Scalar adjectives, modality and context: evidence from an experimental study in the derivation of upper-bound and lower-bound readings
Adjetivos escalares, modalidad y contexto: evidencia de un estudio experimental sobre la derivación de lecturas acotadas superior e inferiormente

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Abstract

Scalar implicature has been a top subject of inquiry in the Anglo-Saxon pragmatics field for quite a long time. Many experimental studies have been conducted about the interpretation and processing of weak quantifiers in English and other languages. Recently these types of studies have been conducted exploring a vast range of the so-called Horn scales, namely adjective scales. These studies have shown that scalar implicatures are not always derived from the use of weak adjectives. Here I present experimental evidence coming from the study of the interpretation of scalar adjectives in Spanish that show that an enriched pragmatic context in addition to modalized propositions enhance lower-bound readings of weak scalar adjectives. Data also show that upper-bound readings are hardly derived by speakers, leading to the conclusion that scalar implicatures are pragmatic inferences derived from a handful of lexical items and not from a vast family of scalar terms.

Keywords: experimental pragmatics, scalarity, semantic-pragmatic interface

Resumen

La implicatura escalar ha sido un tema de investigación muy estudiado en la pragmática anglosajona por largo tiempo. Se han realizado muchos estudios experimentales sobre la interpretación y el procesamiento de cuantificadores débiles en inglés y en otras lenguas. Recientemente, estos estudios se han llevado a cabo para explorar un conjunto mayor de escalas de Horn, específicamente adjetivos. Dichos estudios han mostrado

que una implicatura escalar no siempre se deriva a partir del uso de adjetivos débiles. Aquí presento evidencia experimental sobre la interpretación de adjetivos escalares en español, la cual muestra que un contexto pragmático elaborado, en conjunto con proposiciones modalizadas, potencializan lecturas acotadas inferiormente. Los datos también muestran que los hablantes casi no derivan lecturas acotadas superiormente, de donde puede concluirse que las implicaturas escalares son inferencias pragmáticas que surgen a partir de un puñado de elementos léxicos y no de la vasta familia de elementos escalares.

Palabras clave*: escalaridad, interfaz semántico-pragmática, pragmática experimental*

Introduction

A well-studied and a well understood phenomenon in linguistic pragmatics is that of certain readings which involve the interpretation of quantifiers, as in (1b).

(1) a. Some of the apples were rotten.
    b. *Not all the apples were rotten.*

These kinds of readings, often called scalar implicatures, are derived, among other things, primarily[1] due to the use by speakers of weak expressions like existential quantifiers such as *some*. According to some theoretical approaches discussed in the literature, the interpretation in (1) that *not all the apples were rotten* could be explained by pragmatic principles. The nature of those principles will vary depending on the kind of theory at hand: the maxim of quantity (Grice, 1975), the Q-principle (Horn, 1984), the principle of relevance (Sperber and Wilson, 1995), to name a few. The point here is to say that no matter what kind of account best explains these interpretations, there is a consensus regarding their existence. Another point of agreement related to these interpretations is that they constitute a special type of inferences known as pragmatic inferences, which essentially means that they are not part of the semantic content of the expressions that give rise to them.[2]

As pragmatic inferences, they are, by definition, sensitive to context, in the sense that hearers may or may not derive them. When it is the case that context requires

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[1] This interpretation is not always the case. Remember that implicatures are context sensitive, as far as we know.

[2] Nevertheless, not all scholars agree with this point of view. See for example Chierchia, Fox and Spector (2011) for a grammatical point.

the emergence of such an interpretation, hearers will arrive at such reading. When it is not the case, they will drop it.[3] In general terms, those interpretations can be considered as upper-bound readings because a limit is somehow imposed by context or grammatical restrictions. Take for instance (2).

(2) a. A: –How was the lecture?
    B: –Some of the scholars left before it ended.
  b. *Not all of the scholars left*
  c. *The lecture was not that interesting.*

In this case, the only relevant reading of A's response is (2c), because the question itself imposes a context where the only relevant information is that of the quality of the lecture, then the hearer could assume that the lecture was boring (the lower-bound reading). Note, nevertheless, that the other reading (*not all of the scholars left*) is always available, but the information shared between the speaker and the hearer (by means of the precedent question) makes this reading at least marginal and therefore not a good candidate for a pragmatic inference made by the hearer. In this sense, lower-bound readings are another kind of inferences that hearers have access to when they interpret scalar weaker terms semantically.[4] Take, for instance, another example from Katsos and Cummins (2010):

(3) a. A: –Are all of the documents that John presented forgeries?
  b. A: –Is there any evidence against John?
  c. B: –Some of the documents that John presented are forgeries.
  d. *Not all his documents are forgeries.*
  e. *There exist evidence against John.*

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[3] This is of course an overgeneralization. According to some accounts, the pragmatic context in which the utterance is uttered can implicitly cancel the implicature (Horn, 1984). Another view is that of a hearer never deriving it in the first place. This discussion is a fundamental one and has been tested experimentally. See Katsos and Cummins (2010) for more details.

[4] Here I align with some of the accounts on the semantics of scalar elements (Horn, 1984). For those accounts, scalar elements have a lower-bound semantics, where weak quantifiers like *some* mean [[AT LEAST SOME]], which is logically compatible with a reading like [[SOME AND POSSIBLY ALL]]. This view has been contested by some studies showing that the so-called scalar elements in fact do not have a lower-bound semantics (Yeom, 2017). Numerals are another example of this disagreement. Even if they can be understood as ordered sets, where *three* entails *two*, which at the same time entails *one*, studies about their interpretations have shown that their semantics is not [[AT LEAST N]] (Villaseñor & Gil, 2022).

In this example, we can see that depending on the question asked by the potential speaker, the answer in (3c) to (3a) or (3b) will give rise to at least to two different readings: i) that *not all his documents are forgeries* or ii) that *in fact there exist evidence against John*. Again, depending on the context (in this particular case a context provided by the question), the reading will be that of an upper-bound (3d) or that of a lower-bound (3e). Note that the availability of these interpretations in examples (2-3) are bound to the information shared by speakers and hearers in the course of an interaction. Nevertheless, this is not always the case: a grammatical form, deliberately uttered by a speaker, could potentially trigger an upper-bound reading or a lower-bound one. Take for instance the examples in (4) that involve the use of numerals, taken from Musolino (2004).

(4) a. You need to make three mistakes to be allowed to take the test again.
   b. *Three or more than three.*
(5) a. You can make three mistakes and still pass the test.
   b. *Three or fewer than three.*

As you can see, as well as (4a) is compatible with the reading in (4b), (5a) is compatible with the reading in (5b). Even if these examples instantiate numerals, the point at issue is the same: the use of modal operators of necessity as in (4a) or possibility as in (5a) make available both interpretations: upper and lower-bound readings. Villaseñor (2018) and Villaseñor and Gil (2022) have already studied the effect of modality in the interpretation of numerals and found that even though numerals have an exact semantics (3=3), modal contexts do affect their possible interpretations.

Scalar elements

Back to the case of the item *some* quantifiers as such could be considered as elements inhabiting lexical scales. Lexical scales are described as sets of linguistic elements that share some properties. Namely, according to Levinson (2000), they are lexicalized, come from the same grammatical category and could be paired with other lexical elements, where one of them entails the other. This is not only the case of quantificational expressions but that of any other lexical item sharing those characteristics outlined by Levinson and others. Take for example gradable adjectives. Gradable adjectives can be seen as sets of terms that encode different degrees of strength according to a particular dimension. For instance, in the dimension of size, we can think of two different adjectives in English that differ

in terms of strength, as is the case of *big* and *huge*. Interestingly, the same pattern can be seen in adjectives with opposite encoded meanings to the first pair: *small* and *tiny*. In either case, the same entailment relationship holds between pairs, where the meaning of [[HUGE]] entails that of [[BIG]] and the meaning of [[TINY]] entails that of [[SMALL]].

Following the reasoning outlined previously for the use of weak quantifiers and numerals, utterances containing weak adjectives could give rise to upper-bound readings as well, as shown in the following example:

(6) a. Peter's debt is big.
        b. *Peter's debt is not huge.*

Although this kind of reasoning seems to be on the right track, there is now experimental evidence available supporting otherwise. In fact, studies on the interpretation of gradable adjectives have shown that there is a great degree of variation concerning upper-bound readings. In other words, it is not always the case that the use of weak adjectives gives rise to upper-bound readings (Zevakhina, 2012; van Tiel *et al.*, 2016; Gil, 2019).

Both Zevakhina (2012) and van Tiel, van Miltenburg, Zevakhina and Geurts (2016) have shown experimentally that some weak gradable adjectives in English are interpreted as having an upper-bound reading. For other cases, this kind of interpretation is rarely derived. Nevertheless, they do not provide a full account that can explain this variability in the readings that speakers have access to. According to van Tiel *et al.* (2016) one of the factors that could affect their interpretation concerns their semantics, specifically a phenomenon described as *distinctness*. Distinctness is operationalized by two different semantic measurements: *semantic distance* and *boundedness*, the first one described as "The difference in strength between $\varphi[\alpha]$ and $\varphi[\beta]$" that "[...]showed a positive correlation with the likelihood that $\varphi[\alpha]$ would trigger the inference that $\neg\varphi[\beta]$" (van Tiel *et al.*, 2016, p. 29). On the other hand, *boundedness* is considered as the fact that a stronger element in a given scale refers to an end point, with the result that its use would give rise to a scalar inference (an upper-bound reading). As pointed out earlier, this account is not a sufficient argument for the variability in the readings, but it does show that there is a much deeper role of semantics here.

This is also the case in Spanish (Gil, 2019), where some experimental data have pointed in the same direction. Gil (2019) has replicated the results of van Tiel *et al.* (2016) using the same paradigm, where subjects are prompted to derive upper-

bound readings from the use of weak gradable adjectives. About these findings, two main points have to be made here, both of them regarding the paradigm used. The first one is that to elicit these kinds of readings from sentences without any linguistic context other than propositions containing the adjectives results perhaps in a sterile task for participants, leading them to interpret the sentences according to their semantic content and nothing more. The second one goes in the same direction: in the lack of a specific communicative situation, where another possibility would apply (that of the rejection of a stronger element in the scale), informants ended up accessing only the lower-bound reading (the semantic interpretation).

However, what happens with contexts where the linguistic form drives the interpretation towards one reading, a reading compatible with certain information shared by hearers and speakers? This is not only the case of Katsos and Cummins (2010) examples seen earlier, but also of those involving the use of modalized utterances, as shown by Musolino's data (2004). In addition, take the following examples, this time featuring gradable adjectives:

(7) a. Sara should present a good poster to be accepted in the congress.
     b. Sara can present a good poster not to be rejected in the congress.

In these examples, it is possible to arrive at different interpretations of the gradable adjective *good*. (7a) could be interpreted as compatible with a reading such as *Sara presenting a good (and possibly an excellent) poster in order to be accepted in the congress*. On the other hand, (7b) could be read as *Sara presenting only a good poster (not necessarily excellent) in order not to be rejected in the congress*. According to my intuitions, both readings depend firstly on the interpretation of the modal expression that takes scope over the scalar term, and secondly on the situation expressed by the second clause, that of being accepted or rejected in the congress for this matter. This is exactly the kind of interaction between modality and situational context on one hand, and the use of weak gradable adjectives on the other that is explored experimentally in the study presented here. Specifically, I will present experimental data in Spanish showing that weak gradable adjectives are preferably interpreted as having a lower-bound reading no matter the linguistic context (for this case modalized utterances), and regardless of the goals of the communicative situation speakers are involved in. Before presenting the experiment, it is necessary to present in more detail how modality is understood in the context of this study. This will be done in the following section.

Modality

Modalized expressions in natural languages have been widely explored and there exist several approaches concerning their semantics and pragmatics. One particular treatment of those expressions is Papafragou′s proposal (2000), which aligns nicely with the intuitions about the interpretation of gradable adjectives presented before. Papafragou′s analysis of modality assumes a monosemous approach in the sense that modals are seen as context-dependent expressions. By context-dependent expressions she understands that their semantic content is undetermined by the meaning they communicate. In this approach, modal expressions are analyzed as operators with a tripartite structure as the following (according to Krifka, Pelletier, Carlson, Ter Meulen, Chierchia, and Link, 1995).

(8) OPERATOR (Restrictor, Matrix)

The operator is a modal expression whose function is to establish a logical relation between the Restrictor and the Matrix. The Matrix over which the modal expression takes scope is an embedded proposition p and the Restrictor is the domain D of other propositions. The logical relation between p and D is that of entailment (in the case of strong modals, e. g. *must*) or that of compatibility (in the case of weak modals, e.g. *may*). According to this, the analysis of a modal operator such as *may* will be like (9).

(9) May (D, p), where D is compatible with p

Let's carry this analysis with an example like (10).

(10) a. In virtue of the creation of a successful vaccine, the pandemic *may* end soon.
b. p = the pandemic ends soon
c. D = in virtue of the creation of a successful vaccine
d. p is compatible with D

As we can see, *may* establishes a relation between the embedded proposition *the pandemic ends soon* and another proposition in the domain: *in virtue of the creation of a successful vaccine*, which in this case turns out to be linguistically expressed by a causal clause. The relation between the two is that of

compatibility, which could be paraphrased as *the scenario where we create a successful vaccine is compatible with the pandemic being over soon*.

Interestingly, the Restrictor (the domain of propositions) against which the embedded proposition is compared to need not to be linguistically expressed. If this is so, the domain is retrieved in the context, as shown in (11).

(11) a. The pandemic may end soon.
(12) a. [In virtue of the creation of a successful vaccine]
    b. [In virtue of a global access to a vaccine]
    c. [In virtue of the human world coming to its end due to the disease]

In these examples, the propositions in (12a-c) are not part of the sentence in (11), but are in the domain of possible propositions (facts) against which (11) is paired with. These propositions will be available depending on the conversational context in which (11) occurs. According to the relevant scenario given by the context, a different degree of potentiality will be communicated by the modalized expressions. In this sense, it could be the case that (11) communicates a greater degree of potentiality in a scenario like (12c), in contrast to a scenario like (12a), where surely the pandemic will meet its end if there are no more humans than can become infected.

As already pointed out, the logical force encoded in the modals is captured by the type of logical relation (imposed by the semantics of the operator) between the Restrictor and the Matrix. In this sense, in the case of the weak modals, the relation imposed by the operator is that of compatibility, and in the case of the strong ones, that of entailment. Table 1 shows this distribution in the case of four modals in English (adapted from Papafragou, 2000).[5]

Table 1. Modals distribution.

Weak modal expressions	Strong modal expressions
May: p is compatible with D	*Must*: p is entailed by D
Can: p is compatible with D	*Should*: p is entailed by D

[5] Papafragou makes a further distinction about the domains of propositions. She distinguishes between **unspecified domains**, which would be the case of the modal expressions *must* and *may*, and **factual** and **normative domains**. The domains specified by *can* would be factual domains and those specified by *should* would be normative domains. By these specifications, Papafragou intends to capture the kind of restrictions in the domains imposed by the semantics of modal expressions.

Another interesting thing about this analysis is that it is possible to formally capture the interaction between a variety of different domains and embedded propositions that involve numerals or gradable adjectives and their possible interpretations. In this sense, we can see that there is a complex interaction between the kind of modal expressions used and the kind of domains in question. In order to show this, let's see an example that involves the use of a strong epistemic operator in the context of a game like poker.

(13) a. It must be the case that John bets five bucks this time.
     b. [John's victory is secure]
(14) a. It must be the case that Peter's debt is big.
     b. [Peter would sell his car, but not his house]

As we can see in (13a), the numeral *five* is under the scope of the operator *must*, which in this case could receive an epistemic interpretation. Let's suppose that the domain in question is one where John knows he is going to win, as made explicit in (13b). In this scenario, we can see that the numeral in (13a) can receive a lower-bound reading of *at least five*. Interestingly, this reading becomes available, and in fact very plausible, because of the domain in question against which the proposition is paired with, in this case a lower-bound domain. In this sense, it is possible to paraphrase this as follows: *if John has secured his victory in this game, he will bet five (and possibly more) bucks*. The same analysis applies *mutatis mutandis* for the example (14a), with the opposite reading to that of (13), that is an upper-bound reading. The situations expressed by this particular domain, an upper-bound domain, could give rise to the interpretation of the weak gradable adjective *big* as follows: *If Peter would sell only his car, his debt must be big, but not hug*e.

Finally, the strength of the operator used could also have an impact in the preference for a reading over the other. So, it could be the case that the kind of relation held between the proposition and the domain could favor upper and lower-bound readings. As noted earlier, strong modal operators hold an entailment relation between the proposition and the domain, while this relation is one of compatibility in the case of weak modal operators. According to this view, both upper and lower bound readings (depending on the domain in question) could be preferred in cases like (13-14a), compared to cases like (15-16a), because the compatibility relation is weaker than the entailment relation.

(15) a. It is possible that John bets five bucks this time.

b. [John's victory is secure]

(16) a. It is possible that Peter's debt is big.

b. [Peter would sell his car, but not his house]

About this study

This study presents an experiment designed to explore the derivation of upper and lower-bound readings of scalar adjectives in Spanish. As pointed out earlier, the hypothesis is that the interaction between the type of domain and the kind of modality will have an impact on the interpretation of scalar adjectives according to the three following predictions:

1. In a lower-bound domain, a lower-bound reading of a scalar adjective will be preferred.
2. In an upper-bound domain, an upper-bound reading of a scalar adjective will be preferred.
3. Strong modality (as opposed to weak modality) will strengthen upper-bound readings and lower-bound readings in their corresponding domain.

This hypothesis was tested in 11 scalar adjectives corresponding to 11 scales in Spanish, as shown in Table 2.

TABLE 2. SCALES TASTED IN THE EXPERIMENT.

DIMENSION	ADJECTIVAL SCALE IN SPANISH	APPROXIMATE ENGLISH TRANSLATION
[SIZE 1]	<grande, enorme>	<big, enormous>
[SIZE 2]	<pequeño, diminuto>	<small, tiny>
[SUBJECTIVE ESTIMATION 1]	<rico, delicioso>	<tasty, delicious>
[SUBJECTIVE ESTIMATION 2]	<adecuado, idóneo>	<adequate, ideal>
[PHYSICAL QUALITY 1]	<húmedo, empapado>	<wet, soaked>
[PHYSICAL QUALITY 2]	<limpio, impecable>	<clean, spotless>
[TEMPERATURE]	<frío, helado>	<cool, cold>
[VISUAL ESTIMATION]	<bonito, hermoso>	<pretty, gorgeous>
[EMOTION]	<molesto, furioso>	<annoyed, furious>
[PERSONAL ATTRIBUTE]	<inteligente, genio>	<intelligent, genius>
[COLOR]	<claro, blanco>	<light, white>

Four conditions were created according to the two levels of the independent variables. Table 3 shows an example of the critical item for the scale *<grande, enorme>* in Spanish (*<big, huge>* for a possible translation).

TABLE 3. FOUR CONDITIONS ACCORDING TO THE LEVELS OF THE TWO VARIABLES.

SIZE 1 <grande, enorme> <*big, huge*>	LOWER-BOUND DOMAIN	UPPER-BOUND DOMAIN
	A Rosa le gustaría poner su casa para la fiesta de graduación. *Rose would like to offer her place to host the graduation party.*	Rosa no quiere poner su casa para la fiesta de graduación. *Rose wouldn´t like to offer her place to host the graduation party.*
Strong epistemic modality	Rosa dice: Mi casa es sin duda grande. *Rose: My place is surely big.* ¿Qué tan probable es que la casa de Rosa sea enorme? *How likely is it that Rose's place is huge?*	Rosa dice: Mi casa es sin duda grande. *Rose: My place is surely big.* ¿Qué tan probable es que la casa de Rosa sea enorme? *How likely is it that Rose's place is huge?*
Weak epistemic modality	Rosa dice: Puede que mi casa sea grande. *Rose: My place is probably big.* ¿Qué tan probable es que la casa de Rosa sea enorme? *How likely is it that Rose's place is huge?*	Rosa dice: Puede que mi casa sea grande. *Rose: My place is probably big.* ¿Qué tan probable es que la casa de Rosa sea enorme? *How likely is it that Rose's place is huge?*

Experiment
Method
Participants

317 native speakers of Spanish participated remotely in the experiment (mean age 32.3, range 18-62) distributed in 4 groups of application.

Stimuli

All items presented a contextual situation and a statement made by a speaker. There were 11 critical items (corresponding to the 11 scales) for each condition, resulting in 44 critical items in total distributed in 4 versions of the application, 5 distractors and 1 session of training for each version. Figure 1 shows the screen of a critical item, in this case for the scale <*adecuado, idóneo*>.

Figure 1. Screenshot of a critical item displayed in *Qualtrics*.

Procedure

The task was presented in the platform *Qualtrics* which allows to remotely collect responses from participants. They were asked in all critical conditions how probable it was that the strong scalar adjective was the case, given the context and the utterance. They had to provide their answers according to the following four-point Likert scale: "not at all likely", "a little likely", "somehow likely" and "very likely". There was an additional question that functioned as a follow-up question but was not considered for the analysis.

Results

According to the first prediction, the expected responses should be gathered in the two positive points of the Likert scale ("very likely" and "somehow likely") for the context of a lower-bound domain. That is to say that when participants interpret an utterance containing a weak scalar adjective $\varphi[\alpha]$ in that particular context, they would consider the stronger possibility $\varphi[\beta]$ "very likely" or "somehow likely" to be the case. In other words, they would derive the lower-bound reading in this context.

The evidence confirmed the previous prediction. There was a preference for lower-bound readings of weak scalar adjectives in contexts of lower-bound domains. This is indicated by most choices in the "very likely" point of the Likert scale, and also by a moderate frequency of responses obtained on the "somehow likely" point of the scale, as shown in Figure 2, in which blue bars represent frequencies for the weak modalized propositions and red bars represent frequencies for the strong modalized propositions.
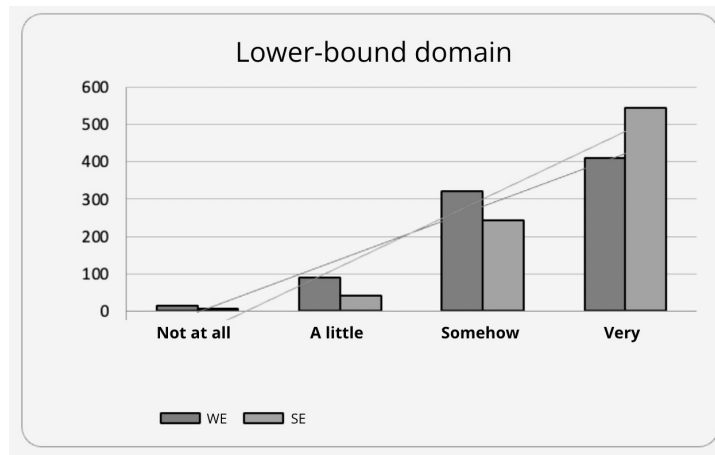

Figure 2. Frequencies of answers in the Likert scale for the lower-bound domain context.

By conducting a chi-square statistical test, the obtained value was statistically significant *p<.0001*. In other words, there is statistical evidence accounting for the preference of lower-bound readings of weak scalar adjectives in the context of lower-bound domains, as shown in Table 4.

TABLE 4. FREQUENCIES, STANDARDIZED RESIDUALS (SR) AND *P* VALUE FOR THE LOWER-BOUND DOMAIN.

	WEAK EPISTEMIC MODALITY	STRONG EPISTEMIC MODALITY	STANDARDIZED RESIDUALS	
Not at all	14	7	1.08	-1.08
A little	89	41	2.98	-2.98
Somehow	322	243	2.35	-2.35
Very	411	545	-3.06	3.06
chi-sq	<.0001			

In addition, the type of modality modifying the propositions in question was predicted to have an effect on their interpretation, in the sense that strong modalized propositions would potentialize the predicted reading for each domain, again in this case increasing the chances for participants to derive a lower-bound reading. As it is shown in Figure 1, there is a greater frequency of responses concentrating in the last point of the scale, corresponding to the strong modalized propositions. This is corroborated by the significant value obtained by the chi-square test (*p<.0001*) by comparing both types of modalized propositions considering only the two points of acceptance.

The second main prediction was that the kind of readings derived in the upper-bound domain would be upper-bound readings. That is to say that when participants interpreted an utterance containing a weak scalar adjective $\varphi[\alpha]$ in an upper-bound domain, they would reject the stronger possibility $\varphi[\beta]$ by choosing "not at all likely" or "a little likely" in the Likert scale. In other words, they would derive the upper-bound reading in this particular context.

It would be expected that greater frequencies of answers would be gathered in the two negative points of the Likert scale. Nevertheless, even in these contexts the frequencies were gathered in the two positive points of the scale, "very likely" and "somehow likely", as shown in Figure 3, in which blue bars represent frequencies for the weak modalized propositions and red bars represent frequencies for the strong modalized propositions. This means that, contrary to the prediction, there were not greater frequencies of rejection of

strong scalar adjectives in the upper-bound domain. This essentially means that the predicted upper-bound readings were in fact not derived.
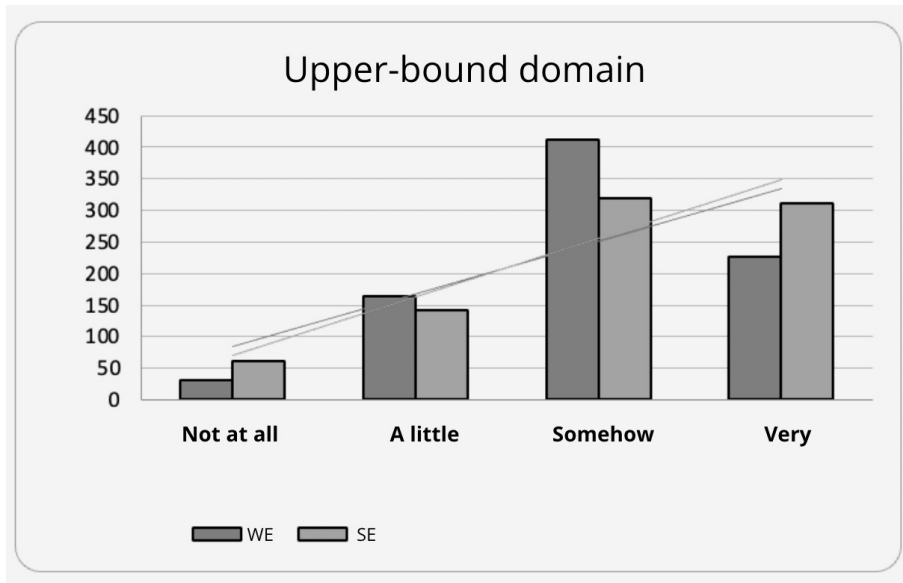

Figure 3. Frequencies of answers in the Likert scale for the upper-bound domain context.

Discussion

Results show different responses across domains and across modalities, which is evidence that different inferences are derived by speakers. When participants interpret weak scalar adjectives in lower-bound domains, they derive lower-bound readings. These readings have the form of $\varphi[\alpha]\wedge\Diamond(\varphi[\beta])$. As an illustration, take the scale *<wet, soaked>*. If a speaker asserts that something is *wet*, this will be interpreted by the hearer that the thing being talked about is *wet* and possibly *soaked*. The consideration that the strong adjective of the scale could also be the case is the so-called lower-bound reading, which could be paraphrased as *at least wet*. Interestingly, this kind of reading is even more frequent if the weak scalar adjective occurs under the scope of a modal operator of necessity.

In contrast, weak scalar adjectives still receive a lower-bound reading even when the context, a communicative situation shared by speaker and hearer, is one where the strong scalar adjective could not be the case. For example, in a situation where someone has booked a hotel room with a view to the garden, but not to the sea, and utters "he view from the room will certainly be pretty," a very likely inference would be that the view won't be gorgeous. This inference

would be licensed because the room has a view but not to the sea and because the speaker is certain about the quality of the view, in this case just *pretty*. Nevertheless, the experimental data collected here contradicts this intuition. Upper-bound readings are hardly derived from the use of weak scalar adjectives even when the situation calls for the rejection of the strong scalar adjective.

As discussed previously in the specialized literature in pragmatics, neo-gricean accounts proposed that the semantic content of scalar elements in natural languages is that of [[AT LEAST X]] (Horn, 1984). Some studies have been conducted in Spanish showing that this is not the case of numerals, for example (Villaseñor, 2017, 2018; Villaseñor & Gil, 2022), which essentially means that numerals could receive lower and upper-bound readings, but their core meaning is [[EXACTLY *N*]]. This is also the theoretical intuition of Yeom (2017), who extends this view of numerals to other scalar elements. Nevertheless, the data collected in this study suggests that most of the time speakers give scalar adjectives an [[AT LEAST X]] reading, regardless of the kind of pragmatic context in which they are asserted. This could be evidence of scalar adjectives having a lower-bound semantics (as proposed by some pragmatic theories), which speakers access no matter the pragmatic context. Another possibility is that adult speakers interpret scalar adjectives logically, even when pragmatic factors are at stake. This evidence runs in the opposite direction to the predicted readings speakers are supposed to give to scalar elements, that is the derivation of scalar implicatures. Whatever the case might be, it is evident that scalar adjectives are interpreted by speakers differently than other scalar elements, as numerals or quantifiers.

Finally, these findings suggest that scalar implicatures are at best marginal cases of pragmatic inferences that are restricted only to certain cases. These cases involved the interpretation of quantifiers or the interpretation of connectors, such as the existential quantifier and the disjunction. Nevertheless, it is evident that a phenomenon such as scalarity does exist in language and that more extensive research has to be conducted regarding its interpretation.

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Appendix
Appendix 1. Experimental items.

SIZE 1 <grande, enorme>	LOWER-BOUND DOMAIN	UPPER-BOUND DOMAIN
	A Rosa le gustaría poner su casa para la fiesta de graduación.	Rosa no quiere poner su casa para la fiesta de graduación.
Strong epistemic	Rosa dice: Mi casa es sin duda grande. ¿Qué tan factible es que la casa de Rosa sea enorme? ---> ¿Qué tan factible es que Rosa termine haciendo la fiesta en su casa? --->	Rosa dice: Mi casa es sin duda grande. ¿Qué tan factible es que la casa de Rosa sea enorme? ---> ¿Qué tan factible es que Rosa termine haciendo la fiesta en su casa? --->
Weak epistemic	Rosa dice: Puede que mi casa sea grande. ¿Qué tan factible es que la casa de Rosa sea enorme? ---> ¿Qué tan factible es que Rosa termine haciendo la fiesta en su casa? --->	Rosa dice: Puede que mi casa sea grande. ¿Qué tan factible es que la casa de Rosa sea enorme? ---> ¿Qué tan factible es que Rosa termine haciendo la fiesta en su casa? --->

SIZE 2 <pequeño, diminuto>	LOWER-BOUND DOMAIN	UPPER-BOUND DOMAIN
	Pedro es un neurocirujano que actualmente trabaja en un caso muy complejo.	Pedro es un neurocirujano que actualmente trabaja en un caso de rutina.
Strong epistemic	Pedro dice: El tumor que causa esta condición es sin duda pequeño. ¿Qué tan factible es que el tumor sea diminuto? ---> ¿Qué tan factible es que la condición sea grave? --->	Pedro dice: El tumor que causa esta condición es sin duda pequeño. ¿Qué tan factible es que el tumor sea diminuto? ---> ¿Qué tan factible es que la condición sea grave? --->
Weak epistemic	Pedro dice: Es posible que el tumor que causa esta condición sea pequeño. ¿Qué tan factible es que el tumor sea diminuto? ---> ¿Qué tan factible es que la condición sea grave? --->	Pedro dice: Es posible que el tumor que causa esta condición sea pequeño. ¿Qué tan factible es que el tumor sea diminuto? ---> ¿Qué tan factible es que la condición sea grave? --->

SUBJECTIVE ESTIMATION 1 <rico, delicioso>	Lower-bound domain	Upper-bound domain
	La mamá de Matías es chef y cocinará para él y su novia.	*Matías va a probar una nueva fonda muy barata.*
Strong epistemic	Matías le dice a su novia: Seguro la comida de hoy va a estar rica. ¿Qué tan factible es que la comida esté deliciosa? ---> ¿Qué tan factible es que a Matías le guste comer la comida de su mamá? --->	Matías le dice a su novia: Seguro la comida de hoy va a estar rica ¿Qué tan factible es que la comida esté deliciosa? ---> ¿Qué tan factible es que Matías regrese a comer ahí? --->
Weak epistemic	Matías le dice a su novia: Es posible que la comida de hoy esté rica. ¿Qué tan factible es que la comida esté deliciosa? ---> ¿Qué tan factible es que a Matías le guste comer la comida de su mamá? --->	Matías le dice a su novia: Es posible que la comida de hoy esté rica. ¿Qué tan factible es que la comida esté deliciosa? ---> ¿Qué tan factible es que Matías regrese a comer ahí? --->

SUBJECTIVE ESTIMATION 2 <adecuado, idóneo>	Lower-bound domain	Upper-bound domain
	Hay muchas plazas disponibles para el empleo por lo que pueden entrar muchos candidatos.	*Solamente hay una plaza para el empleo por lo que hay que elegir muy bien al candidato.*
Strong epistemic	El jefe dice: No tengo duda de que el perfil de este candidato es adecuado. ¿Qué tan factible es que el perfil del candidato sea idóneo? ---> ¿Qué tan factible es que el candidato obtenga el empleo? --->	El jefe dice: No tengo duda de que el perfil de este candidato es adecuado. ¿Qué tan factible es que el perfil del candidato sea idóneo? ---> ¿Qué tan factible es que el candidato obtenga el empleo? --->
Weak epistemic	El jefe dice: Es posible que el perfil de este candidato sea adecuado. ¿Qué tan factible es que el perfil del candidato sea idóneo? ---> ¿Qué tan factible es que el candidato obtenga el empleo? --->	El jefe dice: Es posible que el perfil de este candidato sea adecuado. ¿Qué tan factible es que el perfil del candidato sea idóneo? ---> ¿Qué tan factible es que el candidato obtenga el empleo? --->

PHYSICAL QUALITY 1 <húmedo, empapado>	Lower-bound domain	Upper-bound domain
	Lara se acaba de bañar.	*Hace un rato que Lara se terminó de bañar.*
Strong epistemic	Lara dice: No me puedo peinar porque mi cabello está definitivamente húmedo. ¿Qué tan factible es que el cabello de Lara esté empapado? ---> ¿Qué tan factible es que el cabello de Lara esté maltratado? --->	Lara dice: No me puedo peinar porque mi cabello está definitivamente húmedo. ¿Qué tan factible es que el cabello de Lara esté empapado? ---> ¿Qué tan factible es que el cabello de Lara esté maltratado? --->
Weak epistemic	Lara dice: No me puedo peinar porque quizás mi cabello está húmedo. ¿Qué tan factible es que el cabello de Lara esté empapado? ---> ¿Qué tan factible es que el cabello de Lara esté maltratado? --->	Lara dice: No me puedo peinar porque quizás mi cabello está húmedo. ¿Qué tan factible es que el cabello de Lara esté empapado? ---> ¿Qué tan factible es que el cabello de Lara esté maltratado? --->

PHYSICAL QUALITY 2 <limpio, impecable>	Lower-bound domain	Upper-bound domain
	El médico de Juan es muy cuidadoso con la higiene en su espacio.	*El médico de Juan normalmente mantiene la higiene en su espacio.*
Strong	Juan dice: seguro el consultorio está limpio. ¿Qué tan factible es que el consultorio esté impecable? ---> ¿Qué tan factible es que Juan visite el consultorio en un futuro? --->	Juan dice: seguro el consultorio está limpio. ¿Qué tan factible es que el consultorio esté impecable? ---> ¿Qué tan factible es que Juan visite el consultorio en un futuro? --->
Weak epistemic	Juan dice: es posible que el consultorio esté limpio. ¿Qué tan factible es que el consultorio esté impecable? ---> ¿Qué tan factible es que Juan visite el consultorio en un futuro? --->	Juan dice: es posible que el consultorio esté limpio. ¿Qué tan factible es que el consultorio esté impecable? ---> ¿Qué tan factible es que Juan visite el consultorio en un futuro? --->

TEMPERATURE <frío, helado>	Lower-bound domain	Upper-bound domain
	Las cervezas ya llevan tiempo en el refrigerador.	*Las cervezas se acaban de meter al refrigerador.*
Strong epistemic	Juan dice: Es seguro que las cervezas están frías. ¿Qué tan factible es que las cervezas estén heladas? ---> ¿Qué tan factible es que Juan quiera tomar una cerveza? --->	Juan dice: Es seguro que las cervezas están frías. ¿Qué tan factible es que las cervezas estén heladas? ---> ¿Qué tan factible es que Juan quiera tomar una cerveza? --->
Weak epistemic	Juan dice: Es posible que las cervezas estén frías. ¿Qué tan factible es que las cervezas estén heladas? ---> ¿Qué tan factible es que Juan quiera tomar una cerveza? --->	Juan dice: Es posible que las cervezas estén frías. ¿Qué tan factible es que las cervezas estén heladas? ---> ¿Qué tan factible es que Juan quiera tomar una cerveza? --->

VISUAL ESTIMATION <bonito, hermoso>	Lower-bound domain	Upper-bound domain
	A Pablo le asignarán una habitación con vista al mar.	*A Pablo le asignarán una habitación con vista, pero no al mar.*
Strong epistemic	Pablo dice: La vista desde la habitación sin duda será bonita. ¿Qué tan factible es que la vista resulte hermosa desde la habitación? ---> ¿Crees que Pablo disfrutará sus vacaciones? --->	Pablo dice: La vista desde la habitación sin duda será bonita. ¿Qué tan factible es que la vista resulte hermosa desde la habitación? ---> ¿Crees que Pablo disfrutará sus vacaciones? --->
Weak epistemic	Pablo dice: La vista desde la habitación quizás será bonita. ¿Qué tan factible es que la vista resulte hermosa desde la habitación? ---> ¿Crees que Pablo disfrutará sus vacaciones? --->	Pablo dice: La vista desde la habitación quizás será bonita. ¿Qué tan factible es que la vista resulte hermosa desde la habitación? ---> ¿Crees que Pablo disfrutará sus vacaciones? --->

EMOTION <molesto, furioso>	Lower-bound domain	Upper-bound domain
	La novia de Alan lo engañó con su mejor amigo.	*La novia de Alan llegó 10 minutos tarde.*
Strong epistemic	Alan dice: Sin duda estoy molesto. ¿Qué tan factible es que Alan esté furioso? ---> ¿Qué tan factible es que Alan perdone a su novia? --->	Alan dice: Sin duda estoy molesto. ¿Qué tan factible es que Alan esté furioso? ---> ¿Qué tan factible es que Alan perdone a su novia? --->
Weak epistemic	Alan dice: Creo que estoy molesto ¿Qué tan factible es que Alan esté furioso? ---> ¿Qué tan factible es que Alan perdone a su novia? --->	Alan dice: Creo que estoy molesto ¿Qué tan factible es que Alan esté furioso? ---> ¿Qué tan factible es que Alan perdone a su novia? --->

PERSONAL ATTRIBUTE <inteligente, brillante>	Lower-bound domain	Upper-bound domain
	Juan es parte de un grupo de alumnos de excelencia.	*Juan ha tenido ciertas dificultades en la escuela.*
Strong epistemic	Su papá dice: Sin duda Juan es inteligente. ¿Qué tan factible es que Juan sea brillante? ---> ¿Qué tan factible es que Juan cuente con el apoyo de su papá? --->	Su papá dice: Sin duda Juan es inteligente. ¿Qué tan factible es que Juan sea brillante? ---> ¿Qué tan factible es que Juan cuente con el apoyo de su papá? --->
Weak epistemic	Su papá dice: Es posible que Juan sea inteligente. ¿Qué tan factible es que Juan sea brillante? ---> ¿Qué tan factible es que Juan cuente con el apoyo de su papá? --->	Su papá dice: Es posible que Juan sea inteligente. ¿Qué tan factible es que Juan sea brillante? ---> ¿Qué tan factible es que Juan cuente con el apoyo de su papá? --->

COLOR <claro, blanco>	Lower-bound domain	Upper-bound domain
	Martín rinde su declaración como testigo de un percance automovilístico. El día del percance no traía sus lentes.	*Martín rinde su declaración como testigo de un percance automovilístico.*
Strong epistemic	Martín dice: Estoy seguro de que la moto que se le cerró al camión era color claro. ¿Qué tan factible es que la moto fuera color blanca? ---> ¿Qué tan factible es que la moto haya ocasionado el percance? --->	Martín dice: Estoy seguro de que la moto que se le cerró al camión era color claro. ¿Qué tan factible es que la moto fuera color blanca? ---> ¿Qué tan factible es que la moto haya ocasionado el percance? --->
Weak epistemic	Martín dice: Es posible que la moto que se le cerró al camión fuera color claro. ¿Qué tan factible es que la moto fuera color blanca? ---> ¿Qué tan factible es que la moto haya ocasionado el percance? --->	Martín dice: Es posible que la moto que se le cerró al camión fuera color claro. ¿Qué tan factible es que la moto fuera color blanca? ---> ¿Qué tan factible es que la moto haya ocasionado el percance? --->