



Modeling Empathy and Distress in Written Language

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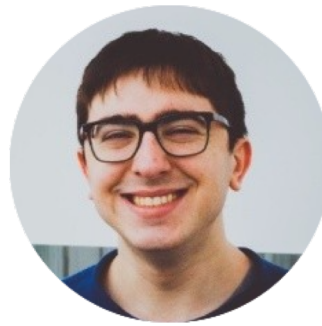
The People Behind This Work



João Sedoc



Barry Slaff



Yoni Nachmany



Anneke Buffone



Lyle Ungar

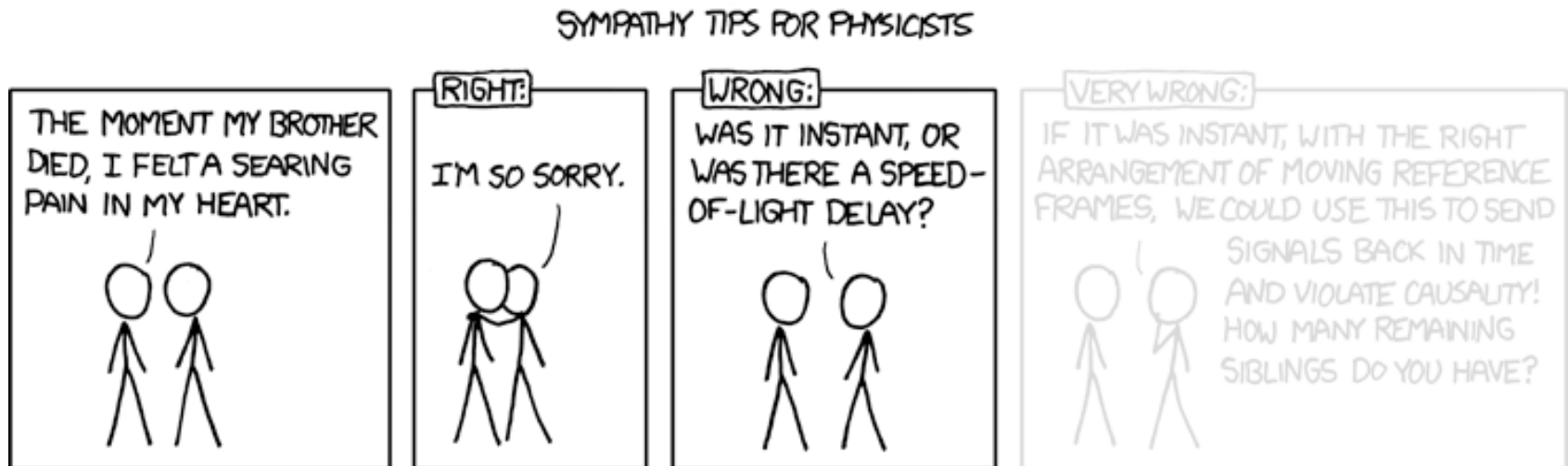
Outline

- A Gold Standard for Empathy and Distress
- Generating Lexica for Empathy and Distress
- WASSA 2020 Shared Task on Empathy and Distress

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- **A Gold Standard for Empathy and Distress**
 - Generating Lexica for Empathy and Distress
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Why Empathy?

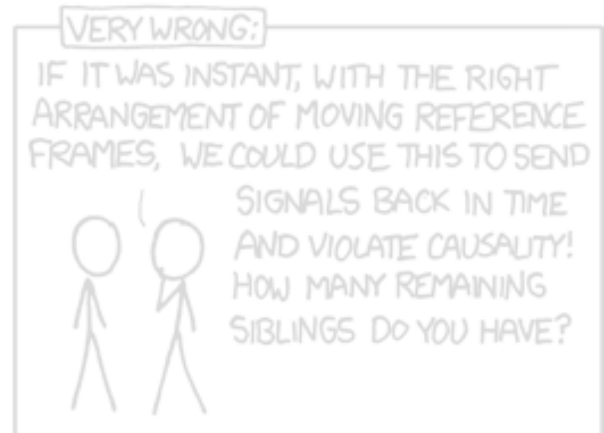
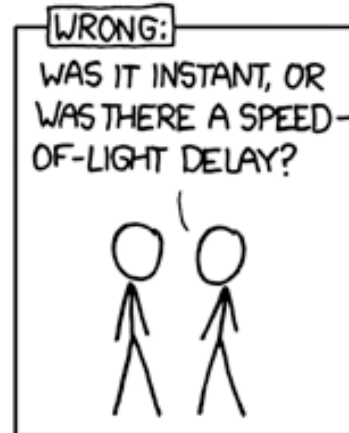


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Why Empathy?

EMPATHY TIPS FOR ENGINEERS

~~SYMPATHY TIPS FOR PHYSICISTS~~



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Why Empathy?

Psychology & Medicine

well-being, longevity but also physiological stress and emotional pain

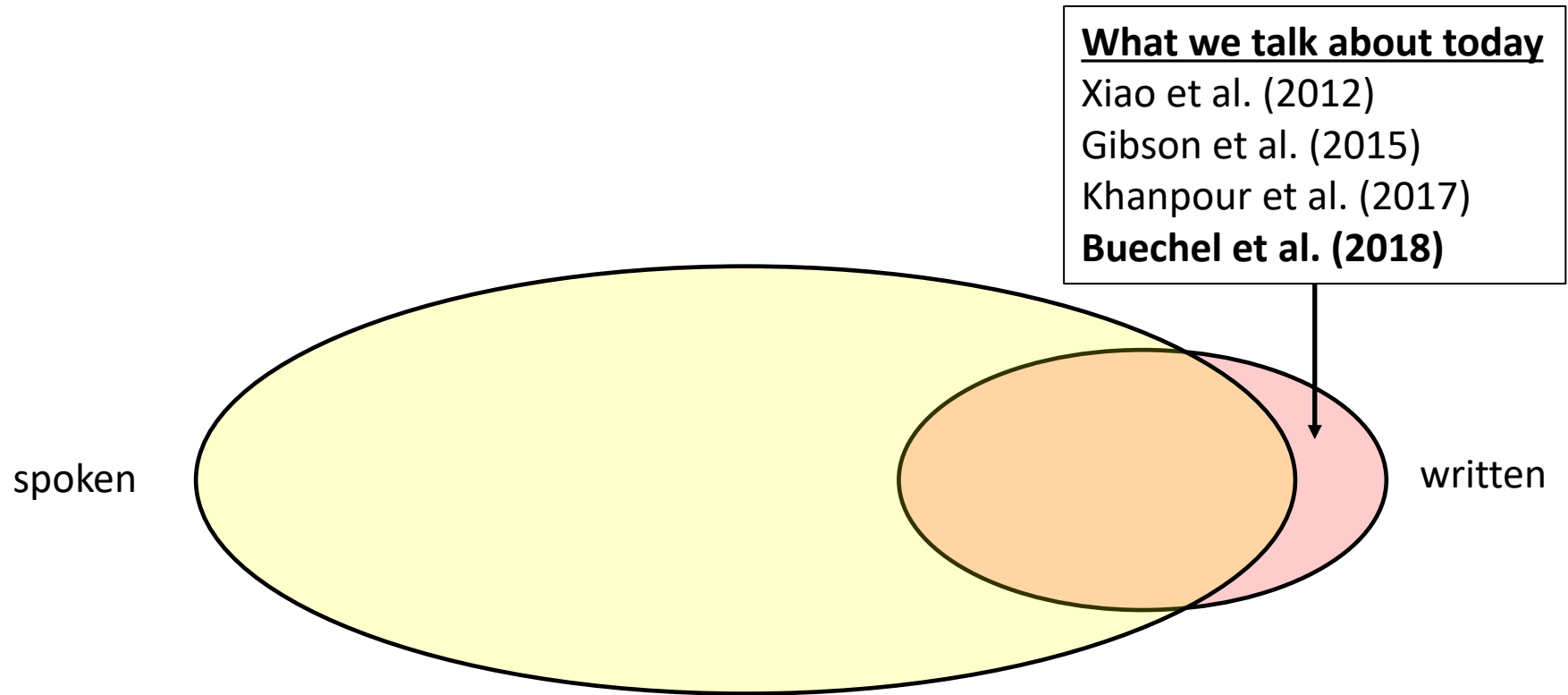
Social Science

charity and volunteering

AI

natural language user interfaces

Prior Work Is Scarce



Shortcomings of Prior Work

- No publicly available gold standard
- 3rd person ground truth
- Disconnected from psychological theory and research

Contribution

- No publicly available gold standard
- 3rd person ground truth
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Contribution

- No publicly available gold standard
 - First publicly available gold standard (CC-BY)
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 - Annotations by the experiencer
(new annotation methodology)
- Disconnected from psychological theory and research

Contribution

- No publicly available gold standard
 - First publicly available gold standard (CC-BY)
- 3rd person ground truth
 - Annotations by the experiencer
(new annotation methodology)
- Disconnected from psychological theory and research
 - Distinguish two different types of empathy
(in line with psych. research)

Empathic Concern vs. Personal Distress

Distinction by Batson et al. (1987)

Empathic Concern vs. Personal Distress

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Empathic Concern

positive, other-focused: “feeling **FOR** someone”

~ (Dan Goleman)



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Personal Distress

negative, self-focused: “feeling **WITH** someone”



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Personal Distress

negative, self-focused: “feeling **WITH** someone”



Post-hoc analysis shows that both are distinct ($r=.45$)

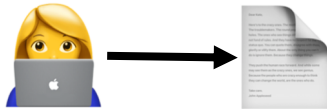
Problem Definition

Message	Empathy	Distress
<i>I'm sorry to hear about Dakota's parents. [...]</i>	4.8	3.1

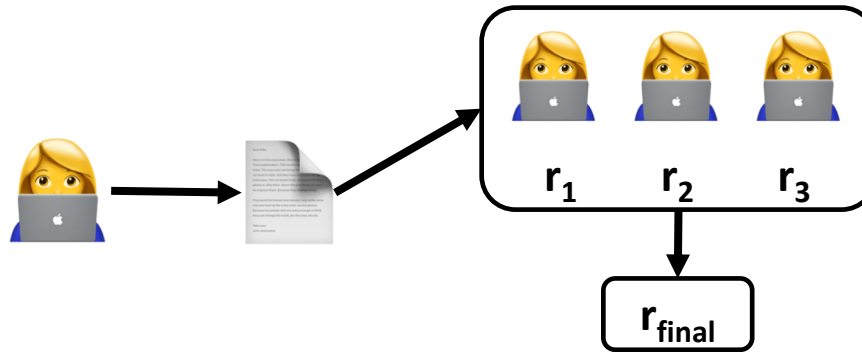
- Given a natural language utterance ...
- ... predict empathy and distress **of the writer** from [1, 7]
- Momentary state, **not** personality trait

Annotation Methodology

Traditional

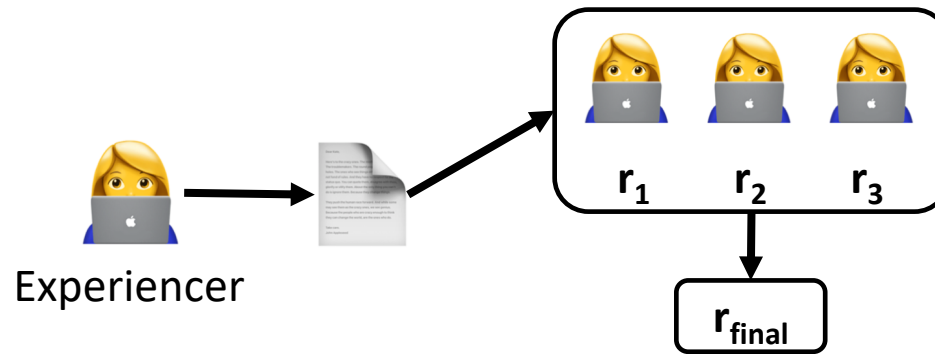


Annotation Methodology



Traditional

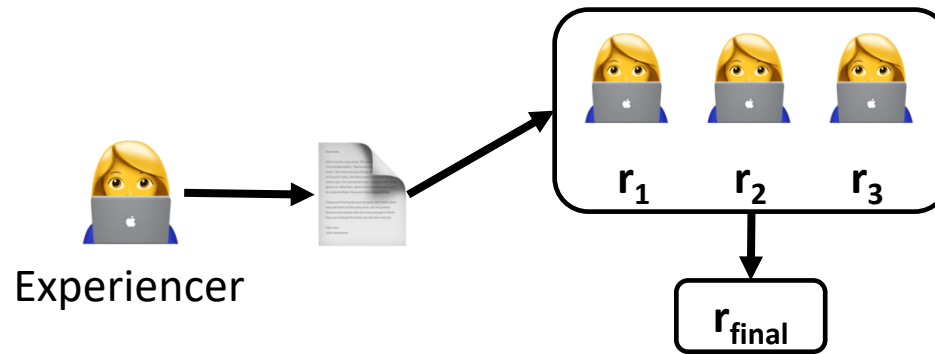
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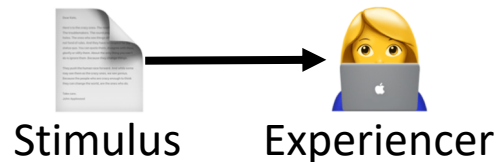
- Annotators “guess” experiencer’s feelings
- Models biased towards annotators

Annotation Methodology



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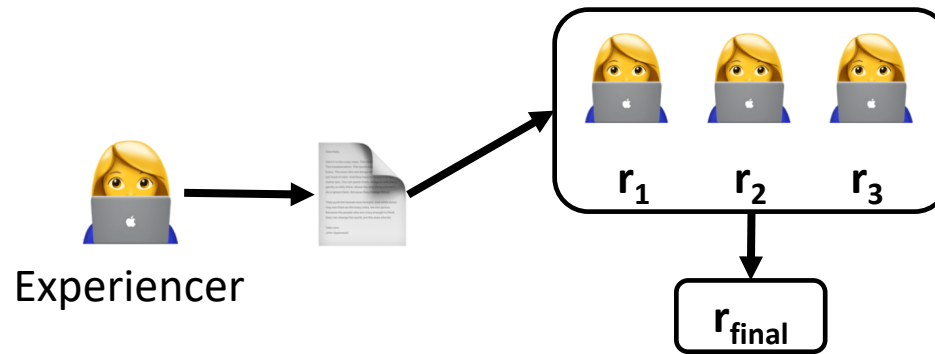
- Annotators “guess” experimenter’s feelings
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Proposed

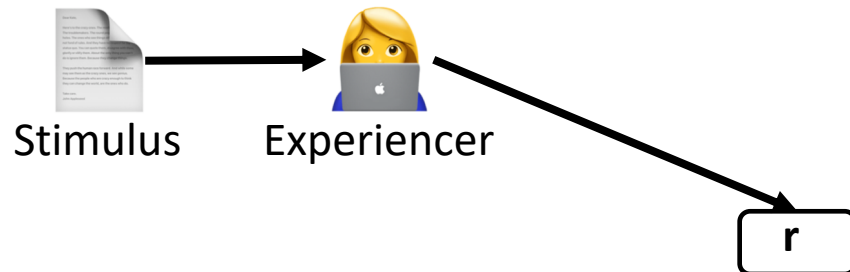
- Annotation as psych. experiment

Annotation Methodology



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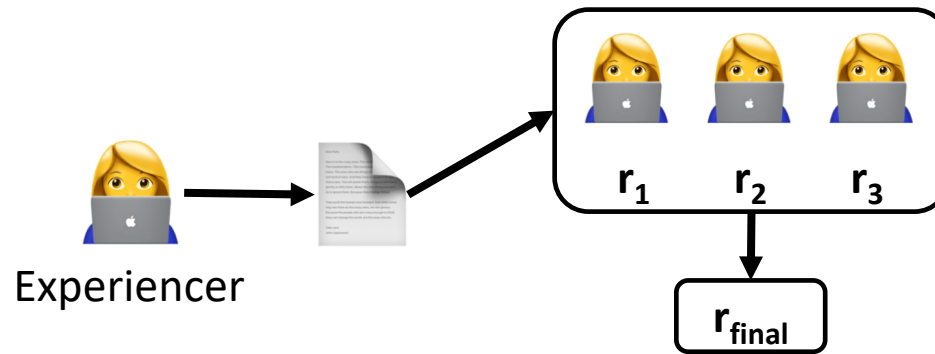
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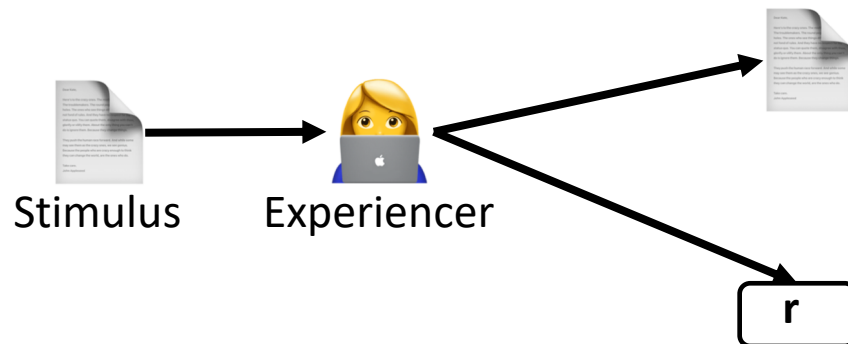
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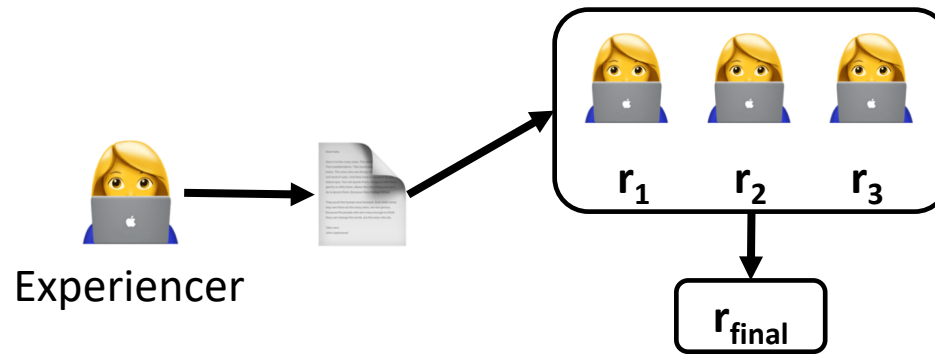
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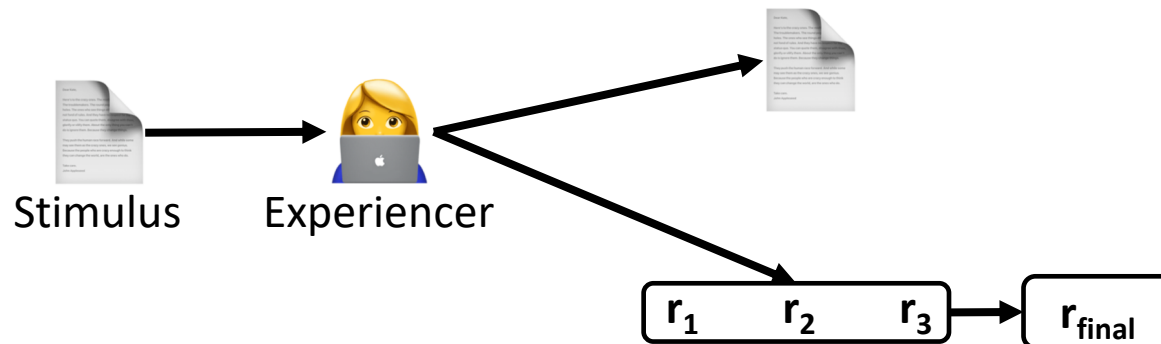
- Annotation as psych. experiment
- Experiencer produces **message and rating**

Annotation Methodology



Traditional

- Annotators “guess” experimenter’s feelings
- Models biased towards annotators



Proposed

- Annotation as psych. experiment
- Experiencer produces **message and rating**
- Reliable through **multi-item scales**

Use of Multi-Item Scales

How strongly do you feel the following emotion? Using the 1-7 scale below, please indicate your agreement.

	Not at All 1	2	3	4	5	6	Extremely 7
Warm	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tender	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sympathetic	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Softhearted	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Moved	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Compassionate	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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2

3

4

5

6

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Warm

Tender

Sympathetic

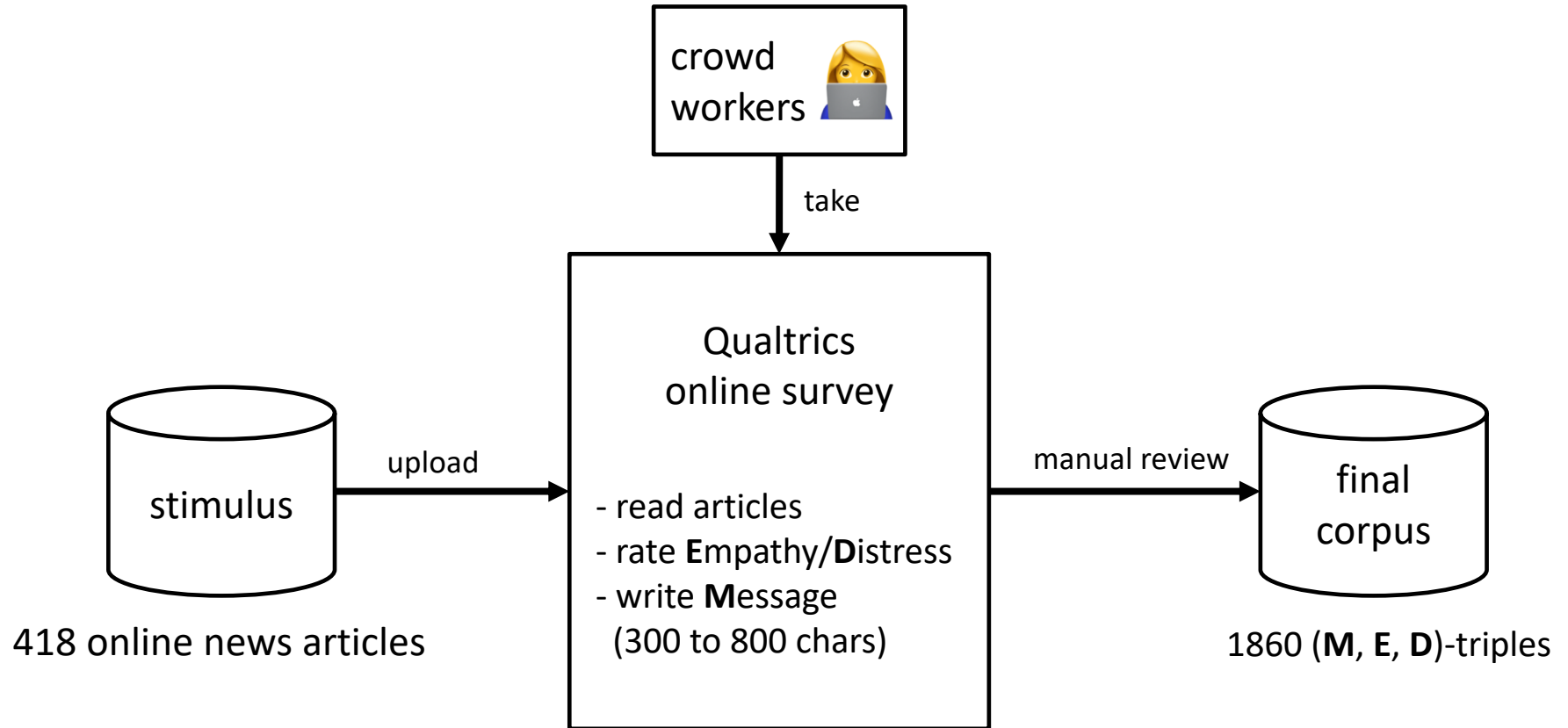
Softhearted

Moved

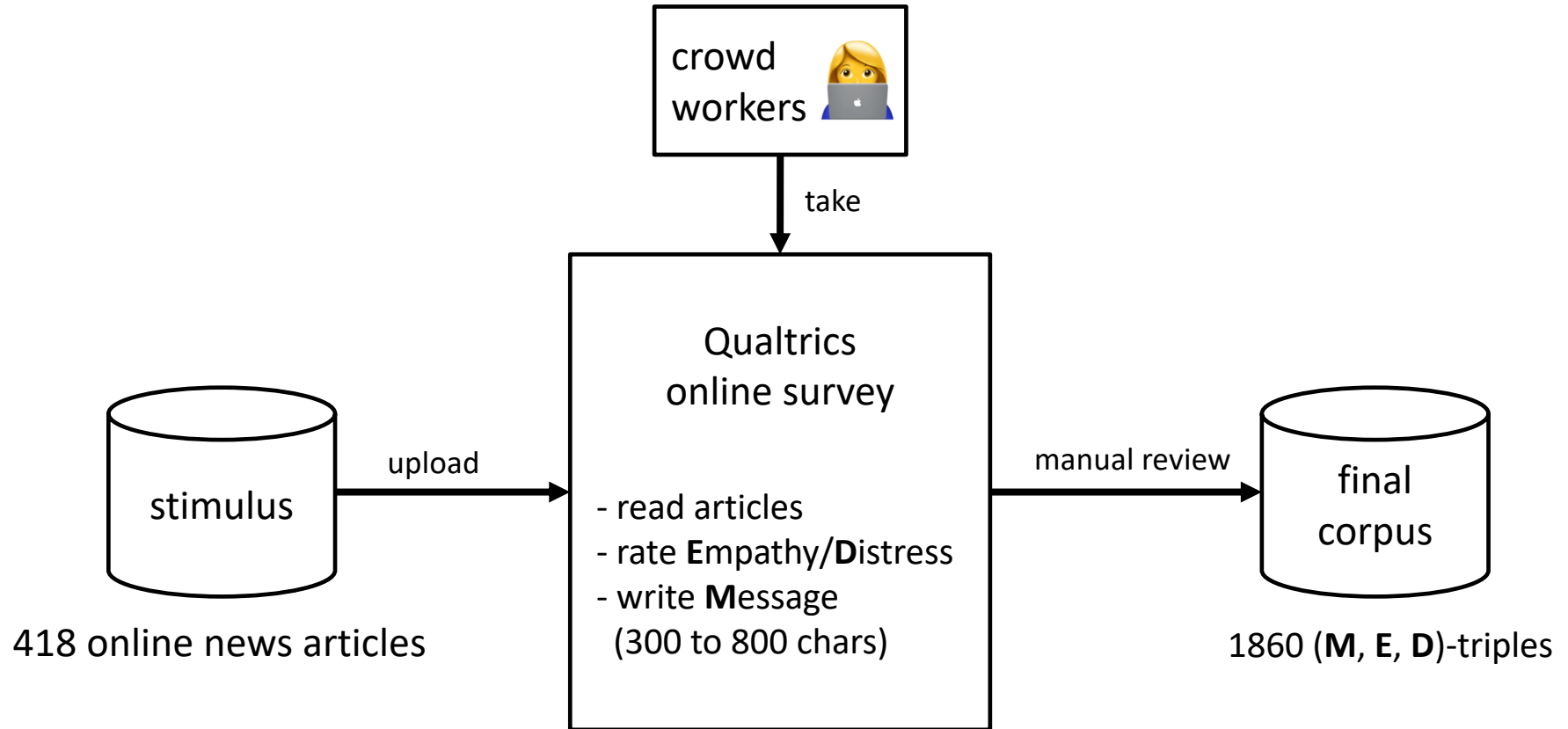
Compassionate

Mean

EMPATHIC REACTIONS: Creation Process



EMPATHIC REACTIONS: Creation Process



Split-half reliability around $r=.9$ for both empathy and distress 😊

Exemplary Entries

Empathy	Distress	Message
4.8	3.1	<i>I'm sorry to hear about Dakota's parents. No one wants that to happen and it's unfortunate that her parents couldn't work it out. I hope they are able to still remain civil around the kids and family. [...]</i>
4.0	5.5	<i>Here's an article about [a] crazed person who murdered two unfortunate women overseas. Life is crazy. [...] It feels like there's no place safe in this world to be a woman sometimes.</i>
1.0	1.3	<i>I just read an article about some chowder-head who used a hammer and a pick ax to destroy Donald Trump's star on the Hollywood walk of fame. [...] Lol, can you believe this garbage? Who has such a hollow and pathetic life that they don't have anything better to do with their time than commit petty vandalism because they dislike some politician? [...]</i>

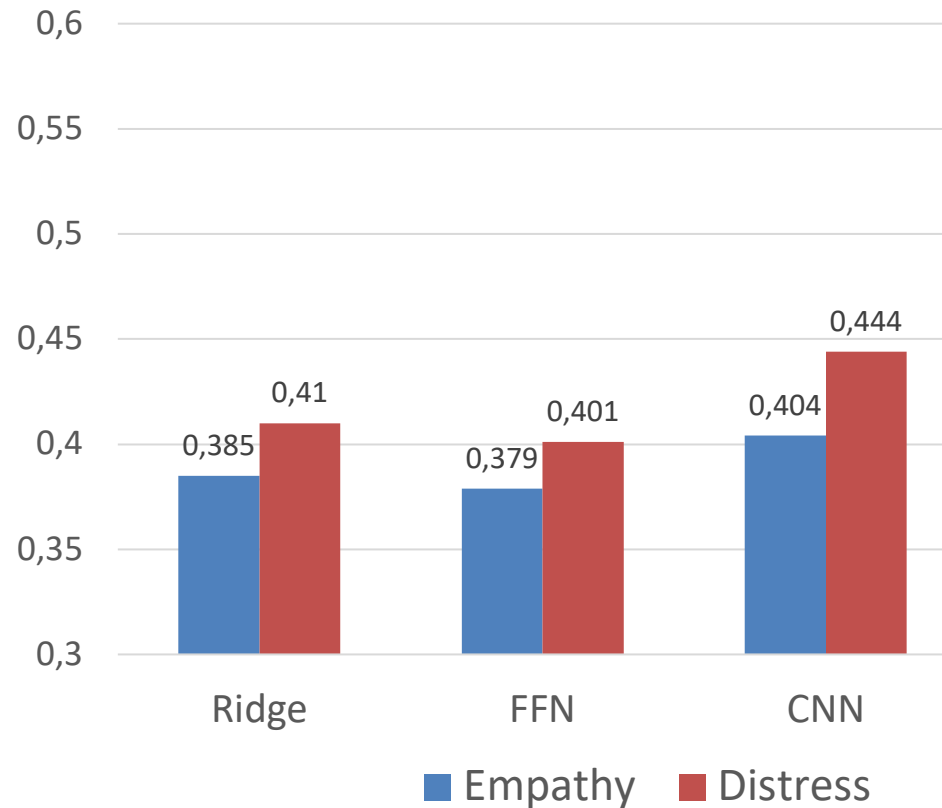
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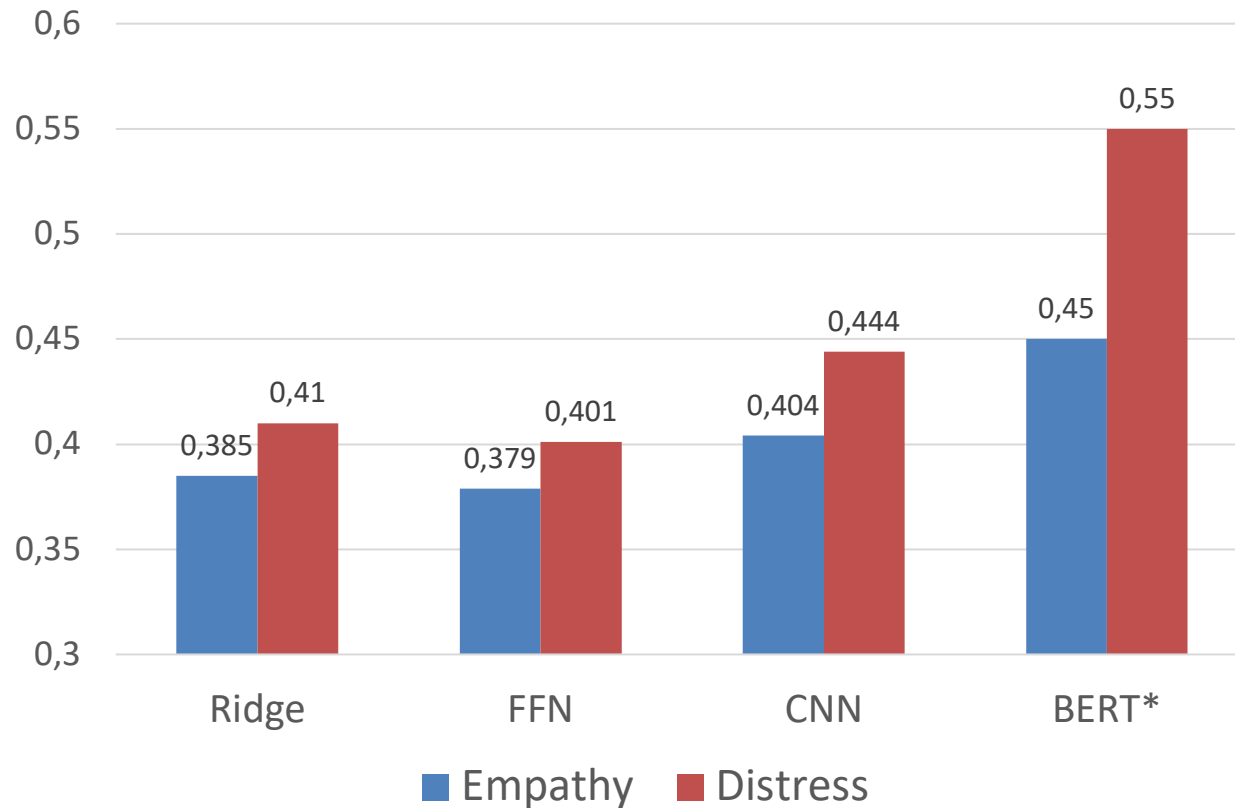
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Baseline Modeling



Baseline Modeling



* Wang et al., arXiv:1905.00537

Interim Conclusion I

- Empathy is underrepresented in resources and modeling
- First publicly available gold standard
 - Empathic Concern vs. Personal Distress
 - New annotation methodology collects reliable ratings **from the experiencer** using multi-item scales

Outline

- **A Gold Standard for Empathy and Distress**
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Words Associated with Empathy

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Moved	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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Applies to many other „constructs“ as well

What Do We Have Lexica For?

- **Emotion**

Warriner et al., BRM 2013

- **Abstractness**

Brysbaert et al., BRM 2014

- **Imageability**

Yee, PloS One 2017

- **Humor**

Engelthaler & Hills, BRM 2017

Lemma	Emotion	
	Valence	Arousal
<i>sunshine</i>	7.6	4.9
<i>calm</i>	6.3	1.9
<i>terrorism</i>	1.5	8.4

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- **Empathy is missing!**


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Empathic Chatbots

Did you hear about the earthquake? The poor children, they must have witnessed a horrific scene in Haiti.



Empathic Chatbots



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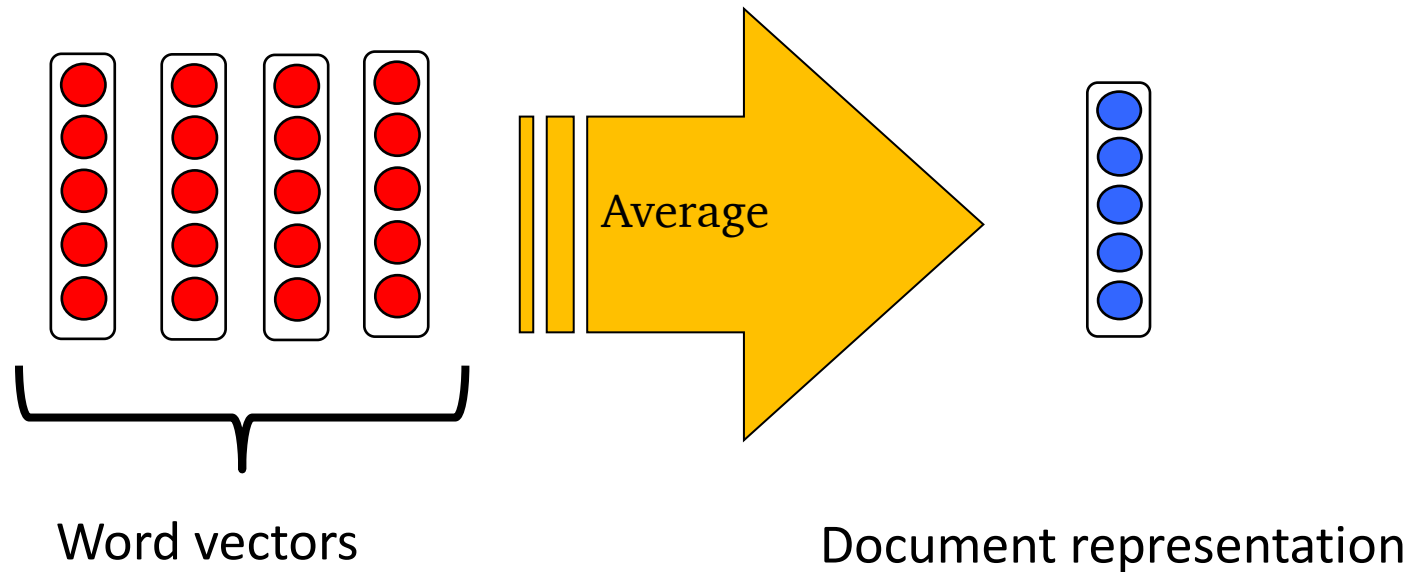


I think you are feeling distressed about this because you said that "they must have witnessed a horrific scene in Haiti." Let us hope that the children in Haiti can heal from that horrible trauma.

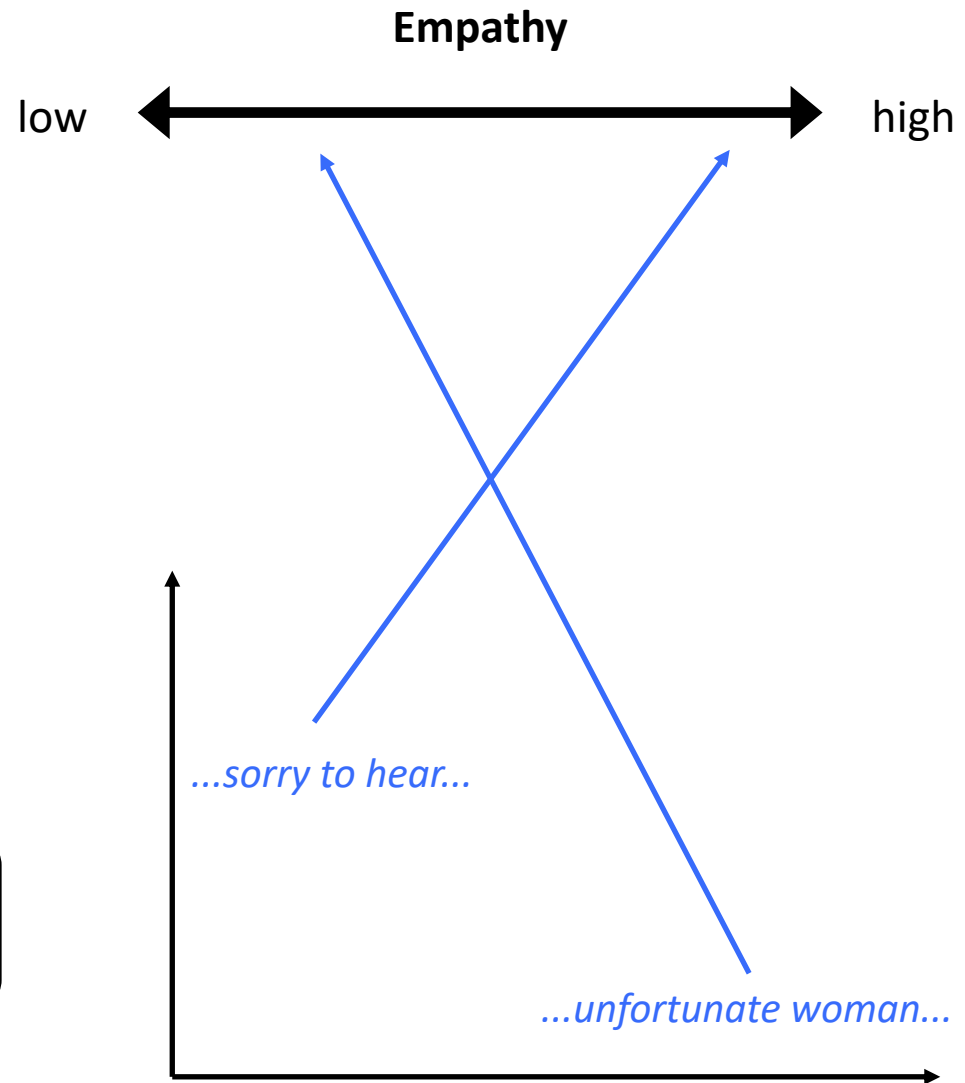
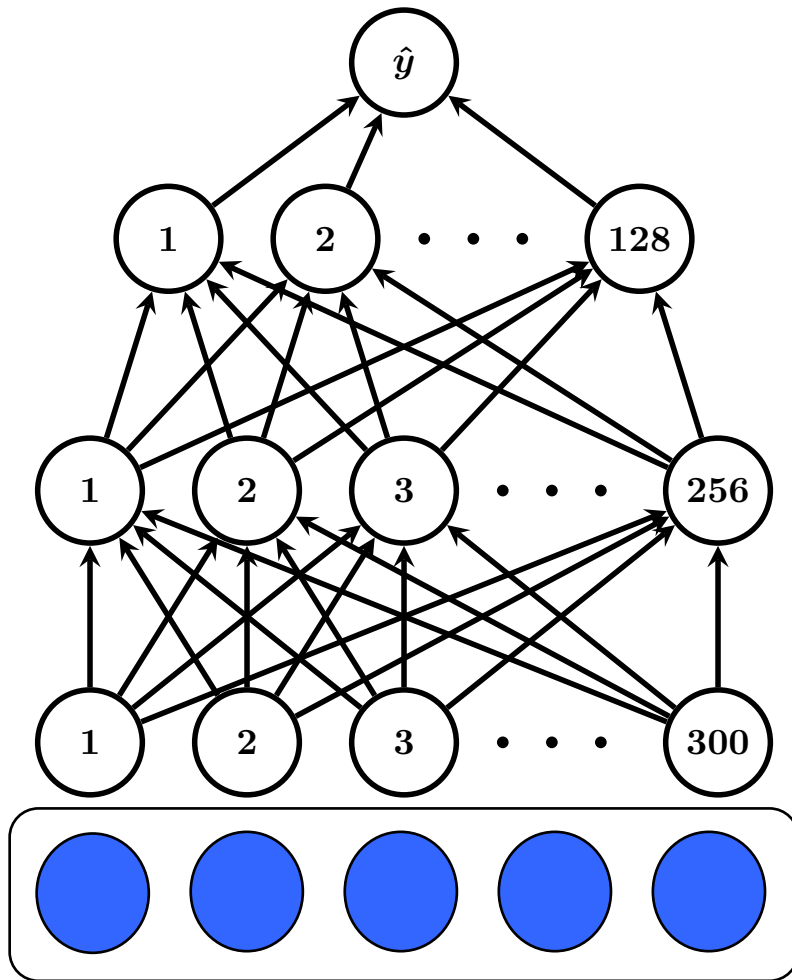
Lexicon Creation

- **Training:** Build neural net model to predict empathy/distress from words
- **Prediction:** ‘Invert’ model to find empathy/distress scores of each word
- **Analysis:** Cluster words to find semantic groups of high empathy/distress

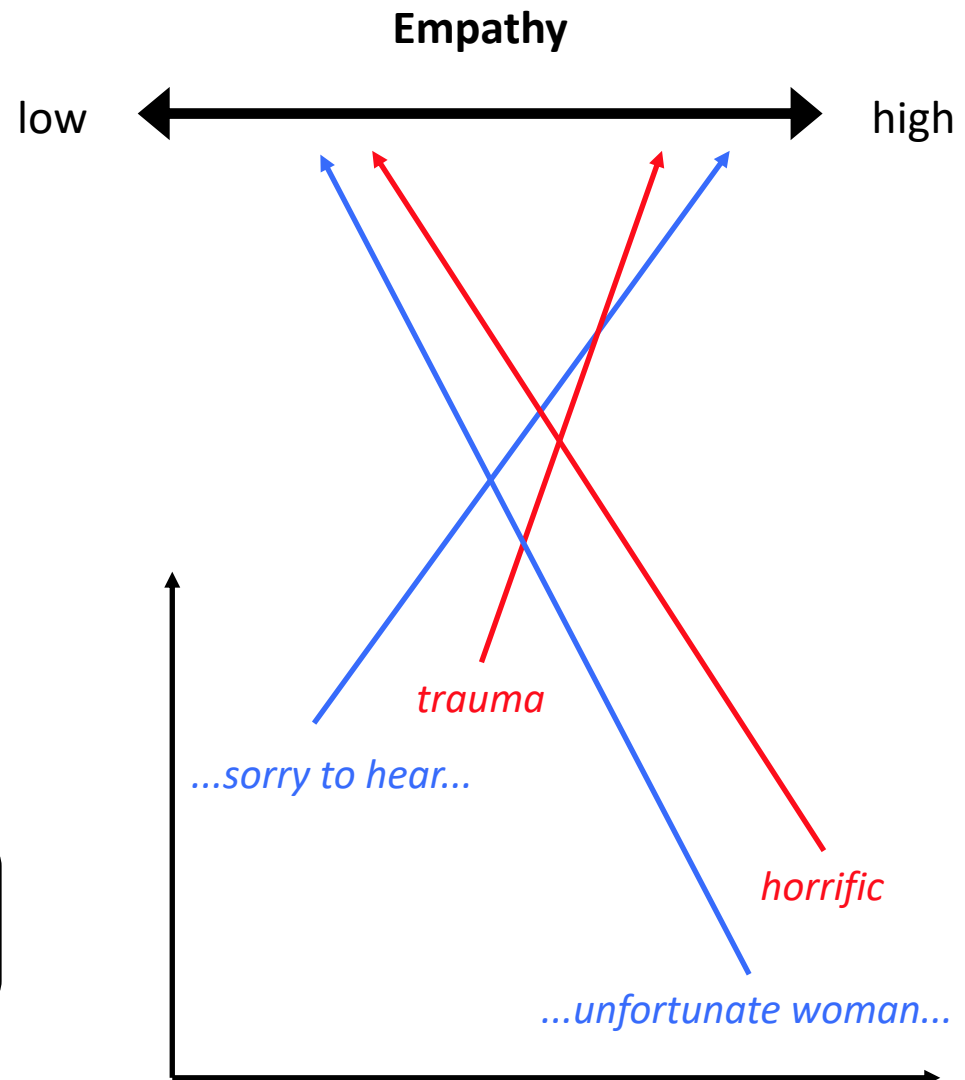
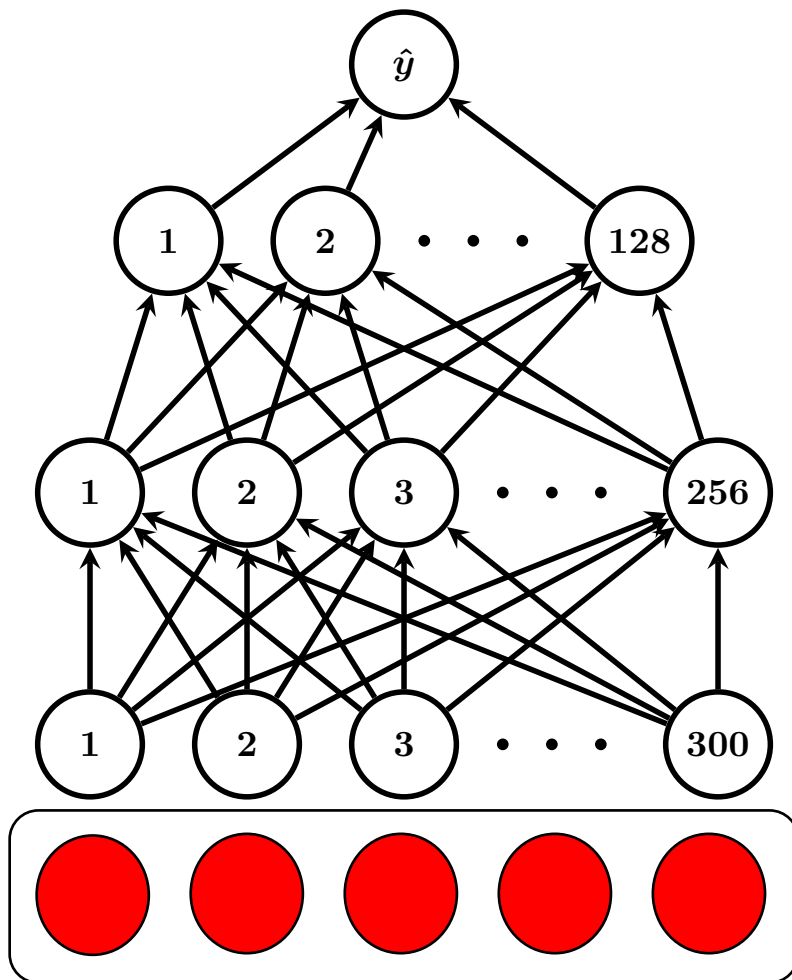
Represent Documents by Word Vector Average



Training Model on Document Ratings



'Invert' Model to Obtain Word Ratings



The Empathy and Distress Lexica

- Predictions for all word types in Empathic Reactions
- About 9,300 entries
- Ratings normalized to [1, 7]

Word	Empathy
lukemia	6.90
lakota	6.70
healing	6.60
.	.
.	.
.	.
wacky	1.10
worrying	1.10
joke	1.10

The Empathy and Distress Lexica

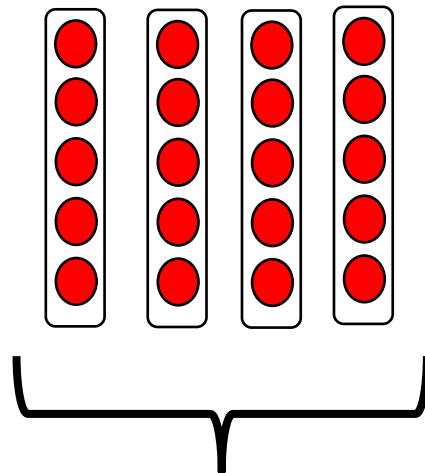
Which semantic groups are associated with Empathy or Distress?

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Signed Clustering

(Sedoc et al., ACL 2017)

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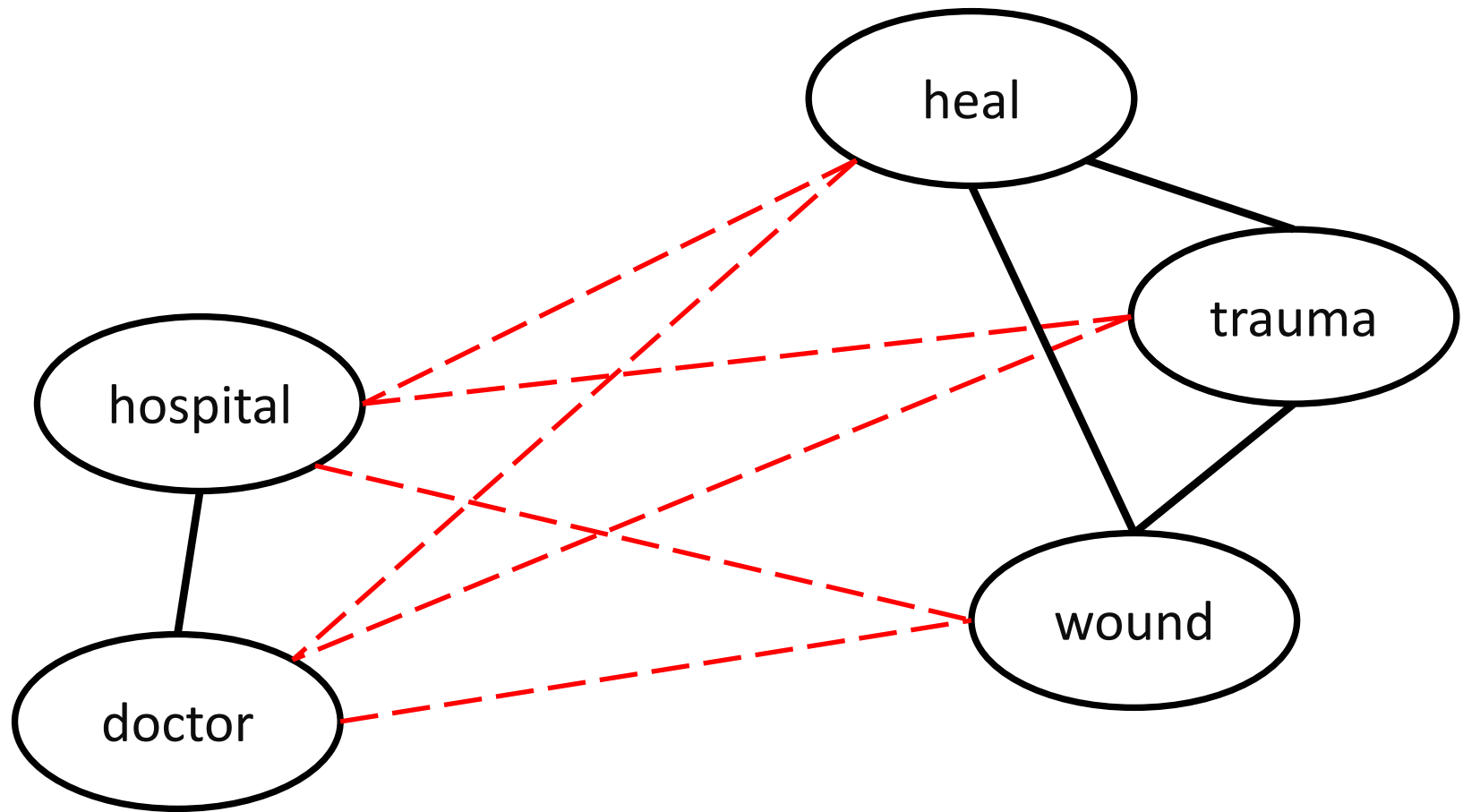


Word vectors

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Signed Clustering

(Sedoc et al., ACL 2017)



Signed Clusters for Empathy and Distress

High Empathy	<ul style="list-style-type: none"> ● grieve, grieving, loss, prayers, grief, heartbroken, losses, depression, condolences, widowed ● wounds, wounded, scars, heal, blisters, trauma, wound, heals, bleeding, fasciitis ● duckworth, salama, mansour, santiago, gilbert, fernandez, braves, vaughn, colonialism, crowe ● minneapolis, neighborhoods, detroit, chicago, charlotte, cincinnati, brisbane, angeles, atlanta, drescher
Low Empathy	<ul style="list-style-type: none"> ● fool, clueless, dumbass, idiotic, lazy, stupidity, morons, idiot, idiots, dumb ● bother, slightest, anything, else, nobody, anybody, any, nothing, anyone, himself ● loser, bs, moron, dingus, maniac, buffoon, ffs, loon, crap, psycho ● wacky, bizarre, odd, creepy, weird, unnerving, masochistic, freaks, unusual, strange
High Distress	<ul style="list-style-type: none"> ● homicide, killings, murdered, massacre, murdering, homicides, genocide, murder, murderers, killed ● brutalized, assaulted, raped, bullied, tormented, harassed, detained, molested, reprimanded, beaten ● horrific, witnessed, retched, wretched, atrocious, awful, horrid, foul, shoddy, unpleasant ● horrifying, terrifying, harrowing, overdoses, suicides, deaths, suicide, gruesome, devastating, tragedy
Low Distress	<ul style="list-style-type: none"> ● dunno, guessing, guess, gues, probably, assuming, maybe, clue, bet, assume ● wont, knowlegde, alot, doesnt, isnt, wasnt, ahve, dont, didnt, exempt ● sort, lot, bunch, sorts, type, whatever, plenty, depending, types, range ● intact, stays, rememeber, keeping, keeps, always, kept, vague, rember, stay

Interim Conclusion II

- Empathy lexicon is lacking for both NLP and psychology
- New approach to lexicon learning from document labels by ‘inverting’ an FFN
- Insights into semantics of empathy/distress words by signed clustering

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Outline

- A Gold Standard for Empathy and Distress
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- **WASSA 2020 Shared Task on Empathy and Distress**

Problem Definition

Message	Empathy	Distress
<i>I'm sorry to hear about Dakota's parents. [...]</i>	4.8	3.1

- Given a natural language utterance ...
- ... predict empathy and distress **of the writer** from [1, 7]

Dataset

- Empathic Reactions with 1860 instances
- Secondary train / dev set with 500+ instances
- Test set with 500+ instances

Example Schedule

(Assuming WASSA 2020 @ EACL)

Release of primary train set	Already available
Release of secondary train/dev set	October 1, 2019
Evaluation period	December 1–15, 2019
Submission deadline for system descriptions	January 15, 2020
Acceptance notification	February 15, 2020
Camera-ready deadline	March 1, 2020
Event Date	April 15, 2020

Conclusion

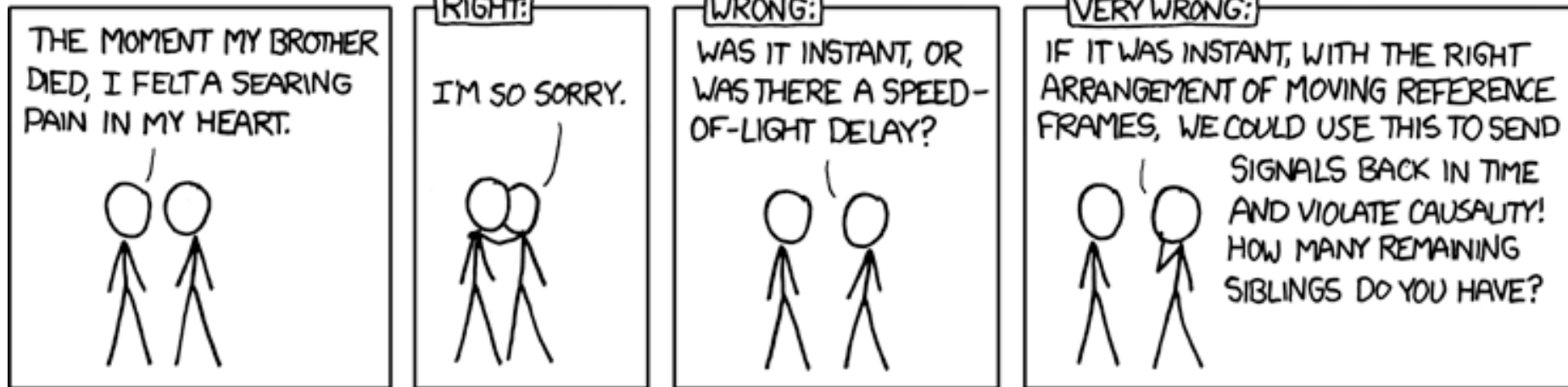
Conclusion

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- First empathy/distress lexicon by „inverting“ NN model
- Stay tuned for WASSA 2020 Empathy Shared Task!

EMPATHY TIPS FOR ENGINEERS

~~EMPATHY TIPS FOR PHYSICISTS~~

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Empathic Reactions Dataset




https://github.com/wwbp/empathic_reactions

Speaker

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 @sven_buechel

 @buechel