CS886 - Affective Computing

Jesse Hoey
School of Computer Science
University of Waterloo
DC3613
jhoey@cs.uwaterloo.ca

September 8, 2021

Artificial Intelligence needs Emotion

theoatmeal.com/blog/google_self_driving_car

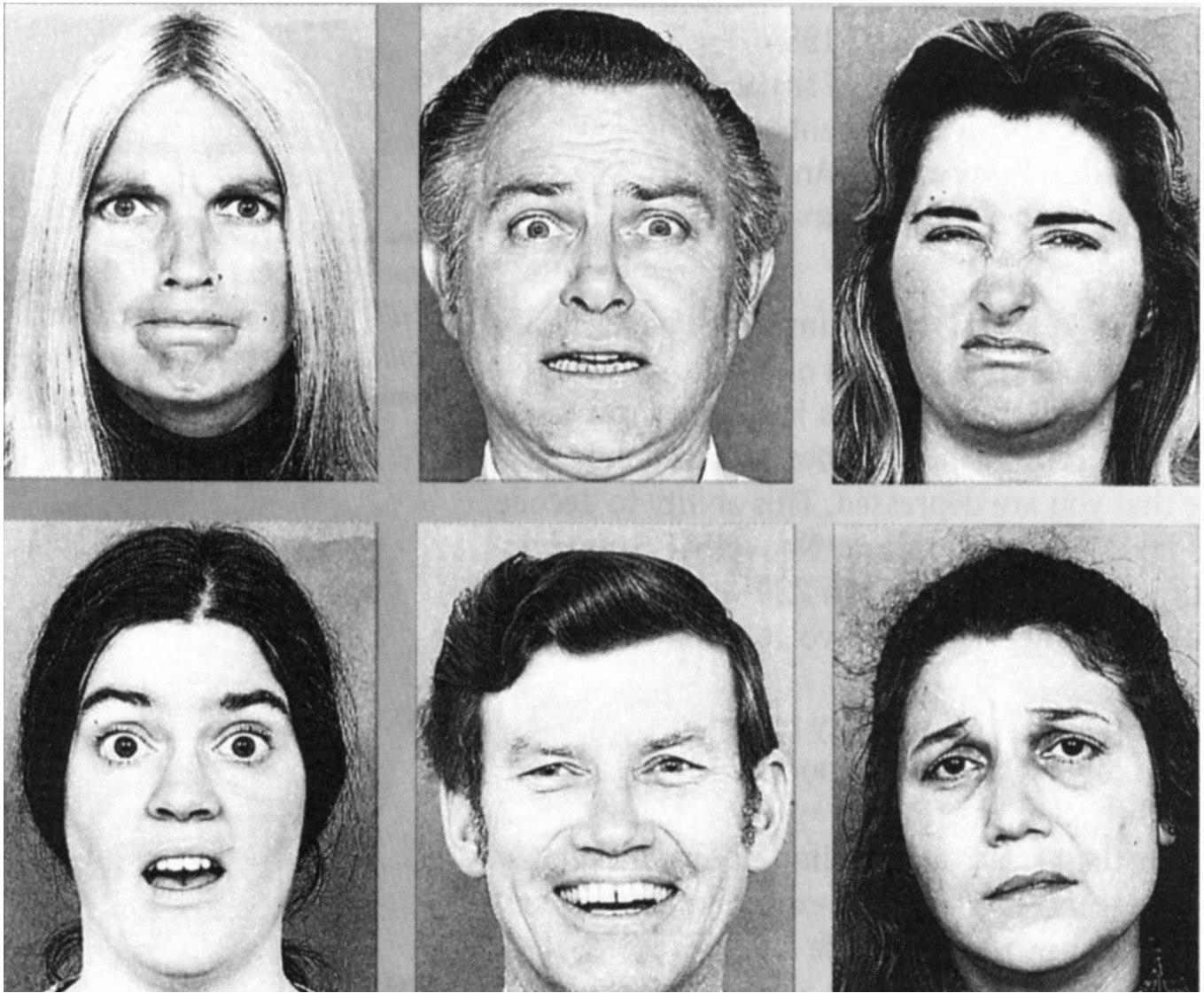
Artificial Intelligence needs Emotion

"They have to learn to be aggressive in the right amount, and the right amount depends on the culture."

– Donald Norman, Design Lab, UCSD

from: New York Times "Google's Driverless Cars Run Into Problem: Cars With Drivers", 02/09/2015.

Emotions and ... Context



Paul Ekman "What the Face Reveals", 2005

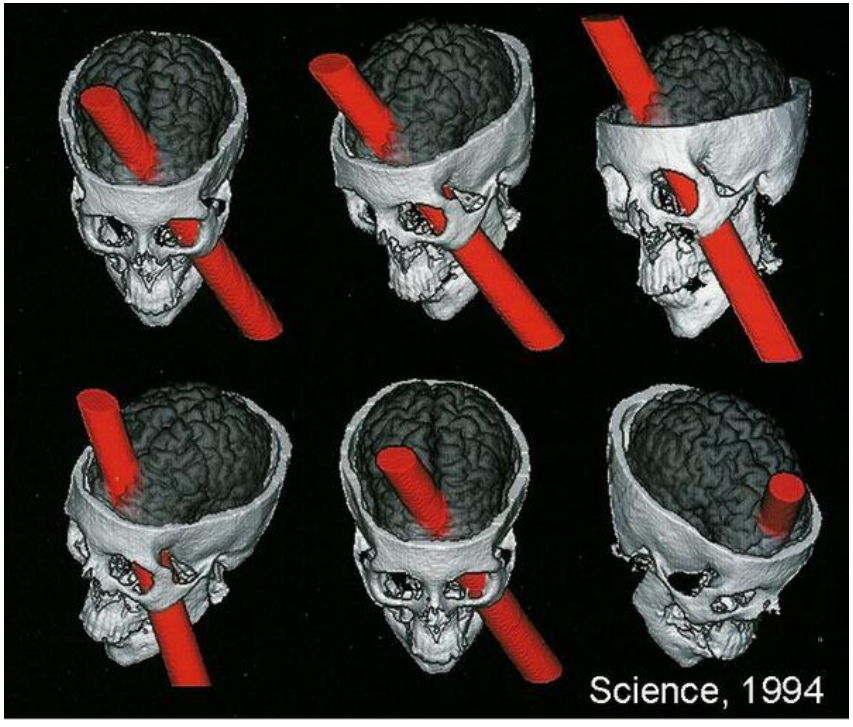
Emotions and ... Context

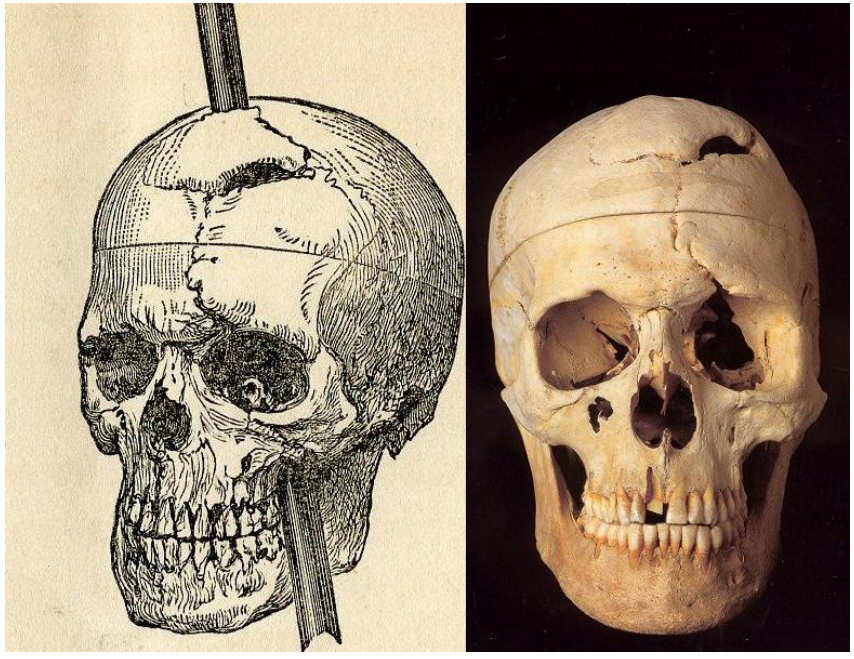
Emotions and ... Context

Emotions and ... Context

Emotions and ... Context

Neuropsychology of Emotion





Antonio Damasio *Descartes' Error*, G.P. Putnam, New York, 1994

Neurophysiologically...

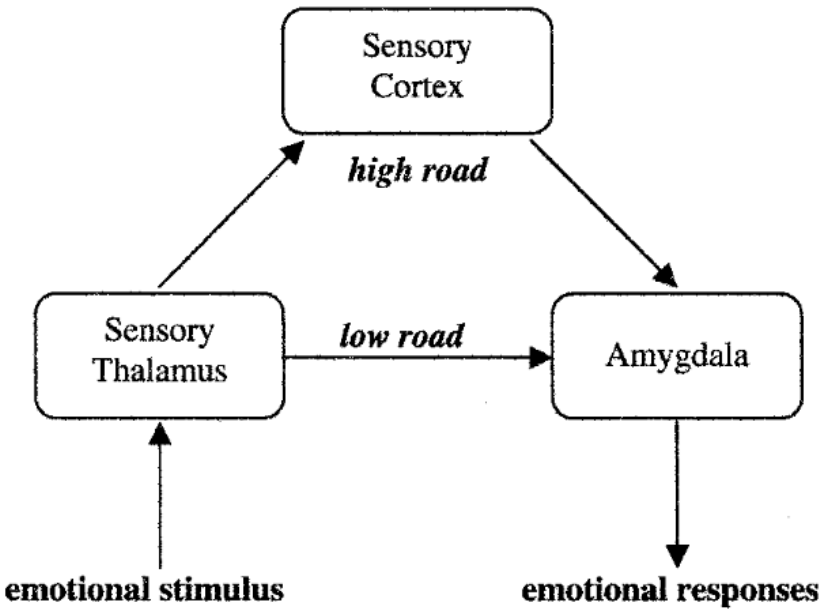
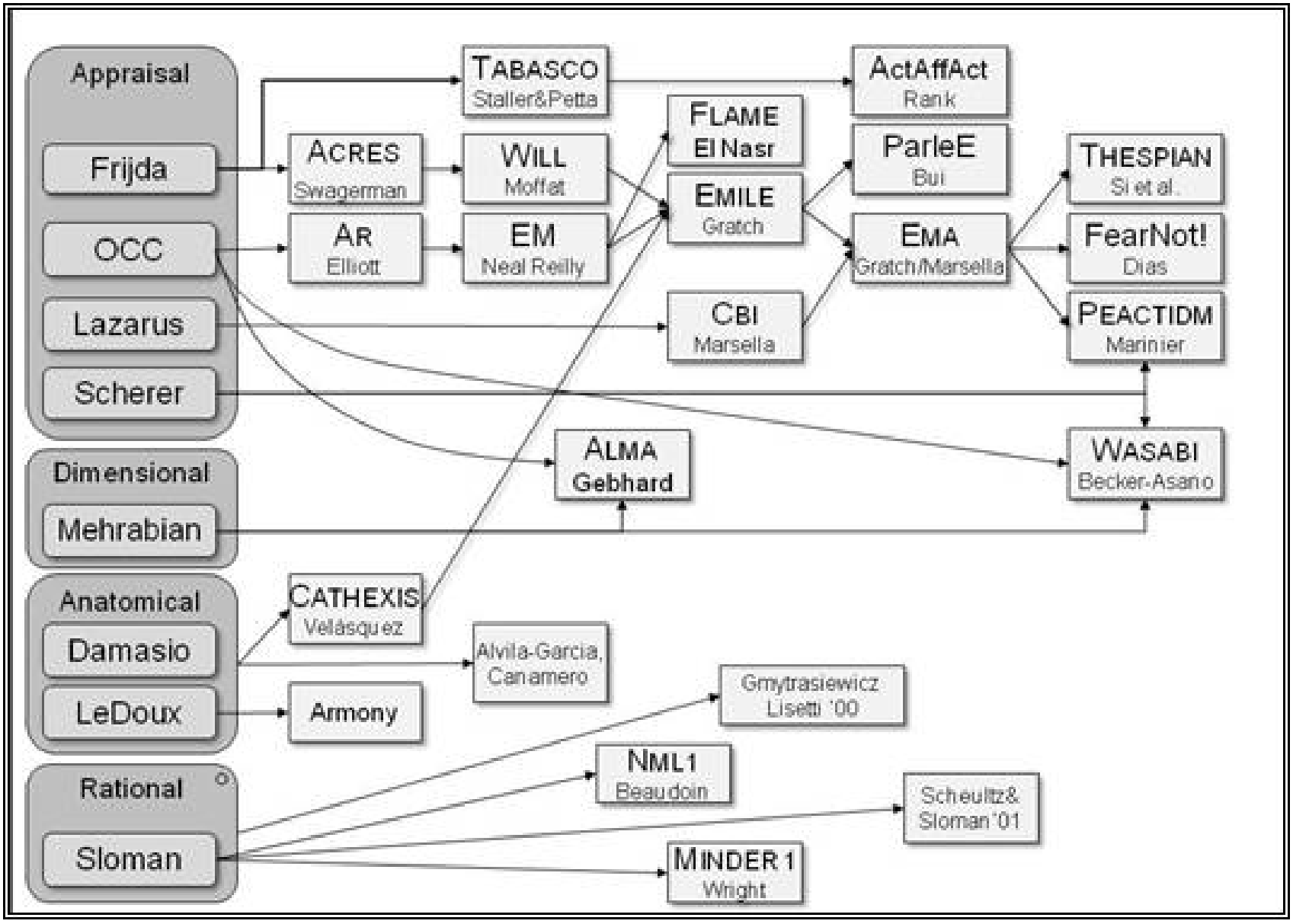


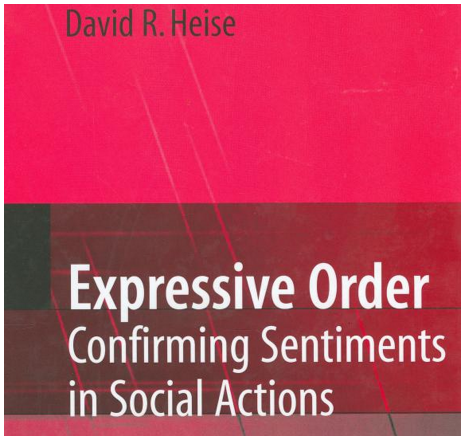
FIG. 3. Two separate pathways from sensory stimulus to emotional responses (adapted from LeDoux 1996, p. 164).

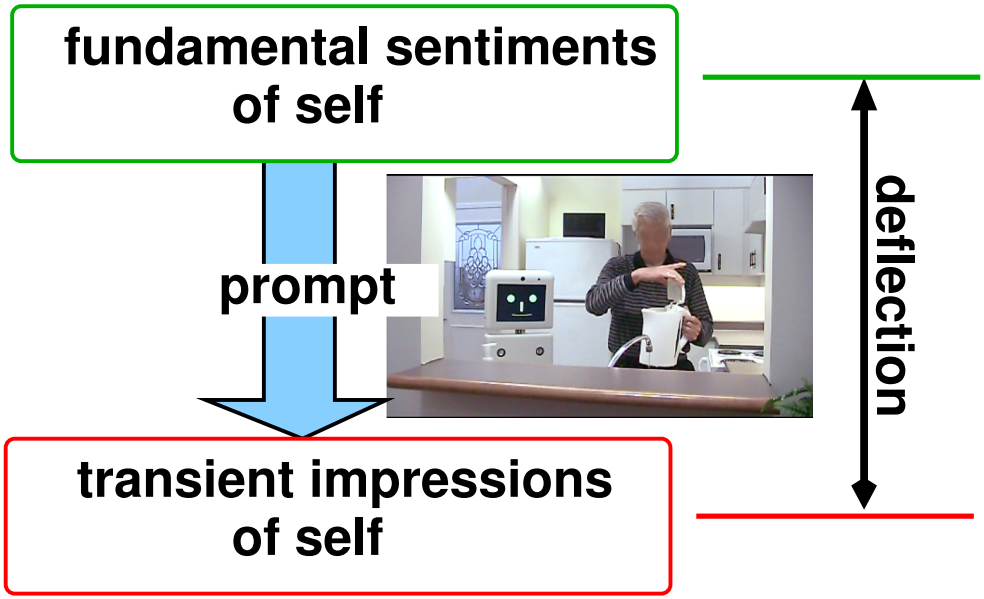
From Zhu & Thagard "Emotion and Action"
Philosophical Psychology Vol 15 No 1, 2002.

Operationalizing Emotions in Affective Computing



Socio-Cultural Models of Emotion





- David Heise. **Expressive Order: Confirming Sentiments in Social Actions**, Springer, 2007

Objectives of the Course

- Study basic theories of emotion: socio-cultural and psychological
- Study existing computational models of emotion, both socio-cultural and psychological
- Learn how emotions are fundamental to human interaction and intelligence
- Investigate how AI systems can make use of emotions to provide better interactions with humans

Key Messages:

1. Emotion motivates humans.
2. Emotion is cultural and social (group oriented)
3. AI for human interactive systems needs emotoin
4. For emotionally aware AI, make sure you get it right for your target users.

Course Outline

- Week 1: Introduction - what is emotion?
- Weeks 2-3: Cultural/Social theories of Emotion/Culture
  - Henrich
  - Douglas
  - Lakoff
  - Lawler
- Week 4: Psychological Theories of Emotion
  - Universal/Categorical
  - Dimensional
  - Rational and Cultural
- Weeks 5-9: Computational Modeling
  - Signals and Affective Computing
  - Socio-Cultural Models
    - Vaisey-Valentino, Bales
    - Ridgeway
    - Affect Control Theory
    - BayesACT
- Weeks 10-12: Student presentations

Course Structure

- 3 hours/week
- Weeks 1-9 (approx): 8-9 lectures on major topics by instructors, and hands-on practical experience, invited lectures
- Weeks 10-12: student presentations (10 minutes each, can be done by asynchronous video)
- Reading summaries
  (200 words 1x per lecture for 6 lectures of your choice)
- 1-3 assignments (tbd)
- Project
- Student presentations
- Assessment:
  - Project (30%: 5% proposal, 25% project)
  - Presentation (1 talk 10% + 1 writeup 10% = 20%)
  - Summaries (6x5=30%)
  - Assignments (10%)
  - Participation (10%)
- No prerequisites - all welcome!

Project Details

- Individual project
- Small groups (2-3 people) OK, but must have a clear delineation of roles in the proposal and approval by the instructor.
- Project ideas:
  - Implementated systems, user studies, conceptual frameworks, theoretical development,
  - Pick a paper and re-implement it and see if you can improve it
  - Write an app that uses emotions (e.g. a chatbot!)
  - Literature reviews are not acceptable
- Proposal: 1 page, 5-10 references
- Final Report: 8 pages, correctly formatted 15-20 references

Academic Integrity

When writing, follow these simple rules:

1. ALWAYS write your own submitted work.
2. CLEARLY indicate contributions from anyone else
   - "The sun was shining on the sea..." (Carroll, 1871)
3. Apply Rule 2 IMMEDIATELY when writing
4. DON'T cut and paste.
5. NEVER NEVER NEVER NEVER cite Wikipedia.

Note:

- Failing to follow Rules 3-4 is undetectable but you are strongly advised to do this.
- Failing to follow Rules 1-2 will result in heavy mark deductions.
- Failing to follow Rule 5 will result in immediate failure.