Negative Islands and obviation by *wa* in Japanese degree questions[*]

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Abstract This paper aims to explain the observation (not previously reported) that -*wa* obviates Negative Island effects in Japanese degree questions. The explanation offered ties this obviation to epistemic implications associated with -*wa*, deriving the latter in a (Neo-)Gricean framework. The explanation relies on Fox & Hackl's (2006) view that Negative Islands in degree questions are due to the necessary failure of a Maximality Presupposition, but it abandons their proposal that such presuppositions must be calculated under the assumption that scales of degrees are invariably dense.

Keywords: Japanese -*wa*, degree questions, Negative Islands

1 Introduction

In English degree questions, *wh*-movement usually cannot cross negation (e.g. Obenauer 1984, Rizzi 1990). This so-called Negative Island effect is illustrated by the acceptability contrast between (1) and (2).

(1)   How long did Taro stay in Germany?

(2)   * How long did Taro **not** stay in Germany?

As shown in (3) and (4), the same contrast holds in Japanese. There the pattern is extended by the fact that Negative Islands are obviated by -*wa*: (5) shows that appending -*wa* to the gradable predicate *nagaku* 'long' in (4) restores acceptability.[1,2]

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1 While the semantics and pragmatics of -*wa* is a classic topic in Japanese linguistics, we are not aware of any previous description of the particle's potential to obviate Negative Island violations.

2 We are hard pressed to think of a good English translation of (5). What is clear is that true answers to (5) specify durations that exceed the actual length of Taro's stay in Germany.

(3)   Taro-wa   doitu-ni   doredake nagaku taizaisimasi-ta ka?
        Taro-TOP Germany-in how   long   stay-PAST   Q

        'How long did Taro stay in Germany?'

(4)   * Taro-wa   doitu-ni   doredake nagaku taizaisimas-**en**-desi-ta ka?
        Taro-TOP Germany-in how   long   stay-not-COP-PAST   Q

(5)   Taro-wa   doitu-ni   doredake nagaku-**wa** taizaisimas-**en**-desi-ta ka?
        Taro-TOP Germany-in how   long-WA   *stay-not-COP-PAST   Q*

We will in the following refer to occurrences of *-wa* in degree questions and their answers as *degree related*. As reflected in the translations in (6) and (7), the meaning contribution of degree related *-wa* is similar to that of English *at least* or *minimally* (e.g. Geurts & Nouwen 2007; Büring 2008; Nouwen 2010).

(6)   Taro-wa   doitu-ni   doredake nagaku-**wa** taizaisimasi-ta ka?
        Taro-TOP Germany-in how   long-WA   *stay-PAST   Q*

        'How long, minimally, did Taro stay in Germany?'

(7)   Taro-wa   doitu-ni   too-ka(-kan)-**wa** taizaisimasi-ta.
        Taro-TOP Germany-in ten-day-for-WA   *stay-PAST*

        'Taro stayed in Germany for at least ten days.'

In particular, (7) shares with its English translation the implication stated in (8), where *P* marks epistemic possibility. So by uttering (7) a speaker conveys that, as far as she knows, the duration of Taro's stay in Germany may have exceeded ten days.

(8)   *P* [Taro stayed in Germany for more than 10 days]

It seems natural to hypothesize a close connection between epistemic possibility implications contributed degree related *-wa* and its potential to obviate Negative Islands. Specifically, one might hope that the proper analysis of possibility implications derives Negative Island obviation for free. This is indeed the line of attack we will take in this paper. In doing so, we adopt the view that Negative Islands are due to necessary failure of a Maximality Presupposition (Fox & Hackl 2006; Fox 2007b; Abrusán 2007; Abrusán & Spector 2011), and we explore the possibility that *-wa* obviates Negative Islands by virtue of rendering a presupposition satisfiable that would otherwise be contradictory.

2   Hamblin sets, Maximization Failure, and scale density

We begin by reviewing Fox & Hackl's (2006) analysis of Negative Islands in degree questions. Adopting a standard approach to *wh*-interrogatives (e.g. Karttunen 1977), Fox & Hackl assume that in English degree questions, *wh*-movement derives a

property of degrees, which in turn determines a so-called Hamblin set (Hamblin 1973), a set of propositions containing possible answers to the question. The propositions in the Hamblin set result from applying the relevant property to the entities in the domain of the *wh*-phrase. So in (1), *wh*-movement derives the degree property in (9a), yielding the Hamblin set in (9b).

(9)   a. λd: d is a duration. that Taro stayed d long in Germany

       b. {that Taro stayed d long in Germany: d is a duration}

In (9), *d long* is to be read as *d long or longer*. This reading is guaranteed to be derived under the standard view that gradable predicates have an *at least* semantics, so that *long* relates an event not only to its exact duration, but to all shorter durations as well.

Parallel to (1) and (9), the negative degree question in (2) will be associated with the degree property in (10a) and the Hamblin set in (10b).

(10)   a. λd: d is a duration. that Taro did **not** stay d long in Germany

       b. {that Taro did **not** stay d long in Germany: d is a duration}

Fox & Hackl (2006) suggest that negative degree questions like (2) are ungrammatical by virtue of being semantically ill-formed. Their account adopts the assumption about question interpretation in (11), and the condition on acceptability in (12). The idea, of course, is that (1) but not (2) meets the Maximality Condition.

(11)   **Maximality Presupposition** (Dayal 1996)
       A question presupposes that its Hamblin set has a maximally informative true element, i.e. a true proposition that entails all the other true propositions in the set.

(12)   **Maximality Condition**
       The Maximality Presupposition of a question must be satisfiable, i.e. non-contradictory.

It is indeed evident that (1) satisfies this condition. The degree property in (9a) is *upward scalar*, mapping higher degrees to stronger propositions than lower degrees.[3] The set of degrees that (9a) describes moreover has a *maximum*: if the exact length of Taro's stay in Germany is, say, ten days, then ten days is the maximal duration that (9a) maps to a true proposition, and the proposition that Taro stayed for ten days (or longer) is the most informative true element of (9b). The Maximality Presupposition is then satisfied and so the Maximality Condition is met.

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3 We take the terms *upward scalar* and *downward scalar* from Abrusán & Spector (2011).

The case of (2) is somewhat less straightforward. The degree property in (10a) is *downward scalar*, mapping lower degrees to stronger propositions than higher degrees. Suppose now that length of stay in Germany is counted in full days only. In that case, the set of degrees that (10a) describes has a *minimum*: if the length of Taro's stay is exactly ten days, then eleven days will be the minimal duration that (10a) maps to a true proposition, and the proposition that Taro did not stay for eleven days (or longer) is the most informative true element of (10b). It would appear, then, that the Maximality Presupposition is satisfied and that the Maximality Condition is again met.

According to Fox & Hackl (2006), however, this appearance is misleading. They suggest that the Maximality Condition is checked by a contextually blind *Deductive System*, which indiscriminately treats all scales of degrees as dense, hence never limits itself to discrete units of measurement such as full days. In that case, the set described by the degree property in (10a) does not in fact have a minimum and so (10b) does not have a most informative true member. If the length of Taro's stay is *r*, then (10a) describes all durations longer than *r*, mapping all of them to true members of (10b). But density will prevent any of them from being the most informative, and so (2) violates the Maximality Condition after all. In the terms of Fox (2007b), (2) suffers from *Maximization Failure*.

A working assumption in our analysis of *-wa* is that in Japanese, just like in English, *wh*-movement in degree questions derives degree properties that determine Hamblin sets. So we will take (3) and (4) above to share with their English counterparts interpretations like (9) and (10), respectively.[4] Adopting Fox & Hackl's approach to Negative Islands in degree questions, we are then led straightforwardly to the hypothesis that *-wa* obviates Negative Islands by virtue of averting the derivation of Hamblin sets that would violate the Maximality Condition.

In the following, we will present and evaluate two such accounts of Negative Island obviation by *-wa*. Both accounts attempt to link the circumvention of Maximization Failure to the presence of epistemic implications. The accounts differ in how this is achieved and in how the implications in question are derived.

3   *Wa* as a modal operator?

3.1   Modal implications in the semantics

As mentioned in section 1, degree related *-wa* is similar in meaning to English *at least* and *minimally*. In their study of *at least*, Geurts & Nouwen (2007) report that it gives rise to the very same possibility implications described above for *-wa*. In fact, Geurts & Nouwen propose that the meaning of *at least* involves both possibility

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4 In our final analysis in section 4, however, we will read *d long* in (9) and (10) as *exactly d long*.

and necessity. In their view, the English translation for (7) has the meaning in (13), where *P* and *N* are epistemic possibility and necessity operators, respectively.

(13) *N* [Taro stayed in Germany for ten days or more] &
      P $\exists d[d >$ ten days & Taro stayed *d* long in Germany]

Specifically, they view (13) as the truth conditional meaning of the sentence in question, and accordingly propose that *at least* is a modal operator, introducing modal quantification at the truth conditional level through its lexical meaning.

We will now investigate, although ultimately reject, the application of such an analysis to *-wa*. To spell out a concrete account, suppose degree related *-wa* is a genuine degree operator: it combines with a degree-denoting expression, such as a measure phrase, to form a generalized quantifier over degrees. This leads us to assigning (7) a logical form like (14).[5]

(14) [ten days *wa*] λd[Taro in Germany [*d* ~~nagaku~~] stayed]

In (14), the degree phrase headed by *-wa* has moved covertly. This movement introduces lambda abstraction, creating a derived degree predicate. We take the variable abstracted over to be the degree argument of the gradable predicate *nagaku* 'long', which remains unpronounced, as indicated by the strikeout. We assume that *nagaku* relates events to durations under an *at least* semantics, as shown in (15). The lambda abstract in (14) then describes (for any given possible world) all durations up to the length of Taro's past stay in Germany. The truth conditions in (13) can then be derived straightforwardly by assigning *-wa* the denotation in (16), where *N* and *P* are the obvious functors of type (st)t.

(15) $[\![nagaku]\!] = \lambda d.\lambda e.\lambda w.\ e'$s duration in $w \geq d$

(16) $[\![wa]\!] = \lambda d_{\mathrm{d}}.\lambda f_{\mathrm{d(st)}}.Nf(d)\&P\lambda w.\exists d'[d' > d \& f(d')(w)]$

3.2 Modal obviation

The particular analysis just presented is designed to tie obviation by *-wa* to a phenomenon that Fox & Hackl (2006) refer to as *modal obviation*: Fox & Hackl observe that English negative degree questions are acceptable if negation is interpreted in the immediate scope of a necessity operator. This is illustrated by the contrast between (17) (which repeats (2)) and (18), where negation appears embedded under the epistemic necessity modal *sure*.

(17) * How long did Taro **not** stay in Germany?

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5 For readability, we use English vocabulary in logical forms, limiting Japanese to those expressions whose interpretation is under discussion.

(18)   How long are you **sure** Taro did **not** stay in Germany?

It turns out that this contrast is predicted under Fox & Hackl's (2006) account. The degree properties associated with (17) and (18) are shown in (19) (which repeats (10a)) and (20), respectively.

(19) λd: *d* is a duration. that Taro did **not** stay *d* long in Germany

(20) λd: *d* is a duration. that **N** [Taro did **not** stay *d* long in Germany]

Recall that (19) is downward scalar, mapping lower degrees to stronger propositions than higher degrees. We have seen that the Maximality Condition excludes (17) because under the density assumption, the set described by (19) cannot have a minimum: there cannot be a shortest duration exceeding Taro's actual length of stay. The property in (20) is downward scalar as well. In contrast to (19), however, the density assumption does not prevent the set it describes from having a minimum. Even under the density assumption, there is nothing logically inconsistent about a speaker being certain, for example, that Taro did not stay for ten days or more, while not being able to exclude any shorter durations of stay. So (18) is correctly predicted to pass the Maximality Condition.

3.3   Obviation by *-wa* as modal obviation

As illustrated by the contrast between (4) above and (21), modal obviation is also attested in Japanese. So it seems that Fox & Hackl's (2006) account of modal obviation can be applied to the Japanese case without modification.

(21)   [Taro-ga   doitu-ni   doredake nagaku taizaisi-**nakat**-ta koto-ga]
         Taro-NOM Germany-in how   long   stay-not-PAST   KOTO-nom
         kakuzitu-desu ka?
         certain-cop   Q
         'How long are you sure that Taro did not stay in Germany?'

As disclosed earlier, the modal analysis of *-wa* presented above is designed to make fall out Negative Island obviation by *-wa* as a case of modal obviation. Let us return, then, to the crucial example in (5) above. Consider the logical form for (5) shown in (22). It contains two lambda abstracts, the lower one introduced by movement of the degree phrase headed by *-wa* across negation, and the higher one by *wh*-movement from within that degree phrase.

(22)   how $\lambda d'$[[d' **wa**] λd[[Taro in Germany [d nagaku] stayed] **not**]]

Assuming that the moved *wh*-expression is semantically vacuous, (22) denotes the degree property in (23). It turns out that (23) can be simplified to (20) above by omitting the second conjunct in the value description (since the second conjunct is already entailed by the first).

(23) λd : *d* is a duration. that **N** [Taro did **not** stay *d* long in Germany] &
         $P\exists d'[d' > d$ & Taro did not stay d' long in Germany]

As a consequence, (5) is predicted to pass the Maximality Condition in the same way as the more transparently modalized case in (21). Obviation by *-wa* falls out as an instance of modal obviation.

3.4   Objections

The account of possibility implications and obviation by *-wa* presented above can be questioned on a number of grounds. We will focus here on two objections that are independent of the compositional particulars of the analysis offered, in particular the assumption that degree related *-wa* is a degree operator that can take clausal scope.

One potentially disappointing feature of the account is that it does not in fact derive obviation by *-wa* from the same source as possibility implications. Obviation is attributed to a (meta-language) necessity operator that is posited in tandem with the operator responsible for possibility implications, but actually independent of it. The problem is that we have no independent evidence for the presence of this necessity operator. Our suggestion that (7) has the truth conditions in (13) may be consistent with speaker intuitions. However, the truth conditions in (24), where the necessity operator has been omitted, admittedly are no less plausible.

(24)   Taro stayed in Germany for ten days or more &
         $P\exists d[d >$ ten days & Taro stayed *d* long in Germany]

Geurts & Nouwen (2007), whose analysis of *at least* provides the model for our modal analysis, acknowledge that their proposal to let *at least* introduce necessity into truth conditions is motivated by theoretical considerations, not by intuitions on the meaning of simple *at least* sentences such as the translation of (7). Unfortunately, we believe that those theoretical considerations do not extend to the case of *-wa*, and so we have to concede that the modal analysis presented falls short of deriving obviation from independently attested properties of *-wa*.[6]

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6 In Geurts & Nouwen 2007, the necessity operator is posited mainly in order to feed a process of *modal concord*; but the need of such a process has been questioned in Büring 2008 and Nouwen 2010. Geurts & Nouwen also motivate the necessity operator with a symmetry argument referring to *at least*'s negative partner *at most*; but Japanese *-wa* lacks such a partner.

Apart from lacking explanatory force, the modal analysis also fails to characterize possibility implications correctly in the general case. Specifically, the modal *-wa* that we have proposed does not always interact in the intended way with other operators in the sentence. Take (25), where a universal quantifier replaces the referential subject in (7).

(25)   Daremo-ga   doitu-ni   too-ka(-kan)-**wa** taizaisimasi-ta.
       *everyone-NOM Germany-in ten-day-for-*WA   *stay-PAST*
       'Everyone stayed in Germany for at least ten days.'

There are two logical forms to consider for (25): *-wa* may scope below or above the subject quantifier, as in (26a) and (26b), respectively.

(26)   a. **everyone** λx[[ten days **wa**] λd[x in Germany [d ~~nagaku~~] stayed]]

       b. [ten days **wa**] λd[**everyone** λx[x in Germany [d ~~nagaku~~] stayed]]

Let us now consider a context where the domain of the universal quantifier is fixed to a salient set of individuals, say, {Taro, Jiro, Saburo}. Under the modal account of *-wa*, the logical form (26a), where the universal subject scopes wide, has a possibility implication for each of these individuals, so (26a) entails each of the statements in (27). (26b) is stronger than (26a) (assuming a fixed domain for the universal), so it too entails that each of the propositions in (27) is true.

(27)   a. *P* [Taro stayed in Germany for more than 10 days]

       b. *P* [Jiro stayed in Germany for more than 10 days]

       c. *P* [Saburo stayed in Germany for more than 10 days]

Consider now a situation where a speaker takes the exact durations of stay in Germany to be as shown in (28). In this situation, each of the necessity statements in (29) is true. Since (27a) and (29a) are inconsistent, it is therefore predicted that (25) cannot be a suitable way of describing the information presented in (28).

(28)   a. Taro: 10 days

       b. Jiro: 11 days

       c. Saburo: 12 days

(29)   a. *N* [Taro stayed in Germany for exactly 10 days]

       b. *N* [Jiro stayed in Germany for exactly 11 days]

       c. *N* [Saburo stayed in Germany for exactly 12 days]

But this prediction is incorrect. Sentence (25) can in fact be used as a true and appropriate characterization of the information presented in (28). In this case, then, the truth conditions derived by the modal account are clearly too strong.

4 *Wa* as a scale aligner

We are back to the question how sentence (7) comes to be associated with the possibility implication in (8). Having abandoned an analysis that builds modality into the lexical meaning of -*wa*, we will in section 4.1 pursue the option that possibility implications have their source in Gricean reasoning and the (quantity) implicatures it generates. In section 4.2, we describe what we call the *scale alignment* analysis of degree related -*wa*, which extends the Gricean account of possibility implications into an analysis of Negative Island obviation by -*wa*.

Importantly, the scale alignment analysis does not depend on Fox & Hackl's (2006) assumption that, for the purposes of the Maximality Condition, scales of measurement are invariably dense. In fact, it depends on the assumption that the Maximality Condition always makes use of, and if necessary accommodates, discrete units of measurement.[7]

4.1 A Gricean route to possibility implications

4.1.1 Possibility implications via quantity implicatures

According to the standard (Neo-)Gricean recipe for quantity implicatures spelled out in, e.g., Sauerland 2004, Fox 2007a, and Geurts to appear, an utterance of a sentence expressing a proposition p invites the listener to infer that relevant alternative propositions entailing p are not epistemic necessities, that is, may be false as far as the speaker's evidence goes.

Consider the case of (7). To begin, assuming an *at least* interpretation for the measure phrase, we take the sentence to express the non-modalized proposition enclosed by square brackets in (30). The parenthesized operator *N* indicates that this proposition is an epistemic necessity for a cooperative speaker who asserts (7).[8]

(30)   (*N*) [Taro stayed in Germany for 10 days or more]   [ASN (7)]

Now suppose that (31a), where *exactly* replaces *or more*, and which entails the bracketed proposition in (30), is a relevant alternative. The standard recipe then derives the quantity implicature in (31b), a *primary implicature* in the terminology of Sauerland (2004).[9] Note that the conjunction of (30) and (31b) entails (8), the

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7 Abrusán & Spector (2011) make a similar point in their analysis of Negative Islands in English degree questions, arguing that the density assumption can be dispensed with under an analysis of degree questions that posits abstractions over intervals of degrees.

8 We write *ASN (n)* to label asserted content associated with sentence *(n)*.

9 We write *ALT (n)* to label a proposition that is assumed to be an alternative to the proposition expressed by sentence *(n)*; and we write *PIM (n)* to label a primary implicature derived for an utterance of *(n)*.

possibility implication we are after.

(31)   a. Taro stayed in Germany for exactly 10 days   [ALT$_1$ (7)]

　　　b. $\neg N$ [Taro stayed in Germany for exactly 10 days]   [PIM$_1$ (7)]

Let us now revisit the problematic example in (25). Its asserted content is expected to be as in (32), and the stronger alternative proposition in (33a), if relevant, will yield the primary implicature in (33b).

(32)   (*N*) [everyone stayed in Germany for 10 days or more]   [ASN (25)]

(33)   a. everyone stayed in Germany for exactly 10 days   [ALT$_1$ (25)]

　　　b. $\neg N$ [everyone stayed in Germany for exactly 10 days]   [PIM$_1$ (25)]

The conjunction of (32) and (33b) (merely) entails (34) below. This possibility implication is in accordance with intuitions. In particular, it is consistent with the observation about (25) reported in section 3.4. Imagine again a context fixing the quantifier domain to {Taro, Jiro, Saburo}. (34) is then consistent with the speaker's commitment to the information in (28): while under the modal account in section 3, (25) entails that *each* of the statements in (27) is true, under the implicature account (25) merely implies that *one* of them is true. This weaker condition is indeed met in (28), where both Jiro and Saburo are listed as staying for more then ten days.

(34)   *P* [someone stayed in Germany for more than 10 days]

The implicature account of possibility implications, then, seems to apply to universally quantified -*wa* sentences in the intended way. The problem encountered in the modal account does not arise.

4.1.2   Ignorance implications

It is time for us to note that the possibility implication in (8) does not exhaust the epistemic implications perceived to be associated with (7). The sentence actually suggests that the speaker has no (conclusive) opinion as to the duration of Taro's stay in Germany beyond her commitment to the assumed truth conditional content of (7). In other words, (7) suggests that the speaker is ignorant as to whether Taro stayed for exactly ten days and (therefore) is equally ignorant as to whether he stayed for more than ten days.

In general, ignorance implications have the form $\neg[N\ p] \wedge \neg N[\neg p]$ or, equivalently, $\neg[N\ p] \wedge P\ p$. Under the standard recipe for quantity implicatures, the ignorance implications associated with (7) suggest that we have to recognize a second alternative proposition, viz. (35a), which also entails the bracketed proposition in (30). Assuming (35a) is relevant, the standard recipe derives the additional primary implicature in (35b).

(35)   a. Taro stayed in Germany for more than 10 days   [ALT$_2$ (7)]

        b. ¬ N [Taro stayed in Germany for more than 10 days]   [PIM$_2$ (7)]

Together with (30), (35b) entails a second possibility implication, viz. (36). Note that the two ignorance implications described above are now accounted for: the conjunction of (35b) with (8) and the conjunction of (31b) with (36).

(36) P [Taro stayed in Germany for exactly 10 days]

If (35a) is considered a second alternative to the asserted content of (7), then presumably (37a) must be considered a second alternative to the asserted content of (25). Assuming this alternative is relevant, the standard recipe will derive the additional primary implicature in (37b). And in conjunction with the asserted content in (32), (37b) entails the second possibility implication in (38).

(37)   a. everyone stayed in Germany for more than 10 days   [ALT$_2$ (25)]

        b. ¬ N [everyone stayed in Germany for more than 10 days]   [PIM$_2$ (25)]

(38) P [someone stayed in Germany for exactly 10 days]

What is interesting is that, in this case, no ignorance implication is derived, as the conjunction of asserted content and primary implicatures has no such entailment. Specifically, this conjunction is consistent with (39a) and (39b), that is, with the speaker's being certain that not everyone stayed for exactly ten days and that not everyone stayed for more than ten days, either.[10]

(39)   a. N ¬[everyone stayed in Germany for exactly 10 days]   [SIM$_1$ (25)]

        b. N ¬[everyone stayed in Germany for more than 10 days]   [SIM$_2$ (25)]

This prediction is again correct. This is clear from our observation in section 3.4 that sentence (25) can be used by a cooperative speaker to characterize the scenario in (28), where someone stays for more than ten days, and someone stays for exactly ten days.

4.1.3   Secondary implicatures

According to the standard recipe, a primary implicature can under certain circumstances be strengthened to what Sauerland (2004) calls a *secondary implicature*. If a listener, having arrived at the primary implicature ¬ *[N p]*, takes the speaker to have a (conclusive) opinion as to the truth value of p, hence assumes *[N p]* ∨ *N [¬ p]*, the listener will arrive at the secondary implicature *N[¬ p]*.

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10 In (39), *SIM* stands for *secondary implicature*. We will introduce this notion momentarily.

In the case at hand, suppose the speaker is known to be reporting from a list specifying everyone's exact duration of stay in Germany. In that case, the speaker will be assumed to have an opinion as to whether or not everyone stayed for exactly ten days, and also whether or not everyone stayed for more than ten days. It is then predicted that (33b) and (37b) are strengthened to (39a) and (39b), respectively. This, too, is correct. In the relevant type of scenario, (25) will indeed be taken to imply the statements in (39a) and (39b), rather than merely being consistent with them.

It may appear at first sight that similar secondary implicatures, viz. the statements shown in (40), can be derived for (7). However, we have already seen that in the case of (7), the asserted content and primary implicatures jointly imply that the speaker has no (conclusive) opinion as to whether she will stay for exactly ten days or whether she will stay for more than ten days. Obviously, these ignorance implications are inconsistent with the potential secondary implicatures in (40).

(40)   a. N ¬[Taro stayed in Germany for exactly 10 days]   [*SIM$_1$ (7)]

       b. N ¬[Taro stayed in Germany for more than 10 days]   [*SIM$_2$ (7)]

According to a principle articulated in Sauerland 2004, primary implicatures are not strengthened to secondary implicatures if this strengthening leads to inconsistency with the assertion and the primary implicatures. If so, it follows correctly that the potential implicatures in (40) will not actually enter the interpretation of (7).

4.1.4   *Wa*, *at least*, and disjunction

We pause briefly to comment on how the implicature account of *-wa* presented above relates to proposals in recent literature. Readers familiar with Sauerland 2004 will have been struck by the resemblance of our implicature account to Sauerland's treatment of disjunction. In fact, Sauerland's analysis generates exactly the same pattern of implications for (41a) and (41b) that we have derived for (7) and (25), respectively.

(41)   a. Taro stayed in Germany for [exactly ten days] or [for more than ten days].

       b. Everyone stayed in Germany for [exactly ten days] or [for more than ten days].

Building on Sauerland's proposal, Büring (2008) moreover posits a tight connection between disjunction and *at least*. In Büring's account, (42a) and (42b) below are treated as short for (41a) and (41b), respectively, in the sense that each *at least* sentence shares both truth conditions and quantity implicatures with its disjunctive paraphrase.

(42)   a. Taro stayed in Germany for at least ten days.

   b. Everyone stayed in Germany for at least ten days.

Sauerland (2004) does not actually consider examples analogous to (25). But Fox (2007a) discusses a contrast in English disjunctions that seems analogous to the one between (7) and (25): while *John talked to Mary or Sue* conveys the speaker's ignorance as to the truth value of each disjunct, no parallel ignorance implication is associated with *Everyone talked to Mary or Sue*, which instead suggests that the speaker takes neither Mary nor Sue to have been talked to by everyone. Fox notes that this contrast is indeed predicted under Sauerland's analysis.

Büring (2008) does not consider cases exactly like (42b), but does discuss examples with universal modals, such as *You are required to stay for at least ten days*, which make much the same point under his account. Nouwen (2010), on the other hand, offers an analysis of *at least* under universal modals that does not obviously extend to cases like (42b). For details, the reader is referred to the works cited.

4.2   *Wa* as a scale aligner

Like all (Neo-)Gricean explanations, the implicature account given above depends on specific assumptions about what counts as an alternative proposition. Actually, it is generally assumed that a theory of alternatives must characterize alternative utterances, or their logical forms, rather than propositions *per se*.

We will now present such a theory of alternatives under which adding degree related -*wa* leads from a set of semantically unrelated alternative propositions to a set of propositions ordered by (or, *aligned* according to) semantic strength. Assuming that all scales can be construed as discrete for the purposes of the Maximality Condition, this explains -*wa*'s potential to obviate Negative Islands in degree questions.

4.2.1   Deriving alternatives: numerals and Horn scales

In a standard view, one way of deriving alternatives consists in replacing an element of a so-called Horn scale with one of its scale mates. Numerals are usually taken to form a Horn scale. If so, we can obtain alternatives for (7) by replacing *too* 'ten' with other numerals. For each numeral on the Horn scale, there is one logical form isomorphic to the logical form of (7). Collecting the propositions expressed by all of these logical forms, we arrive at the set of propositions in (43a).

(43)   a. {Taro stayed in Germany for n days or more: *n* is a numeral}

   b. Taro stayed in Germany for 11 days or more   [ALT$_2$ (7)]

The proposition in (43b) is one of the elements of (43a). And, of course, taking duration of stay in Germany to be measured in full days, (43b) is equivalent to (35a) above, one of the alternative propositions we seek to account for.

Much the same applies to (25). The Horn scales of numerals generates the set of alternative propositions in (44a), which has the proposition (44b) as one of its elements; and under our assumption about measuring length of stay, (44b) is equivalent to the intended alternative in (37a).

(44) a. {everyone stayed in Germany for *n* days or more: *n* is a numeral}

  b. everyone stayed in Germany for 11 days or more   [ALT$_2$ (25)]

4.2.2 Deriving alternatives: the role of *wa*

The remaining task is to account for the *exactly* alternatives in (31a) and (33a) above. We propose that these alternative propositions are due to logical forms just like those for (7) and (25) except that -*wa* is omitted. As before, we take the logical forms of (7) and (25) to feature an (unpronounced) gradable predicate. We now assume that -*wa* is an optional modifier of such gradable predicates. Departing from our earlier assumption, suppose moreover that unmodified degree predicates have an *exactly* semantics, rather than the more standard *at least* semantics illustrated in (15). Our revised lexical entry for *nagaku* 'long' is then as shown in (45).

(45) $[\![nagaku]\!] = \lambda d.\lambda e.\lambda w.e'$s duration in $w = d$

In order for this lexical entry to have the intended effect, we need to make certain assumptions about the semantic composition of the relevant logical forms. Specifically, we need to assume that the external argument of the degree predicate is maximized in a sense familiar from e.g. Landman 2004. In the case of (7), this means that the eventuality argument of *nagaku* is the maximal past state of Taro's staying in Germany. Similarly, in the case of (25) it means that for each individual in the domain of the universal subject, the degree predicate is applied to the maximal past state of that individual's staying in Germany. This accounts for the intended *exactly* alternatives: under the lexical entry in (45), the resulting interpretations for (7) and (25), shown in (46) and (47), respectively, are accurately paraphrased by (31a) and (33a) above.

(46) $\lambda w.[\![nagaku]\!](10 \text{ days})$
  $(\max\{e: e \text{ is past state of Taro staying in Germany}\})(w)$ [ALT$_1$ (7)]

(47) $\lambda w.$ for every person x: $[\![nagaku]\!](10 \text{ days})$
  $(\max\{e: e \text{ is past state of } x \text{ staying in Germany}\})(w)$ [ALT$_1$ (25)]

We take modification of a lexical gradable predicate by *-wa* to result in a new gradable predicate with an *at least* semantics. So, as shown in (48), we assign to *nagaku wa* the interpretation previously given to unmodified *nagaku* (cf. (15)).

(48) $[\![nagaku\ wa]\!] = \lambda d.\lambda e.\lambda w.e'$s duration in $w \geq d$

Assuming that states of stay in Germany are maximized as before, (7) and (25) are predicted to express the propositions in (49) and (50), respectively. As intended, these are correctly paraphrased by the bracketed statements in (30) and (32).

(49) $\lambda w.\ [\![nagaku\ wa]\!](10\ \text{days})$
      $(\max\{e:\ e$ is past state of Taro staying in Germany$\})(w)$ [ASN (7)]

(50) $\lambda w.$ for every person $x:\ [\![nagaku\ wa]\!](10\ \text{days})$
      $(\max\{e:\ e$ is past state of x staying in Germany$\})(w)$ [ASN (25)]

4.2.3   Back to degree questions and Negative Islands

We are now ready to revisit the data pattern in (3) to (5), repeated in (51) to (53). The first task is to demonstrate that (51) and (53) satisfy the Maximality Condition in (12), while (52) violates it.

(51) Taro-wa doitu-ni doredake nagaku taizaisimasi-ta ka?
      Taro-TOP Germany-in how   long   stay-PAST   Q

      'How long did Taro stay in Germany?'

(52) * Taro-wa doitu-ni doredake nagaku taizaisimas-**en**-desi-ta ka?
      Taro-TOP Germany-in how   long   stay-not-COP-PAST   Q

(53) Taro-wa doitu-ni doredake nagaku-**wa** taizaisimas-**en**-desi-ta ka?
      Taro-TOP Germany-in how   long-WA   stay-not-COP-PAST   Q

Under present assumptions, the degree property and Hamblin set for (51) are as shown in (54). (54a) is neither downward nor upward scalar. In fact, the elements of (54b) are mutually inconsistent, so the set contains at most one true proposition. Suppose now that Taro stayed in Germany for, say, exactly ten days. In that case, the proposition that (54a) maps ten days to is the one and only, hence the most informative, true proposition in (54b). So the Maximality Condition is met.

(54) a. $\lambda d:\ d$ is a duration. that Taro stayed **exactly** d long in Germany

      b. {that Taro stayed **exactly** d long in Germany: d is a duration}

The degree property and Hamblin set for (52) are shown in (55). (55a) too is neither upward nor downward scalar, but in contrast to (54b), (55b) contains at most

one *false* element. In the scenario under consideration, this is the proposition that Taro did not stay for exactly ten days. All the other propositions in the Hamblin set are true, and since they are not related by entailment, none of them can be the most informative. So, as intended, the Maximality Condition is violated.

(55)   a. λd : d is a duration. that Taro did **not** stay **exactly** d long in Germany

        b. {that Taro did **not** stay **exactly** d long in Germany: d is a duration}

The idea that an *exactly* semantics for gradable predicates could be behind the Negative Island effect in English degree questions is contemplated, though dismissed in the end, in Abrusán 2007. Abrusán moreover observes that such an analysis would be able to accommodate the phenomenon of modal obviation (see section 3.2).[11] We are the first, however, to exploit an *exactly* semantics in tying together epistemic implications and Negative Island obviation.

To see how, consider the degree property and Hamblin set for (53) in (56). Note that these are familiar from section 2 (see (10)), where we took lexical gradable predicates to have an *at least* semantics.

(56)   a. λd : d is a duration. that Taro did **not** stay d long (**or longer**) in Germany

        b. {that Taro did **not** stay d long (**or longer**) in Germany: d is a duration}

The key observation is that, in contrast to (54b) and (55b), the elements of (56b) are related by, or *aligned* according to, semantic strength. Specifically, as we mentioned section in 2, (56a) is downward scalar. It is now enough to repeat observations from section 2. If length of stay is counted in full days only, the set of degrees that (56a) describes has a *minimum*. For example, if the length of Taro's stay is exactly ten days, then eleven days will be the minimal duration that (56a) maps to a true proposition, and the proposition that Taro did not stay for eleven days (or longer) is the most informative true element of (56b). The Maximality Condition is met, and this completes our account of the paradigm in (51) to (53).

Evidently, this account requires that, for the analysis of Japanese, we reject Fox & Hackl's (2006) hypothesis that all scales are dense for the purposes of the Maximality Condition. We must assume that the Maximality Condition after all has access to contextual information, such as the assumption that duration of stay in Germany is counted in full days only. In fact, since *-wa* obviates Negative Islands even in cases where the density assumption seems fairly plausible, such as the

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11 Fox (2007b) explains the general principle behind this observation, showing that wide scope necessity modals are predicted to obviate any violations of the Maximality Condition, whether or not they are related to scale density. In the case at hand, obviation by a higher epistemic necessity modal, as in (21), can be credited to the fact that it is logically possible for there to be a unique duration r such that the speaker is certain that Taro did not stay exactly r long in Germany.

Japanese counterpart of *How tall isn't Taro?*, we have to assume that the Maximality Condition allows for accommodation of discrete units of measurement in contexts that do not themselves make such discrete units salient. We have to leave to future work the task of resolving the obvious tension between this conclusion and Fox & Hackl's (2006) analysis of Negative Islands (and related phenomena) in English.

5   Concluding remarks

One way of resolving the tension referred to in the last paragraph is to identify problems afflicting the scale alignment analysis that would clearly offset its success in tying together obviation by *-wa* and ignorance implications. We actually think that, unfortunately, this line of attack has some promise. We are aware of two potential weaknesses of (the current version of) our scale alignment analysis. First, it is not clear that ignorance implications and obviation by *-wa* are limited to what we have called *degree related -wa*; so our scale alignment account may at least have to be generalized in non-trivial ways. Second, we have limited confidence in our assumption that all lexical gradable predicates in Japanese have an *exactly* semantics; it certainly remains to be seen whether this assumption is consistent with speaker intuitions on a wider range of cases.

Lack of space prevents us from elaborating on these points, but we hope to pursue these issues in future work. We also plan to take up the important task of connecting the analysis of Negative Island obviation to previous literature on *-wa*, especially Hara 2006 and Tomioka 2009. While these authors are not concerned with degree questions, they discuss epistemic effects contributed by *-wa* which are bound to be closely related to the possibility implications that have figured prominently in this paper.

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