

CSC591: Special Topics: HCI

Cognition and Emotional
interactions

Announcements

- Presentations start next week.
- Critiques are due by email by 4pm next Wednesday
- Site shows your presentation schedule
- CITI training

ASPECTS OF COGNITION

Outline

- What is cognition?
- Why it is important to understand in HCI?
- How cognition has been applied to interaction design?
- What are mental models and how to elicit them?

What is cognition?

- Thinking, remembering, learning, daydreaming, decision-making, seeing, reading, talking, writing...
- Ways of classifying cognition at a higher level:
 - **Experiential vs. reflective** cognition (Norman, 1993)
 - **Fast vs. slow** thinking (Kahneman, 2011)

Which involves fast vs. slow thinking?

- $2 + 2 =$
- $21 \times 29 =$
- What color eyes do you have?
- How many colors are there in the rainbow?
- How many months in the year have 31 days?
- What is the name of the first school you attended?

How can understanding cognition help?

- Provides **knowledge about what users can and cannot** be expected to do
- **Identifies and explains the nature and causes of problems** that users encounter
- Provides theories, modeling tools, guidance, and methods that can lead to the design of better interactive products

Cognitive processes

- Attention
- Perception
- Memory
- Learning
- Reading, speaking and listening
- Problem-solving, planning, reasoning and decision-making



Interdependent
(these
processes
rarely occur in
isolation)

Attention

- **Selecting things on which to concentrate at a point in time from the mass of stimuli around us**
 - Allows us to focus on information that is relevant to what we are doing
- Involves audio and/or visual senses
- Focused and divided attention
 - Enables us to be selective in terms of the mass of competing stimuli, but limits our ability to keep track of all events

Find the price for a double room at the Quality Inn in Pennsylvania

Pennsylvania

Bedford Motel/Hotel: Crinaline Courts
(814) 623-9511 S: \$118 D: \$120

Bedford Motel/Hotel: Holiday Inn
(814) 623-9006 S: \$129 D: \$136

Bedford Motel/Hotel: Midway
(814) 623-8107 S: \$121 D: \$126

Bedford Motel/Hotel: Penn Manor
(814) 623-8177 S: \$119 D: \$125

Bedford Motel/Hotel: Quality Inn
(814) 623-5189 S: \$123 D: \$128

Bedford Motel/Hotel: Terrace
(814) 623-5111 S: \$122 D: \$124

Bradley Motel/Hotel: De Soto
(814) 362-3567 S: \$120 D: \$124

Bradley Motel/Hotel: Holiday House
(814) 362-4511 S: \$122 D: \$125

Bradley Motel/Hotel: Holiday Inn
(814) 362-4501 S: \$132 D: \$140

Breezewood Motel/Hotel: Best Western Plaza
(814) 735-4352 S: \$120 D: \$127

Breezewood Motel/Hotel: Motel 70
(814) 735-4385 S: \$116 D: \$118

Find the price of a double room at the Holiday Inn in Columbia

South Carolina					
City	Motel/Hotel	Area code	Phone	Rates	
				Single	Double
Charleston	Best Western	803	747-0961	\$126	\$130
Charleston	Days Inn	803	881-1000	\$118	\$124
Charleston	Holiday Inn N	803	744-1621	\$136	\$146
Charleston	Holiday Inn SW	803	556-7100	\$133	\$147
Charleston	Howard Johnsons	803	524-4148	\$131	\$136
Charleston	Ramada Inn	803	774-8281	\$133	\$140
Charleston	Sheraton Inn	803	744-2401	\$134	\$142
Columbia	Best Western	803	796-9400	\$129	\$134
Columbia	Carolina Inn	803	799-8200	\$142	\$148
Columbia	Days Inn	803	736-0000	\$123	\$127
Columbia	Holiday Inn NW	803	794-9440	\$132	\$139
Columbia	Howard Johnsons	803	772-7200	\$125	\$127
Columbia	Quality Inn	803	772-0270	\$134	\$141
Columbia	Ramada Inn	803	796-2700	\$136	\$144
Columbia	Vagabond Inn	803	796-6240	\$127	\$130

Both displays have the same density of information (31%)?

Activity

- Tullis (1987) found that the two screens produced quite different results
 - 1st screen: Took an average of 5.5 seconds to search
 - 2nd screen: Took 3.2 seconds to search
- Spacing
 - In the 1st screen, the information is bunched up together, making it hard to search
 - In the 2nd screen, the characters are grouped into vertical categories of information making it easier

Multitasking and attention

- **Is it possible to perform multiple tasks without one or more of them being detrimentally affected?**
- Multitasking can cause people to lose their train of thought, make errors, and need to start over
- Ophir et al. (2009) compared heavy vs light multitaskers
 - Heavy multitaskers were **more prone to being distracted** than those who infrequently multitask
 - Heavy multitaskers **are easily distracted and find it difficult to filter** irrelevant information
 - Have you experienced this yourself?

Multitasking experiment

- Lotteridge et al. (2015) conducted another study involving writing an essay under two conditions:
 - Presenting them relevant information
 - Presenting them irrelevant information
- What do you think happened?
- **Relevant case:** Both heavy and light multitaskers performed relatively similarly
 - Heavy multitaskers were easily distracted but able to put this to good use if the distracting sources were relevant to the task in hand
- **Irrelevant case:** Was found to impact task performance negatively

Multitasking at work

It is increasingly common for workers to multitask

How many of you multitask?

Is it OK to use a phone when driving?



WHY?

No!

- Driving is very demanding
- Drivers are prone to being distracted
- There is a significant chance of causing accidents
- Drivers' **reaction times are longer** to external events when talking on the phone in a car (Caird et al., 2018)
- Drivers using their phones rely more on their expectations about what is likely to happen next as conducting a conversation takes up their attention
- **Response time is slower to unexpected events** (Briggs et al., 2018)
- **Drivers often try to imagine what the other person's face is like– the person to whom they are speaking**
 - Doing so competes with the processing resources needed to enable them to notice and react to what is in front of them

Are hands-free phones safer to use when driving?

Design implications for attention

- **Make information salient when it needs to be attended to at a given stage of a task**
- Use techniques to achieve this:
 - For example, color, ordering, spacing, underlining, sequencing, and animation
- **Avoid cluttering**
- Consider designing different ways to support effective switching and returning to an interface

Perception

- **How information is acquired from the world and transformed** into experiences
- Obvious implication is to design representations that are readily perceivable, for instance:
 - **Text should be legible**
 - **Icons should be easy to distinguish and read**

Activity

- Weller (2004) found people took less time to locate items for information that was grouped
 - Using a border compared with using color contrast
- Some argue that too much white space on web pages is detrimental to search process
 - Makes it hard to find information
- Do you agree?

Find Italian

Black Hills Forest	Peters Landing	Jefferson Farms	Devlin Hall
Cheyenne River	Public Health	Psychophysics	Positions
Social Science	San Bernardino	Political Science	Hubard Hall
South San Jose	Moreno Valley	Game Schedule	Fernadino Beach
Badlands Park	Altamonte Springs	South Addison	Council Bluffs
Juvenile Justice	Peach Tree City	Cherry Hills Village	Classical Lit
Results and Stats	Highland Park	Creative Writing	Sociology
Thousand Oaks	Manchesney Park	Lake Havasu City	Greek
Promotions	Vallecito Mts.	Engineering Bldg	Wallace Hall
North Palermo	Rock Falls	Sports Studies	Concert Tickets
Credit Union	Freeport	Lakewood Village	Public Radio FM
Wilner Hall	Slaughter Beach	Rock Island	Children's Museum
Performing Arts	Rocky Mountains	Deerfield Beach	Writing Center
Italian	Latin	Arlington Hill	Theater Auditions
Coaches	Pleasant Hills	Preview Game	Delaware City
McKees Rocks	Observatory	Richland Hills	Scholarships
Glenwood Springs	Public Affairs	Experts Guide	Hendricksville
Urban Affairs	Heskett Center	Neff Hall	Knights Landing
McLeansboro	Brunswick	Grand Wash Cliffs	Modern Literature
Experimental Links	East Millinocket	Indian Well Valley	Studio Arts
Graduation	Women's Studies	Online Courses	Hughes Complex
Emory Lindquist	Vacant	Lindquist Hall	Cumberland Flats
Clinton Hall	News Theatre	Fisk Hall	Central Village
San Luis Obispo	Candlewood Isle	Los Padres Forest	Hoffman Estates

Raise your hand as soon you see the term Italian

Find French

Webmaster
Russian
Athletics
Go Shockers
Degree Options
Newsletter

Curriculum
Emergency (EMS)
Statistics
Award Documents
Language Center
Future Shockers

Student Life
Accountancy
McKnight Center
Council of Women
Commute
Small Business

Dance
Gerontology
Marketing
College Bylaws
Why Wichita?
Tickets

Geology
Manufacturing
Management
UCATS
Alumni News
Saso

Intercollegiate
Bowling
Wichita Gateway
Transfer Day
Job Openings
Live Radio

Thinker & Movers
Alumni
Foundations
Corbin Center
Jardine Hall
Hugo Wall School

Career Services
Doers & Shockers
Core Values
Grace Wilkie Hall
Strategic Plan
Medical Tech

Educational Map
Physical Plant
Graphic Design
Non Credit Class
Media Relations
Advertising

Beta Alpha Psi
Liberal Arts
Counseling
Biological Science
Duerksen Fine Art
EMT Program

Staff
Aerospace
Choral Dept.
Alberg Hall
French
Spanish

Softball, Men's
McKinley Hall
Email
Dental Hygiene
Tenure
Personnel Policies

English
Graduate Complex
Music Education
Advising Center
Medical School
Levitt Arena

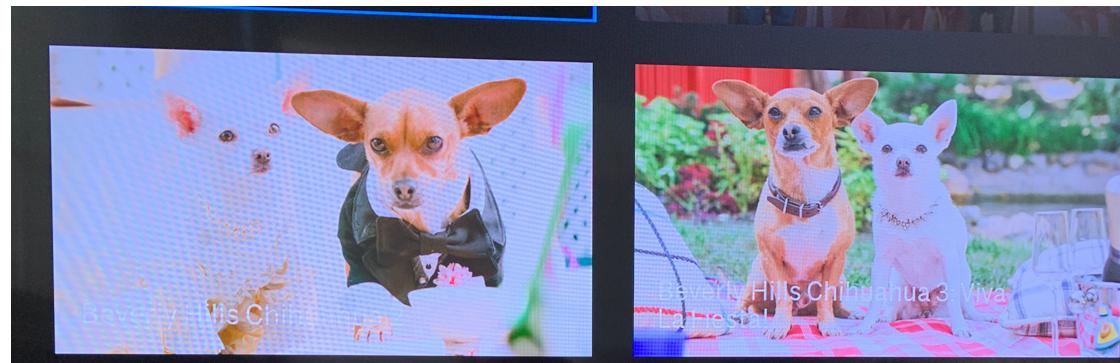
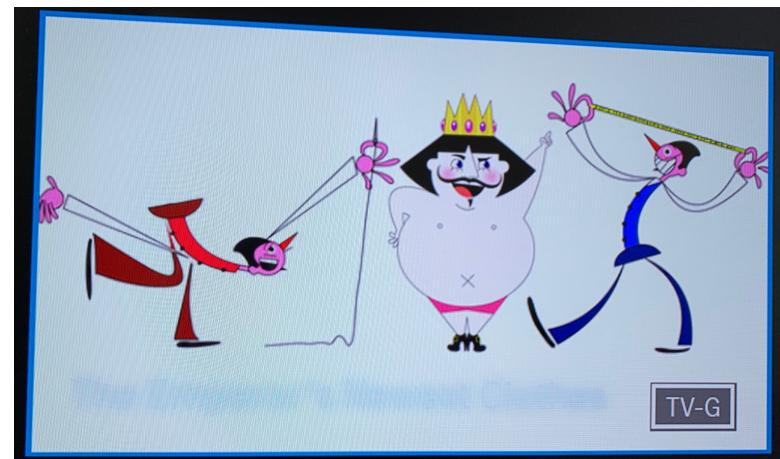
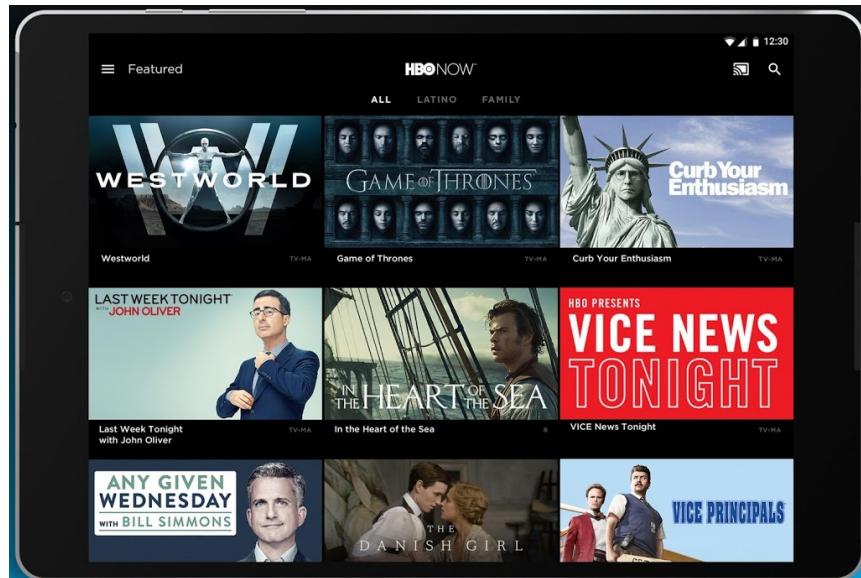
Religion
Art Composition
Physics
Entrepreneurship
Koch Arena
Roster

Parents
Wrestling
Philosophy
Wichita Lyceum
Fairmount Center
Women's Museum

Instrumental
Nursing
Opera
Sports History
Athletic Dept.
Health Plan

Raise your hand as soon as you see the term French

HBO “Now” and “Then”



Design implications for perception

- Icons should enable users to *distinguish* their meaning readily
- Bordering and spacing are effective visual ways of grouping information
- Sounds should be audible and distinguishable
- Haptic feedback should be used judiciously

Memory

- **Involves recalling** various kinds of **knowledge** that allow people to act appropriately
 - For example, recognizing someone's face or remembering someone's name
 - First encode and then retrieve knowledge
- We don't remember everything—it involves filtering and processing what is attended to
 - **Context is important** as to how we remember (that is, where, when, how, and so on)
- **We recognize things much better than being able to recall things**
 - We remember less about objects that we have photographed than when we observe them with the naked eye (Henkel, 2014)

Processing in memory

- Encoding is first stage of memory
 - Determines which information is attended to in the environment and how it is interpreted
- The more attention paid to something...
- The more it is processed in terms of thinking about it and comparing it with other knowledge...
- The more likely it is to be remembered

Activity

- Try to remember the dates of your friends' birthday
 - Try to remember the cover of the last two books you read
 - Which was easiest? Why?
-
- **People are very good at remembering visual cues about things**
 - For instance, the color of items, the location of objects and marks on an object
 - They find it more **difficult to learn and remember arbitrary material**
 - For example, birthdays and phone numbers

Recognition versus recall

- Command-based interfaces require users to recall from memory a name from a possible set of 100s of names
- Graphical interfaces provide visually-based options (menus, icons) that users need only browse through until they recognize one
- Web browsers provide tabs and history lists of visited URLs that support recognition memory

The problem with the classic '7,+ or - 2'

- George Miller's (1956) theory of how much information people can remember
- People's immediate memory capacity is very limited to 7, + or - 2
- Has been applied in interaction design when considering how many options to display

When creating an interface, should the designer...

- Present only 7 options on a menu?
- Display only 7 icons on a tool bar?
- Have no more than 7 bullets in a list?
- Place only 7 items on a pull down menu?
- Place only 7 tabs on the top of a website page?



Good idea?

Probably Not! Because...

- People can scan lists of bullets, tabs, and menu items for the one they want
- They don't have to recall them from memory, having only briefly heard or seen them
- So you can have more than nine at the interface
 - For instance, history lists of websites visited

Are there any situation where memory not required by still menus are short?

Sometimes show ‘less’ for different reasons

- Sometimes a small number of items is good
 - For example, smart watch displays
- Depends on task and available screen estate
- It is still not about remembering things.
- But on small interfaces, scanning can be tedious.
Hence small menus.

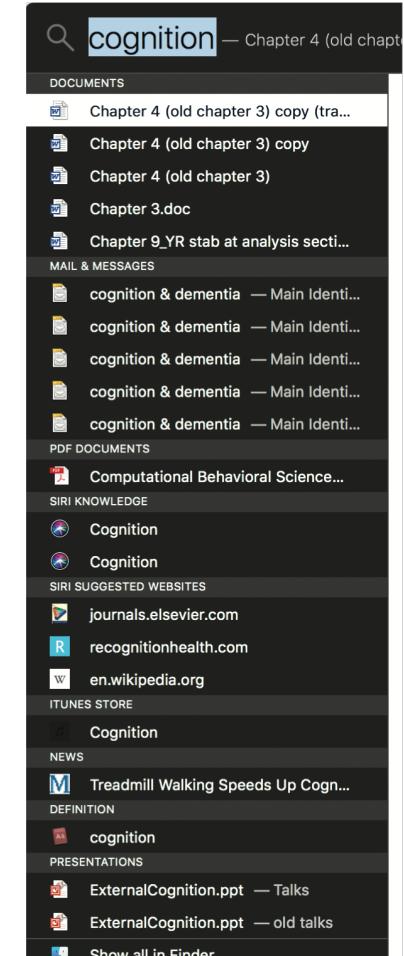
Personal Information management

Is a growing problem for many users:

- They accumulate a vast numbers of documents, images, music files, video clips, emails, attachments, bookmarks, and so forth
- Where and how to save them all; then remembering what they were called and where to find them again?
- How might such a process be facilitated taking into account people's memory abilities?

Personal Information management

- Bergman and Whittaker, (2016) study found:
 - Most common approach is to use folders and naming
 - Strong preference for scanning across and within folders when looking for something
 - Search engines only helpful if you know the name of the file
 - Smart search engines help with listing relevant files for partial name or when type in first letter



Apple Spotlight Tool

Design implications for memory

- **Reduce cognitive load** by avoiding long and complicated procedures for carrying out tasks
- Design interfaces that **promote recognition rather than recall**
- **Provide users with various ways of labelling digital information** to help them easily identify it again
 - For example, folders, categories, color, flagging, and time stamping

Learning

- **Involves the accumulation of skills and knowledge involving memory**
- Two main types:
 - **Incidental learning** (for example, recognizing people's faces, what you did today)
 - **Intentional learning** (for instance, studying for an exam, learning to cook)
- Intentional learning is much harder!
 - Many technologies have been developed to help (for example, multimedia, animations, VR)
- People find it hard to learn by following instructions in a manual
- **People prefer to learn by doing**

Design implications for learning

- Design interfaces that **encourage exploration**
- Design interfaces that **constrain and guide learners**
- Dynamically linking concepts and representations can facilitate the learning of complex material

Reading, speaking, and listening (RSL)

The ease with which people can read, listen, or speak differs:

- Many prefer listening to reading
- Reading can be quicker than speaking or listening. Do you agree?
- **Listening requires less cognitive effort** than reading or speaking
 - Audiobooks/Podcasts have become so popular
- Dyslexics have difficulties understanding and recognizing written words

Design implications for RSL

- Speech-based menus and instructions should be short
 - Remembering stuff one listens to is not easy.
- Accentuate the intonation of artificially generated speech voices
 - They are harder to understand than human voices
- Provide opportunities for making text large on a screen

Problem-solving, planning, reasoning, and decision-making

- All these processes **involve reflective cognition**
 - For example, thinking about what to do, what the options are, and the consequences
- Often **involves conscious processes**,
 - discussion with others (or oneself),
 - and the use of artifacts such as maps, books, pen and paper
 - Weighing up alternatives

Design implications

- Provide information and help pages that are easy to access for people who wish to understand more about how to carry out an activity more effectively (for example, web searching)
- Use simple and memorable functions to support rapid decision-making and planning

Dilemma

- The app mentality is making it worse for people to make their own decisions because they are becoming risk averse (Gardner and Davis, 2013)
 - Instead, they now rely on a multitude of apps
 - This makes them increasingly anxious
 - They are unable to make decisions by themselves
 - They need to resort to looking up info, getting other's opinions on social media, and comparing notes
- Do you agree?
- Did it happen to you when deciding which university/school to attend?

Mental models

- Using all the cognitive processes we talked about (properly or otherwise) people develop an understanding of a (any) “system”
 - System can be anything --- from an umbrella to a Fitbit
- **Knowledge is sometimes described as a mental model:**
 - How to use the system (what to do next)
 - What to do with unfamiliar systems or unexpected situations (how the system works)
- People make inferences using mental models of how to carry out tasks

More on mental models

- Craik (1943) described mental models as:
 - Internal constructions of some aspect of the external world **enabling predictions** to be made
- Involves unconscious and conscious processes
 - Imagery and analogies are activated
- **Deep vs. shallow** models
 - For example, how to drive a car and how it works

Your mental model

You arrive home on a cold winter's night to a cold house. How do you get the house to warm up as quickly as possible? Set the thermostat to be at its highest or to the desired temperature?

Heating up a room or oven that is thermostat-controlled

- Many people when asked choose the first option
- Why?
 - They think it will heat the room up quicker
 - **General valve theory**, where ‘more is more’ principle is generalized to different settings (for instance, gas pedal, gas cooker, tap, radio volume)
 - **But it is a wrong mental model for thermostats based on on-off switch model**
- Most of us have erroneous mental models (Kempton, 1996)

Erroneous mental models

- Lots of people hit the button for elevators and pedestrian crossings at least twice. Why?
- What kinds of mental models do users have for understanding how interactive devices work
 - Poor, often incomplete, easily confusable, based on inappropriate analogies and superstition (Norman, 1983)

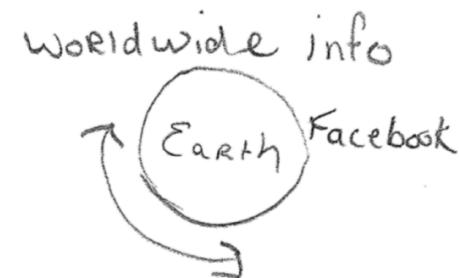


Figure 6. A depiction of where his information goes online (C04)

"I think it goes everywhere. Information just goes, we'll say like the earth. I think everybody has access."

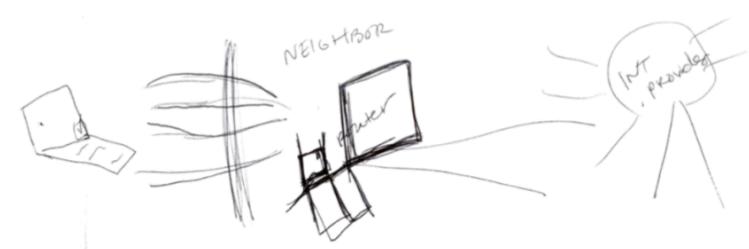


Figure 4. Drawing of how she uses neighbor's Wi-Fi (N05)

Ruogu Kang, Laura Dabbish, Nathaniel Fruchter, and Sara Kiesler. 2015. "My data just goes everywhere": user mental models of the internet and implications for privacy and security. In *Proceedings of the Eleventh USENIX Conference on Usable Privacy and Security (SOUPS '15)*. USENIX Association, USA, 39–52.

UX be designed to help people build better mental models

- **Clear and easy to use instructions**
 - Appropriate tutorials and contextual sensitive guidance
- **Provide** online videos and chatbot windows when needing **help**
- **Transparency** to make interfaces intuitive to use
- **Affordances** of what actions an interface allows
 - For example, swiping, clicking, or selecting

ASPECTS OF EMOTIONAL INTERACTION

Overview

- Emotions and the user experience
- Expressive and emotional design
 - How the ‘appearance’ of an interface can affect users
- Affective computing and emotional AI
- Persuasive technologies and behavioral change
- Anthropomorphism
 - The pros and cons

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
 - For example, to be happy, to be trusting, to learn, or 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
- Why people become emotionally attached to certain products (for instance, virtual pets)?
- Can social robots help reduce loneliness and improve well-being?
- How to change human behavior through the use of emotive feedback?

Why has this simple way of obtaining visitor feedback been so effective?



Why does this work?

CRISIS

Homepage | Get involved | Reserve a place at Crisis at Christmas

DONATE

Will you help someone take their first step out of homelessness today?



1 place **2 places** **5 places** **10 places**
20 places **50 places** **100 places**

£28.18

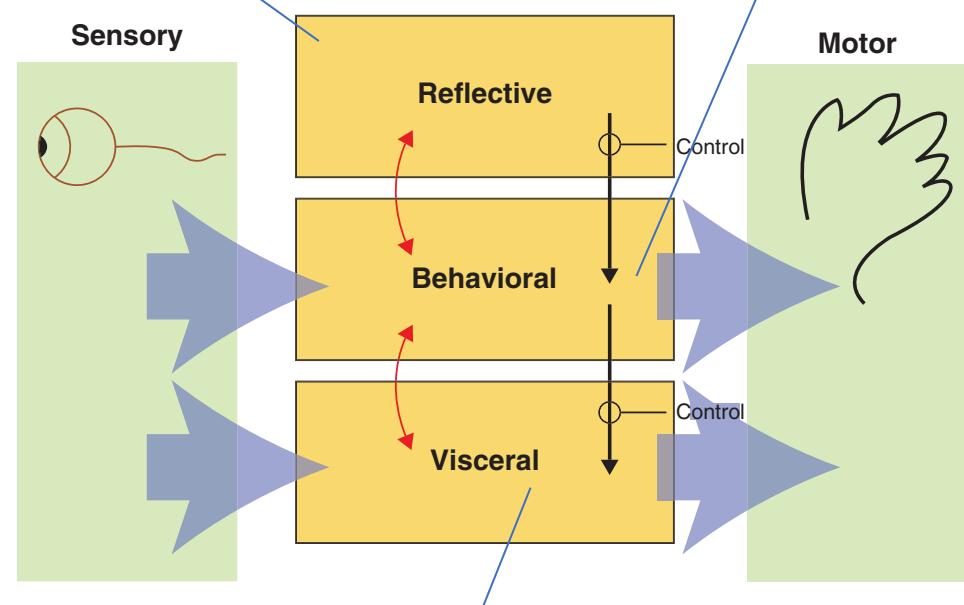
[Donate £28.18 now](#) Or Number of places [Donate](#)

Automatic (affect) versus conscious emotions

- Emotions can be short-lived (for instance, a fit of anger) or complex and long-lasting (for example, jealousy)
- Emotions have been categorized as automatic or conscious:
 - Automatic ones are rapid and dissipate quickly
 - Conscious ones develop slowly and take a long time to go (for instance, reflection)

Ortony et al. (2005) model of emotional design

- Our emotional state changes how we think
 - When frightened or angry, we focus narrowly, and our bodies respond by tensing muscles and sweating
 - More likely to be less tolerant
 - When happy, we are less focused, and our bodies relax
 - We are more likely to overlook minor problems and be more creative
- Entails conscious thought
- Counter-factual thinking
- Etc.
- Behavioral responses (in some ways the most human) is where well learned, routine actions occur (speaking, talking, walking)



- Responds rapidly, making judgements about good/bad, safe/dangerous etc.
- It triggers emotional response to stimuli --- fear, anger, joy, sadness
- These are expressed through physiological/behavioral responses

Analyzing a swatch watch design using the model



What do you think about this watch w.r.t. the Ortony et al.'s model ?

- Cultural images and graphical elements designed at the reflective level
- Affordances of use at the behavioral level
- Brilliant colors and wild design attract user's attention at the visceral level



Expressive interfaces

- **Provide reassuring feedback** that can be both informative and fun
 - Can also be intrusive, however, causing people to become 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
- In turn, this can affect the usability of an interface
 - **People are prepared to put up with certain aspects of an interface** (for instance, slow download rate) **if the result is appealing** and aesthetic



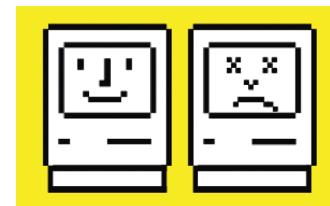
The appearance of an interface

(a) Emotional icons were used in the 1980s to indicate rebooting or crashed computer

- Smiling apple face

(b) Nowadays, computers use more impersonal but aesthetically-pleasing icons to indicate that the user needs to wait

- Beachball



(a)



(b)

The design of thermostats

(a) The Nest thermostat has a minimalist and aesthetically-pleasing design

- Round face and simple dial
- Large font and numbers



(a)

(b) It is very different from earlier thermostat designs

- Utilitarian and dull



(b)

Annoying interfaces

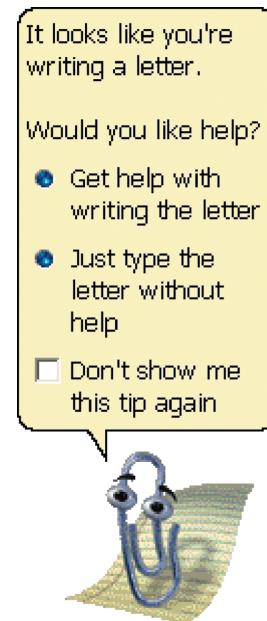
- Microsoft pioneered friendly interfaces for **technophobes**
 - For example, ‘At Home with Bob’ software
 - 3D metaphors based on familiar places (for instance, living rooms)
- Agents in the guise of pets (such as a bunny or dog) were included to talk to the user
 - **Made users feel more at ease and comfortable**



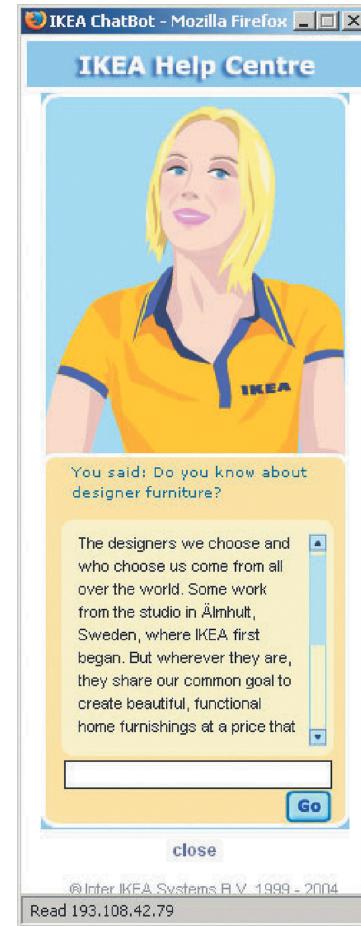
But many people did not like the idea of Bob, so it never made it as a product. Why?

Microsoft's Clippy and IKEA's Anna

- Clippy was a product...
 - But was disliked by so many?
- Anna appeared as a virtual agent
 - Blinked, moved her lips and head to suggest facial expressions



(a)



(b)

Frustrating interfaces

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 that a mistake was made earlier and that they need to start all over again

Error messages

“The application Word Wonder has unexpectedly quit due to a type 2 error.”

Why not instead?

“The application has expectedly quit due to poor coding in the operating system”

Shneiderman's classic guidelines for error messages include:

- Avoid using terms like FATAL, INVALID, or BAD
- Audio warnings
- Avoid UPPERCASE and long code numbers
- Messages should be precise rather than vague
- Provide context-sensitive help

A friendly cute image instead of the impersonal 404 error message



Dilemma: Should computers say they're sorry?

- Reeves and Naas (1996) argue that computers should be made to apologize
- Should emulate human etiquette
- Would users be as forgiving of computers saying they're sorry as people are of each other when saying they're 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”

Affective Computing and Emotional AI

- *Affective computing is concerned with how to use computers to recognize and express emotions as humans do* (Picard, 1998)
- It involves designing ways for people to communicate their emotional state
 - It uses sensing technologies to measure GSR, facial expressions, gestures, and body movement
 - Explores how affect influences personal health
- *Emotional AI aims to automate the measurement of feelings and behavior using AI* to infer them from facial expressions and voice
 - The goal is to predict user's emotions and aspects of their behavior
 - For example, what is someone most likely to buy online when feeling sad, bored, or happy

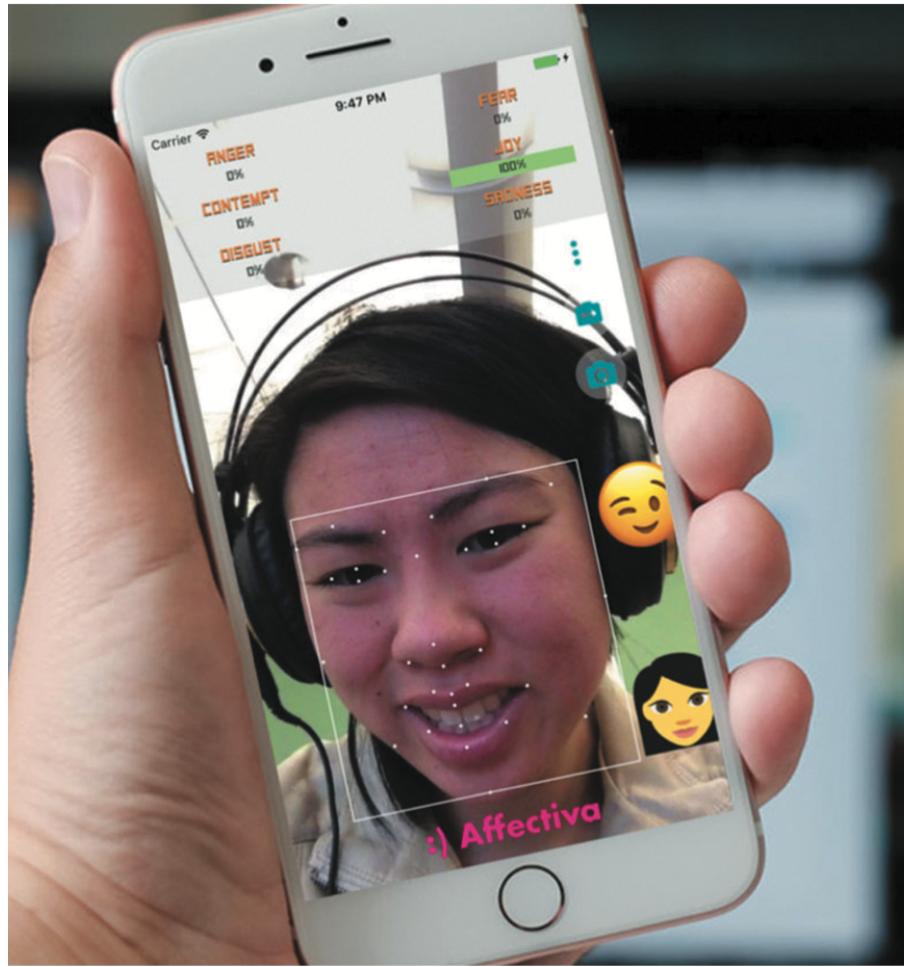
Techniques used

- Cameras for measuring facial expressions
- Biosensors placed on fingers or palms to measure GSR
- Affective expression in speech (for example, intonation, pitch, and loudness)
- Body movement and gestures using accelerometers and motion capture systems

Classification of emotions

- Six core expressions typically measured:
 - Sadness, disgust, fear, anger, contempt, and joy
- Type of facial expression chosen by AI through detecting presence of absence of:
 - Smiling, eye widening, brow raising, brow furrowing, raising a cheek, mouth opening, upper-lip raising, and wrinkling of the nose

Facial coding using Affdex software



<https://apps.apple.com/us/app/affdexme/id971529011>

How is this emotional data used?

- If user “*makes a face*” when an ad pops up
Feel disgust
- If user starts smiling
They are feeling happy
- Website can adapt its ad, movie storyline, or content to match user’s emotional state
- If system used in a car, it might detect an angry driver and suggest they take a deep breath
- Eye-tracking, finger pulse, speech, and words/phrases also analyzed when tweeting or posting to Facebook

Indirect emotion detection

- Also used more to infer or predict someone's behavior
 - For instance, determining a person's suitability for a job or how they will vote in an election
- **Do you think it is ethical that technology can read your emotions from your facial expressions or from your tweets?**

Persuasive technologies and behavioral change

- Interactive computing systems designed to change people's attitudes and behaviors (Fogg, 2003)
- A diversity of techniques now used to change what they do or think
 - Pop-up ads, warning messages, reminders, prompts, personalized messages, recommendations, or Amazon 1-click
 - Commonly referred to as *nudging*

Nintendo's Pocket Pikachu

Developed **to change bad habits** and improve well being

- Designed to **motivate children** to be more physically active on a regular basis
- Owner of the digital pet that 'lives' in the device is required to walk, run, or jump
- If owner does not exercise, the virtual pet becomes angry and refuses to play anymore

How effective?

- How does looking after a virtual pet change a child's behavior?
 - Emotional attachment
 - Happy Pokemon makes them feel good
 - Sulking Pokemon makes them feel bad
- **Anyone see down-sides here?**



Tracking devices

- Mobile apps designed to help people monitor and change their behavior (for instance, fitness, sleeping, or weight)
- **Can compare with online leader boards** and charts to show how they have done in relation to their peers and friends
- Also apps that encourage reflection, which in turn increase well-being and happiness

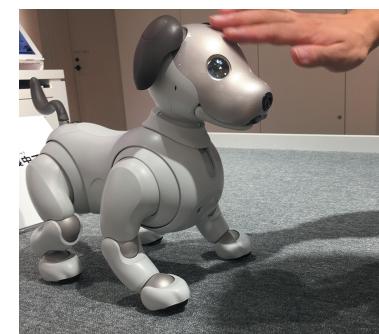
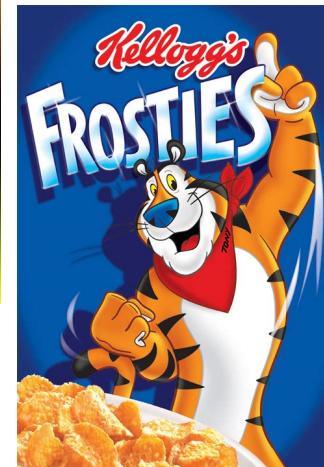
The Tidy Street project

- Large-scale visualization of the street's electricity usage
 - Stenciled display on the road surface using chalk
 - Provided real-time feedback that all could see change each day
 - Reduced electricity consumption by 15 percent
- (Bird and Rogers, 2010)



Anthropomorphism

- Attributing human-like qualities to inanimate objects (for instance cars or computers)
- Well known phenomenon in advertising
 - Dancing butter, drinks, and breakfast cereals
- Much exploited in human-computer interaction
 - Make user experience enjoyable and motivating
 - Make people feel at ease by reducing anxiety
- **Furnishing technologies with personalities can make them enjoyable to interact with**



Aibo

The Haptic Creature

Which message you prefer?

As a welcome message:

- “*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.*”

Which do you prefer?

Feedback when user gets something wrong:

1. “Now Chris, that’s not right. You can do better than that. Try again.”
2. “Incorrect. Try again.”

Is there a difference as to what you prefer depending on type of message? Why?

Evidence to support anthropomorphism

- Reeves and Naas (1996) found that computers that flatter and praise users in educational software programs result in:

Positive impact on users

“Your question makes an important and useful distinction. Great job!”

- Students were more willing to continue with exercises with this kind of feedback

Summary

- **Emotional aspects of interaction design are concerned with how to facilitate certain states** (for example, pleasure) or avoid reactions (for instance, frustration)
- **Well-designed interfaces can elicit good feelings** in people
 - Aesthetically-pleasing interfaces can be a pleasure to use
 - Badly designed interfaces make people frustrated, annoyed, or angry
- **Emotional AI and affective computing use AI and sensor technology for detecting people's emotions** by analyzing their facial expressions and conversations
 - Emotional technologies can be designed to persuade people to change their behaviors
- **Anthropomorphism** is the attribution of human qualities to objects
 - Increasingly, robots are being used as companions in the home
 - Is used to make technologies likeable and relatable to users