

## The presupposition of *even*\*

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1     **Abstract** I present a new observation with regard to the felicity of using *even*:  
2     There is no apparent focus/QUD congruence for *even*-sentences. For example, *even*  
3     *Mary<sub>F</sub> came* cannot be used to answer a question like *who came* or *who was unlikely*  
4     *to come*. Instead, the felicitous use of *even Mary<sub>F</sub> came* is to address issues like *how*  
5     *successful the exhibition was*, *how enthusiastic people were*, *how urgent the matter*  
6     *was*, etc. Thus I propose that the use of *even* is QUD-sensitive, always with regard  
7     to a contextually salient degree question. *Even* brings a degree-based presupposition  
8     of additivity, not an entity-based one (see also Greenberg 2018 for a similar view).  
9     An *even*-sentence presupposes that its prejacent is associated with a degree value,  
10    a benchmark value higher than the usual contextual threshold, resolving a degree  
11    question with an increasingly positive answer. E.g., under a relevant scenario  
12    about how popular a certain talk was, *even Mary<sub>F</sub> came* is roughly interpreted  
13    as *(the talk was so popular) that Mary<sub>F</sub> came*. Under the current analysis, the  
14    entity-based additivity and likelihood-based scalarity of *even*, which are considered  
15    presuppositions under the traditional view, are now considered implicatures.

16    **Keywords:** *even*, presupposition, question under discussion (QUD), degree question, degree  
17    semantics, additivity, likelihood, gradable predicate, scale, interval, informativeness

### 18    **1 Introduction: The canonical analysis of *even* and its problems**

19    According to the classical view (e.g., Karttunen & Peters 1979), the use of *even* has  
20    two presuppositions: **entity-based additivity** and **likelihood-based scalarity**.

21    As illustrated in (1), the use of *even* is focus-sensitive, and the word *Mary* bears  
22    focus here. Both the positive and negative version of (1) convey the presuppositional  
23    meaning that someone other than *Mary* came. This presupposed additivity is directly  
24    based on the alternative set of the focused item *Mary* and thus dubbed as **entity-**  
25    **based additivity** in this paper.

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26 Both the positive and negative version of (1) also have the meaning that compared  
 27 to others, Mary was relatively unlikely to come. In other words, the alternative set of  
 28 Mary is considered ordered along a scale of likelihood (i.e., how likely it is for  $x$ , a  
 29 member of the alternative set of Mary, to make ‘come( $x$ )’ hold true), and thus the  
 30 use of *even* involves a **presupposition of likelihood-based scalarity**.

- 31 (1) (It’s not the case that) even [Mary]<sub>F</sub> came.  
 32 a. **Presupposition of entity-based additivity:**  
 33 (1)  $\rightsquigarrow$  Someone other than Mary came.  
 34 b. **Presupposition of likelihood-based scalarity:**  
 35 (1)  $\rightsquigarrow$  Compared to others, Mary was unlikely to come.

36 It has been long noticed that this entity-based additivity (see (1a)) is actually  
 37 somewhat soft and not necessarily satisfied in felicitous uses of *even*. For example,  
 38 Szabolcsi (2017) shows that under the given scenario in (2), the use of *even* in (2a)  
 39 is perfectly natural, although the presuppositional requirement of additivity is not  
 40 met, because Eeyore was the only one who took a bite of thistles and spit them out.

- 41 (2) **Scenario:** Imagine Pooh and friends coming upon a bush of thistles. Eeyore  
 42 (known to favor thistles) takes a bite but spits it out.  
 43 a. Those thistles must be really prickly! Even [Eeyore]<sub>F</sub> spit them out!  
 44 ((2a)  $\not\rightsquigarrow$  Someone other than Eeyore spit thistles out.)

45 It has been pointed out that the likelihood-based presupposition of *even* (see  
 46 (1b)) also encounters empirical challenges: a low likelihood is neither a necessary  
 47 nor a sufficient condition for felicitous uses of *even*.

48 As illustrated in (3) (from Rullmann 1997), given that John is a political non-  
 49 conformist, compared to other reading materials, it’s not necessarily less likely for  
 50 him to read a banned book. Similarly, in the example (4) (from Greenberg 2016),  
 51 the use of *even* does not convey the meaning that it is less likely for a tool to be  
 52 made of steel than to be made of strong aluminum. These examples show that a low  
 53 likelihood is not always necessary in felicitous uses of *even* (similar examples can  
 54 also be found in Herburger 2000; Gast & Van der Auwera 2011, a.o.).

- 55 (3) John is a political non-conformist. He even read [Manufacturing Consent]<sub>F</sub>  
 56 although it has been banned by the censorship committee. (Rullmann 1997)  
 57 (4) Seller to client: Both tools are strong. The one on the right is made of strong  
 58 aluminum, and the one of the left is even made of [steel]<sub>F</sub>. (Greenberg 2016)

59 On the other hand, as pointed out by Greenberg (2016, 2018), it is infelicitous to  
 60 use *even* in the example (5). In this case, the proposition *the blue box has apples*

61 asymmetrically entails the proposition *the blue box has fruits*. Thus the likelihood  
62 of the former is guaranteed to be lower than that of the latter, with focus alternative  
63 *fruits* to replace *apples*. Nevertheless, the use of *even* is weird in (5), suggesting that  
64 a low likelihood is actually insufficient for felicitous uses of *even*.

65 (5) The red box has fruits. The blue one (#*even*) has [apples]<sub>F</sub> in it. (Greenberg  
66 2016)

67 Based on these observations, Greenberg (2018) challenges the classical likelihood-  
68 based analysis of *even* (see (1)) and proposes a new gradability-based account.

69 In this paper, I will provide a new observation on how to use *even* felicitously  
70 (Section 2). Essentially, I show that an *even*-sentence is never about its focused part.  
71 Instead, it's a contextually salient degree-related QUD (Question under discussion)  
72 that an *even*-sentence addresses. Then I will provide a new degree-QUD-based  
73 analysis for *even* (Section 3) and compare my new proposal with Greenberg (2018)  
74 (Section 4). Finally, I will address remaining issues for further research (Section 5).

## 75 2 A new observation in light of focus/QUD congruence

76 Here I show that *even* is distinct from other focus-sensitive particles like *only* and  
77 *also* with regard to patterns of focus/QUD congruence (see Roberts 2012, a.o.).

78 As illustrated in (6), the declarative sentence (6a) contains focus-sensitive particle  
79 *only*, and *Eeyore* bears focus here. Intuitively, (6a) tells us whether Eeyore spit  
80 thistles out and whether there exists someone else that spit thistles out. In other  
81 words, (6a) addresses an overarching QUD like *who spit out thistles* (see (6b)),  
82 which, as expected, corresponds to the focused part in (6a). Given an implicit or  
83 explicit question *who spit out thistles*, we can use (6a) as a felicitous answer to it.

- 84 (6) a. Only [Eeyore]<sub>F</sub> spit thistles out.  
85        $\leadsto$  Eeyore spit thistles out, and no one other than Eeyore spit them out.  
86       b. (6a) corresponds to the QUD: Who spit out thistles?

87 Similarly, as shown in (7), here the declarative sentence (7a) contains focus-  
88 sensitive particle *also*, and again, the word *Eeyore* bears focus. Intuitively, (7a) is  
89 also about whether Eeyore as well as someone else spit thistles out, i.e., (7a) also  
90 addresses an overarching QUD like *who spit out thistles* (see (7b)). As expected,  
91 this QUD corresponds to the focused part in (7a).

- 92 (7) a. (Pooh spit thistles out.) [Eeyore]<sub>F</sub> also spit thistles out.  
93        $\leadsto$  Eeyore spit thistles out, and someone else spit them out.  
94       b. (7a) corresponds to the QUD: Who spit out thistles?

95 The upshot here is that for sentences containing *only* and *also*, there is a natural  
 96 correspondence between the focused part in these sentences (e.g., *Eeyore* in (6a) and  
 97 (7a)) and a QUD that targets this focused part (e.g., the *who* question shown in (6b)  
 98 and (7b)). Thus focus/QUD congruence holds for felicitous *only/also*-sentences.

99 Intriguingly, this pattern of focus/QUD congruence does not hold for *even*-  
 100 sentences. Under the previous scenario with regard to Pooh and friends' coming  
 101 upon a bush of thistles, if we (implicitly or explicitly) wonder **who spit out thistles**  
 102 (i.e., without the likelihood component) or **who was unlikely to spit out thistles**  
 103 (i.e., with the likelihood component), it is weird to use the *even*-sentence with focus  
 104 on *Eeyore*, (8c), as a felicitous answer.

- 105 (8) **Scenario:** Imagine Pooh and friends coming upon a bush of thistles. We  
 106 wonder **who takes a bite of thistles and spits them out**.
- 107 a. QUD: Who spit out thistles?  
 108 b. QUD: Who was unlikely to spit out thistles?  
 109 c. #Even [*Eeyore*]<sub>F</sub> spit thistles out! Not a good answer to (8a) or (8b)!

110 However, if, instead, we (implicitly or explicitly) wonder **how prickly those**  
 111 **thistles are**, then the same *even*-sentence with focus on *Eeyore*, (8c)/(9c), can be  
 112 used as a felicitous answer to this kind of degree(-related) question.

- 113 (9) **Scenario:** Imagine Pooh and friends coming upon a bush of thistles. We  
 114 wonder **how prickly those thistles are**.
- 115 a. QUD: How prickly are those thistles?  
 116 b. QUD: Are those thistles prickly?  
 117 c. Even [*Eeyore*]<sub>F</sub> spit thistles out! A good answer to (9a) or (9b)

118 To sum up our observations from (8) and (9), although in the *even*-sentence  
 119 (8c)/(9c), it is *Eeyore* that bears focus, a good QUD to which this *even*-sentence is a  
 120 felicitous answer, is not about this focused part, but instead a degree question.

121 The examples shown in (10) and (11) make the same point. Under the scenario  
 122 in (10), we wonder **how tall Bill is**. Evidently, the focused part in (10c), *6 feet*,  
 123 provides information on the height of Bill. However, with the use of *even*, no matter  
 124 whether we include the likelihood component or not (see (10a) vs. (10b)), (10c) is  
 125 intuitively infelicitous to be used as an answer to this kind of *how-tall* question.

- 126 (10) **Scenario:** We wonder **how tall Bill is**.
- 127 a. QUD: How tall is Bill?  
 128 b. QUD: How tall is Bill unlikely to be?  
 129 c. #Bill is even [*6 feet*]<sub>F</sub> tall. Not a good answer to (10a) or (10b)!

130 However, once we shift our interest from the height of Bill to his eligibility of  
 131 joining the tennis team (see the scenario in (11)), the same *even*-containing sentence  
 132 with focus on *6 feet* becomes felicitous.

- 133 (11) **Scenario:** Only boys as tall as 5'8" are eligible to join the tennis team.  
 134 We wonder **whether Bill is tall enough to be eligible.**
- 135 a. QUD: How is Bill's eligibility?  
 136 b. QUD: Is Bill tall enough to join the tennis team?  
 137 c. Bill is even [6 feet]<sub>F</sub> tall. A good answer to (11a) or (11b)

138 The contrast between (10) and (11) shows again that, for an *even*-sentence, the  
 139 pattern of focus/QUD congruence is distinct from the pattern for *only/also*-sentences.  
 140 An *even*-sentence does not address a QUD that targets the focused part of the *even*-  
 141 sentence. By including *even* in the sentence and uttering *Bill is even [6 feet]<sub>F</sub> tall* (see  
 142 (10c)/(11c)), interlocutors do not really show an interest in the height information of  
 143 Bill, but rather how this height information of Bill helps to resolve the issue of how  
 144 Bill is eligible for joining the tennis team.

145 Therefore, the generalization is that (i) the use of an *even*-sentence in a discourse  
 146 is to address a degree-related QUD, and (ii) this degree-related QUD is not about the  
 147 focused part in the *even*-sentence per se, but rather about another contextually salient  
 148 issue which the information provided by the focused part contributes to resolve.  
 149 In (9), *even [Eeyore]<sub>F</sub> spit thistles out* indicates that those thistles are very prickly,  
 150 reaching a degree higher than usual. In (11), *Bill is even [6 feet]<sub>F</sub> tall* indicates that,  
 151 in terms of height, Bill's eligibility is higher than required.

152 In this sense, *even*-sentences can often be roughly paraphrased with the use of  
 153 the '*so ... that*' construction, as shown in (12) and (13). Obviously, both the positive  
 154 and negative version of (13) convey the meaning that Mary's coming indicates a  
 155 high degree of success, enthusiasm, urgency, etc. While the positive version of (13)  
 156 asserts the truth of the prejacent and thus further means that this high degree (of  
 157 success, etc.) is reached, the negative version of (13) suggests the contrary.

158 (12) **Scenario:** Imagine Pooh and friends coming upon a bush of thistles. Eeyore  
 159 (known to favor thistles) takes a bite but spits it out.

- 160 a. Even [Eeyore]<sub>F</sub> spit them out!  
 161 ≈ Those thistles are so prickly that [Eeyore]<sub>F</sub> spit them out.

(13) (It's not the case that) even [Mary]<sub>F</sub> came. (Prejacent: *Mary came.*)

The exhibition was (not) so successful }  
 People were (not) so enthusiastic } to the degree that [Mary]<sub>F</sub> came  
 The matter was (not) so urgent }

162 **3 Proposal**

163 As presented in Section 2, in the example about the prickly thistles (that Eeyore spit  
 164 out) (see (9)), the *even*-sentence, *even* [Eeyore]<sub>F</sub> spit thistles out, emphasizes the  
 165 high degree of prickliness of the thistles. In the examples (11) and (13), the *even*-  
 166 sentences, *Bill is even* [6 feet]<sub>F</sub> tall and *Even* [Mary]<sub>F</sub> came, express an intensified  
 167 degree of eligibility, success, enthusiasm, urgency, etc. In this sense, the semantic  
 168 contribution of *even* involves **degree-based additivity**, **not entity-based additivity**  
 169 (cf. entity-based focus particles like *only* and *also*, see (6) and (7)).

170 Thus, I propose that the major semantic contribution of *even* is to make its  
 171 prejacent contribute information to resolve a contextually salient degree-related  
 172 QUD (i.e., an implicit or explicit degree question), leading to an increase from a  
 173 usual contextual threshold to a higher value, and thus resolving the degree QUD  
 174 with an increasingly positive answer.

175 The presupposition of a sentence of the form ‘*even*(*p*)’ includes two parts: (i) the  
 176 prejacent *p* provides information to resolve a degree QUD, and (ii) *p* is maximally  
 177 informative, as informative as any of its alternatives in resolving this degree QUD.

178 The formal implementation of this basic idea involves (i) how to associate the  
 179 information provided by a proposition *p* with the information needed to resolve a  
 180 degree QUD and (ii) how to represent and compare informativeness. Below I first  
 181 address these two issues and then assemble them into a formal analysis of *even*.

182 **Associating *p* with the resolution of a degree QUD.** Inspired by previous liter-  
 183 ature on the semantics of degree modifiers like *enough*, *too*, and *so* (... *that*) (see  
 184 Meier 2003; Hacquard 2005, 2006; Nadathur 2019), I assume that for *even*-sentences,  
 185 there is also a hidden conditional relating two propositions.

186 As illustrated by (14), with the use of *enough* and *so* (... *that*), the prickliness  
 187 degree of the thistles informs on whether Eeyore spit them out. Then as illustrated by  
 188 (15), intuitively, an *even*-sentence is interpreted like a backtracking conditional: the  
 189 truth of the prejacent of *even* (here *Eeyore spit out thistles*) informs on the prickliness  
 190 degree of the thistles (see also Section 5 for more discussion).

- 191 (14) a. The thistles were prickly enough for [Eeyore]<sub>F</sub> to spit out.  
 192 b. The thistles were so prickly that [Eeyore]<sub>F</sub> spit them out.  
 193 (14a)/(14b)  $\approx$  If the thistles reach the degree *d* in terms of prickliness,  
 194 then Eeyore spit them out (see Meier 2003).
- 195 (15) (The thistles must be really prickly.) Even [Eeyore]<sub>F</sub> spit them out.  
 196 (15)  $\approx$  If (we know that) Eeyore spit the thistles out, then (we know that)  
 197 they must reach the degree *d* in terms of prickliness.

198 Based on this, I use a necessity modal (see Kratzer 1981, 1991) to relate  $p$  (i.e.,  
 199 the prejacent of ‘*even(p)*’) and the degree information for resolving a degree QUD.  
 200 If  $p$  is true, then it follows that the QUD *how  $G_{qud}$  is  $x_{qud}$*  is informatively addressed,  
 201 yielding a positive answer:  *$x_{qud}$  is  $G_{qud}$*  (i.e.,  $x_{qud}$  reaches the contextual standard  
 202  $d_{std}$  along the scale of  $G_{qud}$ ). As sketched out in (16) (to be revised), for each  
 203 world  $w'$  accessible from the reference world  $w$ ,<sup>1</sup> if  $p$  holds true in  $w'$ , then the  
 204 measurement of  $x_{qud}$  along the scale  $G_{qud}$  in  $w'$  reaches the standard degree  $d_{std}$ .

- 205 (16) Associating the prejacent  $p$  with the resolution of a degree QUD *how  $G_{qud}$*   
 206 *is  $x_{qud}$* :  
 207  $\forall w' \in \text{Acc}(w)[p(w') \rightarrow G_{qud}(x_{qud})(w') \geq d_{std}]$   
 208 i.e., Every  $p$ -world is a world where the measurement of  $x_{qud}$  along the  
 209 scale  $G_{qud}$  reaches the standard degree  $d_{std}$ .  
 210 ( $G_{qud}$  is a measure function of type  $\langle e, \langle s, d \rangle \rangle$ , which is to be revised soon.)

211 **Representing and comparing the informativeness of a scalar value.** To repre-  
 212 sent and compare informativeness of degree-related information, I follow previous  
 213 literature on degree semantics (Schwarzchild & Wilkinson 2002; Abrusán 2014;  
 214 Zhang 2020; Zhang & Ling 2015, 2021) and adopt the notion of **intervals** to repre-  
 215 sent scalar values in a more generalized way. An interval is a convex set of degrees,  
 216 e.g.,  $\{d \mid 15'' < d \leq 20''\}$ , which can also be written as  $(15'', 20'']$ .<sup>2</sup>

217 As shown in (17), a gradable adjective like  $[[\text{tall}]]^w$  relates an interval  $I$  and an  
 218 atomic individual  $x$ , such that the height measurement of  $x$  in world  $w$  falls within  
 219 the interval  $I$  along a scale of height. Thus, as illustrated in (18), the semantics of a  
 220 measurement sentence is derived straightforwardly. Obviously, given that the interval  
 221  $[18'', 18'']$  is a proper subset of the interval  $[15'', 20'']$  (i.e.,  $[18'', 18''] \subset [15'', 20'']$ ),  
 222 (18b) is more informative on the height of Eeyore than (18a).

- 223 (17)  $[[\text{tall}]]^w \stackrel{\text{def}}{=} \lambda I_{\langle dt \rangle} . \lambda x_e . \text{Height}_{\langle e, \langle s, dt \rangle \rangle}(x)(w) \subseteq I$   
 224 (i.e., the height measurement of  $x$  in  $w$  falls within the interval  $I$ .)  
 225 (Here Height is a measure function of type  $\langle e, \langle s, dt \rangle \rangle$ .)
- 226 (18) a.  $[[\text{Eeyore is between 15 and 20 inches tall}]]^w$   
 227  $\Leftrightarrow \text{Height}(\text{Eeyore})(w) \subseteq [15'', 20'']$  **Measurement sentence**
- 228 b.  $[[\text{Eeyore is exactly 18 inches tall}]]^w$   
 229  $\Leftrightarrow \text{Height}(\text{Eeyore})(w) \subseteq [18'', 18'']$  ( $I$ : a singleton set of degrees.)

1 In interpreting *even Mary<sub>F</sub> came*, we don’t want to include those worlds very different from the reference world, e.g., a world where Mary was kidnapped to an unsuccessful exhibition.

2 A totally ordered set  $P$  is convex iff for any elements  $a$  and  $b$  in the set  $P$  (suppose  $a \leq b$ ), any element  $x$  such that  $a \leq x \leq b$  is also in the set  $P$ . In interval notation, square brackets are used to represent **closed** lower/upper bounds, while round parentheses are used to represent **open** lower/upper bounds.

230 For the positive use of gradable adjectives, as illustrated in (19),  $[d_{\text{std}}, +\infty)$ , an  
 231 interval with the contextual threshold degree,  $d_{\text{std}}$ , as the lower bound, serves as the  
 232 interval argument of  $\llbracket \text{tall} \rrbracket^w$ . (19) means that the height measurement of Brienne  
 233 reaches the contextual threshold of being tall (for a relevant comparison class, e.g.,  
 234 as a woman, or as a knight).

$$235 \quad (19) \quad \llbracket \text{Brienne is tall} \rrbracket^w \Leftrightarrow \text{Height}(\text{Brienne})(w) \subseteq [d_{\text{std}}, +\infty) \quad \textbf{Positive use}$$

236 With this interval-based degree semantics for gradable adjectives, I adopt the  
 237 categorial approach to questions (see Hausser & Zaefferer 1978 and Krifka 2011  
 238 for a review) and analyze a degree question as a set of intervals, as shown in  
 239 (20). Essentially, this set of intervals includes all possible intervals  $I$  that make  
 240 ‘ $\text{Height}(\text{Brienne})(w) \subseteq I$ ’ hold true, which is in the same spirit as Hamblin (1973):  
 241 a *wh*-question denotes the set of all its possible answers. Hamblin (1973)’s set is a  
 242 set of propositional answers, while I follow the categorial approach and consider a  
 243 set of fragment answers in this paper.

$$244 \quad (20) \quad \llbracket \text{How tall is Brienne} \rrbracket^w = \lambda I. \text{Height}(\text{Brienne})(w) \subseteq I$$

245 Then as shown in (21), the operator  $\text{Max}_{\text{info}}$  takes a set of intervals and returns the  
 246 unique maximally informative one. The proposal of this  $\text{Max}_{\text{info}}$  operator follows  
 247 the same spirit as Dayal (1996)’s answerhood operator, which presupposes the  
 248 existence of a maximally informative true answer for a *wh*-question and picks  
 249 out this maximally informative true answer from the set of all possible answers.  
 250 Obviously, when  $\text{Max}_{\text{info}}$  is applied onto a degree question (see the set of intervals in  
 251 (20)), the output is the most informative interval that resolves this degree question.  
 252 For a question like  $\llbracket \text{how tall is Brienne} \rrbracket^w$ , ‘ $\text{Max}_{\text{info}}[\lambda I. \text{Height}(\text{Brienne})(w) \subseteq I]$ ’  
 253 yields the singleton set of degrees that stands for the precise height measurement of  
 254 Brienne in the reference world, e.g.,  $[6'3'', 6'3'']$  (suppose the measurement is ideal  
 255 and does not involve any measurement imprecision).

$$256 \quad (21) \quad \text{Max}_{\text{info}}\langle\langle dt, t \rangle, \langle dt \rangle\rangle \stackrel{\text{def}}{=} \lambda p_{\langle dt, t \rangle}. \mathbf{1}I[p(I) \wedge \forall I'[[p(I') \wedge I' \neq I] \rightarrow I \subset I']]$$

$$257 \quad \text{(defined when } \exists I[p(I) \wedge \forall I'[[p(I') \wedge I' \neq I] \rightarrow I \subset I']\text{)}$$

258 **The formal analysis of the semantics of *even*.** Thus, as shown in (22), the asser-  
 259 tion of an *even*-sentence is its prejacent part.

$$260 \quad (22) \quad \text{The assertion of } \llbracket \text{even} \rrbracket^w(p): p(w)$$

261 The main semantic contribution of *even* consists in its presupposition, which  
 262 includes two parts: (i) the prejacent of *even* resolves a degree QUD, and (ii) compared  
 263 to its alternatives, the prejacent is maximally informative in resolving the QUD.



The presupposition of *even*

264 As shown in (23), with regard to the contextually salient degree QUD, *how*  
 265  $G_{qud}$  is  $x_{qud}$ , the first part of the presupposition (i.e., on the left side of  $\wedge$ ) says  
 266 that ‘in any  $p$ -world  $w'$  (accessible from the reference world  $w$ ), the maximally  
 267 informative answer to the degree question  $\lambda I. G_{qud}(x_{qud})(w') \subseteq I$  is a proper subset  
 268 of the interval  $[d_{std}, +\infty)$ . In other words, in any world  $w'$ , the measurement of  
 269  $x_{qud}$  along the scale  $G_{qud}$  not just reaches but exceeds the contextual standard degree  
 270  $d_{std}$ , resolving the degree QUD with an increasingly positive answer.

271 As shown in (24),  $C$ , the alternative set of the prejacent  $p$ , is a subset of the  
 272 set of propositions yielded by replacing the focused part of the prejacent with the  
 273 alternatives to the focus. Based on this, the second part of the presupposition (i.e.,  
 274 on the right side of  $\wedge$ ) says that ‘for any proposition  $q$  in the alternative set of the  
 275 prejacent  $p$ , the maximally informative answer to the question *how  $G_{qud}$  is  $x_{qud}$  in*  
 276 *the  $p$ -worlds* is a subset of (i.e., at least as informative as) the maximally informative  
 277 answer to the question *how  $G_{qud}$  is  $x_{qud}$  in the  $q$ -worlds*. I call these two maximally  
 278 informative answers  $I_p$  and  $I_q$ , and visually represent them in a diagram in (25).

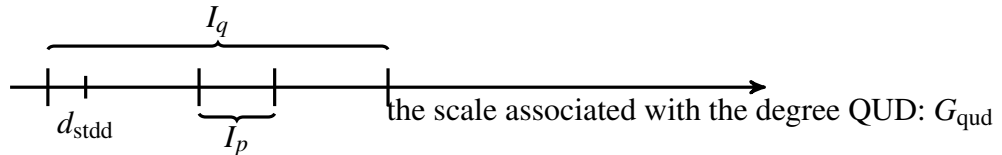
279 (23) The presupposition of  $[[\text{even}]]^w(p)$ :  
 280  $\forall w' \in \text{Acc}(w) \cap p [ \underbrace{\text{Max}_{\text{info}}[\lambda I. G_{qud}(x_{qud})(w') \subseteq I]}_{\substack{\text{the most informative interval } I \text{ such that} \\ \text{the measurement of } x_{qud} \text{ along the scale } G_{qud} \\ \text{in } w' \text{ falls within this interval } I \\ \text{i.e., the most informative answer to the question} \\ \text{how } G_{qud} \text{ is } x_{qud} \text{ in } w'}}] \subseteq [d_{std}, +\infty) \wedge$

281  $\forall q \in C [ \underbrace{\text{Max}_{\text{info}}[\lambda I. [\forall w' \in \text{Acc}(w) \cap p [ G_{qud}(x_{qud})(w') \subseteq I ] ] ]}_{\substack{I_p = \text{the most informative interval that answers the question} \\ \text{how } G_{qud} \text{ is } x_{qud} \text{ in the } p\text{-worlds}}} ] \subseteq$

282  $\text{Max}_{\text{info}}[\lambda I. [\forall w'' \in \text{Acc}(w) \cap q [ G_{qud}(x_{qud})(w'') \subseteq I ] ] ]$   
 $\underbrace{\hspace{15em}}_{\substack{I_q = \text{the most informative interval that answers the question} \\ \text{how } G_{qud} \text{ is } x_{qud} \text{ in the } q\text{-worlds}}}$

283 (24)  $C \subseteq \{q \mid \exists x. [x \in \text{Alt}([[ \text{focus} ]]) \wedge q = [[ \text{Background} ]](x)]\}$   
 284 (Here  $\text{Alt}([[ \text{focus} ]])$  is the set of alternatives to the focused part, and  $[[ \text{Background} ]](x)$   
 285 yields alternatives to the prejacent  $p$  by applying the non-focused part of  
 286 the prejacent to focus alternatives.)

287 (25) The degree-QUD-based presupposition of *even* in the current analysis:



288  $I_p = \text{Max}_{\text{info}}[\lambda I. [\forall w' \in \text{Acc}(w) \cap p [ G_{qud}(x_{qud})(w') \subseteq I ] ]],$   
 289  $I_q = \text{Max}_{\text{info}}[\lambda I. [\forall w'' \in \text{Acc}(w) \cap q [ G_{qud}(x_{qud})(w'') \subseteq I ] ]].$   
 290

291 As shown in (25),  $I_p$  is a proper subset of  $[d_{\text{std}}, +\infty)$ , which is what the first part  
 292 of the presupposition says (i.e., the lower bound of  $I_p$  reaches and exceeds  $d_{\text{std}}$ ),  
 293 and  $I_p$  is a subset of  $I_q$ , which is what the second part of the presupposition says (i.e.,  
 294  $I_p$  is maximally informative, as informative as any  $I_q$ ).

295 (25) also shows that  $I_q$  actually does not provide much information on the degree  
 296 QUD *how  $G_{\text{qud}}$  is  $x_{\text{qud}}$* , because the lower bound of  $I_q$  might or might not be lower  
 297 than  $d_{\text{std}}$ . In other words, given the truth of  $q$ , it is not even guaranteed that the  
 298 measurement of  $x_{\text{qud}}$  reaches the contextual standard  $d_{\text{std}}$  along the scale of  $G_{\text{qud}}$ .

299 In (26), I again use the scenario of Pooh and friends' coming upon a bush of  
 300 thistles to illustrate the interpretation of an *even*-sentence under the current proposal.

301 The QUD here is *how prickly those thistles are* (see (26a) and the discussion in  
 302 Section 2). The assertion of *Even [Eeyore]<sub>F</sub> spit the thistles out* is that the prejacent  
 303 of *even*, i.e., the proposition 'Eeyore spit the thistles out', holds true in the reference  
 304 world (see (26c)).

305 The presupposition of *Even [Eeyore]<sub>F</sub> spit the thistles out* is that (i) in every  
 306 world  $w'$  where Eeyore spit out the thistles, the thistles are prickly (i.e., more prickly  
 307 than the contextual threshold), and (ii) in the worlds where 'Eeyore spit out the  
 308 thistles' holds true, the thistles are  $I_p$ -prickly, while in the worlds where 'another one  
 309 among Pooh and friends spit out the thistles' holds true, the thistles are  $I_q$ -prickly,  
 310 and  $I_p$  is as informative as any  $I_q$  can be (i.e.,  $I_p$  is maximally informative).

311 (26) **Scenario:** Imagine Pooh and friends coming upon a bush of thistles. Eeyore  
 312 (known to favor thistles) takes a bite but spits out.

313 Even [Eeyore]<sub>F</sub> spit the thistles out.

314 a. QUD: How prickly are those thistles?

315 b.  $[[\text{prickly}]]^w \stackrel{\text{def}}{=} \lambda I_{\langle dt \rangle} . \lambda x_e . G_{\text{Prickliness}\langle e, \langle s, dt \rangle \rangle}(x)(w) \subseteq I$   
 316 (i.e., the measurement of  $x$  along the scale  $G_{\text{Prickliness}}$  in  $w$  falls within  
 317 the interval  $I$ .)

318 c. The assertion of  $[[\text{Even [Eeyore]<sub>F</sub> spit the thistles out}]]^w$ :  
 319  $\text{spit-the-thistles-out}(\text{Eeyore})(w)$

320 d. The presupposition of  $[[\text{Even [Eeyore]<sub>F</sub> spit the thistles out}]]^w$ :

$$321 \forall w' \in \text{Acc}(w) \cap p \underbrace{[\text{Max}_{\text{info}}[\lambda I . G_{\text{Prickliness}}(\text{the-thistles})(w') \subseteq I] \subseteq [d_{\text{std}}, +\infty)]}_{\text{i.e., the most informative answer to the question}}$$

*how prickly are the thistles in  $w'$*

$$322 \forall q \in C \underbrace{[\text{Max}_{\text{info}}[\lambda I . [\forall w' \in \text{Acc}(w) \cap p [G_{\text{Prickliness}}(\text{the-thistles})(w') \subseteq I]]] \subseteq}$$

*$I_p$ =the most informative interval that answers the question  
how prickly are the thistles in the  $p$ -worlds*

$$323 \text{Max}_{\text{info}}[\lambda I . [\forall w'' \in \text{Acc}(w) \cap q [G_{\text{Prickliness}}(\text{the-thistles})(w'') \subseteq I]]]$$

*$I_q$ =the most informative interval that answers the question  
how prickly are the thistles in the  $q$ -worlds*

324 The analysis in (26) is clearly consistent with our intuition for the interpretation  
 325 of *Even* [*Eeyore*]<sub>F</sub> *spit the thistles out* under the given scenario. From the truth of the  
 326 proposition ‘Eeyore spit the thistles out’, we know that the thistles must be really  
 327 prickly. On the other hand, from the truth of alternative propositions like ‘Pooh spit  
 328 the thistles out’, it remains rather unknown whether the thistles are prickly or not.

329 Below I show that under the current analysis, inferences of entity-based additivity  
 330 and likelihood-based scalarity, which are considered presuppositions under the  
 331 canonical view, are now considered implicatures (Sections 3.1 and 3.2).

### 332 3.1 Entity-based additivity is not necessary

333 As already shown in Section 1, to felicitously use *even*, entity-based additivity is not  
 334 necessarily satisfied. In the example of Pooh and friends’ coming upon a bush of  
 335 thistles, Eeyore was the only one who took a bite of thistles and spit them out, yet it  
 336 is felicitous to utter *Even* [*Eeyore*]<sub>F</sub> *spit the thistles out* to make the point that the  
 337 thistles are really prickly (see (2) and more discussion in Section 2).

338 Entity-based additivity means that within the alternative set of the prejacent of  
 339 an *even*-sentence, there exists an alternative *q* which is different from the prejacent  
 340 *p*, and this alternative proposition *q* holds true in the reference world *w* (see (27)).

341 (27) Entity-based additivity for  $[[\text{even}]]^w(p)$ :  $\exists q \in C[q \neq p \wedge q(w)]$

342 Under the current analysis (see (22) and (23)), nothing guarantees (27). The  
 343 alternatives of the prejacent only appear in the second part of the presupposition (see  
 344 (23)). What matters is, compared to the prejacent, how these alternatives inform on  
 345 the resolution of the contextually salient degree QUD. Whether alternatives hold true  
 346 in the reference world is irrelevant in the interpretation of an *even*-sentence. Thus,  
 347 the current analysis correctly predicts that entity-based additivity is not necessary  
 348 in the use of *even*. In other words, even if entity-based additivity is involved in our  
 349 intuitive interpretation of an *even*-sentence, this kind of inference can at most be an  
 350 implicature, which is cancellable (see more discussion in Section 3.2).

351 Here is one more example. Under the scenario in (28), Bill is the only kid who  
 352 has jumped. By uttering this *even*-sentence, the teacher means that the ditch is really  
 353 easy to jump over, suggesting that other kids will also jump over it. But they might  
 354 not. Yet this *even*-sentence is felicitous even if eventually no one else succeeds.

355 (28) **Scenario:** A group of kids are lining up to jump over a ditch. Bill, known to  
 356 be a physically weak kid, is the first and successfully jumps over the ditch.  
 357 Their teacher wants to encourage the other kids who haven’t jumped yet:  
 358 a. ‘Even [*Bill*]<sub>F</sub> jumped over the ditch.’

359 **3.2 Likelihood-based scalarity (and entity-based additivity) as an implicature**

360 Also, as already shown in Section 1, ample empirical evidence suggests that a  
 361 low likelihood of the prejacent is neither a necessary nor a sufficient condition for  
 362 felicitous uses of *even*. Indeed, proposition-level likelihood-based scalarity (see  
 363 (29)) is not part of the current analysis of *even* (see (22) and (23)).

364 (29) Likelihood-based scalarity for  $\llbracket \text{even} \rrbracket^w(p)$ :  $\forall q \in C[q \neq p \rightarrow p >_{\text{Unlikely}} q]$

365 Under the current analysis, the comparison between the prejacent of *even* and  
 366 alternatives (see the second part of the presupposition in (23)) is based on their  
 367 informativeness in resolving a contextually salient degree QUD.

368 With regard to the example (3) (repeated here in (30)), as pointed out by Rull-  
 369 mann (1997), the likelihood of the prejacent (i.e., *He read Manufacturing Consent*)  
 370 is irrelevant. Under the current analysis, the felicity of the use of *even* is based on (i)  
 371 how this prejacent resolves the contextually salient degree QUD, *how non-conformist*  
 372 *is John*, and (ii) how, in addressing the QUD, this prejacent is more informative,  
 373 compared to alternative propositions (e.g., *He read Syntactic Structures*).

374 (30) John is a political non-conformist. He even read  $[ \text{Manufacturing Consent} ]_F$   
 375 although it has been banned by the censorship committee. (= (3))

376 Similarly, with regard to the example (4) (repeated in (31)), likelihood is also  
 377 irrelevant in interpreting *the one on the left is even made of [steel]<sub>F</sub>*. The felicity  
 378 of the use of *even* is based on (i) how the prejacent resolves the degree QUD, *how*  
 379 *strong are both tools* (see also later discussion on (39) for this kind of QUDs), and  
 380 (ii) how, in addressing this QUD, the prejacent is more informative, compared to  
 381 alternative propositions (e.g., *the one on the left is made of strong aluminum*).

382 (31) Seller to client: Both tools are strong. The one on the right is made of strong  
 383 aluminum, and the one of the left is even made of  $[ \text{steel} ]_F$ . (= (4))

384 However, with regard to the example (5) (repeated in (32)), since there is no  
 385 salient degree question that serves as the QUD here, the use of *even* becomes weird.

386 (32) The red box has fruits. The blue one (#even) has  $[ \text{apples} ]_F$  in it. (= (5))

387 Rullmann (1997) raises two issues on the scalarity of *even* (see Section 4 of his  
 388 paper): (i) what kind of scale is involved; (ii) whether the interpretation of *even* is  
 389 related to a superlative meaning (i.e., an endpoint, e.g., the least likelihood).<sup>3</sup> For  
 390 the first issue, under the current analysis, the scale of likelihood is never involved.

<sup>3</sup> Rullmann (1997) actually raises three issues. The third issue is about entity-based additivity.

391 There are two kinds of scales involved in the current analysis of *even*: (i) the scale  
 392 associated with the contextually salient degree QUD (e.g., a scale of exhibitions’  
 393 success, associated with *how successful a certain exhibition is* in interpreting *even*  
 394 [*Mary*]<sub>F</sub> *came*, or a scale of thistles’ prickliness, associated with *how prickly the*  
 395 *thistles are* in interpreting *even* [*Eeyore*]<sub>F</sub> *spit those thistles out*); (ii) the scale of  
 396 informativeness in comparing the prejacent of *even* and its alternatives.

397 Along both scales, I use the entailment between intervals to characterize the  
 398 relation between items under comparison: as shown in (25), (i) the comparison  
 399 between  $I_p$  and  $[d_{\text{std}}, +\infty)$  along the scale associated with the degree QUD, and (ii)  
 400 the comparison between  $I_p$  and  $I_q$  along the scale of informativeness.

401 For the second issue raised by Rullmann (1997), under the current analysis, the  
 402 comparison along the scale of informativeness is related to a superlative meaning.

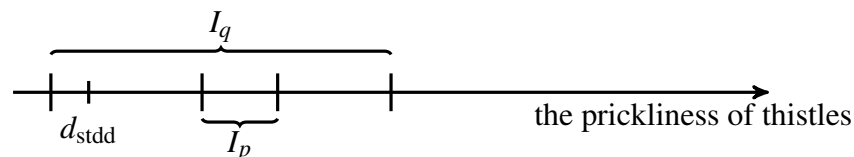
403 In (33), with the use of *even*, this sentence not just provides information on *how*  
 404 *many children they have*, but crucially, resolves an implicit degree QUD: e.g., *how*  
 405 *enthusiastic / nervous they are towards having children*.

406 (33) Ed has two children and Fred even has [three]<sub>F</sub>. (Rullmann 1997: (19b))

407 Thus, *Fred even has [three]<sub>F</sub> children* presupposes that (i) the truth of *Fred has*  
 408 *3 children* indicates that their enthusiasm (or nervousness) is above the contextual  
 409 threshold, and (ii) *Fred has 3 children* is as informative as any of its alternatives  
 410 in resolving the degree QUD. The second part of the presupposition means that  
 411 even if the focused item here, 3, is not the largest number among its alternatives,  
 412 sentences like *Fred has 4 children* are not considered more informative than *Fred has*  
 413 *3 children* in telling about people’s enthusiasm (or nervousness). I.e., the prejacent  
 414 of *even* is considered maximally informative in resolving the degree QUD.

415 This superlative meaning along the scale of informativeness also explains why  
 416 there are low likelihood inferences in interpreting *even*-sentences. Let’s come back  
 417 to the example of Pooh and friends’ coming upon a bush of thistles. As illustrated  
 418 in (34),  $I_p \subseteq I_q$ . Thus the likelihood of ‘the thistles are  $I_p$ -prickly’ cannot be higher  
 419 than the likelihood of ‘the thistles are  $I_q$ -prickly’. I.e., the prejacent is associated  
 420 with the least likelihood on the information of how prickly the thistles are.

421 (34) Even [*Eeyore*]<sub>F</sub> spit the thistles out.



422

423  $I_p$  = how prickly the thistles are, if Eeyore spit them out.

424  $I_q$  = how prickly the thistles are, if Pooh spit them out.

425 Similarly, for the example on John’s reading materials (see (3)/(30)), the use  
 426 of *even* indicates that John’s being a non-conformist reaches a rare extent. For the  
 427 scenario with regard to the selling of tools (see (4)/(31)), the use of *even* indicates  
 428 that the strength of the tools is high, and unexpectedly high.

429 To sum up, low likelihood inferences are not at the (prejacent) proposition level,  
 430 but at the level of the resolution of the degree QUD.

431 According to Rullmann (1997), inferences of entity-based additivity (dubbed as  
 432 existential presupposition in his paper) are further built on low likelihood inferences,  
 433 in an indirect way. His reasoning can be carried over to the current proposal.

434 As illustrated in (34), since  $I_p \subseteq I_q$ , if Eeyore spit the thistles out in a world  
 435  $w'$  where the thistles are  $I_p$ -prickly, then  $w'$  is also a world where the thistles are  
 436  $I_q$ -prickly, and we are inclined to believe that  $q$  should hold true in  $w'$ , e.g., Pooh also  
 437 spit the thistles out in this world  $w'$ . Hence the inference of entity-based additivity.

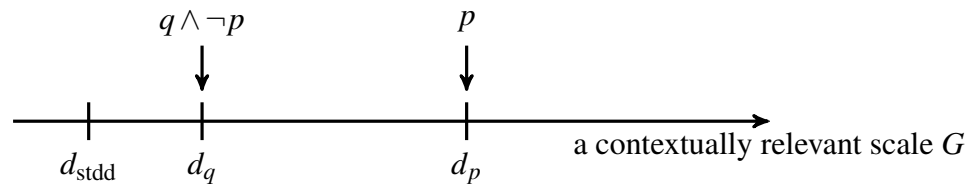
438 Of course, this inclination only leads to an implicature. There can still be a  
 439  $p$ -world where  $q$  does not hold true, e.g., the reference world of the example on Pooh  
 440 and Eeyore’s coming upon thistles. After all, both this inclination and low likelihood  
 441 inferences are based on ‘ $I_p \subseteq I_q$ ’, not ‘ $p \subseteq q$ ’ (i.e., all the  $p$ -worlds are  $q$ -worlds).

#### 442 4 Discussion: Comparison with Greenberg (2018)

443 Greenberg (2018) also challenges the classical likelihood-based analysis of *even* and  
 444 proposes a gradability-based account (see also Greenberg 2015, 2016).

445 As shown in (35), the use of *even* presupposes that along a contextually relevant  
 446 scale  $G$  where we take the measurement of a certain item,  $x$  (both  $x$  and  $G$  are  
 447 from context), the largest degree such that the measurement of  $x$  reaches in all the  
 448 worlds where the prejacent  $p$  holds true is  $d_p$ , and the largest degree such that the  
 449 measurement of  $x$  reaches in all the worlds where  $q \wedge \neg p$  ( $q$  is an alternative to the  
 450 prejacent) holds true is  $d_q$ , and these two degree values  $d_p$  and  $d_q$  are such that (i)  $d_p$   
 451 exceeds  $d_q$ , and (ii)  $d_q$  reaches the contextual standard value  $d_{\text{std}}$ .

452 (35) Greenberg (2018)’s gradability-based presupposition of *even*:



453

454 Presupposition:

455  $\forall q [q \in C \wedge q \neq p \rightarrow \forall w_1, w_2 \in \text{Acc}(w) [p(w_2) \wedge [q \wedge \neq p](w_1) \rightarrow$

456  $\text{Max}[\lambda d_p. G(d_p)(x)(w_2)] > \text{Max}[\lambda d_q. G(d_q)(x)(w_1)] \wedge$

457  $\text{Max}[\lambda d_q. G(d_q)(x)(w_1)] \geq d_{\text{std}}]$

458 The current proposal and Greenberg (2018) are similar in that both accounts  
459 reject the direct use of likelihood scales in comparing the prejacent of *even* and its  
460 alternatives. Instead, Greenberg (2018) adopts a contextually relevant scale  $G$  to  
461 measure  $x$ . The current proposal is in the same spirit, adopting a scale that aims to  
462 resolve a degree QUD. With regard to the example on Pooh and friends' coming  
463 upon a bush of thistles, for both accounts,  $G$  is considered a prickliness scale for  
464 thistles, and a sentence like *Even [Eeyore]<sub>F</sub> spit the thistles out* essentially addresses  
465 the prickliness measurement of those thistles Pooh and Eeyore encounter.

466 Another similarity shared by Greenberg (2018) and the current analysis is that the  
467 evaluative meaning is considered part of the presupposition of *even*. Thus for *Even*  
468 *[Eeyore]<sub>F</sub> spit the thistles out*, the prejacent indicates a high degree of prickliness,  
469 above the contextual threshold.

470 Then the current proposal and Greenberg (2018) are different in a few aspects:

471 **One scale vs. two scales.** First, and most fundamentally, only one scale is involved  
472 in the analysis of Greenberg (2018), while, as addressed in Section 3.2, two kinds of  
473 scales are involved in the current analysis.

474 According to Greenberg (2018)'s analysis, in interpreting *Even [Eeyore]<sub>F</sub> spit*  
475 *the thistles out*, both (i) the evaluative meaning (which indicates a high degree of  
476 prickliness of the thistles) and (ii) the comparison between the prejacent and its  
477 alternatives are based on the scale of prickliness for thistles.

478 However, under the current analysis, only the evaluative meaning is based on  
479 this scale of prickliness for thistles. The comparison between the prejacent and its  
480 alternatives is based on a scale of informativeness.

481 This fundamental difference leads to the next four differences.

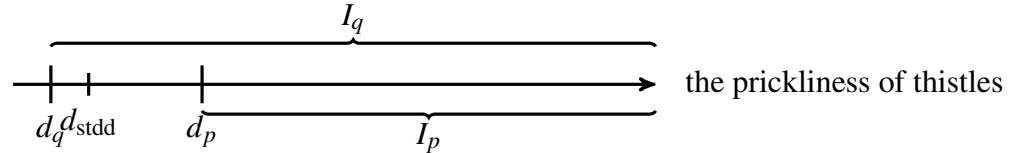
482 **Degrees va. intervals.** For formal implementation, to (i) derive the evaluative  
483 meaning and (ii) conduct a comparison between the prejacent and its alternatives,  
484 Greenberg (2018) adopts the inequality relation between degrees (along the same  
485 scale, e.g., the scale of prickliness of thistles).

486 The current account adopts intervals, a more generalized notion, to represent  
487 scalar values, and use the entailment relation between intervals to conduct compar-  
488 ison. The evaluative meaning is derived when an interval  $I$  is a proper subset of  
489  $[d_{\text{std}}, +\infty)$ , i.e., the lower bound of  $I$  exceeds the contextual standard  $d_{\text{std}}$ . Then  
490 the comparison between intervals along the scale of informativeness directly follows  
491 the entailment relation between sets, because intervals are convex sets of degrees.

492 Apparently, it seems that these two different formal implementations are some-  
493 how convertible between one another. For the example on thistles, we can naturally  
494 assume that when thistles get very prickly, anyone would spit them out. Thus,

495 as shown in (36), both  $I_p$  and  $I_q$  can be considered right-unbounded, and mathe-  
 496 matically, the entailment relation between two intervals (here among  $I_p$ ,  $I_q$ , and  
 497  $[d_{\text{std}}, +\infty)$ ) amounts to the inequality relation between their lower bounds.

498 (36) Even [Eeyore]<sub>F</sub> spit the thistles out.



499

500  $I_p = [d_p, +\infty)$  = how prickly the thistles are, if Eeyore spit them out.

501

$I_q = [d_q, +\infty)$  = how prickly the thistles are, if Pooh spit them out.

502 However, in terms of natural language interpretation, the entailment relation  
 503 between  $I_p$  and  $I_q$  actually conveys more information than the inequality relation  
 504 between  $d_p$  and  $d_q$ . The entailment relation between  $[d_p, +\infty) \subseteq [d_q, +\infty)$  says not  
 505 only that  $d_p \geq d_q$ , but also makes sentences containing  $[d_p, +\infty)$  more informative  
 506 than those containing  $[d_q, +\infty)$ . The inequality relation  $d_p \geq d_q$  does not lead to a  
 507 comparison of informativeness (see (37):  $3 > 2$ , but (37a) does not entail (37b)).

- 508 (37) a. I read exactly 3 novels.  $\rightsquigarrow$  the cardinality of all the novels I read = 3  
 509 b. I read exactly 2 novels.  $\rightsquigarrow$  the cardinality of all the novels I read = 2

510 Therefore, with the use of interval technique, the current analysis supports the  
 511 comparison of informativeness between the prejacent and its alternatives.

512 **Comparing the prejacent with its alternatives.** Following the technical choice  
 513 addressed above, in the analysis of Greenberg (2018), the comparison between the  
 514 prejacent  $p$  and an alternative  $q$  amounts to an inequality relation between  $d_p$  and  
 515  $d_q$ . However, under the current analysis, the comparison between the prejacent  $p$   
 516 and an alternative  $q$  amounts to a comparison of informativeness between  $I_p$  and  $I_q$ .

517 There are at least two reasons to think that the comparison of informativeness  
 518 on how  $I_p$  and  $I_q$  resolve a degree QUD is better motivated than the comparison  
 519 between  $d_p$  and  $d_q$ .

520 First, according to Gricean pragmatics, interlocutors should make their utterance  
 521 as informative as possible. Thus, if the utterance of  $p$  contributes the maximal  
 522 information to resolve the contextually salient QUD, then  $p$  should be uttered, not  
 523 its alternatives. In this sense, it is reasonable and natural to compare the uttered  
 524 prejacent with its non-uttered alternatives in terms of informativeness.

525 Second, it seems stipulative to require that  $d_p$  be larger than  $d_q$ . How about we  
 526 accommodate a reversed scale and require that  $d_p$  be lower than  $d_q$ ? According to



The presupposition of *even*

527 Greenberg (2018), this kind of over-generation can be avoided, due to the second  
528 conjunct in the presupposition:  $d_q \geq d_{\text{std}}$  (see (35)), i.e., degrees associated with  
529 alternatives reach the contextual threshold. With a reversed scale, the inequality  
530 relations would become  $d_{\text{std}} \geq d_q > d_p$ , failing to meet the requirement ' $d_q \geq d_{\text{std}}$ '.  
531 Below I show why this requirement is actually questionable.

532 **Are there evaluative inferences for alternatives?** Under the current proposal,  
533 only the prejacent brings an evaluative meaning, i.e.,  $I_p \subset [d_{\text{std}}, +\infty)$  (see (23)/(25)),  
534 resolving the degree QUD with an increasingly positive answer. This kind of eval-  
535 uative meaning is irrelevant to alternatives (i.e., ' $I_q \subseteq [d_{\text{std}}, +\infty)$ ' is not required).  
536 However, according to Greenberg (2018), ' $d_q \geq d_{\text{std}}$ ' is required.

537 In (38), the use of the *even*-sentence is felicitous under its context. Obviously,  
538 in this example, in the worlds where Pooh spit out thistles but Eeyore did not, the  
539 prickliness degree of the thistles does not necessarily reach the contextual threshold  
540 of prickliness. This counter-example suggests that ' $d_q \geq d_{\text{std}}$ ' or ' $I_q \subseteq [d_{\text{std}}, +\infty)$ '  
541 is not required. In other words, alternatives do not necessarily provide information  
542 to resolve the degree QUD with a positive answer.

543 (38) **Scenario:** Imagine Pooh and friends coming upon a bush of thistles. Only  
544 Eeyore is known to favor thistles, and Eeyore does not eat thistles that are  
545 too prickly, while Pooh and other friends don't eat any thistles, no matter  
546 they are prickly or smooth. Eeyore takes a bite but spits it out.  
547 a. Those thistles must be really prickly! Even [Eeyore]<sub>F</sub> spit them out!

548 Greenberg (2018)'s proposal of ' $d_q \geq d_{\text{std}}$ ' is motivated by examples like (39).  
549 Intuitively, *even* can only be felicitously used in (39a), but not in (39b) or (39c).  
550 According to Greenberg (2018), the infelicity of using *even* in (39b) or (39c) is due  
551 to their failure of satisfying ' $d_q \geq d_{\text{std}}$ '. In (39b) and (39c), the height of John does  
552 not reach the contextual standard, here *1.90 m*.

553 (39) **Context:** John and Bill want to join our basketball team, where the standard  
554 for player height is 1.90 m. (Greenberg 2018: (17))  
555 Coach: So – what about John and Bill?  
556 a. John is 1.95 m tall and Bill is (even) [2.10]<sub>F</sub> tall.  
557 b. John is 1.70 m tall and Bill is (#even) [1.75]<sub>F</sub> tall.  
558 c. John is 1.75 m tall and Bill is (#even) [1.95]<sub>F</sub> tall.

559 The current proposal can provide an alternative account. Under this context, the  
560 most salient degree QUD is about the eligibility of both John and Bill. Thus the use  
561 of *even* is to indicate an increasingly positive answer to this degree QUD. I.e., the  
562 prejacent *Bill is 1.95 tall* is to provide information that both people are tall.

563 **Explaining low likelihood inferences.** Under the current analysis, low likeli-  
 564 hood inferences are based on ‘ $I_p \subseteq I_q$ ’ (see Section 3.2). Given that  $I_p$  entails  $I_q$ ,  
 565 the likelihood of ‘the thistles are  $I_p$ -prickly’ cannot be higher than the likelihood  
 566 of ‘the thistles are  $I_q$ -prickly’. I.e., the prejacent is associated with the maximal  
 567 informativeness to address the QUD, and thus the least likelihood.

568 According to Greenberg (2018) (see her Footnote 29), since the use of *even*  
 569 presupposes ‘ $d_p > d_q \geq d_{\text{std}}$ ’, if we assume a normal distribution along the relevant  
 570 scale, then the degree associated with the prejacent,  $d_p$ , should lead to a lower  
 571 likelihood than the contextual standard,  $d_{\text{std}}$ .

572 The explanation provided by the current proposal might have two advantages.  
 573 First, it does not require the additional assumption of a normal distribution. Second,  
 574 we intuitively feel that it is compared to its alternatives, not  $d_{\text{std}}$ , that the prejacent  
 575 of *even* is associated with a lower likelihood, or some kind of surprise. Thus for  
 576 Greenberg (2018), low likelihood inferences need to be based on the part ‘ $d_p > d_q$ ’,  
 577 not ‘ $d_p > d_{\text{std}}$ ’. However, as I have addressed earlier, whether ‘ $d_q \geq d_{\text{std}}$ ’ holds true  
 578 in interpreting an *even*-sentence seems debatable, and if  $d_p$  and  $d_q$  are on different  
 579 sides of  $d_{\text{std}}$  (i.e.,  $d_p > d_{\text{std}} > d_q$ ), the assumption of a normal distribution does not  
 580 help to address whether  $d_p$  leads to a lower likelihood than  $d_q$ .

## 581 5 Outlook and concluding remarks

582 In this paper, based on a novel observation that there is no apparent focus/QUD  
 583 congruence for *even*-sentences, I propose a new degree-QUD-based analysis for the  
 584 presupposition of *even*. The use of *even* is always based on a contextually salient  
 585 degree QUD: the prejacent of *even* provides information to resolve this degree QUD  
 586 with an increasingly positive answer, and compared with alternatives, this prejacent  
 587 is also considered maximally informative in resolving this degree QUD.

588 The proposed new analysis for the presupposition of *even* also raises new ques-  
 589 tions for more *even*-related research. One issue is about how the current proposal  
 590 brings new insights to (i) the interplay between *even* and downward-entailing and  
 591 non-monotonic operators, (ii) how *even* is used in questions, and (iii) the potential  
 592 existence of a covert *even*-like item in negative polarity items (see e.g., Lahiri 1998;  
 593 Guerzoni 2003, 2004; Crnić 2013; Chierchia 2013).

594 Another issue is about how the current analysis of *even* can be extended to  
 595 provide a compositional account for expressions like *even if* and *even though*.

596 Finally, the current account for the presupposition of *even* should also shed  
 597 light on the semantics of cross-linguistic siblings of English *even*: e.g., *-mol-demo*  
 598 in Japanese (see Nakanishi 2006); (*lián* ...) *dōu* in Mandarin Chinese (see Liu  
 599 2017). It is worth investigating how all these focus-sensitive particles are similar and  
 600 different in contributing to discourse coherence.

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