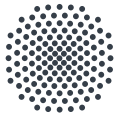


University of Stuttgart
Institute for
Natural Language Processing

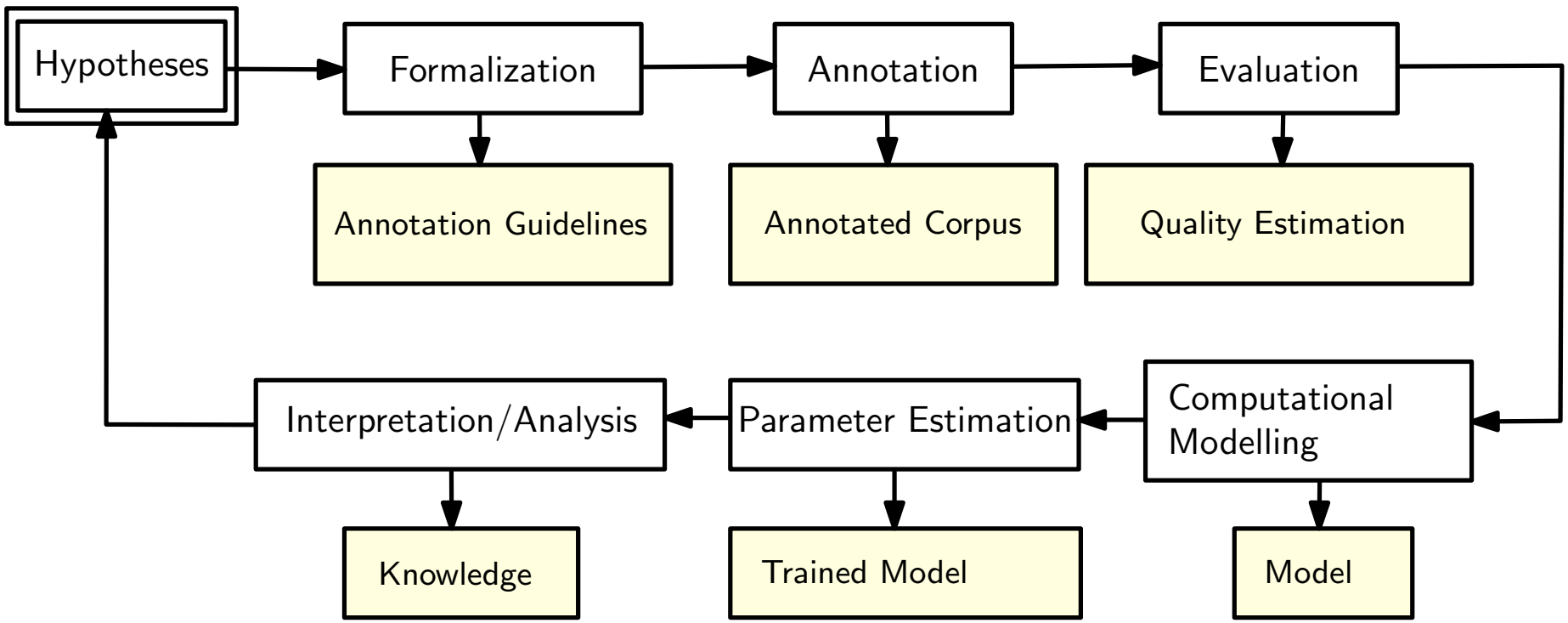
Emotion Analysis

Lexicons

Nov 15, 2022

Roman Klinger

The need for corpora



The need for corpora

Good-quality corpora rely on:

- Representative data
- Good annotation guidelines
- Representative and consistent annotations

Challenges:

- Writing unambiguous guidelines
- Crowdsourcing vs. expert annotations
- Emotion interpretations can vary
- Task is just difficult

Take Away

- Dictionaries as a representation of lexical semantics of emotions
- Computational access to emotions in text
- Downstream Applications of Dictionaries for Emotion Analysis
- Creation Process of Emotion Dictionaries
- Existing Resources

Organization: Videos

- I asked via mail if you would still like to have the videos, given that nearly nobody watches them.
- I received replies by ≈5 people that they use or will use the videos, therefore I will continue to put them online.
- Thanks for the feedback!

Organization: Assignment 1

- Question I received via mail: Is it ok if only part of the group participates in the presentation of a solution?
- Yes, you need to organize responsibilities in your group.
- Part of the presentation, however, might be an interactive discussion/answering questions from the audience. For that part, I cannot grade the contribution of somebody who is not present. Based on this aspect, the grades of different group members could differ in the end.
- Any further/other questions regarding Assignment 1?

Organization: Exam

- We will write the exam in the last session of the lecture: Februar 7, 2022, 17:30h
- Place: PWR5b, 5.01/2 or V47.03. Depending on numbers of people registered, we will move to another lecture hall (which you can currently already see on Campus, but we might stay in 5.01/2. We will know one or two weeks before the exam.)

Outline

1. Motivation
2. Applications
3. Affective Lexical Resources
4. Existing Dictionaries

Motivation

- Let us assume we have an automatic method:
  text in, emotion label out
- What can we do with this method?
  What would be applications?
- What could be challenges to develop this method?

Applications of automatic emotion recognition methods

- Information Retrieval
  - searching for emotional scenes in theatre plays/novels
  - grouping documents based on emotion
  - finding named entities close to emotion expressions
- Classification
  - emotion towards politicians, products, countries, ideas
  - emotions related to medical conditions
  - emotions in literature (emotion arcs)
- Understanding emotions
  - Which events cause which emotions?
  - Intercultural differences?
  - ...

Challenges for an automatic emotion analysis method

Will the method ...

- ...capture every kind of emotion expression?
  (description of joyful event vs. explicit report of feeling)?
- ...work comparably across different groups?
  (age groups or cultures)
- ...work comparably on every domain?
  (social media vs. literature from 17th century)

Agenda:

- Dictionaries (today)
- Rules (later)
- Machine learning-based classification (later)

Outline

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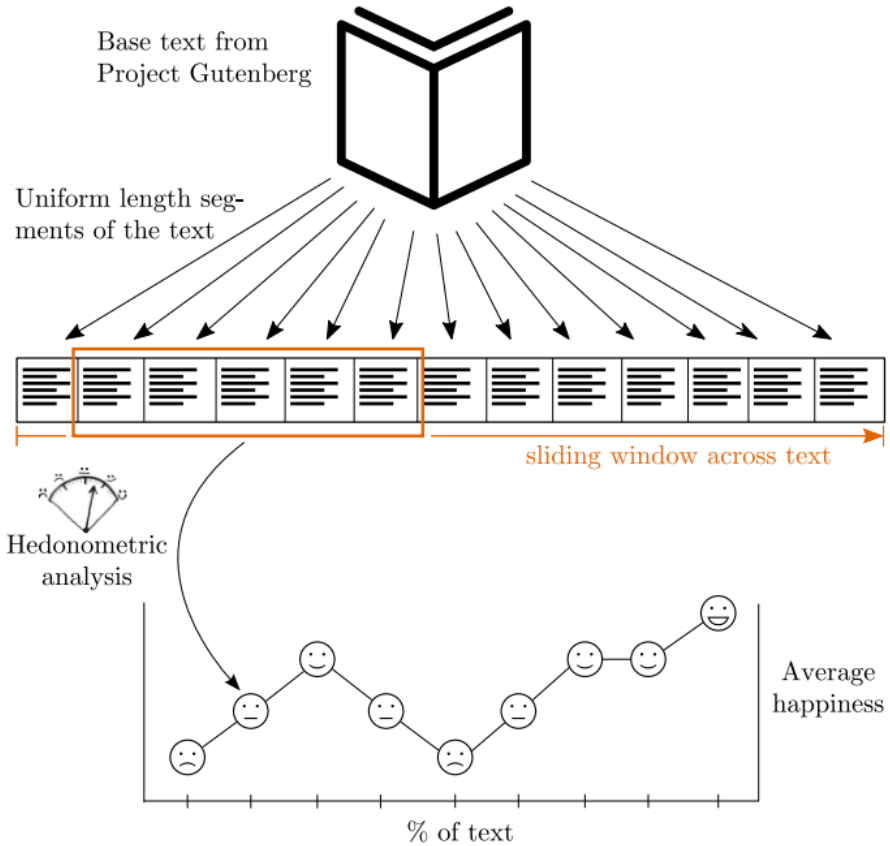
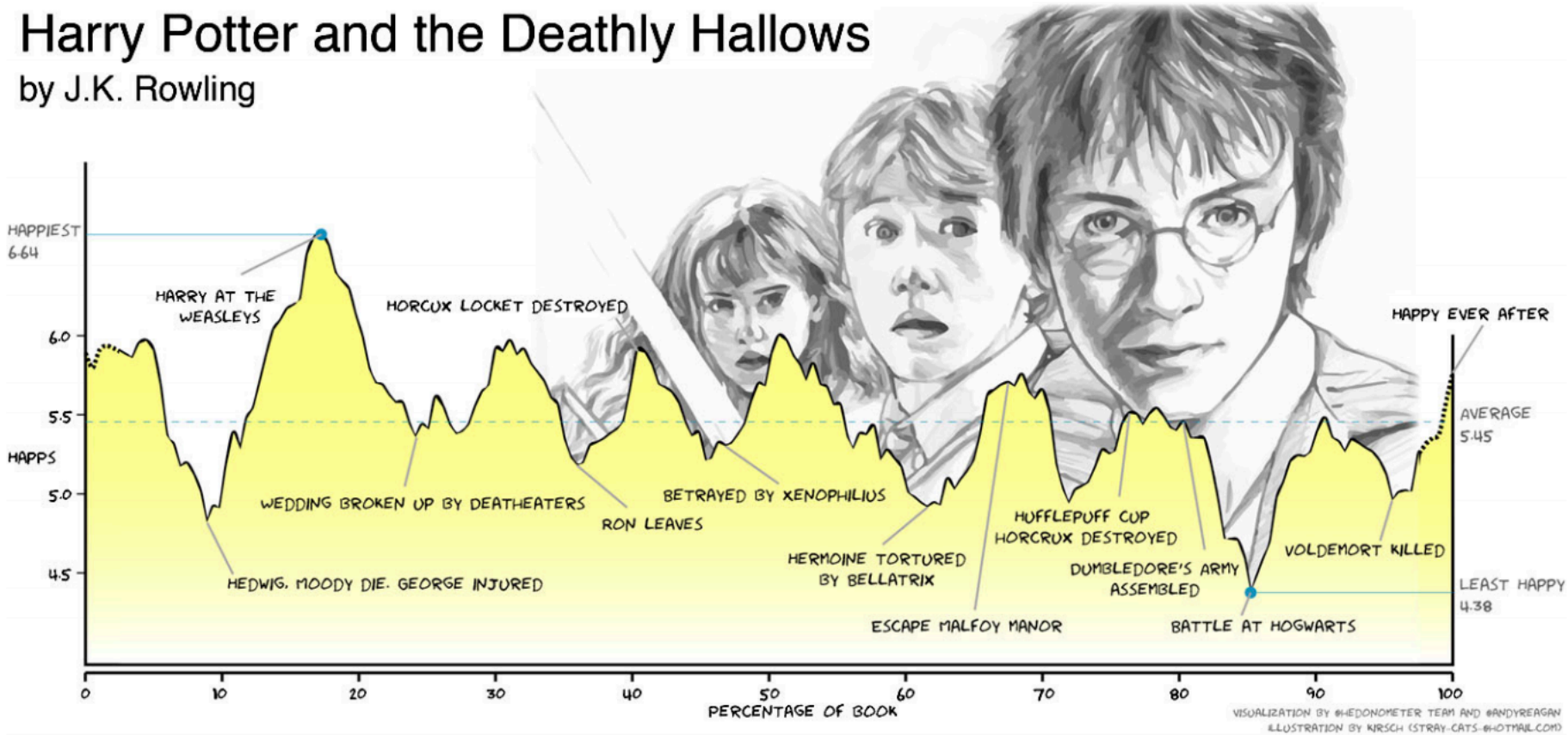
Literary Studies: Reagan et al., 2016



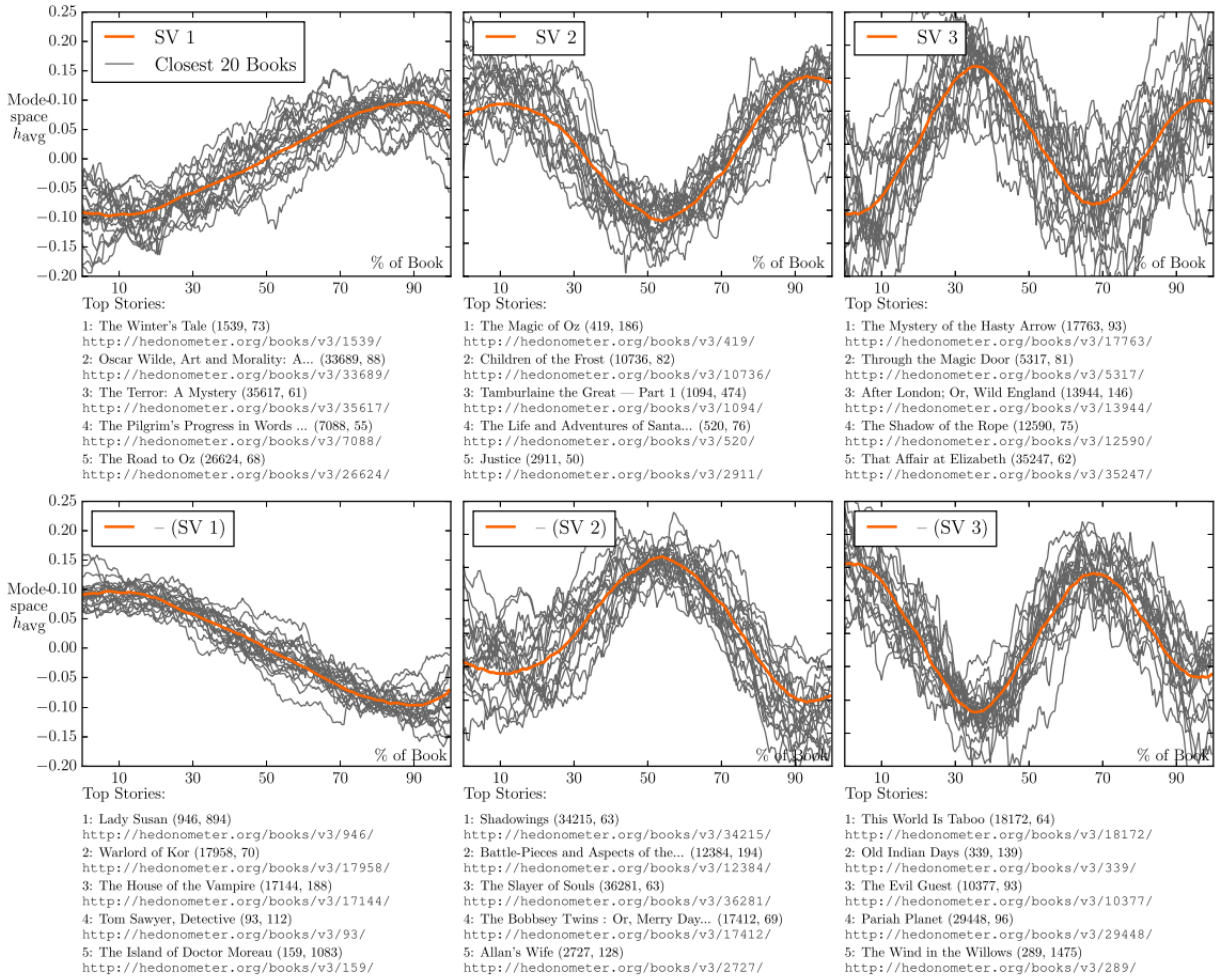
Reagan et al., 2016.
The emotional arcs of stories are dominated by six basic shapes.

`https://doi.org/10.1140/epjds/s13688-016-0093-1`

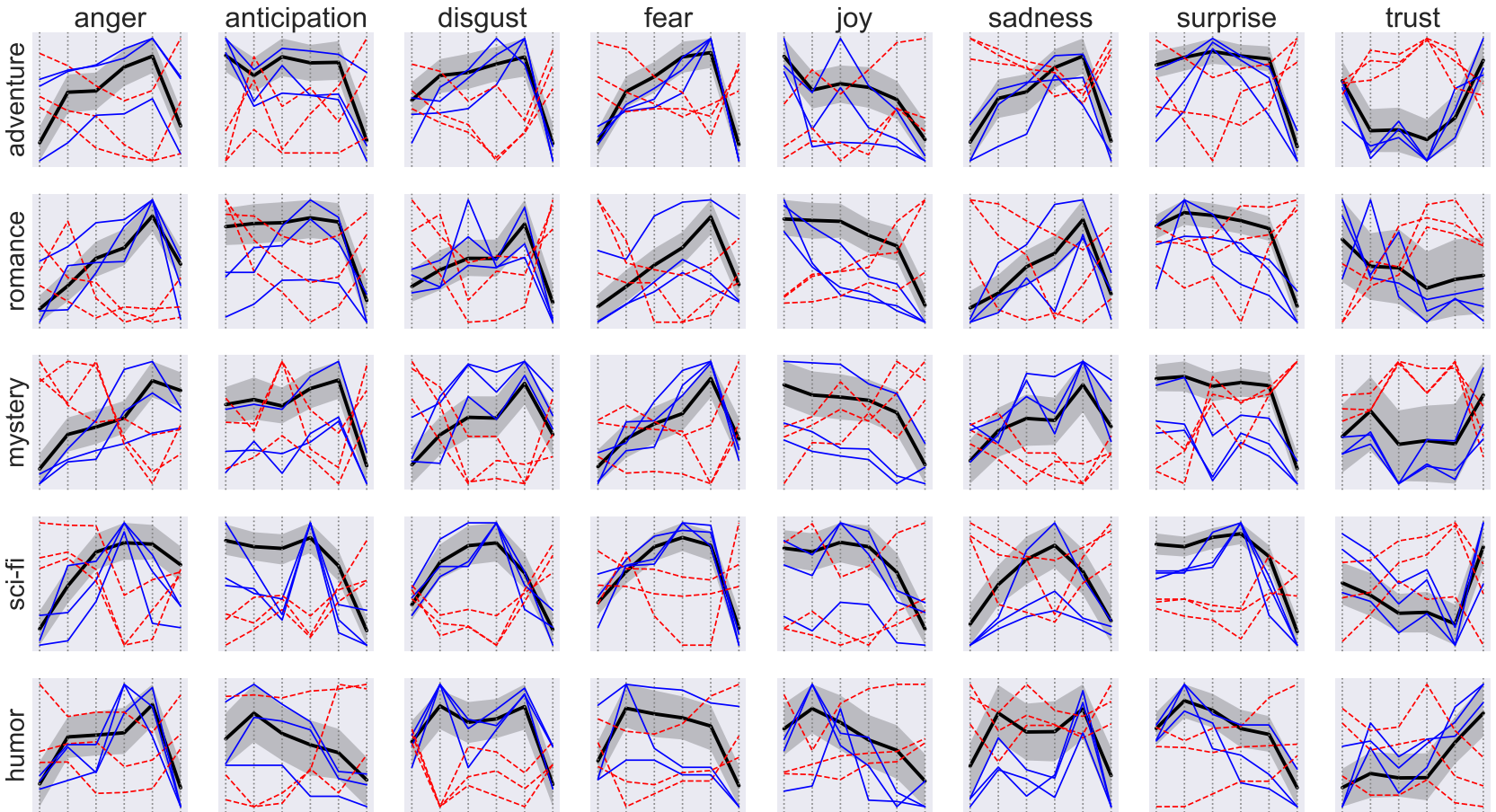
Literary Studies: Reagan et al., 2016



Literary Studies: Reagan et al., 2016



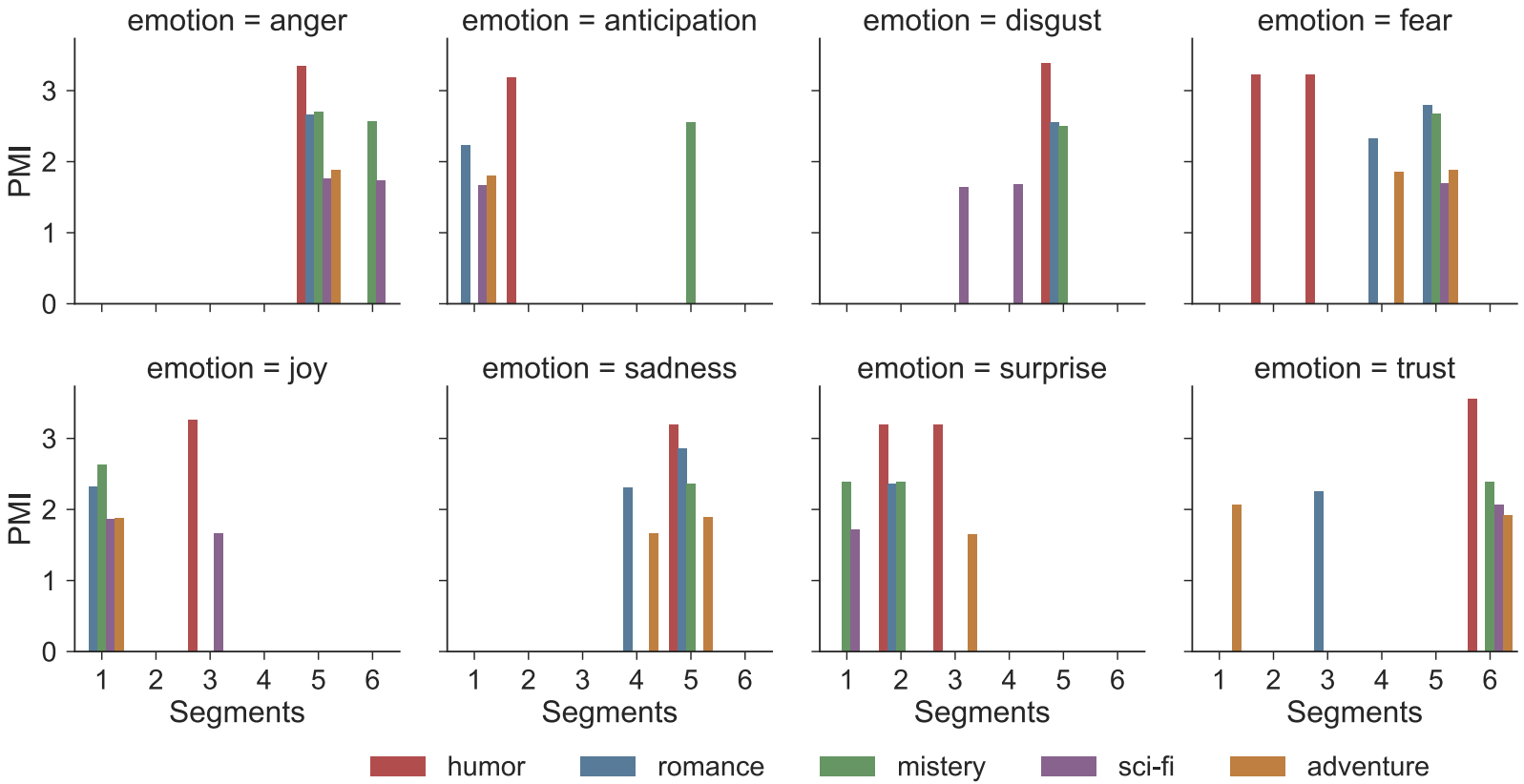
Literary Studies: Kim et al., 2017



Kim et al., 2017.

Investigating the Relationship between Literary Genres and Emotional Plot Development. https://www.aclweb.org/anthology/W17-2203/

Literary Studies: Kim et al., 2017



Kim et al., 2017.

Investigating the Relationship between Literary Genres and Emotional Plot Development. `https://www.aclweb.org/anthology/W17-2203/`

Literary Studies: Mohammad, 2011

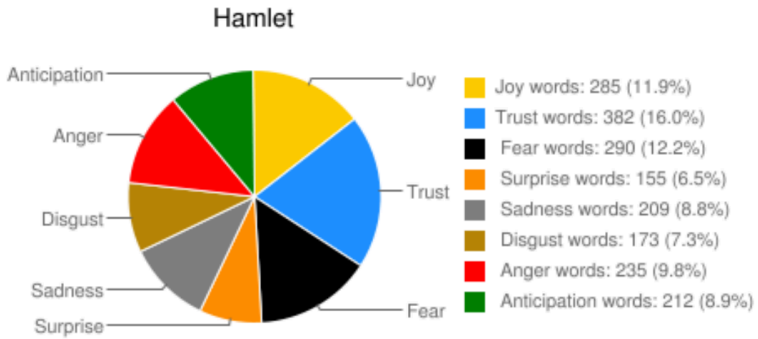


Figure 1: **Emotions pie chart** of Shakespeare's tragedy *Hamlet*. (Text from Project Gutenberg.)

Figure 2: **Emotions pie chart** of Shakespeare's comedy *As you like it*. (Text from Project Gutenberg.)

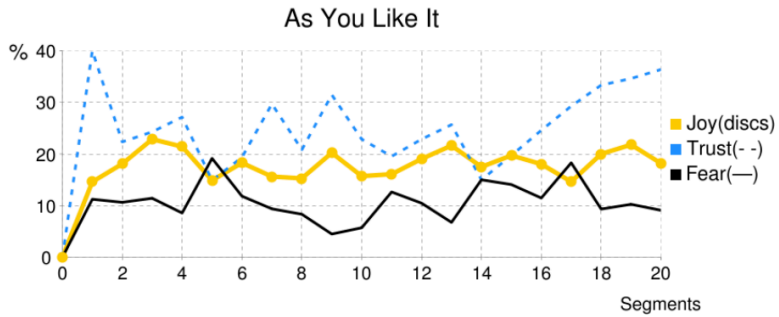


Figure 6: Timeline of the emotions in *As You Like It*.

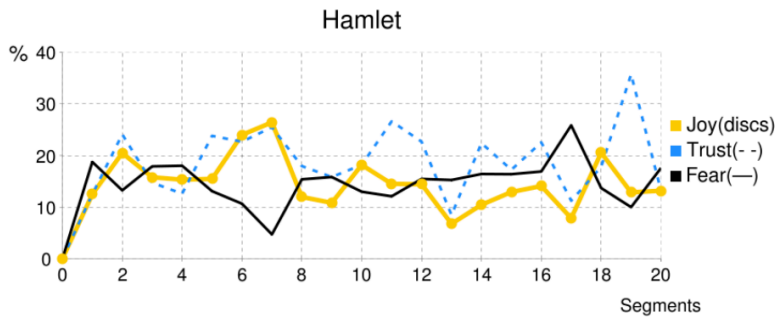
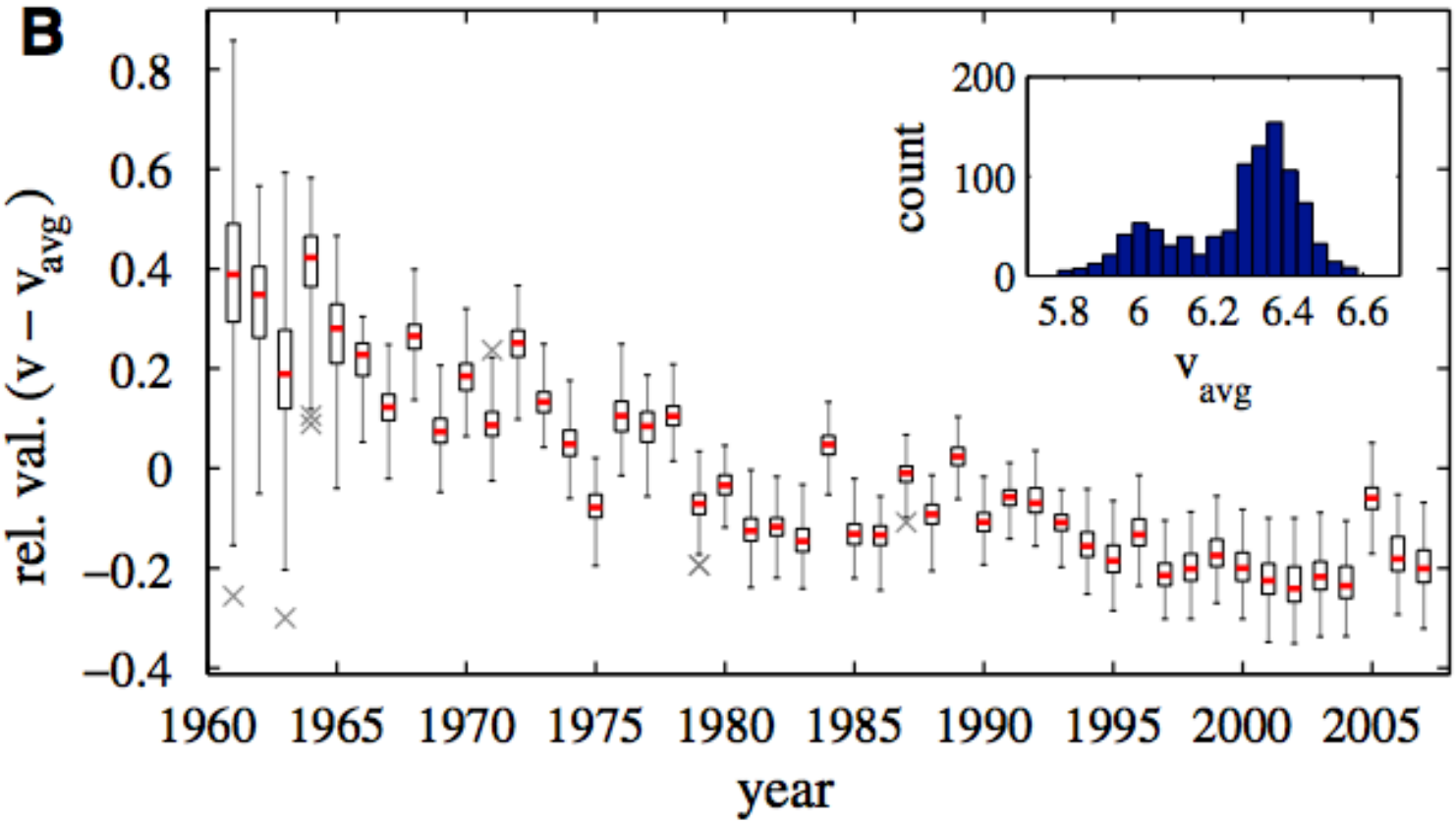


Figure 7: Timeline of the emotions in *Hamlet*.

Mohammad et al., 2011. From Once Upon a Time to Happily Ever After: Tracking Emotions in Novels and Fairy Tales.

`https://www.aclweb.org/anthology/W11-1514/`

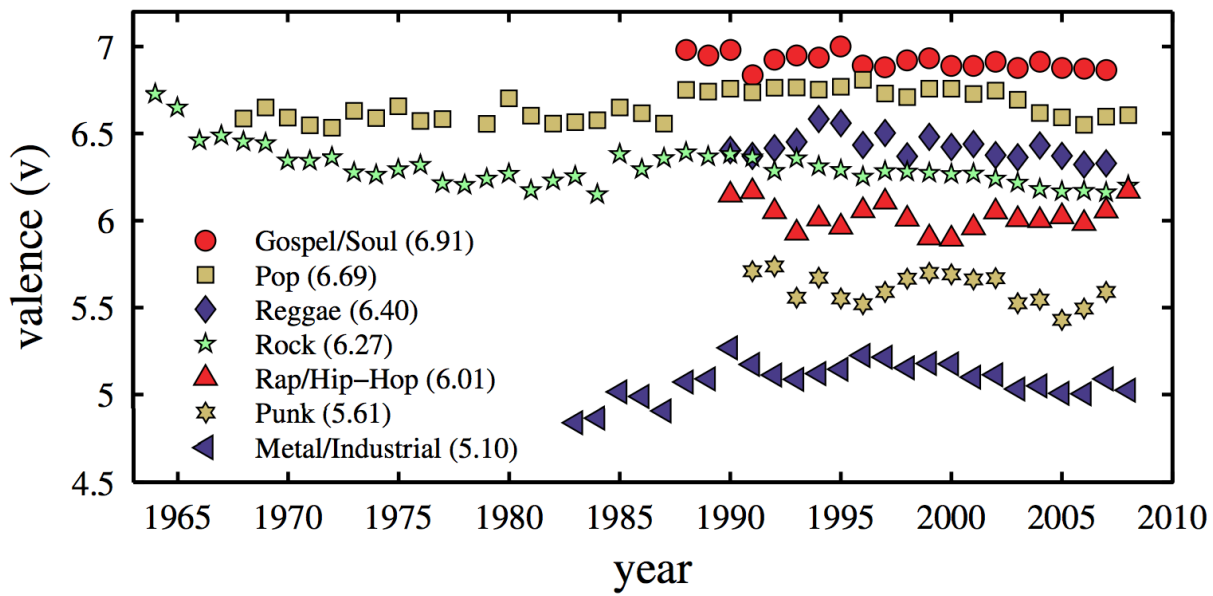
Happiness in Art and Public: Dodds 2009



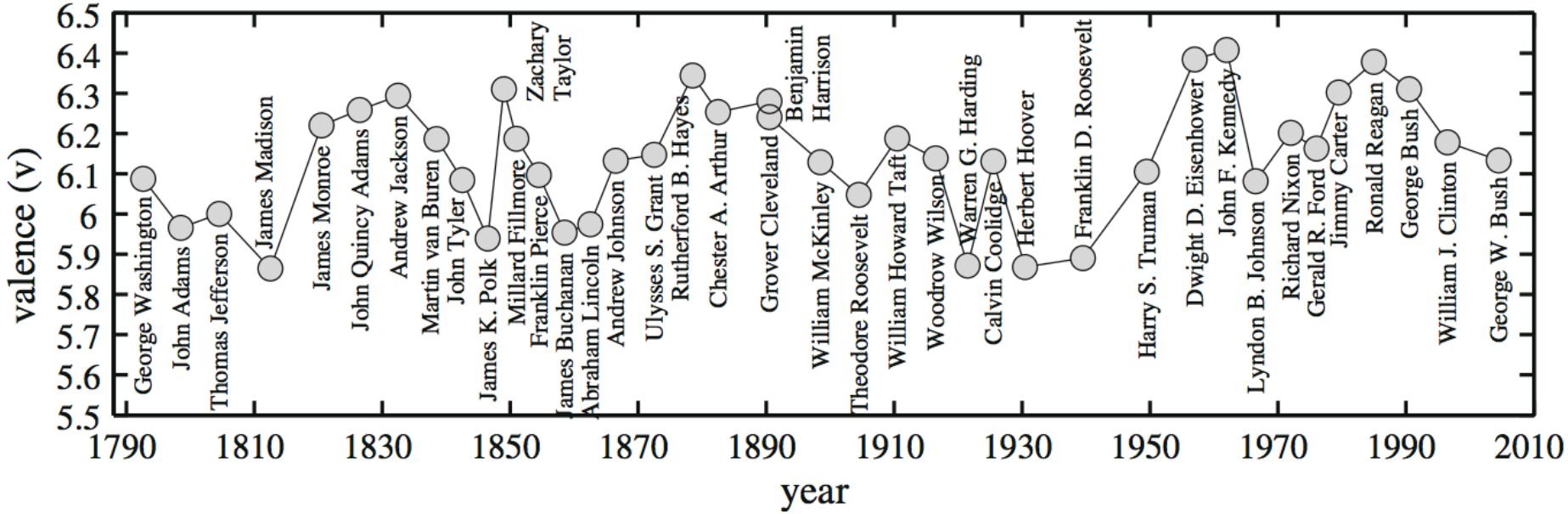
Dodds et al. 2009. Measuring the Happiness of Large-Scale Written Expression: Songs, Blogs, and Presidents.

`https://doi.org/10.1007/s10902-009-9150-9`

Happiness in Art and Public: Dodds 2009



Happiness in Art and Public: Dodds 2009



Population study: Waterloo 2017

Table 1. Main properties of covariates, sex, and age.

	N	Perceived privacy, *M* (*SD*)	Privacy settings		Sex		Age category (years)	
			Custom	Public	Male	Female	15–18	19–25
Facebook	1060	3.56 (1.78)	81.9%	18.1%	47.1%	52.9%	47.3%	52.7%
Twitter	416	3.38 (1.82)	53.1%	46.9%	53.8%	46.2%	47.8%	52.2%
Instagram	655	3.28 (1.66)	60.0%	40.0%	42.3%	57.7%	55.7%	44.3%
WhatsApp	1083	6.15 (1.40)	55.4%	44.6%	47.5%	52.5%	50%	50%

SD: standard deviation.

Waterloo et al 2017, Norms of online expressions of emotions: Comparing Facebook, Twitter, Instagram, and WhatsApp

`https://doi.org/10.1177/1461444817707349`

Population study: Waterloo 2017

Table 2. Correlations between perceived norms of emotion expression, covariates, age, and sex for all platforms combined.

	1	2	3	4	5	6	7	8	9	10
1. Sadness	–									
2. Anger	.80***	–								
3. Disappointment	.82***	.82***	–							
4. Worry	.79***	.78***	.81***	–						
5. Joy	.44***	.39***	.43***	.46***	–					
6. Pride	.45***	.42***	.44***	.47***	.84***	–				
7. Privacy settings	.07***	.12***	.11***	.10***	.05**	.07***	–			
8. Perceived privacy	.20***	.20***	.21***	.20***	−.01	−.01	−.05**	–		
9. Age category	−.01	.01	.01	.00	−.05*	−.05**	.02	−.01	–	
10. Sex	.06**	.05**	.04*	.06**	.16***	.14***	−.08***	−.04**	−.01	–

*$p < .05$; **$p < .01$; ***$p < .001$.

Waterloo et al 2017, Norms of online expressions of emotions: Comparing Facebook, Twitter, Instagram, and WhatsApp

https://doi.org/10.1177/1461444817707349

Population study: Waterloo 2017

Table 3. Estimated means and standard errors for the perceived norms of emotion expression.

Perceived norms	*M (SE)*			
	Facebook	Twitter	Instagram	WhatsApp
Sadness	3.23 (.03)[b]	3.14 (.05)[a]	3.09 (.04)[a]	3.66 (.04)[c]
Anger	3.20 (.03)[a]	3.26 (.05)[a]	3.07 (.04)[b]	3.64 (.04)[c]
Disappointment	3.24 (.03)[a]	3.25 (.05)[a]	3.08 (.04)[b]	3.69 (.04)[c]
Worry	3.27 (.03)[a]	3.29 (.05)[a]	3.15 (.04)[b]	3.74 (.04)[c]
Joy	3.90 (.03)[a]	3.78 (.04)[b]	3.93 (.03)[a]	4.05 (.03)[c]
Pride	3.83 (.03)[a, b]	3.74 (.04)[a]	3.89 (.04)[b]	4.02 (.03)[c]

SE: standard error.
Means with different superscripts differ significantly from each other within rows, with p at least <.01.

Waterloo et al 2017, Norms of online expressions of emotions: Comparing Facebook, Twitter, Instagram, and WhatsApp

`https://doi.org/10.1177/1461444817707349`

Mapping Emotions to Locations

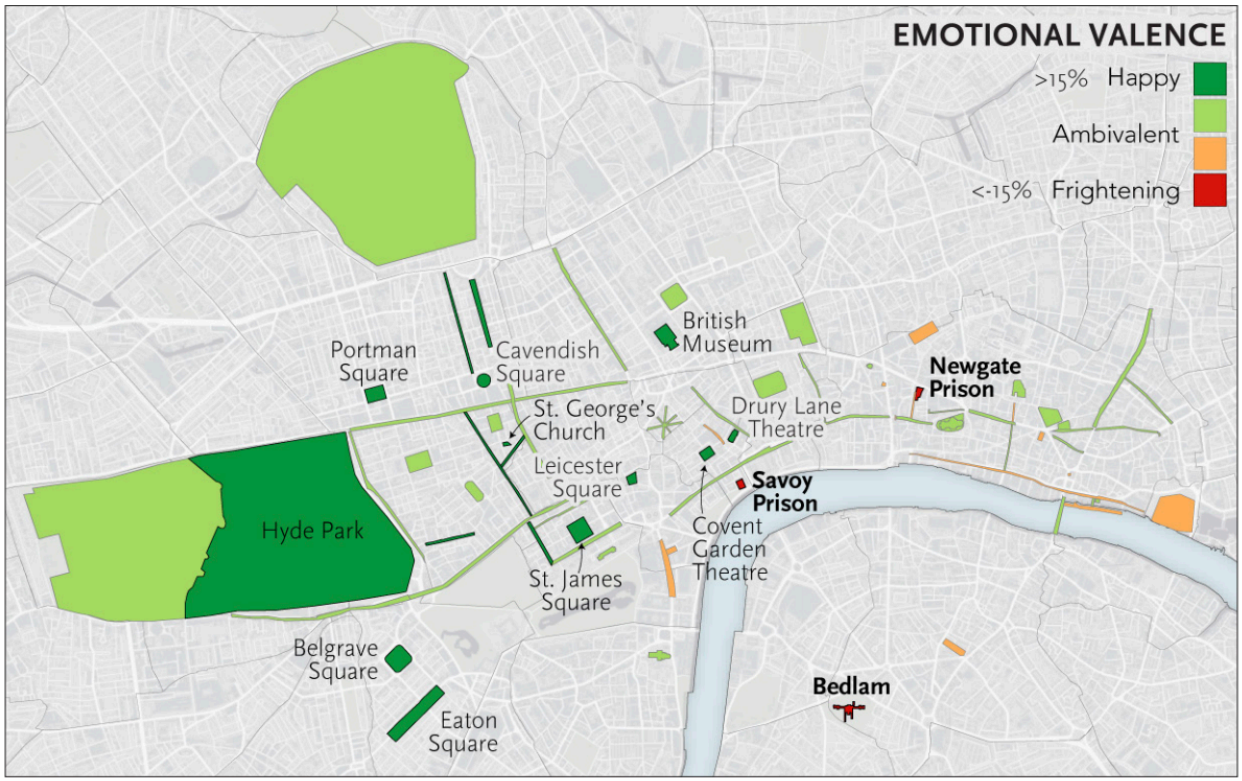


Figure 5.1 The emotions of London, 1700-1900

Heuser et al 2016, The Emotions of London

`https://litlab.stanford.edu/LiteraryLabPamphlet13.pdf`

Quantifying the Effects of COVID-19

r/Anxiety			r/depression			r/SuicideWatch		
Category	% Outliers		Category	% Outliers		Category	% Outliers	
MOTION*	79	↓	YOU*	55	↓	PREP*	33	↑
WORK*	73	↓	CONJ*	51	↓	SPACE*	33	↑
I*	68	↓	MOTION*	45	↓	NETSPEAK*	23	↑
BODY*	61	↑	QUANT*	43	↑	ASSENT*	23	↓
PPRON*	54	↓	FAMILY*	40	↑	INFORMAL*	22	↑
RELATIV*	54	↓	ARTICLE*	39	↓	CAUSE*	20	↑
WE*	50	↑	PRONOUN*	38	↑	AFFILIATION	17	↓
BIO*	49	↑	REWARD*	36	↓	FOCUSFUTURE	16	↓
PERCEPT*	42	↑	FEEL*	35	↓	NEGEMO	15	↑
CERTAIN*	41	↑	FOCUSPAST *	33	↑	CONJ	15	↓

Biester et al 2020, Quantifying the Effects of COVID-19 on Mental Health Support Forums

`https://www.aclweb.org/anthology/2020.nlpcovid19-2.8/`

Summary and more

- Many and different applications exist that make use of dictionaries to measure emotions
- A bit more listed in our survey on sentiment and emotion analysis for computational literary studies (Kim/Klinger 2019, `http://www.zfdg.de/2019_008`)
- Many more in:
  - DH and DHd conferences
  - ACL Anthology `https://www.aclweb.org/anthology/`
  - Life sciences/psychology, search for name of resource in PubMed: e.g. `https://pubmed.ncbi.nlm.nih.gov/?term=liwc`

Outline

1. Motivation
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4. Existing Dictionaries

Brief historical background

1957 The idea of formally representing the subjective meaning of words. Osgood, Suci, Tannenbaum (1957): The Measurement of Meaning

1986 Study of health improvements following emotional reports Pennebaker & Beall: Confronting a Traumatic Event. Toward an Understanding of Inhibition and Disease

1991 Linguistic subjectivity
Janyce Wiebe: Recognizing subjective sentences: A computational investigation of narrative text

1996 Pennebaker & Francis: Linguistic Inquiry and Word Count

2001 The term sentiment analysis comes up
e.g. Das and Chen: Yahoo! for Amazon: Opinion Extraction from Small Talk on the Web

2010 First large emotion dictionary
Mohammad, Turney: Emotions Evoked by Common Words and Phrases: Using Mechanical Turk to Create an Emotion Lexicon

What is an affective lexical resource?

- Dictionary: collection of entries associated to some information, like meaning, translation, sense, synonyms, etc.

$$\begin{array}{lcl} \text{word}_1 & \Longrightarrow & \text{additional information}_1 \\ \text{word}_2 & \Longrightarrow & \text{additional information}_2 \\ \text{word}_3 & \Longrightarrow & \text{additional information}_3 \end{array}$$

- Emotion dictionary: collection entries/words/senses with associated emotion/affect information
- Can come in different files, file formats, word lists, ...

Assumptions

Do all words communicate an emotion? Or just some of them?
Are there neutral words?

Affective meaning is conveyed by (potentially) all words

- Direct affective words directly refer to emotions
  fear, anger, joy, happy, afraid…
- Indirect affective words
  - Idiosyncratic associations: dog, cat, plane
  - Collective experiences: ghost, monster, laugh
- No limitation to particular word classes

Affective meaning of words can be measured as association between word and emotion concept

- Discrete categories: word → anger, fear, joy
- VAD: word → V-score, A-score, D-score
- Appraisal theories: word →
  bodily symptom, verbal reaction, cognitive evaluation dim.
- …

How to create an emotion lexicon?

Please discuss with your neighbor:

- What could be a strategy to select words to be put into an emotion dictionary?
- How to decide which emotions are associated with each word?

How to create an emotion lexicon? (discussion)

- What could be a strategy to select words to be put into an emotion dictionary?

- How to decide which emotion(s) are associated with each word?

Example Lexicon Application

Let's assume this (tiny) emotion lexicon:

beautiful	song	heart	nice	beat	stop	stone
joy	joy	neutral	joy	anger	sadness	neutral

What goes wrong and why?

- "The song has nice beat."
- "Your heart is cold as stone."
- "Her heart stopped beating."
- "She was hit by a stone."

Challenges

- Polysemous words? “cold person” vs. “cold beer”
- Negations? “They are not happy.”
- Metaphors? “His joke killed me!”
- Sarcasm? “Awesome perfume. Did you marinate in it?”
- Questions? “Are you happy?”
- Contradictions? “Not happy – sad.”
- Semantic scales? unhappy < cheerful < awesome

Observations

- The richer the information is (e.g. word senses) the better
- The emotion of a whole is not (always) the sum of the emotion of its parts.
- Association can be domain dependent
- Agreement may vary depending on the type of words (abstract vs. concrete nouns, explicit emotion names vs. verbs referring to events, cultural-specific vs. idiosyncratic concepts).

Creation Procedures and Evaluation

Creation:

- Entirely Manually
- Semi-automatically
- Automatically

Evaluation:

- Intrinsic: Evaluate word associations
- Extrinsic: Evaluate use of dictionary on downstream task

Manual Creation

- Select entries
- Write annotation guidelines
- Design annotation procedure
- Compute inter-annotator agreement (and repeat, if unhappy)
- Evaluate intrinsically or extrinsically

Automatic Creation

With annotated corpus:

- Use existing corpus with emotion labels
- Calculate information theoretic measures of word occurrences
- Output emotion labels

Without annotated corpus:

- Use distributional semantics and similiarity measures
- Calculate similarities to emotion concepts
- Common for early work in sentiment
  (Turney 2002: Thumbs Up or Thumbs Down? Semantic Orientation Applied to Unsupervised Classification of Reviews)
- Probably only works for emotions when distributional space is ensured to represent emotions well (e.g. via retrofitting, Farouqi et al., 2014)

Semi-Automatic Creation

- Assumption: Existing emotion dictionary
- Goal: Expand or adapt
- Expansion: Label-propagation, define graph in which words are nodes and edges define similarity, propagate labels via random walk.
- Zhu, Garamani (2002): Learning from labeled and unlabeled data with label propagation.
- Application to emotions: Giulianelli, de Kok (2018): Semi-Supervised Emotion Lexicon Expansion with Label Propagation
- More work on adapting dictionaries:
  - Buechel/Hahn 2018: Word Emotion Induction for Multiple Languages as a Deep Multi-Task Learning Problem
  - Buechel/Hellrich/Hahn 2016: Feelings from the Past—Adapting Affective Lexicons for Historical Emotion Analysis
  - Buechel/Hahn 2018: Representation Mapping: A Novel Approach to Generate High-Quality Multi-Lingual Emotion Lexicons

Classification with Dictionaries

Idea 1: Use a dictionary D_e of entries t with emotion scores $s_e(t)$ for emotion e:

$$\text{score}(\text{text}, e) = \frac{1}{|\text{text}|} \sum_{w \in \text{text}} s_e(w)$$

- Issues? Number of words in dictionary associated with emotion might differ. Normalize:

$$\text{score}(\text{text}, e) = \frac{1}{|D_e|} \frac{1}{|\text{text}|} \sum_{w \in \text{text}} s_e(w)$$

- Decision for an emotion:

$$\text{emotion}(\text{text}) = \arg\max_{e \in \text{Emotions}} \text{score}(\text{text}, e)$$

Classification with Dictionaries

- Advantages:
  - Very easy to use
  - Transparent results
- Disadvantages:
  - Context, negations, intensifiers
  - Out-of-vocabulary words
- What about

$$\text{score}(\text{text}, e) = \frac{1}{|D_e| \cdot |\text{text}|} \sum_{w \in \text{text}} \sum_{t \in D_e} \text{sim}(w, t) \cdot s_e(t) \,?$$

- Challenge:
  Find a similarity function which represents emotions.
- Pretrained embeddings/vector spaces often do not represent differences in emotion association (out of the box)

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Disclaimer

- This lecture does not provide a comprehensive list of all emotion dictionaries that are available.
- We collected those, because they provide a good overview and combine different methodologies to create them, but there are many others which are as good.
- We do not aim at judging them, they all have different advantages or disadvantages, depending on the application.
- I am not aware of a comprehensive list of emotion/affect dictionaries, if you know one, please let me know.

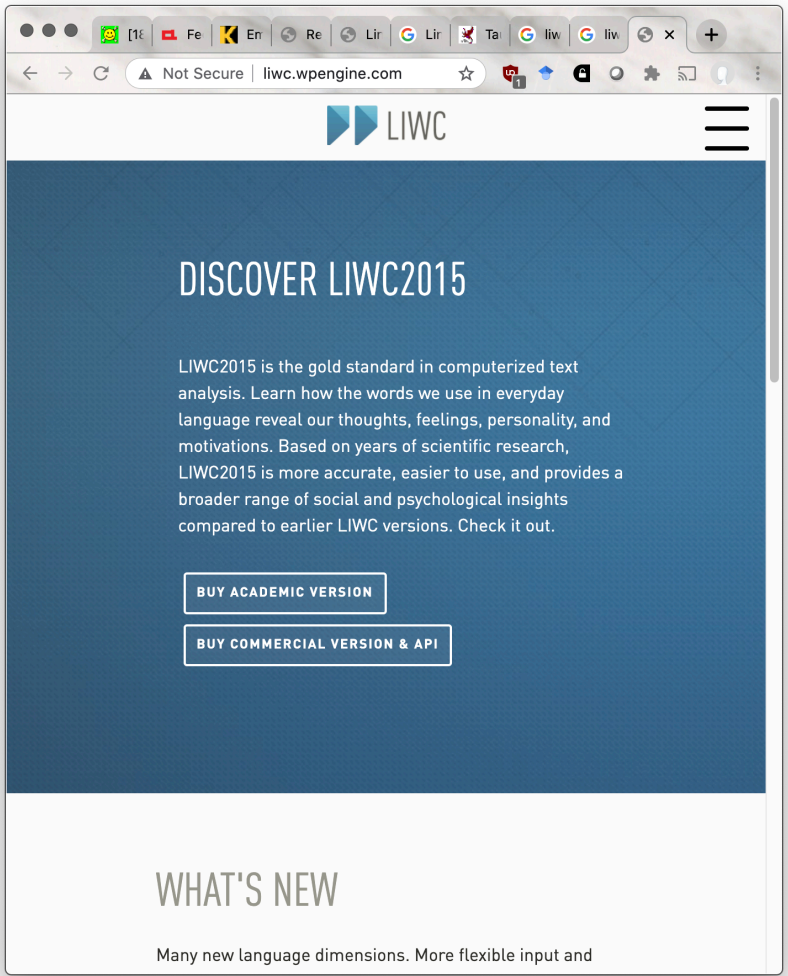
LIWC, Linguistic Inquirey and Word Count

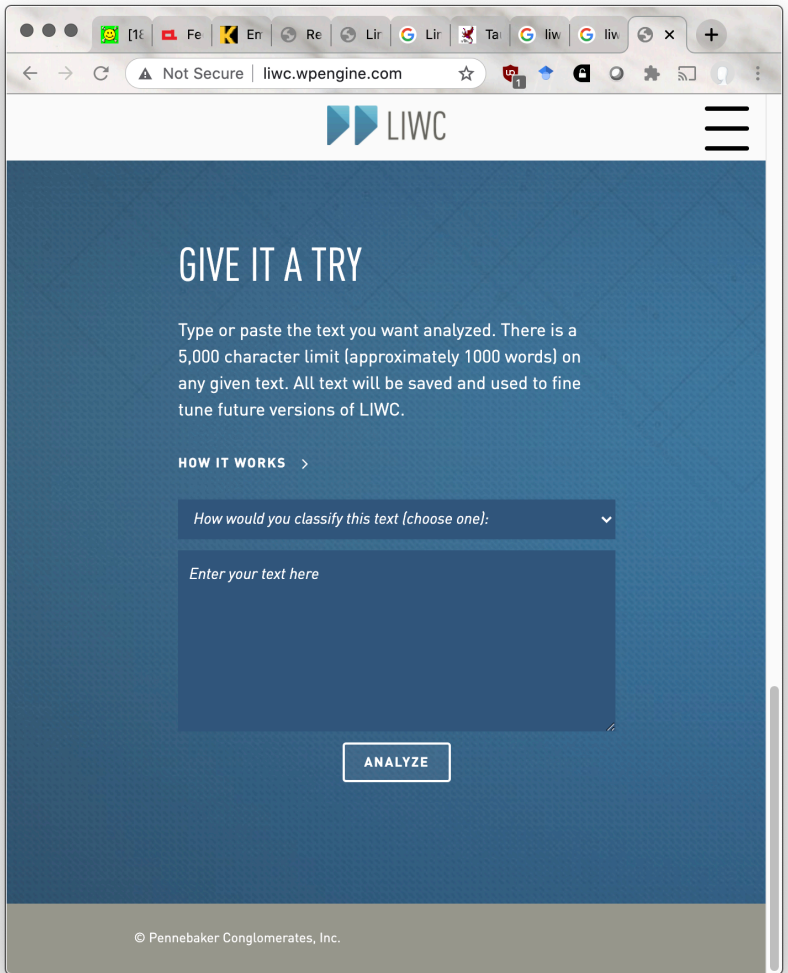
- Motivation & Background:
  - One of the first approaches to measure psychological concepts in text
  - Built on top of research showing that words allow to infer physical/mental health from words they use
- Creation Procedure:
  - Collected words from other thesauri, word lists
  - Manual annotation by multiple judges
- Label Set: Many classes, e.g. attentional focus, emotions, social relationships, group processes
- Statistics: 4500 words, 80 classes
- Applications:
  - Comes with commercial program which uses dictionary.
  - Evaluated in many downstream applications, incredibly popular in psychology and social sciences
  - Website with demo: `https://www.liwc.app/demo`

LIWC Examples

- Positive Emotions:
  happy, pretty, good
- Negative Emotions:
  hate, worthless, enemy
- Sadness or depression:
  grief, cry, sad
- Anxiety or fear:
  nervous, afraid, tense
- Causation
  because, effect, hence
- Tentative
  maybe, perhaps, guess
- Social processes
  talk, us, friend
- Family
  mom, brother, cousin

Pennebaker, J.W., Booth, R.J., & Francis, M.E. (2007). Linguistic Inquiry and Word Count: LIWC 2007.
Tausczik/Pennebaker 2010: The Psychological Meaning of Words: LIWC and Computerized Text Analysis Methods
https://journals.sagepub.com/doi/10.1177/0261927X09351676


Not Secure | liwc.wpengine.com
LIWC
DISCOVER LIWC2015
LIWC2015 is the gold standard in computerized text analysis. Learn how the words we use in everyday language reveal our thoughts, feelings, personality, and motivations. Based on years of scientific research, LIWC2015 is more accurate, easier to use, and provides a broader range of social and psychological insights compared to earlier LIWC versions. Check it out.
BUY ACADEMIC VERSION
BUY COMMERCIAL VERSION & API
WHAT'S NEW
Many new language dimensions. More flexible input and


Not Secure | liwc.wpengine.com
LIWC
GIVE IT A TRY
Type or paste the text you want analyzed. There is a 5,000 character limit (approximately 1000 words) on any given text. All text will be saved and used to fine tune future versions of LIWC.
HOW IT WORKS
How would you classify this text (choose one):
Enter your text here
ANALYZE
© Pennebaker Conglomerates, Inc.

LIWC Example

"I think that I should be happy, given that my whole life situation is great."

TRADITIONAL LIWC DIMENSION	YOUR DATA	AVERAGE FOR PERSONAL WRITING
I-WORDS (I, ME, MY)	20.0	8.70
SOCIAL WORDS	0.0	8.69
POSITIVE EMOTIONS	13.3	2.57
NEGATIVE EMOTIONS	0.0	2.12
COGNITIVE PROCESSES	13.3	12.52
SUMMARY VARIABLES		
ANALYTIC	1.0	44.88
CLOUT	2.3	37.02
AUTHENTICITY	43.4	76.01
EMOTIONAL TONE	99.0	38.60

WordNet Affect

- Motivation & Background Build rich emotion lexicon
- Creation Procedure:
  - Manual: Start with core (Affect), manually labeled words, automatically assign same label to related words, extend to synsets
  - Automatic: Project Affect to WordNet, propagate labels based on selected WordNet relations
- Label Set: emotions (anger, fear), mood, traits (aggressiveness), cognitive states (confusion), physical states (illness), attitude (intolerance)...
- Statistics:
  - Affect:
    1903 terms, 539 nouns, 517 adjectives, 238 verbs, 15 adverbs
  - WordNet-Affect: 2,874 synsets and 4,787 words
- Applications: Many, affect-sensing, computational humor, tutoring systems

Carlo Strapparava and Alessandro Valitutti. WordNet-Affect: an Affective Extension of WordNet, LREC 2004

WordNet Affect Examples

A-Labels	Examples
EMOTION	noun `anger#1`, verb `fear#1`
MOOD	noun `animosisy#1`, adjective `amiable#1`
TRAIT	noun `aggressiveness#1`, adjective `competitive#1`
COGNITIVE STATE	noun `confusion#2`, adjective `dazed#2`
PHYSICAL STATE	noun `illness#1`, adjective `all_in#1`
EDONIC SIGNAL	noun `hurt#3`, noun `suffering#4`
EMOTION-ELICITING SITUATION	noun `awkwardness#3`, adjective `out_of_danger#1`
EMOTIONAL RESPONSE	noun `cold_sweat#1`, verb `tremble#2`
BEHAVIOUR	noun `offense#1`, adjective `inhibited#1`
ATTITUDE	noun `intolerance#1`, noun `defensive#1`
SENSATION	noun `coldness#1`, verb `feel#3`

`https://wndomains.fbk.eu/wnaffect.html`

NRC Word-Emotion Association Lexicon

- Motivation & Background
  Create larger dictionary than existing previously
- Creation Procedure:
  - Select 10k term-sense pairs from a thesaurus, filter via Google n-grams, WordNet-Affect and LIWC
  - Collect judgements via crowdsourcing (Amazon Mechanical Turk) for emotion and polarity
- Label Set: Plutchik emotions, polarity
- Statistics: 14182 words, 25000 senses
- Applications: My impression is that this is the most popular dictionary these days, including machine-translated variants. Used across many research fields.

Saif Mohammad and Peter Turney, Crowdsourcing a Word-Emotion Association Lexicon, Computational Intelligence 29 (3), 436-465, 2013

NRC Word-Emotion Association Lexicon – Questions

- Q1. Which word is closest in meaning (most related) to startle?
  - automobile, shake, honesty, entertain
- Q2. How positive (good, praising) is the word startle?
  - startle is not positive; startle is weakly positive; startle is moderately positive; startle is strongly positive
- Q4. How much is startle associated with the emotion joy? (For example, happy and fun are strongly associated with joy.)
  - startle is not associated with joy, startle is weakly associated with joy, startle is moderately associated with joy, startle is strongly associated with joy
- not/weak $\Rightarrow$ 0; moderately, strong $\Rightarrow$ 1

`https://saifmohammad.com/WebPages/NRC-Emotion-Lexicon.htm`

Example from NRC Emotion Dictionary

...		
scape	trust	0
scapegoat	anger	1
scapegoat	anticipation	0
scapegoat	disgust	0
scapegoat	fear	1
scapegoat	joy	0
scapegoat	negative	1
scapegoat	positive	0
scapegoat	sadness	0
scapegoat	surprise	0
scapegoat	trust	0
scar	anger	1
scar	anticipation	0
scar	disgust	1
scar	fear	1
scar	joy	0
scar	negative	1
scar	positive	0
scar	sadness	1
scar	surprise	0
scar	trust	0
scarab	anger	0
...		

DepecheMood

- Motivation & Background: Build large resource semi-automatically
- Creation Procedure:
  - Collect articles from a news website `rappler.com`
  - `rappler.com` asks readers what the article made them feel
  - Distributional semantics-based analysis of this corpus
- Label Set: inspired, happy, amused, neutral. annoyed, sad, angry, afraid
- Statistics: 37000 terms

Jacopo Staiano, Marco Guerini, Depeche Mood: a Lexicon for Emotion Analysis from Crowd Annotated News, 2014

DepecheMood

Word-emotion matrix=

	AFRAID	AMUSED	ANGRY	ANNOYED	DONT_CARE	HAPPY	INSPIRED	SAD
doc_10002	0.75	0.00	0.00	0.00	0.00	0.00	0.25	0.00
doc_10003	0.00	0.50	0.00	0.16	0.17	0.17	0.00	0.00
doc_10004	0.52	0.02	0.03	0.02	0.02	0.06	0.02	0.31
doc_10011	0.40	0.00	0.00	0.20	0.00	0.20	0.20	0.00
doc_10028	0.00	0.30	0.08	0.00	0.00	0.23	0.31	0.08

×

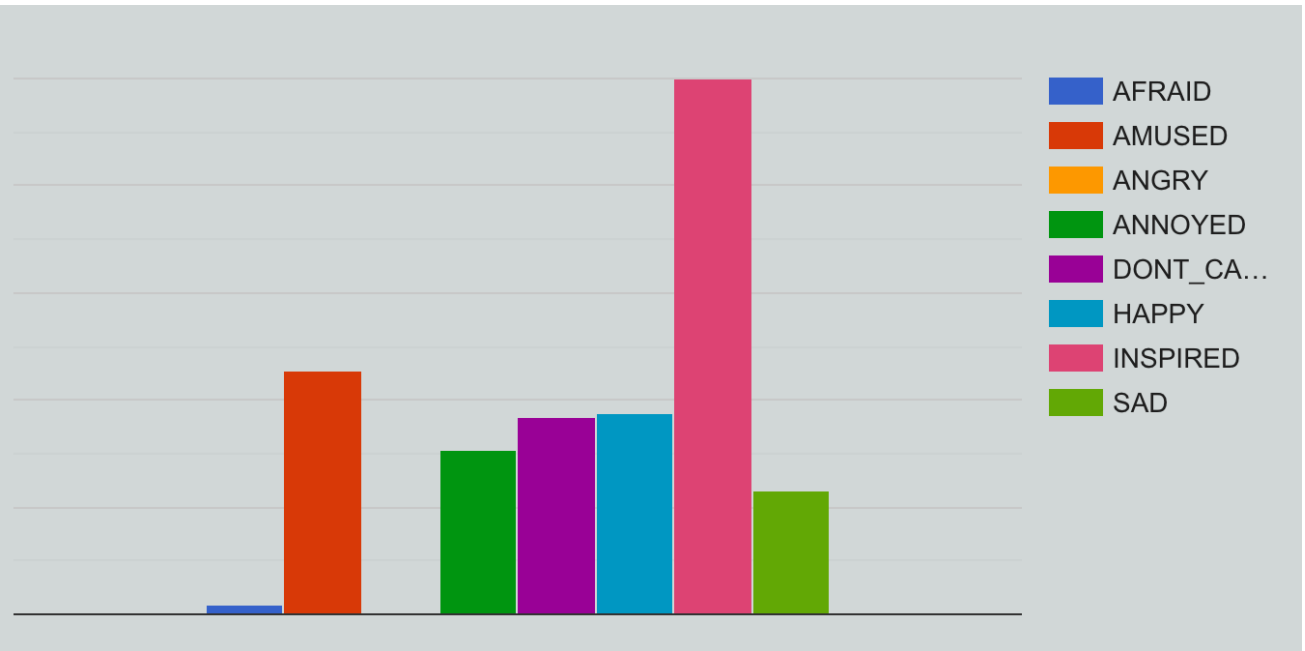
Table 1: An excerpt of the Document-by-Emotion Matrix - M_{DE}

Word	AFRAID	AMUSED	ANGRY	ANNOYED	DONT_CARE	HAPPY	INSPIRED	SAD
awe#n	0.08	0.12	0.04	0.11	0.07	0.15	**0.38**	0.05
comical#a	0.02	**0.51**	0.04	0.05	0.12	0.17	0.03	0.06
crime#n	0.11	0.10	**0.23**	0.15	0.07	0.09	0.09	0.15
criminal#a	0.12	0.10	**0.25**	0.14	0.10	0.11	0.07	0.11
dead#a	0.17	0.07	0.17	0.07	0.07	0.05	0.05	**0.35**
funny#a	0.04	**0.29**	0.04	0.11	0.16	0.13	0.15	0.08
future#n	0.09	0.12	0.09	0.12	0.13	0.13	**0.21**	0.10
game#n	0.06	0.15	0.06	0.08	0.15	**0.23**	0.15	0.12
kill#v	**0.23**	0.06	**0.21**	0.07	0.05	0.06	0.05	**0.27**
rapist#n	0.02	0.07	**0.46**	0.07	0.08	0.16	0.03	0.12
sad#a	0.06	0.12	0.09	0.14	0.13	0.07	0.15	**0.24**
warning#n	**0.44**	0.06	0.09	0.09	0.06	0.06	0.04	0.16

Table 3: An excerpt of the Word-by-Emotion Matrix (M_{WE}) using normalized frequencies (nf). Emotions weighting more than 20% in a word are highlighted for readability purposes.

DepecheMood Example

Demo: `http://www.depechemood.eu/`
"I think that I should be happy, given that my whole life situation is great."

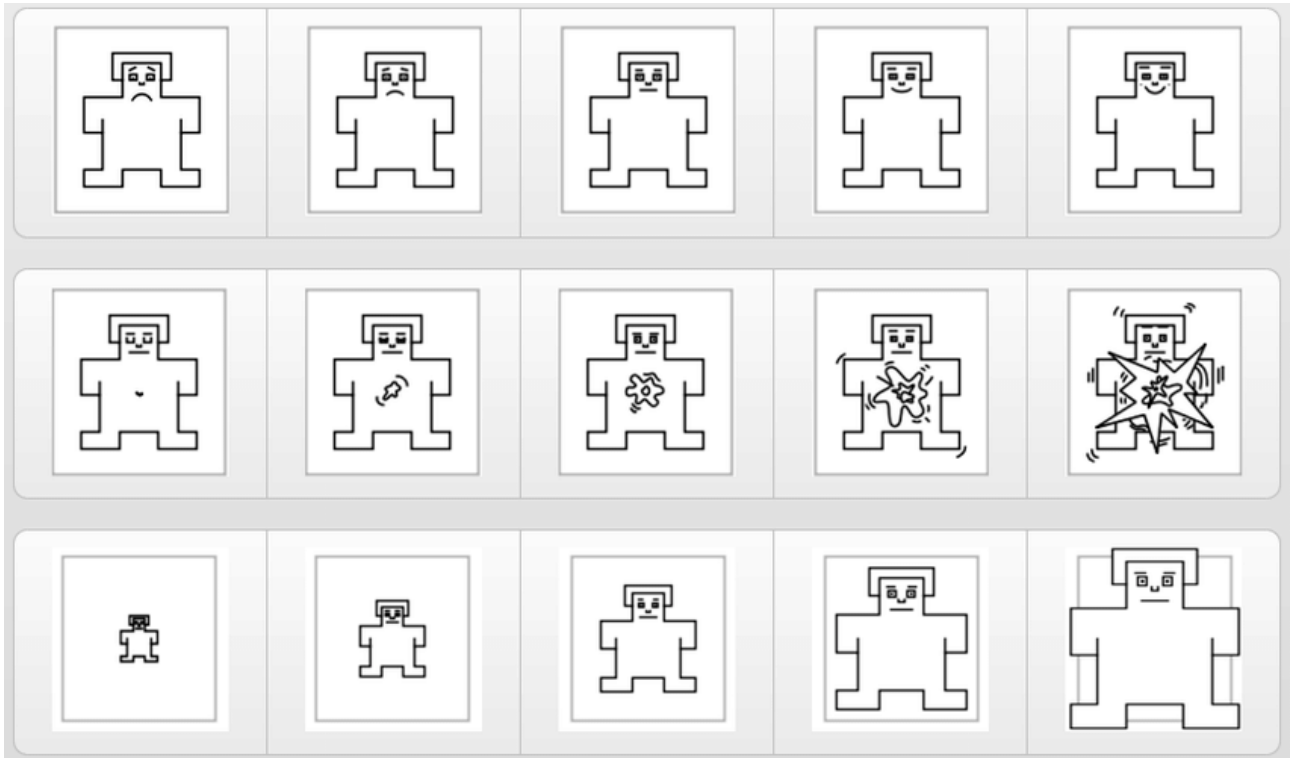


ANEW

- Motivation & Background: "Provide a set of normative emotional ratings for a large number of words in the English language. The goal is to develop a set of verbal materials that have been rated in terms of pleasure, arousal, and dominance"
- Creation Procedure: Psychology Students marked words with the self-assessment Manikin scheme (next slide)
- Label Set: Valence, Arousal, Dominance
- Statistics: $\approx$ 1600 words

Bradley/Lang 1999: Affective Norms for English Words (ANEW): Instruction Manual and Affective Ratings

Selt-Assessment Manikin



ANEW

Affective Norms for English Words. **All Subjects** *Table 1*
Bradley, M.M., & Lang, P.J. (1999)

Description	Word No.	Valence Mean(SD)	Arousal Mean(SD)	Dominance Mean (SD)	Word Frequency	Description	Word No.	Valence Mean(SD)	Arousal Mean(SD)	Dominance Mean (SD)	Word Frequency
abduction	621	2.76 (2.06)	5.53 (2.43)	3.49 (2.38)	1	anguished	19	2.12 (1.56)	5.33 (2.69)	3.45 (2.37)	2
abortion	622	3.50 (2.30)	5.39 (2.80)	4.59 (2.54)	6	ankle	638	5.27 (1.54)	4.16 (2.03)	4.77 (1.74)	8
absurd	623	4.26 (1.82)	4.36 (2.20)	4.73 (1.72)	17	annoy	20	2.74 (1.81)	6.49 (2.17)	5.09 (2.04)	2
abundance	624	6.59 (2.01)	5.51 (2.63)	5.80 (2.16)	13	answer	639	6.63 (1.68)	5.41 (2.43)	5.85 (1.88)	152
abuse	1	1.80 (1.23)	6.83 (2.70)	3.69 (2.94)	18	anxious	21	4.81 (1.98)	6.92 (1.81)	5.33 (1.82)	29
acceptance	625	7.98 (1.42)	5.40 (2.70)	6.64 (1.91)	49	applause	640	7.50 (1.50)	5.80 (2.79)	6.48 (2.11)	14
accident	2	2.05 (1.19)	6.26 (2.87)	3.76 (2.22)	33	appliance	641	5.10 (1.21)	4.05 (2.06)	5.05 (1.34)	5
ace	626	6.88 (1.93)	5.50 (2.66)	6.39 (2.31)	15	arm	642	5.34 (1.82)	3.59 (2.40)	5.07 (1.50)	94
ache	627	2.46 (1.52)	5.00 (2.45)	3.54 (1.73)	4	army	23	4.72 (1.75)	5.03 (2.03)	5.03 (2.45)	132
achievement	3	7.89 (1.38)	5.53 (2.81)	6.56 (2.35)	65	aroused	24	7.97 (1.00)	6.63 (2.70)	6.14 (1.97)	20
activate	4	5.46 (0.98)	4.86 (2.56)	5.43 (1.84)	2	arrogant	25	3.69 (2.40)	5.65 (2.23)	5.14 (2.71)	2
addict	581	2.48 (2.08)	5.66 (2.26)	3.72 (2.54)	1	art	643	6.68 (2.10)	4.86 (2.88)	5.30 (2.33)	208
addicted	628	2.51 (1.42)	4.81 (2.46)	3.46 (2.23)	3	assassin	26	3.09 (2.09)	6.28 (2.53)	4.33 (2.68)	6
admired	5	7.74 (1.84)	6.11 (2.36)	7.53 (1.94)	17	assault	27	2.03 (1.55)	7.51 (2.28)	3.94 (3.10)	15
adorable	6	7.81 (1.24)	5.12 (2.71)	5.74 (2.48)	3	astonished	28	6.56 (1.61)	6.58 (2.22)	5.16 (1.79)	6
adult	546	6.49 (1.50)	4.76 (1.95)	5.75 (2.21)	25	astronaut	501	6.66 (1.60)	5.28 (2.11)	5.20 (1.95)	2
advantage	629	6.95 (1.85)	4.76 (2.18)	6.36 (2.23)	73	athletics	644	6.61 (2.08)	6.10 (2.29)	6.12 (2.12)	9
adventure	630	7.60 (1.50)	6.98 (2.15)	6.46 (1.67)	14	autumn	29	6.30 (2.14)	4.51 (2.50)	5.15 (1.85)	22
affection	7	8.39 (0.86)	6.21 (2.75)	6.08 (2.22)	18	avalanche	645	3.29 (1.95)	5.54 (2.37)	3.61 (2.00)	1
afraid	8	2.00 (1.28)	6.67 (2.54)	3.98 (2.63)	57	avenue	646	5.50 (1.37)	4.12 (2.01)	5.40 (1.53)	46
aggressive	9	5.10 (1.68)	5.83 (2.33)	5.59 (2.40)	17	awed	30	6.70 (1.38)	5.74 (2.31)	5.30 (2.03)	5
agility	22	6.46 (1.57)	4.85 (1.80)	5.87 (1.52)	3	baby	31	8.22 (1.20)	5.53 (2.80)	5.00 (2.80)	62
agony	10	2.43 (2.17)	6.06 (2.67)	4.02 (2.49)	9	bake	647	6.17 (1.71)	5.10 (2.30)	5.49 (1.88)	12
agreement	631	7.08 (1.59)	5.02 (2.24)	6.22 (1.85)	106	bandage	648	4.54 (1.75)	3.90 (2.07)	4.52 (1.89)	4
air	632	6.34 (1.56)	4.12 (2.30)	5.10 (1.56)	257	bankrupt	32	2.00 (1.31)	6.21 (2.79)	3.27 (2.39)	5
alcoholic	582	2.84 (2.34)	5.69 (2.36)	4.45 (2.56)	3	banner	649	5.40 (0.83)	3.83 (1.95)	4.80 (1.57)	8
alert	11	6.20 (1.76)	6.85 (2.53)	5.96 (2.24)	33	bar	650	6.42 (2.05)	5.00 (2.83)	5.47 (1.94)	82
alien	633	5.60 (1.82)	5.45 (2.15)	4.64 (2.07)	16	barrel	651	5.05 (1.46)	3.36 (2.28)	4.89 (1.57)	24
alimony	634	3.95 (2.00)	4.30 (2.29)	4.63 (2.30)	2	basket	547	5.45 (1.15)	3.63 (2.02)	5.76 (1.45)	17
alive	635	7.25 (2.22)	5.50 (2.74)	6.39 (2.15)	57	bastard	33	3.36 (2.16)	6.07 (2.15)	4.17 (2.40)	12
allergy	636	3.07 (1.64)	4.64 (2.34)	3.21 (1.77)	1	bath	502	7.33 (1.45)	4.16 (2.31)	6.41 (1.87)	26
alley	637	4.48 (1.97)	4.91 (2.42)	4.00 (1.70)	8	bathroom	548	5.55 (1.36)	3.88 (1.72)	5.65 (1.59)	18
alone	12	2.41 (1.77)	4.83 (2.66)	3.70 (2.42)	195	bathtub	652	6.69 (1.57)	4.36 (2.59)	5.76 (1.76)	4
aloof	13	4.90 (1.92)	4.28 (2.10)	4.69 (1.92)	5	beach	34	8.03 (1.59)	5.53 (3.07)	5.44 (2.52)	61
ambition	14	7.04 (1.98)	5.61 (2.92)	6.93 (2.07)	19	beast	653	4.23 (2.41)	5.57 (2.61)	4.89 (2.29)	7
ambulance	15	2.47 (1.50)	7.33 (1.96)	3.22 (2.29)	6	beautiful	654	7.60 (1.64)	6.17 (2.34)	6.29 (1.81)	127
angel	16	7.53 (1.58)	4.83 (2.63)	4.97 (2.34)	18	beauty	35	7.82 (1.16)	4.95 (2.57)	5.53 (2.10)	71
anger	17	2.34 (1.32)	7.63 (1.91)	5.50 (2.82)	48	bed	549	7.51 (1.38)	3.61 (2.56)	6.88 (1.78)	127
angry	18	2.85 (1.70)	7.17 (2.07)	5.55 (2.74)	45	bees	583	3.20 (2.07)	6.51 (2.14)	4.16 (2.11)	15

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https://csea.phhp.ufl.edu/media.html

NRC Valence, Arousal, and Dominance (NRC-VAD) Lexicon

- Motivation & Background:
  Create large and reliable VAD Resource
- Creation Procedure:
  - Join terms from NRC Emotion, General Inquirer and other Thesauri, ANEW, high-frequent social media terms
  - Crowdsourcing annotation via best-worst scaling
    (to be discussed later)
- Label Set: Valence Arousal Dominance
- Statistics: 20k Words

Saif M. Mohammad, Obtaining Reliable Human Ratings of Valence, Arousal, and Dominance for 20,000 English Words, 2018

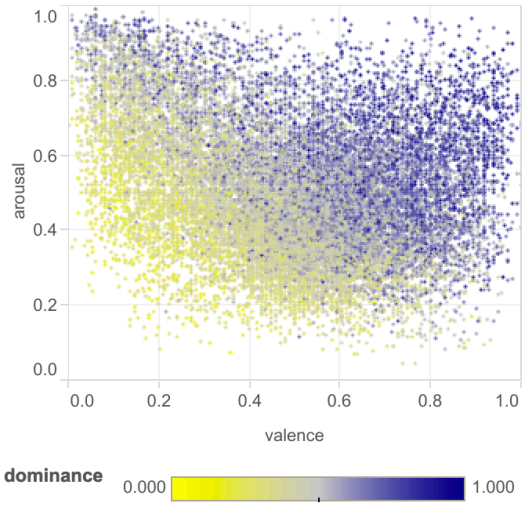
`https://saifmohammad.com/WebPages/nrc-vad.html`

NRC Valence, Arousal, and Dominance (NRC-VAD) Lexicon

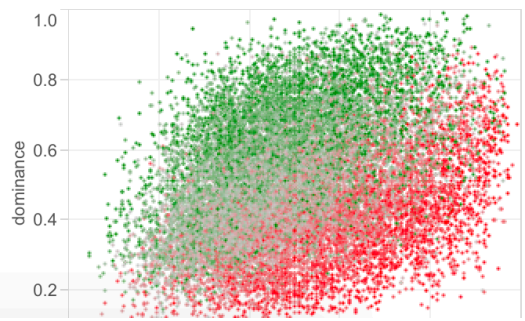
The NRC VAD Lexicon

term	valence	arousal	dominance
pandemonium	0.229	0.885	0.500
pandemic	0.160	0.790	0.544
panda	0.646	0.194	0.406
pancreas	0.469	0.302	0.366
pancakes	0.844	0.373	0.402
pancake	0.802	0.274	0.364
panache	0.510	0.363	0.306
panacea	0.420	0.427	0.613
pan	0.734	0.182	0.364
pamphlet	0.530	0.250	0.327
pamper	0.792	0.321	0.348
paltry	0.333	0.491	0.320
palsy	0.083	0.446	0.221
palpitations	0.417	0.702	0.528
palpable	0.552	0.343	0.611
palomino	0.616	0.349	0.396
palmer	0.480	0.269	0.413
palm	0.531	0.194	0.340
palliative	0.548	0.394	0.518
pallet	0.604	0.241	0.349
palladium	0.470	0.380	0.393
pall	0.277	0.387	0.394
palette	0.590	0.333	0.205
paleontology	0.438	0.308	0.617
pale	0.281	0.259	0.245
palate	0.625	0.350	0.358

valence vs. arousal



arousal vs. dominance



A Dictionary of Emotion-Provoking Events

- Motivation & Background: Create dictionary of events
- Creation Procedure:
  - Manually annotate with 30 subjects
  - Augment with web data: "I am EMOTION that EVENT"
- Label Set: happiness, sadness, anger, fear, surprise

Emotions	Events		
happiness	meeting friends	going on a date	getting something I want
sadness	someone dies/gets sick	someone insults me	people leave me alone
anger	someone insults me	someone breaks a promise	someone is too lazy
fear	thinking about the future	taking a test	walking/driving at night
surprise	seeing a friend unexpectedly	someone comes to visit	receiving a gift

Table 1: The top three events for each emotion.

Vu et al 2014, Acquiring a Dictionary of Emotion-Provoking Events

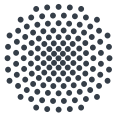
Summary

Dictionaries are

- A transparent approach to access emotions in text
- Might fail to capture context and compositionality
- Can be created in many different ways, including manual creation, crowdsourcing, cross-lingual induction, distributional semantics, semi-supervised methods…

Take Away

- Dictionaries as a representation of lexical semantics of emotions
- Computational access to emotions in text
- Downstream Applications of Dictionaries for Emotion Analysis
- Creation Process of Emotion Dictionaries
- Existing Resources



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Natural Language Processing

Emotion Analysis

Lexicons

Nov 15, 2022

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