

University of Stuttgart
Institute for
Natural Language Processing

Emotion Analysis

Evaluation-based Approaches

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Roman Klinger
(includes material
by Evgeny Kim)



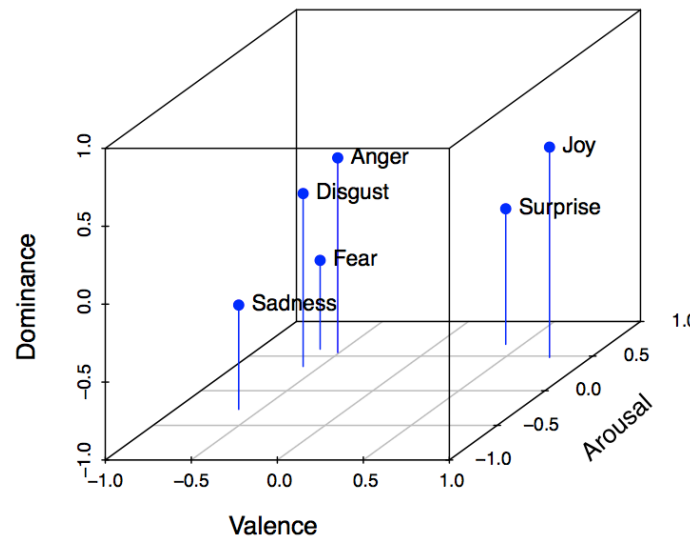
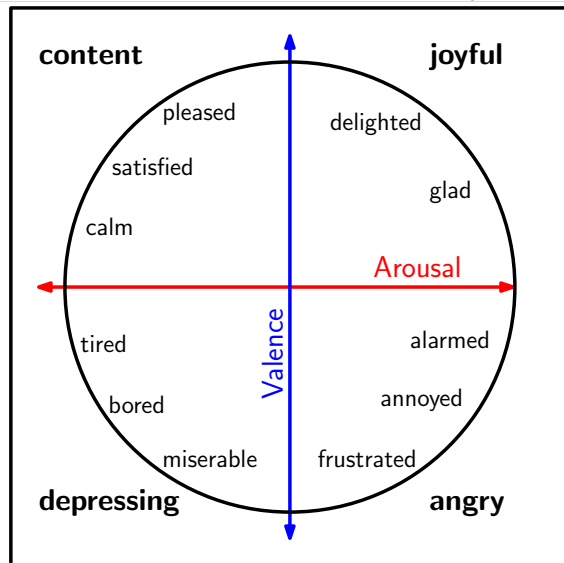
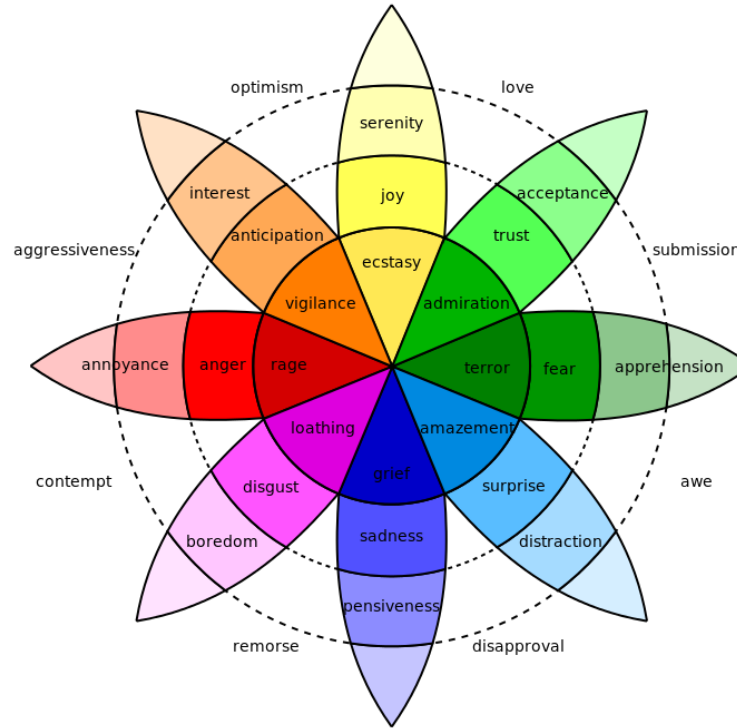
Outline

- 1 Recap
- 2 The OCC Model of Emotions
- 3 OCC on text
- 4 Assignment 02

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Emotion Models



Corpora

Dataset	Type	Annotation	Size	Source	Avail.
AffectiveText	📄	📄 + {valence}	1,250	Strapparava (2007)	D-U
Blogs	📄	📄 + {mixed, noemo}	5,025	Aman (2007)	R
CrowdFlower	🐦	📄 + {fun, love, ...}	40,000	CrowdfLOWER (2016)	D-U
DailyDialogs	🗣️	📄	13,118	Li et al. (2017)	D-R0
Electoral-Tweets	🐦	🌈	4,058	Mohammad (2015)	D-R0
EmoBank	📄 📄 📄	📄	10,548	Buechel (2017)	CC-by4
EmoInt	🐦	📄 - {disgust, surprise}	7,097	Mohammad (2017)	D-R0
Emotion-Stimulus	📄	📄 + {shame}	2,414	Ghazi et al. (2015)	D-U
fb-valence-arousal	📄	📄	2,895	Preoticiu (2016)	D-U
Grounded-Emotions	🐦	😊 😞	2,585	Liu et al. (2017)	D-U
ISEAR	👤	📄 + {shame, guilt}	7,665	Scherer (1997)	GPLv3
Tales	📄	📄	15,302	Alm et al. (2005)	GPLv3
SSEC	🐦	🌈	4,868	Schuff et al. (2017)	D-R0
TEC	🐦	📄 + {±surprise}	21,051	Mohammad (2012)	D-R0

Bostan/Klinger, COLING 2018

Data-driven Classification

- **Lexicon-based**: Count words, normalize appropriately, and accept dominating emotion
- **Machine-learning**: Bag-of-words, feature-based, deep-learning
- **Transfer learning, Multi-task learning**
- **Zero-shot learning**

⇒ Methods mostly treat emotions as a label and learn the association to text properties, without considering (too much) knowledge from psychology about emotions

Appraisal Theories

Emotions have different components...

- **Cognitive appraisal:**
an evaluation of events and objects
- **Bodily symptoms:**
physiological component of emotional experience
- **Action tendencies:**
a motivational component for the preparation and direction of motor responses
- **Expression:** facial and vocal expression, body language, gestures, almost always accompanies an emotional state
- **Subjective perceptions/Feeling:** subjective experience of emotional state once it has occurred

Smith/Ellsworth (1985)

Locations of Emotion Means Along the PCA Components

Emotion	Component					
	Pleasant ^a	Responsibility/ Control ^b	Certain ^c	Attention ^d	Effort ^e	Situational- Control ^f
Happiness	-1.46	0.09	-0.46	0.15	-0.33	-0.21
Sadness	0.87	-0.36	0.00	-0.21	-0.14	1.15
Anger	0.85	-0.94	-0.29	0.12	0.53	-0.96
Boredom	0.34	-0.19	-0.35	-1.27	-1.19	0.12
Challenge	-0.37	0.44	-0.01	0.52	1.19	-0.20
Hope	-0.50	0.15	0.46	0.31	-0.18	0.35
Fear	0.44	-0.17	0.73	0.03	0.63	0.59
Interest	-1.05	-0.13	-0.07	0.70	-0.07	0.41
Contempt	0.89	-0.50	-0.12	0.88	-0.07	-0.63
Disgust	0.38	-0.50	-0.39	-0.96	0.06	-0.19
Frustration	0.88	-0.37	-0.08	0.60	0.48	0.22
Surprise	-1.35	-0.94	0.73	0.40	-0.66	0.15
Pride	-1.25	0.81	-0.32	0.02	-0.31	-0.46
Shame	0.73	1.31	0.21	-0.11	0.07	-0.07
Guilt	0.60	1.31	-0.15	-0.36	0.00	-0.29

Note. Scores are standardized.

^a Pleasantness: high scores indicate increased unpleasantness.

^b Responsibility/Control: high scores indicate increased self-responsibility/control.

^c Certainty: high scores indicate increased uncertainty.

^d Attentional activity: high scores indicate increased attentional activity.

^e Effort: high scores indicate increased anticipated effort.

^f Situational control: high scores indicate increased situational control.

Take Away

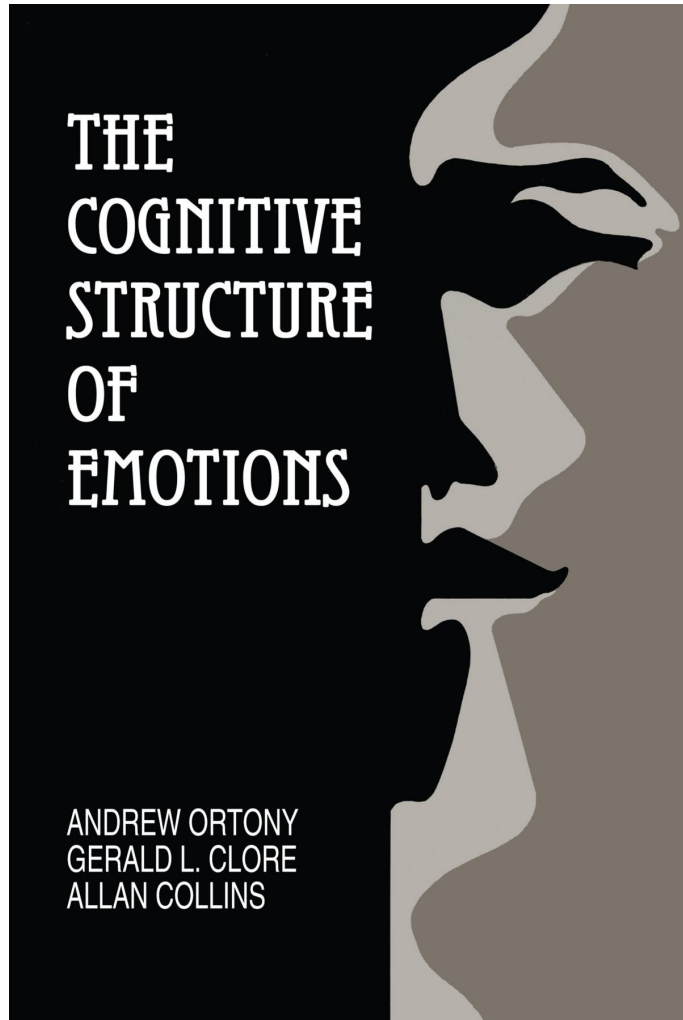
- The OCC Model of Emotions
- Interpretation of Text with the OCC Model
- Appraisal Theories according to Smith/Ellsworth and Scherer
- Text-classification methods that consider these theories

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Motivation

- Dictionaries alone, without interpretation of context, might not be sufficient.
- Emotions have a context structure and components, we want to exploit that for text interpretation
- Building rules which associate text with emotions enable to better understand emotions



(1988)

Published in final edited form as:
Emot Rev. 2013 October ; 5(4): 335–343. doi:10.1177/1754073913489751.

Psychological Construction in the OCC Model of Emotion

Gerald L. Clore and
Department of Psychology, University of Virginia, USA

Andrew Ortony
Department of Psychology, Northwestern University, USA

Abstract

This article presents six ideas about the construction of emotion: (a) Emotions are more readily distinguished by the situations they signify than by patterns of bodily responses; (b) emotions emerge from, rather than cause, emotional thoughts, feelings, and expressions; (c) the impact of emotions is constrained by the nature of the situations they represent; (d) in the OCC account (the model proposed by Ortony, Clore, and Collins in 1988), appraisals are psychological aspects of situations that distinguish one emotion from another, rather than triggers that elicit emotions; (e) analyses of the affective lexicon indicate that emotion words refer to *internal mental states focused on affect*; (f) the modularity of emotion, long sought in biology and behavior, exists as mental schemas for interpreting human experience in story, song, drama, and conversation.

OCC and Appraisal

Appraisal:

- **Emotion component process model by Scherer:**
Coordinated process of different subsystems
- **Appraisal:**
Cognitive evaluation of event
- **OCC:** (from the abstract of the paper on the last slide)
(d) in the OCC account [...], appraisals are **psychological aspects of situations that distinguish one emotion from another, rather than triggers that elicit emotions;**
- **OCC is a model that describes constituting factors of emotions**

OCC

- (a) Emotions are more readily distinguished by the situations they signify than by patterns of bodily responses;
- (b) emotions emerge from, rather than cause, emotional thoughts, feelings, and expressions;
- (c) the impact of emotions is constrained by the nature of the situations they represent;
- (d) in the OCC account [...], appraisals are **psychological aspects of situations that distinguish one emotion from another, rather than triggers that elicit emotions;**
- (e) analyses of the affective lexicon indicate that emotion words refer to internal mental states focused on affect;
- (f) the modularity of emotion, long sought in biology and behavior, exists as mental schemas for interpreting human experience in story, song, drama, and conversation.

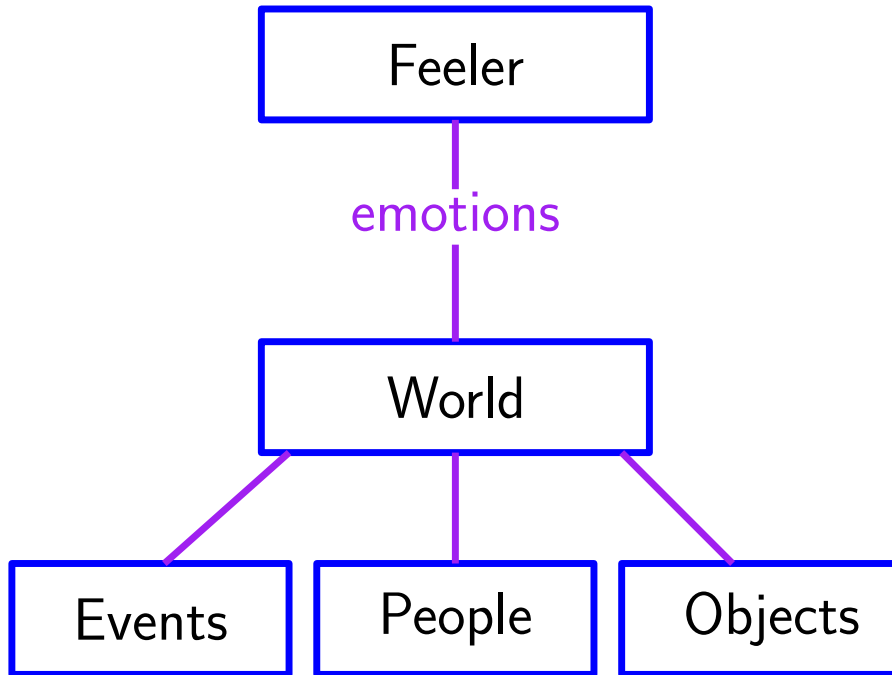
Warm-Up Example

How to interpret the emotion?

I passed the exam!

⇒ We will develop rules...
...which enable us to evaluate events.
Motivation: Cognitive Appraisal

The Basis of Appraisals



- How do **events** distinguish emotions from another?
- How do (other) **people** distinguish (the feelers) emotions from another?
- How do **objects** distinguish emotions from another?

Building Blocks of OCC

- Appraisal/Evaluation
 - **Goals, Standards, Attitudes**
- Intensities
 - Desirability of consequences of events
 - Praiseworthiness of actions of people
 - Attitudes towards properties of objects

Goals

- **Active Goals**
 - wants to be done with that.
 - Actively pursued
 - Variable duration, from seconds to years
 - Disappears once it's achieved
- **Refill**
 - needs to be reoccur.
 - After realization, desire/wish drops to zero.
 - But it's not abandoned, repeats after a while.
- **Interests**
 - wants to see that happening.
 - Less actively pursued, but can become obsessive.
 - Does not disappear based on "completion"
- Do you know examples for each of these type of goals?

degree, family plans, once in a lifetime vacations

*Vacations ;
desires ;
reading ;
baking ;
hobbies ;
reading ;*

Standards

- Behaviour and Performance
 - “You should try harder.”
- Role-based Norms
 - “Rescue this person, you are a life-guard”.
 - “Call the ambulance, there is an emergency.”.
- Socially learned
 - “That is not how one behaves during dinner.”
- Can you think of other examples?

Attitudes

Attitudes include dispositional liking/disliking, taste; evaluate objects and properties.

- **Components**
 - **Affective Component**
 - Links of emotions/feelings to attitude objects
 - Can be learned or inborn
 - **Behavioural Component**
 - Attitude influences our behaviour
 - **Cognitive Component**
 - Association of positive/negative attributes of object

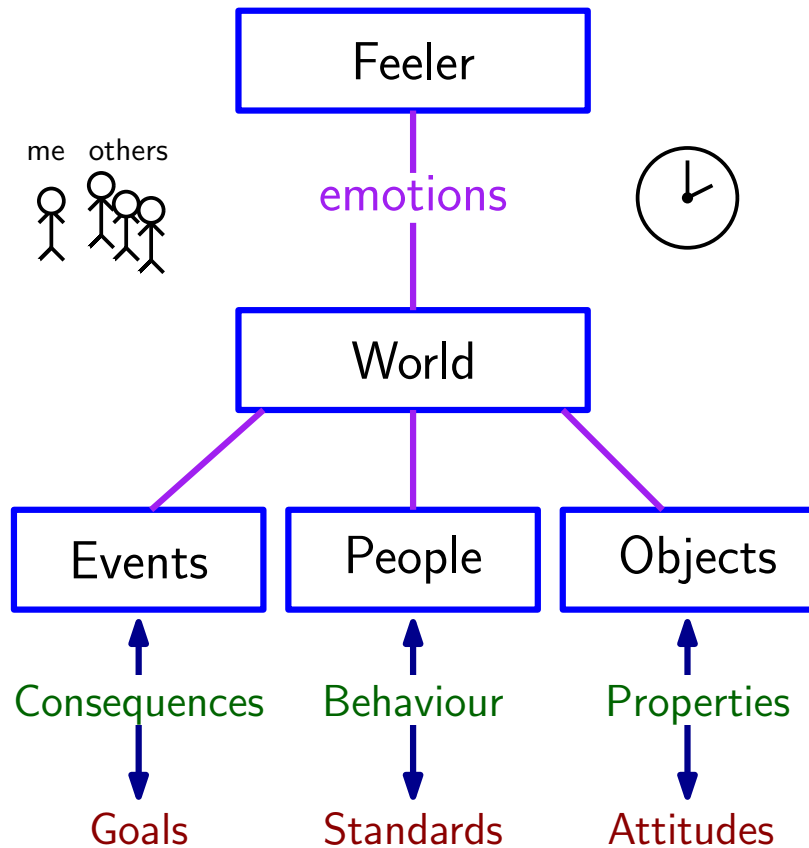
Building Blocks of OCC

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 - Desirability of consequences of events
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 - Attitudes towards properties of objects

Intensity variables

- **Desirability of events**
 - Goal: I want to visit my grandmother-in-law every month.
 - Event: World-wide pandemia
- **Praiseworthiness of people**
 - Standard: Behave nicely to everybody
 - Person: Starts a fight for no reason
- **Appealingness of objects**
 - Disposition: I like cars
 - Tesla Cybertruck

OCC Model



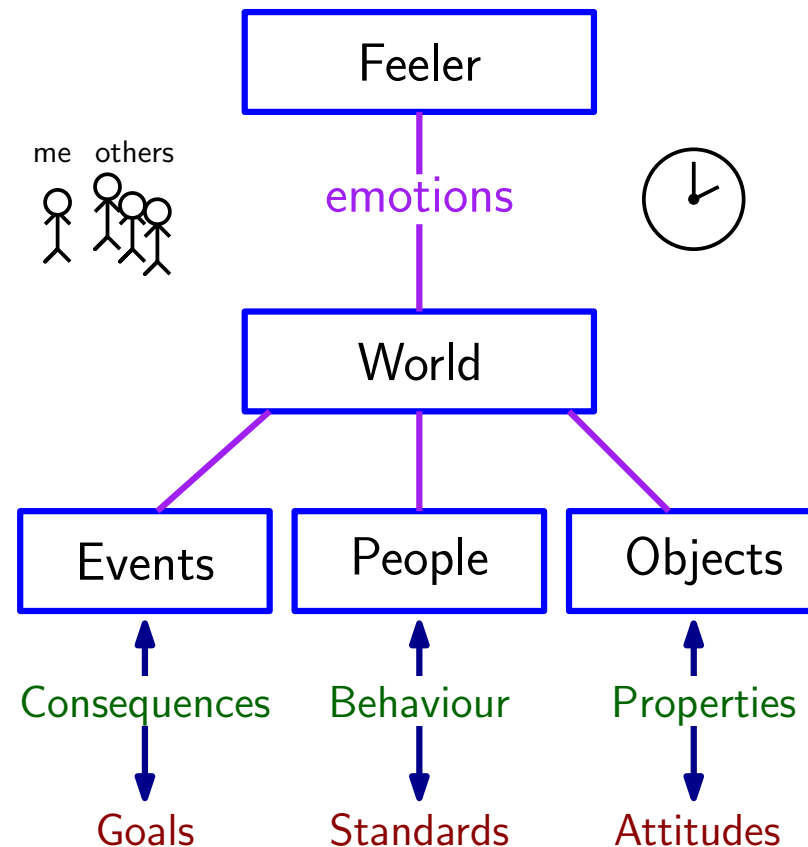
Further components

- **Point of view:** Different consequences, standards, goals, attitudes.
- **Time:**
 - Anticipate an event
 - Be afraid about something that could have happened

Exercise

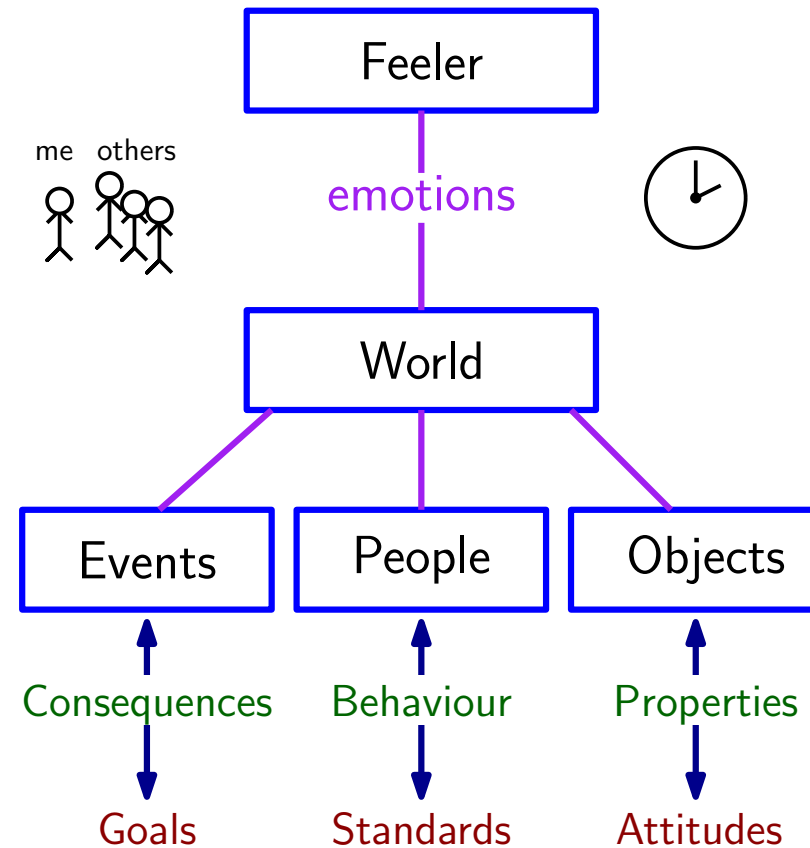
Assign variable values to OCC components for the following descriptions. Infer an emotion.

- The man ran out of gas in the middle of the highway.
- The employee thinks that he might be fired.
- Mary learns that her husband cheated to win in the lottery.
- Snowden has been praised for revealing malpractices.



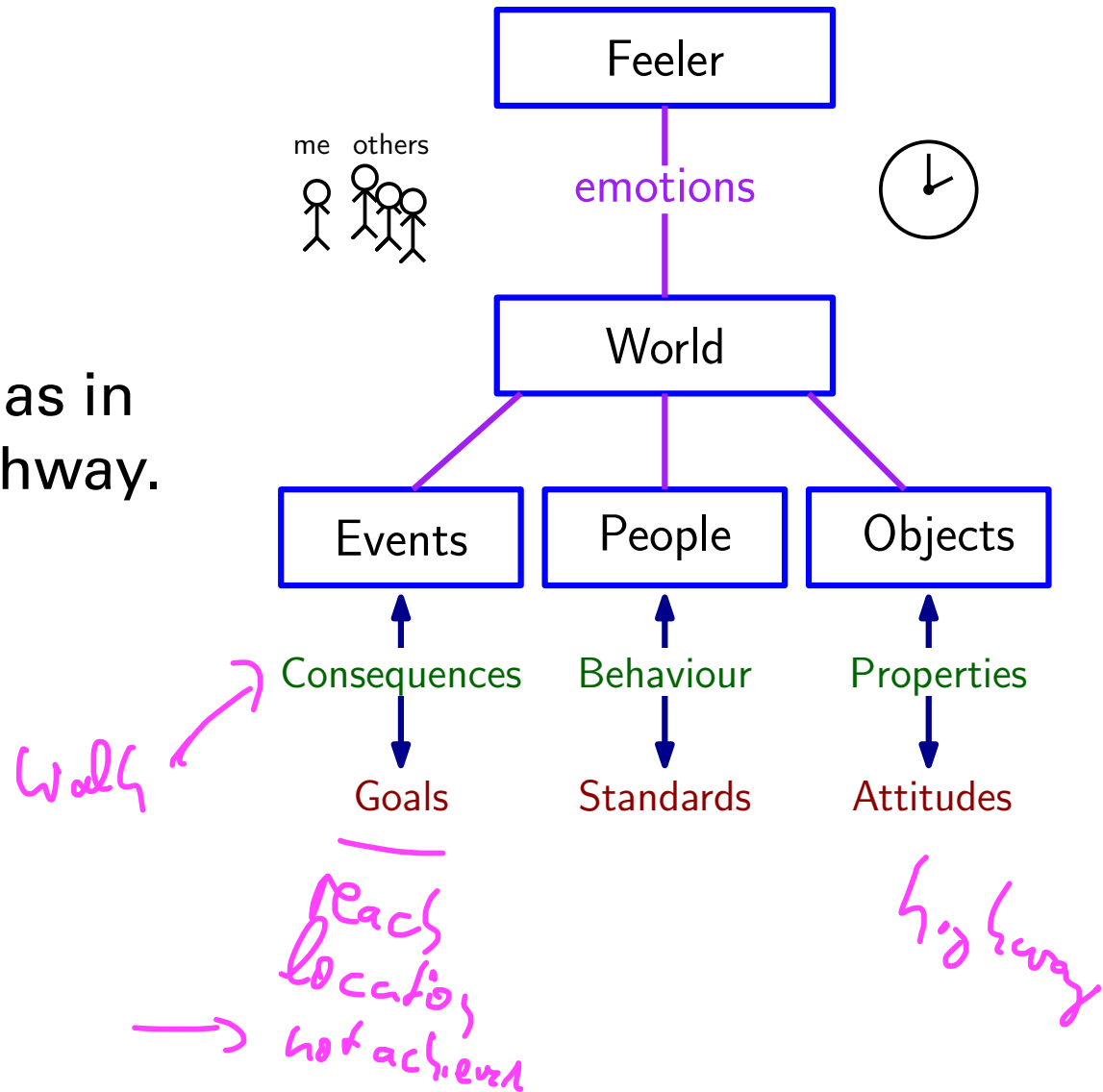
Exercise Discussion

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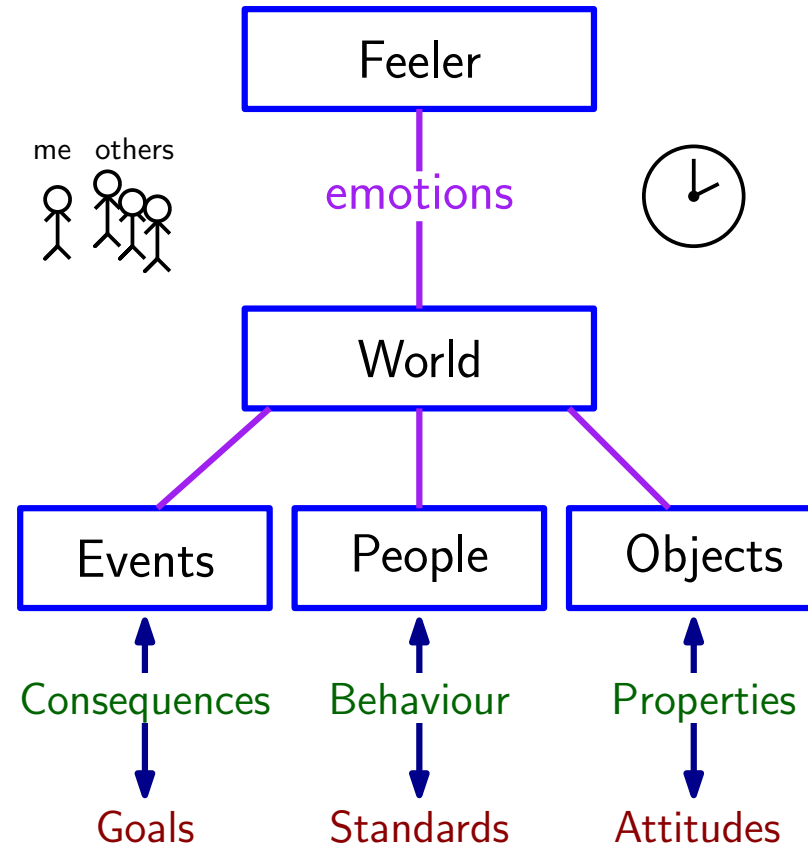
Exercise Discussion

- The man ran out of gas in the middle of the highway.



Exercise Discussion

- The employee thinks that he might be fired.

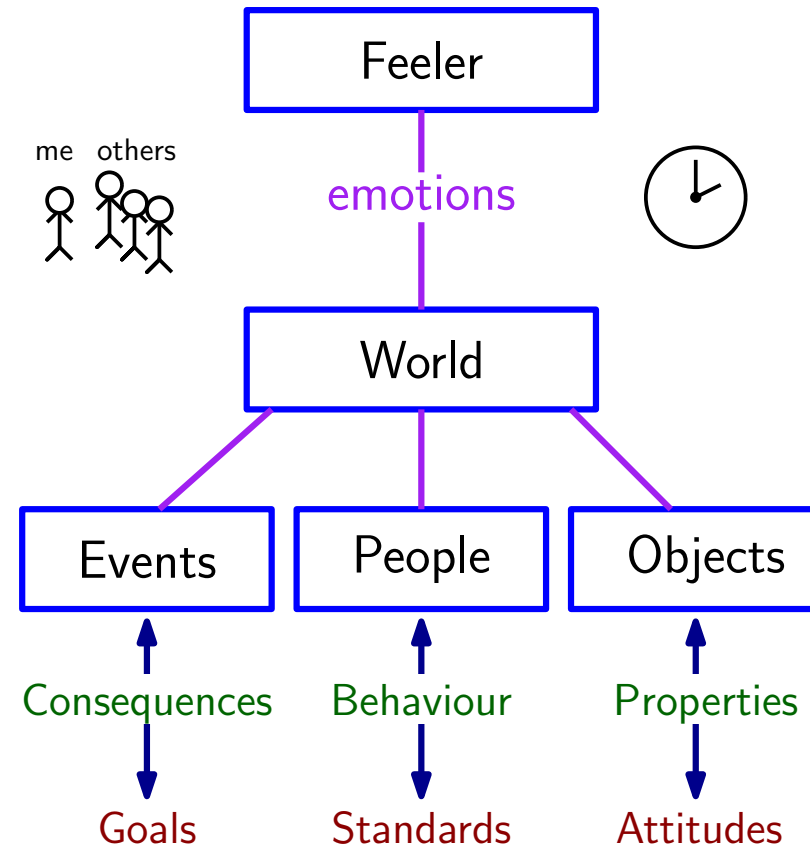


*Keep job
violated*

*You should
not fire
people*

Exercise Discussion

- Mary learns that her husband cheated to win in the lottery.

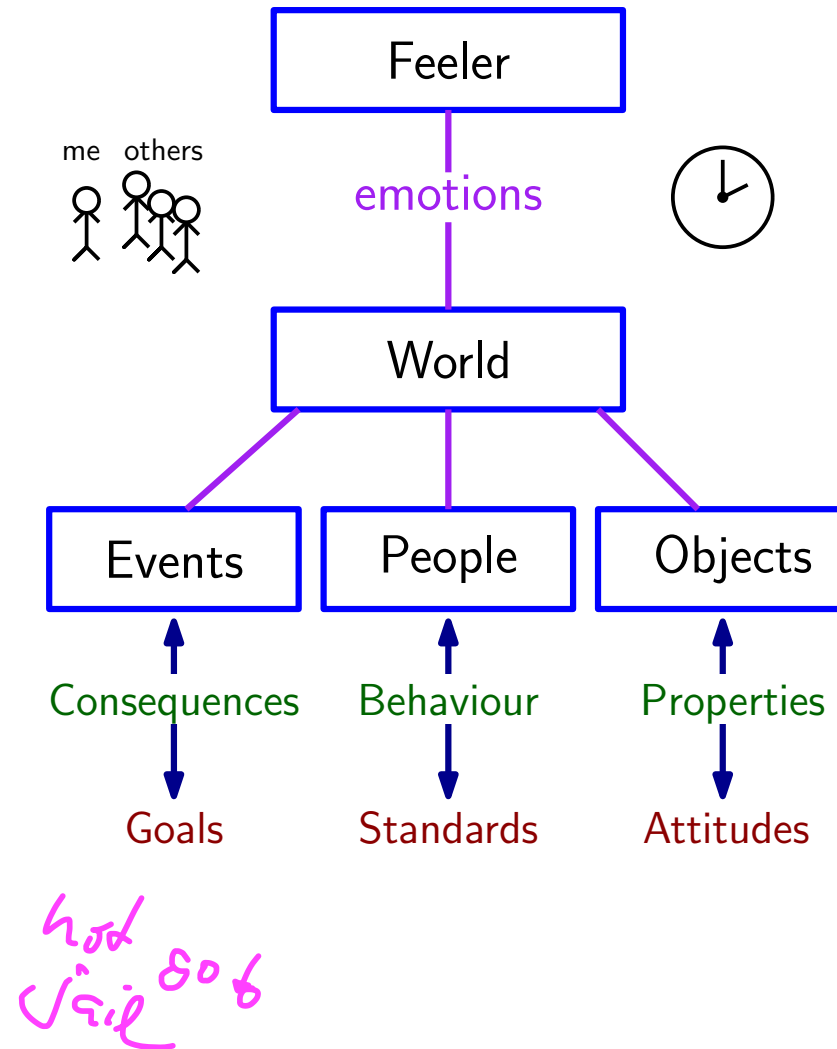


*get rich
→ achieved
→ can't keep money*

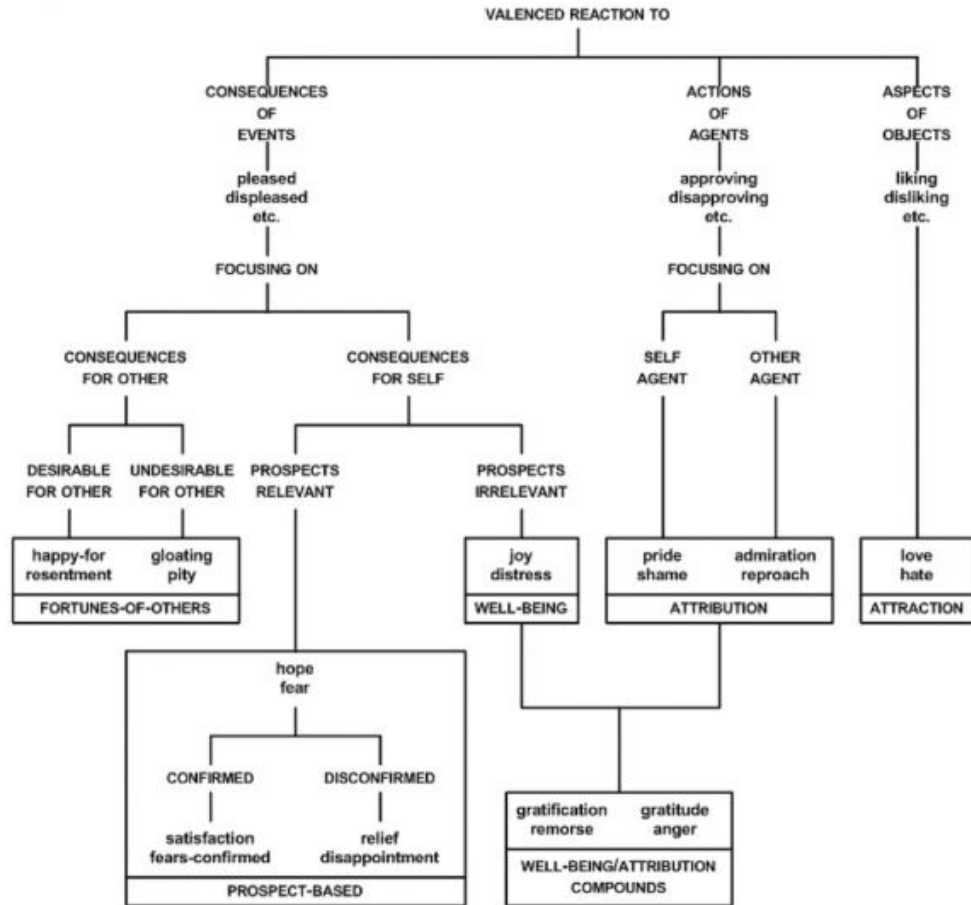
Standards
violated

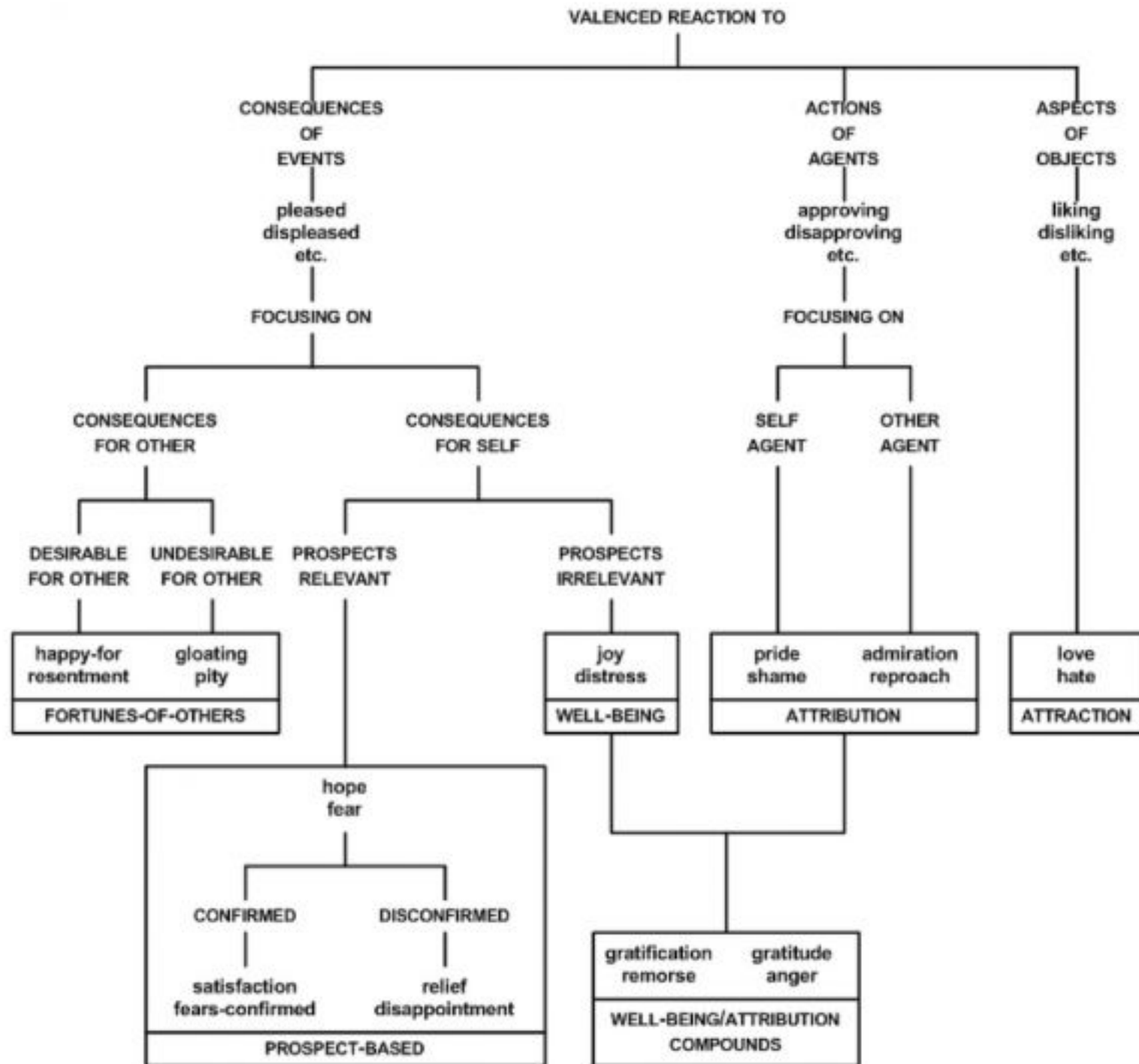
Exercise Discussion

- Snowden has been praised for revealing malpractices.

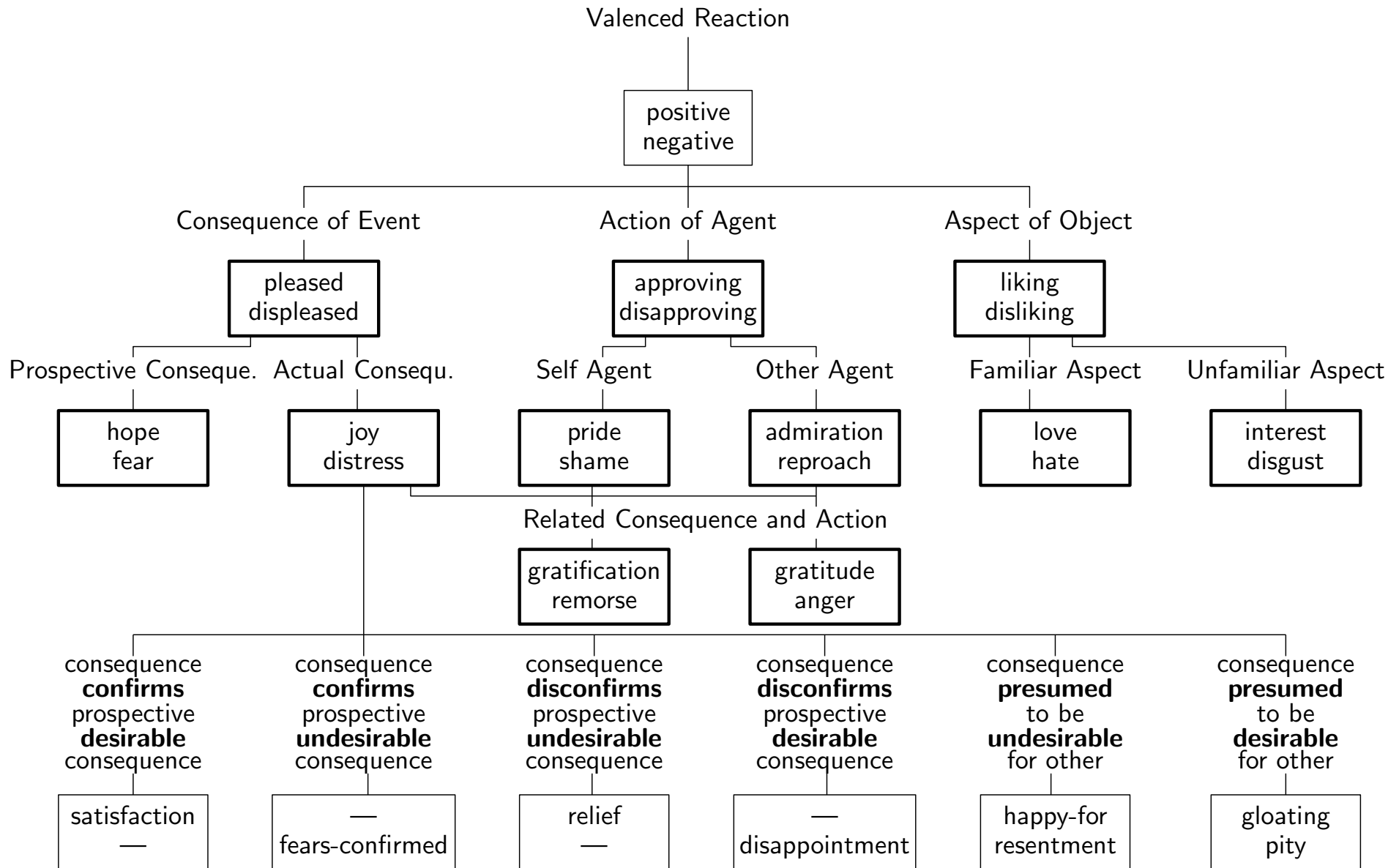


OCC Original and Complete





OCC Redrawn

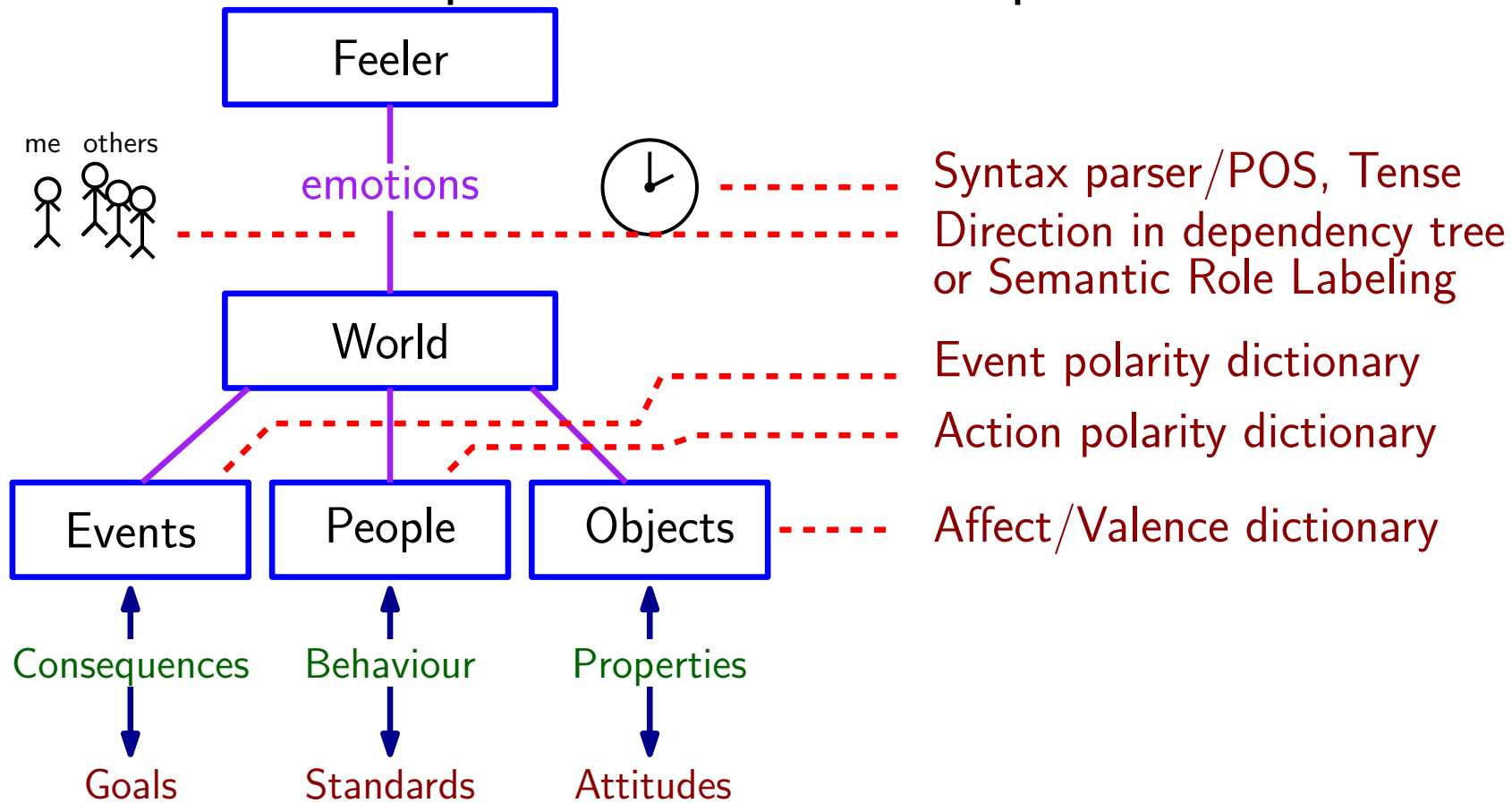


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Interpretation of Text with the OCC Model

How can we interpret the different components in the OCC?



OCC Text Interpretation

Chapter 4 A Linguistic Interpretation of the OCC Emotion Model for Affect Sensing from Text

Mostafa Al Masum Shaikh, Helmut Prendinger, and Mitsuru Ishizuka

Abstract Numerous approaches have already been employed to ‘sense’ affective information from text; but none of those ever employed the OCC emotion model, an influential theory of the cognitive and appraisal structure of emotion. The OCC model derives 22 emotion types and two cognitive states as consequences of several cognitive variables. In this chapter, we propose to relate cognitive variables of the emotion model to linguistic components in text, in order to achieve emotion recognition for a much larger set of emotions than handled in comparable approaches. In particular, we provide tailored rules for textural emotion recognition, which are inspired by the rules of the OCC emotion model. Hereby, we clarify how text components can be mapped to specific values of the cognitive variables of the emotion model. The resulting linguistics-based rule set for the OCC emotion types and cognitive states allows us to determine a broad class of emotions conveyed by text.

A Rule-Based Approach to Implicit Emotion Detection in Text

Orizu Udochukwu^(✉) and Yulan He

School of Engineering and Applied Science, Aston University, Birmingham, UK
{[orizuus,y.he9](mailto:orizuus,y.he@aston.ac.uk)}@aston.ac.uk

Abstract. Most research in the area of emotion detection in written text focused on detecting explicit expressions of emotions in text. In this paper, we present a rule-based pipeline approach for detecting implicit emotions in written text without emotion-bearing words based on the OCC Model. We have evaluated our approach on three different datasets with five emotion categories. Our results show that the proposed approach outperforms the lexicon matching method consistently across all the three datasets by a large margin of 17–30 % in F-measure and gives competitive performance compared to a supervised classifier. In particular, when dealing with formal text which follows grammatical rules strictly, our approach gives an average F-measure of 82.7 % on “Happy”, “Angry-Disgust” and “Sad”, even outperforming the supervised baseline by nearly 17 % in F-measure. Our preliminary results show the feasibility of the approach for the task of implicit emotion detection in written text.

Keywords: Implicit emotions · OCC model · Emotion detection · Rule-based approach

Example Parse

- “The employee thinks that he might be fired.”
- Tense?

DT	NN	VBZ	IN	PRP	MD	CB	VBN	.
The	employee	thinks	that	he	might	be	fired	.

VPZ: 3rd-person singular present

- Perspective?

	<input type="checkbox"/> SRL	<input type="checkbox"/> SRL	<input type="checkbox"/>	<input type="checkbox"/>
The	[A0]			
employee				
thinks	V: think.01			
that				
he	[A1]	[A1]		
might		general modification [AM-MOD]		
be				
fired		V: fire.02		
.				

(SRL: https://cogcomp.seas.upenn.edu/page/demo_view/srl)
 (POS: <https://corenlp.run/>)

Example Rules (à la Shaikh)

“The employee thinks that he might be fired.”

Variables:

- **vr**: valenced reaction
as sentence valence
- **sr**: self reaction
valence of event \approx desirability
- **pros**: prospect
valence of verb
- **sp**: self presumption
valence of event \approx desirability
- **status**
tense of verb
- **de**: direction of emotion
other if object is person/pronoun
- If (vr = true & sr = 'displeased' & pros = 'negative' & sp = 'undesirable' & status = 'unconfirmed' & de = 'self')
 \Rightarrow fear

The rules for the emotion are listed as follows.

- If ($vr = \text{true} \ \& \ sr = \text{'displeased'} \ \& \ sp = \text{'undesirable'} \ \& \ de = \text{'self'}$), 'distress' is true.
- If ($vr = \text{true} \ \& \ sr = \text{'displeased'} \ \& \ op = \text{'undesirable'} \ \& \ af = \text{'liked'} \ \& \ de = \text{'other'}$), 'sorry-for' is true.
- If ($vr = \text{true} \ \& \ sr = \text{'displeased'} \ \& \ op = \text{'desirable'} \ \& \ af = \text{'not liked'} \ \& \ de = \text{'other'}$), 'resentment' is true.
- If ($vr = \text{true} \ \& \ sr = \text{'pleased'} \ \& \ op = \text{'undesirable'} \ \& \ af = \text{'not liked'} \ \& \ de = \text{'other'}$), 'gloating' is true.
- If ($vr = \text{true} \ \& \ sr = \text{'pleased'} \ \& \ pros = \text{'positive'} \ \& \ sp = \text{'desirable'} \ \& \ status = \text{'unconfirmed'} \ \& \ de = \text{'self'}$), 'hope' is true.
- If ($vr = \text{true} \ \& \ sr = \text{'displeased'} \ \& \ pros = \text{'negative'} \ \& \ sp = \text{'undesirable'} \ \& \ status = \text{'unconfirmed'} \ \& \ de = \text{'self'}$), 'fear' is true.
- If ($vr = \text{true} \ \& \ sr = \text{'pleased'} \ \& \ pros = \text{'positive'} \ \& \ sp = \text{'desirable'} \ \& \ status = \text{'confirmed'} \ \& \ de = \text{'self'}$), 'satisfaction' is true.
- If ($vr = \text{true} \ \& \ sr = \text{'displeased'} \ \& \ pros = \text{'negative'} \ \& \ sp = \text{'undesirable'} \ \& \ status = \text{'confirmed'} \ \& \ de = \text{'self'}$), 'fears-confirmed' is true.
- If ($vr = \text{true} \ \& \ sr = \text{'pleased'} \ \& \ pros = \text{'negative'} \ \& \ sp = \text{'undesirable'} \ \& \ status = \text{'disconfirmed'} \ \& \ de = \text{'self'}$), 'relief' is true.
- If ($vr = \text{true} \ \& \ sr = \text{'displeased'} \ \& \ pros = \text{'positive'} \ \& \ sp = \text{'desirable'} \ \& \ status = \text{'disconfirmed'} \ \& \ de = \text{'self'}$), 'disappointment' is true.
- If ($vr = \text{true} \ \& \ sr = \text{'pleased'} \ \& \ sa = \text{'praiseworthy'} \ \& \ sp = \text{'desirable'} \ \& \ de = \text{'self'}$), 'pride' is true.
- If ($vr = \text{true} \ \& \ sr = \text{'displeased'} \ \& \ sa = \text{'blameworthy'} \ \& \ sp = \text{'undesirable'} \ \& \ de = \text{'self'}$), 'shame' is true.
- If ($vr = \text{true} \ \& \ sr = \text{'pleased'} \ \& \ sa = \text{'praiseworthy'} \ \& \ op = \text{'desirable'} \ \& \ de = \text{'other'}$), 'admiration' is true.
- If ($vr = \text{true} \ \& \ sr = \text{'displeased'} \ \& \ sa = \text{'blameworthy'} \ \& \ op = \text{'undesirable'} \ \& \ de = \text{'other'}$), 'reproach' is true.
- If ($vr = \text{true} \ \& \ sp = \text{'desirable'} \ \& \ sr = \text{'pleased'} \ \& \ of = \text{'liked'} \ \& \ oa = \text{'attractive'} \ \& \ event \ valence = \text{'positive'} \ \& \ de = \text{'other'}$), 'love' is true.
- If ($vr = \text{true} \ \& \ sp = \text{'undesirable'} \ \& \ sr = \text{'displeased'} \ \& \ of = \text{'not liked'} \ \& \ oa = \text{'not attractive'} \ \& \ event \ valence = \text{'negative'} \ \& \ de = \text{'other'}$), 'hate' is true.

The OCC model has four complex emotions, namely, 'gratification,' 'remorse,' 'gratitude,' and 'anger.' The rules for these emotions are as follows.

- If both 'joy' and 'pride' are true, 'gratification' is true.
- If both 'distress' and 'shame' are true, 'remorse' is true.
- If both 'joy' and 'admiration' are true, 'gratitude' is true.
- If both 'distress' and 'reproach' are true, 'anger' is true.

The cognitive states 'shock' and 'surprise' are ruled as follows.

- If both 'distress' and *unexp* are true, 'shock' is true (e.g., the bad news came unexpectedly).
- If both 'joy' and *unexp* are true, 'surprise' is true (e.g., I suddenly met my school friend in Tokyo University).

Results (Udochukwu/He 2015)

Table 2. Statistics of the datasets. “Total” denotes the original number of sentences in each emotion category while “Implicit” denote the number of sentence which do not contain any emotion words according to WordNet-Affect.

Emotion Total Implicit			Emotion Total Implicit			Emotion Total Implicit		
Joy	1095	537	Joy	362	317	Happy	406	103
Fear	1095	366	Fear	160	130	Fearful	121	33
Anger	1096	483	Anger	66	60	Angry-Disgusted	174	84
Sadness	1096	488	Sadness	202	182	Sad	247	90
Disgust	1096	484	Disgust	26	24	Surprised	92	50
Shame	1096	581	Surprise	184	160	Total	1040	360
Guilt	1093	482	Total	1000	873			
Total	7667	3421						

(a) ISEAR

(b) SemEval

(c) Alm's

Table 3. Performance comparison of F-measure results on the three datasets. Bold face values denote the best results obtained in each dataset.

Emotion	ISEAR			SemEval			Alm's		
	Lexicon	NB	Rule	Lexicon	NB	Rule	Lexicon	NB	Rule
Joy/Happy	33.4	61.2	69.6	39.7	71.7	59.9	58.8	63.5	81.8
Fear/Fearful	0	47.6	18.3	0	52.2	31.8	0	26.7	14.0
Anger/Angry-Disgusted	23.0	47.1	61.3	55.8	16.2	61.3	48.9	58.6	86.6
Sadness/Sad	25.6	55.4	68.0	47.8	56.0	71.5	61.0	56.0	79.6
Disgust	25.6	51.0	39.2	38.5	34.5	61.7	-	-	-
Average	21.5	52.5	51.3	36.4	58.2	57.3	42.2	56.0	65.5
Average (- Fear)	27.0	53.7	59.5	45.5	44.6	63.6	56.12	65.8	82.7

OCC Wrap-Up

- OCC model explains how events, people, objects are evaluated and how that could lead to emotions
- Clearly related to (other) appraisal theories
- These rules can be used to be instantiated
- I am only aware of rule-based interpretations of the OCC model for text analysis.

Warm-Up Example Again

I passed the exam!

- Sentence valence is positive: **Valenced Reaction (vr) = true**
- Valence of event is positive:
Self Reaction (sr) = pleased, self presumption = desirable
- Valence of verb is positive: **Positive**
- Past tense: **Status = Confirmed**
- No object that is person: **Directed = self**
- “Passing” more similar to “praiseworthy” than
“blameworthy”: **self-appraisal (sa) = praiseworthy**

If (vr = true & sr = ‘pleased’ & sa = ‘praiseworthy’ & sp = ‘desirable’ & de = ‘self’) ⇒ pride

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Assignment 02

Goal: Implement two emotion classification methods and compare them on two corpora

Ideally: Come up with a research question that you would like to answer.

Step 1: Choose corpora

- Decide on two annotated corpora you want to work with.
- Pick those from the data sets mentioned in class or elsewhere (please limit your self to discrete categories)
- You can use your own corpus as a third test corpus
- See Ilias for corpora described in <https://www.aclweb.org/anthology/C18-1179/>
- Don't share any resources publicly!

Assignment 02

Step 2: Choose method

- Decide on two out of four approaches:
 - ① Dictionary-based
 - ② OCC (or other rules)
 - ③ ML/Feature based
 - ④ ML/Deep Learning based

Assignment 02

Step 3: Implement

- Implement two emotion classification approaches (see step 2)
- Free choice of libraries, models, architectures, programming languages

Step 4: Evaluate

- Evaluate your system on two independent hold out data
- Evaluate on your corpus (Ass. 01, optionally)

Assignment 02

Step 5: Slides

- Prepare your slides, max 10 minutes, as before
- Content
 - Introduction, Motivation
 - Models/Methods
 - Resources
 - Experimental Setting
 - Results
 - Critical Assessment and Discussion

Assignment 02

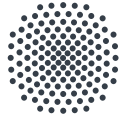
Get a grade

Please check:

- Did you properly motivate and explain what you are doing? Why did you chose a particular approach? What would you like to learn from the experiments you are performing?
- Are the slides (+optional additiona document) understandable?
- Did you critical reflect on what you were doing? Did you look into the results? What might have gone wrong? Are the results somehow questionable?
- Did you clearly point out own creative ideas, ideally motivated by observations during development? Were these properly explained?
- Do you share sufficient information that we see that the work has been carefully performed? Is that observable from the documentation?

Take Away

- The OCC Model of Emotions
- Interpretation of Text with the OCC Model
- Appraisal Theories according to Smith/Ellsworth and Scherer
- Text-classification methods that consider these theories



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Emotion Analysis

Evaluation-based Approaches

Dec 6, 2022

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(includes material
by Evgeny Kim)

