Cognition and Emotion

Week 1 - Class 1

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On a scale from 1 – 10, how happy are you at the moment?

1. Ready to jump of bridge
2. Slightly unhappy
3. Slightly happy
4. Really loving life
To what extent does your current emotional state influence your behaviour, attention, interest, motivation, etc?

1 Not at all
5 Hardly at all
6 Perhaps a bit
10 Extremely

To what extent do emotional states in general affect people’s behaviour, attention, decision making, engagement, etc?

So what are the consequences for ICT? Application development, interface design, testing, evaluation .....
Increased interest in emotions and ICT (1)

Mappiness


PrEmo Emotional Measurement

Dr. Pieter Desmet, Technical University of Delft

http://www.promo-online.com
Increased interest in emotions and ICT (2)

There’s a pressing requirement for robots in the social care of the elderly. We have fewer people of working age.
Cognition and emotion in HCI

1. Why this course?
   Background and context.
2. What will you learn?
3. Course organisation
4. Introduction to emotions in HCI
5. Questions and remarks
Cognition and HCI

How do we acquire, store, transform and use information?
How do humans solve problems and take decisions?
What is attention, and what are schemas?

Application design
Testing and evaluation

Relation with Emotion?
Technology and Emotions (1)

(Technology and Emotions (Daniel Shank, 2014))

Sociological approach to technology and emotions
Discussion of 4 main issues, from societal level to individual experience

1. Emotions and use of technology
2. The mediation of emotion via technology
3. Emotions in interaction with technology
4. Technology based methodologies

“It’s called ‘reading’. It’s how people install new software into their brains”
Emotions and the Use of Technology

Emotions alter technology use patterns
- both positive and negative emotions may increase or decrease technology use: emotions are catalysts to take action, e.g. anxious people seeking support.

Technology use may alter one’s emotional state (positively and negatively).
  
  Using the Internet for gaming and entertainment can be associated with greater happiness, increase well-being and reduce depression ...
Multitasking is associated with anxiety and stress
The Mediation of Emotion via Technology

- Affective mediation
  - Information channels (visual, auditory, haptic)
    - Face to face, visual: eyes, mouth, posture
    - Interpretation and compensation
  - Synchronization
    - Importance of co-presence?
  - Directionality of the technology
    - 1-1, 1-many

- Areas of Affective Mediation: Work, Leisure (virtual worlds and games), Romance (online dating)
Technology and Emotions (4)

(Technology and Emotions (Daniel Shank, 2014))

Emotions in Interaction with Technology

- Technology can be the basis for emotional reactions due to its novelty, ability, malfunctions, or social function.

In this wide-ranging examination of the emotional and physical relations between humans and the inanimate objects of their desire, AI guru Levy (Robots Unlimited) first addresses the question of love with robots, and moves on to consider the mechanics of actually having sex with them. In order to put the reader at ease with the possibility of human-robot love, Levy compares the phenomenon to the ways in which humans fall in love with each other, their pets, and even their motorcycles. From there, Levy argues, it is a short emotional step to the affection people can be expected to display towards robots. Some readers may be turned off by Levy's fairly graphic descriptions of the mechanics of having sex with robots, (...). (Review Amazon)

.... Turkle argues that people are increasingly functioning without face-to-face contact. For all the talk of convenience and connection derived from texting, e-mailing, and social networking, Turkle reaffirms that what humans still instinctively need is each other, and she encounters dissatisfaction and alienation among users: teenagers whose identities are shaped not by self-exploration but by how they are perceived by the online collective, mothers who feel texting makes communicating with their children more frequent yet less substantive, Facebook users who feel shallow status updates devalue the true intimacies of friendships. Turkle’s prescient book makes a strong case that what was meant to be a way to facilitate communications has pushed people closer to their machines and further away from each other. (review Amazon)
Technology and Emotions (5)

(Technology and Emotions (Daniel Shank, 2014))

• Incorporating theory on emotional intelligence into the design of virtual agents: Affective Computing
  – Non-verbal communication and representation of emotions

• Social presence, games, VR
• Persuasive Technology
Human–computer interaction (HCI) researches the design and use of computer technology, focusing particularly on the interfaces between people (users) and computers.
What will you learn? (2)

**Cognitive principles**
understand how people
- perceive information (e.g. for interface design)
- understand information (e.g. in data visualisation)
- use information (e.g. for decision making)
- and remember information (e.g. for virtual training).

**Theories of emotion (and affect, mood)**
understand how emotions influence
- information processing,
- attention
- memory etc.

And understand **emotion-related constructs** that are important in the use of technology, e.g.:
- engagement
- presence.
Virtual training:
• recreates situations live training cannot
• can better stress pilots, and thereby better prepare them for the real deal, in simulators, especially for emergency situations like mechanical failures.

Sense of play, fun, engagement, motivation to enhance learning...

.. and increase problem solving and creativity

http://neomam.com/blog/8-awe-inspiring-video-game-infographics/
What will you learn? (3)

Different perspectives of emotion and technology
- Affective Computing
- Affective Interaction
- Affective Design

Emotion Recognition and Generation
- Recognizing emotions from sensors
- Generating non-verbal behaviors

Virtual Reality, Games and Presence
- Virtual reality technologies
- Serious games
- Presence, Social Presence and Collaboration

Persuasive Technology
- Captology and computers as persuasive tools
- Theoretical Models of Behavior Change
This course in the track Games & Interaction
Course organisation (1): time table

**Week 1 - 6**
- Classes: important topics in cognitive psychology in relation to HCI, the impact of emotion (affect, mood): theory and assignments
- Week 1 – week 5: Assignments help to understand the theory and prepare for the project.
- Week 6: assignment to prepare for the project

**Christmas break**

**Week 7 – 9**
- Project: design or evaluate an application involving topics discussed in the course; based on literature research

**Week 10**
- Exam
- Present project results
- Submit project report
The grade for this course consists of two components:

1. Exam (40%)
2. Weekly assignments and project (60%).

You pass this course when the weighed average is >= 5.5 and the grades for the two components are each >=5.5.

The grade of the second component is calculated by the average of the assignments (40%) and the project (60%). If the average of the assignments is lower than 5.5 you are allowed to repair one of the assignments.

During the project you will receive feedback on your progress, so you know if you are heading for a low grade. In case you receive a grade between 4 and 5.5 for the project, you will get some (but limited) opportunity for repair.

To qualify for a re-examination the exam grade should be higher than 4 but lower than 5.5.

\[
G = 0.4 \times E + 0.6 \times (0.4 \times A + 0.6 \times P)
\]

\[
E \geq 5.5 \text{ and } (0.4 \times A + 0.6 \times P) \geq 5.5
\]

E: Exam A: Weekly assignments P: Final project G: Your final grade
Course organisation (3): who and how

Teaching staff
- Joske Houtkamp (coordination)
- Zerrin Yumak
- Dimitrios Bountouridis
- Marries van de Hoef

Student assistants
- Thomas Alflen
- Sabine Molenaar
- Raoul Schipper

Contact
- ask in class or
- mail to IKUCognEmo@gmail.com
- only when you need a personal answer, mail one of us directly

In the lectures we introduce, explain and discuss selections of the theory and give a short introduction to the assignments. Attendance is not mandatory; therefore we expect your attention. Use of tablets, laptops etc. only on the back rows (and preferably not at all unless this is required in the class).
Materials

Exam:

• Cognitive Psychology, 8th Edition International Student Version (Margaret W. Matlin) (Chapters 1-5, 8, 11,12)
• Additional papers (listed in the slides and online); sometimes video
• All slides

Use the extra materials listed on the website for the assignment, or as background for the theory.
Let’s start

A soft landing
Emotion in HCl

• Interaction with computers: traditionally focus on efficiency and rationality

• End of last century: recognition of role of emotions, since then an important topic of research

• Technological advances
  – allow assessment of users’ emotions (through physiological correlates)
  – allow multimodal interfaces that convey emotions (voice, face, posture)

Scottie

“Affectieve communicatie en het gevoel op afstand verbonden te zijn komt tot stand dankzij het samen kunnen spelen.”
http://waag.org/nl/project/zorgpilot-scottie-gate
The role of emotions (one view)

Inside out

https://www.youtube.com/watch?v=_MC3xMvsDl
Emotion

(Brave and Nass, 2003)

Two generally agreed-upon aspects of emotion
(a) Emotion is a reaction to events deemed relevant to the needs, goals, or concerns of an individual; and,
(b) emotion encompasses physiological, affective, behavioral, and cognitive components.

For instance
Fear: a reaction to a situation that threatens (or seems to threaten, as in a frightening picture) an individual’s physical well-being, resulting in a strong negative affective state, as well as physiological and cognitive preparation for action.
Joy: a reaction to goals being fulfilled and gives rise to a more positive, approach-oriented state.
Components of emotion

- Valence (positive, negative, neutral)
- Aboutness, they are about something- “intentional”
- Function, vital for survival
- Response consists of multiple components again
  - Subjective experience (how it feels)
  - Behavioral (outward display of behaviour, face, movements)
  - Physiological aspects (brain, autonomic nervous system – changes in heart rate, breathing, sweating)

June Gruber, Yale University:
https://www.youtube.com/watch?v=slwdzpg4Aqk
<table>
<thead>
<tr>
<th>Emotion is not...</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mood</strong></td>
<td>a long lasting state, days to weeks, months; is nonintentional (does not have an aboutness), more diffuse; (gemoedstoestand, stemming)</td>
</tr>
<tr>
<td><strong>Feeling</strong></td>
<td>subjective representation of an emotion, a private experience; in daily language confusion with emotion</td>
</tr>
<tr>
<td><strong>Affect</strong></td>
<td>broader, all encompassing term, refers to general topics of emotions, feelings, and moods together</td>
</tr>
<tr>
<td><strong>Personality trait</strong></td>
<td>Stable individual difference across different situations</td>
</tr>
<tr>
<td><strong>Cognition</strong></td>
<td>does not have facial expressions, not always physiological arousal (Lazarus: cognitions can give rise to emotions)</td>
</tr>
</tbody>
</table>

June Gruber, Yale University: https://www.youtube.com/watch?v=slwdzpg4Aqk
Emotions-moods

- Emotions bias action, prepare for immediate response;
- Moods tend to bias cognitive strategies and processing over a longer term;
- Moods: background affective filter through which internal and external events are appraised.
Time spectrum of emotions

Initial appraisals with accompanying physiological changes and expressions last only a few seconds.

Episodes of emotion that people can report tend to last for minutes or hours, sometimes longer.

Moods tend to last for hours, days, or weeks.

Psychological illnesses (emotional disorders), such as depression and anxiety states, last at least 2 weeks.

Emotion-based traits of personality such as shyness or cheerfulness can last a lifetime.

Cognitive approaches to emotions

Oatley&Johnson-Laird, 2014
Effects of Affect – quick overview

(1) Attention

• Emotions direct and focus *attention* on important needs and goals;
• Emotion can lead to regulation: directing *attention away* from the emotion-eliciting stimuli;
• More attention to thoughts and stimuli that have relevance to current mood state;
• Challenges in HCI: interface that detects a user’s emotional or mood state and adapt; e.g. detecting frustration in computer-assisted instruction and learning

Other examples?
Effects of Affect – quick overview

(2) Memory

• Emotional stimuli are remembered better than unemotional events;
• People remember mood-congruent emotional stimuli better than incongruent stimuli;
• Mood-dependent recall: memories encoded while in a particular mood are better recalled when in that same mood.

Examples?
Emotions and retention: example (1)

Use of emotionally arousing sounds in a VR training to improve retention (=onthouden van informatie)

• Training application: Rescue Sim, VSTEP
• A simulation platform that allows incident command training in an immersive 3D virtual environment for safety and security professionals.

http://vstepsimulation.com/product/rescuesim/
Emotions and retention: example (2)

VR training scenarios for company safety training (BHV) in hospitals - “Samen Voorbereid Veilig” (SVV) project

• Procedure training; e.g. fire in operating theatre and evacuation of hospital wards

• Training in reality is costly and impractical

• Virtual training has many didactical advantages (feedback, adapt to individual pace, variation in scenarios etc.)

• Objective: improve learning and retention
Emotions and retention: example (3)

Basic assumption:
• Sound tracks and sound effects can enhance the emotional impact of virtual environments and events;
• emotional arousal has a positive effect on memory recall
Emotions and retention: example (4)

- Implementation of emotionally arousing sounds in training scenario: fire in hospital kitchen.
- Selection of sounds that elicit high arousal appropriate for the scenario
  Sounds from IADS (International Affective Digitized Sounds) database of 111 standardized, emotionally evocative sounds (car horns, bagpipes, belch, siren, dog, screaming, gun shot, sports crowd, robin etc.)
- Explosion, screaming, crying, dentist drill, glass breaking, vomiting, coughing, etc
- Added to locations/moments in the scenario when trainee should notice important information
- After training, test retention (directly after and one week later)
Emotions and retention: example (5)

Visual Scene: Reception Room, people in the reception room rushed outside because of the sound of the explosion, except the receptionists.

Task: When realizing an explosion occurs, navigate ERO avatar to the reception desk where the ERO equipment is located.

To-Be-Remembered Objects:
A patient lying in a bed near the receptionist, as it would be considered people who will need special assistance during emergency incident/evacuation.

Arousing Sound: Explosion (626), followed by Glass Break (730).

Environmental Sound: Crowd rushing outside, footstep.
Emotions and retention: example (6)

**Visual Scene:** ERO enters 2nd floor and comes across a crowd that is running from 2nd floor. One male patient is walking in a rush when suddenly he vomits. Emergency exit sign is on the wall of 2nd floor

**Task:** Navigate ERO to the emergency location (2nd floor)

**To-Be-Remembered Objects:**
1. Vomiting patient (would need help during evacuation)
2. Emergency Exit Sign

**Arousing Sound:** Vomit (255), Panic Crowd (310)

**Environmental Sound:** Footsteps
Emotions and retention: example (7)

Scene 10

**Visual Scene:** A female victim lying down in the kitchen floor. Fire is coming from an exploded microwave.

**Task:** There is a fire in the kitchen, the ERO should do what is necessary to save the victim and contain the fire

**To-Be-Remembered Objects:**
The female victim from the incident

**Arousing Sound:** Femscream 3 (277)

**Environmental Sound:** Footsteps, ERO’s heavy breathing

To be continued in week 3
Effects of Affect – quick overview

(3) Performance

• Mood affects cognitive style and performance;
• Positive affective states affect flexibility and efficiency of thinking and problem solving;
• Example: Duncker's candle problem ....

(functional fixedness)
Attractive things work better
(Donald Norman)

• State of **negative affect**, feeling anxious or endangered: the neurotransmitters focus the brain processing -> concentration, in depth, attention to details

• State of **positive affect**: neurotransmitters broaden the brain processing -> less focused, receptive to interruptions, attending to any novel idea or event; curiosity, creativity, learning.

For design:

• *Pleasant mood: more creative*, more able to overlook and cope with minor problems with a device.

• *Anxious: more focus* -> information required to do the task must be continually at hand, readily visible, with clear and unambiguous feedback about the operations that the device is performing.

Things intended to be used under stressful situations require more care, with much more attention to detail.
Effects of Affect – quick overview

(4) Assessment

- Mood influences judgment and decision making;
- Positive mood may lead to positive evaluations of other objects, situations;
- Positive mood decreases risk-taking.

In e-commerce:

- Happy user in an e-commerce is more positive about products;
- Low-risk purchase more likely during good mood (high-risk during neutral or negative mood).

Examples?
Literature for week 1

- Matlin Chapter 1. An Introduction to Cognitive Psychology, pp.2-13


- Gruber, J. Human Emotion 1.3 : What is an emotion? [https://www.youtube.com/watch?v=slwdzpg4Aqk](https://www.youtube.com/watch?v=slwdzpg4Aqk)
Introduction Assignment week 1

Identify a personal experience with technology that involves or involved an emotional response, and that had an effect on your interaction with that device or application. You describe the experience, the effect, and relate it to the literature of week 1 of this course and other literature.

For instance, you may have experienced:

• **frustration** during the use of an application because it did not respond as expected; as a result you stopped using the application after a few more attempts;

• **enjoyment** using an app that keeps track of your workouts, because it gave you very encouraging feedback; and you were motivated to train even harder that week;

• a **sense of urgency** when you visited a flight ticket booking site because the site kept warning you that only two seats still available for this low price; and perhaps because of that feeling you booked the tickets;

• **anger** because you were confused by information on a webshop; and you realized too late that the product you ordered would not be dispatched to you immediately but after 14 days. You decide never to buy from this shop again.

Individuals may experience many other emotions (surprise, doubt, boredom, etc.) when using an application or a device.

You work in pairs; each of you makes one description and reviews the description of your colleague. For each description, use the provided template.

Deadline Saturday 19/11, 11.00 AM.

Important:

Plagiarism is the copying of another person’s documents, ideas or lines of thought and presenting it as one’s own work; also of other students. So be original in your work.
Final remarks for week 1

See you Wednesday 16/11 at 9.00 in KBG ATLAS

• No “werkcollege” on Wednesday 16/11