

# Very necessary: the meaning of non-gradable modal adjectives in discourse contexts

Maryam Rajestari<sup>1</sup>

s8maraje@stud.uni-saarland.de

Simon Dobnik<sup>2</sup>

simon.dobnik@gu.se

Robin Cooper<sup>2</sup>

robin.cooper@ling.gu.se

Aram Karimi<sup>2</sup>

aram.karimi@gu.se

<sup>1</sup>Saarland University  
Saarbrücken, Germany

<sup>2</sup>CLASP and FLOV  
University of Gothenburg, Sweden

## Abstract

The current study investigates the meaning of non-gradable modal adjectives in discourse contexts. The adjectives studied are “essential”, “necessary”, “crucial” and “vital”. The co-occurrence of these adjectives with the degree modifier “very” was examined both by human qualitative analysis and computational analysis. Totally 120 English native speakers judged the meaning of non-gradable modal adjectives. Different types of contexts were chosen for this purpose. In some of them these adjectives were used as gradable and in others as non-gradable. The results from the human analysis show that the context can typically coerce non-gradable adjectives into gradable ones. Further computational analysis is underway to ascertain the semantics of these adjectives.

## 1 Introduction

Modality gives human beings the ability to talk about events and situations beyond here and now, for example, we can easily talk about what we could have done in the past or what should be done in the future. This ability is unique to human beings and children use it even from the early stages of their language development. In English, modality can be expressed by several parts of speech, for example, verbs, adjectives, adverbs, nouns and others. Modal verbs are the most well-known category of modality and there are a lot of studies related to them. Our study focuses on non-gradable modal adjectives such as “vital” and “crucial” and examines the contexts in which these can be interpreted as gradable.

In the literature non-gradable adjectives are distinguished from “gradable adjectives” such as “It is important to close the door” where the necessity is not necessarily required to maintain over all situations. Paradis (2001) argued that weak modal adjectives are unbounded as opposed to strong modal

adjectives and they are not associated with a boundary, but represent a range on a scale. Unlike strong adjectives, they are fully gradable in that they occur in the comparative. In addition, they combine with scalar degree modifiers, such as “very” or “fairly” (Paradis, 2001). The two conditions mentioned by Paradis hold of weak modal adjectives/operators. However, we cannot say for sure that degree modifiers are not used in combination with non-gradable modal operators, as examples where strong modal adjectives are used as gradable can be seen in corpora. Consider this sentence from the ukWaC corpus (Baroni et al., 2009) containing “very vital”: “Stories have always been a *very vital* part of my world, so a museum devoted to encouraging children to read and enjoy stories seems a wonderful idea” (from the ukWaC corpus (Baroni et al., 2009)). As can be seen in this example, the strong non-gradable modal adjective “vital” is used as gradable which contradicts the initial assumption about their non-gradability status. This gradability condition from (Paradis, 2001) is applied in this study as a criterion to examine the semantics of non-gradable modal adjectives. Extreme modal adjectives which are named as non-gradable in this study can also be compared with extreme forms of non-modal adjectives, for example the extreme adjective for “big” is “huge” or the extreme form of “important” is “crucial” (Portner and Rubinstein, 2014).

Our research questions are therefore as follows: (1) what is the semantics of non-gradable adjectives when they co-occur with degree modifiers; (2) what kind of modification do the modifiers provide to the semantics of “non-gradable adjectives” and what are the conditions of such modifications; can all non-gradable adjectives be modified in the same way? While our study focuses on both research questions, in this paper we report on the work in progress on the first research question.

## 2 Hypotheses

In our line of research we take the approach to semantics that is common in the study of discourse and dialogue, namely that meaning of words is negotiated within the communicative context (Clark, 1996; Cooper, in prep) and we examine the adjectival modification in context. We hypothesise that modifiers shift the meaning of the non-gradable adjectives to being gradable. The shift is within the context of the discourse in which the sentences are presented so this means there will be different interpretation shifts for different contexts. Our approach therefore follows the line of research in semantics which argues that meaning of words is not fixed but fluid, relative to the contexts they are used in (Clark, 1996; Cooper, in prep).

## 3 Method

In our study, 120 English native speakers evaluated the meaning of non-gradable modal adjectives within different contexts from the ukWaC corpus (Baroni et al., 2009) which consist of a target sentence containing a non-gradable adjective plus one preceding and one following sentence. For example:

“As soon as you can, you should arrange further supplies by contacting your GP surgery. It is *very vital* that you never run out of drugs. For information about each of the drugs named below, click on each link.”

From the ukwaC contexts four sets of data collection tasks have been designed, each of them containing 25 instances. First, 25 sentences (with their contexts) containing a non-gradable modal adjective and a modifier were selected from the corpus (**very A**). Then, another 25 sentences (with their contexts) were selected but where the adjectives were not used by a degree modifier “very” (**A**). We examined the following adjectives: essential, crucial, necessary and vital. From each set of sentences two additional sets of modified sentences were created: either the modifier was removed (**very A**) from the first set of sentences or added (**+very A**) to the second set of sentences. The sentences were split to four tasks so that each task contained one half of the original and one half of modified sentences.

Participants are randomly assigned to one of the tasks. They are asked to provide the closest synonym for each non-gradable modal adjective. This way, we can analyse the meaning variation of the

provided synonyms in each context to confirm the hypothesis about context dependent meaning. In particular, our hope is that the semantic similarity of synonyms within the context will be stronger than across the contexts. The tasks were presented to the participants in two ways: a crowd-sourcing task which we ran on the Semant-o-matic tool<sup>1</sup> and the Amazon Mechanical Turk (AMT). The data collected from Semant-o-matic was specifically for the purpose of online collection of linguistic data which can be targeted to particular informants. The AMT also allows us to collect a large number of judgements more quickly but the background of participants is less known.

## 4 Preliminary qualitative results

The data has been collected and is now being analysed. In particular we assessed the quality of data that we received from the AMT and non-native/native speakers using Semant-o-matic and we selected the high quality answers from AMT for our analysis. We removed the participants who provided more than 25% of irrelevant answers. As mentioned in the previous part, our contexts were divided into two types. One type in the non-gradable adjective originally used with “very” (**very A**) and the other type the non-gradable adjective not originally used with “very” (**A**). From both types, we created modified types. So if the context is of type **very A**, there is a “non-very” modification (**very A**) and if the context is of type **A** there is a **Cvery**” modification (**+very A**).

### 4.1 Very A and very A

The modified contexts lead the participants to choosing more varied replacements. Here is an example:

“That’s the true value of literature and story – to give delight; and I’m very happy to see it given a home and a museum here in Oxford, where so many stories have begun.” Jacqueline Wilson, Children’s Laureate 2005-2007 “Stories have always been a *very vital* part of my world, so a museum devoted to encouraging children to read and enjoy stories seems a wonderful idea. It’s especially fitting that it’s based in Oxford, which from Lewis Carroll onwards has always been associated with brilliant children’s literature.”

As shown in Table 1 when the local context of the adjective is modified by removing very as in very A there is a meaning shift of the adjective A

<sup>1</sup><http://www.dobnik.net/simon/semant-o-matic/>

in order to be able to fit into the remaining context of the sentence excluding the modifier. This results in a larger number of possible synonym choices indicating a more dynamic interpretation of the adjective. Effectively, the modified sentences become more difficult to interpret and therefore the results become less congruent as individual participants are attempting different interpretations. It seems that this modified version forced the context to bear another sense of meaning such as “engaging”, “intrinsic”, “integral”, “chief”, “substantial”, “cornerstone”, “big” and “key” as opposed to the non-modified version where “very vital” was replaced with only “important”, “essential”, “necessary”, “central” and “consequential”.

<u>very</u> vital	very vital
important 6	important 11
essential 4	essential 3
crucial 3	necessary 3
big	central
chief	consequential
intrinsic	
engaging	
integral 2	
key 3	
substantial	
cornerstone	
fundamental	

Table 1: Answers obtained for “vital” in the original (“very vital”) and modified contexts (“very vital”)

Another prominent result is related to meaning-shift. In this particular type, the modified context represents a kind of meaning-shift. Consider the context below:

I believe the purpose of doing so is to develop mathematical skills and knowledge at students’ own level and learning pace. It’s *very essential* to meet their individual needs. However, many low ability students have lost their confidence from early years in school because of the grouping and teachers’ comments.

This context was written originally with the degree modifier “very”. We listed the answers provided by English native speakers in the original context *very A* and the modified context *very A* in Table 2. As it can be observed, there is a meaning-shift when the context is modified. “paramount”, “desired” and “hard” are considered viable replacements for “essential”.

In terms of what type of adjective the participants selected instead of the non-gradable adjective, both gradable and non-gradable adjectives

<u>very</u> essential	very essential
important 7	important 13
vital 4	vital 3
crucial 2	crucial 5
critical 4	critical 6
hard	key
paramount	
necessary	
imperative 2	
desired	
essential	

Table 2: Answers obtained for “essential” in the original (“very essential”) and modified contexts (“very essential”)

were chosen as a replacement. For example, some participants considered “vital” as synonymous to “important” in original or modified contexts. However, there were still participants who selected another non-gradable adjective such as “essential” or “crucial” instead of “vital”. This shows that non-gradability is highly context-dependent and we can not classify an adjective as gradable or non-gradable out of its context of use.

## 4.2 A and +very A

Here, as in the previous section, the modified contexts have more varieties in terms of what adjectives have been chosen by the participants. Table 3 shows one example of the variety of answers for one of the contexts:

The CA plays a crucial role in Web security, since the CA makes a third-party trust relationship possible. In a large, distributed and complex network such as the Web, the third-party trust model is necessary since there are many permutations of dynamic, client-server relationships. Servers and clients may not have an established mutual trust; yet both parties want to have secure sessions, which demands a foundation of trust.

As can be seen, there is a larger variety of answers when “necessary” occurs with rather than without “very”.

Another crucial result was that in some specific contexts and in this type the meaning-shift of the modified version was observed. For example in this particular context, some participants replaced “necessary” with “needed”, “required”, “essential”, “requisite” only when it did not occur with the modifier “very” (**A**), and when it did occur it seems that there was a slight change of meaning in that some of them used “appropriate” or “basic” instead of “necessary” (**+very A**) as shown in Table 4.

+very necessary	necessary
needed 7	needed 6
essential	essential 5
crucial 3	crucial 2
key	key 3
vital 3	vital 2
important 3	important 9
imperative	dependent
mandatory 3	obligatory
integral	significant
required 4	indispensable
critical	
powerful	

Table 3: Answers obtained for “necessary” in the original (“necessary”) and modified contexts (“+very necessary”)

The bathroom is fully tiled and has a bath with overhead shower, bidet, w.c and wash hand basin. All the *necessary* bedding, bath and hand towels are provided. A useful store cupboard is located just inside the front door where the boiler is fitted.”

necessary	+very necessary
needed 9	needed 3
essential 6	essential 6
fundamental	fundamental
required 8	required 1
requisite 2	
important 1	important 7
indispensable	
	appropriate
	basic 3
	critical
	crucial
	vital

Table 4: Answers obtained for “necessary” in the original (“necessary”) and modified contexts (“+very necessary”)

With respect to the type of the adjective that is replaced, there are participants who replaced “necessary” occurring with or without “very” with another non-gradable modal adjective such as “essential”, “required” or “needed”. Interestingly, some English native speakers used the gradable modal adjective “important” instead of “necessary” when this occurred with “very”. Equally, there are also a considerable number of answers where the participants replaced “necessary” in +very A type with “essential”, “needed” or “required”. This suggests that “necessary” is considered as gradable in certain contexts.

## 5 Discussion and conclusion

In this study we tried to look at non-gradable modal adjectives from both linguistics and computational linguistics perspectives. English native speakers judged the semantic of non-gradable adjectives in the contexts in which they used as gradable. We obtained the following results accordingly. Firstly, the result of the analysis shows that there is a possibility of meaning modification by adding a degree modifier like “very” to a non-gradable adjective. In fact, the context determines how non-gradable adjectives can be used as gradable and the context can coerce non-gradable adjectives into gradable. Secondly, modified contexts resulted in a larger number of possible replacement and finally, in some contexts (both original and modified contexts) it was possible to use both non-gradable (e.g. “essential”) or gradable adjectives (e.g. ‘important’) simultaneously. This implicates that due to the contextual dependence of language the traditional distinction between gradable and non-gradable adjectives is not as straightforward as it was previously thought.

This is a very much ongoing work and in the next step we are looking at the distribution and semantic similarity of provided synonyms in contexts and compare them across the contexts using computational measures such as entropy of labels and semantic similarity as predicted by contextualised language models such as Bert (Devlin et al., 2018). The preliminary results indicate that in the majority of cases the modified contexts to a higher entropy of replacement labels than non-modified contexts which supports the qualitative findings presented in the paper.

## Acknowledgements

The research reported in this paper was supported by an Erasmus+ Student Mobility for Traineeships grant and a grant from the Swedish Research Council (VR project 2014-39) for the establishment of the Centre for Linguistic Theory and Studies in Probability (CLASP) at the University of Gothenburg.

## References

- Marco Baroni, Silvia Bernardini, Adriano Ferraresi, and Eros Zanchetta. 2009. The wacky wide web: a collection of very large linguistically processed web-crawled corpora. *Language resources and evaluation*, 43(3):209–226.

Herbert H. Clark. 1996. *Using language*. Cambridge University Press, Cambridge.

Robin Cooper. in prep. From perception to communication: An analysis of meaning and action using a theory of types with records (TTR). Draft at <https://sites.google.com/site/typetheorywithrecords/drafts>.

Jacob Devlin, Ming-Wei Chang, Kenton Lee, and Kristina Toutanova. 2018. BERT: pre-training of deep bidirectional transformers for language understanding. *arXiv*, arXiv:1810.04805 [cs.CL]:1–14.

Paradis. 2001. Adjectives and boundedness. *Cognitive Linguistics*.

Paul Portner and Aynat Rubinstein. 2014. Extreme and non-extreme deontic modals. *Oxford University Press*.