Emotional Interaction

Interaction Design: Chapter 5
19 Feb 2014
Overview

- Emotions and the user experience
- Expressive interfaces
  - how the ‘appearance’ of an interface can affect users
- Frustrating interfaces
  - what are they and how to reduce them
- Persuasive technologies and behavioral change
  - how technologies can be designed to change people’s attitudes and behavior
- Anthropomorphism
  - The pros and cons
- Models of emotion in interaction design
Emotions and the user experience

- HCI has traditionally been about designing efficient and effective systems
- Now more about how to design interactive systems that make people respond in certain ways
  - e.g. to be happy, to be trusting, to learn, to be motivated
- Emotional interaction is concerned with how we feel and react when interacting with technologies
Emotional interaction

- What makes us happy, sad, annoyed, anxious, frustrated, motivated, delirious and so on
  - translating this into different aspects of the user experience
- Start by understanding how people…
  - express themselves
  - read each other’s expressions
    - includes understanding relationship between different modalities like facial expressions, body language, gestures, tone of voice
Emotional interaction

- How to change human behavior through the use of emotive feedback
- Interaction design: Creating user experiences that elicit, avoid, or encourage specific emotional reactions
- Affective computing: Creating systems that can recognize and/or express emotions in the same way humans do (Picard 1998)
  - Not to replace humans, but as an aid
  - Social robots, virtual pets, virtual humans
Expressive interfaces

- Emoticons, sounds, icons, virtual agents have been used at the interface
  - to convey emotional states
  - to elicit emotional responses (e.g. comfort and happiness)
- Icons have been used to show computer state, e.g. ‘happy Mac’
  - convey friendliness
  - reassure users
Expressive interfaces

- Provide reassuring feedback that can be both informative and fun
- But can also be intrusive, causing people to get annoyed and even angry
- Color, icons, sounds, graphical elements and animations are used to make the ‘look and feel’ of an interface appealing
  - conveys an emotional state
- This can affect the usability of an interface
  - users may prepared to put up with certain aspects of an interface (e.g. slow download rate) if the end result is appealing (Tractinsky et al 2000)
Which one do you prefer?
Marcus and Teasley study

- Marcus (1993) proposed interfaces for different user groups
  - Left dialog box was designed for white American females
    - Who “prefer a more detailed presentation, curvilinear shapes and the absence of some of the more brutal terms ... favored by male software engineers.”
  - Right dialog box was designed for European adult male intellectuals
    - who like “suave prose, a restrained treatment of information density, and a classical approach to font selection”
- Teasley et al (1994) found this not to be true
  - the European dialog box (b) was preferred by all and was considered most appropriate for all users
  - round dialog box was strongly disliked by everyone
Friendly interfaces?

- Microsoft pioneered friendly interfaces for technophobes ‘At home with Bob’ software
- 3D metaphors based on familiar places (e.g. living rooms)
- Agents in the guise of pets (e.g. bunny, dog) were included to talk to the user
  - Make users feel more at ease and comfortable
- Aim was to help novice users but backfired
  - Source of annoyance and frustration
Friendly interfaces?

- Bob never became a commercial product
  - Too cute and childish
- Clippy
  - Intrusive and distracting
Frustrating interfaces

- Poorly designed interfaces can make users feel stupid, insulted, threatened, annoyed

- Many causes:
  - When an application doesn’t work properly or crashes
  - When a system doesn’t do what the user wants it to do
  - When a user’s expectations are not met
  - When a system does not provide sufficient information to enable the user to know what to do
  - When error messages pop up that are vague, obtuse or condemning
  - When the appearance of an interface is garish, noisy, gimmicky or patronizing
  - When a system requires users to carry out too many steps to perform a task, only to discover a mistake was made earlier and they need to start all over again
Frustrating interfaces

- User frustration often a result of bad design, no design, inadvertent design, ill-thought-out design
  - **Gimmicks** - amusing to the designer but not the user, e.g. clicking on a link to a website only to discover that it is still ‘under construction’

- **Error messages** – Shneiderman’s guidelines for error messages:
  - Avoid using terms like FATAL, INVALID, BAD
  - Audio warnings
  - Avoid UPPERCASE and long code numbers
  - Messages should be precise rather than vague
  - Provide context-sensitive help
Frustrating interfaces

- **Waiting** – websites or apps that take forever to load
- **Upgrading software** – something that worked before now doesn’t, well-learned procedures for carrying out tasks that changed in the upgrade
- **Appearance** – users annoyed by
  - Websites overloaded with text and graphics
  - Flashing animations
  - Too many sounds effects and music
  - Too many buttons
  - Childish designs, e.g. some helper agents
  - Poor layout: websites, keyboards, control panels, etc
Should computers say they’re sorry?

- Would users be as forgiving of computers saying sorry as people are of each other when saying sorry?
- How sincere would they think the computer was being? For example, after a system crash:
  - “I’m really sorry I crashed. I’ll try not to do it again”
- Reeves and Nass (1996) argue that computers should be made to apologize
- Should emulate human etiquette
Motivations for affective interaction

- Make technologies more flexible
- Understand human behaviour
- Learn how to change behaviour
- More engaging interaction
Persuasive technologies and behavioral change

- Interactive computing systems deliberately designed to change people’s attitudes and behaviors (Fogg, 2003)
- Lots of techniques now used to change what people do or think
  - Pop-up ads, warning messages, reminders, prompts, personalized messages, recommendations, Amazon 1-click
  - Commonly referred to as nudging
Persuasive technologies and behavioral change

- Interactive technologies also used to change behaviors outside commercial settings
  - e.g. safety, preventative healthcare, fitness, energy consumption, personal relationships, learning
  - Changing bad habits and improving well being
  - Pokemon Pikachu, iBitz: Designed to motivate children to be more physically active on a regular basis
  - WaterBot (Arroyo et al 2005): monitoring & feedback
Which is most effective?
Anthropomorphism

- Attributing human-like qualities to inanimate objects (e.g. cars, computers)

- Well known phenomenon in advertising
  - Dancing butter, drinks, breakfast cereals, fruits and vegetables

- Much exploited in human-computer interaction
  - Make user experience more enjoyable, more motivating, make people feel at ease, reduce anxiety
ActiMates

- Series of plush toys developed by Microsoft in 1997
- Designed to encourage children to learn through play using human-based speech and movement
- Sensors in eyes, feet and hands – responds to touch
- Barney: 2,000 word vocabulary
  - Squeeze his foot and he'll sing one of 17 songs, e.g. "Alphabet Song"
  - Squeeze his hand and he'll do one of 12 activities, e.g., counting, rhymes and ABCs
  - Cover his eyes and he'll play peek-a-boo.
Anthropomorphism

- Technologies with human-like attributes makes them more enjoyable and fun to interact with – especially for children
- Makes them feel more at ease and reduces anxiety
  - Which would you prefer?
    - “Hello Chris! Nice to see you again. Welcome back. Now what were we doing last time? Oh yes, exercise 5. Let’s start again”
    - “User 24, commence exercise 5”
- Anthropomorphistic interfaces may be most useful as teachers, salespeople, therapists, or entertainment figures
Evidence to support anthropomorphism

- Reeves and Nass (1996) found that computers that flatter and praise users in education software had a positive impact on them
  - “Your question makes an important and useful distinction. Great job!”
- Students were more willing to continue with exercises with this kind of feedback
Criticism of anthropomorphism

- Anthropomorphic interfaces can be perceived as deceptive, make people feel anxious, inferior or stupid

- When the message is negative
  - People tend not to like screen characters that wave their fingers at the user and say:
  
  **Now Chris, that’s not right. You can do better than that. Try again**

- Many prefer the more impersonal:
  - Incorrect. Try again
Virtual characters

- Agents that support interactions with human users in virtual environments
- Lots of application areas
  - Education and training
    - Virtual patients (Lok et al)
    - Justin (Gratch & Marsella)
  - Museum guides
    - Ada & Grace (Swartout et al)
  - Conversational
    - Rea (Cassell et al)
    - Greta and Spike (Pelachaud et al)
Virtual patients
Virtual museum guides

Responsive Virtual Human Museum Guides

Demonstration Interaction

https://www.youtube.com/watch?v=K6kcv3zwoo8
Spike

https://www.youtube.com/watch?v=6KZc6e_EuCg
What makes a virtual agent believable?

- Believability refers to the extent to which users come to believe an agent’s intentions and personality
- Appearance is very important
  - Are simple cartoon-like characters or more realistic characters, resembling the human form more believable?
- Behavior is very important – emotion adds believability
  - How an agent moves, gestures and refers to objects on the screen
  - Exaggeration of facial expressions and gestures to show underlying emotions
Social robots
Paro: Therapeutic robot seal

Posture Sensor
32 bit RISC Chip x 2
Microphones x 3
Light Sensor x 2
Speaker
Stereo Whisker Tactile Sensor
Artificial Fur (Antibiotic)
Ubiquitous Surface Tactile Sensor:
- head
- under jaw
- back and side
- front flipper
- rear flipper
7 Actuators:
- each eyelid (1)
- neck (2)
- each front flipper (1)
- rear flipper (1)

Takanori Shibata
Experiment: Interaction with Paro

- 12 Ss – 67-89 yrs
- Interviews
  - Social ties: examined using free-pile sort method
  - Relationship with Paro
    - Open: “How is your daily life after intro of the robots?”
    - Closed: “Do you speak to & touch the robot?”, “What is the robot to you?”, “Is the robot (un)necessary in the house?”
- Interviewed twice: at start & 1 month later
- Video recording common area
  - Before & during Paro
Results of interaction with Paro

- Results
  - Improved moods
  - Increased activity and communication
  - Reduced stress
  - Effects of interaction lasted more than a year
Kismet: social interaction robot

- Inspired by infant social development, psychology, evolution
- Kismet’s role: natural and intuitive social interaction with humans and learn, like parent-infant relationship
- Basis postures change according to intensity
  - Gaze direction, facial expression, body posture, vocal babbles
What makes a robot believable?

- Are simple cartoon-like characters or more realistic characters, resembling the human or animal form more believable?
- How ‘real’ should they be?
Reborn dolls
Aimed to resemble real babies with as much realism as possible

Yotaro baby simulator
Responds to touch, then displays emotions
Geminoid-F & Actroid-F
Actress & hospital worker
Mimics operator actions

Repliee Q2
Mimics blinking, breathing, speaking
Recognises / responds to speech, touch
Uncanny valley

Masahiro Mori 1970
Avoiding the uncanny valley

- Robots need to have a certain amount of “human-ness”
  - so humans feel comfortable in socially engaging the robot

- Robots also need to have a certain amount of “robot-ness”
  - so humans don’t develop unrealistic expectations of the robot’s capabilities
Geminoid DK - Henrik Scharfe

https://www.youtube.com/watch?v=eZILNVmaPbM
Geminoid DK

https://www.youtube.com/watch?v=miQqJlbeLms
Actroids – Hiroshi Ishiguro

https://www.youtube.com/watch?v=DF39Ygp53mQ
Geminoid summit

https://www.youtube.com/watch?v=J71XWkh80nc
Models of emotion

- Lots of different models of emotion imported from other disciplines and developed in interaction design
- Help designers understand people
  - How they react and respond in different contexts
  - How to design for emotions or to try to reduce emotions
- Interaction design model of emotion – Norman 2004
  - Our emotional attachment to and involvement with products is *as important as* how easy these products are to use
  - i.e. if we like the look and feel of a product, we’re likely to have a positive experience with it
Emotional design model

- Ortony, Norman, and Revelle (2005) model of emotion and behavior – 3 levels of brain processes
Emotional design model

- Visceral
  - Automatic rapid response
  - Triggers emotional responses expressed through combo of physiological and behavioral responses
  - e.g. seeing a big snake may elicit fear

- Behavioral
  - Everyday activities, e.g. talking, typing, driving

- Reflective
  - Conscious thought
Claims from model

- Our emotional state changes how we think
  - when frightened or angry we focus on the problem and body responds by tensing muscles and sweating
    - more likely to be less tolerant
  - when happy we are less focused and the body relaxes
    - more likely to overlook minor problems and be more creative
Implications

- Should we create products that adapt according to emotional states?
  - When people are feeling angry should an interface be more attentive and informative than when they are happy?

- Donald Norman says
  - designers “can get away with more” for products intended to be used during leisure time
  - products and interfaces designed for serious tasks need clear and unambiguous feedback, more attention to detail
Technology as Experience

- McCarthy and Wright (2004) – framework of the user experience – how it is ‘felt’ by the user

- Draws from Pragmatism, which focuses on the sense-making aspects of human experience

  - Dewey (1934): “Emotion is the moving and cementing force. [...] It thus provides unity in and through the varied parts of experience.”
Technology as Experience

- Made up of 4 core threads
  - **Compositional**
    - The internal thinking we do during our experiences
  - **Sensual** – similar to visceral
    - Equates with level of absorption with technology
    - Can involve thrill, fear, pain, & comfort
  - **Emotional**
    - How emotions are intertwined with the situation that causes them (e.g., person becomes angry w/ computer because it doesn’t work properly)
  - **Spatio-temporal**
    - The space and time in which our experiences take place and their effect on those experiences
Summary

- Emotional interaction is concerned with how interactive systems make people respond in emotional ways
- Well-designed interfaces can elicit good feelings in users
- Expressive interfaces can provide reassuring feedback
- Badly designed interfaces make people angry and frustrated
- Anthropomorphism is the attribution of human qualities to objects
- An increasingly popular form of anthropomorphism is to create virtual characters and social robots
- Models of affect provide a way of conceptualizing emotional and pleasurable aspects of interaction design