

Scalar reasoning and the semantics of *let alone**

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1 Introduction

Quantitative scales—orderings on linguistic expressions by logical entailment—have long interested pragmaticists studying implicatures arising from the maxim of Quantity. The utterance of *Some linguists are Danes* (usually) implicates that not ALL linguists are Danes. In the traditional account, first articulated by Horn (1972), this implicature is generated because *some* and *all* are related on a scale of quantificational determiners $\langle all, some \rangle$ —where *all* (on the left) is more informative than *some* (on the right) since any statement containing the former will unilaterally entail a parallel statement containing the latter.¹

Hirschberg (1985) identifies some quantity implicatures derived from scales not ordered by logical entailment; these pragmatic scales are highly context-dependent. We can imagine that when one gets a driving permit to operate a large truck, one can also operate a small one, but not vice versa. In such a scenario, uttering *He can drive small trucks* would implicate that he cannot drive BIG trucks (example from Levinson 2000:104). For Hirschberg, both types of implicatures derive from the same Gricean maxim, and so both types of scales involved—both the entailment and the pragmatic ones—have the same logical structure; they are partially ordered sets.² For a pragmatic scale, the order is provided by the context, while for the entailment scales, it is the logical entailment relation.

In this paper, I explore how language makes use of pragmatic scales in a different domain. In particular, I look at *let alone* (Fillmore *et al.* 1988), the expression illustrated in (1).³

- (1) Oswald hasn't climbed the Berkeley hills, let alone Mt. Everest.

Intuitively, the sentence in (1) conveys two things: first, that Oswald hasn't climbed the Berkeley hills; and, second, that he has not climbed Mt. Everest. There is, however, an informational asymmetry between these two statements: given how the world usually works, we can infer the second statement from the first. Figuring

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¹This is an informal paraphrase of the definition in Gazdar 1979:58.

²A PARTIALLY ORDERED SET, or POSET, is a set ordered by a relation that is reflexive, antisymmetric, and transitive.

³Parallel expressions have been identified in Dutch (Verhagen 2005:35–69) and Japanese (Sawada 2003, 2008).

out how this inference arises—and how the labor is divided between the semantics and pragmatics—is the main task of this paper. The semantics that I propose in the end for *let alone* supports Hirschberg’s general approach of giving pragmatic and logical entailment scales the same formal structure.⁴

2 An aside on *let alone*’s syntax

Before starting in on *let alone*’s meaning, we need a better understanding of its syntax. I start with some terminology: I call the constituent that follows *let alone* the REMNANT—*McCain* in (2)—while the corresponding part of the preceding clause is the CORRELATE—here, *Clinton*.

- (2) **Clinton, let alone McCain**, won’t withdraw the troops from Iraq.

This sentence also exemplifies the first of two basic *let alone* sentence types, the AP-POSITIVE REMNANT structure, in which *let alone* and the remnant occur immediately following the correlate. This contrasts with the SENTENCE-FINAL REMNANT structure, where *let alone* and the remnant occur at the end of the sentence:

- (3) **Clinton** won’t withdraw the troops from Iraq, **let alone McCain**.

These two structures can be understood in a unified way, if we take *let alone* to be a COORDINATOR—an expression that freely combines syntactic objects of the same category. Importantly, the notion of ‘coordinator’ is a syntactic one; it does not imply any particular semantic contribution.⁵

In all the examples so far, the remnant and correlate have both been DPs, but it is also possible for them to be VPs, TPs, PPs, APs, and NPs—as well as tense-inflected verbs:

- (4) In most respects, Britain spent a smaller proportion of the annual budget on welfare than did continental European countries with a system financed from contributory sources or with a greater mix of public and private provision. Nor could it be said that the British welfare system identified, or even **defined, let alone assisted**, the genuinely needy groups as effectively as did some systems prevailing elsewhere. (A66 454)⁶

Crucially, the remnant can be a tense-inflected verb only in the appositive remnant structure. The corresponding sentence-final remnant structure is ungrammatical:

- (5) * Nor could it be said that the British welfare system **identified** the genuinely needy groups, **let alone assisted**.

This contrast is familiar from sentences with *and*:

⁴Horn (1972) never actually defines what a quantitative scale is, though he correlates them with certain syntactic frames, listed in Horn 2001:234–235. One of these frames is *let alone*; others include *much less*, *if not*, and *not only... but*.

⁵Fillmore *et al.* also take (pp. 514–517) *let alone* to be a coordinator, but only one that combines clauses.

⁶This example, and others with reference numbers of the same form, are from the British National Corpus (version 2).

- (6) The British welfare system identified, and assisted, the genuinely needy groups.
- (7) *The British welfare system identified the genuinely needy groups, and assisted (too).

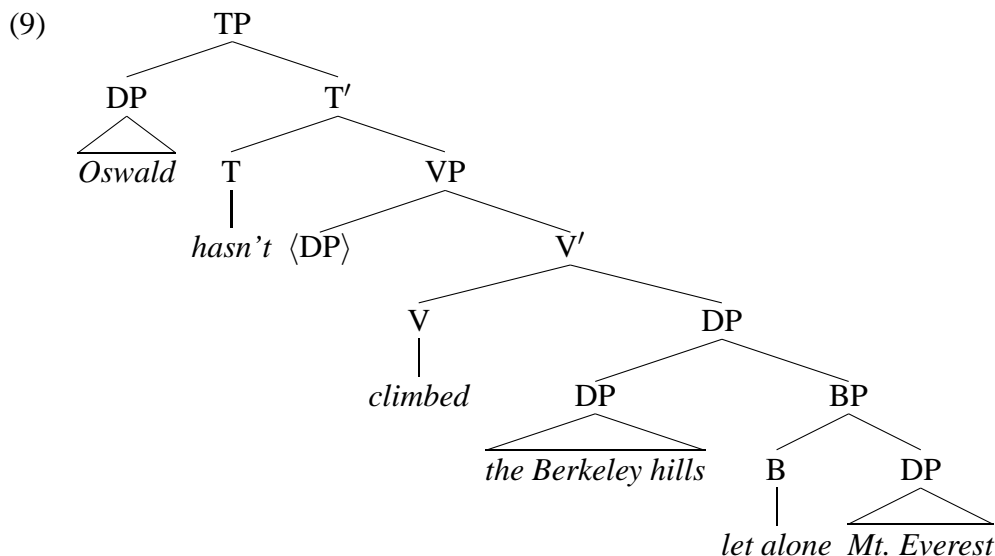
In (6), *and* conjoins two tense-inflected main verbs. But if the second conjunct occurs in sentence-final position, as in (7), the sentence is ungrammatical. The reason for this is that (7) is an attempt at gapping (which, when only one remnant is involved, is sometimes also called stripping). This sentence consists underlyingly of two coordinated clauses; in the second clause, everything has been removed except the tense-inflected main verb. Gapping, however, must always delete the head that bears tense inflection, whether it be an auxiliary or, as in this case, the main verb.

We can understand the contrast in (4–5) in a similar way. The appositive remnant structure is derived from the coordination of two subclausal constituents, while the final-remnant structure is the product of clausal coordination plus gapping. One piece of evidence in support of this analysis comes from the fact that multiple final remnants are possible:

- (8) You'll never get **Gorbachev** to denounce **communism**, let alone **Reagan capitalism**.

This follows directly if the second coordinate undergoes gapping, which can leave behind one or more remnants (Johnson 2004:1–3).

For reasons of space, I will only be accounting for the meaning of the appositive remnant structure, where the correlate and remnant are the two members of a subclausal coordination. The relevant parse for the sentence in (1) is thus:



I adopt Munn's (1993) analysis of coordination, which makes *let alone* the head of a B(olean)P that contains the remnant and is right-adjoined to the correlate (the entire constituent thus ends up being a DP). There is, of course, the alternate parse (which, in this case, is string-identical) that coordinates two clauses, but I set it aside for present purposes.

3 Previous work on *let alone*

In Fillmore *et al.*'s original analysis of *let alone*, the sentence in (10), repeated from (1) above, asserts the conjunction of two propositions in (11).

(10) Oswald hasn't climbed the Berkeley hills, let alone Mt. Everest.

(11) $\neg\text{climb}(\text{the-berkeley-hills})(\text{oswald}) \wedge \neg\text{climb}(\text{mt-everest})(\text{oswald})$

In order to derive the informational asymmetry between the two conjuncts, they place an additional semantic requirement on *let alone*:

(12) *Semantic requirement on let alone*
[O]ne of the two propositions, syntactically that expressed by the initial, full clause, is stronger than the other.

(Fillmore *et al.* 1988:528)

That is, a *let alone* sentence expresses the conjunction of two propositions that are related on the basis of their strength, or informativeness: the first conjunct must be more informative than the second. Intuitively, this seems true of the sentence in (10). If Oswald hasn't climbed the Berkeley hills, the highest peak of which is only 1,905 feet high, it is reasonable to infer that he also has not climbed Mt. Everest, which is much taller (29,028 feet), and hence more difficult to ascend.

But the relevant notion of informativeness for the example in (10) cannot be logical entailment.⁷ It is easy to come up with countermodels for the inference in (10). If Oswald is an expert mountaineer from Nepal who has never been to North America, then Oswald will not have climbed the Berkeley hills, though he may very well have ascended Mt. Everest. It is, of course, possible for the first conjunct of a *let alone* sentence to logically entail the second conjunct, as in (13).

(13) I challenge Mr. Hutton to produce hard copy of how 'each leaflet made clear in one form or another, that it was not a substitute for individuals taking proper advice about their own position.' I maintain that such advice was not given in **any leaflet, let alone all**.⁸

In every situation where such advice was not given in one leaflet, such advice was not given in all leaflets. Thus, the first conjuncts of both (10) and (13) are more informative than their second conjuncts, in the sense that the latter can be inferred from the former, though only in the second case is this inference a logical entailment.

In order to unify these two cases, Fillmore *et al.* introduce the notion of a SCALAR MODEL—an ordered set of propositions on which a primitive 'more informative' relation can be defined (see also Kay 1990). It relies on the fact that *the Berkeley hills* and *Mt. Everest* are related in some way, though not by logical entailment. The referents of both DPs are located on a scale provided by the context, which, in (10), is a scale of height or difficulty. Mt. Everest is taller or more difficult to climb than the Berkeley hills.

⁷A sentence *p* LOGICALLY ENTAILS a sentence *q* iff *q* is true in every model in which *p* is true.

⁸<http://www.telegraph.co.uk/money/main.jhtml?xml=/money/2006/07/08/cmpe08.xml>,
06/14/2008



Figure 1: Scalar model for (10)

Figure 1 shows how, in a scalar model, the scale relating the correlate and remnant is mapped onto informativeness. The elements of the scale are fitted into a propositional schema, which is the full clause of (10) minus negation and with a variable in place of *the Berkeley hills*. Each member of the scale of mountains is slotted into this schema to produce a set of propositions ordered by a relation ‘more informative than’: **climb(mt-everest)(oswald)** is more informative than **climb(the-berkeley-hills)(oswald)**, since Mt. Everest is higher on the scale of mountains than the Berkeley hills.

The sentence in (10) contains negation, the effect of which is to reverse the direction of inference.⁹ When wide-scope negation is added to the sentences in (14a), as in (14b), the entailment relation flips. The sentence containing the weaker member of the scale, *some*, now logically entails the sentence containing the stronger member, *every*.

- (14) a. **All** linguists are Danes. \Rightarrow **Some** linguists are Danes.
 b. It’s not the case that **all** linguists are Danes. \Leftarrow It’s not the case that **some** linguists are Danes.

As Ducrot (1973:239) and Fauconnier (1975:362) show, negation affects pragmatic scales, like the one relating *Mt. Everest* and *the Berkeley hills*, in the same way. Given a context that licenses the inference in (15a), such as the one in §1, adding negation, as in (15b), flips the direction of the inference.

- (15) a. He can drive **big trucks**. \Rightarrow He can drive **small trucks**.
 b. He can’t drive **big trucks**. \Leftarrow He can’t drive **small trucks**.

If somebody can’t drive a small truck, they also won’t be able to drive a large truck (since everybody who has a permit to drive big trucks has one to drive small ones).¹⁰

⁹All the *let alone* sentences in this paper contain negation or another downward entailing operator. Fillmore *et al.* suggest that *let alone* might be a negative polarity item (pp. 518–520), but I argue elsewhere (Toosarvandani, to appear) that the distribution of *let alone* in downward entailing contexts is epiphenomenal of its lexical semantics.

¹⁰The reason that negation has this effect is that it is downward entailing—a function F is DOWNWARD ENTAILING iff, for arbitrary elements X and Y , if $X \subseteq Y$, then $F(Y) \subseteq F(X)$. The entailment reversal in (14) thus follows from the semantics of negation: since $\llbracket \text{all linguists} \rrbracket \subseteq \llbracket \text{some linguists} \rrbracket$, then $\llbracket \text{It’s not the case that some linguists are Danes} \rrbracket \subseteq \llbracket \text{It’s not the case that all linguists are Danes} \rrbracket$.

Because Fillmore *et al.* define the notion of informativeness IN A SCALAR MODEL (as opposed to assimilating it to the subset relation), they must stipulate the relationship between polarity and the direction of inference. That is, when negation is not present, the mapping works as depicted in (1); but when it is present, a statement containing a LOWER member of the scale will be MORE INFORMATIVE. But, as Russell (2006:369) points out in a different domain, this is undesirable, since it would be just as easy to say that statements containing a HIGHER scalar alternative are more informative in negative sentences.

I do not adopt Fillmore *et al.* (1988)'s semantics for *let alone* because, as they point out themselves (p. 529), not all *let alone* sentences express the conjunction of two propositions that are identical except for the correlate and remnant. These problematic sentences, which do not have the meaning expected under their analysis, contain the adverb *barely*:

- (16) Maria barely reached Denver, let alone Chicago.
- a. \neq Maria barely reached Denver, and she barely reached Chicago.
 - b. \approx Maria barely reached Denver, and she did not reach Chicago.

Given the discussion in this section, the sentence in (16) should mean something like (16a). But this sentence is best paraphrased as (16b); Maria barely reached Denver, and she did NOT reach Chicago. Because the two conjuncts are not identical, it is not possible to talk about their relative informativeness in a scalar model. Recall that a scalar model is a set of propositions derived from a single propositional schema; these propositions are therefore all going to be identical in form except for the scalar element.

Nonetheless, at an intuitive level, the second conjunct of (16b) does follow from the first conjunct. If Maria is taking a roadtrip from San Francisco to Chicago via Denver, then if she barely reaches Denver, it follows that she never reaches Chicago. Any successful account of the semantics of *let alone* must be able to derive the correct meaning for sentences with *barely*.

4 A new semantics for *let alone*

I propose to give *let alone* the following meaning (a compositional account is provided in an appendix):

- (17) Oswald hasn't climbed the Berkeley hills, let alone Mt. Everest.
- a. *At-issue entailment*: $\neg \text{climb}(\text{the-berkeley-hills})(\text{oswald})$
 - b. *Scalar component*: $\text{the-berkeley-hills} <_S \text{mt-everest}$

The at-issue entailment of (17) is contributed by just the clause preceding *let alone*; the DP constituent following *let alone* does not add anything to the at-issue content. I will discuss this difference with Fillmore *et al.*'s account in §5. But I first want to discuss the scalar component in (17b), which does the work of their informativeness requirement (12).

Instead of relating two propositions by their relative informativeness, *let alone* directly states the relative positions of the correlate and remnant on a contextually provided scale. The precise scale involved will depend on the context, as it will vary with the assignment function that values S , a free variable over scales.¹¹ In an out-of-the-blue context, the default is a scale of mountains ordered by height or

¹¹I have so far ignored the role of focus in the semantics of *let alone*. It should be noted, however, that both the correlate and remnant are focussed, as in our parade example (capitalization marks the pitch accents): *Oswald hasn't climbed the Berkeley HILLS, let alone Mt. EVerest*. The scale relating the correlate and the remnant is constructed from their focus alternatives, in the sense of Rooth (1985, 1992).

climbing difficult. But this can change in a different context. Imagine that Oswald is the member of a climbing club that ascends mountains in alphabetical order. In such a scenario, (17) is felicitous, since the Berkeley hills are again lower than Mt. Everest, but this time on a scale ordered by the alphabet.

What exactly is the status of the scalar component? It is clearly not an at-issue entailment, since, intuitively, the scalar relationship between the correlate and remnant has a secondary status relative to the at-issue entailment. This is confirmed by the fact that the scalar component cannot be contested in the same way:

- (18) A: Isabelle doesn't eat squid, let alone cuttlefish.
B1: That's not true, she eats squid.
B2: # That's not true, cuttlefish is less strange to eat than squid.
B3: That's true, but isn't cuttlefish less strange to eat than squid?

The at-issue entailment can be challenged by saying *That's not true...* (Karttunen & Peters 1979:12), as in B's first answer. This is not possible, however, with the scalar component, as shown by the infelicity of B's second answer. Instead, as in the third answer, B must first acknowledge the at-issue entailment, before going on to contest the relative scalar positions of cuttlefish and squid.

The scalar component might instead be a conversational implicature. But conversational implicatures arise through the interaction of principles of cooperative conversation with the context, while the scalar component is a conventional property of *let alone*. In addition, implicatures are cancelable without leading to a contradiction, but the scalar component is not:

- (19) Isabelle doesn't eat cuttlefish, let alone squid. #In fact, squid is less strange to eat than cuttlefish.

Attempting to cancel the proposition that cuttlefish is less fishy or less strange to eat results in a contradiction.

We can also dismiss the possibility that the scalar component is a presupposition, even though, like a presupposition, it is backgrounded information. The truth of an at-issue entailment depends on the truth of its presuppositions, but this is not the case with the scalar component of a *let alone* sentence:

- (20) A: Isabelle doesn't eat squid, let alone cuttlefish.
B: Well, I accept that she doesn't eat squid, but isn't cuttlefish less strange to eat than squid?

Speaker B can accept the truth of the at-issue entailment, while at the same time disputing whether the scalar relationship between cuttlefish and squid holds. If this were a presupposition, then the at-issue entailment would lack a truth value.

Moreover, presuppositions are prototypically already in the Common Ground when they are triggered (though they can, of course, be accommodated). The scalar component, however, is often novel information:

- (21) The constitutional convulsions of Rome will mean urgent matters such as the fight against organised crime and tackling the burgeoning debt will be

postponed. The Mafia pervades Italy now and its tentacles reach across the continent and across the Channel by all accounts. It will have to be fought on a European scale. A more pressing issue for Europe is that no makeshift Italian government is likely to **cut Italy's public expenditure, let alone raise taxes**, to reduce public debt to make the 1993 deadline set for European convergence at Maastricht. (AJD 1030)

The idea that cutting Italy's public expenditure might be less of a challenge than raising taxes was not mentioned prior to the *let alone* sentence. Yet, the sentence is felicitous.

In sum, it does not seem as if the scalar component corresponds to either an at-issue entailment, a conversational implicature, or a presupposition. Instead, it is more like what Karttunen & Peters (1979) would call a conventional implicature, Bach (1999) a background entailment, or Horn (2002) an assertorically inert entailment. That is, the scalar component is part of 'what is said' and is truth-conditional, but it has a backgrounded status relative to the at-issue entailment.

5 Deriving the 'second conjunct'

If the sentence in (22) conveys, as I am arguing, just the two entailments shown, what do we make of our intuition that it also entails (23), Fillmore *et al.*'s 'second conjunct'?

- (22) Oswald hasn't climbed the Berkeley hills, let alone Mt. Everest.
 a. *At-issue entailment*: $\neg\text{climb}(\text{the-berkeley-hills})(\text{oswald})$
 b. *Background entailment*: $\text{the-berkeley-hills} <_S \text{mt-everest}$
- (23) $\neg\text{climb}(\text{mt-everest})(\text{oswald})$

I propose that it is a contextual entailment produced by updating the Common Ground with the at-issue and background entailments.

The background entailment, when added to the Common Ground, can do more than just state a scalar relationship. It can trigger a restriction of the context set to obey the scale, if doing so is relevant to the issue at hand. This follows from the maxim of Relevance, which directs the speaker and hearer to make utterances maximally relevant. When the background entailment in (22b) is added, the speaker and hearer draw on their general knowledge, in particular the commonsense fact that, if somebody is not able to climb a very easy mountain, they will not have climbed a more difficult one. Since the background entailment states that the Berkeley hills are shorter, and hence easier to climb, than Mt. Everest, the following statement is added to the Common Ground: if somebody has not climbed the Berkeley hills, they also have not climbed Mt. Everest.

To make this point visually, consider the toy model in (24), which contains three entities—Oswald, the Berkeley hills, and Mt. Everest—and four possible worlds. Oswald climbs the Berkeley hills in w_1 and w_2 , and he climbs Mt. Everest in w_2 and w_3 .

(24) **Model:**

$D_e = \{\text{Oswald, the Berkeley hills, Mt. Everest}\}$

$D_s = \{w_1, w_2, w_3, w_4\}$

$\llbracket \text{climb}(\text{the-berkeley-hills})(\text{oswald}) \rrbracket = \{w_1, w_2\}$

$\llbracket \text{climb}(\text{mt-everest})(\text{oswald}) \rrbracket = \{w_2, w_3\}$

Before (22) is asserted, the context set C (the intersection of all the propositions in the Common Ground) is equal to D_s , the domain of possible worlds. When the background entailment is added, it leads to further contextual restrictions based on world knowledge, as discussed above. Because w_3 is a world in which somebody—namely, Oswald—climbs a taller mountain (Mt. Everest) without also having climbed a shorter mountain (the Berkeley hills), it is thrown out.

(25)

$$\begin{array}{c} C \\ \left\{ \begin{array}{l} w_1, w_2, \\ w_3, w_4 \end{array} \right\} \Rightarrow + \text{Background entailment} \\ \left\{ \begin{array}{l} w_1, w_2, \\ w_3, w_4 \end{array} \right\} \end{array}$$

Subsequently, when the at-issue entailment in (22a) is added to the Common Ground, all the worlds in which Oswald climbs the Berkeley hills are removed, leaving a single world, w_4 . The Common Ground now entails the ‘second conjunct’ in (23), since w_4 is a world in which Oswald does not climb Mt. Everest.¹²

This inference has a similar profile to other entailments, supporting the idea that it is a contextual entailment. It cannot be cancelled, for instance, as in (26), and it can be contested with *That’s not true...*, as in (27).

(26) Oswald hasn’t climbed the Berkeley hills, let alone Mt. Everest. #In fact, he has climbed Mt. Everest.

(27) A: Isabelle doesn’t eat squid, let alone cuttlefish.
B: That’s not true, she eats cuttlefish.

6 Scalar reasoning

The account I have been sketching proposes that the gap between a pragmatic scale expressed by *let alone* and inferences with the same force as logical entailments can

¹²The semantics for *let alone* that I am proposing makes its at-issue content identical to that of the answer in the following exchange:

- (i) Q: Has Oswald climbed Mt. Everest yet?
A: Oswald hasn’t climbed the Berkeley hills.

We predict that in an appropriate context, this sentence, too, should lead to contextual entailments of the sort we have been exploring. This is indeed the case. Consider the following scenario: We are standing in front of a museum exhibit about the tallest mountain in the world. Two mountains are depicted: Mt. Everest, of course, but also, in order to give a sense of its size, the Berkeley hills. In this context, the exchange in (i) produces the contextual entailment that Oswald has climbed neither the Berkeley hills nor Mt. Everest.

be filled by reasoning from more general knowledge. In a sense, *let alone* presupposes the knowledge of how to strengthen the scale in this way, so that it is relevant to the issue under discussion. There is another possibility, though, that does not involve this kind of reasoning; a *let alone* sentence like (22) could actually entail, in addition to (23), the conditional statement in (28).¹³

$$(28) \quad \forall x(\neg\text{climb}(\text{the-berkeley-hills})(x) \rightarrow \neg\text{climb}(\text{mt-everest})(x))$$

This would allow inferences involving the scale of mountains, since, when (28) is added to the Common Ground, it will remove all worlds from the context set in which somebody has climbed Mt. Everest without also having climbed the Berkeley hills.

These two possibilities come apart, however, when the speaker and hearer do not share the same assumptions about how a scale should be used. Imagine that Max and Liz are talking about Oswald's mountain climbing escapades. Max is an avid follower of the sport while Liz knows nearly nothing about it. They could have the following conversation:

- (29) M: Has Oswald climbed Mt. Everest?
 L: Oswald hasn't climbed K-2, let alone Mt. Everest.
 M: But you haven't answered my question. Sure K-2 is not as high as Mt. Everest, but I don't think that's any reason to think that he hasn't climbed Mt. Everest. K-2 is harder to climb than Mt. Everest.

Max does not share the naive belief that taller mountains are harder to climb, so that, while he accepts the scale intended by Liz—K-2 (the second highest mountain in the world) is less tall than Mt. Everest—he does not believe the proposition in (30), parallel to (28).

$$(30) \quad \forall x(\neg\text{climb}(\text{k-2})(x) \rightarrow \neg\text{climb}(\text{mt-everest})(x))$$

Nor can he accommodate this knowledge since he holds a contradictory belief (K-2 is harder to climb than Mt. Everest). The result is that the conversation comes to a halt until this inconsistency is resolved.

This is not the outcome we expect if the *let alone* sentence in (29) actually entails (30). Under this view, Max should treat Liz's utterance as if she had asserted something he thought was false. But any response designed to target such entailed content is impossible:

- (31) a. # That's not true, somebody can climb Mt. Everest without climbing the Berkeley hills.
 b. # That's true, but somebody can climb Mt. Everest without climbing the Berkeley hills.

It would be infelicitous for Max to respond to Liz's utterance with either of the sentences in (31).

¹³I thank Anastasia Giannakidou for raising this concern.

7 The puzzle redux

Before concluding, it remains to be seen how my account deals with the puzzle introduced in §3. The relevant data is repeated below:

- (32) Maria barely reached Denver, let alone Chicago.
- a. \neq Maria barely reached Denver, and she barely reached Chicago.
 - b. \approx Maria barely reached Denver, and she did not reach Chicago.

Unexpectedly for Fillmore *et al.*, the sentence in (32) seems to convey that Maria barely reached Denver, and that she did not reach Chicago at all.

We first need an understanding of what the semantic contribution of *barely* is. It is standardly analyzed as having two components of meaning, a proximal component and a polar one:

- (33) Maria barely reached Denver.
- a. *Proximal component*: Maria came close to not reaching Denver.
 - b. *Polar component*: Maria reached Denver.

Both components are entailed (Atlas 1997, Sevi 1998,¹⁴ Horn 2002), though the polar one is backgrounded relative to the proximal component.¹⁵ For the sentence in (33), the proximal component conveys the difficulty that Maria encountered in trying to reach Denver, while the polar component conveys that she DID actually reach Denver. This paraphrase of the proximal component does not capture the fact that *barely* itself makes reference to scales. A more accurate paraphrase would be: if Denver is located on a scale S , Maria came close to not reaching Denver in such a way that she did not reach any subsequent points on S .

Under the proposal developed here, the sentence in (32) expresses the twin entailments in (34).

- (34) a. *At-issue entailment*: **barely-reach(denver)(maria)**
b. *Background entailment*: **denver $<_S$ chicago**

The correct interpretation in (32b) follows straightforwardly from (34) and the meaning of *barely*. The background entailment in (34b) states that Denver is lower than Chicago on some scale. The at-issue entailment in (34a) says that Maria came close to not reaching Denver in such a way that she did not reach any subsequent points on the same path. It follows, then, that Maria did not reach Chicago, since it follows Denver.

Sentences with *barely* do not pose a challenge for the present approach to *let alone*, since only the ‘first conjunct’ is actually asserted. When combined with the background entailment (and potentially, world knowledge), this produces additional contextual entailments. Because of the lexical semantics of *barely*, the contextual entailment turns out to be different in form from the at-issue entailment.

¹⁴My understanding of Aldo Sevi’s thesis comes from Horn’s (2002) discussion of it, since I was not able to obtain a copy myself.

¹⁵The polar component is not an implicature since it cannot be cancelled:

- (i) Maria barely reached Denver. #In fact, she didn’t reach Denver.

8 Conclusion

In sum, I have argued for an analysis of *let alone* in which it expresses, in addition to an at-issue entailment corresponding to the full clause preceding *let alone*, a background entailment that conveys a scalar relationship between the correlate and remnant. This departs from previous work by Fillmore *et al.*, who conceive of this scalar component as relating two propositions by their relative informativeness.

The nature of the scalar relationship between the correlate and remnant is of particular interest in light of the work that has been done on quantity implicatures. As discussed in §3, the correlate must be lower on a scale than the remnant—regardless of whether that scale is defined by logical entailment or by some more context-specific ordering. Since it is obviously desirable to have a unified lexical entry for *let alone*, there needs to be a uniform formal characterization of entailment and pragmatic scales. The semantics of *let alone* thus seems to require something like Hirschberg’s treatment of scales as partially ordered sets.

Appendix: A compositional semantics for *let alone*

I provide the semantic derivation for the structure in (9), which contains a single appositive remnant. In order to derive both an at-issue and a background entailment for a *let alone* sentence, I adopt a composition scheme like the ones that Karttunen & Peters (1979) and Potts (2005) propose for conventional implicatures.

I divide the set of types into at-issue types, superscripted with a , and background types, superscripted with b . Restricting ourselves to extensions, the set of basic at-issue types consists of e^a and t^a and the basic background types of e^b and t^b . If σ^a and τ^a are at-issue types, then $\langle \sigma^a, \tau^a \rangle$ is an at-issue type. If σ^a is an at-issue type and τ^b is a background type, then $\langle \sigma^a, \tau^b \rangle$ is a background type and $\langle \tau^b, \sigma^a \rangle$ is an at-issue type.¹⁶ Nothing else is a type.

A new composition operation is needed, which I call BACKGROUND ENTAILMENT APPLICATION, defined as follows (note the similarity to Potts’ (2005:64) CI Application):

$$(35) \quad \text{Background Entailment Application}$$

$$\begin{array}{ccc} \beta : \sigma^a & \text{iff } \tau \text{ is } t & \alpha(\beta) : \tau^b \quad \text{iff } \tau \text{ is a function} \\ \bullet & & \alpha : \langle \sigma^a, \tau^b \rangle \quad \beta : \sigma^a \\ \alpha(\beta) : \tau^b & & \\ \alpha : \langle \sigma^a, \tau^b \rangle \quad \beta : \sigma^a & & \end{array}$$

A crucial property of this composition operation is that, whenever the range of the background functor is in D_{t^b} , both the resulting background expression and the at-issue argument are passed upwards (they are separated by the metalogical symbol \bullet).¹⁷ Otherwise, just the background expression is passed upwards. This disjunction

¹⁶The verb *say* would be of such an at-issue type, taking both an at-issue entailment of type t^a and a background entailment of type t^b as its arguments.

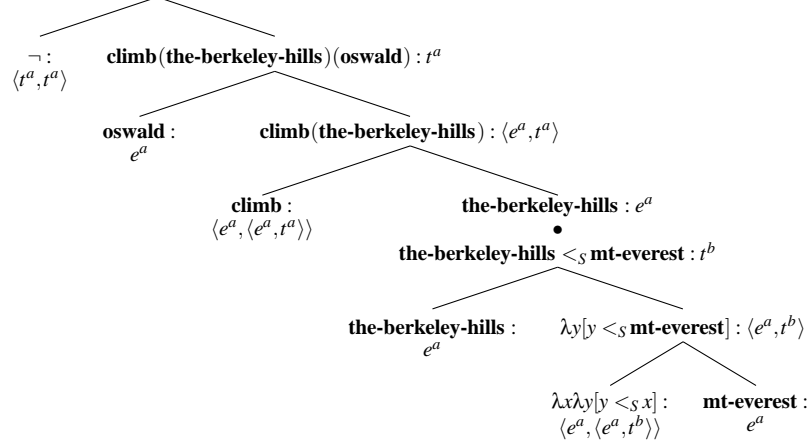
¹⁷These background entailments must somehow be gathered together, though, so that verbs like *say* can take them as arguments.

ensures that the at-issue expression is only returned intact when the background expression is of a propositional type and cannot take any more arguments.

A cross-categorical lexical entry for *let alone* is provided in (36), where σ^a is a variable over well-formed at-issue types. (37) is a parsetree showing the composition of (9).

(36) $let\ alone \rightsquigarrow \lambda X \lambda Y [Y <_S X] : \langle \sigma^a, \langle \sigma^a, t^b \rangle \rangle$

(37) $\neg\text{climb}(\text{the-berkeley-hills})(\text{oswald}) : t^a$



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