# Computational Models for the Semantic Bleaching of English Intensifiers

Paper presentation by Zara Bertram

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01

# Introduction

"From *insanely jealous* to *insanely delicious*: Computational models for the semantic bleaching of English intensifiers" (August 2019)

Yiwei Luo, Dan Jurafsky, Beth Levin

# Key Terms

## Semantic Bleaching

A word originally used in a specific context loses some of its meaning over time

E.g. literally

| Original usage | Bleached usage |
|---|---|
| **awfully** behaved | **awfully** nice |
| **wildly** flailing | **wildly** easy |
| **insanely** muttering | **insanely** delicious |
| **abundantly** endow | **abundantly** at ease |
| singing **terribly** | **terribly** sorry |
| **aggressively** demanded | **aggressively** sunny |

## Intensifier

An adverb that adds emphasis

E.g. very cold

## Reanalysis

A word changing via a more familiar form replacing an unfamiliar one

E.g. a napron > an apron

## Bridging Context

Words are used in a specific way due to context, but end up being used that way outside of that context

E.g. wildly flailing > wildly easy

# SIGNIFICANCE

## Why Study Semantic Bleaching?

Gain a better understanding of how language evolves

## Why is This Paper Important?

First computational study of semantic bleaching
Allows it to be analyzed as a quantifiable and continuous process
Builds the foundation for discovering what causes semantic bleaching

# 02

# BACKGROUND

# Prior Research

## DOCUMENTING

Meaning and Change of Meaning, Gustaf Stern, 1931 - Lays out different kinds of semantic shifts

Semantics: Studies in the Science of Meaning, Michel Breal, 1964 - Lays out laws and explanations about how meaning is formed and shifts

## DETECTING

A distributional similarity approach to the detection of semantic change in
the Google Books Ngram corpus, Kristina Gulordava, Marco Baroni, 2011 - Puts forward a method to detect semantic shifts

## ANALYZING?

# 03 Research Questions

## Q1

Can we build computational models of the bleaching process that match known semantic reflexes of bleaching?

## Q2

Can bleaching be explained in terms of reanalysis, by which certain contextual factors lead to one interpretation being favored over another?

## Q3

If bleaching is a form of reanalysis, what are the contexts that trigger this re-interpretation?

# Study 1: Do these methods capture bleaching?

## Ways of Measuring Semantic Bleaching

1. SimVery - increasing similarity to 'very'
2. SimLex - decreasing similarity to original meaning
3. Breadth - How semantically broad the words modified by the adverb are
4. TypeDiv - the number of types of words modified by the adverb

## Data Used

Google Books English Fiction (1850-1999)

# Study 1: Do these methods capture bleaching?

## Methods

Used a set of bleaching intensifiers + a control group of non-bleaching adverbs
Measured change over time in SimVery, SimLex, Breadth, and TypeDiv
Computed each bleaching metric with both W2V and SVD embeddings

| metric | sign of slope over time |
|---|---|
| SIMVERY | + |
| SIMLEX | – |
| BREADTH | + |

## Results

Signs of slopes matched predictions
SimVery and Breadth statistically significant
SimLex only significant with W2V

For control set, SimLex not significant,
SimVery is significant when using W2V, but slope is greater for intensifiers than control

Shows that the study's methods do capture bleaching

| | most bleached | least bleached |
|---|---|---|
| SIMVERY | **extremely**, terribly, truly, awfully, *definitely*, remarkably, **absolutely**, precisely, honestly, seriously | amply, vigorously, richly, *heavily*, violently, mysteriously, profusely, severely, furiously, miraculously |
| SIMLEX | entirely, decidedly, *heavily*, supremely, **particularly**, sorely, literally, deeply, especially, sharply | pleasantly, abundantly, enthusiastically, intensely, delightfully, *definitely*, furiously, curiously, *evidently*, **profusely** |
| BREADTH | wholly, completely, **particularly**, deeply, *evidently*, distinctly, **absolutely**, **extremely**, perfectly, clearly | grievously, gorgeously, stupendously, surpassingly, outrageously, miraculously, deliciously, extravagantly, **profusely**, ludicrously |

# Study 2: Testing a causal theory

## Hypothesis

When an adverb begins to modify adjectives that are semantically similar to itself, the adverb begins to be re-interpreted as an intensifier.

(1) a. There is an **abnormally** disproportionate lack of demand.
b. The most **abnormally** developed organs [...]

(2) a. [...] but it has left these rooms **awfully** dirty.
b. [...] most **awfully** behaved girl she had ever met.

(3) a. The scenery on the river was **beautifully** picturesque [...]
b. The country is **beautifully** broken, highly fertile, and cultivated like a garden.

SimAdjMod - Similarity between an adverb and the adjectives modified by the adverb

Expected to be positively correlated with rate of bleaching

## Methods

Took the rate of bleaching using SimVery, SimLex, and Breadth for each adverb

Took average cosine similarity between adverb and the adjective it modified

# Study 2: Testing a causal theory

## Results

Rate of bleaching was positively correlated with SimAdjMod, indicating that there is truth to the hypothesis that semantic similarity between adverb and adjective leads to bleaching

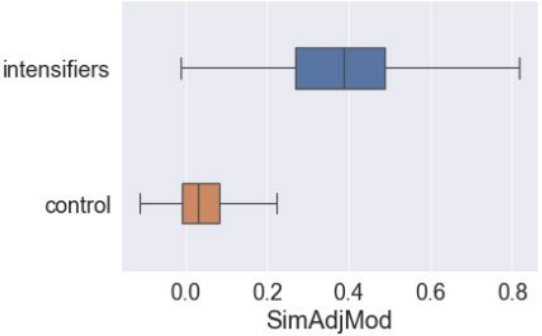
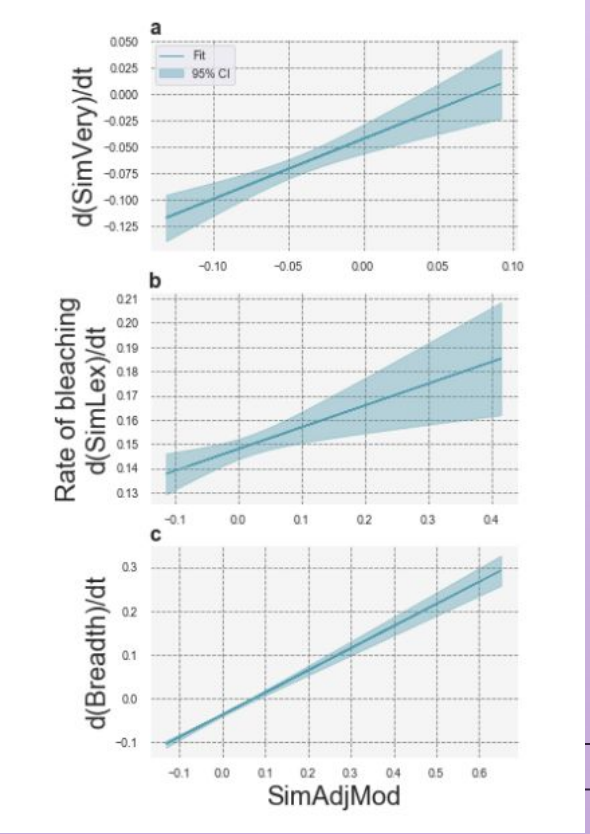



Figure 4. Intensifiers on average modify semantically more similar adjectives compared to control adverbs.



05

# OVERALL FINDINGS

Hypothesis of this paper supported by findings

Lends credence to explanation of shared meaning between adverb and adjective leading to bleaching

# 06 COMMENTARY

Potential bias due to increasing corpus size over years

Very solid paper overall, interesting to see how this research could be furthered to discover more about semantic bleaching

Metrics used in this paper could be useful for further research, sets up a useful framework for consistent research into semantic bleaching

Would've liked to know more about alternative theories to causes of semantic bleaching, paper briefly mentions a couple at the end

07

# QUIZ!

# Question 1: What is an intensifier?

a. An adverb that adds emphasis

b. A noun with an intense meaning

c. A strategy to increase tension in novels

d. A changing of tense in a body of work

# Question 2: What is reanalysis in linguistics?

a. Analyzing a set of data for a second time

b. Going back and changing the way a word was analyzed

c. A word reversing its meaning

d. A word changing from an unfamiliar form to a more familiar one

# Question 3: Semantic bleaching is the process by which...

a. A group of words gains a different meaning than its individual words

b. A word loses its meaning over time

c. A word loses its emphasis with overuse

d. A word becomes the antonym to its previous meaning over time

# Question 4: Which of the following is NOT a method to measure semantic bleaching?

a. SimVery

c. Depth

b. SimLex

d. Breadth

# THANKS!

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