

# A Unified Feature Representation for Lexical Connotations

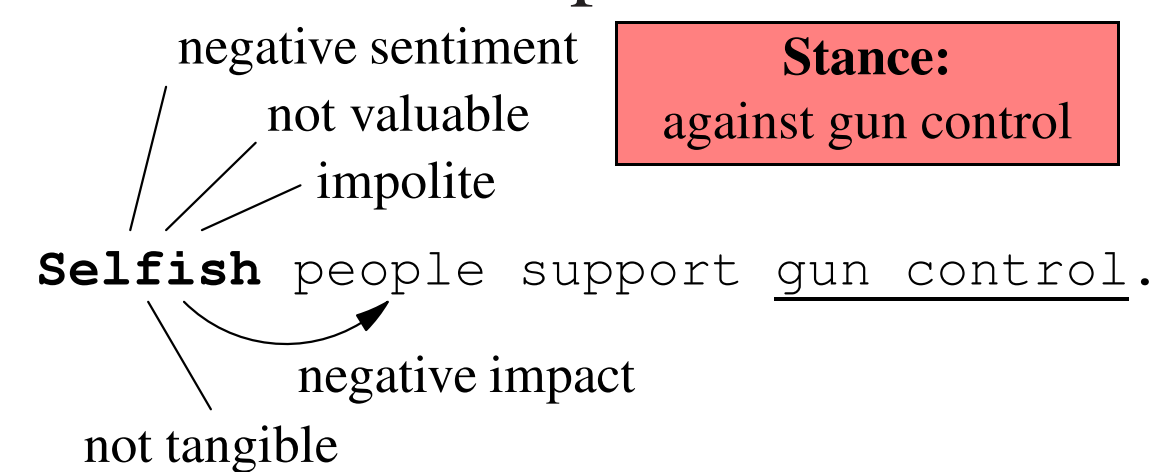
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## Connotations

### Motivation

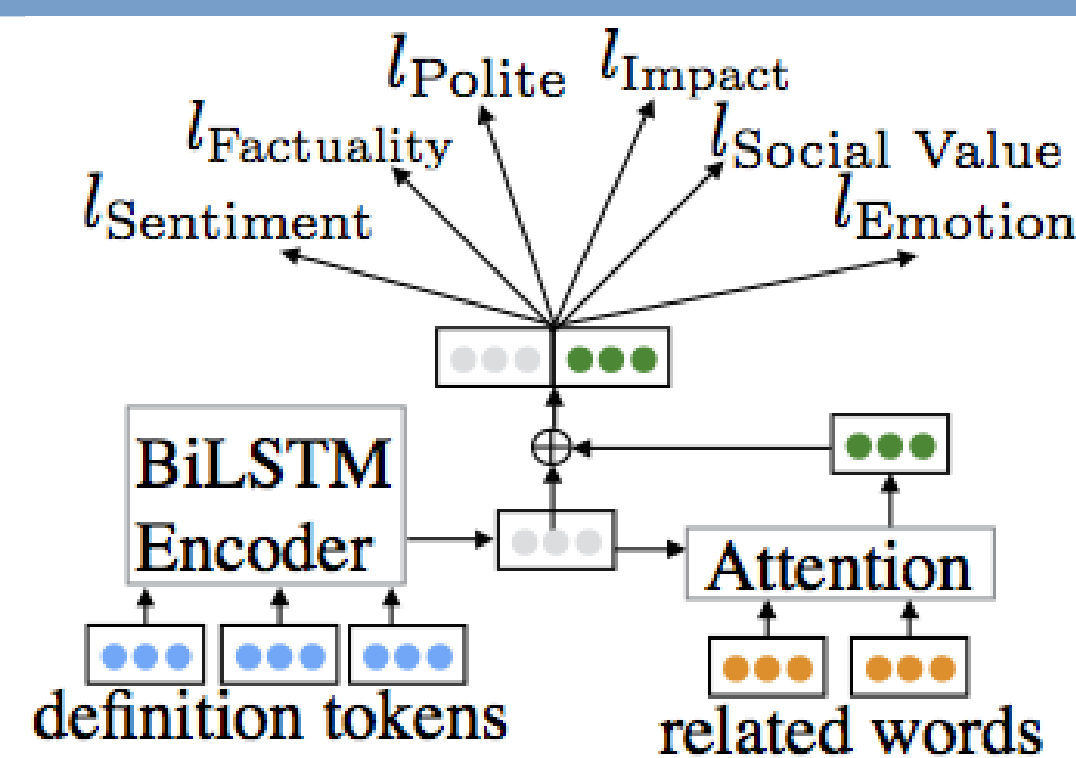
What hidden influences do words convey and what is their impact?



### Contributions:

- New connotation lexicon of  $\sim 7.5k$  nouns and adjectives with **6** new aspects
  - Aligns well with human judgments
  - Confirms hypotheses about synonym differences
- Train connotation representations for words from all parts of speech
  - Connotation representations improve low-resource stance detection

## Connotation Representations

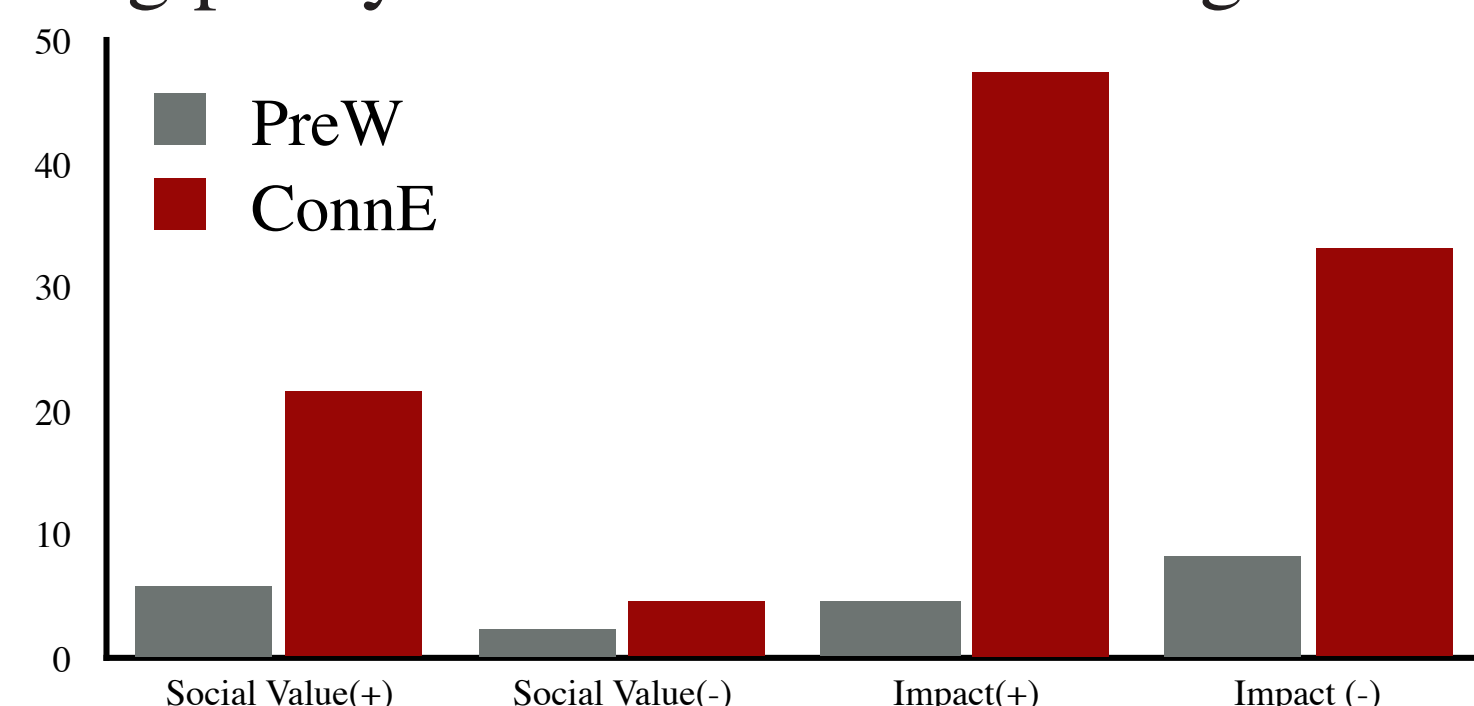


**Goal:** Combine multiple lexica for a unified, adaptable representation

- Multi-task learning
- Input: dictionary definitions & related words
- Aspect prediction = task (17 tasks)

### Intrinsic Evaluation

Avg purity ratio of 50 nearest neighbors



## A Connotation Lexicon for Nouns and Adjectives

### Example Distant Labeling Rules

Aspect	Examples	Example Rules	Lex
<i>Social Value</i>	attorney $\leadsto$ valuable (+) aimless $\leadsto$ not valuable (-)	Authoritative power $\rightarrow$ valuable Related to failure $\rightarrow$ not valuable	HGI
<i>Politeness</i>	commendable $\leadsto$ polite (+) alienation $\leadsto$ impolite (-)	Gain of respect $\rightarrow$ polite Loss of affection $\rightarrow$ impolite	HGI
<i>Impact</i>	adept $\leadsto$ positive impact (+) shock $\leadsto$ negative impact (-)	Virtue $\rightarrow$ positive Loss of well-being $\rightarrow$ negative	HGI
<i>Factuality</i>	rocky $\leadsto$ factual (+) tradition $\leadsto$ not factual(-)	Imagery( $w$ ) $> \theta_F \rightarrow$ factual Imagery( $w$ ) $< -\theta_F \rightarrow$ not factual	DAL
<i>Sentiment</i>	song $\leadsto$ positive (+) cancerous $\leadsto$ negative (-)	$v > \theta_S \rightarrow$ positive $v < -\theta_S \rightarrow$ negative	CWN
<i>Emotional Association</i>	snake $\leadsto$ {disgust, fear} effective $\leadsto$ {trust}	emotions $E \subseteq$ {anger, joy, fear, trust, anticipation, sadness, disgust, surprise}	NRCE

HGI: Harvard General Inquirer, DAL: Dictionary of Affect in Language, CWN: Connotation WordNet, NRCE: NRC Emotion Lexicon

### Labeling Process

- Combine dimensions of existing lexica
- Word-sense independent
- Emotional association: Plutchik emotions
- All other dimensions  $\ell \in \{-1, 0, 1\}$

### Statistics

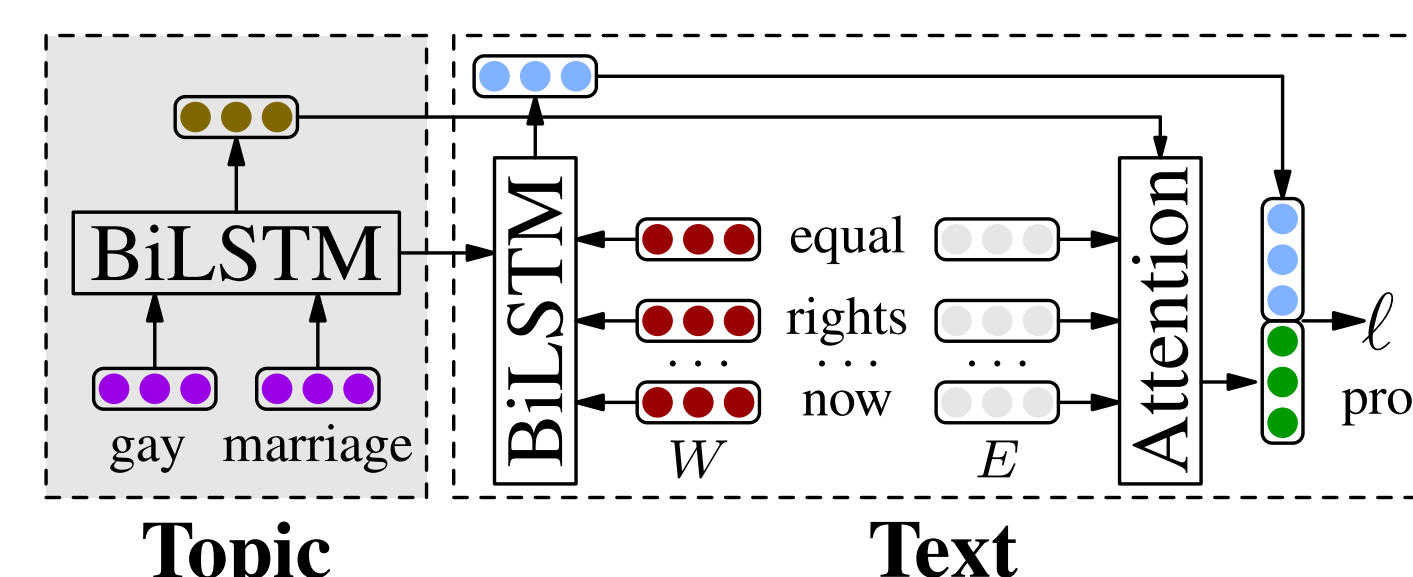
- 7,578 fully-labeled words
- $\sim 93k$  labeled only some aspects

### Class Distributions

	<i>Social Value</i>	<i>Polite</i>	<i>Impact</i>	<i>Fact</i>	<i>Sent</i>
%+	32.1	10.5	14.8	19.0	56.8
%-	15.5	1.0	13.3	67.2	33.1

## Evaluation on Stance Detection

### Stance Detection Model



- BiCond (Augenstein et al., 2016)
- $E \in \{\text{ConnE, PreW, Random}\}$

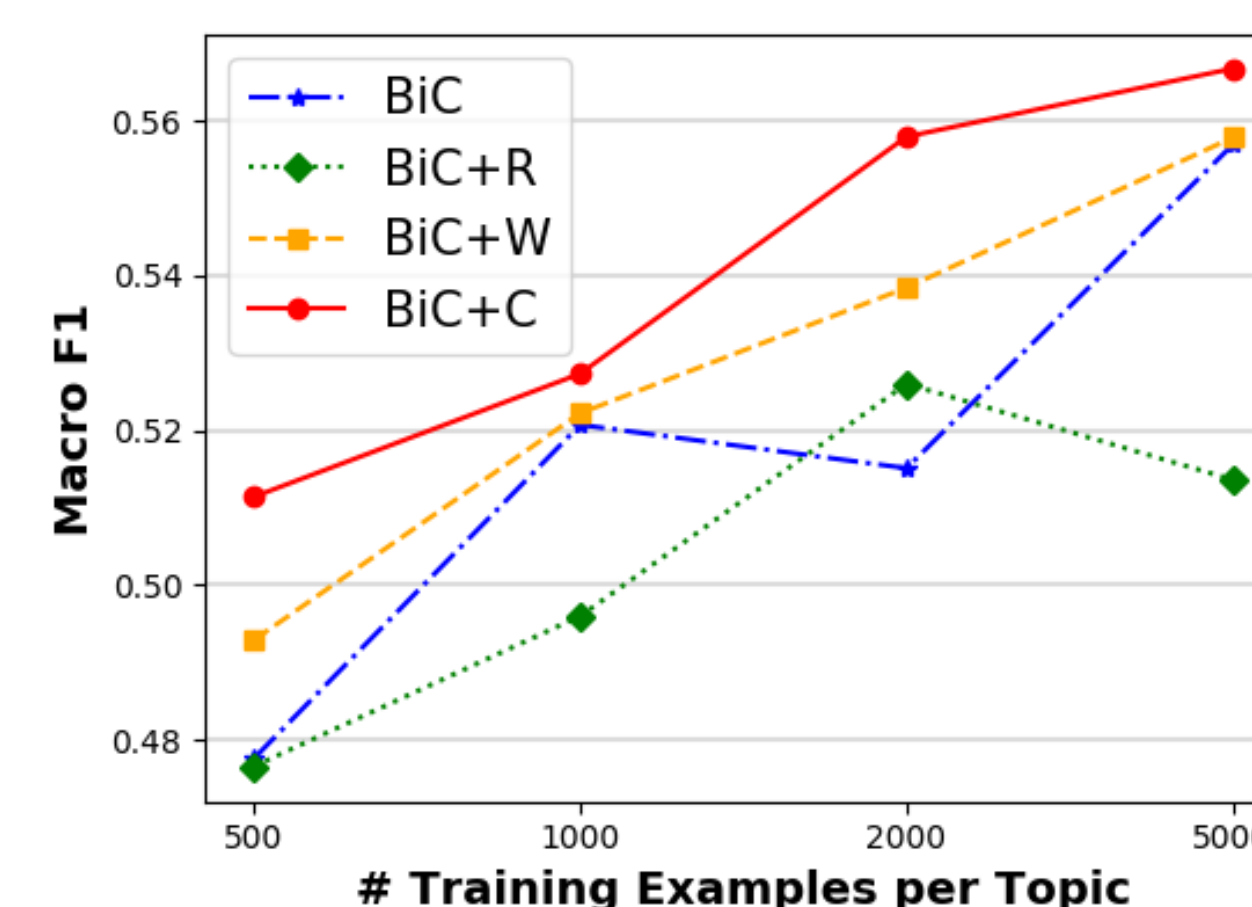
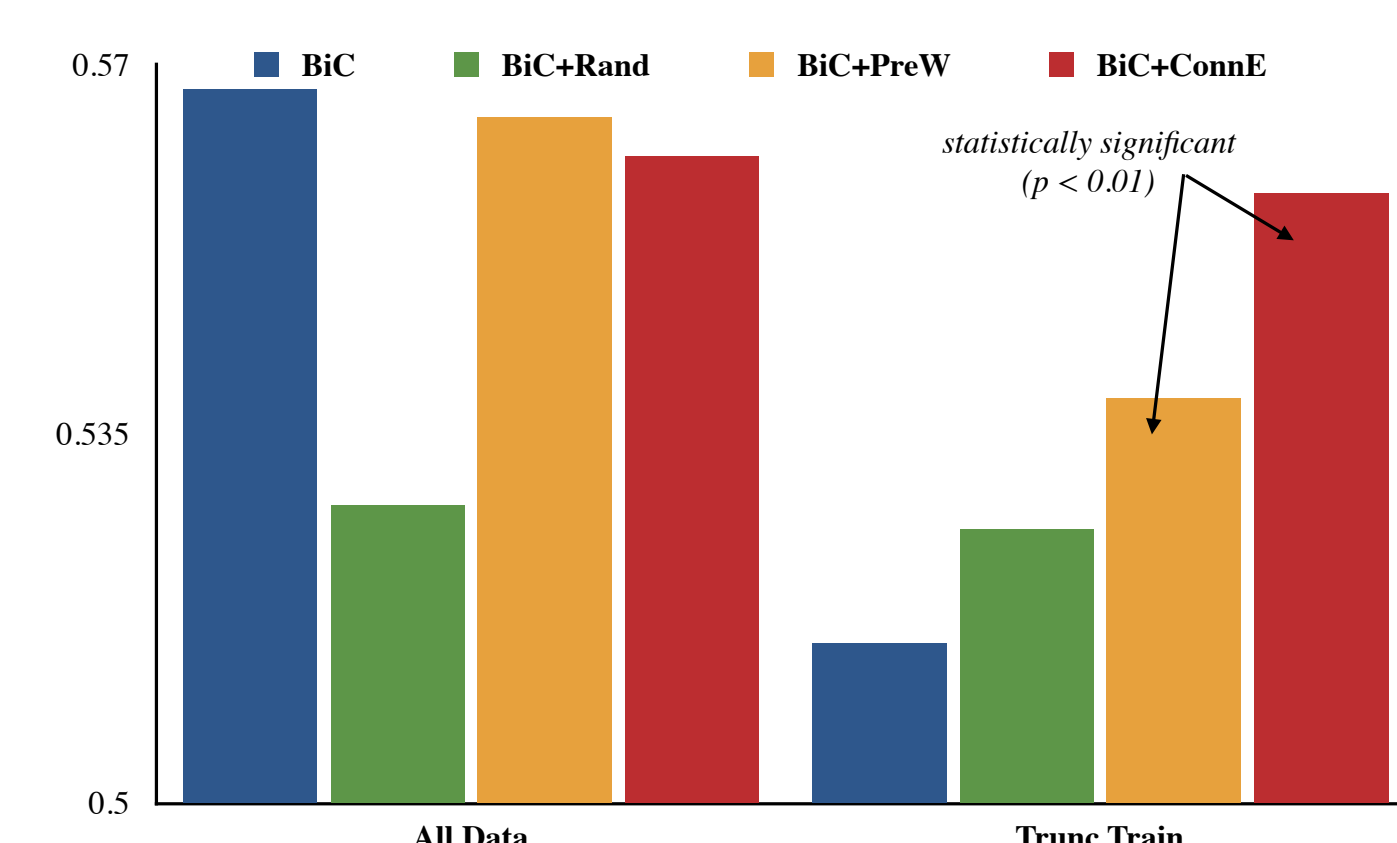
### Dataset statistics

- Internet argument corpus: 16 topics
- Wide range in number of examples per topic
- Ex: *abortion, gay marriage* with  $> 10k$  ex
- Ex: *minimum wage* with  $< 100$

### Low-resource Stance Detection

- Truncate number of training examples

### Stance Prediction Results



## Lexicon Analysis

### Human Evaluation

- NLP researchers label 350 words
- Compute agreement between humans and lexicon
- NC: non-conflicting (+ or - agrees with neutral)

Aspect	Avg $\kappa$	Avg % Agree	Lex % Agree	Lex % NC
<i>Social Value</i>	.699	88.9	68.6	92.6
<i>Politeness</i>	.381	56.6	59.4	95.1
<i>Impact</i>	.630	87.6	73.7	94.6
<i>Factuality</i>	.675	86.3	58.0	77.7
<b>Average</b>	.596	87.9	64.2	90.0

### Synonym Analysis

- Hypothesis: no *true* synonyms

(Clark, 1992; Bhagat and Hovy, 2013)

- 74% lexical pairs from PPDB differ on some aspect

Aspect	Different Connotation
	sentence (=)
<i>Social Value</i>	vs. condemnation (-) relentless (-) vs. persistent (+)
	gentleman (+)
<i>Politeness</i>	vs. man (=) preposterous (=) vs. ridiculous (-)
<i>Emotional Association</i>	dire (fear, sadness) vs. terrible (fear,sadness,disgust)

Aspect	Same Connotation
<i>Social Value</i>	(=) hurry vs. rush (+) fantastic vs. wonderful
<i>Politeness</i>	(-) disgrace vs. shame (+) humble vs. modest
<i>Emotional Association</i>	(trust) wise vs. smarter (sadness) flaw vs. disturbance

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