazuda* 'must' cannot combine with the negative *totemo*:

(34) a. * Taro-wa gakusei-de-wa   totemo   nai-hazuda.
           Taro-TOP student-PRED-TOP TOTEMO NEG-must
           'Taro must not *totemo* be a student.'
       b. *Taro-wa gakusei-de-wa   totemo   nai-daroo.
           Taro-TOP student-PRED-TOP TOTEMO NEG-EPI.MOD
           'Probably, Taro is not *totemo* a student.'
       c. *Taro-wa totemo   okane-ga   nai-ni tigainai.
           Taro-TOP TOTEMO money-NOM NEG-must
           'Taro must not *totemo* have money.'
       d. *Taro-wa gakusei-de-wa   totemo   nai-kamosirenai.
           Taro-TOP student-PRED-TOP TOTEMO NEG-may
           'Taro may not *totemo* be a student.'

I would like to claim that these sentences are ill formed because the modals in (34) are non-gradable. Note, however, that the following example is perfectly natural:

(35) Taro-ni-wa   totemo   deki-nai-hazuda.
     Taro-to-TOP TOTEMO can-NEG-must
     'It must be the case that it is *tetemo* impossible for Taro (to do it).'

Here, *totemo* is not modifying the modal expression *hazuda* but modifying the lower modal expression *dekinai*. Given the above discussion, this paper suggests that there are two types of modal expressions in Japanese, a gradable modal expression and a non-gradable modal expression:

(36) a. *dekiru* 'can' /*deki-nai* 'cannot' (Gradable)
       b. *arisoo* 'likely'/*arisoo-ninai* 'unlikely' (Gradable)
       c. *arieru* 'likely'/*arie-nai* 'unlikely' (Gradable)

(37) a. *kamoshirenai* 'may' (Non-gradable)
       b. *hazuda* 'must' (Non-gradable)
       c. *daroo* 'probably' (Non-gradable)
       d. *tigainai* 'must' (Non-gradable)

6 Conclusion

This paper investigated the meaning of the negative use of the Japanese intensifier *totemo* 'very.' It asserted that although the negative *totemo* always co-occurs with negation, it does not form a logical NPI because its meaning does not contribute to "what is said," and it is not licensed (scoped over) by negation or downward-entailing or non-veridical operators. I argued that the negative *totemo* is a conventional implicature-triggering expression or expressive that (i) intensifies the unlikelihood or impossibility of a given proposition and (ii) refuses to update the common ground (the context set) with the at-issue proposition. In addition, I claimed that it is the refusal function of the negative *totemo* that causes it to occur in a negative environment. Finally, I suggested that the negative *totemo* can be a good diagnostic for distinguishing between a gradable modal expression and a non-gradable modal expression.

The theoretical implications of this paper are that there are polarity sensitive expressions, i.e. discourse-oriented NPIs, in which the expressive dimension plays an important role in explaining the source of polarity sensitivity. This implication is theoretically significant because unlike semantic NPIs, the distributions of discourse-oriented NPIs are restricted by their pragmatic functions. Future studies must further investigate the difference between semantic NPIs and discourse-oriented NPIs. Furthermore, I would like to investigate the extent to which "update refusal-oriented NPIs" (or discourse-oriented NPIs) are pervasive in natural language. It seems that in Japanese, there are various related phenomena that behave similarly to the negative *totemo*. For example, the non-at-issue use of *nani-mo* 'lit. what-also/even' has to appear in a negative modal environment, but it is not scoped over by negation:

(38) Nani-mo ima sore-nituite hanasu-hituyoo-wa {nai/*aru}.
　　 What-MO now it-about　 talk-need-TOP　　 NEG/BE
　　 At-issue: You do not need to talk about it now.
　　 CI: The at-issue proposition does not need to be updated (at least for now). ($p =$ "you talk about a contextually salient topic.")

In (38), *nani-mo* conventionally implicates that the at-issue proposition does not need to be updated at least for now. Therefore, similar to *totemo*, it serves the pragmatic function of rejection. However, unlike the negative *totemo*, the rejection is mild.

References

1. Chierchia, Gennaro. 2013. *Logic in grammar: Polarity, free choice, and intervention*. Oxford: Oxford University Press.
2. Cresswell, Max J. 1976. The semantics of degree. In B. Partee (ed.), *Montague grammar*, 261-292. New York: Academic Press.
3. Cruse, Allan D. 1986. *Lexical semantics*. Cambridge, UK: Cambridge University Press.
4. Giannakidou, Anastasia. 2011. Negative and positive polarity items: licensing, compositionality and variation. In C. Maienborn, K. von Heusinger, and P. Portner (eds.), *Semantics: An International Handbook of Natural Language Meaning*, 1660-1712. Berlin: Mouton de Gruyter.
5. Giannakidou, Anastasia. 1998. *Polarity sensitivity as (non)veridical dependency*. Amsterdam: Benjamins.

6. Grice, Paul. 1975. Logic and conversation. In P. Cole and J. Morgan (eds.), *Syntax and semantics*, iii: *Speech acts*, 43-58. New York: Academic Press.

7. Gutzmann, Daniel. 2012. *Use-conditional meaning: Studies in multidimensional semantics*. Doctoral dissertation, University of Frankfurt.

8. Horn, Laurence. R. 2013. I love me some datives: Expressive meaning, free datives, and F-implicature. In D. Gutzmann and H.-M. Grtner (Eds.), *Beyond expressives: Explorations in use-conditional meaning*, 151-199. Leiden: Brill.

9. Horn, Laurence. R. 2007. Toward a Fregean pragmatics: Voraussetzung, Nebengedanke, Andeutung. In I. Kecskes and L.R. Horn (Eds.), *Explorations in pragmatics*, 39-69. Berlin: Mouton de Gruyter.

10. Israel, Michael. 2001. Minimizers, maximizers and the rhetoric of scalar reasoning. *Journal of Semantics* 18: 297-331.

11. Israel, Michael. 1996. Polarity sensitivity as lexical semantics. *Linguistics and Philosophy* 19: 619-666.

12. Kennedy, Christopher. 2007. Vagueness and grammar: The semantics of relative and absolute gradable adjectives. *Linguistics and Philosophy* 30(1): 1-45.

13. Kennedy, Christopher, and McNally, Louise. 2005. Scale structure, degree modification, and the semantics of gradable predicates. *Language* 81(2): 345-381.

14. Kaplan, David. 1999. The meaning of ouch and oops: explorations in the theory of meaning as use. M.s., UCLA.

15. Klecha, Peter. 2012. Positive and conditional semantics for gradable modals. *Proceedings of Sinn und Bedeutung* 16, 363-376.

16. Klein, Ewan. 1991. Comparatives. In A. von Stechow and D. Wunderlich (eds.), *Semantik: Ein internationales handbuch der zeitgeno¨ ssischen forschung*, 673-691. Berlin: Walter de Gruyter.

17. Ladusaw, William. 1980. *Polarity sensitivity as inherent scope relations*. New York: Garland.

18. Lassiter, Daniel. 2011. *Measurement and modality: The scalar basis of modal semantics*. Doctoral dissertation, New York University.

19. McCready, Eric. 2010. Varieties of conventional implicature. *Semantics and Pragmatics* 3(8): 1-57.

20. Morita, Yoshiyuki. 1989. *Kiso nihongo jiten* (A Dictionary of Basic Japanese). Kadokawa Tokyo: Syoten.

21. Portner, Paul. 2009. *Modality*. Oxford: Oxford University Press.

22. Potts, Christopher. 2007. The expressive dimension. *Theoretical Linguistics* 33(2): 165-197.

23. Potts, Christopher. 2005. *The logic of conventional implicatures*. Oxford: Oxford University Press.

24. Sawada, Osamu. 2014. An utterance situation-based comparison. *Linguistics and Philosophy* 37(3): 205-248.

25. Sawada, Osamu. 2010. *Pragmatic aspects of scalar modifiers*. Doctoral dissertation, University of Chicago.

26. Seuren, Piter A.M. 1973. The comparative. In F. Kiefer and N. Ruwet (eds.), *Generative grammar in Europe*, 528-564. Dordrecht: Reidel.

27. Stalnaker, Robert. 1978. Assertion. In P. Cole. (ed.), *Syntax and Semantics* 9, *Pragmatics*, 315-332. New York: Academic Press.

28. von Stechow, Arnim. 1984. Comparing semantic theories of comparison. *Journal of Semantics* 3: 1-77.

29. Szabolcsi, Anna. 2004. Positive polarity-negative polarity. *Natural Language and Linguistic Theory* 22: 409-452.

30. Watanabe, Minoru. 2001. *Sasuga! Nihongo* (Sasuga! Japanese). Tokyo: Chikuma Shobo.

31. Zwarts, Frans. 1995. Nonveridical contexts. *Linguistic Analysis* 25: 286-312.