The semantics and probabilistic pragmatics of deadjectival intensifiers

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1 Introduction

An important notion in the semantics of adjectives is the notion of positive form. Standardly, this term is used to express the bare, unmodified form of an adjective. One of the goals of semantics is to understand how adjectives are interpreted in their positive form and how and why some positive form adjectives give rise to vagueness while others do not (Kennedy 2007, a.m.o.). Unmodified adjectives express comparison to a standard. In the case of relative adjectives, like “tall,” this standard is underspecified: “John is tall” is true whenever John’s height exceeds whatever we may think is the appropriate contextual standard for what counts as being tall, given the contextual set of individuals we are comparing John to.

In this work, I discuss cases where interpretation similarly relies on a contextual standard, but where the adjective is not in its positive form. Specifically, I will discuss combinations of intensifying adverbs and relative adjectives. A common example of intensification is the use of “very” in English. The truth-conditions for “John is very tall” rely on a contextual standard just as those for “John is tall” do; it’s just that the standard for the sentence with “very” is higher than the standard for the sentence with the positive form. This observation was reason for Wheeler (1972) and Klein (1980) to assume that “very” reduplicates the semantics of the positive form: while “John is tall” means that John counts as tall among his comparison class, “John is very tall” means that John counts as tall among the tall individuals in the comparison class.

As Wheeler observes, an analysis along these lines cannot be extended to adverbs that contribute more than just intensification to the sentence. For instance, “John is worryingly tall” does not just express a vague classification of how tall John is; it also clearly communicates that John’s height is a cause of worry for the speaker. The key goal of this paper is to do justice to the fact that the intensifying function of deadjectival adverbs like “worryingly” is intricately linked to the evaluation expressed by the base of those adverbs. So, to understand how intensification works, we would need to understand how the degree function of some deadjectival adverbs is derived from the semantics of the adjectival base. I provide a formal semantics for this class of intensifiers that is explicit about this relation.

I will restrict my attention in this work to English adverbs, with occasional glances at
nearby languages like Dutch and German. This admittedly conservative focus is practical in nature: the landscape of intensifiers is vast and, while there is a considerable body of descriptive literature, there is very little theoretical semantic work that addresses the adjectival base of deadjectival intensifiers. Some exceptions are discussed below, but none of these provide a systematic analysis of the role of the adjectival content in the degree adverb.

The plan for the article is as follows. I start in the next section with a descriptive overview of deadjectival intensifiers in English. After that I introduce existing analyses and I explain where I think they miss the mark. Next, I introduce my own analysis.

2 The landscape of intensifiers

I will start by characterising the varied landscape of intensifiers. By doing so, I will introduce a set of notions, observations and generalisations that will prove crucial in what follows. In particular, I will set out here the various ways in which deadjectival degree adverbs rely on their adjectival base for their intensifying function.

2.1 Defining “intensifiers”

This figure, adapted from Klein (1998), illustrates the landscape of adverbs of degree. As is clear from the table, while there is lots of variability in terminology, there is some regularity in how such adverbs are divided up in meaningful sub-classes. Most of the

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1See, for instance, Stoffel (1901); Borst (1902); Biedermann (1969); Bolinger (1972); Bäcklund (1973); Van Os (1989).
time, these classifications are based on intuitive functions that the adverb performs when modifying an adjective. Often, but not always, these intuitions can be made precise by relating them to notions familiar from formal degree semantics. For instance, the leftmost column is for adverbs that express that the adjective it combines with holds to the maximum degree. As a result, such adjectives are only compatible with adjectives that have a fully closed scale or a half-open scale with a maximum (Kennedy and McNally (2005)).

(1) The rod is completely straight.  
(2) #The rod is completely bent.  
(3) #The rod is completely wide.  

(Here and in what follows I indicate unacceptable sentences using the hash tag, which is intended to leave unexpressed what the source of the unacceptability is.)

Similarly, approximatives also target the maximum of a closed scale (Rotstein and Winter (2004)) and therefore have a similar distribution to adverbs like “absolutely”, “totally” and “completely”:

(4) The rod is almost straight.  
(5) #The rod is almost bent.  
(6) #The rod is almost wide.  

On the other end of the table we find what I call L-adverbs (for low degree adverbs, Nouwen (2013)), adverbs expressing that the adjective they combine with holds to a degree that is just above the minimum end-point of the scale. These adverbs rely on the presence of a minimum and have the corresponding distributions, as can be seen by the following examples:

(7) #The rod is a bit straight.  
(8) The rod is a bit bent.  
(9) #The rod is a bit wide.  

This leaves the class of adverbs of degree that does not target scalar end-points. It is this class that I will call the class of intensifiers in this work. Intensifiers are scale insensitive:

(10) The rod is extremely / pretty straight.  
(11) The rod is extremely / pretty bent.  
(12) The rod is extremely / pretty wide.  

I will use the term H-adverbs for intensifiers of high degree (“extremely”, “terribly”, “very”, “insanely”, etc.) and M-adverbs for intensifiers of moderate degree (“pretty”, “fairly”, “rather”, “quite”, etc.). It is important to note, though, that while this is a distinction found broadly in the literature, it is sometimes unclear how we decide whether
an intensifier expresses high or moderate degree and, consequently, there are plenty of intensifiers that do not clearly fall under either of these classes. For instance, whether “disappointingly” intensifiers to a high or moderate degree in a sentence like “The queue was disappointingly long” seems quite hard to say. (See below for more discussion of this point; see also Solt and Wilson (2021); Nouwen (2018)).

2.2 Bleached versus unbleached

There is one other feature that sets intensifiers apart from other degree adverbs. Intensifiers are an open class. As Morzycki (2004) explains, it is quite easy to accept novel intensifiers based on adjectives. He gives the following example:

(13) How can you wear those shoes? They look foot-shatteringly uncomfortable.

In fact, often if someone makes up a new adjective, as in “That ice cream is fabulicious!”, then automatically they will have made up a corresponding deadjectival intensifier, as in “It’s fabuliciously sweet!”. This stresses a point that is crucial for the current paper: intensifiers tend to be deadjectival adverbs. Since the class of adjectives is an open class, so is the class of intensifiers.

Having said that, there are important differences within the class of intensifiers as to how the adverbial intensifying function relates to the meaning of the adjectival base. In some intensifiers the meaning of the base is transparent within that of the intensifier. Take “disappointingly” for instance. A sentence like “The soup is disappointingly hot” does not just express that the soup is hot to some contextually-determined degree, it also expresses that the soup’s temperature disappoints the speaker. In other words, the semantics of the adjectival base is an active component in the semantics of the derived adverb. This is different for an adverb like “terribly”. Saying that “the soup is terribly hot” does not entail that the speaker is terrified in any way. To see this, compare (14) and (15). Both disappointment and terror clash with the assertion of happiness in these sentences. But while that clash is clearly present in (14), it is much less an issue for (15). (Some of my native English informant find (15) slightly marked, but acknowledge that (14) is clearly more odd).

(14) #I’m happy, because my new neighbour is disappointingly nice.
(15) I’m happy, because my new neighbour is terribly nice.

Intensifiers like “terribly” are bleached, meaning that by some diachronic process the meaning of the adjectival base has disappeared from the meaning of the adverb, leaving only the intensifying function behind. The prime example of bleaching is “very”. First examples of intensifier “verray” stem from the 16th century. Before that it is an adjective meaning true or real, stemming from the old French adjective “verrai” (Mustanoja (1960), pp.326/327). The existence of bleaching has often been acknowledged in the descriptive literature, but its relevance to semantics has remained largely unexplored.

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2 For instance, Stoffel (1901) humorously illustrates this with a quote by Lord Chesterfield: “Not
Bleaching doesn’t happen overnight. Hence, it is unlikely that a crisp classification will be possible of on the one hand intensifiers whose adjectival content has been bleached and on the other hand those intensifiers that express the content of their adjectival base. In the remainder of this work, I will nevertheless use terminology that distinguishes bleached and what I propose to call unbleached adverbs, using the latter term for adverbs, like “disappointingly”, that clearly contribute the adjectival content in tandem with their intensifying degree function. The reader should bear in mind, though, that there will be adverbs that are perhaps neither clearly bleached, nor clearly unbleached.

2.3 The Goldilocks effect

Although I won’t have anything deep to say about the diachronic process of bleaching, it seems evident to me that at least some part of that process is simply that bleached adverbs end up being associated to the degree function their initial unbleached version was regularly associated with. If an unbleached adverb, through the lexical content of its adjectival stem, ends up typically expressing high degree, then the pure expression of high degree is a natural candidate for the meaning of a bleached version of this adverb. That is, I take it that the deadjectival nature of intensifiers is not an accident, but that their degree semantics is derived from the semantics of the adjectival base and that only subsequently this semantic link between adjective and adverb can be severed.

Evidence for this comes from a systematicity in the relation between the intensifying function of a deadjectival adverb and the valence of the adjective base. English deadjectival H-adverbs, i.e. intensifiers expressing high degree, tend to be derived from negative valence adjectives, while English M-adverbs, i.e. intensifiers expressing moderate degree, tend to be derived from positive valence adjectives. For instance, the negative “terribly”, “horribly”, “ridiculously”, “stupendously” typically express higher degrees than the positive “pretty”, or “fairly”.

As far as I know this observation has not received any serious attention in the literature. (Rissanen (2008) is the most explicit statement of the observation that I know, but offers no account.) I think there is a straightforward explanation for this systematicity, which involves regularities in how we evaluate different parts of a scale. Typically, extreme values of a scale are evaluated negatively because they involve excess. A nice day is when it is warm but not too warm. Nice food is well seasoned but not too salty and not too bland. I call this the Goldilocks effect of evaluation: good things are typically things that are void of excess; the extremes of a scale typically do involve excess and, as such, they (again, typically) are associated with negative evaluation.

In contented with enriching our language by words absolutely new, my fair country-women have gone still farther, and improved it by the application and extension of old ones to various and very different significations. They take a word and change it, like a guinea into shillings for pocket-money […] For instance, the adjective vast, and its adverb vastly, mean any thing, and are the fashionable words of the most fashionable people. […] I had lately the pleasure to hear a fine woman pronounce, by a happy metonymy, a very small gold snuff-box that was produced in company, to be vastly pretty, because it was vastly little. Mr. Johnson [RN: i.e. Samuel Johnson, editor of “a dictionary of the English language”] will do well to consider seriously to what degree he will restrain the various and extensive significations of this great word.” (Philip Dormer Stanhope, 4th Earl of Chesterfield, December 5th, 1754, The World).
The systematicity seen in English is also seen in Dutch and German. Bleached adverbs of moderate and high degree include the following:

(16) Dutch
   a. Moderate degree: aardig (nice), redelijk (reasonable), best (best), tamelijk (fitting), vrij (free)
   b. High degree: zeer (sore), verschrikkelijk (terrible), erg (bad), ontzettend (disrupting)

(17) German
   a. Moderate degree: leidlich (tolerable), ziemlich (fitting)
   b. High degree: sehr (etymologically related to Dutch zeer and English sore), furchtbar (terrible), fuerchterlich (terrible)

These are all relatively bleached adverbs. As such, the Goldilocks effect shows the lasting impact of the content of the adjectival base on the deadjectival intensifier. The ensuing picture has consequences for theories of the semantics and pragmatics of bleached intensifiers. One prominent idea in the literature is that intensifiers manipulate the contextual threshold of the adjective (e.g. Katz 2005, Sæbø 2010). For instance, if Scarlett is tall is true whenever Scarlett’s height exceeds some threshold \( \theta \), then Scarlett is terribly tall is true whenever her height exceeds \( \theta + d \), where \( d \) is some boosting value contributed by the intensifier. Opposed to this view is the view supported by Bennett and Goodman (2018), that intensification by bleached intensifiers is the result of a manner implicature. That is, the bleached adverb of degree is void of semantic content, but its very presence in the sentence leads to the implicature that the intended meaning is narrower than that of the unmodified variant. The effect is that the presence of an intensifier leads to an interpretation that concerns a more specific part of the scale. The Goldilocks effect shows that intensifier meaning cannot be a purely pragmatic affair. Yet, the Goldilocks effect shows that the boosting function of intensifiers is semantic in nature and that it needs to be connected to the adjectival base of the adverb.

The above suggests a rather straightforward diachronic process. Initially, these adverbs express positive or negative evaluation, which is (typically) associated to respectively medium or high regions of the adjective’s scale. Once the evaluative meaning is bleached away, the association to medium or high degree remains and becomes the functional semantics of the intensifier.

2.4 Kinds of adjectival bases

Since intensifiers are deadjectival, the question arises which adjective bases we find in this class. Here, I will discuss two major sub-classes of intensifiers, namely evaluative and modal intensifiers. This is probably not an exhaustive list, but it covers most of the cases I know of, and these categories will prove useful as we proceed later to the semantics.
2.4.1 Evaluative intensifiers

Most examples I’ve given so far were evaluative adverbs. Because evaluative adjectives form an open class, adverbs derived from such adjectives constitute what is probably the largest subclass of intensifiers.

I will call an adjective *evaluative* when it expresses some kind of positive or negative value judgement. I will refer to the polarity of this judgement as the adjective’s *valence*. So, “good” and “bad” are the prototypical evaluative adjectives, with positive and negative valence, respectively. Other examples include “disappointing”, “pretty”, “beautiful”, “terrible”, “remarkable”, “amazing”, “impressive”, “shocking”, “wonderful”, “tasty”, “nasty”, “nice”, “pleasant”, “worrying” etc. Evaluative adjectives are *ordering subjective*, meaning that the denotation of their comparative form is subjective. Whether A is more pretty, disappointing, beautiful, etc. than B differs from person to person. Compare this to non-evaluative multi-dimensional adjectives like “happy” and “healthy”: whether Sue is happier or healthier now than she was ten years ago is not up to the speaker.

A subclass of evaluative intensifiers are expressive intensifiers. These express not just (underspecified) evaluative content, but also add an affective connotation. This affective dimension often comes from the fact that the intensifier is derived from a taboo word.

(18) Sue is damned / blooming / bloody / fucking tall.

Note that the expressive nature of this class seems to override the Goldilocks effect that positive evaluation is typically associated to the safe middle of the scale. Taboo adverbs can be used to express positive evaluation when degree modifying, but in these cases they express high rather than moderate degree.

(19) That pie is fucking delicious.

This should come as no surprise. The markedness of the expressive (taboo) utterance, is left unexplained if (19) were intended to communicate that the pie in question were reasonably delicious. A similar trade-off between the role of valence and the expressive strength of the adjective can be witnessed with extreme adjectives with positive valence, such as “amazingly” and “fabulously”.

2.4.2 Mirative and (other) modal intensifiers

Mirative adjectives are adjectives expressing some deviation from expectation or the norm. Mirative adjectives are ordering subjective, just like evaluative intensifiers. They are not evaluative, however, since they do not offer a value judgement. Some example of intensifying miratives:

(20) The soup was surprisingly / unusually / unexpectedly / abnormally / atypically / uncommonly warm.

Mirative intensifiers are a good example of why it is not always possible to categorise
degree adverbs on the basis of the degree intensity they express. While it is clear that “terribly” is associated to higher degrees than “fairly”, it is quite impossible to decide what degree range should be attached to “surprisingly”. It can be “surprisingly warm”, simply because it is warmer than we expected it to be. But our expectations could have been that the temperature would be particularly low, or particularly high, or that the temperature would be completely normal, so it is impossible to say whether “surprisingly” is an intensifier that expresses high or low degrees.

Like mirative adjectives, modal adjectives are ordering subjective (except for cases of objective modality) and they do not provide a value judgement. Here, too, we find that some deadjectival adverbs receive an intensifying interpretation:

(21) The soup was undesirably / impossibly / unnecessarily / improbably / unbelievably / unknowingly warm

The reader may have noticed that the adverbs in (20) and (21), with the exception of “surprisingly”, are all morphologically negative. I return to this in 2.5 below.

2.4.3 Other intensifiers

Both evaluative and mirative/modal intensifiers are intensional in nature, in the sense that the adjectival base is a propositional operator. These are the two types of intensifiers that I will account for in the remainder of this article. There is one class of deadjectival intensifiers, however, that falls squarely outside of this intensional category. Some intensifiers are derived from dimensional adjectives:

(22) The jam was hugely / enormously / immensely / massively influential.
(23) Portobello mushrooms are widely available in the UK.
(24) Fritz was deeply / greatly / highly troubled by the affair.

My impression is that this class is the least discussed of all degree adverbs. Their distribution is somewhat more restricted. For instance, “widely” is incompatible with most adjectives.

(25) Sue was widely tall / smart / young / rich.

I will not have much to say about dimensional intensifiers, but I will return to them briefly at the end of the paper.

My conviction is that the above three categories (evaluative, mirative/modal, dimensional) are the most prominent kinds of deadjectival adverbial intensifiers to be found in English. That is not to say that there are no others, but just that these are less clearly part of a productive mechanism of deriving intensifiers from adjectives. Let me discuss a few outliers. First of all, adjectives expressing some kind of maximality do productively form intensifiers. However, they typically end up as maximisers, referencing the end-point of a scale. As such, they do not qualify as intensifiers. (See above.) Examples include: “totally”, “maximally”, “wholly”, “entirely”, “fully”, “completely”, etc. While
there are some uses of these maximizers as intensifiers, as in “%this is totally sad”, they are not productive, so I will leave them out of the picture in the remainder of this work.3

A similar group of deadjectival adverbs that fall out of the above four groups involve adjectives that express scalar sufficiency or excess, such as “sufficiently”, “excessively”. Given that they directly encode their degree-semantic operation, I will leave such adverbs out of the discussion below.

2.5 Zwicky’s generalisation

Zwicky (1970) offers a striking observation about mirative/modal intensifiers: only adverbs with the negative antonym as the base gain an intensifying function. (See Nouwen 2010; Katz 2005; Nouwen 2005, for discussion). While the examples in (26) lack degree-intensifying readings, the examples in (27) show that the corresponding negative adverbs do act as intensifiers. I’ll refer to this observation as Zwicky’s generalisation and one of my aims below will be to account for it.

(26) The soup was usually / possibly / typically / necessarily warm.  
(27) The soup was unusually / impossibly / atypically / unnecessarily warm.

Strikingly, we can express the intensifier meanings absent from (26), (26) and (27) by negating their positive counterparts.

(28) The soup was not unusually / impossibly / atypically / unnecessarily warm.  
(29) Portobello mushrooms are not narrowly available in the UK.  
(30) Fritz was not deeply / highly troubled by the affair.

Zwicky’s generalisation does not extend to the evaluative domain. There are clear cases of adverb pairs involving antonyms.

(31) The weather was pleasantly / unpleasantly warm.  
(32) The ditch was unimpressively / impressively deep.  
(33) He was pretty successful / hideously successful.

This said, there are some gaps. For instance, while “dangerously” is a degree adverb, “safely” is not. Also, as shown in (33), “hideously” modifies degree, yet “ugly” never does. It will sometimes be difficult to assess which of these observations about evaluatives are part of some generalisation and which are just accidents of diachronic development.

2.6 Summary of desiderata

In the remainder of this work, my goal will be to account for the following:

3Presumably, some of these maximisers are in the diachronic process of attaining a more general semantics Pertejo and Martínez (2014). Other maximisers are left behind. Compare, for instance, “#this is fully sad”.  

The semantics of deadjectival intensifiers, or at least the semantics of unbleached such adverbs, should provide an explanatory link between the semantics of the base and the intensifying function of the adverb.

**Goldilocks** This base-aware semantics of deadjectival intensifiers should then immediately explain why moderate degree tends to be expressed by positive evaluation, while high degree tends to be expressed by negative evaluation and (sometimes) extreme positive evaluation.

**Zwicky** The semantics of deadjectival intensifiers should explain why there only one set of mirative and modal antonyms form deadjectival intensifiers and why no such restriction is observed with evaluative intensifiers.

### 3 The semantics of unbleached intensification

My account of these goals will be in two steps. First, I will discuss the semantics involved in intensification. To meet my goals, however, I will also need to discuss the pragmatic mechanisms of vagueness.

#### 3.1 Existing approaches to intensifier semantics

Wheeler (1972) proposes that unbleached evaluative degree modifiers are best analyzed as factive propositional operators. On his analysis, (34) is interpreted as *it is horrible that it is as warm as it is*, which I will formalise as in (35).

$$
\text{The weather today is horribly warm. (34)}
$$

$$
\text{horrible} (\lambda w. \mu_{\text{warm}}(s)(w) = \mu_{\text{warm}}(t)(@)) (35)
$$

Morzycki (2008) argues against such an analysis on the basis that it would wrongly predict that the weather can be described as "horribly warm" also when it is very cold. On a freezingly cold day, most people would agree that it is indeed horrible that the temperature is what it is, but no-one would agree that it is "horribly warm".

Another example: consider a typical Dutch city canal frequented with tourist boats. These canals are quite narrow, potentially leading to dangerous situations when oversized vessels have to manoeuvre alongside each other. This situation can be expressed using the sentence "The canal is dangerously narrow", but not using "The canal is dangerously wide". On Wheeler’s account, however, both should be possible. In fact, both should express the same proposition, since both "narrow" and "wide" are associated with the same measure function.

Morzycki solves this by stipulating that evaluative intensifiers express extreme degrees: "horribly warm" means that it is horrible how extremely warm it is; "dangerously wide", means that it is dangerous how extremely wide the subject in question is. While

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I adopt the standard assumption that adjectives are associated with measure functions, that map entities to a point on the scale. Antonyms share the same measure function, but the ordering on the scale is revered. In what follows, the @ symbol refers to the actual world. In this example, “t” corresponds to the weather today.
this analysis solves the issues with Wheeler’s semantics, it in turn predicts that evalu-
ative adverbs always express high degree. This, however, is not the case. A case in point
is “pleasantly warm”, which is associated with a temperature that is warm enough to be
pleasant but not too warm. We could of course stipulate that in this case extreme degree
is replaced by moderate degree, but pursuing this line of analysis we would lose hope of
deriving the intensifying function of an adverb from its adjectival base - which is exactly
my goal here. My assumption is that “horribly” is associated with extreme degree, in
virtue of the content of the adjective base. So even though Morzycki’s proposal may be
on the right track in the sense that it provides the right truth-conditions, it does not
yet provide us with a rationale of how such meanings come about in the deadjectival
derivation process.

Mirative adverbs are also problematic for Morzycki. If something is “surprisingly
warm” it means that the temperature is higher than what was expected, but there is
no entailment that this temperature is extreme. Imagine a cup of hot soup that has
been left to cool for an hour. You dip your finger in it, expecting it to feel cold, but the
soup still feels a little bit warm. In this case, it would be fine to say the soup is still
“surprisingly warm”. But you’d probably hesitate calling the soup ”warm”.

The approach in Nouwen (2010) also suffers shortcomings, although it was designed
to avoid the above problems (see also Katz 2005; Piñón 2005; Nouwen 2005; Castroviejo-
Miró 2012). The idea in that proposal is that (34) is to be analysed as (36).

\[(36) \exists d [\mu_{\text{warm}}(s)(@) \geq d \land \text{horrible}(\lambda w.\mu_{\text{warm}}(s)(w) \geq d)]\]

This solves Morzycki’s problem. Say that the temperature is some very cold degree \(c\). It
is now the case that \(\mu_{\text{warm}}(s)(@) = c\) and so that \(\mu_{\text{warm}}(s)(@) \geq c\). But the proposition
\(\text{horrible}(\lambda w.\mu_{\text{warm}}(s)(w) \geq c)\) is probably false. This is because \(\lambda w.\mu_{\text{warm}}(s)(w) \geq c\)
is the proposition that the temperature is at least \(c\). So this proposition encompasses
both horrible weather situations (for instance, when the temperature is \(c\)) and pleasant
weather situations (for instance, when the temperature is higher than \(c\), but not too
high). As a result, \(\text{horrible}(\lambda w.\mu_{\text{warm}}(s)(w) \geq d)\) will only be true for degrees \(d\) that
are higher than what is pleasant, not lower than what is pleasant.

Similarly, for the Dutch canal sentence “The canal is dangerously wide”, we’d get:

\[(37) \exists d [\mu_{\text{wide}}(c)(@) \geq d \land \text{dangerous}(\lambda w.\mu_{\text{wide}}(c)(w) \geq d)]\]

Here \(\mu_{\text{wide}}(c)\) is the width of the canal. In the actual world, the width \(d\) is considered
dangerous because it is so little. But that doesn’t make dangerous(\(\lambda w.\mu_{\text{wide}}(c)(w) \geq d\))
true. This is because the proposition \(\lambda w.\mu_{\text{wide}}(c)(w) \geq d\) is very inclusive. It contains
widths ranging from \(d\) upwards. Consequently, it is unlikely that we’d find the fact
that the canal is at least \(d\) wide dangerous. As a result, (37) correctly predicts that
“The canal is dangerously wide” cannot be used to describe a canal that is “dangerously
narrow”.

Despite the fact that (37) successfully accounts for the truth-conditions of adverbs
like “dangerously” or “horribly”, this same analysis runs into problems with M-adverbs
like “pleasantly”, just like Morzycki’s analysis did. On the account of Nouwen 2010,
“The soup is pleasantly warm” will now receive the analysis in (38). But this is much too weak. Say that $p$ is a degree of temperature that is pleasant (for soup) and that $h > p$ is a degree that is horrible. If the soup is indeed this horrible temperature ($\mu_{\text{warm}}(s)(@) = h$) then it is also true that the temperature is at least the pleasant temperature $p$ ($\mu_{\text{warm}}(s)(@) \geq p$) and, so, we wrongly predict that the soup is pleasantly warm whenever it is too warm to eat.

\begin{equation}
38 \quad \exists d [\mu_{\text{warm}}(s)(@) \geq d \land \text{pleasant}(\lambda w. \mu_{\text{warm}}(s)(w) \geq d)].
\end{equation}

The accounts above have in common that they do not analyse the adjective in an intensifier - adjective combination as a positive form. This is natural in a way, given the fact that we are dealing with modified occurrences of adjectives. However, intensified adjectives share key properties with the positive form. Most importantly, they are vague. “John is worryingly tall” is vague just like “John is tall” is. In both cases, there is a context-dependent, implicit, unknown standard of comparison and in both cases there exist borderline cases. In fact, intensified absolute adjectives are vague even when their unmodified positive form is not. Compare “The glass is empty” with “The glass is disappointingly empty”.

Another assumption made in both Nouwen (2010) and Morzycki (2004) is that the adverb meaning is a simple crisp predicate. But adverbs have positive forms, just like adjectives. In fact, in the simple combination of a deadjectival adverb and an adjective, the adverb has a positive form interpretation. In “John is worryingly tall” there is a context-dependent, implicit, unknown standard of comparison for the speaker’s worry and there are borderline cases of where John’s height may not be definitely worrying nor definitely not worrying. It should not be surprising that deadjectival adverbs have positive forms, for they themselves can undergo degree modification, albeit not easily when modifying an adjective:

\begin{equation}
39 \quad \text{This rod is more disappointingly short than that one.}
\end{equation}
\begin{equation}
40 \quad \text{The team played very disappointingly.}
\end{equation}

What we see then is that the semantics of combinations of deadjectival intensifiers and adjectives involve two positive form-like interpretations. That is, they involve two separate standards of comparison, one for the adverb and one for the adjective. I will now show the consequences of assuming that the semantics of intensified adjectives is largely

\begin{enumerate}
\item a. This is \{ surprisingly / ridiculously / shockingly / \} tasty for something you made.
\item b. He is \{ disappointingly / amazingly / fantastically / \} short for a basketball player.
\end{enumerate}

These kinds of PPs are also found with markers of excess and sufficiency, like “too” and “enough”. For instance, “Sue is too short for basketball”, “that rod is long enough for our purposes”. These are clearly not positive forms and the “for” PPs are appear to provide more a goal than a comparison class. Such examples show, however, that we shouldn’t take the presence of a PP as evidence of the presence of a positive form.
that of a positive form.

### 3.2 Intersecting positive forms

There is some consensus that (42) is a good approximation of the truth-conditions of (41):

(41)  John is tall.
(42)  $\text{height}(\text{john}) \geq \theta$

That is, the interpretation of the positive form of relative adjectives involves comparison to some contextually determined threshold $\theta$. More generally, if $\mu$ is the measure function associated with the adjective and $x$ is the referent of the subject of the adjective, then in general the positive form combination of that subject and adjective will be interpreted as:

(43)  $\mu(x) \geq \theta$

While semanticist may disagree about how (43) comes about, there is general agreement that something akin to (43) is the interpretation of a positive form relative adjective. There are two other aspects of (43) that I take to be non-controversial. First of all, the value of $\theta$ is not provided in the compositional interpretation process. Rather, it is treated like a free variable whose value needs to be resolved by reasoning about the context and information that is provided by composition, such as the comparison class, the subject etc. Secondly, in order to account for the vagueness of the positive form, there has to be some indeterminism about the value of $\theta$ and / or about what it means for a measure to meet this threshold. (See e.g. Égré 2017 for discussion.) So, for a more complete understanding of what (43) amounts to as a meaning, we need not just degree semantics (e.g. Kennedy 2007), but also some kind of pragmatic theory of how under-specified standards of comparison are used (e.g. Lassiter and Goodman 2017).

As I explained above, the combination of an intensifier and a relative adjective is no less vague than the adjective by itself. For that reason, I am proposing that (43) is a core part of the meaning of intensified adjectives. Alongside (43), however, there is a second positive form interpretation that corresponds to the adverb. For instance, for “the weather today is pleasantly warm” we have two parallel vague interpretations, one saying that it is warm and one that it is pleasant. To a first tentative approximation, my proposal is that a combination of a deadjectival adverb $D$ and a gradable adjective $A$ is interpreted using the two positive form meanings in (44).

(44)  Let $D$ be a deadjectival $D$ and $A$ be a gradable adjective $A$, $[\![DA]\!]$ is the conjunction of (45-a) and (45-b). (to be amended)

a.  $\mu_A(x) \geq \theta_i$

b.  $\mu_D(x) \geq \theta_j$

For “the weather today is pleasantly/horribly warm”, we would then for instance get:
Here \( t \) stands for “the weather today”. As I will explain below, (46) is too rough, but it will do for now to illustrate the benefits of looking at intensification like this. One clear advantage of (45) is that it straightforwardly accounts for why intensified adjectives are vague (providing we have a proper theory of what makes these positive form interpretations vague - see below). But how promising is this idea with respect to my two main goals: the Goldilocks effect and Zwicky’s generalisation?

Let me start by setting out how I intend to explain the Goldilocks effect using (45). Because the two positive form interpretations in (46) are interpreted conjunctively, an intersective meaning emerges. So, while “the weather today is warm” may be compatible with a broad range of degrees of temperature, including say at least the interval \([d, d']\), “the weather today is pleasantly warm” is compatible only with those degrees in that interval which make (46-b) true. Typically, positive evaluations like “pleasant” are reserved for the middle of a scale and, hence, this positive evaluation results in intensification to a medium degree. Negative evaluative adverbs like “horribly” are compatible only with those degrees in \([d, d']\) that make \( \mu_{\text{horrible}}(t) \geq \theta_{\text{horrible}} \) true. Typically, negative evaluations are associated to extreme ends of the scale and, so, “horribly warm” will end up being compatible only with the higher degrees in this range. Note that extremely low temperatures are also horrible, but they are not in the interval \([d, d']\), because we arrived at that interval using the positive form of the adjective.

The Goldilocks effect is only a tendency. For instance, an expressive taboo positive evaluation may result in an upper range of degrees, since the expressive taboo signals that something out of the ordinary is the case. The moderate part of \([d, d']\) is not compatible with the use of such inflammatory language.

This explanation of the Goldilocks effect is not yet perfect, however. The problem is that I assumed that the subject of the adverb in (46-b) is “the weather today”. However, that means that (46) is compatible with the weather being just moderately warm, but horrible in some other way (perhaps it is raining non-stop). The sentence “the weather today is horribly warm”, however is not compatible with such states of affairs. It doesn’t just say that the weather is both warm and horrible, it say that the weather is warm and horrible because of how warm it is.

To remedy this, we need to incorporate Wheeler’s original semantics in the current proposal for a double positive form. So, instead of (45), we get:

\[
\begin{align*}
(45) & \quad \text{a. } \mu_{\text{warm}}(t) \geq \theta_i \\
& \quad \text{b. } \mu_{\text{pleasant}}(t) \geq \theta_j \\
(46) & \quad \text{a. } \mu_{\text{warm}}(t) \geq \theta_k \\
& \quad \text{b. } \mu_{\text{horrible}}(t) \geq \theta_l 
\end{align*}
\]

To keep things simple, I simplify (47) by keeping the world variables implicit where
possible:

\[(48) \begin{align*}
  a. \quad & \mu_A(x) \geq \theta_i \\
  b. \quad & \mu_D(\lambda w. \mu_A(x)(@) = \mu_A(x)(w)) \geq \theta_j
\end{align*}\]

Applying this to the “horribly warm” example, we get (49):

\[(49) \begin{align*}
  a. \quad & \mu_{\text{warm}}(t) \geq \theta_i \\
  b. \quad & \mu_{\text{horrible}}(\lambda w. \mu_{\text{warm}}(t)(@) = \mu_{\text{warm}}(t)(w)) \geq \theta_j
\end{align*}\]

Now, for a day to be horribly warm it needs to be warm and the fact that it is as warm as it is needs to be evaluated as being horrible. The explanation of the Goldilocks effect runs as before.

What about Zwicky’s generalisation? Nouwen (2010) attempts to explain Zwicky’s generalisation by showing that modal adverbs that lack an intensifying function would be drastically under-informative if they did have such a function. Take the antonymous pair “usual” - “unusual” of which only the latter is the base of an intensifier. While the adverb in (50-a) is interpreted as a sentence adverb, the adverb in (50-b) receives an intensifying interpretation.

\[(50) \begin{align*}
  a. & \quad \text{Sue is usually tall.} \\
  b. & \quad \text{Sue is unusually tall.}
\end{align*}\]

For Nouwen (2010) these would be interpreted as (51-a) and (51-b) if the adverbs in both sentences were intensifiers:

\[(51) \begin{align*}
  a. & \quad \exists d[\mu_{\text{tall}}(s)(@) \geq d \land \text{usual}[\lambda w. \mu_{\text{tall}}(s)(w) \geq d]] \\
  b. & \quad \exists d[\mu_{\text{tall}}(s)(@) \geq d \land \text{unusual}[\lambda w. \mu_{\text{tall}}(s)(w) \geq d]]
\end{align*}\]

The truth-conditions in (51-b) are very exclusive: this proposition is only true if Sue’s height is such that it is judged to be unusual. In contrast to that, (51-a) is entirely uninformative. Just take the lowest degree on the scale. It will be true that Sue’s height in the actual world exceeds that degree and (trivially) it will also be usual for Sue to exceed that height. As such, Nouwen concludes that the reason that positive modals lack intensifier uses is simply because they wouldn’t be informative as intensifiers.

Could we construct a similar explanation from my current proposal? The corresponding interpretations to (51-a) and (51-b) are in (52-a) and (52-b), respectively. I’m assuming here that the adverbs in (51) are gradable and (thus) contribute a positive form, but the arguments I give below would actually also go ahead if we were to treat possibility and impossibility as crisp predicates as Nouwen (2010) did.

\[(52) \begin{align*}
  a. & \quad \mu_{\text{tall}}(s) \geq \theta_i \\
  & \quad \mu_{\text{usual}}(\lambda w. \mu_{\text{tall}}(s)(@) = \mu_{\text{tall}}(s)(w)) \geq \theta_j \\
  b. & \quad \mu_{\text{tall}}(s) \geq \theta_k \\
  & \quad \mu_{\text{unusual}}(\lambda, \mu_{\text{tall}}(s)(@) = \mu_{\text{tall}}(s)(w)) \geq \theta_l
\end{align*}\]

Starting with (52-b), the positive form of “tall” once more selects a range of situations
where Sue has a certain height \( h \), which include at least those where \( h \) is in some interval \([d, d']\). Some (in fact, lots) of these situations are situations in which Sue is tall, but where her height is not deemed unusual. What height would Sue need to have so that her having that height is evaluated as being unusual? Well, the unusual cases is where Sue’s height is extreme, either so tall it is (or seems to be) rare for a human to be so tall or so short that it seems rare. Since we know we also have a positive form for tall, only the former can be the case and in this way “unusually tall” ends up entailing that Sue is very tall.

Turning now to (52-a), we once more know from the positive form of “tall” that Sue’s height is in some degree \([d, d']\). Which degrees are such that it is usual that Sue is so tall? Well, quite a few of them are. But there exist extreme heights that will be judged to be unusual. As a result, “usual” is expected to have an intensifier meaning. It would be relatively uninformative, but not entirely, in contrast to (51-a). In other words, the account seems to so far wrongly predict that “usually tall” means the same as “not unusually tall”.

We could opt to bring (52) closer to the account in Nouwen (2010). The weakness of (51-a) is due to the fact that we are looking at propositions where Sue’s height is at least \( d \). So, instead of (52-a), we could propose (53).

\[
\begin{align*}
\mu_{\text{tall}}(s) & \geq \theta_i \\
\mu_{\text{usual}}(\lambda w.\mu_{\text{tall}}(s)(w)) & \geq \mu_{\text{tall}}(s)(\emptyset) \geq \theta_j
\end{align*}
\]

But this has little effect. Say, Sue is tall, but not particularly so. In that case, it will be usual for here height to be at least that of her actual height. Say, now that Sue is unusually tall. In that case, it will not be true that it is usual that here height is at least that of her actual height. So, just like (52-a), (53-a) wrongly predicts “usually tall” to mean “unusually tall”.

While the explanation in Nouwen (2010) works for modal intensifiers, recall that it wrongly predicts that positive evaluatives are compatible with high degrees. That is, in that account “pleasantly warm” ends up meaning “at least pleasantly warm”. So, the lower bound that is so important in deriving Zwicky’s generalisation creates problems for the account of evaluatives. The current proposal seems even worse off, though, since its semantic component does not even come close to an explanation. As I will show below, once we turn to the pragmatics of deadjectival intensifiers, an explanation does present itself.

### 4 The probabilistic pragmatics of deadjectival intensifiers

How do interlocutors use meanings like \( \mu(x) \geq \theta \)? To answer this, we need a theory of how interlocutors reason about how values for \( \theta \) affect the reaching of certain communicative goals. Here, I will adopt the Bayesian game theoretical approach of Lassiter and Goodman (2017). The key thought behind this approach is that meanings like \( \mu(x) \geq \theta \) are extremely uninformative for low values of \( \theta \), while for high values of \( \theta \), they end up so informative that they are hardly ever usable. Lassiter and Goodman model a hearer
who probabilistically reasons about \( \theta \), given these considerations of informativity.  

I will explain my take on Lassiter and Goodman’s framework in more detail now. I say “my take” because I will introduce some minor differences with the original proposal. All of these will still be well within the spirit of that proposal, but they will help me make my point more easily. The first of these differences is that I make explicit the assumption that each utterance comes with a question under discussion (QUD) that directly determines a partitioning of the knowledge space relevant for interpreting that utterance. In particular, I will assume that the use of an adjective can be associated to a corresponding question under discussion that asks a corresponding degree question of the subject. For instance, “John is tall” is associated to the question of how tall John is.

I implement this as follows. Let \( W \) be the space of possible worlds. Let \( A \) be an adjective, \( \mu_A \) its measure function, \( X \) the subject and \( x \) the referent of the subject. Whenever \( A \) is predicated of \( X \), there is a QUD, \( Q_A^X \), defined as in (54). In words, \( Q_A^X \) partitions the space of worlds in such a way that each cell of worlds agrees on the value of \( \mu_A(x) \).

\[
(54) \quad \text{Let } w \sim_A^X w' \text{ whenever } \mu_A(x)(w) \approx \mu_A(x)(w'), \text{ where } \approx \text{ indicates that the measures are identical taking into account some level of granularity.} \quad Q_A^X = \left\{ [w]_{\sim_A^X} \mid w \in W \right\}
\]

Pragmatic interpretation involves probabilistic inferences of where in the space \( Q_A^X \) the actual world lies, given the speaker’s utterance (Goodman and Frank 2016; Lassiter and Goodman 2017; Qing and Franke 2014). This is represented as a probability distribution \( \rho(s|m, \ldots) \), where \( s \) is a cell in the partition and \( m \) the uttered sentence. This is the probability that the real world is in cell \( s \), given that \( m \) was uttered. Instead of the actual sentence, I will represent \( m \) in what follows as a pair \((\varphi, c)\) where \( \varphi \) is the set of truth-conditions for \( m \) and \( c \) is the cost of uttering \( m \).

Lassiter and Goodman’s proposal is built on the rational speech act framework (RSA, Goodman and Frank 2016). RSA starts by positing what a literal interpretation (\( \pi \)) of an utterance looks like, given some prior expectations about the space of worlds, represented by \( P \). This literal interpretation determines the utility (\( U \)) of a message for a speaker: messages are better when there’s a higher probability that the cell with the actual world is identified. The cost of the message is also factored in. The speaker model \( \sigma \) represents the likelihood of a speaker using an utterance with meaning \( \varphi \) and cost \( c \), given \( U \). Finally, the pragmatic listener model \( \rho \) is a simple application of Bayes’ law. The definitions are given in figure 2. Here \( S(s, \varphi) \) is 1 whenever \( \varphi \) is true in every world in \( s \) (i.e. \( s \) entails \( \varphi \)) and 0 otherwise.

Lassiter and Goodman (2017) adapt this rational speech act framework to derive \( \rho \) for positive form utterances. They assume that a positive form utterance of \( (\mu(x) \geq \theta, c) \) (with \( c > 0 \)) competes with a silent tautology. So, \( M = \{(\mu(x) \geq \theta, c), (\top, 0)\} \). The

---

\(^6\)There are similar theories in the literature (e.g. Qing and Franke 2014) and there are perhaps also quite different routes to understanding the use of the vague positive form better. It will remain an open question whether these alternatives can provide similar explanation to what I offer below.
The rational speech act framework, Goodman & Frank 2016

resulting definitions are as in (55). Note that contrary to Lassiter and Goodman (2017) I am assuming that the QUD-induced space \( Q \) is discrete rather than dense. This seems to me to be reasonable, given the normal reliance of interlocutors on levels of granularity.

\[
\begin{align*}
\pi(s|\varphi, c), Q_{A} & = \frac{P(s)S(s, \varphi)}{\sum_{s'\in Q} P(s')S(s', \varphi)} \\
U(s, (\varphi, c), Q) & = \ln(\pi(s|(\varphi, c), Q,...)) - c \\
\sigma((\varphi, c)|s, Q,...) & = e^{\lambda U(s,(\varphi,c),Q)} \\
\rho(s|(\varphi, c), Q,...) & = \frac{\sum_{(s',c'\in M} e^{\lambda U(s,(s',c'),Q)}}{\sum_{s'\in Q} P(s'|s|(\varphi,c),Q,...)}
\end{align*}
\]

Figure 2: The rational speech act framework, Goodman & Frank 2016

As an illustration of how this proposal works, figure 3 shows \( \rho(s|\mu_{A}(x) \geq \theta, c), Q_{A} \) for a partition that groups together worlds where \( \mu(x) \) is the same when rounded off to the nearest one decimal. The prior distribution \( P(s) \) is a discrete approximation of the \( z \)-distribution. The x-axis shows the cells of the QUD partition where 0 stands for the cell that includes the case where \( \mu_{A}(x) \) is the average expected measure. As can be seen from this figure, the posterior \( \rho \), i.e. the probability distribution resulting from updating the prior on the basis of the utterance of the positive form, shifts the most probably cell in the partition to be one where the measure is higher than the average expected degree. This is of course exactly what we associate the positive form interpretation with.

Let’s now turn to intensified adjectives. Importantly, when interpreting the combination of a dejectival adverb and an adjective, it is still the adjective that determines the QUD and (thus) the partition of the space of possibilities. The measure function associated with the (adjectival base of the) adverb maps each cell in that partition to some degree.

For instance, for the combination “horribly warm”, we have the following ingredients of the analysis. First of all, there is a partition \( Q \) such that \( \forall s \in Q : \forall w, w' \in s : \)
\( \mu_{\text{warm}}(x)(w) \approx \mu_{\text{warm}}(x)(w') \), where \( \approx \) indicates the measures are equal taking into account some level of granularity. Additionally, for each \( s \in Q \), \( \mu_{\text{horrible}}(s) \) returns a degree of how horrible it would be if the actual world is in cell \( s \). (For simplicity, I am assuming that the speaker’s horribleness measure function is rigid across the space of possible worlds). As before, there is also a prior expectation as to how warm is it. That is, there is a prior expectation of where in \( Q_{X}^{\text{warm}} \), the actual world is situated. This prior distribution translates to a prior expectation of how horrible the weather is. Each cell in the QUD has both a prior probability and a degree of horribleness. So, to obtain a prior for the negative evaluation, we only need to do the following:

\[
P'(d|P, Q_{X}^{\text{warm}}) = \sum_{s \in \{s' \in Q_{X}^{\text{warm}} | \mu_{\text{horrible}}(s') = d\}} P(s).
\]

Although we won’t use this prior \( P' \) explicitly, it is good to realize that it is a direct consequence of the prior over the QUD, \( P \). The figure in 4 depicts a typical situation. The plot in the middle shows a handcrafted function that maps moderate situations to low degrees of horribleness (close to 0) and extreme situations to high degrees of horribleness (close to 1). The right plot shows what this means for our expectations about how horrible things are. Given the fact that extreme situations are unlikely and that high degrees of horribleness are assigned to those situations, it follows that extreme degrees of horribleness are improbable.

We can now model the pragmatic effect of an intensified adjective by calculating \( \rho(s|\mu_{A}(x) \geq \theta_{i} \land \mu_{D}(s) \geq \theta_{j}, c), Q_{X}^{A}, \theta_{i}, \theta_{j}) \). In particular, we are after the following marginal probability:

\[
\rho(s|\mu_{A}(x) \geq \theta_{i} \land \mu_{D}(\lambda_{w} \cdot \mu_{A}(x)(w) = \mu_{A}(x)(\@)) \geq \theta_{j}, c), Q_{X}^{A}) \\
\propto \sum_{\theta_{i}} \sum_{\theta_{j}} \rho(s|\mu_{A}(x) \geq \theta_{i} \land \mu_{D}(\lambda_{w} \cdot \mu_{A}(x)(w) = \mu_{A}(x)(\@)) \geq \theta_{j}, c), Q_{X}^{A}, \theta_{i}, \theta_{j})
\]

Figure 5 plots the effects of this for a (discrete approximation of a) \( z \)-distribution prior and the hand-crafted evaluation measure function used above (figure 4). This could be
seen as predicting the meaning of something like “The weather today is horribly warm”, where the x-axis represents temperature and the 0-point represents the average temperature. As is visible from the plot, the effect is one of intensification, but unfortunately, we end up in a situation that is not that unlike that of Wheeler (1972): horribly warm is not (entirely) incompatible with things being horribly cold.

It turns out that the source of this problem lies in the simple conjunctive analysis I assume in (56). Basically, this model assumes that the two thresholds are resolved in tandem. But on reflection I believe that the two positive forms that I assume to be part of an intensified adjective have a different status from one another. In particular, I think that the positive form interpretation of the adverb is backgrounded and that the positive form of the adjective is interpreted against that backgrounded information.

Why would the adverb’s contribution have a different status from that of the adjective? In the literature, there are some similar suggestions that evaluative intensifiers are interpreted as expressive rather than descriptive predicates (e.g. Castroviejo and Gehrke 2019). Additionally, evaluative attributive adjectives tend to favour non-restrictive interpretations, and, conversely, non-restrictive readings of attributive adjectives tend to be evaluative in nature (e.g. Martin 2014, and references therein). Umbach (2012) suggests that this is due to the fact that restrictive interpretations cannot be achieved when the interpretation of the adjective rests on private subjective information. That is, whenever the hearer does not have access to the speaker’s extension of the adjective, they favour to interpret the adjective’s content as a non-restrictive (side) comment. I adopt a similar idea here. The evaluation contributed by the deadjectival adverb is taken as backgrounded information for interpreting the rest of the sentence (viz. the adjective positive form).

To implement this in the Bayesian framework I am assuming here, all we need to do is update the two positive forms successively rather than simultaneously. Let’s from now...
Figure 5: Model predictions of (56). The right panel shows the evaluative measure function used for this prediction, which is the same as shown in figure 4. The left panel shows the update of the prior $P$, producing posterior $\rho$. (For this plot $\lambda$ was set to 3, and $c$ to 3.)

on make the prior explicit whenever we mention $\rho$. So we write $\rho(s|\varphi, c, Q^A_X, P)$ for the probability that the actual world is in $s$, given that a message with meaning $\varphi$ and cost $c$ was uttered in a context with QUD $Q^A_X$ and prior expectations $P$. For a combination $D A$ of a deadjectival intensifier and adjective $A$ we now get the following $\rho$:

$$\rho(s|\mu_A(x) \geq \theta_i, c), Q^A_X, \mu(t)|\mu_D(\lambda w.\mu_A(x)(w) = \mu_A(x)(@)) \geq \theta_j, c'), Q^A_X, P)$$

Let us first have a look at the prior within this final posterior, the backgrounded information that the threshold for the adverb is met. This prior can be compared to what happens when a QUD about $A$ is answered by the evaluation $D$. For instance, if the QUD is something like (58-a), this prior can be compared to what happens when this QUD is answered using (58-b).

(58)  
\begin{itemize}
  \item a. How warm is it today?
  \item b. It’s horrible!
  \item c. $\rho(s|\mu_{\text{horrible}}(s) \geq \theta, c), Q^\text{warm}_X, P)$
\end{itemize}

The effect of (58-b) in this context is modeled as (58-c). Once more taking $P$ to be the (discrete approximation of a) $z$ distribution, (58-c) (i.e. the prior for the $\rho$ in (58)) results into figure 6.

The predictions in figure 6 are in line with intuitions. A simple evaluation of the temperature as “horrible” is compatible with either particularly low or particularly high degrees. The effect of now taking (58-c) as background (i.e. prior) to a subsequent update of the adjective positive form is illustrated in figure 7. The effect of background-
ing the evaluative information results in an intensified interpretation of the adjective positive form that is only compatible with high degree, as is desired. Also, compare the interpretation of the bare adjective in figure 3 to the final posterior in 7. As can be clearly seen, the effect of intensification with “horrible” is stronger than the effect of the simple unmodified positive form.

What about a positive evaluation? To model something like “pleasantly” (or the evaluation made by intensifiers like “fairly”, “pretty” before they were bleached), I handcrafted a function that assigns high degrees (close to 1) to moderate values and low degrees (closer to 0) to extreme values. The model predictions are in figure 8. Note that the mean expected temperature for “pleasantly warm” in that figure is comparable to that of “warm” in figure 3, but that the curve is much narrower. This, too, is largely in line with the desired effect of such an M-adverb.

I should stress immediately that the model predictions I have presented in figures 3-8 can only be seen as a proof of concept. They show that a pragmatic theory along the lines of (my adaptation of) Lassiter and Goodman (2017) makes predictions that go in the direction of what we observe. Explicit support for this particular theory of positive forms, however, would need to come from experimental data that links together evaluative judgements of particular situations (replacing the handcrafted functions used above) and judgements of interpretation of sentences with intensifiers.

In the absence of such support, let me return to the final of my desiderata: how does this setup explain Zwicky’s generalisation? The key ingredient is my assumption that the contribution by the adverb is backgrounded and used to steer the prior expectations about the QUD partition before updating with the adjective positive form. Let’s assume, contrary to fact, that a positive modal adverb like “normally” is an intensifier. According
Figure 7: Model predictions of 7. The right panel shows the evaluative measure function used for this prediction, which is the same as shown in figure 4. The left panel shows the update of the prior $P$ ($z$-distribution), the intermediate prior resulting from updating $P$ with the positive form of the adverb and the final posterior resulting from updating that prior with the positive form of the adjective. (For this plot $\lambda$ was set to 3, and $c$ to 3.)

Figure 8: Model predictions for positive evaluation. (For this plot $\lambda$ was set to 3 and $c$ to 3.)
to the above proposal, that would mean that something like “normally tall” would background the information that the probability distribution over the QUD partition is “normal”. However, before the hearer start interpreting, the prior expectations are simply already such that the probability of the actual world being in a cell is determined by how normal, usual, expected etc. this is. In other words, the probability that the real world is in $s$, given that things are “normal” is exactly $P(s)$. As a result, backgrounding that things are “normal” is vacuous. This is why an adverb like “normally” is not an intensifier. For if it were, its function would be vacuous. The same line of argument can be used for “usually”, “expectedly”, etc.

We now have an account for why positive modals are not intensifiers while positive evaluatives are not subject to this same restriction. As I showed above, backgrounding that things a “pleasant” for instance, is informative and results in a (moderately) intensified meaning. Recall that there is a way of getting positive modals to intensify, namely by negating the negative modal/mirative:

(59) Sue is not abnormally tall.

This is unexpected if “not abnormal” means the same as “normal”. As is well-known, however, these cases of double negation lead to litotes readings (e.g. Horn 2017Blutner 2000), where the double negative does not result in a simple positive. For instance, there is a clear difference between saying that someone is “happy” and saying that they are “not unhappy”. The latter but not the former seems to include grey area cases where the subject is neither clearly happy nor clearly unhappy. Similarly, “not abnormal” differs from “normal” in pointing to the borderline cases where things are neither normal nor abnormal. As such, cases for (59) pose no challenge to my explanation of Zwicky’s generalisation.

5 Conclusion and discussion

My aim in this work was to provide an account of how the intensifying meaning of some deadjectival adverbs is linked to the meaning of their adjectival base. I proposed that combinations of deadjectival intensifiers and adjectives comprise two positive form interpretations and that this combination explains the Goldilocks effect. Because the meanings involved in the proposal are vague, it is not always easy to generate more specific predictions. As I showed, a pragmatic theory of vagueness, such as that of Lassiter and Goodman, could (to some extent at least) help. I presented a proof of concept that shows that the probabilistic predictions are in line with our intuitions. More importantly, the Bayesian pragmatic framework also offers a straightforward explanation of Zwicky’s generalisation.

There are two serious limits to my proposal. First of all, everything I said here applies to English and may only have limited relevance to different languages. As I showed above, Dutch and German share the Goldilocks effect with English, but beyond those languages deadjectival intensifiers tend to be rarer and (thus) the Goldilocks effect is difficult to establish. (In particular, I found that positive valence evaluative intensifiers are
much rarer outside of English, Dutch and German). Also, I know of at least one counterexample to Goldilocks. Czech “nice” (“pěkný”) can be a degree modifier (“pěkně”), but when it is, it is bleached and indicates high degree.\footnote{Jakub Dotlačil p.c.}

Closer to English, namely in German, we find an exception to Zwicky’s generalisation. Sentences like (60) are fine and indicate that Fritz’s height is normal.

\begin{verbatim}
(60) Fritz ist normal groß. (German)
Fritz is normal(ly) big.
\end{verbatim}

The other limit to my proposal is that I have only given an account of intensional deadjectival intensifiers. In particular, I have not said anything about intensifiers derived from dimensional adjectives. I will leave this class for further research, but have two preliminary thoughts. First of all, it seems to me that dimensional adverbs are quite different from the intensional ones in the sense that they seem \textit{iconic} in nature. That is, their use as intensifiers is only possible if the situation they describe could be conceptualised as having a considerable size. For instance, (61) is felicitous with “expensive” because we can conceptualise the expense as being huge. (You could for instance visualise the heap of money needed to pay for it.) We cannot do the same for “cheap”. If something is exceptionally cheap, then it doesn’t come with something that can be (easily) conceptualised as being particularly big.

\begin{verbatim}
(61) This is hugely expensive / #cheap.
\end{verbatim}

Another illustration of this is in (62) and (63). In (62), we can conceptualise how much time the event in question takes. If time passes slowly, then the event will take long and is conceptualised to be longer. Conversely, if time passes quickly, then the event will be perceived to be short and so conceptualising it as something “gigantic” is hard. In contrast to (62), things are reversed for (63), where the focus is more on Sue’s speed. Here, high speed is easier to conceptualise as something big, for instance, because we can look at the speedometer and map the values on that speedometer to sizes.

\begin{verbatim}
(62) Time passed gigantically slowly / ??fast.
(63) Sue was going gigantically ??slow / fast.
\end{verbatim}

All this is reminiscent of intensification by means of prosodic lengthening. Saying that a meeting was “loooong” expresses a higher degree of length than saying that is was simply “long”. As Fuchs et al. (2019) show, this type of intensification tends to be iconic. They found that adjectives like “long” contains letter reduplications (the written language counterpart of prosodic lengthening) significantly more often than adjectives like “short”, presumably since it is harder to conceptually link something particularly short to something long. They also found for instance that “slow” is more readily lengthened when compared to “fast”, again because slow things take more time and, as such, are longer.

If my intuitions are on the right track, then dimensional adverbs need an altogether
different theory from the one I have been outlining above. Dimensional adverbs, I hypothesise, intensify iconically. As such, a theory for them should contain ideas of how iconicity enters into the semantics. Interestingly, however, it does seem to me that we see something quite similar to Zwicky’s generalisation when we turn to dimensional adverbs. All examples of dimensional intensification that I’ve given concern adverbs derived from positive antonyms. The corresponding negative antonyms do not turn into intensifiers.\footnote{Note that some such antonyms do play a role in L-adverbs like “a little bit”, “a tiny bit” etc. But these cases are clearly morphologically more complex and they are also not intensifiers.}

(64) #Portobello mushrooms are narrowly available in the UK.

(65) #Fritz was shallowly / lowly troubled by the affair.

At this moment in time, I don’t know whether this is just an accident or whether the observations in (64) and (65) need to be subsumed under Zwicky’s generalisation.

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