Hedging with Litotes, the Underdetermined NPI

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October 10, 2015

1 Introduction

Although it has been prescriptively persecuted for eons (Horn, 2015a), *litotes*—illustrated in (1)—is a rhetorical device which allows for boolean negation[1] to transform into either a typical scalar implicature, or an alternate strengthening to the contrary.

(1) *Litotes*
   a. The farmers were not unhappy about the rain.
   b. Helen was not happy about her son's report card.
   c. Neither of George's neighbors disliked him.
   d. None of the restaurants were cheap by Missouri standards.
   e. George was seldom misinformed about hockey.
   f. The driver took the turn without decelerating.
   g. My mother did not disagree entirely.
   h. Not all of my students were abysmal last year.
   i. The road was not extremely straight.
   j. George's version wasn't entirely inaccurate.
   k. One can hardly doubt that litotes is an interesting phenomenon.(van der Wouden, 1996)

The conversational usefulness of these constructions derives from the equal availability of multiple inferences; which inference is derived will be determined by a combination of contextual grounding and intonational cues, but the equal possibility of both results from litotes's underdetermined logical form. This underdetermined form is produced by a combination of a gradable and vague predicate which falls within the scope of—minimally—a downward entailing operator. These production patterns show remarkable similarities with the licensing patterns of strong negative polarities items (henceforth, sNPIs), such as punctual *until*, additive *either*, and *in weeks/months/years*, suggesting that litotes may be a form of compositional negative polarity item (henceforth, NPI).

[1] also referred to as the boolean complement

2 Defining the Object of Study: What Is Litotes?

In its simplest definition, litotes is "[a] figure of speech, in which an affirmative is expressed by the negative of the contrary" (OED Online, 2015). This definition targets the use of litotes typically used in rhetoric where the negative of *unhappy*—the contrary of *happy*—appears in the form of *not unhappy*, and is intended to express the affirmative, *happy*. However, the information conveyed by this "negative of the contrary" is much more flexible than the simple affirmative proposition. For example, the statement in (2)—an example of common (and prescriptively disparaged) "not un-" litotes—could have any of the interpretations shown in (3) given the right context.

(2) The farmers were not unhappy about the rain.

(3) a. *Boolean Complement:*
The farmers were not sad about the rain, but how they really feel beyond that is unknown, (e.g. because it is unknown how much rain there has been recently.)

b. *Scalar Implicature:*
The farmers were neither happy nor unhappy about the rain, because they had had plenty for the crops to grow well, but flooding also wasn't a concern.

c. *Strengthening to the Contrary:*
The farmers were happy about the rain, because they were in a drought and it was sorely needed.

This is due to (2)'s underdetermined logical form; that is, since *not unhappy* only removes *unhappy* from the set of possibilities, it generates a set of alternatives that are still compatible with the updated context without directly entailing any one member of this set. For example, (2) generates the set of possible interpretations (i.e. set of alternatives) shown in (3), but none of the members of that set—the direct boolean complement, the scalar implicature of the middle ground, and the strengthening to the contrary—must necessarily be accepted as the entirety of the information conveyed. Which option is chosen is entirely dependent on context and other pragmatic and paralinguistic information, and it is this indecipherability on the level of the logical form that makes it underdetermined. Importantly, it is a combination of the gradable and vague quality of the predicate (discussed in section 2.1) and its position within the scope of the productive operator (discussed in section 2.3) which makes this underdetermination possible.

2.1 Predicate Gradability and Vagueness

The predicate of successful litotes must be gradable and vague in some fashion, either compositionally via intensifying scalar adverbs, or inherently as a feature of the base predicate. Example (2) is vague due to the nature of the base predicate, *happy*, which is itself both gradable (or scalar) and vague in that it requires some contextual standard of comparison for definition. Alternatively, a predicate such as *odd* (in the numerical sense), which is neither vague nor gradable, does not result in multiple different interpretations. It can only mean (4a), and the other expressions given below are weird at best.

(4) The number 3 is not un-odd.[2]

a. The number 3 is odd. = The number 3 is not even.

b. # The number 3 is extremely odd.

c. # The number 3 is neither even nor odd.

This disparity is an illustration of the primary defining characteristic of litotes: it must be vague when it lacks proper contextual grounding, which (4) is not. Nevertheless, these interpretations are not dependent on different logical forms, and therefore are not simply an instance of structural or lexical ambiguity. I argue that the logical form of litotes is the same for each interpretation of litotes, thereby making it underdetermined, and any further update to the common ground must be due to pragmatic processes. Whether an expression is actually litotes (i.e. whether it is capable of having an underdetermined logical form) is dependent on the semantic features of its base predicate, even when the rest of the expression appears to be nearly identical, as with (2) and (4). That is, litotes must allow for a contrary interpretation as well as that of the boolean complement (which is the contradiction in Horn's terms (2015b; 2015a)). For example, in the litotes in (2) above, the contrary interpretation of of *not unhappy* is *happy*, while the boolean complement, is just what remains when *unhappy* is removed as a possibility, and this includes both the contrary *happy* and any relevant values which may lie between *happy* and *unhappy*. Both oppositions—between the predicate and its contrary and between the predicate and its boolean complement—follow the "Law of Contradiction" (that both predicates cannot be true of the same entity) as defined in (5).

(5) Law of Contradiction:
$\forall x \in D, \neg(F(x) \wedge G(x))$

However, only the predicate and its boolean complement obey the "Law of the Excluded Middle" (that an entity must be either one predicate or the other) as defined in (6) (van der Wouden, 1996, 2002; Horn, 1989, 2015b).

(6) Law of the Excluded Middle:
$\forall x \in D, (F(x) \vee G(x))$

This essentially states that for a predicate P to have a contrary Q, its boolean complement C must include both some further opposition of P and a middle ground where neither P nor the opposition of P is true; the "further opposition" is the contrary, Q. That is, for G to be the contrary of F, rather than just the boolean complement of F, (5) must hold, but (6) must fail. The embedding of Q within C explains its unilateral entailment relationship with C, as shown in (7); that is, the contrary entails the complement, but the complement does not entail the contrary. If such a distinction cannot be made within the boolean complement C, C remains the only opposition to the original proposition P.

(7) Unilateral Entailment:
$\forall x \in D, Q(x) \rightarrow C(x)$

Some simple predicates, such as *happy*, *rich*, *good*, *big*, etc., naturally allow for a middle ground without modification as in (8a); that is, they have antonyms that violate (6).

[2] A reviewer pointed out that this sentence itself is odd in that negating non-productive predicates like this is somewhat awkward.

These are what Kennedy (2007) calls *relative gradable* predicates: They are both *gradable* and *vague*. Gradable predicates map their arguments onto degrees (i.e. abstract units of measurement), and a set of totally ordered degrees with respect to some dimension constitutes a scale (Kennedy, 2007). The gradable, or scalar, nature of a predicate is illustrated by whether it can take degree morphology (e.g. comparative morphemes: *more*, *less*, *as*; intensifiers: *very*, *rather*, *quite*, etc.; sufficiency morphemes: *too*, *enough*, *so*, etc.); thus the gradable nature of relative gradable predicates is illustrated in (8b).

(8) Relative Gradable

a. The farmers were not happy, but they were not unhappy either.

b. Brad was happier than Finn about the pay adjustments this quarter.

Relative gradable predicates' status as vague pertains to their dependence on a contextually defined point of reference, especially when lacking degree morphology (i.e. in its "positive form"). For a relative gradable predicate to apply to an entity, the only necessity is that the entity's degree of the quality expressed by the predicate must stand out with respect to a contextually defined standard of comparison (Kennedy, 2007). This means that corresponding relative gradable antonyms, although they map entities to the same scale only with reverse orderings, need not have their standards of comparison at the same point, and therefore allow for a natural middle ground, as in (8a). That is, even though the farmers did not stand out with respect to the context on the dimension of "increasing mood", it is not necessarily the case that they must therefore stand out with respect to the context on the dimension of "decreasing mood"; they can be somewhere between these contextual comparison points.

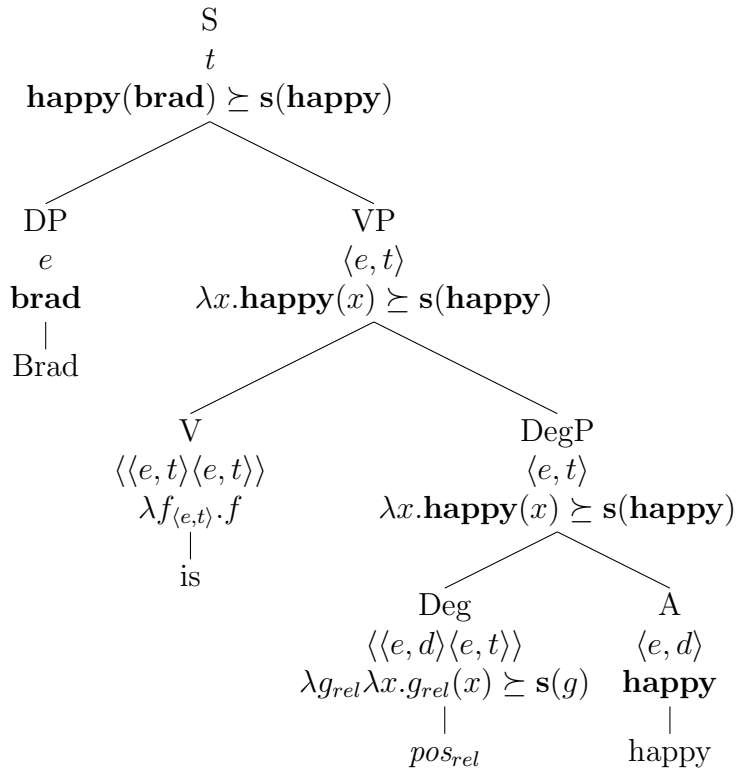
Kennedy (2007) defines a relative gradable predicate in terms of its positive form (i.e. when it appears without degree morphology) as (9a), where g is a function of type $\langle e, d\rangle$ from entities to degrees, "**s** is a context-sensitive function from measure functions to degrees that returns a standard of comparison based both on properties of the adjective [or predicate] g (such as its domain) and on features of the context of utterance" (Kennedy, 2007, p. 16) and pos_{rel} is a null degree morpheme which takes the relative gradable measure function, g_{rel}, and returns a property of entities, making the Degree Phrase type $\langle e, t\rangle$.[3] The tree in (9b) shows the compositional derivation of a sentence featuring a relative gradable predicate in its positive form.

(9) Relative gradable logical form

a. $[\![[_{\text{Deg}} pos_{rel}]]\!] = \lambda g_{rel} \lambda x : g_{rel} \in D_{\langle e,d\rangle} \wedge$ g_{rel} is a relative gradable predicate $\wedge x \in D_e$. $g_{rel}(x) \succeq \mathbf{s}(g_{rel})$ (extrapolated from Kennedy (2007, p. 17))

[3]This can also be analyzed as a type shifting rule without any serious repercussions for the theory. See Kennedy (2007) for a full discussion of the necessity of *pos* and **s** in analyzing vague predicates in their positive form.

b. *Brad is happy.*



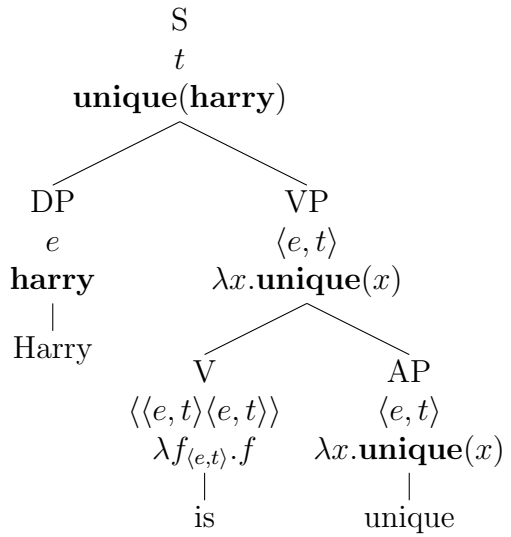
Non-gradable adjectives allow for neither a middle ground, nor degree morphology, as shown in (10) below with examples borrowed from Kennedy (2007). These predicates can be analyzed as having a complementary distribution, but they are not scalar. As such, non-gradable adjectives are actually of a different type than gradable adjectives; rather than being $\langle e,d\rangle$ like gradable predicates which return degrees, non-gradable predicates are the traditional type of $\langle e,t\rangle$ and return truth values. Therefore, no null degree morpheme[4] is required for non-gradable predicates, and the adjective phrase cannot be embedded in a Degree Phrase.

(10) Non-gradable

a. $[\![\text{AP}]\!] = \lambda f \in D_{\langle e,t\rangle}\lambda x \in D_e.f(x)$

[4]Or type shifting rule if that is the preferred approach

b. *Harry is unique.*



c. ?? Harry is more unique than Ron.

d. ?? The table is more wooden than the floor. (Kennedy, 2007)

e. ?? The upstairs windows were not unlocked, but neither were they locked.

f. ?? The platinum is less geological than the gold.(Kennedy, 2007)

g. ?? The front door was more locked than the back door was.

Other predicates, which Kennedy (2007) calls "absolute gradable" predicates, do not have an inherent middle ground, but still have entailments about a scale that extends beyond their domain. This scalarity is demonstrated by the fact that they can take degree morphology as illustrated in (11).

(11) Absolute Gradable: gradable, but no middle ground

a. ?? The door to Jacob's office was not open, but neither was it closed.

b. ?? The laundry on the line was not wet, but neither was it dry.

c. ?? The gold was neither pure nor impure.

d. The door was more open that it had been when Ellen had left.

e. The laundry is drier now than it was an hour ago.

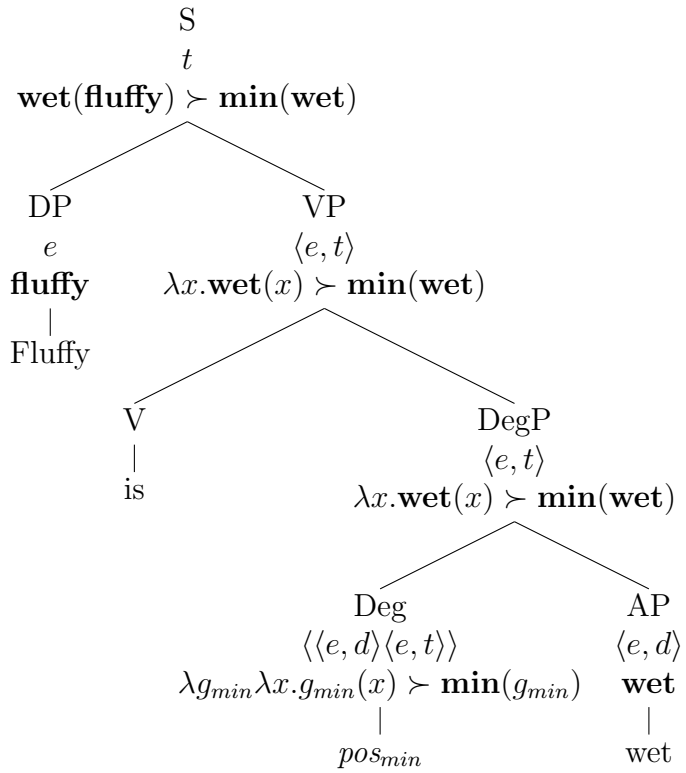
The reason these predicates do not have a middle ground is due to the antonym pairs they typically come in: one minimal standard and one maximal standard.[5] Minimal standard absolute predicates, defined as in (12a), are true when the minimal point on the predicate's scale is reached or succeeded. The function **min** maps a measure function (i.e. $g \in D_{\langle e,d\rangle}$) to the minimal element in its range. The tree in (12b) shows a compositional derivation using the logical form in (12a).

(12) *Minimal Standard*

a. $[\![[_{\text{Deg}} pos_{min}]]\!] = \lambda g_{min} \lambda x : g_{min} \in D_{\langle e,d\rangle} \wedge g_{min}$ is a minimal absolute gradable predicate $\wedge$ $x \in D_e$. $g(x) \succ \textbf{min}(g_{min})$ (extrapolated from Kennedy (2007, p. 26))

[5]Although it is possible to have antonyms which both have maximal standards, as is the case with *full* and *empty*, these predicates can still have an antonym which does have a minimal standard, such as *unempty*.

b. *Fluffy (the dog) is wet.*

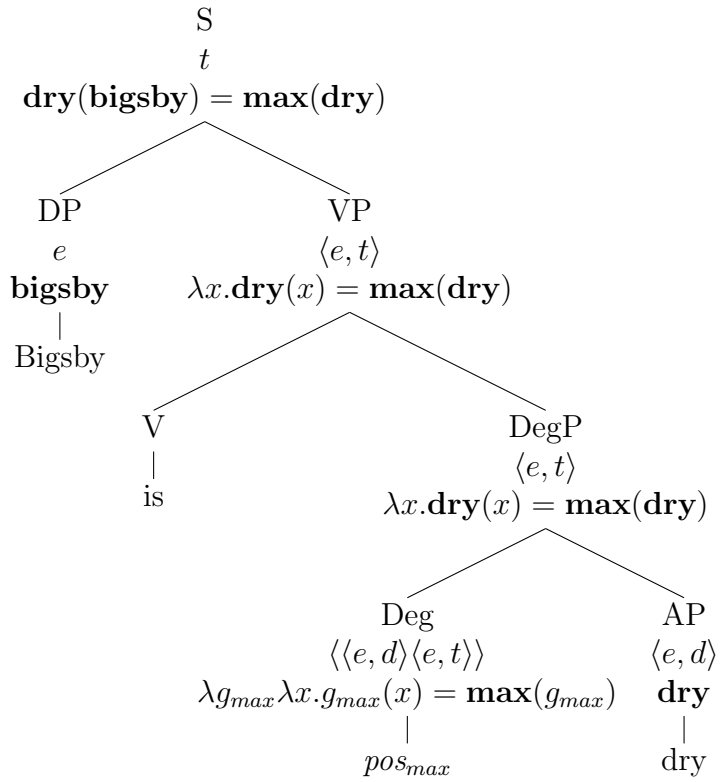


Corresponding to minimal absolute predicates, maximal standard absolute predicates, as defined in (13a), are only true when the maximal point is reached. The function **max** maps a measure function (i.e. $g \in D_{\langle e,d\rangle}$) to the maximal element in its range. Again, the tree in (13b) shows a compositional derivation of such a predicate in its positive form.

(13) *Maximal Standard*

a. $[\![[_{\text{Deg}} pos_{max}]]\!] = \lambda g_{max}\lambda x : g_{max} \in D_{\langle e,d\rangle} \wedge g_{max}$ is a maximal absolute gradable predicate $\wedge$ $x \in D_e$. $g_{max}(x) = \mathbf{max}(g_{max})$ (extrapolated from Kennedy (2007, p. 26))

b. *Bigsby (the cat) is dry.*



Both maximal and minimal standard absolutes are still embedded in a DegP (type $\langle e, t\rangle$) and are of type $\langle e, d\rangle$. That is, they are gradable and can take degree morphology, as mentioned above in (11) and illustrated again in (14a) and (14b).

(14) Absolute Gradable Degree Morphology

a. Minimal Standard

i. The rear windows on the car were open more than the front windows.

ii. Julie stood the closest to the falls, so her clothes were the wettest.

iii. The gold was far more impure than the silver.

b. Maximal Standard

i. The front windows were more closed than the back windows.

ii. Jim was nowhere near the falls, so his clothes were the driest.

The main distinction between absolute gradable predicates and relative gradable predicates, as was already mentioned above, is that relative predicates have an inherent middle ground in their scales, but absolute predicates do not. The reason that relative predicates' scales allow for a middle ground is due to their vagueness, or context dependency. Absolute predicates, although gradable, are not vague. Absolute predicates do map entities to degrees (i.e. points on a scale), but the point which they are mapped to is not dependent on the context.[6] Since absolutes depend on **min** and **max**, which indicate specific and context in-

[6]The precision required in any given situation will still be dependent on the context, but this is a different issue and does not affect the existence of a middle ground. Lower requirements of precision simply broaden the standard itself. See Kennedy (2007) for further discussion.

dependent degrees of the dimension being measured, rather than the contextually defined **s**, any opposition of a minimal and maximal absolute will not allow for a middle ground. That is, given the same scale (i.e. same dimension, same set of points, and same total ordering of those points), but opposite directions, the non-zero (i.e. minimal) threshold in one direction will correspond to the maximal threshold in the opposite direction, as is illustrated in (15). That is, if and only if the the minimum amount of the minimal absolute, such as *wet*, is not met will the maximum amount of the maximal absolute, such as *dry*, be met. This agrees with the intuitive entailments shown in (16).

(15) Corresponding scales of absolute predicate antonyms

wet:	← increasing moisture	$\succeq \mathbf{min}(wet)$	***threshold***	$\neg wet$
dry:	→ decreasing moisture	$\neg dry$	***threshold***	$= \mathbf{max}(dry)$

(16) a. The laundry isn't wet. ⇔ The laundry is dry.

b. The laundry isn't dry. ⇔ The laundry is wet.

The following table (17) illustrates the scale of absolute gradable adjective pairs (indicated by matching letters). Some scales are closed at both ends, such as that of *open/closed*, and some are only closed at the maximal end. The minimal standard for $\mathbf{min}(g_{min})$, for a minimal predicate is necessarily at a lower point on the scale than the maximal standard, $\mathbf{max}(g_{max})$, for a maximal predicate. Correspondingly, the maximal standard is also at a point that exceeds the minimal standard, but on these matched scales, there is still no middle ground between these standards. At the point where $\mathbf{min}(g_{min})$ is no longer met or exceeded, $\mathbf{max}(g_{max})$ becomes necessarily valid. For example, as soon as the least possible amount of moisture can no longer be detected on an item, the item must be perceived as dry.

(17) Scale of Absolute Gradable Predicates

Minimal			
truth conditions	$\lambda g_{min} \lambda x. g_{min}(x) \succ \mathbf{min}(g_{min})$	$...= \mathbf{min}(g_{min})$	$...\prec \mathbf{min}(g_{min})$
truth values	x is g_{min} to some degree	x is minimally g_{min}	x is not g_{min}
a.	more wet .....less wet	least wet	$\neg wet$
b.	more impure .....less impure	least impure	$\neg impure$
c.	more bent .....less bent	least bent	$\neg bent$
d.	most open .....less open	least open	$\neg open$
e.	most transparent...less transparent	least transparent	$\neg transparent$
Maximal			
truth conditions	$\lambda g_{max} \lambda x. g_{max}(x) \prec \mathbf{max}(g_{max})$	$...\prec \mathbf{max}(g_{max})$	$... = \mathbf{max}(g_{max})$
truth values	x is not g_{max}	x is not g_{max}	x is g_{max}
a.	$\neg dry$	$\neg dry$	dry
b.	$\neg pure$	$\neg pure$	pure
c.	$\neg straight$	$\neg straight$	straight
d.	$\neg closed$	$\neg closed$	closed
e.	$\neg opaque$	$\neg opaque$	opaque

Even though absolute gradable predicates of either variety are non-vague and scalar, the difference between them is highlighted by the form of the adverbial modifiers they can be combined with: provided the scale is only partially closed, the minimal standard element of the pair will be infelicitous with maximizing adverbs—which denote a maximal amount as defined in (18b)—such as *completely*, *entirely*, and *perfectly*, as illustrated in (20a), and the maximal standard of the pair will be infelicitous with minimizing adverbs—which denote a minimal amount as defined in (18a)—such as *slightly* and *partially* as illustrated by (20b) (Kennedy, 2007).[7] When the scale is totally closed (i.e. on both ends), as with *open/closed* and *transparent/opaque*, this restriction does not apply: both predicates are felicitous with both maximizing and minimizing adverbs.

(18) Scalar Adverbs

a. $[\![\text{minimizing adverb}]\!] = \lambda g \lambda x : g \in D_{\langle e,d \rangle} \wedge x \in D_e \; . \; g(x) \succeq \mathbf{min}(g)$

b. $[\![\text{maximizing adverb}]\!] = \lambda g \lambda x : g \in D_{\langle e,d \rangle} \wedge \mathbf{max}$ *is defined* $\wedge \, x \in D_e \; . \; g(x) = \mathbf{max}(g)$

c. $[\![\text{intensifying adverb}]\!] = \lambda g \lambda x : g \in D_{\langle e,d \rangle} \wedge x \in D_e \; . \; g(x) \succeq \mathbf{intense}(g)$

The set of "maximizing" adverbs does not include—rather, it is a subset of—those which indicate an extremely high degree, but not necessarily the maximum degree, such as *extremely*, *insanely*, or *ridiculously* (henceforth intensifying adverbs). In some contexts, even maximizing adverbs can be attributed this "high degree" reading (Kennedy, 2007), but there is a distinction. All gradable predicates can are felicitous with intensifying adverbs, which indicate a more intense interpretation of the predicate, rather than a particular end point of its corresponding scale. Intensifying adverbs are defined in (18c) where **intense** is a function which maps a measure function (i.e. $g \in D_{\langle e,d \rangle}$) to a degree in its range which is contextually distinct from lesser degrees of the predicate. That is, a rod which is "extremely bent" (i.e. $bent(rod) \succeq \mathbf{intense}(bent)$) will not only be bent, but also markedly more bent than other rods which can also be classified as bent in the same context with the same level of precision.

The table in (19) shows the repartitions of absolute scales. Note that for any maximal predicate with a partially open scale, the intensified or maximized form will be redundant with the base form, seeing as the maximum point must already be reached for the bare positive form to apply at all. Any minimal predicate with a partially open scale will not be felicitous in in the maximized form (i.e. if there is no endpoint, the endpoint cannot be reached.) When the scale is totally closed, the minimized form of an maximal predicate may be informative, even if it seems likely that this is in reference to the distance from the opposite endpoint, rather than in reference to its own maximum.

(19) *Scale repartitioned by scalar adverbs*

$\mathbf{max}(g_1)$	$\mathbf{intense}(g_1)$	$\mathbf{min}(g_1)$	$\mathbf{min}(g_1)$	$\mathbf{intense}(g_2)$	$\mathbf{max}(g_2)$
max(open)	**intense(open)**	**min(open)**	**min(closed)**	**intense(closed)**	**max(closed)**
	intense(bent)	**min(bent)**		**intense(straight)**	**max(straight)**

[7] See Kennedy (2007) for further discussion, including reasons why these judgements are not always predictable.

(20) a. "Maximal" Adverb Modification of Minimal Absolutes
   i. ?? Valerie didn't bring in the laundry because it was perfectly wet.
   ii. ?? Greg never bought silver that was absolutely impure.
  b. "Minimal" Adverb Modification of Maximal Absolutes
   i. ?? Jim's hair was slightly dry.
   ii. ?? The gold was partially pure.

The fact that these predicates do not allow for a middle ground—regardless of their gradability—should prevent them from forming litotes, since they are not compatible with contrary opposition (i.e. their negated forms can only indicate the boolean complement). However, it is also possible to synthetically create a middle ground on the scale of absolute gradable pairs by repartitioning it with intensifying adverbs or maximizing adverbs,[8] such as *extremely*, *insanely*, *ridiculously*, *completely*, *entirely*, and *totally*. For instance, (21) and (22) are perfectly acceptable. Modifying an absolute predicate with an intensifier creates a salient and symmetrical distinction on the remainder of the scale, thereby creating a middle ground (e.g. neither *entirely open* nor *entirely closed* in (22).)

(21) After walking through the damp cave, Sarah's clothes were not completely wet, but they were not dry either.[9]

(22) He did not leave my car windows entirely open, but he did leaved them closed either, so my little sister could still squeeze her arm through.

Following this logic, any intensified absolute predicate should be compatible with contrary opposition, which should be sufficient to make it compatible with litotes; however, this is not the case. The intensified minimal standard absolutes in (23) do behave differently than the non-gradable predicates in (24), but they do not behave precisely like the other instances of litotes discussed thus far. Whereas the non-gradable predicates in (24) can have no middle ground, and therefore have only one possible interpretation (e.g. Patrick is unmarried.), the intensified minimal standard predicates in (23) can have a middle ground, and therefore should create litotes when under the scope of negation, but the interpretation that, for example (23a) means that the laundry is extremely dry is not as readily available as it should be for litotes.

(23) Intensified Minimal Standard
  a. The laundry was not extremely wet.
  b. The gold was not terribly impure.
  c. Jacob's door was not totally open.

[8] which denote a degree which is included in the range of degrees denoted by intensifiers, and as such can be treated as a subset of intensifiers

[9] Given a leading context like this, the intensifier may be optional if the statement includes intonational cues: After walking through the damp cave, Sarah's clothes were not WET, but they weren't dry either. However, in such an instance, it seems likely that the predicate is being reinterpreted as a more intensified version of itself already, and as such is not cause for concern.

(24) Non-Gradable

a. Patrick is not married. ⊨ Patrick is unmarried.

b. The squadron did not die. ⊨ The squadron lived.

In contrast, the constructions in (25), which have intensified maximal standard absolute predicates, can easily have either interpretation, especially when informed by intonational cues. For example, (25a) can easily mean either that the laundry was extremely wet (the contrary), or that it was only partially wet (the middle ground).

(25) Intensified Maximal Standard

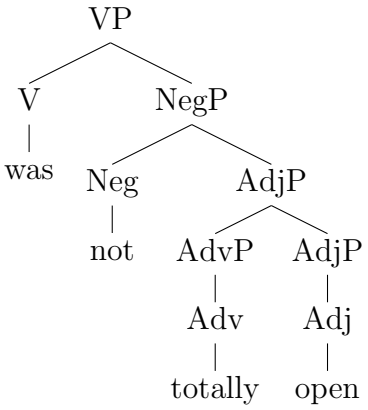
a. The laundry was not extremely dry.

b. The gold was not completely pure.

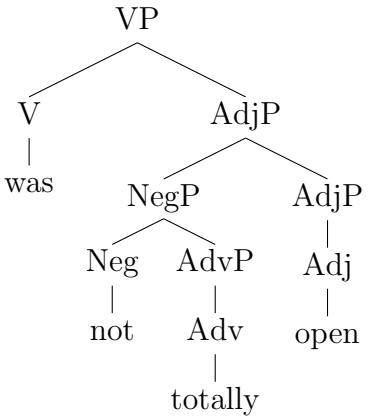
c. Jacob's door was not totally closed.

This unexpected disparity can be explained by a combination of scope ambiguity and repercussions of the denotation of maximal and minimal standard absolutes. The first part of the explanation is illustrated by the simplified trees in (26) and (27) below. While the negation in (26) scopes over *totally open* as a complex predicate, in (27) the negation only scopes over the intensifying adverb.

(26) *not [totally open]*



(27) *[not totally] open*



When the negation[10] takes wide scope the logically possible interpretations are either

[10]Or other suitable operator as will be discussed further in the following sections

the middle ground or the contrary of the complex predicate. That is, (26) allows for interpretations of both *totally closed* and *neither totally open nor totally closed*. Therefore, with wide scope, (23c) and (25c) should have equal access to the interpretations required by litotes. The narrow scope illustrated in (27) however does not necessarily allow for both interpretations with absolute gradable predicates; rather, it depends then on whether the predicate has a maximal or minimal standard.

When the predicate has a minimal standard, narrow scope produces that shown in (28a), given that an intensifying adverb is one which denotes a maximal or strengthened (which includes maximal) degree. If negation only scopes over the intensifying or maximizing adverb, when combined with a predicate with a minimal standard, the construction is informative and indicates the middle ground of, for example, *neither totally open nor totally closed*.

(28) a. $[[\neg maximal]g_{min}] \rightarrow \mathrm{g}_{min}$, but to a non-maximal degree ofg_{min}
b. $[[\neg totally]open] \rightarrow$ open, but to a non-maximal degree of openness

In contrast, when narrow scoping negation is combined with an intensifier and a predicate with a maximal standard, something like (29a) is produced. This contradicts itself: every maximal absolute must have a maximal degree of that quality, so stipulating that it does not have a maximal degree makes the proposition false. This means that narrow scope produces an infelicitous logical form when combined with maximal standard absolute predicates. Therefore, the default scope for intensified maximal absolutes should be wide scope, but this need not be the case for minimal standard absolutes, which explains why both interpretations are more readily available for maximal absolutes than they are for minimal absolutes: minimal absolutes allow for a scope of negation which is not consistent with the contrary interpretation. That is, *[not totally] open* cannot mean *totally closed*, while *[not totally] closed* is not even available, except perhaps as an adjustment in precision of the measurement of closure.

(29) a. $[[\neg maximal]g_{max}] \rightarrow \mathrm{g}_{max}$, but to a non-maximal degree $\Rightarrow \bot$
b. $[[\neg totally]closed] \rightarrow$ closed, but to a non-maximal degree $\Rightarrow \bot$

(30) $[\neg[maximal\ g_{max}]] \rightarrow$ non-maximal degree of g_{max}

In summation, for an expression to be litotes, the gradability of the predicate is key, whether inherent or compositionally derived via scalar modification. If the predicate is non-gradable, it has no middle ground, and therefore will inevitably obey Law of the Excluded Middle, allowing it to only creat an inference of the boolean complement. Thus, any non-gradable predicate will be incompatible with litotes, which requires the ability to infer the contrary. This kind of gradable scale is illustrated for the predicate *happy* in (31) below.

(31) Gradable scale of predicate *happy*

unhappy	indifferent	happy
negative affect	*middle ground*	*positive affect*

It is important to note here that although *indifferent* is on this gradable scale as the middle ground, it itself is non-gradable: both (32a) and (32b) hold.

(32) a. Law of Contradiction: $\forall x \in D, \neg(\text{indifferent}(x) \wedge \neg\text{indifferent}(x))$

b. Law of Excluded Middle: $\forall x \in D, (\text{indifferent}(x) \vee \neg\text{indifferent}(x))$

That is, as its own predicate, *indifferent*[11] does not have a contrary, or an opposing predicate which allows for a middle ground between them, as illustrated by the questionableness of (33). Additionally, *indifferent* cannot take degree morphology, as shown in (34).

(33) Degree morphology disallowed: ?? Catherine wasn't indifferent, but neither was she not-indifferent.

(34) No middle ground: ?? John and Catherine were both absolutely indifferent to Raymond's pleas, but Catherine was more indifferent.

2.2 Interim Summary: Semantic Underdetermination

As previously mentioned, the defining surface characteristic of litotes is that it generates multiple alternatives as possible inferences. That is, litotes L using the base predicate P which has a contrary C will have the undertermined logical form (LF) shown in (35a).

(35) Logical Form of Litotes:

a. $\lambda L \lambda P \lambda x. L(P(x)) = \forall x \in D \wedge \forall P \in D_{e,t} |\ P\ is\ gradable \wedge \exists C \in D_{e,t} | C\ is\ contrary\ to\ P. \neg P(x) = C(x) \vee \neg(P(x) \vee C(x))$

b. Informal Gloss: ¬predicate = boolean complement of predicate = contrary of predicate or middle ground between predicate and contrary

This LF is underdetermined as a result of the predicate's scale, which allows for multiple pragmatic inferences, as with example (2), repeated below in (36) for convenience.

(36) The farmers were not unhappy about the rain.

a. The farmers were happy about the rain, because they were in a drought and it was sorely needed.

b. The farmers did not care about the rain, because they had had plenty for the crops to grow well, but nor was flooding a concern.

c. The farmers were not sad about the rain, but how they really feel beyond that is unknown, because it is unknown how much rain there has been recently.

The underdetermined logical form of litotes is compatible with any combination of the remaining scale points, or the equivalent of inclusive disjunction of the middle ground and the contrary of the predicate (i.e. 'the middle ground or the opposite or both.') Table (37) illustrates this underdetermination, where each litotes form (37e-h) is compatible (shown with a ✓) with multiple other points on the scale. Given that each of the acceptable predicates is defined as meeting *or exceeding* a given standard, the extreme endpoints (i.e. *ecstatic* and *miserable*) are consistent with their less extreme synonyms, and their litotes forms are consistent with those less extreme points as well.

[11] as well as *meh*

(37) Compatibility of expressions with scale of *happy*

		miserable	unhappy	indifferent	happy	ecstatic
a.	*ecstatic*				✓	✓
b.	*happy*				✓	
c.	*unhappy*		✓			
d.	*miserable*	✓	✓			
e.	*not ecstatic*	✓	✓	✓	✓	
f.	*not happy*	✓	✓	✓		
g.	*not unhappy*			✓	✓	✓
h.	*not miserable*		✓	✓	✓	✓

Given that the gradability of the predicate determines when underdetermination is possible, the following sentences should all be litotes:

(38) It is not unwise to take precautions.[12]

(39) She did not discourage Bill's advances.

(40) Sarah's clothes were not completely dry.

(41) Your windows weren't totally closed.

(42) The last talk was not brilliant.

Although the morphologically transparent construction in (38) is certainly a common method of producing litotes in English, it is not the only means to do so. Gradable adjectives are easier to call to mind in English, but gradable verbs can also be used in litotes, as in (39).[13] Litotes is not dependent on direct morphological negation, since gradable predicates can be achieved without having such a compositional component, as alluded to in the previous section and shown in (40)–(42). Indeed, sometimes constructions with transparent "neg-root" morphology are *not* litotes, such as (43). Any vague reading (i.e. litotes) that arises from (43) is due to a pragmatic shift of the base predicate from from *possibility* to *probability*: the former is non-gradable and should behave like "odd" or"unique" (i.e. reading (43a-i) only), but the shift in interpretation to *probability* allows for both (43b-i) and (43b-ii) as readings. This shift is facilitated by the fact that the second *probability* interpretation (43b-ii) is synonymous with the only *probability* interpretation (43a-i), due to the presupposition triggered by *probable* that the object clause is possible.

(43) It is not impossible that Joel will earn an A in this class.

a. *Possibility*

i. It is possible that Joel will earn an A in this class.

b. *Probablity*

i. It is probable that Joel will earn an A in this class.

ii. It is neither probable nor improbable that Joel will earn an A in this class.

[12]Taken from van der Wouden (1996)

[13]This is why I have referred to the "predicate" rather than "adjective" or "verb." Further work is needed to determine if litotes can be formed with simple predicate nouns.

Litotes is also not double negation, shown in (44), which arises from non-gradable predicates being used in the same constructions.

(44) Double Negation:
The sync wasn't incomplete.
≈ The sync wasn't not complete.
⊨ The sync was complete.

It is also not negative concord, shown in (45), since the purpose of litotes is to express the affirmative, not to emphasize the negative.

(45) Negative Concord:
Ain't nobody around offering to help.
≈ Absolutely no one was offering to help.

Metalinguistic negation, shown in (46), does not fall under litotes, since these constructions are typically intended to disagree with the *way* something has been expressed, rather than its meaning.

(46) Metalinguistic Negation:
It's not improbable that I'll be there in 30 minutes—it's impossible! I'm a thousand miles away. [14]

Finally, although litotes is a common form of understatement, the two are not equivalent: understatement also includes expressions such as (47a), which directly indicates a less extreme point/range on the scale than what is actually consistent with the speaker's beliefs.[15]

(47) [Context: The speaker has just opened the door in the midst of a monsoon and says one of the following.]
   a. Understatement:
   I'd say it's damp out today.
   b. Litotes:
   Well, it isn't arid today.

However, litotes—illustrated for comparison in (47b)—indirectly indicates a range which includes less extreme points by eliminating part of the scale, but it does not directly specify a particular point or range. Even though understatement constructions like (48a) below are very similar to the available interpretations of the typical litotes in (48b) (i.e. (48a) has the same available readings as (48b), namely that George was either upset or apathetic), (48a) is not litotes.

(48) a. *understatement:* George was less than overjoyed with the idea.
   b. *litotes:* George was not overjoyed with the idea.

[14] This reading is much easier to get when focus is placed on the stem of *im[$_F$probable].*

[15] For the rest of the paper, I will use "understatement" to refer only to the forms of understatement which are not litotes.

The available readings are almost the same, but they are spelled out differently: *less than* works in a much more direct fashion than that of "traditional" or overt negation litotes. The *less than* form in (48a) directly indicates the scalar range where George's mood is below the threshold for *overjoyed*, and any possibility that is inconsistent with this (i.e. the possibility that George is overjoyed) is discarded. In contrast, the litotes in (48b) first removes the possibility that George is overjoyed, and the conclusion that his mood is below that level is a result of this removal.

This difference is supported by two additional data points. The first is that while litotes is felicitous with base predicates at both the upper and lower ends of a given scale (49b), the *less than* construction does not allow for predicates at the lower endpoint (49a). This supports the idea that *less than* directly indicates the range, but litotes does not: if there is no range to indicate, the *less than* construction fails.

(49) a. ?? George was less than irate about the idea.

b. George was not irate about the idea.[16]

The second point which supports that *less than* is different than litotes is that does not have the possibility of a meta-linguistic interpretation. The litotes which I am concerned with here do not include this kind of interpretation, but the same construction which can can be clearly demonstrated to produce litotes will allow for a meta-linguistic reading (), while the *less than* construction will not (50). This can again be explained by the direct interpretation required by the latter: the lower range is specified directly by *less than*, so the meta-linguistic reversal to the upper range is not allowed. However, with sentential negation, the interpetation of the lower range is arrived at indirectly by first removing the base predicate as a possibility, so a meta-linguistic reversal is allowed. That is, in (50), that George is ecstatic is inconsistent with the previous assertion, but in (51), this proposition is not inconsistent with the litotes assertion (even though it is not the expected interpretation without the aid of indicative stress and the right context.)

(50) ?? George was less than happy—he was ecstatic!

(51) George was not happy—he was ecstatic!

The direct manner in which constructions using *less than* are interpreted suggests that they are better classified as belonging to the broader class of understatement in general than to the more restricted understatement subclass of litotes, which is distinguished by its indirect generation of scalar possibilities via direct elimination of one (i.e. underdetermination.)

2.3 Productive Formations

The analysis of *less than* above is less concerned with features of the base predicate than it is with which environments can create litotes. Hoffmann (1987) posited that a NEG particle alone can license litotes in her study of Latin litotes, but admits that there are many issues for this in English (van der Wouden, 1996). Downward entailing environments that are weaker

[16] Although (49b) does feel less likely to have as large a range of available interpretations as (48b), that is an issue of pragmatics. The important point here is that both expressions can be used and technically have a range of possible meanings.

than classic negation (i.e. sentence negation, which has created the litotes in a majority of the examples so far), can also produce the characteristic variety of interpretations of litotes, as discussed in van der Wouden (1996, 2002) and shown below.[17] Since litotes must be underdetermined, any available interpretation (the contrary interpretation in these examples) must not be entailed by the original expression. If one interpretation is an entailment, then it fails this test, and the expression is not litotes. The following, however, all have inferences which are available, but not entailed, and thus are instances of litotes.

(52) None of the cats were ecstatic about the rain.
⊭ The cats were unhappy about the rain.
⊭ The cats were indifferent to the rain.

(53) Neither of the restaurants were cheap.
⊭ Either of the restaurants were expensive.
⊭ Either of the restaurants were averagely priced.

(54) Not a single camper was unhappy.
⊭ A camper was happy.
⊭ A camper was indifferent.

(55) No fortune teller is unwise.
⊭ A fortune teller is wise.
⊭ A fortune teller is neither wise nor unwise.

Since Hoffmann's (1987) theory that a NEG particle is required clearly undergenerates, van der Wouden (1996, 2002) has proposed that litotes arise in downward entailing/downward monotonic environments, provided the scale of the downward entailing operator and the predicate are the same[18]—a similar condition to what is generally accepted to be a licensing factor for NPIs. Van der Wouden demonstrates this with Dutch examples, but it may be less straightforward in English, simply because English does not have any single lexical items which are supposed to be infelicitous when not used in litotes like those van der Wouden (1996, 2002) cites for Dutch.[19]

Although many downward entailing operators do create the underdetermined LF of litotes, not all do. Not only are *if* and *every/all* demonstrably downward entailing within their restriction (Zwarts, 1998), they are also anti-additive—a stronger feature of negativity than downward entailment—which was originally posited as the licensor of strong NPIs (henceforth sNPIs; NPIs which only occur in a subset of those weak NPIs, or wNPIs, do) by Zwarts (1998). Yet suitably gradable predicates within the scope of these anti-additive operators do not definitively produce litotes. Therefore, if litotes can be analyzed as similar to NPIs, strong or weak, as suggested by van der Wouden (1996, 2002)(and the data given below in 2.3.1 suggest that this is the case,) both litotes and NPIs must be sensitive to some feature beyond simple downward entailment or anti-additivity. One plausible approach is

[17] I use ⊭ to indicate that the following is not an entailment of the original proposition, but it is a possible inference

[18] I believe that by the scales being the same, van der Wouden means that the scales have the same direction; it seems less relevant that they would have the same grain/number of partitions.

[19] For example, *Onverdienstelijk*, meaning 'without merit', is a negative polarity item and only produces litotes in Dutch.

to extend Gajewski's (2011) theory that sNPIs are sensitive to the non-truth conditional information of their licensing operators, even if litotes winds up being sensitive to a different part of this information than sNPIs: seeing as litotes is a highly pragmatic phenomenon, such a constraint would not be surprising.

2.3.1 Valid Operators

The first step in determining what feature of an operator enables it to form litotes is to determine *which* operators are in fact able to do so, and to then assess what features the productive operators share. Although strong and weak NPIs are lexical items which are simply infelicitous/ungrammatical in certain contexts, and thus native speaker judgments on the acceptability of constructions will suffice to determine the acceptable licensing environments, litotes can be much more difficult to determine: even when an expression is not litotes, it may (and probably will) still be grammatical/felicitous, just with a different interpretation.

In an effort toward a methodical treatment of possible operators, I will use two tests to assess them: *exactly* modification and entailment relations to the contrary and middle ground of the predicate. As previously mentioned, English does not exactly have a lexical item which can determine whether an expression is litotes, but the addition of the adverb *exactly* comes close. As (56) and (57) demonstrate, a predicate modified by *exactly* is perfectly acceptable under the scope of negation, but seems to lose meaning when in a positive declarative context—a context which definitely does not produce litotes. There are two possible explanations for this: either *exactly* is some sort of NPI on its own, or it is the expression which its addition creates that is incompatible with the context. Assuming that the latter is the more likely conclusion, simply because exactly frequently occurs in positive contexts, *exactly* can be seen as a litotes enabler, much like the intensifying adverbs discussed in 2.1, and that the felicty of *exactly* in a context indicates that litotes are compatible with this context.

Although *exactly* does not have precisely the same effect as an intensifier, it is frequently used similarly, and can be used to repartition the scale of absolute gradable (maximal) predicates as discussed previously, and shown in (58). And, also as previously discussed, this repartitioning allows for the underdetermined reading required for litotes, as shown in (59); while the windows are not exactly open, whether they are exactly open ($\approx$ totally open) or inexactly open ($\approx$ partially open) cannot be determined from this proposition alone. Note, however, that it is entailed that the windows are open in some manner—the fact that there can still be an underdetermined interpretation beyond this initial distinction of open or closed is evidence of the repartitioning created by *exactly*.

(56) The dinner wasn't exactly phenomenal.

(57) ?? The dinner was exactly phenomenal.

(58) The windows were neither exactly closed nor exactly open.

(59) The windows weren't exactly closed.
$\nvDash$ The windows were exactly open.
$\nvDash$ The windows were partially/inexactly open.
$\vDash$ The windows were open.

The set of entailment relations in (59) also illustrates the second test for determining if an expression is litotes. Since litotes has an underspecifed LF it should not *entail* either the contrary or the middle ground of the predicate, but both should be available interpretations. In order for an operator to produce litotes (given an appropriate predicate), the insertion of *exactly* should not be infelicitous, and the expression should not entail either the contrary or middle ground, but still maintain them as possibilities.

In order to determine the likelihood of a parallel between NPIs to litotes, I will also assess each context for sNPI (e.g. *in years/months/weeks*, additive *either*) and wNPI (e.g. *any*, *ever*) licensing. If the formation of litotes is similar to the licensing of NPIs, then these features should pattern predictably. For example. and as a point of comparison for the following data analysis, simple positive declaratives, illustrated in (60), do not license any NPIs (60a–60b), and cannot produce litotes (60c): it does not produce the underdetermined entailment relations necessary for litotes (60c-i–60c-iv) and is incompatible with *exactly* modification (60c-v). That is, (60c) does not entail that the scalar alternatives to *pleased*, its contrary *displeased* and the middle ground *indifferent*, but the contradiction of each of these is entailed. Therefore, the degree of Jenny's pleasure is not underdetermined: for an expression to be underdetermined, neither the scalar alternatives of the predicate, nor their contradictions, can be entailed by the expression.

(60) For Comparison: Simple Positive Declarative
   a. *wNPI: *Jenny has any money.
   b. *sNPI: *Jenny has called home in weeks. *Jenny has visited home recently, either. *Jenny left for home until the dorms kicked her out.
   c. *Litotes: Jenny was pleased with her assignment.
      i. $\not\models$ Jenny was displeased with her assignment.
      ii. $\not\models$ Jenny was indifferent with her assignment.
      iii. $\models$ Jenny was not displeased with her assignment.
      iv. $\models$ Jenny was not indifferent with her assignment.
      v. ?? Jenny was exactly pleased with her assignment.

Zwarts (1998) proposed that NPIs are sensitive to the strength of negation, positing that anti-additive operators license both strong and weak NPIs, but merely downward entailing operators (weaker than anti-additive operators) only license wNPIs. The following operators, (61) through (69), are all unarguably anti-additive, and produce litotes (in c), in addition to licensing both sNPIs (punctual *until*, additive *either*, *in weeks/months/years*; in b) and wNPIs (*any*, *ever*;[20] in a).

(61) *not*
   a. wNPI: Jill did not eat any cake.
   b. sNPI: Jake has not been to Paris in years. He hasn't been to Rome recently, either.

[20]I have neglected the sometimes wNPI *yet* because I have positive *yet* in my dialect, though there may be a slight difference in the meaning of positive *yet* and negative *yet*. Regardless, I could not trust my own judgments on the issue.

c. Litotes: Jake did not love his mothers cooking.
   i. $\not\models$ Jake hated his mothers cooking.
   ii. $\not\models$ Jake was not strongly opinionated about his mother's cooking.
   iii. $\not\models$ Jake did not hate his mother's cooking.
   iv. $\not\models$ Jake was strongly opinionated about his mother's cooking.
   v. $\not\models$ Jake loved his mother's cooking
   vi. $\models$ Jake did not love his mother's cooking.
   vii. Jake did not exactly love his mother's cooking.
   viii. ?? Jake exactly loved his mother's cooking.

Sentential negation (61), the classic NPI and litotes operator, and the strongest form of negation, clearly licenses wNPIs and sNPIs. It also clearly create litotes: none of the scalar alternatives to the predicate (61c-i and 61c-ii) nor their contradictions (61c-iii and 61c-iv) are entailed by the statement, indicating that the form is truly underdetermined. Additionally, exactly modification(61c-vii) is perfectly comprehensible under sentential negation, in contrast to the confusing addition it makes in a simple positive declarative (61c-viii).

(62) *no NP*
   a. wNPI: No student had any idea how to answer the question.
   b. sNPI: No tutor knew how to answer the question, either.
   c. Litotes: No fortune teller is unwise.
      i. $\not\models$ Some fortune teller is wise.
      ii. $\not\models$ Some fortune teller is neither wise nor unwise.
      iii. $\not\models$ Some fortune teller is not wise.
      iv. $\not\models$ Some fortune teller is either wise or unwise.
      v. No fortune teller is exactly unwise.

A negated existential, *no NP*, as shown above in (62) also licenses both varieties of NPIs and creates litotes when scoping over a suitably vague and gradable predicate, as indicated by its entailment relations to the predicate's scalar alternatives and their contradictions, and the felicity of *exactly* modification. This is unsurprising since it is logically equivalent to universally quantified sentential negation, as shown in (63).

(63) *No fortune teller is unwise.*
   1. $\neg(\exists\ fortune\ teller)unwise(x)$
   2. Law of Double Negation: $P(x) \Leftrightarrow \neg\neg P(x)$
   3. Law of Quantifier Negation: $\neg(\forall x)P(x) \Leftrightarrow (\exists x)\neg P(x)$
   4. $\neg(\exists\ fortune\ teller)\neg\neg unwise(fortune\ teller)$ via 1,2
   5. $\neg\neg(\forall\ fortune\ teller)\neg unwise(fortune\ teller)$ via 3,4
   6. $(\forall\ fortune\ teller)\neg unwise(fortune\ teller)$ via 2,5

   Every fortune teller is not unwise.

Provided the existence of the NP, this also entails existentially quantified sentential negation. That is, (62c) entails that *some fortune teller is not unwise* if the existence of fortune tellers is presupposed, which the examples in (64) suggest may be the case for the restriction of *no*, but not for the following verb phrase (which seems to only implicate the existence of an entity that satisfies it.) This additional assumption creates the entailments about the base predicate shown in (65).

(64) Presupposition of Restriction
  a. No fortune teller is unwise. #There are no fortune tellers.[21]
  b. No fortune teller is unwise. No one is unwise.

(65) Entailments about base predicate, assuming: Fortune tellers exist.
  a. $\nvDash$ Some fortune teller is unwise.
  b. $\vDash$ Some fortune teller is not unwise.

Returning to the entailment relations of the scalar alternatives of the base predicate in (62c), if even the scalar alternatives and their contradictions of the existential form are not entailed by this expression, then it must be underdetermined. All that can be deduced with certainty is that the set containing unwise fortune tellers is empty, as indicated by the LF $(\exists x)\neg P(x)$, where x is a fortune teller and P is unwise. For any of these operators to be able to produce litotes, they should be able to derive a form which contains $\neg P(x)$, which, if P is an appropriate predicate, should be underdetermined.

(66) *neither (NP)*
  a. wNPI: Neither tree had any blossoms. Neither the tree nor the bush had any blossoms.
  b. sNPI: Neither of my parents have visited me in months. Neither my sister nor any of my brothers have, either.
  c. Litotes: Neither of the restaurants was cheap.
    i. $\nvDash$ One of the restaurants was expensive.
    ii. $\nvDash$ One of the restaurants was moderately priced.
    iii. $\nvDash$ One of the restaurants was not expensive.
    iv. $\nvDash$ One of the restaurants was not moderately priced.
    v. Neither of the restaurants was exactly cheap.

Since *neither* is essentially a negated existential of a universe constrained to two entities, the availability of litotes and NPIs in (66) is again not surprising, provided the presupposition of the restriction's existence is maintained.[22]

(67) *none of the NP*

[21] Any interpretation where this is acceptable has a meta-linguistic flavor.

[22] The examples in (**??**) indicate that this assumption is again tenable.

(1) Neither of the restaurants was cheap. #There were no restaurants.

(2) Neither of the restaurants was cheap. Nothing in this town is cheap.

a. wNPI: None of the elves had any shoes.
b. sNPI: None of the elves wanted any shoes, either.
c. Litotes: None of the cats were ecstatic about the rain.
   i. $\not\models$ A cat was unhappy about the rain.
   ii. $\not\models$ A cat was apathetic about the rain.
   iii. $\not\models$ A cat was not unhappy about the rain.
   iv. $\not\models$ A cat was not apathetic about the rain.
   v. None of the cats were exactly ecstatic about the rain.

As another negated existential, *none of the* NP should—and does—license NPIs and create litotes as (67) illustrates: even the existentially quantified contrary and middle ground and their contradictions are not entailed, indicating underdetermination.

(68) *not a single NP*
a. wNPI: Not a single hippo has ever attacked Judy.
b. sNPI: Not a single rhino has attacked Judy, either. Not a single animal has even seen her in months.
c. Litotes: Not a single hobo was rich.
   i. $\not\models$ A single hobo was poor.
   ii. $\not\models$ A single hobo was neither rich nor poor.
   iii. $\not\models$ A single hobo was not poor.
   iv. $\not\models$ A single hobo was either rich or poor.
   v. Not a single hobo was exactly rich.

Again, the—even more explicit—negated existential quantifier *not a single* creates the underdetermined form required by litotes, and licenses both varieties of NPIs. Essentially, a negated existential quantifier should always be a productive operator.

(69) *without*
a. wNPI: Without any batteries for their flashlights, they pitched the tent in the dark.
b. sNPI: Jose managed to lose 7 pounds without intentionally exercising in weeks.
c. Litotes: Without decelerating, the driver suddenly turned onto a nearly obscured dirt track.
   i. $\not\models$ With some acceleration, the driver suddenly turned.
   ii. $\not\models$ With a constant speed, the driver suddenly turned.
   iii. $\not\models$ Without accelerating, the driver suddenly turned.
   iv. $\not\models$ Without maintaining a constant speed, the driver suddenly turned.
   v. Without exactly decelerating, the driver suddenly turned onto a nearly obscured dirt track.

Although *without* is less transparent, it is also equivalent to a negated existential. In (69c, *without decelerating* can be rephrased as *with not a single instance of decleration*; therefore, *without* should also be expected to produce litotes and license NPIs of any strength. As (69) illustrates, this is in fact the case.

The operators in (70) through (72), however, are only downward entailing—not anti-additive—according to Zwarts (1998), but they can also license strong (and weak) NPIs. Additional examples pulled from *The New York Times* (NYT200X Corpus) are also included as evidence that *almost no*, *hardly*, and *few*—all of which denote minimal amounts—are able to license sNPIs, even if they rarely do so. The fact that neither the scalar alternatives to the base predicate nor their contradictions are entailed indicates that these operators are compatible with litotes, in addition to their allowing *exactly* modification.

(70) *almost no*

a. wNPI: Almost no clouds looked like they could produce any rain.

b. sNPI: Almost no clouds looked like they could produce hail, either. Almost no precipitation at all has fallen in weeks.

c. NPIs in *The New York Times*:

i. "Li had almost no response, either." (NYT200X)

ii. * Li had a response, either.

iii. "Almost no one doubts White, either." (NYT200X)

iv. "I have no quarrel with any of this, but almost no memory of it either, though the fresh-faced Brown is appealing as the young sheriff." (NYT200X)

v. * I have no quarrel with any of this, but some memory of it, either.

d. Litotes: Almost no road is entirely straight.

i. ⊭ Some road is extremely curvy.

ii. ⊭ Some road is (only) slightly curvy.

iii. ⊭ Some road is not extremely curvy.

iv. ⊭ Some road is not (only) slightly curvy.

v. Almost no road is exactly straight.

(71) *hardly*

a. wNPI: Tony hardly ever swam in his apartment complex's pool.

b. sNPI: The prisoners had hardly eaten in months.

c. NPIs in *The New York Times*:

i. "Critics who had hardly found a kind word for the festival in years vented a new-found rage." (NYT200X)[23]

ii. "Jim DiVitale makes his living taking pictures, but he has hardly touched a piece of film in years." (NYT200X)

iii. "The communities between which it once served as a stagecoach stop, thus taking its name, are hardly thriving either." (NYT200X)

[23] I don't know how to properly cite this.

iv. "Of course, there was hardly any passion involved with the play, either." (NYT200X)

v. "The men were hardly one-dimensional, either." (NYT200X)

d. Litotes: Erica's work was hardly deplorable.

i. ⊭ Erica's work was commendable.

ii. ⊭ Erica's work was (merey) acceptable.

iii. ⊭ Erica's work was not commendable.

iv. ⊭ Erica's work was not (merely) acceptable.

v. Erica's work was hardly deplorable exactly.[24]

(72) *few*

a. wNPI: Few snakes at this zoo have ever attacked anyone.
"Few Americans have ever been to Spain. Few Canadians have either." (Rullman (2003) in Gajewski (2011))

b. sNPI: Few truly impressive applications have been submitted in years. In fact, few even acceptable applications have been submitted either. And very few have ever arrived until the deadline.

c. NPIs in *The New York Times*:

i. "Few rap albums have sounded this assured, this sumptuous, in years" (NYT200X)

ii. * Some rap albums have sounded this assured in years.

iii. "There had been reason for some doubt about a renaissance for new series, because few new network scripted entertainment shows have bolted from the gate as runaway hits in years, probably going all the way back to that 'Friends' year on NBC." (NYT200X)

iv. "Few seemed to want to talk shop with the executives, either, not amid so much hoopla in the Coex exhibition center." (NYT200X)

v. "Few had anticipated the scale of the turnout either." (NYT200X)

vi. * Some had anticipated the scale of the turnout, either.

vii. "Few are standing up for big new taxes, either." (NYT200X)

viii. * Some are standing up for big new taxes, either.

ix. "'The Eternal Road' is in fact a musical reliquary for a vanished liturgical tradition that no one in Chemnitz remembered and few in New York will remember, either." (NYT200X)

d. Litotes: Few gold rings are entirely pure.

i. ⊭ Some gold ring is extremely impure.

ii. ⊭ Some gold ring is somewhat impure.

iii. ⊭ Some gold ring is not extremely impure.

iv. ⊭ Some gold ring is not somewhat impure.

v. Few gold rings are exactly pure.

[24]The fact that the operator is itself an adverb here interferes with the placement possibilities of *exactly*; however, this alternate construction is at least moderately acceptable for me.

The status of *few* as a sNPI licensor is debated (see Gajewski (2011) for discussion), but I maintain that *few* can license sNPIs, and the data given above in (72c), support this. The murkiness about the issue is the result of the nuanced interpretations *few* has, as would be the case under Gajewski's (2011) theory (following Chierchia (2004)) that scalar implicatures can truncate the end of a scale, allowing for different levels of intervention. If *few* is interpreted as denoting a small number, rather than a minimal amount, the acceptability of any NPI is seriously affected. To illustrate this, *a few* forces the small number reading, while *very few* can force the minimal reading. As (73) and (74) indicate, the former, which is upward entailing, does not license NPIs, but the latter, which is downward entailing (but not anti-additive), can license NPIs of both varieties.

(73) small amount: *a few*

a. Upward Entailing:
A few students like vegetables. $\nvDash$ A few students like cucumbers.
(Not Anti-Additive: A few students drank and a few students smoked. $\not\Leftrightarrow$ A few students drank or smoked.)

b. *wNPI: *A few students have any money.

c. *sNPI: *A few students have attended lecture in weeks.

d. *Litotes: A few students were pleased with the postponement of the exam.

i. $\nvDash$ A student was displeased with it.

ii. $\nvDash$ A student was indifferent with it.

iii. $\vDash$ A student was not displeased with it.

iv. $\vDash$ A student was not indifferent to it.

v. ?? A few students were exactly happy with the postponement of the exam.

(74) minimal amount: *very few*

a. Downward Entailing: Very few students like vegetables. $\vDash$ Very few students like cucumbers.
(But still not Anti-Additive: Very few students drank and very few students smoked $\not\Rightarrow$ Very few students drank or smoked.)

b. wNPI: Very few students have any money.

c. sNPI: Very few students have attended lecture in weeks.

d. Litotes: Very few students were pleased with the postponement of the exam.

i. $\nvDash$ Some student was displeased with it.

ii. $\nvDash$ Some student was indifferent with it.

iii. $\nvDash$ Some student was not displeased with it.

iv. $\nvDash$ Some student was not indifferent with it.

v. Very few students were exactly pleased with the postponement of the exam.

The above argument for *few* licensing NPIs, provided it denotes a minimal amount rather than just a small amount, should easily extend to *almost no* and *hardly*. If this explanation were to prove correct, it would support Gajewski's (2011) story that scale truncation can

remove interference in licensing from implicatures which can be generated by non-end points of a scale.

The next set of operators—*not all NP*, *not every NP*, and *not everyone*—do not reliably license NPIs, but do create litotes. However, they all have one thing in common: they are negated universals of some form, and universal quantifiers have been shown to cause interference with NPI licensing (Chierchia, 2004; Gajewski, 2011) by creating an implicature which can place the NPI in an unacceptable environment. The story that this intervention is caused by an implicature is supported by the fact that, although extremely rare, there are some instances of negated universals licensing NPIs in *The New York Times*; the cancellation of the implicature would remove the interference. This intervention with of a universal quantifier is seen with wNPIs, illustrated in (75), but is slightly mitigated when the wNPI precedes the objectionable quantifier. If NPIs are not licensed because of this intervention, then the non-NPI counterpart (i.e. *something* in place of *anything*) should be fully allowed, yet even this combination is degraded when *everyone* precedes *something*. Chierchia (2004) argues that this intervention effect is due to the enriched meaning of the assertion plus its implicature not allowing the wNPI. However, this does not explain why switching the order of the goal and the recipient should have any effect. This suggests that there is a syntactic component in addition to this sensitivity to non-truth-conditional meaning proposed by Chierchia (2004). Additionally, the interference does not seem to hold with sNPIs (76), or with litotes (77); this correlates nicely with the fact strong NPIs were much easier to find within the scope of negated universals in the corpus.

(75) *every* Intervention with wNPI
  a. Bill didn't give Mary anything.
  b. Bill didn't give anything to Mary.
  c. * Bill didn't give everyone anything.
  d. ? Bill didn't give anything to everyone.
  e. ? Bill didn't give everyone something.
  f. Bill didn't give something to everyone.

(76) No *every* Intervention with sNPIs
  a. Bill hadn't baked Mary a cake in months.
  b. Bill hadn't baked everyone a cake in months.
  c. Bill hadn't baked someone a cake in months.

(77) No *every* Intervention with Litotes
  a. Litotes: Bill didn't make Mary unhappy (exactly).
    i. $\not\models$ Bill made Mary happy.
    ii. $\not\models$ Bill made Mary neither happy nor unhappy.
    iii. $\not\models$ Bill made Mary not happy.
    iv. $\not\models$ Bill made Mary either happy or unhappy.

b. Litotes: Bill didn't (exactly) make (?exactly) everyone (?exactly) happy (exactly).[25]

i. ⊭ Bill made someone unhappy.

ii. ⊭ Bill made someone neither happy nor unhappy.

iii. ⊭ Bill made one person unhappy.

iv. ⊭ Bill made most people unhappy.

The following examples illustrate that litotes is clearly produced under these operators, regardless of the questionableness of NPI licensing. This is unsurprising since the law of quantifier negation transforms a negated universal directly to an existential with a negated predicate, as shown in (78), which should enable litotes given a suitable predicate.

(78) 'Not all students excelled' → 'Some student did not excel'
via the first law of quantifier negation:
$\neg(\forall x)P(x) \Leftrightarrow (\exists x)\neg P(x)$
$\neg(\forall\ student)\ excel(student) \Leftrightarrow (\exists\ student)\neg excel(student)$

(79) *not all (NP)*

a. ??wNPI: ??Not all (of the) students had any questions before the exam began.

b. wNPI in *The New York Times*:

i. "Not all of the laboratories had received any post-Sept. 11 instructions regarding access by visiting researchers." (NYT200X)

ii. "Not all those who created and posted the 'Missing' signs ever held out hope." (NYT200X)

iii. "But not all specialists share the view that China's booming economy is in any jeopardy." (NYT200X)[26]

c. ?sNPI: ?Not all of the students had been to lecture in weeks. ?Not all of the students passed the exam, either.

d. sNPIs in *The New York Times*:

i. "Not all the palm trees were delivered on time, either." (NYT200X)

ii. "Not all thefts are the same, either." (NYT200X)

iii. "And not all counties have a written policy on how to evaluate potential hires, either." (NYT200X)

iv. "Yet not all Russians believe the country should hitch its wagon with Washington , either..." (NYT200X)

v. "And not all the women characters are young either, which pleases Bache." (NYT200X)

vi. "And not all the buzz is being generated from Asian manufacturer's either." (NYT200X)

[25]Interestingly, the questionableness of *exactly* reverses without negation:
Bill (?exactly) made (exactly) everyone (exactly) happy (?exactly).

[26]These are the only instances I could find in the entirety of NYT200X

e. Litotes: Not all (of the) students excelled on the final exam.
   i. $\not\models$ Some student failed the exam.
   ii. $\not\models$ Some student (merely) passed the exam.
   iii. $\not\models$ Some student did not fail the exam.
   iv. $\not\models$ Some student did not (merely) pass the exam.
   v. Not all of the students exactly excelled on the final exam.[27]

(80) *not every* NP
   a. ??wNPI: ??Not every child has ever been to Disney World.[28]
   b. ?sNPI: ?Not every seagull is destined to cross the ocean, either. ??Not every party guest left until dawn.
   c. sNPIs in *The New York Times*:
      i. "But not every complaint is unreasonable, either." (NYT200X)
      ii. "Not every material used at Lebombo is cheap, either." (NYT200X)
      iii. "While the crude racism certainly scares away outsiders, not every local is happy with the Skullbone Music Park either." (NYT200X)
      iv. "Not every program works with Rosetta, either." (NYT200X)
      v. "Not every defensive end would have caught that ball either." (NYT200X)
   d. Litotes: Not every student in the class was pleased with the postponement.
      i. $\not\models$ Some student was displeased.
      ii. $\not\models$ Some student was indifferent.
      iii. $\not\models$ Some student was not displeased.
      iv. $\not\models$ Some student was not indifferent.
      v. Not every student in the class was exactly pleased with the postponement.

(81) *not everyone*
   a. ??wNPI: ??Not everyone has ever seen the Northern Lights.
   b. wNPIs in *The New York Times*:
      i. "Not everyone can ever say that they've led a major championship before, and it's a privilege." (NYT200X)
      ii. "'Not everyone's ever going to get along,' Davenport explained." (NYT200X)
      iii. "Not everyone found a need to make any changes." (NYT200X)
      *Someone found a need to make any changes.
      *Everyone found a need to make any changes.
      iv. "While most people interviewed said the former king's return marked the start of a new era, not everyone was convinced he would make any difference." (NYT200X)
      *Someone was convinced he would make any difference.

[27] There may be some interference with where exactly *exactly* can be adjoined, before or after the predicate, and whether it needs to be right next to it or not

[28] Could not find any in NYT

v. "And not everyone with these early signs of AMD will necessarily lose any part of their vision." (NYT200X)
*Someone with the signs will lose any part of their vision.

vi. "Even if the sports investigations resume after the Spanish court finishes its work, not everyone is convinced that there will ultimately be any sanctions." (NYT200X)
*Someone is convinced there will ultimately be any sanctions.

vii. "Of course, not everyone believes that New York will ever become a scooter mecca." (NYT200X)
*Someone believes that New York will ever become a scooter mecca.

c. ?sNPI: ?Not everyone left the party until 3 am. ?Not everyone has left the country in months.

d. sNPIs in *The New York Times*:

i. "But not everyone has the means with which to change the world, either." (NYT200X)

ii. "As for Menino's be-happy approach, not everyone buys that, either." (NYT200X)

iii. "Not everyone is LeBron James, but not everyone is cut out for college either." (NYT200X)

iv. "But not everyone who gets shingles gets the lingering pain, either." (NYT200X)

v. "But French admits not everyone thinks he's a legitimate news gatherer, either." (NYT200X)

vi. "Not everyone went to bed, either." (NYT200X)

vii. "Not everyone buys into the report's basic premise, either." (NYT200X)

viii. "Not everyone thinks that this is all bad news, either." (NYT200X)

ix. "Not everyone is convinced the military is doing enough this time, either." (NYT200X)

x. "Not everyone who gets hit by lightning dies, either." (NYT200X)

e. Litotes: Not everyone had a pleasant train ride.

i. $\not\models$ Someone had an unpleasant train ride.

ii. $\not\models$ Someone had a merely average train ride.

iii. $\not\models$ Someone did not have an unpleasant train ride.

iv. $\not\models$ Someone did not have a merely average train ride.

v. Not everyone had a pleasant train ride exactly.[29]

Thus far, every operator examined has easily produced litotes and has been capable of licensing both strong and weak NPIs, even if it does not always do so, in the case of the negated universal determiners. However, as has been discussed extensively in the literature, not every operator that licenses wNPIs can also license sNPIs. Similarly, not every operator which can license wNPIs can produce litotes, as is demonstrated in the following examples, (82) through (91).

[29]There may be some interference with where exactly *exactly* can be adjoined, before or after the predicate, and whether it needs to be right next to it or not

These examples have anti-additive operators, but do not license sNPIs, though they do license wNPIs. Additionally, although there is clear entailments which contradict an underdetermined LF, as with upward entailing operators, these examples still do not have a suitably underdetermined LF. Rather they are what I will call *undetermined*; that is, they make no prediction at all about the truth values of the base predicate (e.g. where the jewelry in (82c-vii) stands on the cost scale cannot be determined or even hinted at, because there is no certainty that there was any jewelry at all which was stolen.) All that these constructions require—since they are all either restrictions of a determiner, or the antecedent of a conditional—is that the two specified sets of entities (e.g. stolen jewelry and expensive jewelry) have an empty intersection. Therefore, I posit that they do not produce litotes, even though they are excluded for different reasons than upward entailing operators are.

Finally, this undetermined, non-litotes analysis of (82) through (91) is supported by the fact that they do not accept *exactly* insertion. Clearly this derails Zwarts (1998) original theory about the ability of anti-additive operators to license sNPIs, but the more interesting feature of these data for the purpose of this paper is that litotes seems to pattern with sNPIs in their acceptable operators, whatever defining feature these operators may have.

(82) Restriction of *no*

a. wNPI: No dog that had any sense even contemplated eating the habenero peppers.

b. *sNPI: *No student who had tried in weeks had solved the problem. *No party guest who left until dawn was invited back.

c. *Litotes: No expensive jewelry was stolen.
≈ Every piece of jewelry was either not expensive or not stolen.
⊨ Some piece of jewelry was either not expensive or not stolen. [30]

i. ⊭ Some cheap jewelry was stolen.

ii. ⊭ Some moderately priced jewelry was stolen.

iii. ⊭ Some cheap jewelry was not stolen.

iv. ⊭ Some moderately priced jewelry was not stolen.

v. ⊭ Some not cheap jewelry was stolen.

vi. ⊭ Some not moderately priced jewelry was stolen.

vii. ⊭ Some jewelry was stolen.

viii. ⊭ Some not expensive jewelry was stolen. (if no jewelry was stolen, it could all be expensive

[30]This is much easier to get without focus on the gradable predicate (1) suggests that there was jewelry stolen, just not expensive jewelry, and when the possibility that none was stolen is removed, the other inferences become available. If the noun is focused instead (2), the inference is then that some other expensive thing was stolen, that set is not constrained to scalar alternatives, because *jewelry* is not a scalar predicate.

(1) No [$_F$expensive] jewelry was stolen,

(2) No expensive [$_F$jewelry] was stolen,

ix. ?? No jewelry that was exactly expensive was stolen.[31]

The restriction of *no* in (82), while still anti-additive like the *no NP* operator examined above in (62), does license wNPIs, but fails to license sNPIs or create litotes. Recall the reasoning from (64) above, and illustrated again in (83) below.

(83) Presupposition of Restriction of *no*

a. No lawyer is truly poor. #There are no lawyers.

b. No lawyer is truly poor. No one is truly poor.

c. No poor man is a lawyer. # There are no poor men.

d. No poor man is a lawyer. No one at all is a lawyer.

The difference is that in the sentence, *No lawyer is truly poor*, where the gradable predicate is not within the restriction, there is a presupposition that the restriction exists, but no presupposition that there is anything which satisfies the gradable predicate. When the a gradable predicate does fall within the restriction, the gradable entity can be presupposed to exist, but there can be no entailments made about its relation to the rest of the sentence. That is, as illustrated in (65) and repeated below as (84), the placement of the gradable predicate in the verb phrase does not have an entailment of the base predicate (because it necessarily does not hold), but does allow the entailment of the boolean complement of the base predicate, making it *under*determined, but not *un*determined. However, when the gradable predicate is in the restriction, no entailments can be made about it or its boolean complement, since it may be the case that the verb phrase is not satisfied at all. Importantly, the entailment of the boolean complement of the base predicate is a necessary condition for litotes.[32]

(84) Entailments about base predicate, assuming existence of restriction, but not the verb phrase:

a. No stolen jewlery was expensive. $\nvDash$ Some stolen jewelry was expensive.

b. No stolen jewelry was expensive. $\vDash$ Some stolen jewelry was not expensive.[33]

c. No expensive jewelry was stolen. $\nvDash$ Some expensive jewelry was stolen.

d. No expensive jewelry was stolen. $\nvDash$ Some expensive jewelry was not stolen (i.e. if nothing was stolen.)

This set of entailment relations is justified by the proof in (85) below. Since the only requirement is that the intersection be empty, the non-existence of the verb phrase satisfies the proposition, preventing any entailments about the price of the jewelry from being made.

(85) *There does not exist a piece of jewelry that was both expensive and stolen.*

1. Given: $\neg(\exists x)(expensive(x) \wedge stolen(x))$
2. Quantifier Negation: $(\forall x)\neg F(x) \Leftrightarrow \neg(\exists x)F(x)$

[31] *No jewelry was stolen that was exactly expensive* and *No exactly expensive jewelry was stolen* were proposed as better alternatives, but these are still infelicitous for me.

[32] It is not, however, a sufficient condition, since the predicate's scale must also have a middle ground.

[33] Even if nothing is expensive, the fact that jewelry is presupposed to have been stolen allows this entailment relation to hold.

3. De Morgan's: $\neg(P(x) \wedge Q(x)) \Leftrightarrow \neg P(x) \vee \neg Q(x)$
4. $(\forall x)\neg(expensive(x) \wedge stolen(x))$ via 1,2
5. $(\forall x)(\neg expensive(x) \vee \neg stolen(x))$ via 3,4
   For every piece of jewelry, it was either not expensive or not stolen.
6. Assume: $\neg(\exists x) stolen(x))$
   No jewelry was stolen
7. $(\forall x)\neg stolen(x)$ via 2,6
   7 satisfies 5 without saying anything about the price of the jewelry.

Also consider that this form cannot be reduced to a form containing just $\neg P(x)$, unlike the previous examples which did create litotes. This predicate is complex and gives only a disjunction. The underdetermination of litotes depends on the removal of P(x) as a possibility, but this proposition does not require that $\neg P(x)$ be true, provided the other part of the complex predicate holds (i.e. if $\neg Q(x)$ is true). The same reasoning can be applied to the following operators as well, meaning that they all have undetermined, instead of underdetermined LFs.

(86) Restriction of *not a single*
   a. wNPI: Not a single hippo who ever attacked Judy was put down.
   b. *sNPI: *Not a single rhino who had attacked Judy either was put down.
   c. *Litotes: Not a single employee who was inefficient lost their job.
      i. ⊭ Some employee who was efficient lost their job.
      ii. ⊭ Some employee who was was average lost their job.
      iii. ⊭ Some employee who was not efficient lost their job.
      iv. ⊭ Some employee who was not average lost their job.
      v. ⊭ Some employee lost their job.
      vi. ⊭ Some employee who was not inefficient lost their job.
      vii. ?? Not a single employee who was exactly inefficient lost their job.

(87) Restriction of *every*
   a. wNPI: Every dog that had any sense stayed out of the hail.
   b. *sNPI: *Every hippo that has attacked Judy in weeks found itself in isolation.
   c. *Litotes: Every beauty queen (i.e. woman who was beautiful) in attendance was spoken for.
      i. ⊭ Some hag was spoken for.
      ii. ⊭ Some average woman was spoken for.
      iii. ⊭ Some hag was not spoken for.
      iv. ⊭ Some average woman was not spoken for.
      v. ⊭ Someone was spoken for.
      vi. ⊭ Someone who was not a beauty queen was spoken for.
      vii. ?? Every woman who was exactly beautiful was spoken for.

The situation with the restriction of *every* is somewhat different, but similar reasoning can explain why it does not create litotes. Even though it is demonstrably anti-additive (and therefore downward entailing), there is nothing to prevent both the restriction of *every* from being false and the verb phrase from being true. The proof in (88) illustrates this, since disjunction here is inclusive.

(88) *Every beautiful woman was spoken for.*

1. $(\forall x)B(x) \rightarrow S(x)$
2. Contraposition Equivalence: $P(x) \rightarrow Q(x) \Leftrightarrow \neg P(x) \vee Q(x)$
3. $(\forall x)\neg B(x) \vee S(x)$

Every woman is not beautiful or spoken for or both.

The only thing such a statement indicates is that the restriction of *every* cannot be true when the verb phrase (or consequent of the universally quantified conditional indicated by *every*) is false. This means that no inferences can be made about the complement of the base predicate when it is in the restriction of *every* (i.e. $\neg P(x)$ cannot be derived), thus constructions of this kind are undetermined in regards to the restriction, and therefore is not a valid operator for creating litotes.

(89) Antecedent of *if*

a. wNPI: If Lena bought Jill any produce, Jill couldn't find it.

b. *sNPI: *If Ellen has been to Europe in weeks, she found out about the recent airport security changes.

c. *Litotes: If John was unhappy, then his children were wary.

i. $\not\models$ John was happy.

ii. $\not\models$ John was neither happy nor unhappy.

iii. $\not\models$ John was not happy.

iv. $\not\models$ John was either happy or unhappy.

v. $\not\models$ John was unhappy.

vi. $\not\models$ John was not unhappy.

vii. ?? If John was exactly unhappy, then his children were wary.

With the antecedent of *if*, the same reasoning holds as with (87) above, since, as already mentioned, *every* simply denotes a universally quantified conditional. The boolean complement of the base predicate is not asserted or entailed, hence the scalar alternatives (e.g. the possibilies for John's mood in (89 c)) cannot be confirmed or denied, classifying this form as undetermined, rather than the requisite underdetermined.

If there are anti-additive operators which do not license sNPIs or create litotes, it follows that there should be simply downward entailing operators (being weaker than anti-additive ones), *at most* n, which is only downward entailing in both its restriction and consequence, which also do not. Examples (90) and (91) illustrate that this is indeed the case, and importantly, sNPIs and litotes are again incompatible with the same operators.

(90) *at most* n

a. wNPI: At most 12 storks have ever delivered a baby.
b. *sNPI: *At most 5 students left until their birthdays.
c. *Litotes: At most 3 farmers were unhappy.
   i. ⊭ Some farmer was happy
   ii. ⊭ Some farmer was neither happy nor unhappy.
   iii. ⊭ Some farmer was not happy.
   iv. ⊭ Some farmer was indifferent.
   v. ⊭ Some farmer was unhappy. (since zero is still less than 3)
   vi. ?? At most 3 farmers were exactly unhappy.

(91) Restriction of *at most* n
a. wNPI: At most 12 storks who have ever delivered a baby knew what they were doing.
b. *sNPI: *At most 5 singers who left rehearsal until past midnight got food afterwards.
c. *Litotes: At most 3 unhappy farmers attended the town meeting.
   i. ⊭ Some happy farmer attended.
   ii. ⊭ Some indifferent farmer attended.
   iii. ⊭ Some happy farmer didn't attend.
   iv. ⊭ Some indifferent farmer didn't attend.
   v. ⊭ Some unhappy farmer attended.
   vi. ?? At most 3 exactly unhappy farmers attended the town meeting.

The fact that the complement of the base predicate is again not asserted or entailed with these constructions indicates that they are also undetermined, rather than underdetermined, and therefore cannot create litotes.

The previous section already demonstrated that *less than* is not a valid operator for creating litotes, since its interpretations are directly determined, rather than indirectly generated from an underdetermined logical form. The following examples in (92) illustrates this discrepancy again—citing meta-linguistic impossibility (92f) and infelicitious/uninformative *exactly* modification (92d—as well as indicate its NPI licensing capabilities. As would be predicted by the pattern in the above data, although *less than* may license wNPIs, it does not license sNPIs.

(92) *less than*
a. wNPI: Andy enjoyed vacuuming less than any chore he'd ever done before.[34]
b. *sNPI: *Andy was less than pleased, either.
c. *Litotes: George was less than overjoyed with the idea.
   ⊭ George was displeased.
   ⊭ George didn't care one way or the other.
   ⊭ George was not displeased.

[34] I'm not actually sure this is ok.

⊭ George was not indifferent.
⊨ George was not overjoyed.

d. ?? George was less than exactly overjoyed by the idea.

e. George wasn't exactly overjoyed by the idea.

f. * George was less than happy about it—he was ecstatic!

g. George was not happy about it—he was ecstatic!

As (93) shows below, *before* can be analyzed in a similar vein. Like *less than*, *before* is infelicitous/uninformative with *exactly* modification, and does not allow for meta-linguistic reversal of interpretation, suggesting that its interpretations are again directly determined and not the result of an underdetermined LF.[35] Additionally, *before* licenses only wNPIs.

(93) *before*

a. wNPI: Julie liked Susan before she ever met her.

b. *sNPI: *Before Harry went to Paris either, he went to Dublin.

c. *Litotes: Before Monica discouraged Bill, he sent her flowers every week.
⊭ When Monica encouraged Bill, he sent her flowers every week.
⊭ When Monica ignored Bill, he sent her flowers every week.
⊨ When Monica didn't discourage Bill, he sent her flowers every week.

d. ?? Before Monica exactly discouraged Bill, he was very persistent.

e. When Monica didn't exactly discourage Bill, he was very persistent.

f. * Before he was happy, he was rich. But when he was rich he was ecstatic.

g. George wasn't happy when he was rich—he was ecstatic!

In summation, the distinguishing feature of operators which can produce litotes is still unclear, although the derivation of $\neg P(x)$ may be the fulcrum. Regardless of what it may prove to be, the given data strongly suggest that, there is a good chance that it is the same as, or at least part of the heretofore also elusive feature which allows an operator to license sNPIs. No context can licenses sNPIs which does not also produce litotes. One way to explain this link between sNPI and litotes behavior would be to posit that expressions of litotes are actually compositional sNPIs, which may be on their way to becoming idiosyncratic NPIs themselves. Further work is needed to make any such conclusion, but regardless of whether litotes is a way of forming sNPIs or not, there is a significant link in their behaviors.

2.3.2 Locality Conditions

It is not enough, however, for a gradable and vague predicate to be in the same sentence as one of these productive operators; as with negative polarity items, litotes has some locality constraints. It can be blocked by clause boundaries except when a neg-raising matrix predicate can bridge the gap.

These locality constraints provide another possible connection here with sNPIs. Strong NPIs can be blocked by an intervening predicate if it is not neg raising, but weak NPIs are not blocked by neg raising predicates or non-neg-raising predicates. If litotes also cannot be

[35] Perhaps *less than* and *before* should be referred to as *determined* forms?

formed with an intervening non-neg raising predicate, then this is another similarity between it and sNPIs. Gajewski (2007) lays out the patterning of sNPIs embedded under neg-raising or non-neg-raising predicates, and litotes seem pattern with sNPIs again, given the examples in (94) .

(94) *Non-Neg Raising Intervener*

a. wNPI:

i. Bill didn't claim that Mary had ever left the country. (Gajewski, 2007)

ii. Mary didn't claim that Bill had seen anything unusual. (Gajewski, 2007)

b. *sNPI:

i. * Bill didn't claim that Mary would arrive until tomorrow. (Gajewski, 2007)

ii. * Mary didn't claim that Bill had left the country in years. (Gajewski, 2007)

c. *Litotes:

i. The council didn't claim that the farmers were (?exactly) unhappy.
⊭ The council claimed that the farmers are (not) happy.
⊭ The council claimed that the farmers are (not) unhappy.
⊭ The council claimed that the farmers are (n)either happy (n)or unhappy.
⊭ The council claimed something about the farmers.

ii. Eric didn't discover that the woman was (?exactly) rich.
⊭ Eric discovered that the woman was (not) rich.
⊭ Eric discovered that the woman was (not) poor.
⊭ Eric discovered that the woman was (n)either rich (n)or poor.
⊭ Eric discovered something about the woman.

Neither of the forms in (94c), when the proposed litotes is embedded under a non-neg raising predicate, allow inferences about the scale of the base predicate (e.g. happiness or wealth), because the is undetermined in regards to the scale of the base predicate. As with the undetermined forms in (82)–(89) above, neither of the scalar alternatives (e.g. poor, neither rich nor poor), nor their boolean complements are entailed, which is a necessary condition for underdetermination, but the boolean complement of the base predicate is also not entailed, preventing any further inferences from being made about the scale of the base predicate. *Exactly* is not as bad here as it was in some of the above contexts—perhaps due to processing interference due to the overt negation earlier in the sentence—but it is still much worse than it is with lower negation (e.g. *The farmers claimed that they were not exactly unhappy* is undeniably better.)

(95) *Neg-Raising Intervener*

a. wNPI:

i. Bill didn't think that Mary had ever left the country. (Gajewski, 2007)
≈ Bill thought that Mary hadn't ever left the country.

ii. Mary didn't believe that Bill had seen anything unusual. (Gajewski, 2007)
≈ Mary believed that Bill hadn't seen anything unusual.

b. sNPI:

i. Bill doesn't think Mary will leave until tomorrow. (Gajewski, 2007)
≈ Bill thinks that Mary won't leave until tomorrow.

ii. Mary doesn't believe Bill has left the country in years. (Gajewski, 2007)
≈ Mary believes that Bill hasn't left the country in years.

c. Litotes:

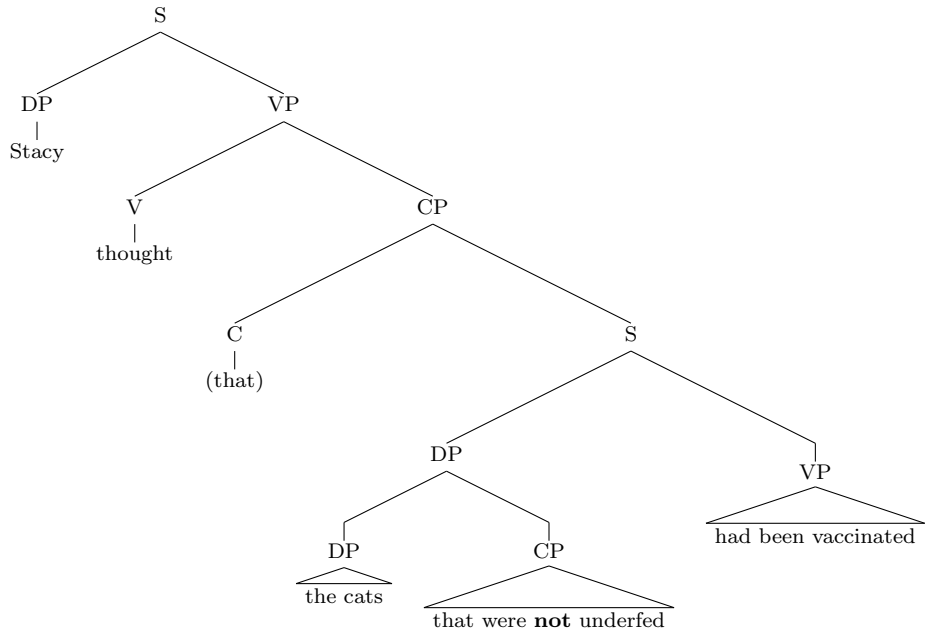
i. The council didn't think that the farmers were (exactly) unhappy.
⊨ The council thought that the farmers were not unhappy.
⊭ The council thought that the farmers (not) were happy.
⊭ The council thought that the farmers were (n)either happy (n)or unhappy.

ii. Eric didn't believe that the woman was (exactly) rich.
⊨ Eric believed that the woman was not rich.
⊭ Eric believed that the woman (not) was poor.
⊭ Eric believed that the woman was (n)either rich (n)or poor.

Another locality constraint is that the base predicate of litotes cannot be embedded an adjunct phrase which does not itself contain a productive operator. For example, (96a) is litotes (where the cats that were vaccinated could have been overfed, or simply healthy), but (97a-i) and its lower negation counterpart, (97b-i) are not litotes, because the cats that Stacy didn't think were vaccinated were underfed, with or without neg raising. sNPIs again pattern with litotes with these constructions, as also shown in the examples below.

(96) *In adjunct phrase with operator*

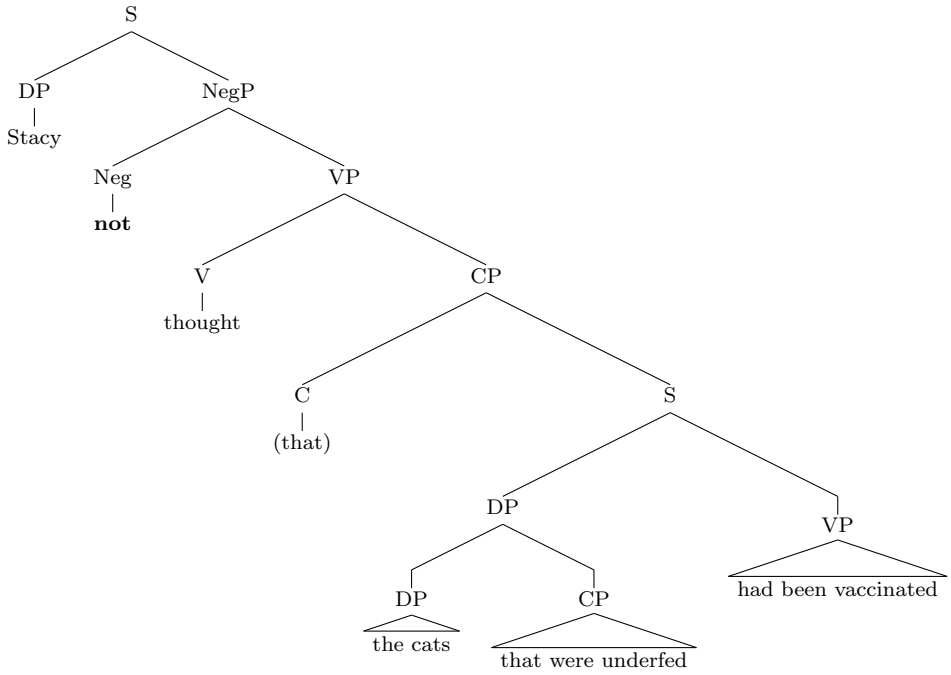
a. Litotes: Stacy thought that the cats [$_{adjunct}$ that were not underfed] had been vaccinated.



b. sNPI: Stacy thought the cats [$_{adjunct}$ that had **not** been fed in weeks] had at least been vaccinated.

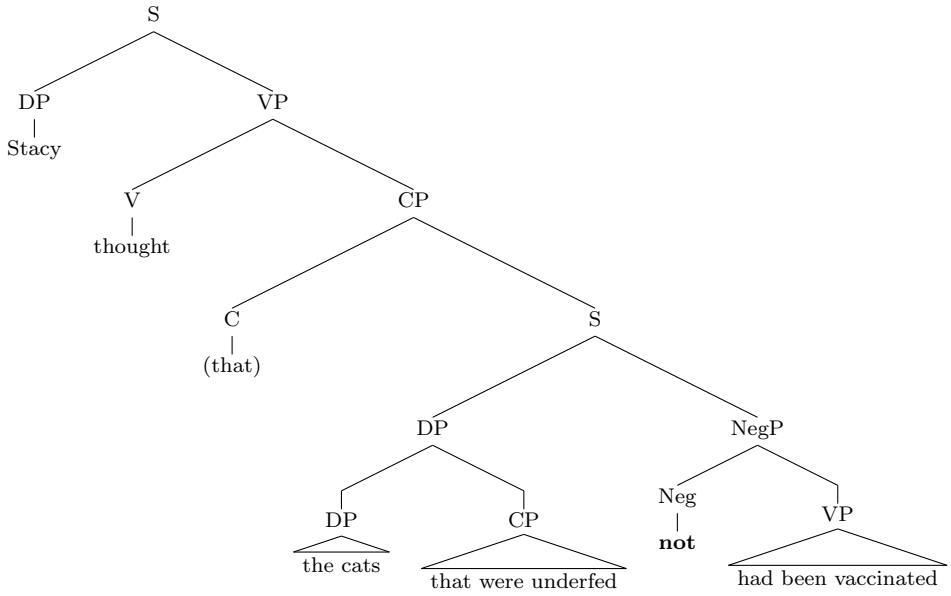
(97) a. *In adjunct phrase without operator*

i. *Litotes:
Stacy did**n't** think that the cats [$_{adjunct}$ that were underfed] had been vaccinated.



ii. *sNPI: *Stacy did**n't** think that even the cats [$_{adjunct}$ that had been fed in weeks] had been vaccinated.

b. i. Stacy thought that the cats [$_{adjunct}$ that were underfed] had **not** been vaccinated.



ii. *sNPI: Stacy thought that the cats [$_{adjunct}$ that had been fed in weeks] had **not** been vaccinated.

It cannot be the case that the generation of the scalar alternatives is blocked by the complementizer phrase alone, because litotes does occur when this phrase is the complement of a neg raising verb, as illustrated in (98a) below as well as (95c) above.

(98) *In complement phrase with or without operator*

a. Litotes:
Stacy did not think [$_{complement}$ the cats were underfed].
≈ Stacy thought [$_{complement}$ the cats were not underfed].

b. sNPI: Stacy did not think [$_{complement}$ the cats had been fed in weeks.]

The above examples illustrate that litotes must be within the same clause as negation. This is extended if the matrix predicate is neg raising, and therefore would allow the negation to scope into a complement phrase, but this extension does not apply to adjunct phrases. Therefore, the operator must be This is again similar to the behavior of sNPIs, which are also blocked by non-neg raising predicates, and can only be 'rescued' by a neg raising predicate if they are in a complement phrase of the neg raiser, not if they are in an adjunct phrase. That is, the operator must c-command both the base predicate of litotes and sNPIs, and this c-command is somehow blocked by adjunct phrases.[36]

2.4 Hedging and Other Uses of Litotes

Regardless of what operators and predicates can create litotes, its semantic underdetermination allows for many possible uses, whether as simply a way of getting creative with one's language, or as a way of actually conveying information in a way that may not be readily available with other forms. Broadly speaking, these uses can be divided into two main types: the *literal*, those where the intended inference is equal to the assertion (i.e. the logical form), and the *inferential*, those where the intended inference a subset of the possibilities given by the assertion. The latter can also be divided into two subsets corresponding to +/– speaker commitment. The following subsections discuss these uses, and the table in (100) summarizes the taxonomy at the end of this section.

2.4.1 Literal Use

The first type includes epistemically *agnostic* litotes, where the purpose is to remove a portion of the predicate's scale. Agnostic litotes are commonly found in academic or empirical discourse, where the intended information is the whole remaining range for purposes of accuracy: evidence may disprove a certain theory, but that does not mean it will prove it, and, importantly, the speaker is not expected to not know if it is proven. As in (99) below, a speaker may choose to convey this information using litotes, where the real information is actually that this one point of the scale is being ruled out, but nothing can be said about the rest of the scale, because the truth value of those points is unknown.

(99) The data collected in this experiment do not disprove Stolzer's 1990 theory.

[36]Further work is needed to verify that these relations hold for the other valid operators from section 2.3.1 above.

This use of litotes is not intended to be underdetermined in an interpretive sense; although there are two different possible readings, the intention is to convey both equally. That is, the intended message is the whole range of possibilities expressed by the underdetermined form: the boolean complement (or contradiction) of the base predicate, the inference of which is required for any litotes.

2.4.2 Committed Inferential Use

The other group of uses for litotes, as mentioned above, are those where the speaker does not intend for the interpretation to be equivalent to the assertion; that is, in these cases, the speaker relies on pragmatics to express some content beyond the logical form. This type where pragmatics does play a role can be split again into two subgroups, which are distinguished by level of speaker commitment. On one side there are those uses where the speaker not only intends the hearer to choose one of the possible readings given by the underdetermined form, but is also committed to one in particular. This type, henceforth *emphatic* litotes (in that one possible interpretation is emphasized and promoted), commit the speaker to a particular (intended) implicature—either the contrary, $C(P(x))$, or the middle ground, $\neg(P(x) \vee C(P(x)))$— regardless of whether the hearer actually infers that which the speaker intended. When these implicatures are not actually inferred by the hearer, it is viewed as a communicative failure, so it makes sense that these forms are frequently used as a method of understatement when $C(P(x))$ is the intended inference: underdetermination allows the speaker to actually state less than what they intend to convey, but they still expect the hearer to pick up on their real belief.

2.4.3 Non-committed Inferential Use

The remaining usage type of litotes, and the focus of the remainder of this paper, do not commit the speaker to having attempted to convey either interpretation. Although the literature has not touched on this connection explicitly, this use of litotes can be classified as a form of *hedge*, which is "a discourse strategy that reduces the force or truth of an utterance and thus reduces the risk a speaker runs when uttering a strong or firm assertion or other speech act" (Fraser, 2010, p. 1). In particular, the use of litotes to hedge is *propositional hedging*, since it affects the truth value of the proposition (Fraser, 2010) (i.e. by producing an underdetermined LF), rather than being *speech act hedging*, which affects the illocutionary force of a speech act (Fraser, 2010). Litotes can sometimes be hedges but are not always: hedges are not a grammatical class—they draw from all grammatical categories—but rather they are closer to a "open functional class," whose members are only recognized as hedges when they are used as such (Fraser, 2010; Clemen, 1997).

Although the speaker does generally intend for the hearer to choose between the possible interpretations, the main difference between hedge litotes and emphatic litotes is that in the former, choice of interpretation is left entirely to the hearer. Granted, the hearer always has final say on which inference they make, but with hedges, as opposed to emphatic litotes, choosing the 'wrong' form (i.e. that proposition which may be less consistent with the speaker's beliefs than the others) is not viewed as a communication error. Hedging has the primary purpose of leaving the speaker with an 'escape hatch'; that is, it is not simply an

issue of politeness, but is a "rationally grounded behavior which is chiefly aimed at avoiding unnecessary risks, responsibilities and conflicts" (Caffi, 1999, p.12, qtd. in Fraser 2010).[37] One can hedge just as easily about someone else's statement which they are reporting as they can about their own belief model. But the point is that when a speaker hedges, they are reducing their commitment to the information being conveyed, whether first hand or second hand; the hearer can, and usually does infer from the common ground a single interpretation, but the utterance itself should not influence that decision.[38]

This division of the uses of litotes is illustrated in (100) below.[39] This division is not semantically or syntactically determined. Any single sentence can assume each of these roles given the proper context and other utterance particular cues (e.g. intonation, extra-linguistic information.) Note that agnostic litotes have been classified as +commitment, but in these forms the speaker is committed to the assertion itself, whereas in the case of emphatic litotes the speaker is committed to the implicature.

(100) **Division of Litotes Uses:**

	Inferential	Literal
+commitment	Emphatic	Agnostic
-commitment	**Hedge**	n/a

3 Defining the Question: How do litotes hedges work?

Looking at the different ways that litotes is used does little to clarify the matter of how these hedges work: It is clear that litotes is very flexible in the meaning that it actually winds up conveying to the audience, as that is the entire point. In hedging, as already mentioned, the speaker intends for the hearer to arrive at one interpretation, but leaves the decision up to the hearer. Determining how hedging with litotes works comes in two parts: First, when do speakers use hedging as a conversational technique? And second, how do hearers determine which interpretation to infer from the hedge?

3.1 On the Speaker's End: When to hedge?

Essentially, whether speakers hedge or not is dependent on the complex interaction of pragmatic maxims and contextual information, such as the speaker's relationship to the hearer, and suspicions about the hearer's belief model and how it may or may not be compatible with their own. Section 3.1.1 will discuss what these pragmatic and contextual issues are, and section 3.1.2 will present a computational toy model in Python that predicts which expressions will be used in a simplified setting for illustration purposes.

[37] Caffi is actually speaking of "mitigation", but as Fraser (2010) notes, her definitions fit within what others have called hedging.

[38] One difference between hedging with litotes and hedging in other ways (e.g. modals, questions) is that using litotes actually uses a weaker LF, while hedging with modals or questions just changes strength with which the speaker commits to the LF being asserted.

[39] There is no form which both has an inference equivalent to the logical form (i.e. the assertion) and lacks speaker commitment: cooperative speakers must commit to their assertions.

3.1.1 Pragmatic Considerations

When considering the optimal way to express an opinion or belief, speakers must deal with a variety of pragmatic maxims, regardless of the fact that this process is not always a conscious endeavor. For the purpose of hedging, three principles are relevant: Quality, Quantity, and Conflict Avoidance. The Gricean maxim of Quality dictates that a cooperative speaker will "try to make [their] contribution one that is true" (Grice, 1970). Whereas the agnostic use of litotes is directly motivated by the second submaxim of Quality—"Do not say that for which you lack adequate evidence"—the hedging use of litotes can be seen as an effort to adhere to the first the submaxim—"Do not say that which you believe to be false" (Grice, 1970). The underdetermined LF of litotes makes it much easier to satisfy this requirement: fewer possible worlds are inconsistent with litotes, thus there are fewer possible worlds where litotes is false than where a more direct statement is false.

The Gricean maxim of Quantity dictates that a cooperative speaker should "make [their] contribution as informative as is required" and not "more informative than is required" (Grice, 1970). This principle indicates that any litotes should implicate the middle ground of the base predicate's scale, else the speaker would have opted for the stronger expression of the contrary of the base predicate. For example, if in uttering (101a), Quantity indicates that the speaker does not believe the stronger statement of (101b) to be true, thus the scalar implicature would be (101c).

(101) a. ASSERTION: David was not pleased at the prospect of waking up at 5 am to go shopping.

b. STRONGER: David was displeased at the prospect of waking up at 5 am to go shopping.

c. IMPLICATE: David was neither pleased nor displeased at the prospect of waking up at 5 am to go shopping.

The same prediction would be made by Horn's "Division of Pragmatic Labor" which states "The use of a marked (relatively complex and/or prolix) expression when a corresponding, unmarked (simpler, less 'effortful') alternative expression is available tends to be interpreted as conveying a marked message (one which the unmarked alternative would not, or could not have conveyed)" (Horn, 1984, p. 22). That is, using the more complex expression instead of an available shorter and/or easier expression tends to signal that the speaker was not in a position to employ the simpler version felicitously. This principle would also prevent a speaker from using the more complex *not pleased* to convey the simpler *displeased*, and thus must implicate the (even) more complex *neither pleased nor displeased*.

However, expressions like (101a) are frequently used to convey exactly what the above motivations would predict not to occur (e.g. that David was in fact feeling quite dismal about the prospect.) Horn (1989) discusses this effect as a dispreference for stating that which is socially undesirable. That is, in not explicitly stating that David is feeling negatively, the speaker has avoided mentioning the undesirable. Given that predicates of negative affect generally indicate a socially undesirable state of affairs, it should be less likely that (102) implicates the contrary (that it is a good way to travel) than the middle ground (that is a mediocre way to travel), but this is not necessarily the case.

(102) Taking the train was not a bad way to travel.

This may not be attributable to social desirability, but it may be due to other contextual and/or societal pressures, such as modesty, where stating that which is socially desirably may in fact be considered "impolite."

Although this avoidance of general social undesirability probably does play a part in the motivation to use litotes of either the emphatic or hedge variety, what really determines when a speaker will hedge is not an avoidance of generally undesirable things, but an avoidance of one particular generally undesirable thing in particular: conflict with the audience. When this personal kind of conflict will occur is much less predictable than the more general adherence to social mores. To know whether there is a chance of conflict with the hearer, the speaker must make some conjecture about the hearer's belief model, which may be entirely unknown to them. Certain contextual features will make some beliefs more probable (e.g. if the discussion is about something which belongs to the hearer which they have not previously expressed a negative attitude toward), but there will necessarily be an element of modality to this particular pragmatic maxim, which will be referred to as Conflict Avoidance henceforth.

The goal of Conflict Avoidance (or, put another way, maximization of agreement) is to produce a statement that has the highest probability of being compatible with the hearer's beliefs. Given that litotes is always compatible with more belief models than its corresponding direct statements are (as illustrated below in (103)),[40] if the speaker suspects that the hearer does not agree with them, they can use a hedge to increase the likelihood that their statement will still be compatible with the hearer's belief while still adhering to Quality as well. The price for such a use however, is a violation of Quantity, since the underdetermined LF of litotes is inherently less informative than a direct statement that directly corresponds to the speaker's belief.

(103) Compatibility of statements with beliefs of hearer:

	terrible	neither	excellent
terrible	✓		
neither		✓	
excellent			✓
not terrible		✓	✓
not excellent	✓	✓	

3.1.2 The Model

In an effort to systematically illustrate when litotes might be used to hedge, I developed a toy model using Python, the full script for which can be found in Appendix A.

The set up for the model is a simplified conversation, namely, only one statement long. The program is entirely self-contained and runs using just 5 arguments: a set of contrary predicates, the speaker's belief, (the speaker's conjecture about) the hearer's belief, and the ordering of the pragmatic principles. There are undoubtedly other contextual features that go into the process, but, for the most part, those should just determine the ordering of the pragmatic principles, or the likely interpretation—scalar or strengthened—of any litotes

[40] This table, and the model, ignores meta-linguistic negation, or denials as Geurts (1998) refers to them. That is, "not ok" is only compatible with "excellent" in a meta-linguistic sense.

that happens to be used. Importantly, this model is not supposed predict when emphatic or agnostic litotes will be used, and is concerned with the prediction of hedging from the speaker's perspective. The interpretation that the hearer attributes to the utterance is independent from the speaker's motivations and this model.

The first two parameters given to the program merely determine which lexical items are relevant in the context, which is currently the assessment of a restaurant. They, plus a constant middle ground which is lexicalized as "neither," and their negated (litotes) counterparts, are then given the strengths shown on the following scale in (104). These strength values are a way of indicating the different number of possible worlds each predicate could share with the neighboring predicates. That is, these numbers (clearly) do not represent the actual number of worlds in any way, but the greater the distance between these strengths (i.e. the absolute value of the difference), the more likely stating one of the predicates is to cause conflict, supposing the hearer believes the other predicate to be true.

(104) The scale attributed to the scale points provided as arguments:

argument number	1				2
bare predicates	terrible		neither		excellent
litotes forms		not excellent		not terrible	
strength	-2	-1	0	1	2

For example, if the speaker thinks that the restaurant under assessment was terrible but supposes that the hearer disagrees, stating,"It was terrible," is likely to cause more conflict than stating,"It was not excellent," because the litotes in the latter is consistent with both the belief that it was terrible (the speaker's belief) and the belief that is was neither terrible nor excellent, while the direct statement in the former is only consistent with the belief that it was terrible. Of course, if the hearer's actual belief *is* that is was excellent, either statement will can still cause conflict, but, given that the speaker cannot actually read their interlocuter's mind, the hedged expression (i.e. that the restaurant was not excellent) is still a better bet from the speaker's perspective if they wish to avoid conflict, since it is compatible with more possible worlds.

There is no option for a negated middle ground because it is inherently non-gradable—*neither...nor* can become *either...or* under negation, but there is no middle ground between them. Consider the convoluted "neither neither nor either" construction which represents the most accurate lexicalization of the middle ground. To me this seems to be a contradiction, which means that *neither*, as a its own predicate at least, obeys has an excluded middle, and clearly does not take degree morphology, and therefore is not an appropriate predicate for litotes. For a slightly easier to process example, recall the discussion of *indifferent* at the end of section 2.1.

The next two arguments provide the program with the speaker's and hearer's beliefs, which can be either of the predicates chosen for the first 2 arguments, or "neither" to indicate that they believe the middle ground. Finally, the last parameter fed to the program is the relative ordering of the 3 maxims discussed above: Quality, Quantity, and Conflict Avoidance. This ordering should predict whether the speaker is most likely to be direct, lie, or hedge in the projected utterance.

These maxims are represented in the program as functions which iterate over a dictionary of available expressions. Quality gradually disallows expression which are inconsistent with

the speaker's belief model in order of decreasing distance from the speaker's belief (absolute value of difference between the expression and the speaker's belief); that is, if speaker belief is set to one of the endpoints, the function first removes the contrary, then the boolean complement, and lastly the middle ground.[41] If speaker belief is set to the middle ground, this function removes the endpoints simultaneously. Quantity disallows any expression which is less informative than the others (i.e. the underdetermined litotes forms for the contrary beliefs); this leaves the question of what it is more informative *about*, but if Quality is not adhered to, then Quantity only dictates that the expression remove as many possible worlds as possible, and all of the non-negated forms, including the middle ground, remove (in this model) two sets of possible worlds, and therefore are equally informative, and more informative than the hedged forms which only remove one set of possible worlds. And finally, the Conflict Avoidance function removes from the set of possibilities any expression which is not compatible with the hearer's belief model, in order of (absolute value of) strength of the predicate—the same function as Quantity, but based on the conjecture of the hearer's belief.

The following tables illustrate the interaction of the three pragmatic principles: given suspected contrary beliefs, any ordering of Quantity after Conflict Avoidance and Quality predicts hedging, and any ordering of Conflict Avoidance and Quality after Quantity predicts no hedges will be used. Whether speakers will lie or not (i.e. shift away from their own belief to the hearer's) is dependent on whether Conflict Avoidance precedes Quality. If it does, the speaker will either flat out lie—when hedging is dispreferred—or lie only when neither belief is the middle ground—when hedging is not dispreferred, since hedging allows for a statement which is consistent with both the middle ground and an endpoint of the scale. This is indeed born out with the given program, the output of which can be found in Appendix B.

(105) Under Quality ≫ Conflict Avoidance ≫ Quantity

terrible	**¬ excellent**	**middle ground**	**¬ terrible**	**excellent**
[S] conflict_1	✓	quality	quality	[H] quality
[S] conflict_1	✓	[H] quality	quality	quality
[H] quality	✓	[S] conflict_2	conflict_1	quality
[H] quality	quality	quality	✓	[S] conflict_1
quality	quality	[H] quality	✓	[S] conflict_1
quality	conflict_1	[S] conflict_2	✓	[H] quality

Key:	
Speaker Belief	[S]
Hearer Belief	[H]
conflict_x	conflict violation number x
quality_x	quality violation number x
quantity	quantity violation
✓	optimal expression

[41] The reason for doing this gradually is that otherwise there could be an instance where all expressions are removed, and thus either no optimal expression can be determined, or the next principle would determine it instead, regardless of the ranking. This could be the more accurate portrayal, but my intuition is that stating the boolean complement of what you believe is somehow "lying less", than stating the contrary of it, so it makes sense that the latter would be removed first and the boolean complement would be chosen.

(106) Under Conflict Avoidance ≫ Quality ≫ Quantity

terrible	**¬ excellent**	**middle ground**	**¬ terrible**	**excellent**
[S] conflict_1	conflict_2	conflict_3	✓	[H] quality_1
[S] conflict_1	✓	[H] quality	quality	conflict_1
[H] quality	✓	[S] conflict_3	conflict_2	conflict_1
[H] quality_1	✓	conflict_3	conflict_2	[S] conflict_1
conflict_1	quality	[H] quality	✓	[S] conflict_1
conflict_1	conflict_2	[S] conflict_3	✓	[H] quality

(107) Under Quality ≫ Quantity ≫ Conflict Avoidance

terrible	**¬ excellent**	**middle ground**	**¬ terrible**	**excellent**
[S] ✓	quantity	quality	quality	[H] quality
[S] ✓	quantity	[H] quality	quality	quality
[H] quality	quantity	[S]✓	quantity	quality
[H] quality	quality	quality	quantity	[S] ✓
quality	quality	[H] quality	quantity	[S] ✓
quality	quantity	[S] ✓	quantity	[H] quality

(108) Under Conflict Avoidance ≫ Quantity ≫ Quality

terrible	**¬ excellent**	**middle ground**	**¬ terrible**	**excellent**
[S] conflict_1	conflict_2	conflict_3	quantity	[H] ✓
[S] conflict_1	quantity	[H] ✓	quantity	conflict_1
[H] ✓	quantity	[S] conflict_3	conflict_2	conflict_1
[H] ✓	quantity	conflict_3	conflict_2	[S] conflict_1
conflict_1	quantity	[H] ✓	quantity	[S] conflict_1
conflict_1	conflict_2	[S] conflict_3	quantity	[H] ✓

(109) Under Quantity ≫ Conflict Avoidance ≫ Quality

terrible	**¬ excellent**	**middle ground**	**¬ terrible**	**excellent**
[S] conflict_1	quantity	conflict_2	quantity	[H] ✓
[S] conflict_1	quantity	[H] ✓	quantity	conflict_1
[H] ✓	quantity	[S] conflict_2	quantity	conflict_1
[H] ✓	quantity	conflict_2	quantity	[S] conflict_1
conflict_1	quantity	[H] ✓	quantity	[S] conflict_1
conflict_1	quantity	[S] conflict_2	quantity	[H] ✓

(110) Under Quantity ≫ Quality ≫ Conflict Avoidance

terrible	**¬ excellent**	**middle ground**	**¬ terrible**	**excellent**
[S] ✓	quantity	quality	quantity	[H] quality
[S] ✓	quantity	[H] quality	quantity	quality
[H] quality	quantity	[S]✓	quantity	quality
[H] quality	quantity	quality	quantity	[S] ✓
quality	quantity	[H] quality	quantity	[S] ✓
quality	quantity	[S] ✓	quantity	[H] quality

3.2 On the Hearer's End: How to interpret a hedge?

After a hedge is made, however, the question still remains as to which reading the hearer will apply to it. As already alluded to, the semantic underdetermination which characterizes litotes obviously leaves room for multiple interpretations, which are outlined in (111):

(111) Available Interpretations of Litotes
   a. Scalar Interpretation = middle ground
   b. Strengthened Interpretation = contrary of predicate
   c. Underdetermined Interpretation = boolean complement of predicate

In regards to hedging, which interpretation the hearer chooses should be entirely up to them. However, given that speakers are generally assumed to be as informative as possible, and the fact that both the scalar and strengthened interpretation will be more informative than maintaining the underdetermined interpretation, hearers are least likely to choose the underdetermined interpretation. The choice between the scalar or strengthened reading is more debatable. The following subsections discuss the issue briefly, but much further work is required to propose any definitive theory.

3.2.1 Scalar versus Strengthened

A more formal distinction between the scalar and strengthened interpretations can be described based on what Horn (2015b) refers to as pragmatic strengthening via disjunctive syllogism, or "**O** to **E** Drift" in reference to the classic square of opposition, as illustrated in Figure 1 below. That is, under a "competent speaker" assumption, the middle ground is excluded ($P(x) \vee C(P(x))$) (Horn, 2015b); thus $\neg(P(x))$ must indicate the contrary, ($C(P(x))$, via disjunctive syllogism, and this produces the strengthening from predicate denial (i.e. boolean complement, e.g. *not good*) to predicate term negation (i.e. contrary, *not-good* $\approx$ *bad*.)

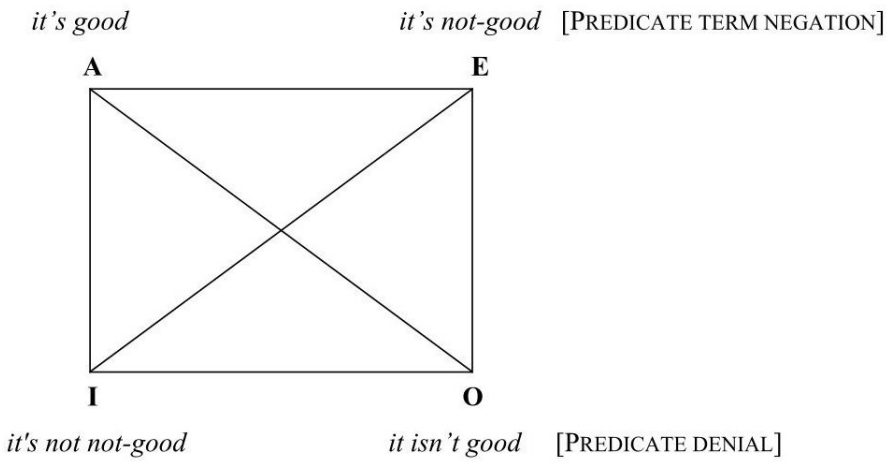


Figure 1: The Classic Square of Opposition

As additional evidence for this drift, Horn (2015b) cites the lack of lexicalized quantifiers and conjunctions corresponding to predicate denial as an indication that predicate term negation is favored over predicate denial. According to Horn, this indicates that strengthening the scalar reading to the contrary ("strengthened") reading is a trend—perhaps even the norm—in natural language. However, **I** is lexicalized, which, based on the preceding argument, should mean that there is no such tendency to strengthen **I** to **A**, and thus this reasoning may not help explain the process of interpreting litotes, which frequently comes in a form similar Figure 1's **I**.

A mitigating point for the argument for drift would be if morphology is relevant in determining the implications, especially if overt negative morphology is the primary indicator of where on the square of opposition the original predicate is situated. That is, if the favored interpretations actually do differ between (112a) and (112b): if **A** is *happy*, then *not happy*$_{\boldsymbol{O}}$ would shift to *unhappy*$_{\boldsymbol{E}}$, but the shift of *not unhappy*$_{\boldsymbol{I}}$ to *happy*$_{\boldsymbol{A}}$ is not accounted for by this, even though, if **A** is *sad*, essentially the same shift—*not sad*$_{\boldsymbol{O}}$ to *un-sad (happy)*$_{\boldsymbol{E}}$) is accounted for by an **O** to **E** tendency. If the scalar reading is actually more likely for (112b) than it is for (112a), then the argument may stand.

(112) a. The farmers were not sad about the rain.
   i. *Available Interpretations:*
   Strengthened: The farmers were happy.
   Scalar: The farmers were neither happy nor sad.

b. The farmers were not unhappy about the rain.
   i. *Available Interpretations:*
   Strengthened: The farmers were happy.
   Scalar: The farmers were neither happy nor unhappy.

I cannot say whether either reading is more likely for the above statements, but it is also possible that the issue for the theory might be one of naming: Horn (2015b) discusses and names the shift from **O** to **E**, but an assumption of the excluded middle, such as that dictated by the "competent speaker" assumption, should account for a similar shift from **I** to **A**. The question then becomes how one decides if such an assumption should occur, because it cannot be the rule: regular scalar implicatures still occur, else it would not really matter that litotes have an underdetermined form—the audience would always interpret them as their strengthened form. This in turn would prevent litotes from ever being used to hedge (though Horn (2015b) does not discuss the issue): if both interpretations are not available, then the litotes form would have no advantages over (and even disadvantages to) the more direct and informative statement of the contrary. The real issue then must be whether the middle ground is ignored or not, and, at least when litotes is used to hedge, the middle ground should remain an option, else it would not really be a hedge at all. That should be the take-away from this discussion: for the purpose of hedging, multiple options for interpretation must remain available.

3.2.2 Intonational Effects

Turning now to the elephant in the room, intonation definitely plays a significant role in the interpretation of litotes. The question is whether these intonational effects can be

categorized and explained within a formal system. Although the scope of this paper does not cover a detailed exploration of pitch tracking and intonation contours, I would at least like to suggest that intonation which biases the hearer into interpreting litotes in one way or the other (e.g. contrastive focus) should abnormal in hedge litotes.

Focus has the primary—though simplified here—effect of highlighting the unchosen alternatives to the focused element, which makes the fact that those alternatives were passed over part of the pragmatic content of the expression. Given that the purpose of hedging is in fact to leave options of interpretation open to the hearer, as discussed above, highlighting which items were not used, as focus does, should be counterproductive. That is, litotes with focus stress should be less likely to be used as hedges, because the focus stress should promote one reading over the other. For example, (113a) does not necessarily have any explicit reference to the alternatives of *decelerate*, whereas (113b), with the locus of focus marked with an F subscript, does make direct reference to these alternatives. Focus stress on the predicate as in (113b) or on the negation itself as in (113c) more strongly indicates a specific reading for litotes (regardless of what that reading will be) than when focus stress is absent as in (113a).

(113) a. Allen did not decelerate through the turn.
b. Allen did not $[\text{decelerate}]_{\text{F}}$ through the turn.
c. Allen did $[\text{not}]_{\text{F}}$ decelerate through the turn.

These focus effects may also explain why (114)—with a contraction—might produce different readings than (115)—with the full form. The contracted form could feel different than the uncontracted form, because it is incapable of acquiring focus on both parts of the litotes (i.e. it cannot become (116) as (115) can), or because it actually has a de-emphasized quality moving it in the reverse of focus.[42]

(114) The farmers weren't unhappy about the rain.

(115) The farmers were not unhappy about the rain.

(116) The farmers were $[\text{not}]_{\text{Focus}}$ unhappy about the rain.

4 Conclusion

Although the uses and interpretations of litotes are extremely varied, the intriguing thing about this phenomenon, and a main point of this paper, is that it all depends on a single underdetermined logical form. The combination of a gradable predicate which allows for a middle ground in the scope of a minimally downward entailing operator allows for the removal of the set of worlds which correspond to that predicate while not entailing anything else about the rest of the predicate's scale. Such an indirect conversational device may seem borderline uncooperative at first, but it brings with it a flexibility which is incredibly useful for many situations and which speakers would be hard pressed to replace.

Much more remains to be pursued with the linguistically rich realm of litotes, from questions of intonation effects on interpreting litotes, to the deeper theoretical questions

[42]Of course, this is not conclusive. It is also possible that any difference in suggested interpretation of (114) and (115) is actually due to a syntactic feature of sentential versus constituent negation.

that arise when considering a topic so dependent on implicature, namely where the different implicatures actually arise. Do they arise from features embedded in the syntax, from null operators as argued by Chierchia (2013) and others? Or do they simply arise due to interactions in the pragmatics as argued by Geurts (2009)?

I am inclined to argue that they either arise in the pragmatics, or at least cannot be entirely the result of embedded semantic features, because the purpose of hedging would prevent this. If the implicatures arise from operators, even null ones, that occur in the syntax, the speaker would have to have some level of conscious control over the appearance of these operators. But if the operators are such that there is a different one for each different interpretation, then there is a problem. The entire purpose of hedging is to not commit the speaker to either interpretation, so it is not at all clear how the speaker could use a specific operator to do this. Since the point of hedging is to leave options of interpretation and allow the hearer to choose between them, the speaker would need to use an operator to indicate how the speaker will interpret the sentence, which is information that is intentionally outside of the speaker's control.

Additionally, regardless of how the scalar implicatures of litotes or its strengthened reading comes about, the fact that litotes patterns very strongly with the licensing of NPIs and strong NPIs in particular, raises interesting questions about what strong NPIs actually are and what it is about their licensing environments that allows them to do so. The apparent link between litotes and these NPIs could provide another vantage point to pursue these topics, especially since litotes is inherently more compositional—and less semantically opaque—than any languages lexicalized NPIs. This indicates that indicating that the phenomenon is definitely another to include in the currently topical discussion of polarity sensitivity.

Appendix A: writehedge.py

```
#Run: python writehedge.py low(e.g.terrible) high(e.g.brilliant) belief(e.g.
    terrible) hearer(e.g. excellent)

import sys
from collections import namedtuple

speaker = str(sys.argv[3])
hearer = str(sys.argv[4])
orders = ["quality >> quantity >> conflict avoidance","quality >> conflict
    avoidance >> quantity", "conflict avoidance >> quality >> quantity","quantity
    >> quality >> conflict avoidance","conflict avoidance >> quantity >>
    quality","quantity >> conflict avoidance >> quality"]

#set points of scale
#positive expressions (scale points)
strength = 0
predicate = 1
scalept = namedtuple("scalept", ["strength", "predicate" ])
NegAff = scalept(-2, sys.argv[1]) #Negative Affect Predicate
MidGround = scalept(0, "neither") #middle ground predicate
PosAff = scalept(+2, sys.argv[2]) #Positive Affect Predicate
PosScalePts = [NegAff, MidGround, PosAff]
directexp = [NegAff, MidGround, PosAff]

#set positive expressions as postive belief options (pbopt)
pbopt = [NegAff.predicate, MidGround.predicate, PosAff.predicate]
#print "non-negated expressions are", pbopt
#negative expressions (scale points)
notNegAff = scalept(+1, "not "+NegAff.predicate)
notPosAff = scalept(-1, "not "+PosAff.predicate)
litotes = [notNegAff, notPosAff]

unsortedScale = PosScalePts

unsortedScale.extend(litotes)
Scale = sorted(unsortedScale)
print "\n The Scale is: ", Scale

for tuple in Scale:
    if speaker == tuple.predicate:
        #set speaker belief to designated tuple
        SBelief = tuple
        #set hearer belief to designated tuple
    if hearer == tuple.predicate:
```

```
        HBelief = tuple
#set negative expressions belief options, nbopt
nbopt = [notNegAff.predicate, notPosAff.predicate]

print SBelief


#iniate dictionary of speaker's belief model as nihilistic
#1 = true; 0 = false
SBeliefMod = dict.fromkeys(Scale, 0)


#update actual opinion to true in belief model
for k, v in SBeliefMod.items():
    if  k == SBelief:
        SBeliefMod[k] = 1
    #fill in rest of belief model based on original^^
    if  abs(SBelief.strength - k.strength) <= 1:
        SBeliefMod[k] = 1

print "\n Hearer believes", HBelief

print "\n Speaker thinks the restaurant was", SBelief.predicate, ": value in
    Belief Model must be", SBeliefMod[SBelief]

#initialize dictionary of possible expressions of belief model with positive
    options only
#all values are set to 1 initially, and will be changed to 0 when that
    expression becomes unavailble

Expr = dict.fromkeys(Scale, 1)
#print "\n Expressions:", Expr

#function to remove statements from dictionary of possible expressions if
    incompatible with belief model
#Quality should essentially just ensure that the belief model and the set of
    possible expressions are equivalent
def quality(dict):
    #print starting dictionary
    print "\n Any expression with a 0 in Speaker's Belief Model will violate
        quality. \n Possible expressions before quality:"
    for k, v in dict.items():
        print v, k.predicate
    proj = dict.copy() #proj = projected dictionary/set of available expressions
        after func is applied
    violations = 0
    for k, v in proj.items():
```

```
        if (v == 1) & (abs((SBelief.strength) - (k.strength)) > 3): #if
            expression is still available and value in expression dict and
            distance between expression and speaker belief is greater than 3
#Removes contrary expression first
            proj[k] = 0 #set value to 0
            violations += 1
            print k[predicate], "violates quality."
    print violations, "total quality violations."

    if (opt_count(proj, count) > 1):
         for k, v in proj.items():
             if (v == 1) & (abs(SBelief.strength - k.strength) > 2): #if
                expression is still available and value in expression dict and
                distance between expression and speaker belief is greater than 2
#Then removes boolean complement expression
                 proj[k] = 0 #set value to 0
                 violations += 1
                 print k[predicate], "violates quality."

    if (opt_count(proj, count) > 1):
        for k, v in proj.items():
             if (v == 1) & (abs(SBelief.strength - k.strength) > 1): #if
                expression is still available and value in expression dict and
                distance between expression and speaker belief is greater than 1
#Finally removes middle ground expression
                 proj[k] = 0 #set value to 0
                 violations += 1
                 print k[predicate], "violates quality."

    print violations, "==> total quality violations."
    #evaluate if projected dictionary is useful
    if opt_count(proj, count) >= 1:
        #if there are still multiple expressions available in the projected
            dictionary
        dict.update(proj) #update the original set of expressions to match
    if opt_count(proj, count) < 1:
        print "All options are equally optimal. Nothing removed."


#Function to remove statements from dictionary of possible expressions which are
    not maximally informative
def quantity(dict):
    print "\n Possible expressions before quantity:"
    for k, v in dict.items():
        print v, k[predicate]
    proj = dict.copy()
    violations = 0
```

```
    for k, v in proj.items():
   if (v == 1) & (k in litotes ): #Removes every negated expression (because they
      are less direct)
          # print (abs(OriginalBelief[strength])-abs(k[strength]))
           proj[k] = 0
           violations += 1
           print k.predicate, "violates quantity."
           print opt_count(proj, count), "expressions left."


    print violations, "total violations."
    if opt_count(proj, count) >= 1:
        dict.update(proj)
    if violations == 0:
        print "No quantity violations. Nothing removed."
    if (violations != 0) & (opt_count(proj, count) < 1):
        print "All options are equally optimal. Nothing removed."

#function to remove expressions which cause conflict with hearer
#dependent on (speaker's expectation of) hearer's belief model
def conflict(dict):
    print "\n If hearer believes it was ",hearer,"then speaker should not commit
        to a something inconsistent with ", hearer
    print "Possible expressions before conflict:"
    for k, v in dict.items():
        print v, k[predicate]
    proj = dict.copy()
    violations = 0
    #print "\n Hearer's belief strength", HBelief[strength]
    for k, v in proj.items():
        if (v == 1) & (abs(HBelief[strength] - k[strength]) > 3):
            proj[k] = 0
            violations += 1
            print k[predicate], "causes conflict, removed."
            print opt_count(proj, count), "expressions left."

    if (opt_count(proj, count) > 1):
        for k, v in proj.items():
            if  (v == 1) & (abs(HBelief.strength - k.strength) > 2):
                proj[k] = 0
                violations += 1
                print k[predicate], "causes conflict, removed."
                print opt_count(proj, count), "expressions left."

    if (opt_count(proj, count) > 1):
        for k, v in proj.items():
            if (v == 1) & (abs(HBelief.strength - k.strength) > 1):
```

```
                proj[k] = 0
                violations += 1

                print k[predicate], "is a direct expression and is more likely to
                    cause conflict, removed."
                print opt_count(proj, count), "expressions left."



    print violations, "total conflicts."
    if opt_count(proj, count) >= 1:
        dict.update(proj)
    if violations == 0:
        print "No conflicts. Nothing removed."
    if opt_count(proj, count) < 1:
        print "All options are equally optimal. Nothing removed."

count = 0
def opt_count(dict, count):
    for v in dict.values():
        if v == 1:
            count += 1
    return count

#ordering, rudimentary
def ordering(dict):

    for x in orders:
        if x == "quality >> quantity >> conflict avoidance":
            order = x
            a = dict.copy()
            quality(a)
            quantity(a)
            conflict(a)
            output(a,order)

        if x == "quality >> conflict avoidance >> quantity":
            order = x
            b = dict.copy()
            quality(b)
            conflict(b)
            quantity(b)
            output(b,order)

        if x == "conflict avoidance >> quality >> quantity":
            order = x
            c = dict.copy()
```

```
            conflict(c)
            quality(c)
            quantity(c)
            output(c,order)

        if x == "quantity >> quality >> conflict avoidance":
            order = x
            d = dict.copy()
            quantity(d)
            quality(d)
            conflict(d)
            output(d,order)

        if x == "conflict avoidance >> quantity >> quality":
            order = x
            e = dict.copy()
            conflict(e)
            quantity(e)
            quality(e)
            output(e,order)

        if x == "quantity >> conflict avoidance >> quality":
            order = x
            f = dict.copy()
            quantity(f)
            conflict(f)
            quality(f)
            output(f,order)

#Print outcomes
def output(dict,order):
    print "The order is", order
    out = open("hedge.outcomes.txt", "a+")
    if 1 in dict.values():
        parameters = "==========================================\nGiven: \n +
            Order of Pragmatic Principles: %s\n + Speaker believes: %s\nIf Hearer
            believes: %s\nThe optimal expression is...\n" % (order, speaker,
            hearer)
        print parameters
        optimal = ""
        for k, v in dict.items():
            if v == 1:
                optimal = "==> \"The restaurant was %s.\"\n\n" % k.predicate
        print optimal
        if parameters not in out.read():
            print "New parameter combination.\nSaving output to hedge.outcomes...
                "
```

```
            out.write(parameters)
            out.write(optimal)
        else:
            print "Parameter combination previously assessed. Output not saved."
    else:
        out.write("\n There is no optimal expression.\n")

    out.close()
#TESTING

#print "Speaker Belief Model:"
#print "The restaurant was..."
#for k, v in SBelief.items():
#    print v, k[predicate]

#print "Speaker believes it was", speaker
#print "Hearer believes it was", hearer
belief_set =
    ".....................................................................\nSpeaker
    believes it was %s and suspects Hearer believes it was
    %s.\n:::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::\n
    \n" % (speaker, hearer)
out = open("hedge.outcomes.txt", "a+")
if belief_set not in out.read():
    out.write(belief_set)
out.close()

ordering(Expr)
#print "::::::::::::::::::::::::::::::::::::::::::::::::\nFinal possible
    expressions:"
#for k, v in Expr.items():
#   print v, k[predicate]

print "Finished."
```

Appendix B: hedge.outcomes.txt

```
.....................................................................
Speaker believes it was terrible and suspects Hearer believes it was excellent.
:::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::

==========================================
Given:
 + Order of Pragmatic Principles: quality >> quantity >> conflict avoidance
 + Speaker believes: terrible
If Hearer believes: excellent
The optimal expression is...
==> "The restaurant was terrible."

==========================================
Given:
 + Order of Pragmatic Principles: quality >> conflict avoidance >> quantity
 + Speaker believes: terrible
If Hearer believes: excellent
The optimal expression is...
==> "The restaurant was not excellent."

==========================================
Given:
 + Order of Pragmatic Principles: conflict avoidance >> quality >> quantity
 + Speaker believes: terrible
If Hearer believes: excellent
The optimal expression is...
==> "The restaurant was not terrible."

==========================================
Given:
 + Order of Pragmatic Principles: quantity >> quality >> conflict avoidance
 + Speaker believes: terrible
If Hearer believes: excellent
The optimal expression is...
==> "The restaurant was terrible."

==========================================
Given:
 + Order of Pragmatic Principles: conflict avoidance >> quantity >> quality
 + Speaker believes: terrible
If Hearer believes: excellent
The optimal expression is...
==> "The restaurant was excellent."
```

```
==========================================
Given:
 + Order of Pragmatic Principles: quantity >> conflict avoidance >> quality
 + Speaker believes: terrible
If Hearer believes: excellent
The optimal expression is...
==> "The restaurant was excellent."

.....................................................................
Speaker believes it was terrible and suspects Hearer believes it was neither.
:::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::

==========================================
Given:
 + Order of Pragmatic Principles: quality >> quantity >> conflict avoidance
 + Speaker believes: terrible
If Hearer believes: neither
The optimal expression is...
==> "The restaurant was terrible."

==========================================
Given:
 + Order of Pragmatic Principles: quality >> conflict avoidance >> quantity
 + Speaker believes: terrible
If Hearer believes: neither
The optimal expression is...
==> "The restaurant was not excellent."

==========================================
Given:
 + Order of Pragmatic Principles: conflict avoidance >> quality >> quantity
 + Speaker believes: terrible
If Hearer believes: neither
The optimal expression is...
==> "The restaurant was not excellent."

==========================================
Given:
 + Order of Pragmatic Principles: quantity >> quality >> conflict avoidance
 + Speaker believes: terrible
If Hearer believes: neither
The optimal expression is...
==> "The restaurant was terrible."
```

```
==========================================
Given:
 + Order of Pragmatic Principles: conflict avoidance >> quantity >> quality
 + Speaker believes: terrible
If Hearer believes: neither
The optimal expression is...
==> "The restaurant was neither."

==========================================
Given:
 + Order of Pragmatic Principles: quantity >> conflict avoidance >> quality
 + Speaker believes: terrible
If Hearer believes: neither
The optimal expression is...
==> "The restaurant was neither."

..........................................................................
Speaker believes it was excellent and suspects Hearer believes it was terrible.
::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::

==========================================
Given:
 + Order of Pragmatic Principles: quality >> quantity >> conflict avoidance
 + Speaker believes: excellent
If Hearer believes: terrible
The optimal expression is...
==> "The restaurant was excellent."

==========================================
Given:
 + Order of Pragmatic Principles: quality >> conflict avoidance >> quantity
 + Speaker believes: excellent
If Hearer believes: terrible
The optimal expression is...
==> "The restaurant was not terrible."

==========================================
Given:
 + Order of Pragmatic Principles: conflict avoidance >> quality >> quantity
 + Speaker believes: excellent
If Hearer believes: terrible
The optimal expression is...
==> "The restaurant was not excellent."

==========================================
```

```
Given:
 + Order of Pragmatic Principles: quantity >> quality >> conflict avoidance
 + Speaker believes: excellent
If Hearer believes: terrible
The optimal expression is...
==> "The restaurant was excellent."

==========================================
Given:
 + Order of Pragmatic Principles: conflict avoidance >> quantity >> quality
 + Speaker believes: excellent
If Hearer believes: terrible
The optimal expression is...
==> "The restaurant was terrible."

==========================================
Given:
 + Order of Pragmatic Principles: quantity >> conflict avoidance >> quality
 + Speaker believes: excellent
If Hearer believes: terrible
The optimal expression is...
==> "The restaurant was terrible."

..........................................................................
Speaker believes it was excellent and suspects Hearer believes it was neither.
::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::

==========================================
Given:
 + Order of Pragmatic Principles: quality >> quantity >> conflict avoidance
 + Speaker believes: excellent
If Hearer believes: neither
The optimal expression is...
==> "The restaurant was excellent."

==========================================
Given:
 + Order of Pragmatic Principles: quality >> conflict avoidance >> quantity
 + Speaker believes: excellent
If Hearer believes: neither
The optimal expression is...
==> "The restaurant was not terrible."

==========================================
Given:
```

```
 + Order of Pragmatic Principles: conflict avoidance >> quality >> quantity
 + Speaker believes: excellent
If Hearer believes: neither
The optimal expression is...
==> "The restaurant was not terrible."

==========================================
Given:
 + Order of Pragmatic Principles: quantity >> quality >> conflict avoidance
 + Speaker believes: excellent
If Hearer believes: neither
The optimal expression is...
==> "The restaurant was excellent."

==========================================
Given:
 + Order of Pragmatic Principles: conflict avoidance >> quantity >> quality
 + Speaker believes: excellent
If Hearer believes: neither
The optimal expression is...
==> "The restaurant was neither."

==========================================
Given:
 + Order of Pragmatic Principles: quantity >> conflict avoidance >> quality
 + Speaker believes: excellent
If Hearer believes: neither
The optimal expression is...
==> "The restaurant was neither."

..........................................................................
Speaker believes it was neither and suspects Hearer believes it was excellent.
::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::

==========================================
Given:
 + Order of Pragmatic Principles: quality >> quantity >> conflict avoidance
 + Speaker believes: neither
If Hearer believes: excellent
The optimal expression is...
==> "The restaurant was neither."

==========================================
Given:
 + Order of Pragmatic Principles: quality >> conflict avoidance >> quantity
```

```
 + Speaker believes: neither
If Hearer believes: excellent
The optimal expression is...
==> "The restaurant was not terrible."

==========================================
Given:
 + Order of Pragmatic Principles: conflict avoidance >> quality >> quantity
 + Speaker believes: neither
If Hearer believes: excellent
The optimal expression is...
==> "The restaurant was not terrible."

==========================================
Given:
 + Order of Pragmatic Principles: quantity >> quality >> conflict avoidance
 + Speaker believes: neither
If Hearer believes: excellent
The optimal expression is...
==> "The restaurant was neither."

==========================================
Given:
 + Order of Pragmatic Principles: conflict avoidance >> quantity >> quality
 + Speaker believes: neither
If Hearer believes: excellent
The optimal expression is...
==> "The restaurant was excellent."

==========================================
Given:
 + Order of Pragmatic Principles: quantity >> conflict avoidance >> quality
 + Speaker believes: neither
If Hearer believes: excellent
The optimal expression is...
==> "The restaurant was excellent."

.....................................................................
Speaker believes it was neither and suspects Hearer believes it was terrible.
:::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::

==========================================
Given:
 + Order of Pragmatic Principles: quality >> quantity >> conflict avoidance
 + Speaker believes: neither
```

```
If Hearer believes: terrible
The optimal expression is...
==> "The restaurant was neither."

=============================================
Given:
 + Order of Pragmatic Principles: quality >> conflict avoidance >> quantity
 + Speaker believes: neither
If Hearer believes: terrible
The optimal expression is...
==> "The restaurant was not excellent."

=============================================
Given:
 + Order of Pragmatic Principles: conflict avoidance >> quality >> quantity
 + Speaker believes: neither
If Hearer believes: terrible
The optimal expression is...
==> "The restaurant was not excellent."

=============================================
Given:
 + Order of Pragmatic Principles: quantity >> quality >> conflict avoidance
 + Speaker believes: neither
If Hearer believes: terrible
The optimal expression is...
==> "The restaurant was neither."

=============================================
Given:
 + Order of Pragmatic Principles: conflict avoidance >> quantity >> quality
 + Speaker believes: neither
If Hearer believes: terrible
The optimal expression is...
==> "The restaurant was terrible."

=============================================
Given:
 + Order of Pragmatic Principles: quantity >> conflict avoidance >> quality
 + Speaker believes: neither
If Hearer believes: terrible
The optimal expression is...
==> "The restaurant was terrible."
```

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