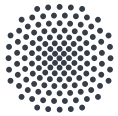

**University of Stuttgart**
Institute for
Natural Language Processing

# Emotion Analysis

## Psychology 2

Oct 25, 2022

Roman Klinger

# Outline

1. Recap
2. What are Emotions?
3. Motivation: Basic Emotion Theories
4. Feeling: Affect and Constructionism
5. Evaluation: Causes and Appraisals
6. Exercise

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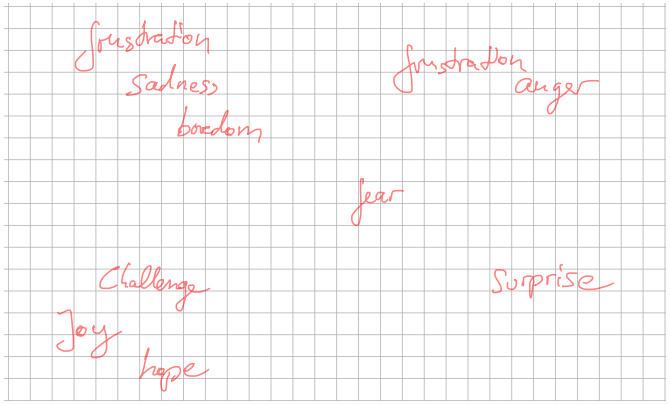
# Warm Up

Groups of 3–4 people

- Step 1: List emotion names (≈10 minutes)
  (some piece of paper)
- Step 2: Group emotions by similarity/dissimilarity, organize them somehow (≈20 minutes)
  (flipchart paper, put on wall when done)
- Step 3:
  See posters by other groups




Ask yourself:

- What is an emotion?
- How can emotions be considered to be similar?
- Create categories, or a distributional space, or…

# Warm Up Summary/Result

You used the following dimensions to structure emotions:

- Valence, Arousal
- Observable, not observable
- Positive, Neutral, Negative, Mixed
- Similarity in subjective feeling
- Intensity
- Duration
- Fundamental emotions and variations
- Process with a stimulus

# Take Away

- Emotion Models
- Components of emotions
- Intro to Computational Emotion Analysis from Text

Next lecture:
How to create annotated corpora for emotion analysis.

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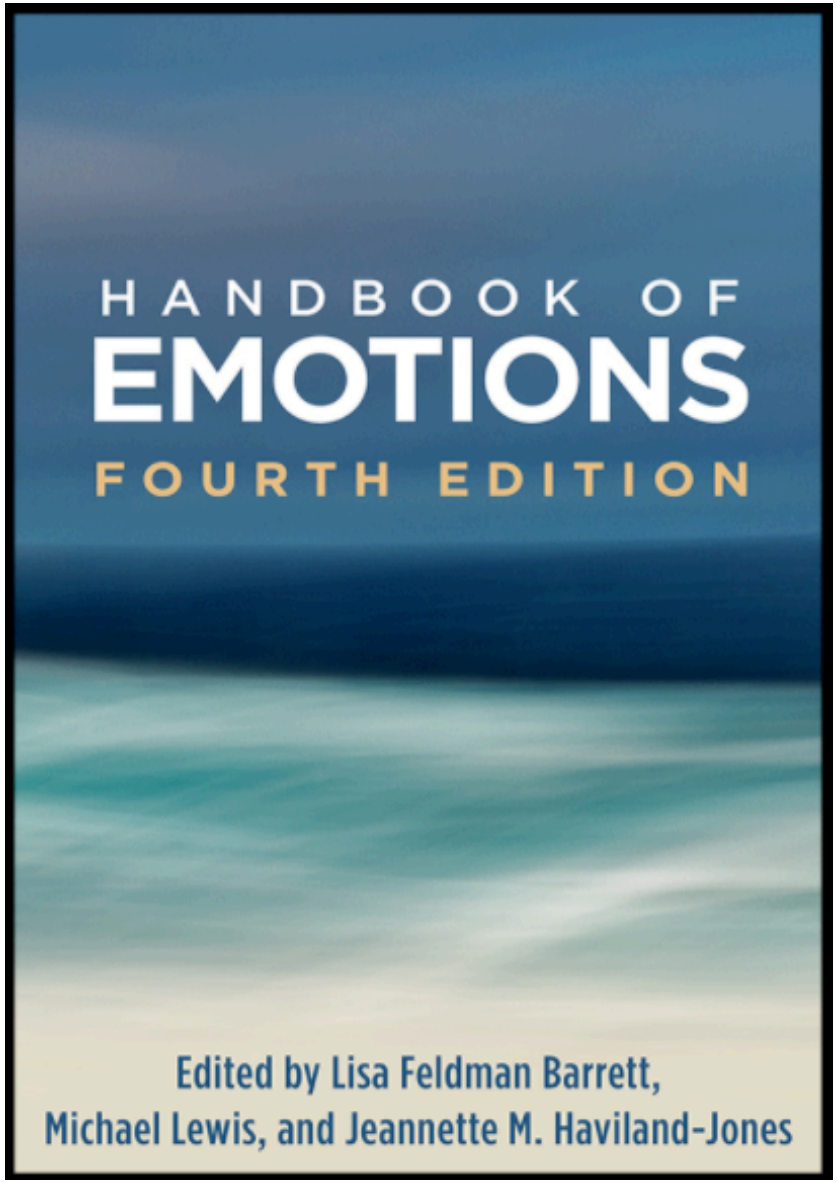
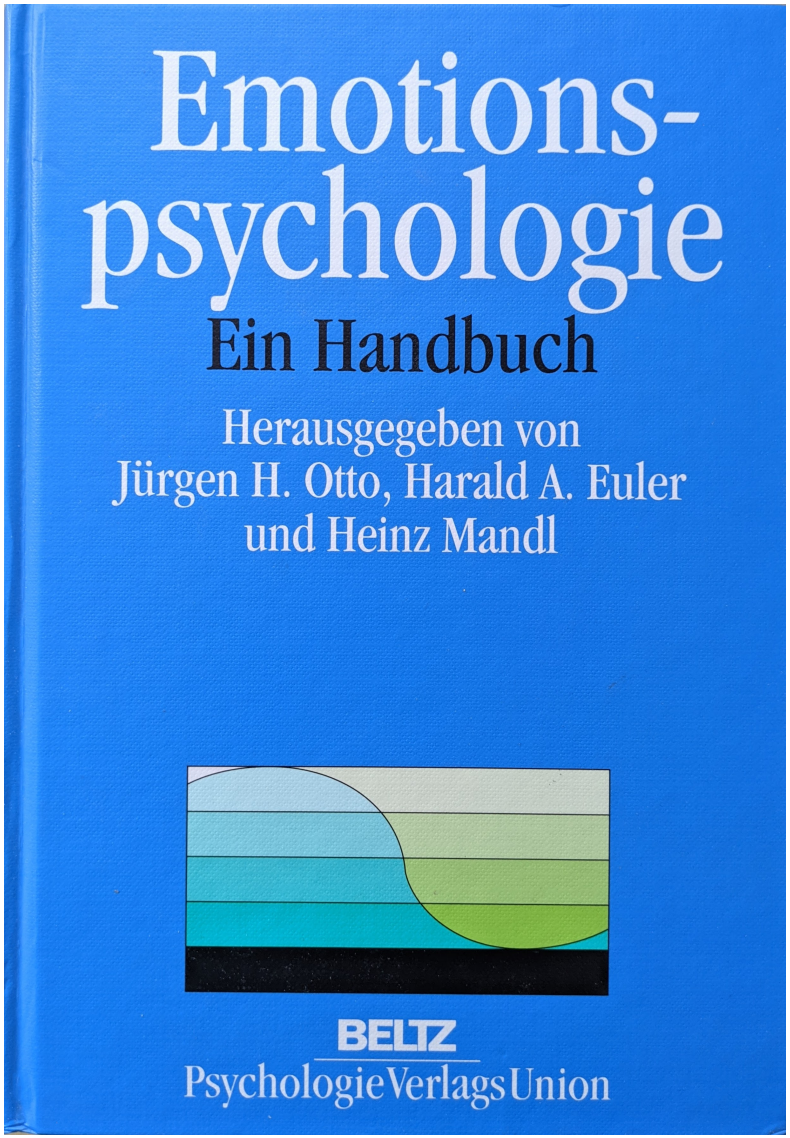
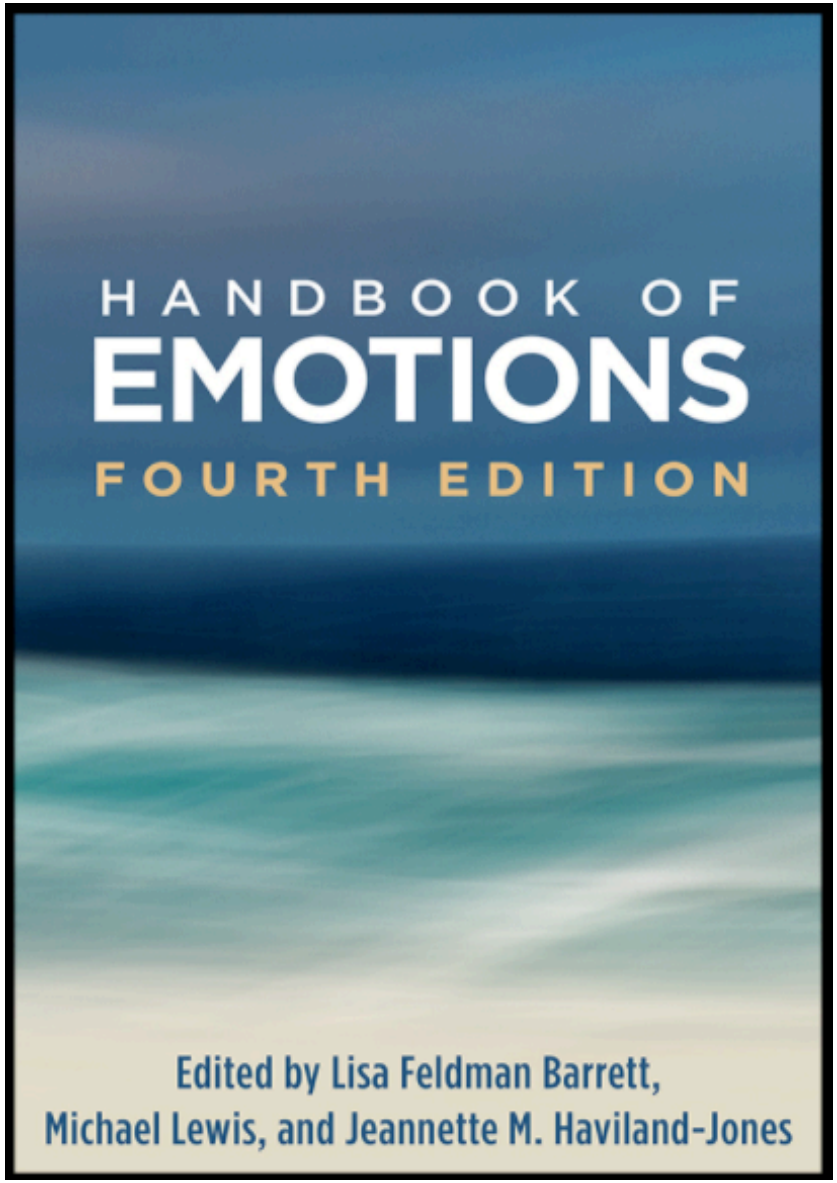
# Disclaimer

I focus here on discussing theories as it is important to understand them for computational modelling. This lecture might not be considered complete from a psychological perspective. An emotion lecture in psychology would also focus on other things.



# Literature


Emotions-
psychologie
Ein Handbuch
Herausgegeben von
Jürgen H. Otto, Harald A. Euler
und Heinz Mandl
BELTZ
PsychologieVerlagsUnion

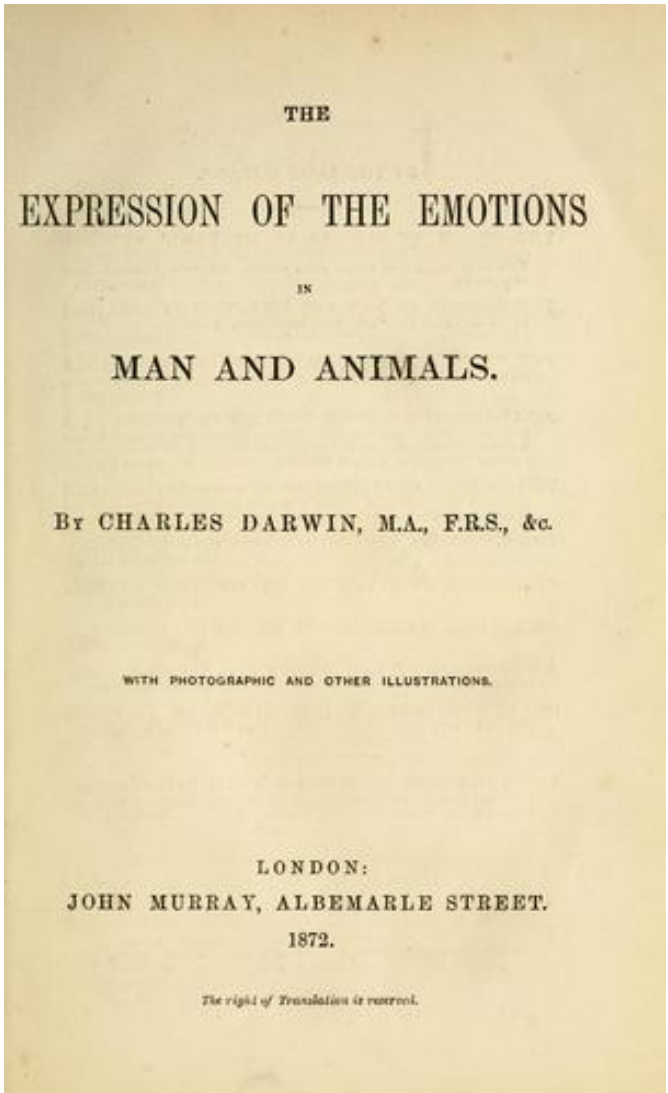

HANDBOOK OF
EMOTIONS
FOURTH EDITION
Edited by Lisa Feldman Barrett,
Michael Lewis, and Jeannette M. Haviland-Jones

# Emotion Theories…

…try to explain …

- what emotions are
- what they consist of
- what their purpose is
- how they are developed
- …

# Evolutionary Approach



THE

EXPRESSION OF THE EMOTIONS

IN

MAN AND ANIMALS.

By CHARLES DARWIN, M.A., F.R.S., &c.

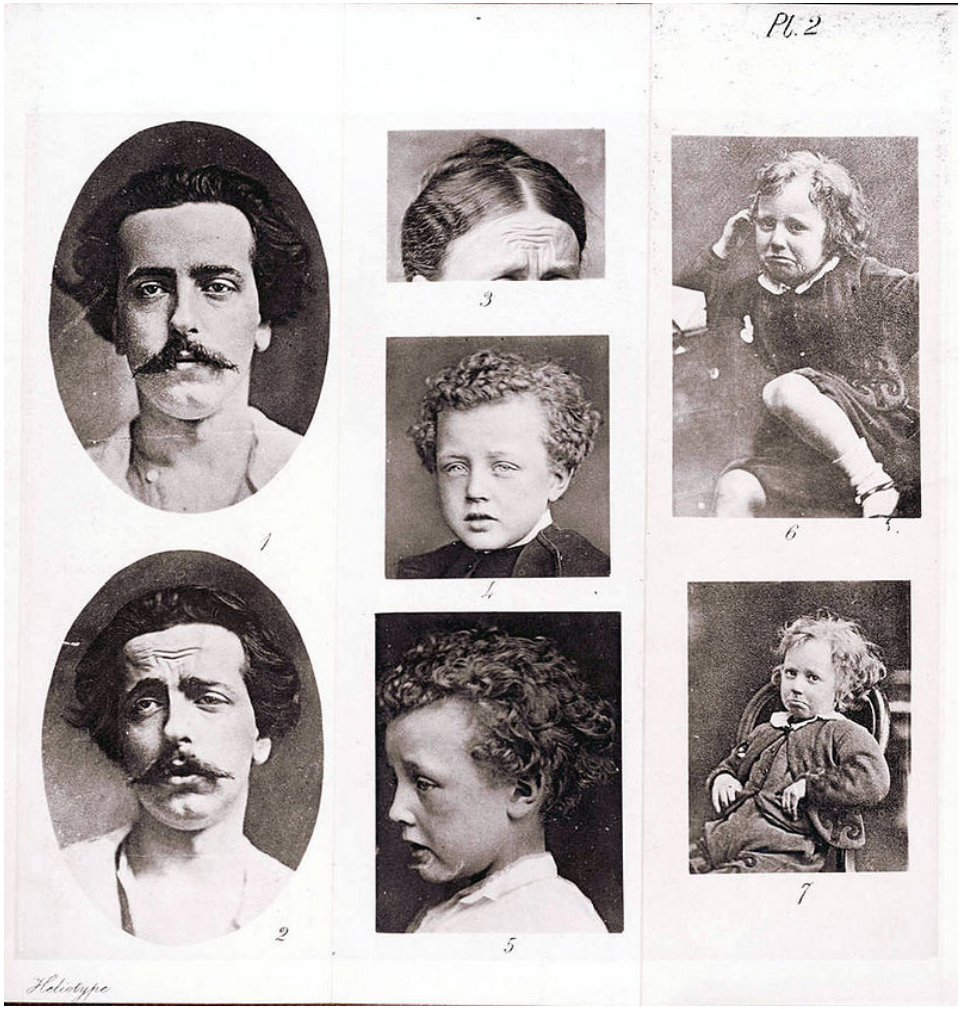
WITH PHOTOGRAPHIC AND OTHER ILLUSTRATIONS.

LONDON:
JOHN MURRAY, ALBEMARLE STREET.
1872.

*The right of Translation is reserved.*

- Focuses on expressions, as they can be observed.
- Emotion expressions support communication
- Emotions and their expressions have a function:
  - Surprise: Eyes wide open helps to perceive what is going on
  - Fear:
    Activation (fight, freeze, flight)
  - ...
- Emotions are not learned

# Evolutionary Approach



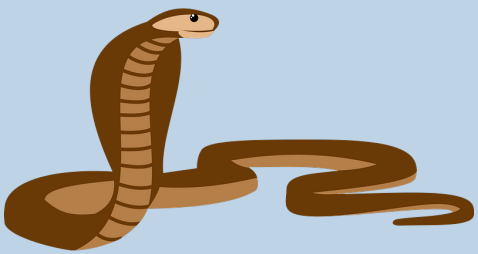

https://en.wikipedia.org/wiki/The_Expression_of_the_Emotions_in_Man_and_Animals

# Emotions and Observations

Definitions were often based on observable effects.

# Emotions and Observations

## James-Lange Theory (1884, 1885)



$\Longrightarrow$ Heart pounding, trembling, sweating, running away $\Longrightarrow$ Fear

- Note:
  Distinction between experience (feeling) and expression.
- Cases have been observed in which spinal cord damages might have affected change in emotion experience
- This example also suggests a function of emotions.

# Emotions and Observations

## Cannon-Bard Theory (≈ 1925)

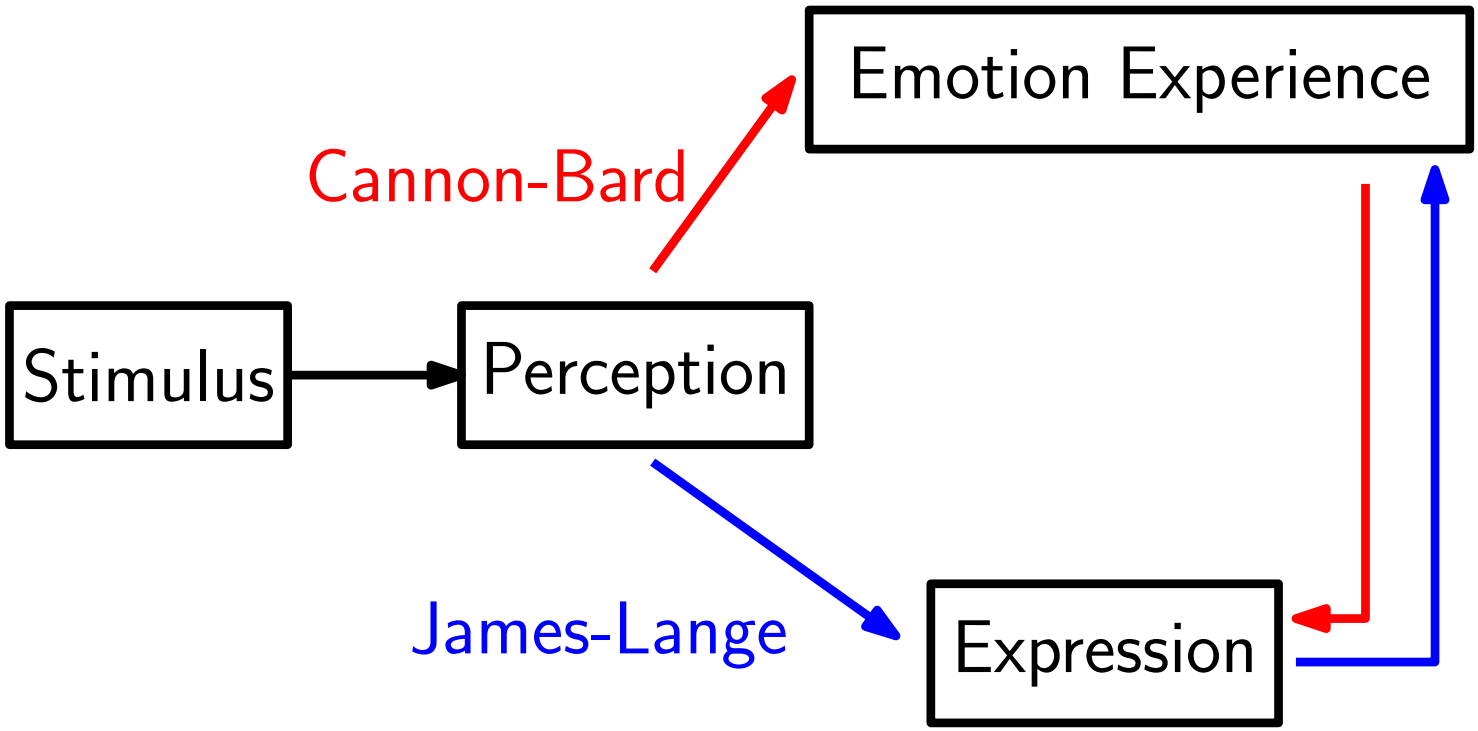
Emotions are not conditioned on physiological signals

- backed by experiments: no reliable correlation between physiological changes and emotions

⇒ physiological reaction and emotion reaction are independent or perhaps go together, but not one is conditioned on the other

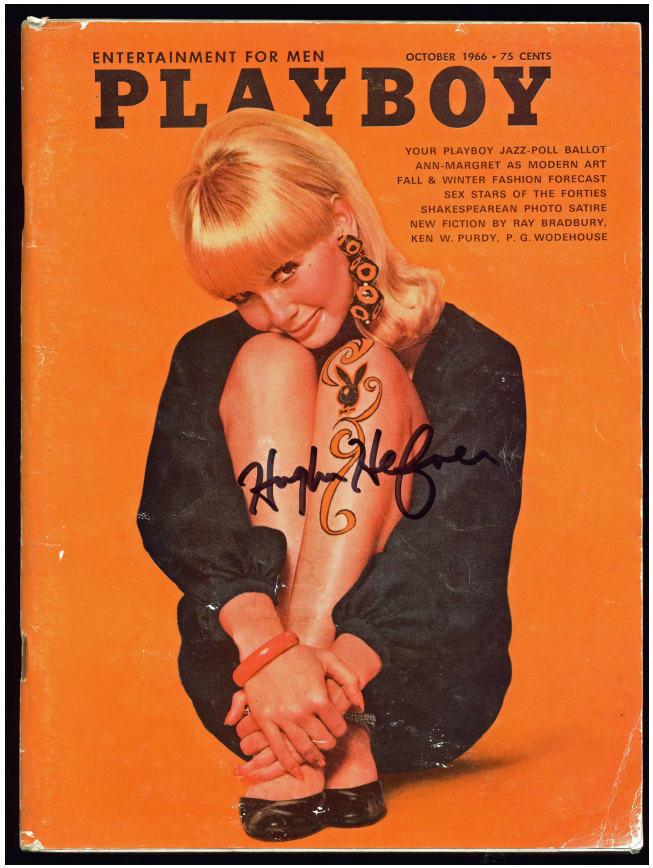
- Emotions can still be experienced with transected spinal cord
- C-B: Activation of thalamus is the reason for emotional experience

# James Lang/Cannon Bard



# What are emotions? Physiological interactions?

Valins Effect (Stuart Valins, 1966)




⇒ Physiological reactions may cause the experiencing of emotions

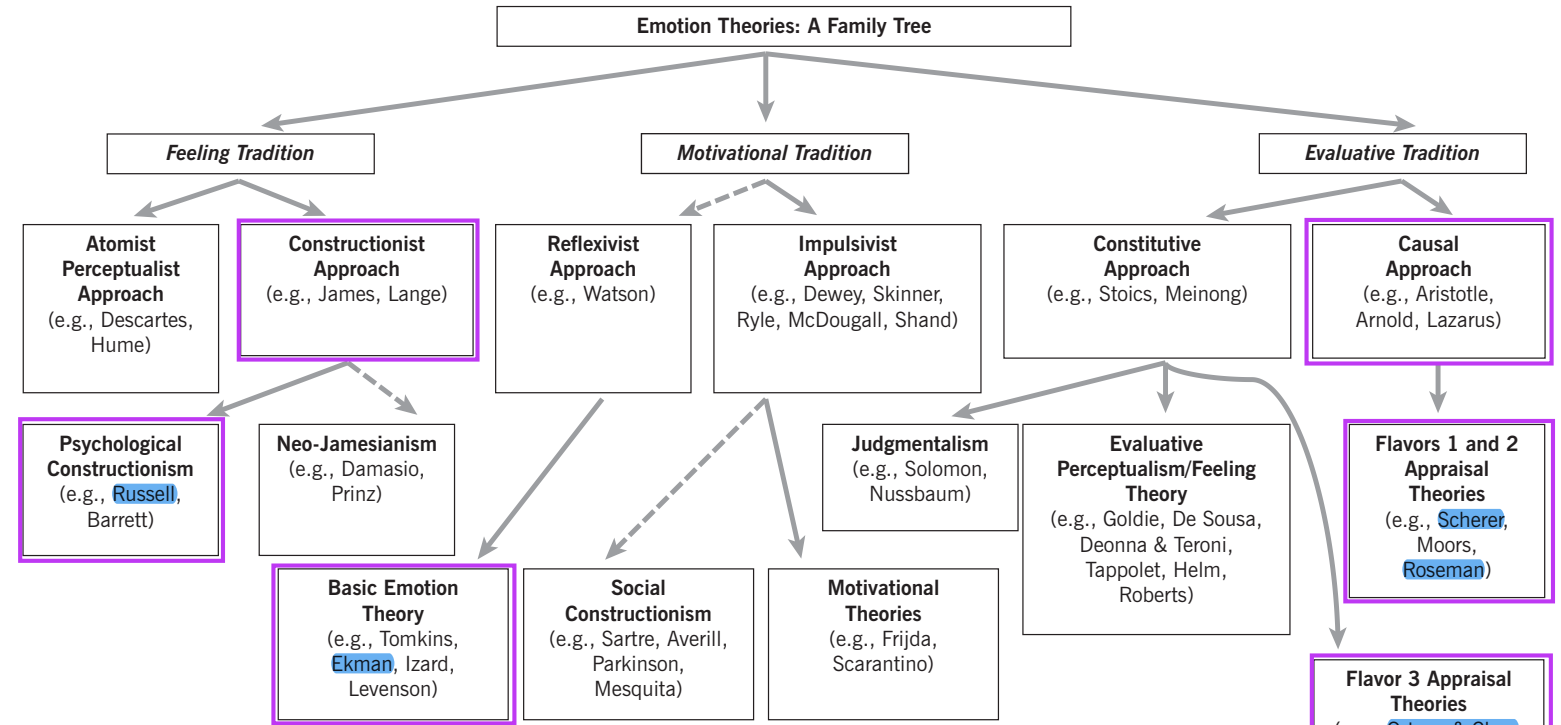
# Aspects of Emotions

We discussed now several aspects of emotions:

- Function: Emotions fulfill a purpose
- Evaluation of event:
  Emotions are caused by some stimulus
- Reaction: Emotions motivate some action.
- Expression:
  Emotions are expressed
  (with facial expressions or otherwise)
- Feeling:
  Emotions are perceived subjectively
- Bodily symptoms:
  Emotions lead to physiological changes

$\Rightarrow$ We will see now: emotion theories differ, but they agree that there is a stimulus and that they can be measured.

# Family Tree of Emotions




Have been or will be mentioned in this lecture.

I am aware of work in NLP that made use of these theories.

**FIGURE 1.1.** A family tree for theories of emotions. Dashed lines are meant to signal more tenuous connections among traditions, approaches, and research programs than solid lines.

Scarantino: The Philosophy of Emotions and Its Impact on Affective Science. In: Handbook of Emotions. 2016

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# Basic Emotion Theories

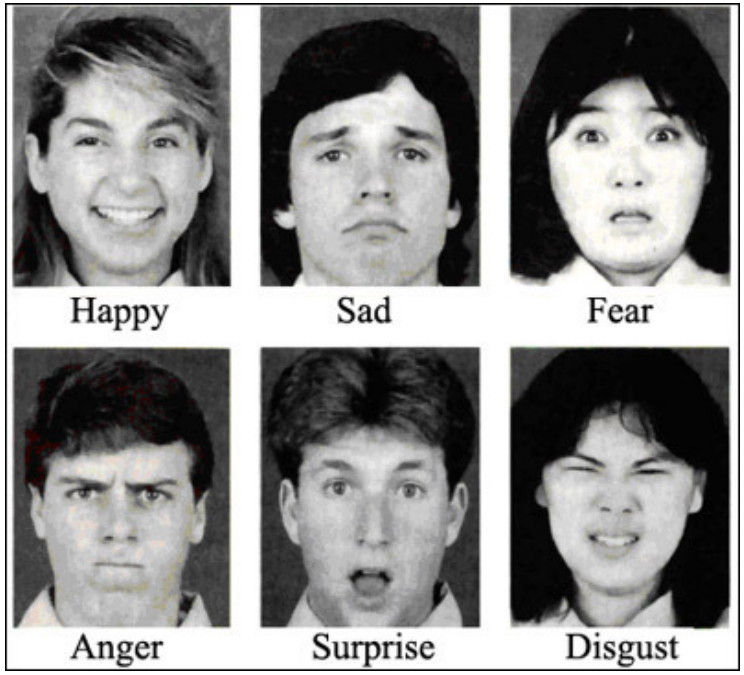
Basic emotion theories state that:

- There is a distinction between basic and non-basic emotions
- There are criteria that decide if an emotion is basic.

# Ekman's model of 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.

# Ekman: What are non-basic emotions?

- "I do not allow for non-basic emotions" (Ekman, 1999)
  - $\Rightarrow$ They do no exist.
- What is love, depression, or hostility?
  - Personality traits (hostility, openness)
  - Moods (depression, anxiety, long-term disturbances are clinically relevant)
  - Emotional plots (love, grief, jealousy)

# Ekman (2011) "What is meant by calling emotions basic?"

- There is evidence that the following are basic emotions:
  - Anger, fear, surprise, sadness, disgust, contempt, happiness
- He expects evidence for the following emotions to be found:
  - Sensory pleasures, amusement, relief, excitement, wonder, ecstasy, naches[1], fiero[2]
- Further research needed/Special cases:
  - Schadenfreude, rejoicing[3], guilt, shame, embarrassement, envy, familiar compassion, jealousy, love, hate, interest

[1] caregiver's feeling when fitnessing offspring's achievements

[2] feeling when meeting a difficult challenge

[3] witnessing unexpected acts of human goodness

# Measure Emotions with Facial Expressions

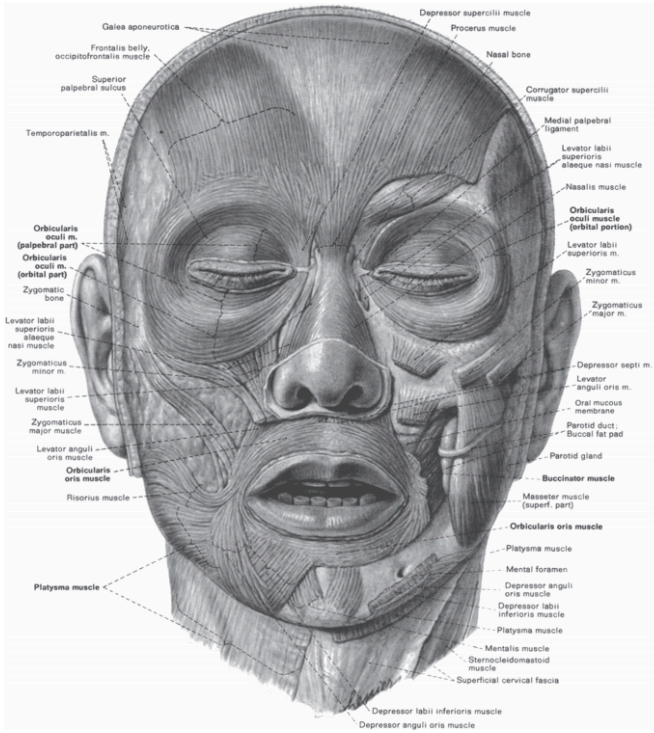
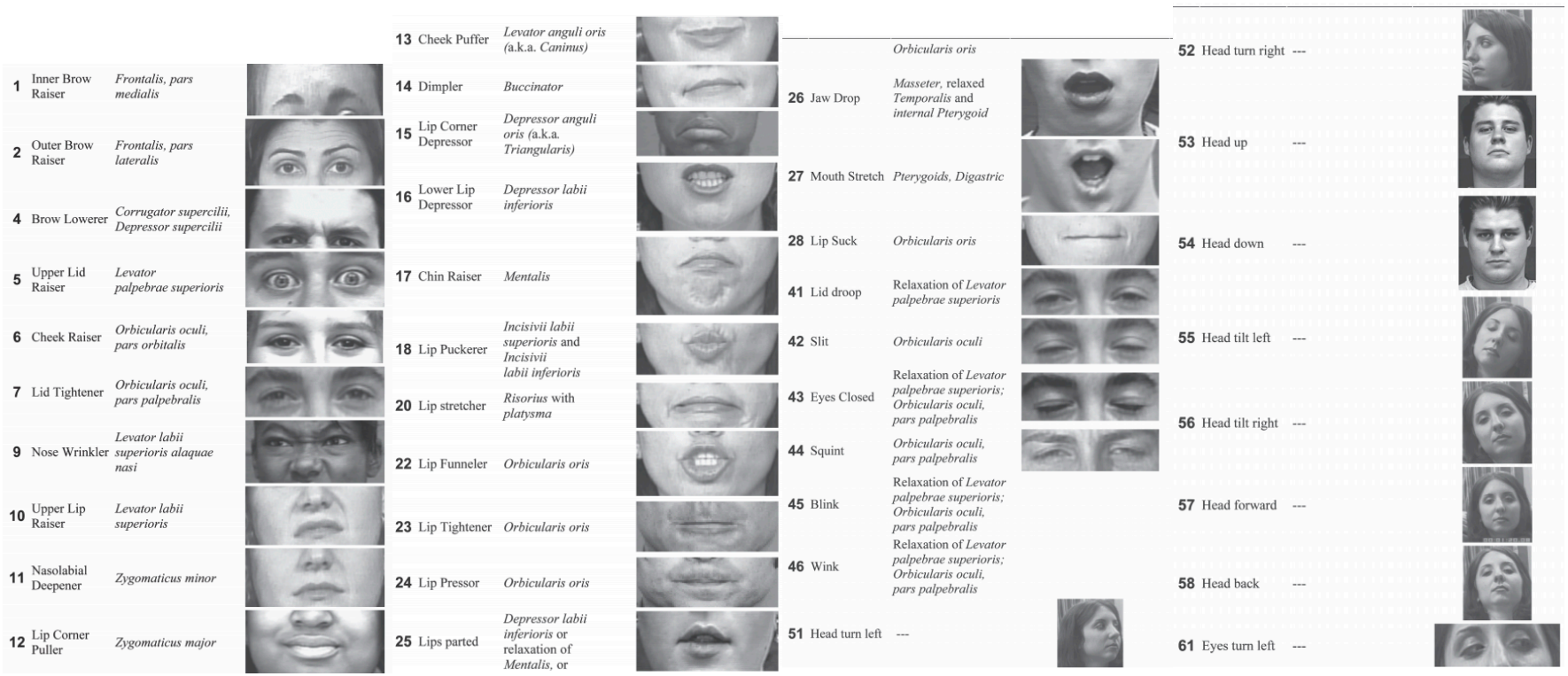



**Figure 13.1.** Muscles of the face (Clemente, 1997).

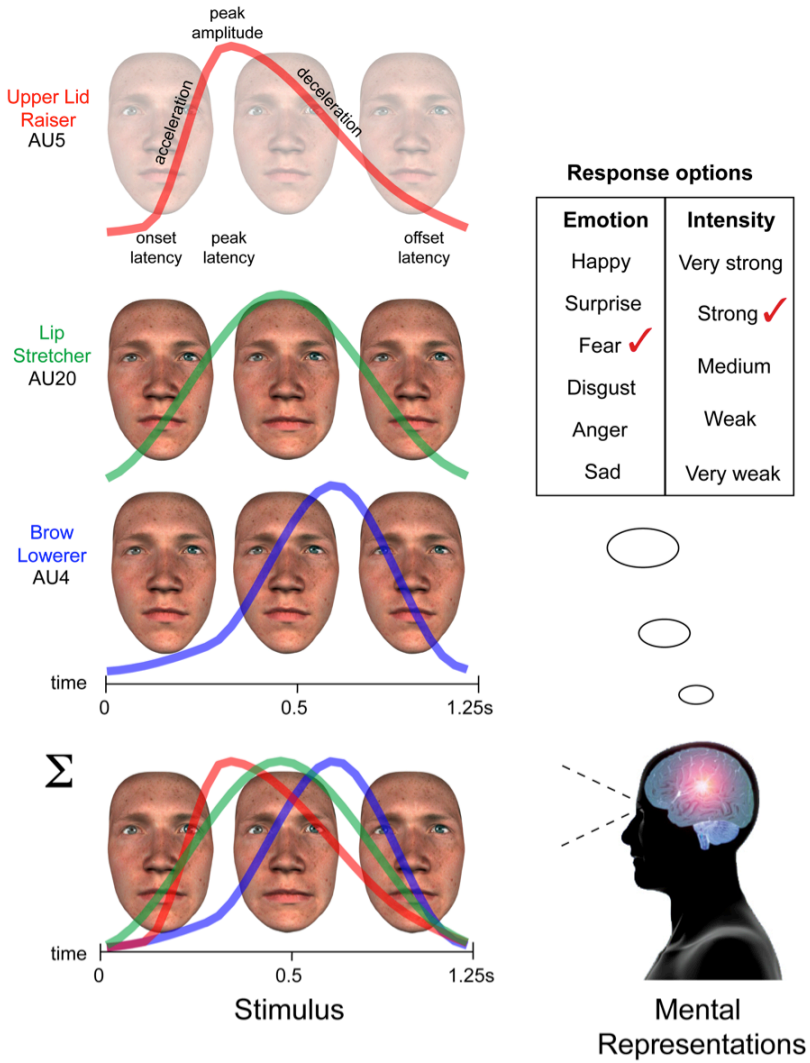
Kohn/Ambadar/Ekman 2007: Observer-Based Measurement of Facial Expression With the Facial Action Coding System

# Measure Emotions with Facial Expressions




Kohn/Ambadar/Ekman 2007: Observer-Based Measurement of Facial Expression With the Facial Action Coding System

# Facial Expressions and Emotions




http://emotionresearcher.com/face-as-dynamic-communication-tool/

# Models of Basic Emotions: Plutchik's Wheel

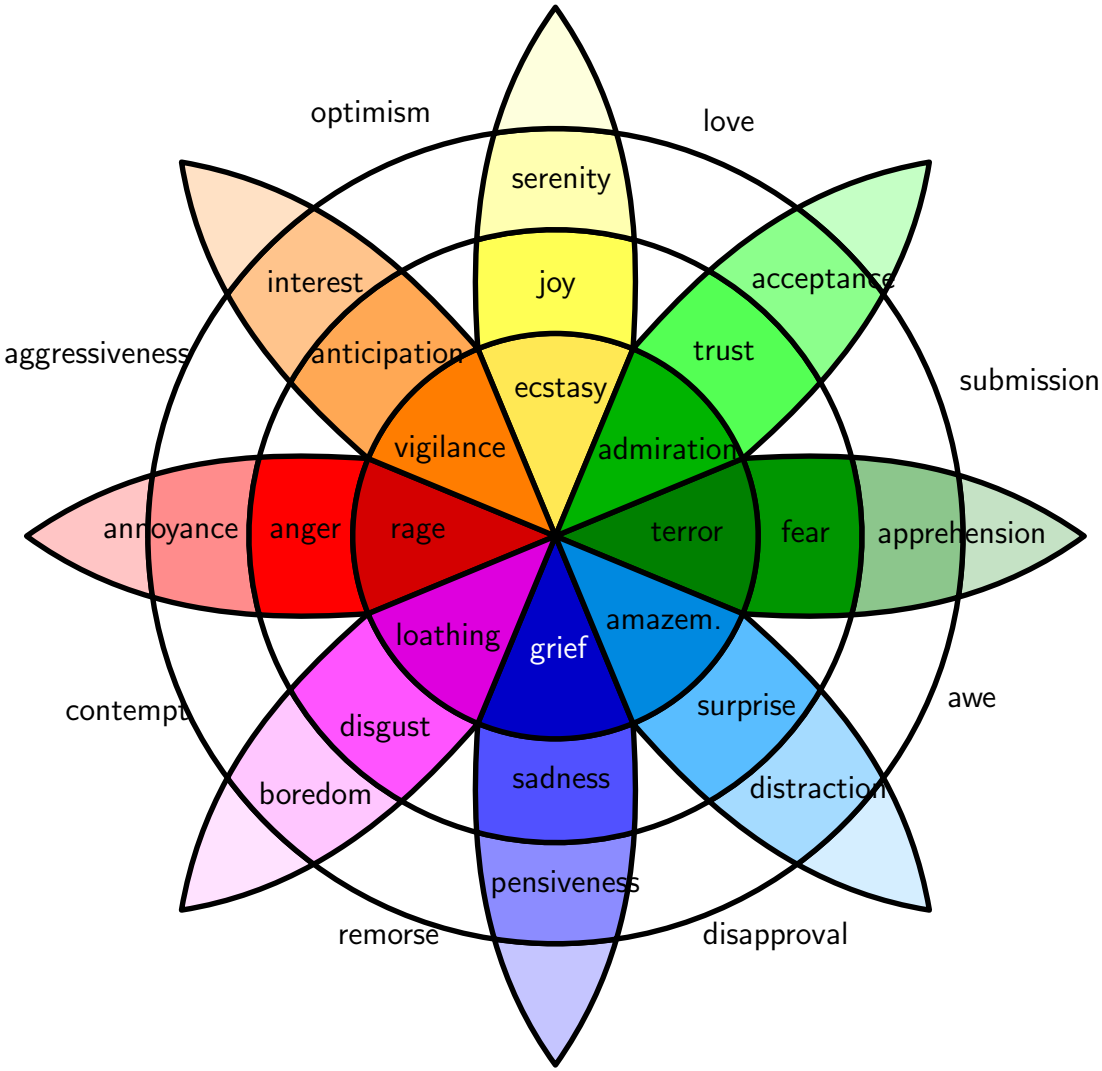
An emotion is a patterned bodily reaction that follows a function

- protection – fear
- destruction – anger
- reproduction – joy
- deprivation – sadness
- incorporation – acceptance
- rejection – disgust
- exploration – anticipation
- orientation – surprise

  ⇒ These are basic emotions according to Plutchik (1970)

# What are non-basic emotions?

According to Plutchik (1970): Gradations and mixtures.



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# The Feeling Tradition of Emotion Theories

- Emotions are not innate
- They are learned constructs
- Depend on culture and contingent situations
- $\Rightarrow$ see James/Lange theory

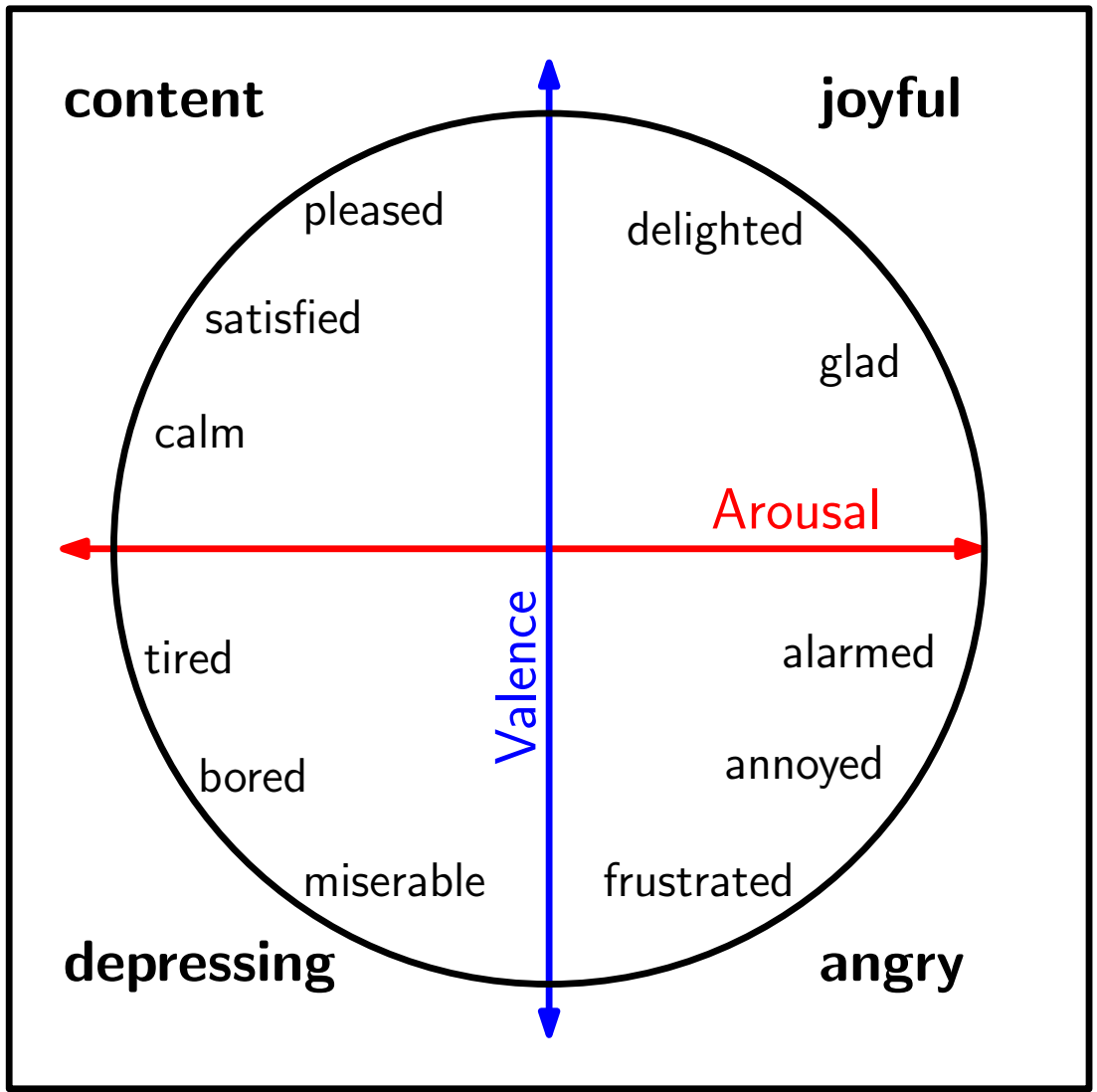
# Feeling

What is not learned then?

## Feeling

- Scarantino (2016): “Feeling is a conscious experience or a sensation or a subjective quality or a quale or a what-it-is-likeness.”
- Feldman-Barrett (2018): Affect is “the general sense of feeling that you experience throughout each day [...] with two features. The first is how pleasant or unpleasant you feel, which scientists call valence. [...] The second feature of affect is how calm or agitated you feel, which is called arousal.”

# Affect: Continuous Circumplex Model (Russel 1980)



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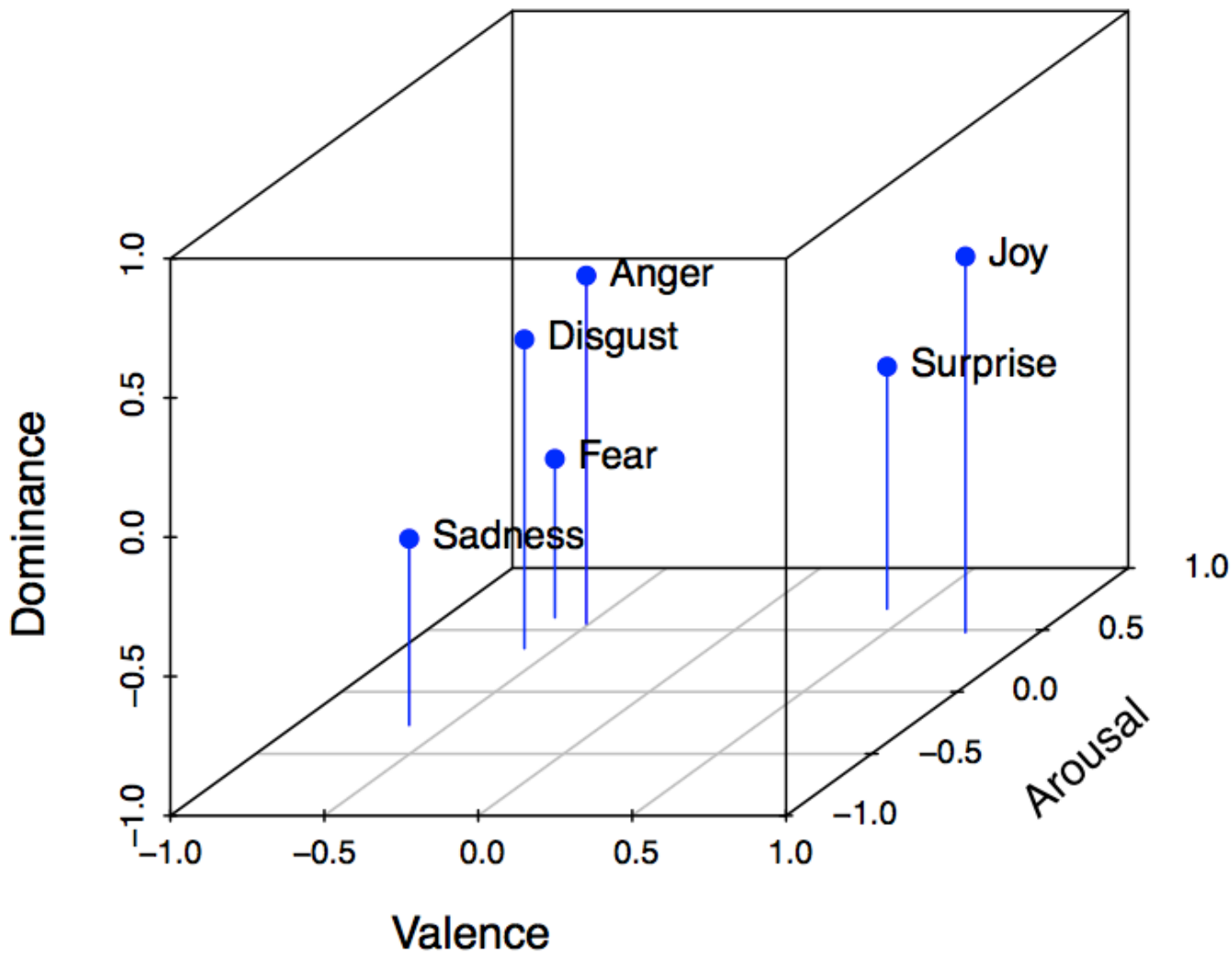


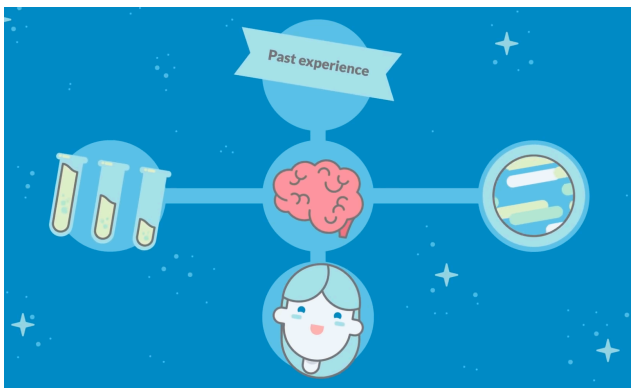
# Dimensional Emotion Models

Note:
Models that constitute a vector space in which emotion categories are positioned are sometimes called dimensional emotion model.

- VA and VAD are dimensional models
- Smith/Ellsworth's appraisal model we see later is as well

# Barrett (2017): Theory of Constructed Emotion

https://www.youtube.com/watch?v=M1OdhdI_3eI
(video: skl.sh/freedominthought6)




Key aspects:

- Paradoxon: We experience discrete emotion categories, but there is nearly no evidence from neuroscience for those.
- Affect (valence and arousal) is what we experience directly, not the emotion.
- Based on context, the brain predicts which emotion makes sense.
- Prediction is important, to motivate or warn us.
- This learned construction of emotions bridges the paradoxon.

Barrett (2017): The theory of constructed emotion: an active inference account of interoception and categorization. Soc Cogn Affect Neurosci (2017) 12 (1): 17–23.

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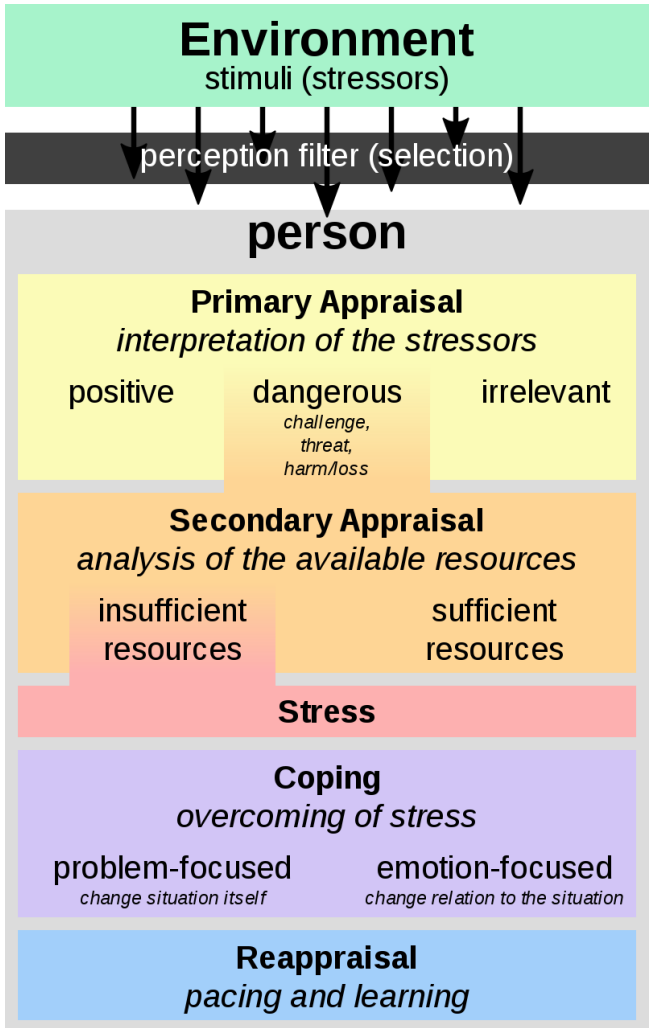
# Cognitive Appraisals: Lazarus Model of Stress

R.S. Lazarus, (1966).
Stress, appraisal, and coping.




Depiction by Philipp Guttmann CC-BY-SA 4.0,
`https://commons.wikimedia.org/w/index.php?title=File:Transactional_Model_of_Stress_and_Coping_-_Richard_Lazarus.svg&oldid=487149426`

# Appraisal Theories (according to Scherer)

## Scherer, 2005

Emotions are “an episode of interrelated, synchronized changes … in response to the evaluation of an external or internal stimulus event as relevant to major concerns of the organism”

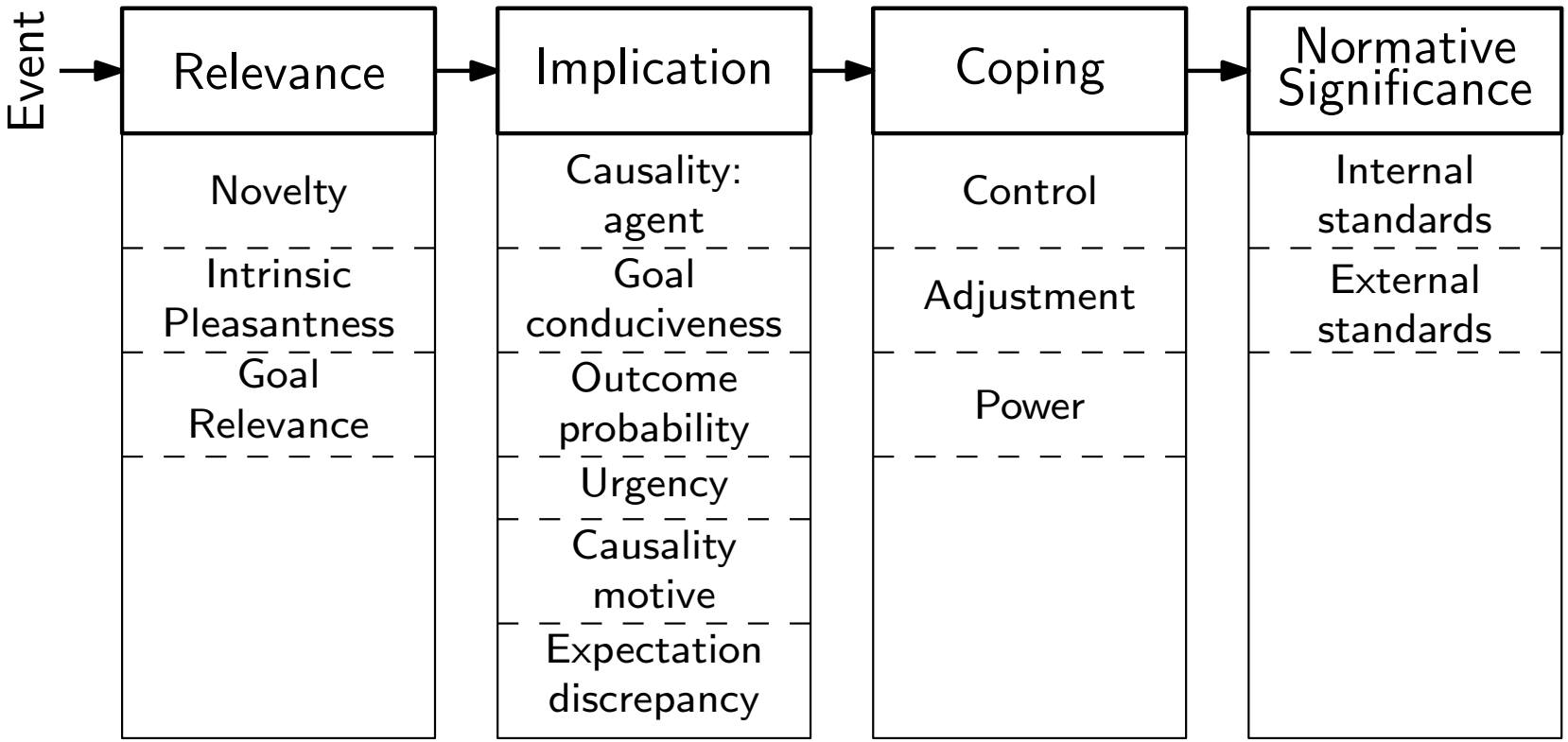
# Appraisal Theories (according to Scherer)

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

# Sequence of appraisal criteria (Scherer 2005/2013)

Scherer: Emotions are evaluated in a sequential manner.



# Results Smith/Ellsworth (1985)

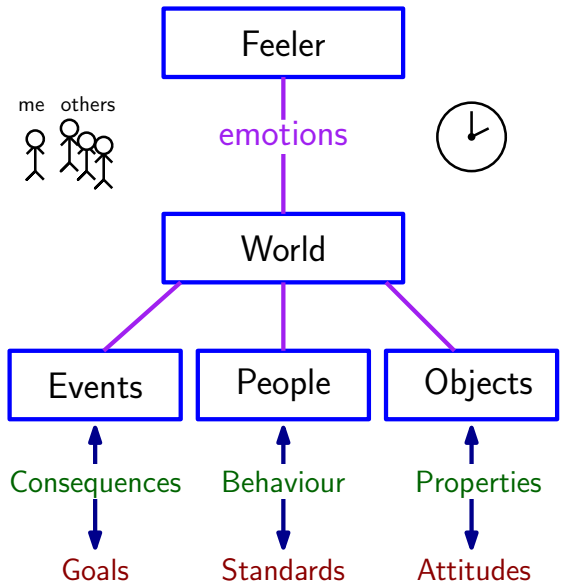
*Locations of Emotion Means Along the PCA Components*

| | Component | | | | | |
|---|---|---|---|---|---|---|
| Emotion | 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 | 0.80 | −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.

# OCC Model of Emotions

Ortony, Clore, Collings (1988): The Cognitive Structure of Emotions.



# Emotion Regulation

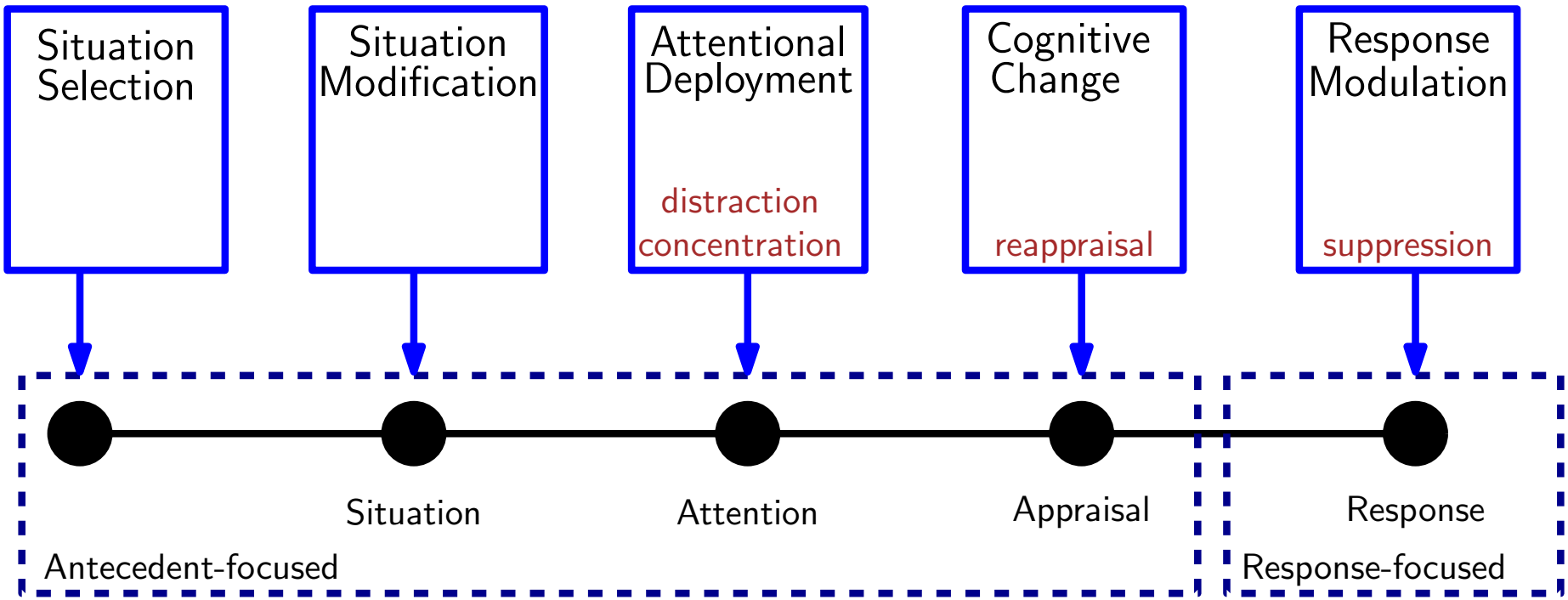
- Emotion reactions are not necessarily spontaneous:

**Emotion Regulation**

Initial Reaction ⇒ Attempt Regulation ⇒ "filtered" emotion

- We can "override" an initial response with a regulation.
- Requires the activation of a goal.
  - Not react angry because that would lead to a disadvantage.
- Emotion generation and regulation interact.

# Emotion Regulation Process Model




- Distraction is cognitively less demanding → earlier
- Reappraisal more demanding → later
- Regulation can also be implicit (automatic)

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# Appraisal Dimensions: Exercise

- Remember an event that caused an emotion in you and describe it with a short text.
- "I walked along the river when I heard a loud sound behind me."
- Assign values according to the emotion models.
  - Affect: Valence, Arousal, Dominance
  - Components: Bodily symptoms, action tendencies, expression, subjective perception/feeling
  - Plutchik: Protection/Fear, Destruction/Anger, Reproduction/Joy, Deprivation/Sadness, Incorporation/Acceptance, Rejection/Disgust, Exploration/Anticipation, Orientation/Surprise
  - Ekman: Joy, Fear, Sadness, Surprise, Anger, Disgust
  - Appraisal: pleasantness, control, responsibility, certainty, attention, effort
  - Regulation: situation selection, modification, attentional deployment, reappraisal, resonse modulation
- Think about: What is the relation between these dimensions and the perceived emotion?
- (working in groups is encouraged)

# Appraisal Dimensions: Exercise Discussion

Event:

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- Affect: Valence, Arousal, Dominance
- Components: Bodily symptoms, action tendencies, expression, subjective perception/feeling
- Plutchik: Protection/Fear, Destruction/Anger, Reproduction/Joy, Deprivation/Sadness, Incorporation/Acceptance, Rejection/Disgust, Exploration/Anticipation, Orientation/Surprise
- Ekman: Joy, Fear, Sadness, Surprise, Anger, Disgust
- Appraisal: pleasantness, control, responsibility, certainty, attention, effort
- Regulation: situation selection, modification, attentional deployment, reappraisal, resonse modulation

# Take Away

- Emotion Models
- Components of emotions
- Intro to Computational Emotion Analysis from Text

Next lecture:
How to create annotated corpora for emotion analysis.