

Event-centered Emotion Classification from Text

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romanklinger

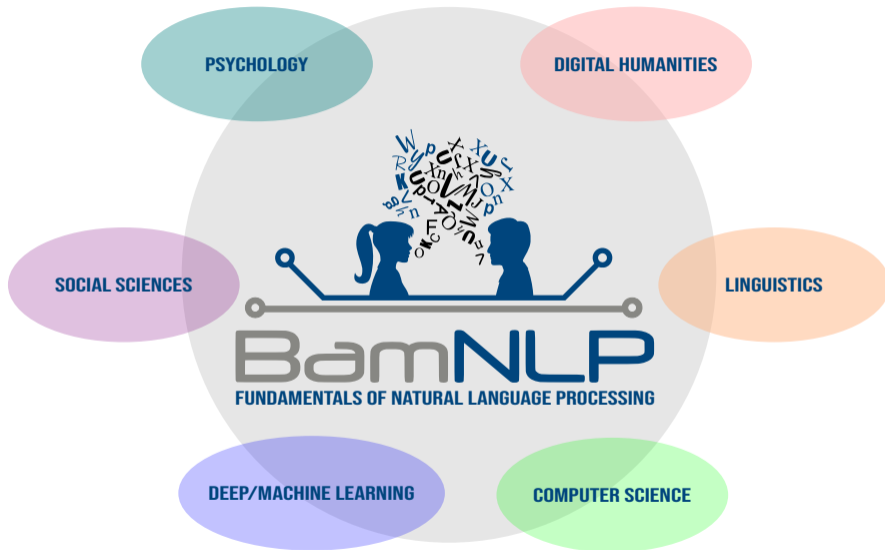
<https://www.bamberg.de/nlproc/>



About Myself

- 1999–2006: Studies at University of Dortmund:
Computer science with minor psychology
- 2006–2010: Doctoral studies at Fraunhofer SCAI, St. Augustin:
Biomedical text mining, machine learning
- 2010, 2013: Research visits at UMass Amherst:
Probabilistic machine learning, MCMC inference
- 2011–2012: Postdoc at Fraunhofer SCAI:
Social media mining, eGovernment
- 2013–2014: Postdoc at Bielefeld University:
Sentiment analysis, opinion mining
- 2015: Co-Founder of Semalytix GmbH (exit 2020)
Social Media Health Mining
- 2014–2024: (Senior) Lecturer/apl. Prof at IMS, Uni Stuttgart
Natural Language Understanding and Generation
- 03/2024: Full Professor for Fundamentals of NLP, Bamberg





Outline

- 1 Emotion Analysis
- 2 Emotions are Events
- 3 Appraisal-based Emotion Analysis
- 4 What's left to do?
- 5 Take Home

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Emotion Examples

Which emotion is associated with the examples?

How did you recognize that?

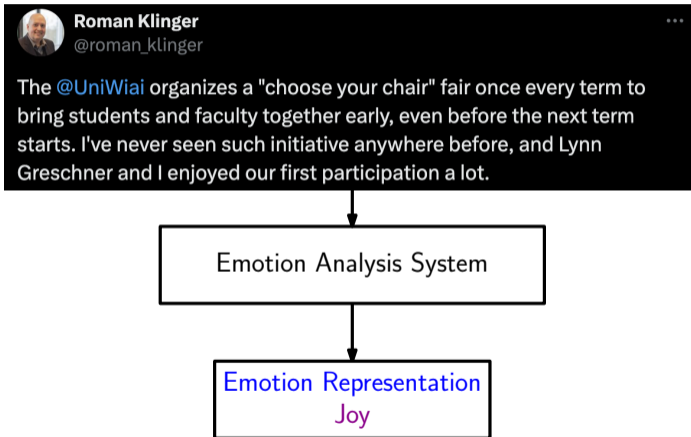
- “She became angry.”
- “A tear is running down his face.”
- “We are going for a walk at the beach.”
- “Their dog ran towards me quickly.”

With this exercise, we discussed:

- What is an appropriate set of emotions?
- How are they expressed/recognized?
- Emotions are subjective.

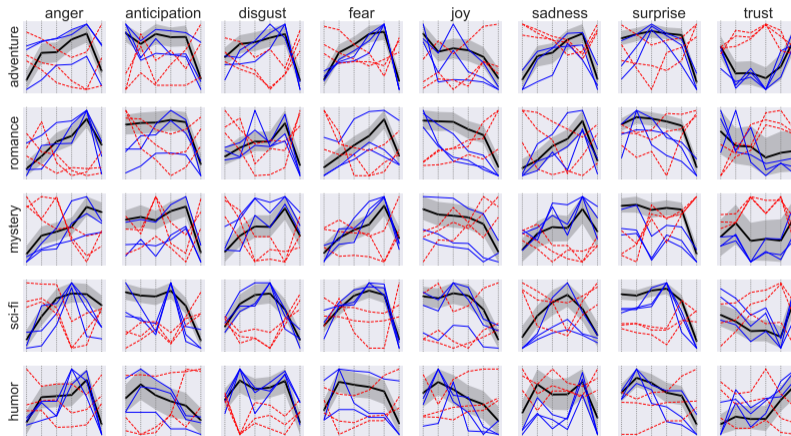


Emotion Analysis: What we want to do.





Literary Studies



Kim et al., 2017.

Investigating the Relationship between Literary Genres and Emotional Plot Development. LaTeCH@ACL



Dominant Emotions Expressed in News Articles

Emotion	Dominant Emotion
Anger	The Blaze, The Daily Wire, BuzzFeed
Annoyance	Vice, NewsBusters, AlterNet
Disgust	BuzzFeed, The Hill, NewsBusters
Fear	The Daily Mail, Los Angeles Times, BBC
Guilt	Fox News, The Daily Mail, Vice
Joy	Time, Positive.News, BBC
Love	Positive.News, The New Yorker, BBC
Pessimism	MotherJones, Intercept, Financial Times
Neg. Surprise	The Daily Mail, MarketWatch, Vice
Optimism	Bussines Insider, The Week, The Fiscal Times
Pos. Surprise	Positive.News, BBC, MarketWatch
Pride	Positive.News, The Guardian, The New Yorker
Sadness	The Daily Mail, CNN, Daily Caller
Shame	The Daily Mail, The Guardian, The Daily Wire
Trust	The Daily Signal, Fox News, Mother Jones

Bostan et al., 2020.

GoodNewsEveryone: A Corpus of News Headlines Annotated with Emotions, Semantic Roles, and Reader Perception. LREC

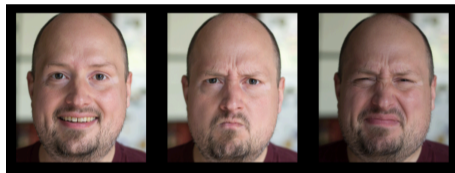


Emotion Models in Psychology – Basic Emotions

How to define a categorical system of emotions?

- Distinctive universal signals
- Presence in other primates
- Distinctive physiology
- Distinctive universals in antecedent **events**
- Coherence among emotional response
- Quick onset
- Brief duration
- Automatic **appraisal**
- Unbidden occurrence

Ekman (1992): An argument for basic emotions.



Joy

Anger

Disgust



Fear

Sadness

Surprise

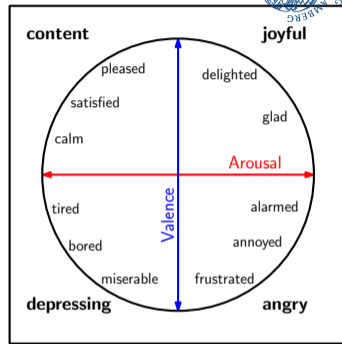
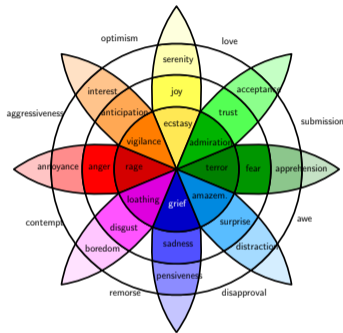
How to define a categorical system of emotions?



Joy Anger Disgust



Fear Sadness Surprise



- Emotion models in psychology explain how emotions are developed.
- Text analysis models learn to associate textual realizations to emotion concepts. They do not (explicitly?) use knowledge from such theories.



Emotions and Events

Emotions and Events are linked in (at least) two ways:

Emotions are events

- “Donald is happy about his birthday present.”
- FrameNet Emotion Directed Frame:
 - Event: “happy”
 - Experiencer: “Donald”
 - Stimulus: “his birthday present”
 - ...

⇒ Motivated the task of
emotion semantic role labeling

Events cause emotions

- “There is a car on fire.”
 - Relevant event for the speaker, might cause fear.
 - Requires interpretation of events to infer possible emotions.
 - Little previous work
 - Udochukwu/He (2015), Shaikh et al. (2009), Balahur et al. (2011)

Outline

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2 Emotions are Events

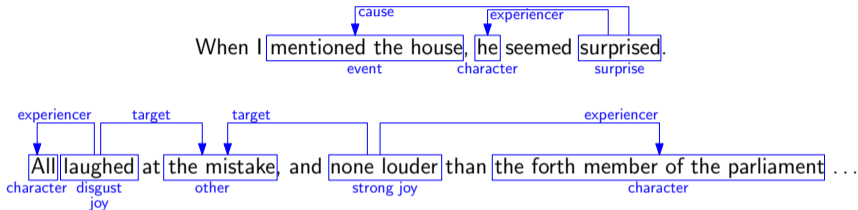
3 Appraisal-based Emotion Analysis

4 What's left to do?

5 Take Home



Emotions are Events: Literature



Who Feels What and Why? Annotation of a Literature Corpus with Semantic Roles of Emotions

Evgeny Kim and Roman Klinger

Institut für Maschinelle Sprachverarbeitung

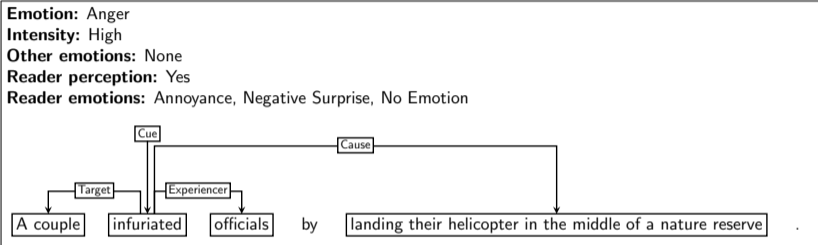
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Emotions are Events: News



GoodNewsEveryone: A Corpus of News Headlines Annotated with Emotions, Semantic Roles, and Reader Perception

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Definition of Emotions: Components

Emotion (Scherer, 2005)

Emotions are “an **episode** of interrelated, synchronized changes in the states of [...] **five organismic subsystems** in response to the evaluation of a [...] **stimulus-event** ...”

		
Feeling	Expression	Bodily Symptom
Action Tendency	Cognitive Appraisal	
Fear		

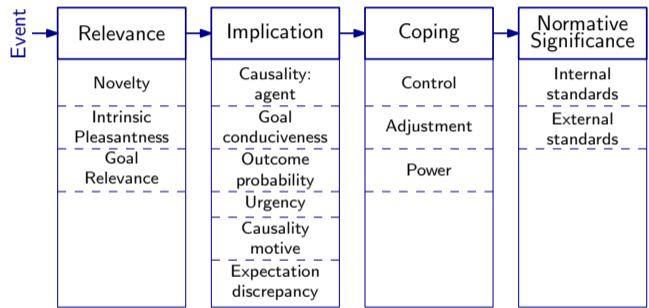
Event

Components

Name



Cognitive Appraisal in Scherer's Component Process model



K.R. Scherer (2001). Appraisal Considered as a Process of Multilevel Sequential Checking.



Research Questions

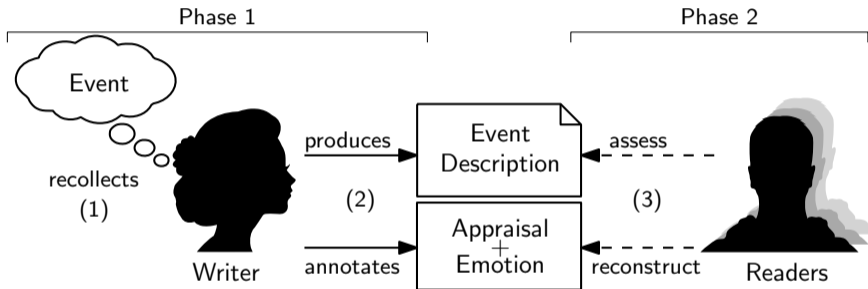
- Can appraisals be annotated reliably?
- Can we predict appraisal variables from event descriptions?
- Do appraisals help emotion categorization?
- Challenge: How to access the personal interpretation of an event?

E. Troiano et al. (2023). “Dimensional Modeling of Emotions in Text with Appraisal Theories: Corpus Creation, Annotation Reliability, and Prediction”. In: Computational Linguistics 49.1

J. Hofmann et al. (2020). “Appraisal Theories for Emotion Classification in Text”. In: COLING



Approach



- Production: 550 event descriptions for anger, boredom, disgust, fear, guilt/shame, joy, pride, relief, sadness, surprise, trust, no emotion



Appraisal Variables

Relevance	Implication	Coping	Normative Significance
<u>Novelty</u> (1) suddenness (2) familiarity (3) predictability (16) attention* (17) att. removal*	<u>Causality: agent</u> (7) own responsibility (8) other's respons. (9) situational respons.	<u>Control</u> (19) own control* (20) others' control* (21) chance control*	<u>Internal standards</u> <u>compatibility</u> (14) clash with own standards/ideals
<u>Intrinsic Pleasantness</u> (4) pleasant (5) unpleasant	<u>Goal conduciveness</u> (10) goal support	<u>Adjustment</u> (13) anticipated acceptance (18) effort*	<u>External standards</u> <u>compatibility</u> (15) clash with laws/norms
<u>Goal Relevance</u> (6) goal-related	<u>Outcome probability</u> (11) consequence anticipation		
	<u>Urgency</u> (12) response urgency		



Variable Assessment

Appraisal Variables

- (1) The event was sudden or abrupt. (suddenness)
- (2) The event was familiar. (familiarity)
- (3) I could have predicted the occurrence of the event. (event predictability)
- (4) The event was pleasant. (pleasantness)
- (5) The event was unpleasant. (unpleasantness)
- (6) I expected the event to have important consequences for me. (goal relevance)
- (7) The event was caused by my own behavior. (own responsibility)
- (8) The event was caused by somebody else's behavior. (other responsibility)
- (9) The event was caused by chance, special circumstances, or natural forces. (situational responsibility)
- (10) I expected positive consequences for me. (goal support)
- (11) I anticipated the consequences of the event. (anticip. conseq.)
- (12) The event required an immediate response. (urgency)
- (13) I anticipated that I would easily live with the unavoidable consequences of the event. (accept. conseq.)
- (14) The event clashed with my standards and ideals. (internal standards)
- (15) The actions that produced the event violated laws or socially accepted norms. (external norms)
- (16) I had to pay attention to the situation. (attention)
- (17) I tried to shut the situation out of my mind. (not consider)
- (18) The situation required me a great deal of energy to deal with it. (effort)
- (19) I was able to influence what was going on during the event. (own control)
- (20) Someone other than me was influencing what was going on. (others' control)
- (21) The situation was the result of outside influences of which nobody had control. (situational control)

- All variables are similarly assessed by writers and readers

Additional Variables

- Age, Gender
- Ethnicity, Education
- Event familiarity
for readers
- Personality traits
 - openness
 - conscientiousn.
 - extraversion
 - agreeableness
 - emotional stability



Examples

pride I baked a delicious strawberry cobbler.

fear I felt ... when there was a power outage in my home. That day, my wife and I were cuddling in the sitting room when a thunderstorm started. Then ... filled me when thunder hit our roof and all the lights went off.

joy I found the perfect man for me, and the more time goes on, the more I realized he was the best person for me. Every day is a



Questions and Answers

- Do readers agree more with each other than with the writers?
(does the writer make use of information that the readers do not have)
 - Yes, a bit for emotions; clearly for the appraisals.
- Does it matter if annotators share demographic properties?
 - Females agree more with each other, but men less.
 - People of similar age agree more.
- Does personality matter?
 - Extraverted, conscientious, agreeable annotators perform better.

Setup:

- Filter instances for attribute, compare with F_1 /RMSE
- Significance test with bootstrap resampling for .95 confidence interval



Examples (writer/reader/avg. writer–reader agreement as error)

- All writers/readers agree on emotion, **high** average appraisal agreement

pride, .65 I baked a delicious strawberry cobbler

fear, .84 A housemate came at me with a knife
- All writers/readers agree on emotion, **low** average appraisal agreement

disgust, 2.0 His toenails where massive

fear, 2.1 I felt ... going in to hospital
- All readers agree on the emotion, but **not with the writer**, **high** appraisal agreement

trust, joy, .87 I am with my friends

anger, fear, 1.1 My waters broke early during pregnancy
- All readers agree on the emotion, **but not with the writer**, **low** appraisal agreement

pride, sadness, 1.7 That I put together a funeral service for my Aunt



Appraisals add additional information to emotion analysis

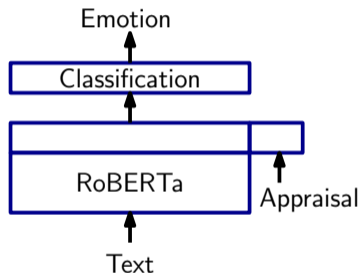
That I put together a
funeral service for my Aunt

Dimension	Writer	Readers	Δ
Emotion	Pride	Sadness	
Suddenness	4	3.6	0.4
Familiarity	1	2.0	-1.0
Predictability	1	1.8	-0.8
Pleasantness	4	1.0	3.0
Unpleasantness	2	4.8	-2.8
Goal-Relevance	4	2.6	1.4
Chance-Resp.	4	4.4	-0.4
Self-Resp.	1	1.2	-0.2
Other-Resp.	1	1.4	-0.4
Conseq.-Predict.	2	1.8	0.2
Goal Support	1	1.2	-0.2
Urgency	2	3.8	-1.8
Self-Control	5	3.2	1.8
Other-Control	3	2.0	1.0
Chance-Control	1	4.6	-3.6
Accept-Conseq.	4	2.4	1.6
Standards	1	2.4	-1.4
Social Norms	1	1.2	-0.2
Attention	4	4.4	-0.4
Not-Consider	1	3.8	-2.8
Effort	4	4.6	-0.6



Modeling Results

- Classification with RoBERTa-based models
 - Appraisal Classification: 75 F_1
 - Emotion classification: 59 F_1
 - + Appraisals: +2pp F_1
(+10 for guilt, +6 for sadness)
- ⇒ Appraisals help to build better models.





Examples where Appraisals correct the Emotion Classifier

- When my child settled well into school
- broke an expensive item in a shop accidentally
- my mother made me feel like a child
- I passed my Irish language test
- His toenails where massive

trust→relief

guilt→shame

shame→anger

pride→relief

pride→disgust



Conclusion & Summary

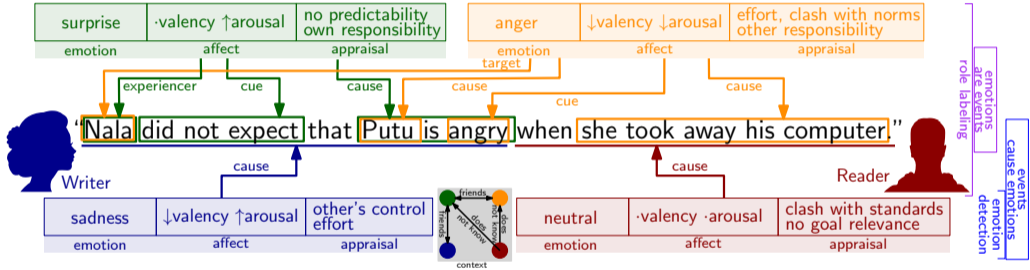
- We presented the first self-annotated large-scale appraisal corpus
- Annotators can reliably recover both emotions and appraisals (demographics play a significant but small role)
- Appraisals help emotion categorization for some emotion categories
- More importantly: Appraisals help to understand reasons for disagreement

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What's left to do?

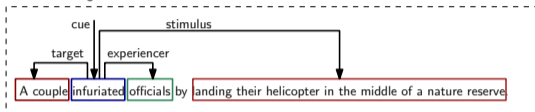


R. Klinger (2023). "Where are We in Event-centric Emotion Analysis? Bridging Emotion Role Labeling and Appraisal-based Approaches". In: Proceedings of the Big Picture Workshop

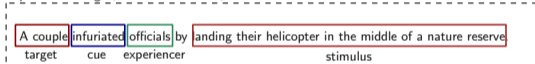


Nobody did model full emotion role labeling...

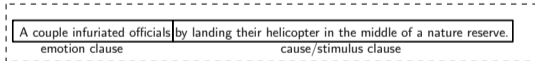
full role labeling



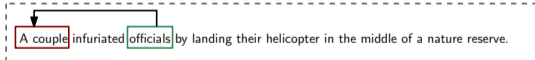
sequence labeling (Ghazi et al., 2015, i.a.)



clause classification (Gao et al., 2017a)



relation detection (Kim/Klinger, 2019)





Open Challenges

- Role labeling with appraisal information
- Other emotion models (e.g., constructionist theories)
- Robust cross-domain modeling
- Interpretation of event chains
- Perspectivism – persona-specific emotion models
- Multimodal modeling
- Emotion modeling in arguments
- ...



Current and Soon-to-Start Emotion-Related Work at BamNLP



Event chains with LLMs

Johannes Schäfer



Model robustness across domains

Sabine Weber



Emotions in arguments

Lynn Greschner



Multimodal emotions in social media

Christopher Bagdon



Prompt optimization

Jiahui Li



Emotion-conditioned text generation

Yarik Menchaca Resendiz



Style transfer

Aswathy Velutharambath



Take Home

- Emotions and Events cannot be separated
- Modeling emotions benefits from knowledge from psychological theories
- A lot of open challenges

Thank you for
your attention.
Questions? Remarks?



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- Collaborators
 - Kai Sassenberg

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