CS886 Affective Computing
Winter 2017
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Emotions and Intelligent Computers

1997: Rosalind Picard in *Affective Computing*

*This book proposes that we give computers the ability to recognize, express and in some case “have” emotions. Is this not absurd?*

Now:

- IEEE Transactions on Affective Computing
- International Conference on Affective Computing and Intelligent Interaction (ACII)
  - [acii2017.org](http://acii2017.org) ... **deadline: May 2nd, 2017**
- Increasing awareness that emotions play a significant role in human intelligence
- but, still don’t have “emotional machines” - why not?
Artificial Intelligence - Cognitive and Emotional

Traditional AI:

- Environment
- Perception
- Cognition
- Action
Neurophysiologically...

![Diagram of two separate pathways from sensory stimulus to emotional responses](image)

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

<table>
<thead>
<tr>
<th>Who</th>
<th>When</th>
<th>Affective</th>
<th>Cognitive</th>
</tr>
</thead>
<tbody>
<tr>
<td>William James</td>
<td>1890</td>
<td>associative reasoning</td>
<td>true reasoning</td>
</tr>
<tr>
<td>Heidegger</td>
<td>1927</td>
<td>ready-to-hand</td>
<td>present-at-hand</td>
</tr>
<tr>
<td>Dreyfus/Ryle</td>
<td>1950</td>
<td>knowing-how</td>
<td>knowing-that</td>
</tr>
<tr>
<td>Joseph LeDoux</td>
<td>1998</td>
<td>Low Road</td>
<td>High Road</td>
</tr>
<tr>
<td>Stanovich/West (Kahneman)</td>
<td>2000</td>
<td>System I</td>
<td>System II</td>
</tr>
<tr>
<td>Jonathan Haidt</td>
<td>2001</td>
<td>intuitive reasoning</td>
<td>reasoning</td>
</tr>
<tr>
<td>Paul Thagard</td>
<td>2006</td>
<td>hot thought</td>
<td>cold thought</td>
</tr>
</tbody>
</table>
Socio-Cultural (Two-System) views

- Environment
- Perception
- Affect
- Action

The diagram illustrates the relationship between socio-cultural views, environment, perception, affect, and action.
Socio-Cultural (Two-System) views

- Environment
- Perception
- Affect
- Action
- Cognition

Flow from environment to perception, affect, action, and cognition, with feedback loops between affect and cognition.
Artificial Intelligence: Individualistic/Rational

human

perceive

act

computer
Artificial Intelligence: Individualistic/Rational

perceive

computer

human

act
Artificial Intelligence: Individualistic/Rational
Artificial Intelligence: Collective/Phenomenological

suggest
commit
human
computer

suggest
commit
human
computer
Artificial Intelligence: Collective/Phenomenological

Diagram:

- Computer
- Human
- Suggest
- Commit

Interaction:

- Computer suggests to human
- Human commits to computer
- Computer commits to human
Breakdown and Negotiation

- Collective Intelligence
- Implies a shared knowledge
- Heuristics that solve social dilemmas
- Relational from Transactional
- Emotionally based

alignment  \(\xrightarrow{\text{breakdown}}\) negotiation  \(\xrightarrow{\text{tension}}\)
Theory of Social Commitments

Instrumental/Transactionall

Affective/Relational

non-separability of contributions
perceptions of shared responsibility
attribution of emotions to group
strengthening of ties (if +ve emotions)
longer-lasting group cohesion

Osgood’s Semantic Differential

Group I (N: 20) -- “polite”

Group II (N: 20) -- “polite”


Affective “EPA” Space

E: Evaluation; P: Potency; A: Activity
Affective “EPA” Space

E: Evaluation; P: Potency; A: Activity
Affective “EPA” Space

E: Evaluation; P: Potency; A: Activity
Affective “EPA” Space

Evaluation; P: Potency; A: Activity
Affect Control Theory

Individual and Collective, Cognitive and Affective
Objectives of the Course

- Study basic theories of emotion
- Study basic principles of affective computing
- Learn how emotions are fundamental to human interaction and intelligence
- Learn how AI systems can make use of emotions to provide better interactions with humans
Course Outline

- Overview lecture
- Basic (individual) theories of emotion
  - Appraisal
  - Dimensional
- Socio-Cultural theories of emotion
  - Affect Control Theory
  - Theory of Social Commitments
  - Emotions in Decision making
- Emotion recognition
  - Computer vision
  - Sensors
- Topics (student led discussion/presentations):
  - Emotion generation
  - Emotion in text (sentiment analysis)
  - Emotion in HCI/AI (applications):
    - Tutoring
    - Social networks
    - Health and Assistive Technology
    - Therapy
    - Advertising...Games...Autonomous Cars...
Course Structure

3 hours/week

Jan-Feb: Lectures on major topics by instructor or invites speakers

March: Weekly readings and discussions in small groups

Two assignments

Student presentations

Project

Assessment:

- Project (50%: 10% proposal, 40% project)
- Presentation (1 writeup 10% + 1 talk 10% = 20%)
- Assignments (2x10=20%)
- 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
- Project ideas:
  - Implemented 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**.
Rough Schedule

- January 10th: introductory lecture, group selection
- January 12th: group work project
- Jan 17th-Feb 23th (except reading week): lectures and invited talks
- Invited talks:
  - Jan 26th Paul Thagard, Philosophy on “Brain Mechanisms Explain Emotions and Consciousness”
  - Feb 2nd Neil MacKinnon, Sociology on Affect Control Theory
  - Feb 9th Igor Grossmann, Psychology on “Emotional Complexity”
- Feb 28th - March 30th: student team discussions and presentations
- February 2nd: Project Proposals due
- February 28th: Assignment 1 due
- March 30st: Assignment 2 due
- (Tentative) April 14th: project reports due