

# Understanding Interactions

## Unit 6



# Learning outcomes

- Understand how to progress in the initial phase of a design
  - Problem space
  - Conceptual model

# Recap

- HCI has moved beyond designing interfaces for desktop machines
- New interaction contexts open new challenges to the user (cognitive limitations)
- Facilitate user experiences through designing interactions
  - Make work effective, efficient and safer
  - Improve and enhance learning and training
  - Provide enjoyable and exciting entertainment
  - Enhance communication and understanding
  - Support new forms of creativity and expression

# Understanding the problem space

- What do you want to create?
- What are your assumptions?
- Will your design achieve what you hope?

## A framework for analysing the problem space

- Are there problems with an existing product?
- Why do you think there are problems?
- Why do you think your proposed ideas might be useful?
- How would you see people using it with their current way of doing things?
- How will it support people in their activities?
- Will it really help them?

# From problem space to design space

- A good understanding of the problem space can inform what kind of interface and functionality to provide
  - PACT analysis UNIT 1
  - Requirement analysis
- But before deciding upon these, it is important to develop a conceptual model of the envisaged system

# Conceptual model

- A conceptual model is a high level description of:
  - “the proposed system in terms of a set of integrated ideas and concepts about what it should do, behave and look like, that will be understandable by the users in the manner intended”
- Think about how the system will appear to users (i.e. how they will understand it)

# First steps in formulating a conceptual model

- What will the users be doing when carrying out their tasks?
- How will the system support these actions?
- What kind of interface metaphor, if any, will be appropriate?
- What kinds of interaction modes and styles to use?

Always keep in mind when making design decisions how the user will understand the underlying conceptual model



# Interaction modes

- “Tell” the system to do something
    - Delegation mode
    - Issue instruction
  - “Do” something on the system
    - Control mode
    - Acting
  - “Exploring” the system
    - Navigation mode
    - Browsing
-

## Conceptual models based on interaction modes

- Giving instructions
  - issuing commands using keyboard and function keys and selecting options via menus
- Conversing
  - interacting with the system as if having a conversation
- Manipulating
  - interacting with virtual objects
- Exploring and browsing
  - finding out and learning things

# 1. Giving instructions

- Where users instruct the system about what to do
  - e.g. copy, print, save a file
- Very common conceptual model, underlying a diversity of devices and systems
  - e.g. CAD, word processors, VCRs, vending machines
- Instructing supports quick and efficient interaction
  - good for repetitive kinds of actions performed on multiple objects

## 2. Conversing

- Underlying model of having a conversation with another human
- Range from simple voice recognition menu-driven systems to more complex 'natural language' dialogues
- Examples range from some form of search engines, advice-giving systems, help systems
- Recently, much interest in embodied conversational agents

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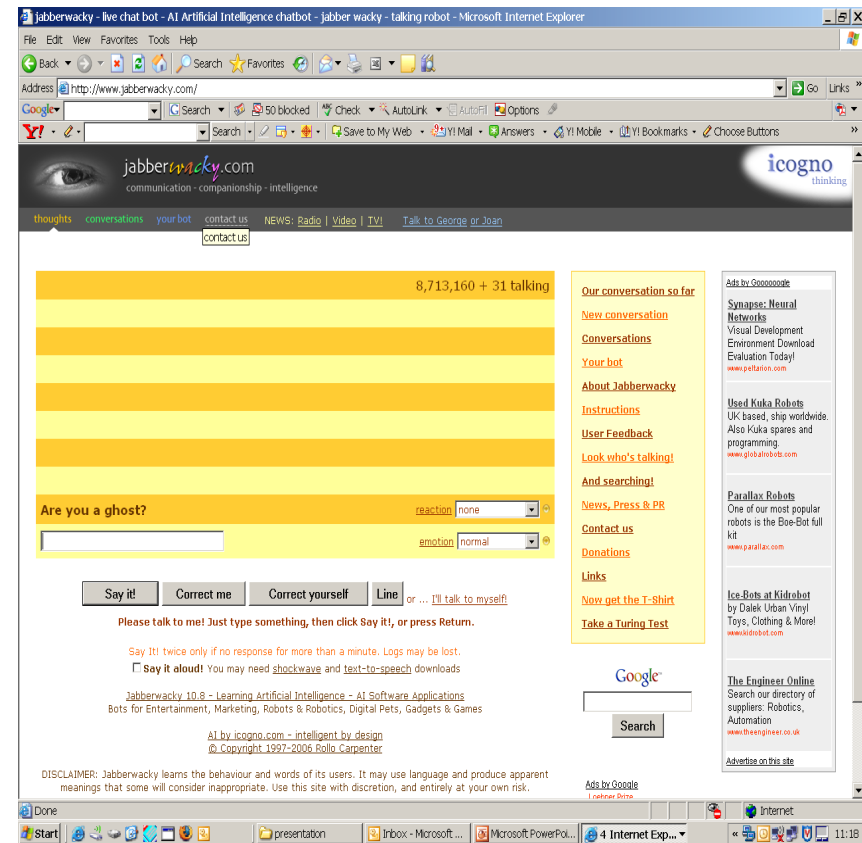
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# Example 2

- Jabberwacky
- Virtual companion
- Winner 2005 & 2006 Loebner prize



# Pros and cons

- Allows users, especially novices and people with negative attitudes, to interact with the system in a way that is familiar
  - makes them feel comfortable, at ease and less scared
- Misunderstandings can arise when the system does not know how to parse what the user says
  - People may have unrealistic expectations
  - Dis-inhibited behaviour

# 3. Manipulating

- Involves dragging, selecting, opening, closing and zooming actions on virtual objects
- Exploit's users' knowledge of how they move in and manipulate the physical world
- Direct manipulation (DM)
  - Continuous representation of objects and actions of interest
  - Physical actions and button pressing instead of issuing commands with complex syntax
  - Rapid reversible actions with immediate feedback
  - What you see is what you get (WYSIWYG)



- **XXXX**

# DM interfaces

- **Advantages**

- Easy to learn (new users)
- Efficient (experienced users)
- Easy to remember (intermittent users)
- Users can immediately see the results of their actions
- Users feel in control

- **Disadvantages**

- Not all tasks can be described by objects and not all actions can be done directly
- Some tasks are better achieved through delegating
  - e.g. spell checking
- Moving a mouse around the screen can be slower/more difficult than pressing function keys to do same actions

## 4. Exploring and browsing

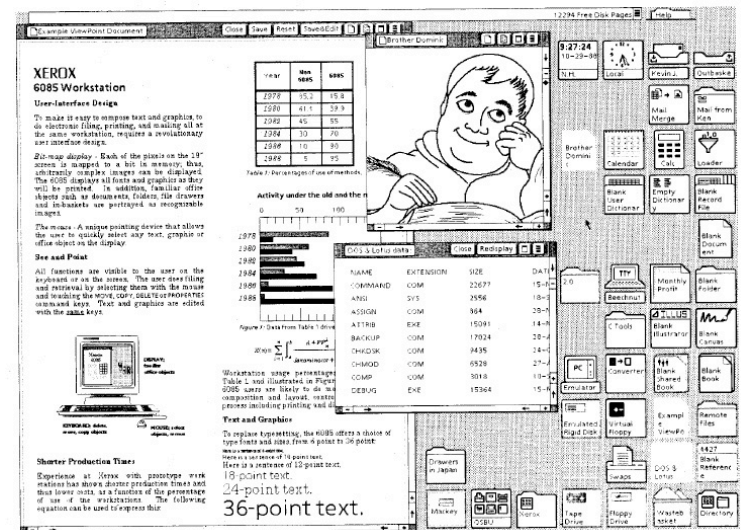
- Similar to how people browse information with existing media (e.g. newspapers, magazines, libraries, pamphlets)
- Information is structured to allow flexibility and the user is able to search for information
  - e.g. multimedia, web

# Which conceptual model is best?

- Direct manipulation is good for 'doing' types of tasks, e.g. designing, drawing, playing (flying, driving), sizing windows
- Issuing instructions is good for repetitive tasks, e.g. spell-checking, file management
- Having a conversation is good for children, computer-phobic, disabled users and specialised applications (e.g. phone services) or for FUN
- Hybrid conceptual models are often employed, where different ways of carrying out the same actions is supported at the interface - but can take longer to learn

# Conceptual models based on analogies

- Usually based on an analogy with something in the physical world
- Examples include books, tools, vehicles
- Classic: Star Interface based on office objects



# Interface metaphors

- Interface designed to be similar to a physical entity
  - It also has own properties
  - e.g. desktop metaphor, web portals
- Exploit user's familiar knowledge, helping them to understand 'the unfamiliar'
- Conjures up the essence of the unfamiliar activity, enabling users to understand more aspects of the unfamiliar functionality



# Tabs





# Benefits of interface metaphors

- Makes learning new systems easier
- Helps users understand the underlying conceptual model
- Can be very innovative and enable the realm of computers and their applications to be made more accessible to a greater diversity of users

# Problems with interface metaphors

- Break conventional and cultural rules
  - e.g. recycle bin placed on desktop
- Can constrain designers in the way they conceptualize a problem space
- Conflict with design principles
- Forces users to only understand the system in terms of the metaphor
- Designers can inadvertently use bad existing designs and transfer the bad parts over
- Limits designers' imagination in coming up with new conceptual models

# Example

- <http://www.leoburnett.ca/>

# From interaction modes to styles

- Interaction modes:
  - what the user is doing when interacting with a system, e.g. instructing, talking, browsing or other
- Interaction styles:
  - the kind of interface used to support the mode, e.g. speech, menu-based, gesture

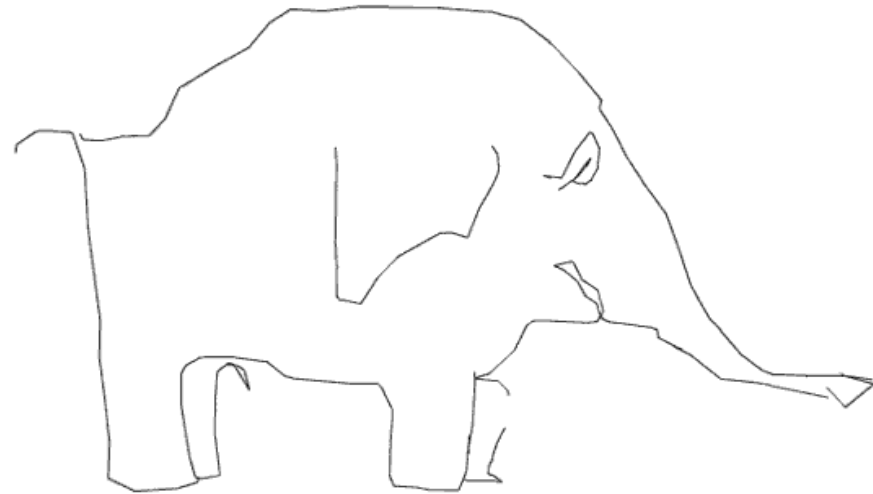
# Interface types ...

- Command
- Speech
- Data-entry
- Form fill-in
- Query
- Graphical
- Web
- Pen
- Augmented reality
- Gesture and even...

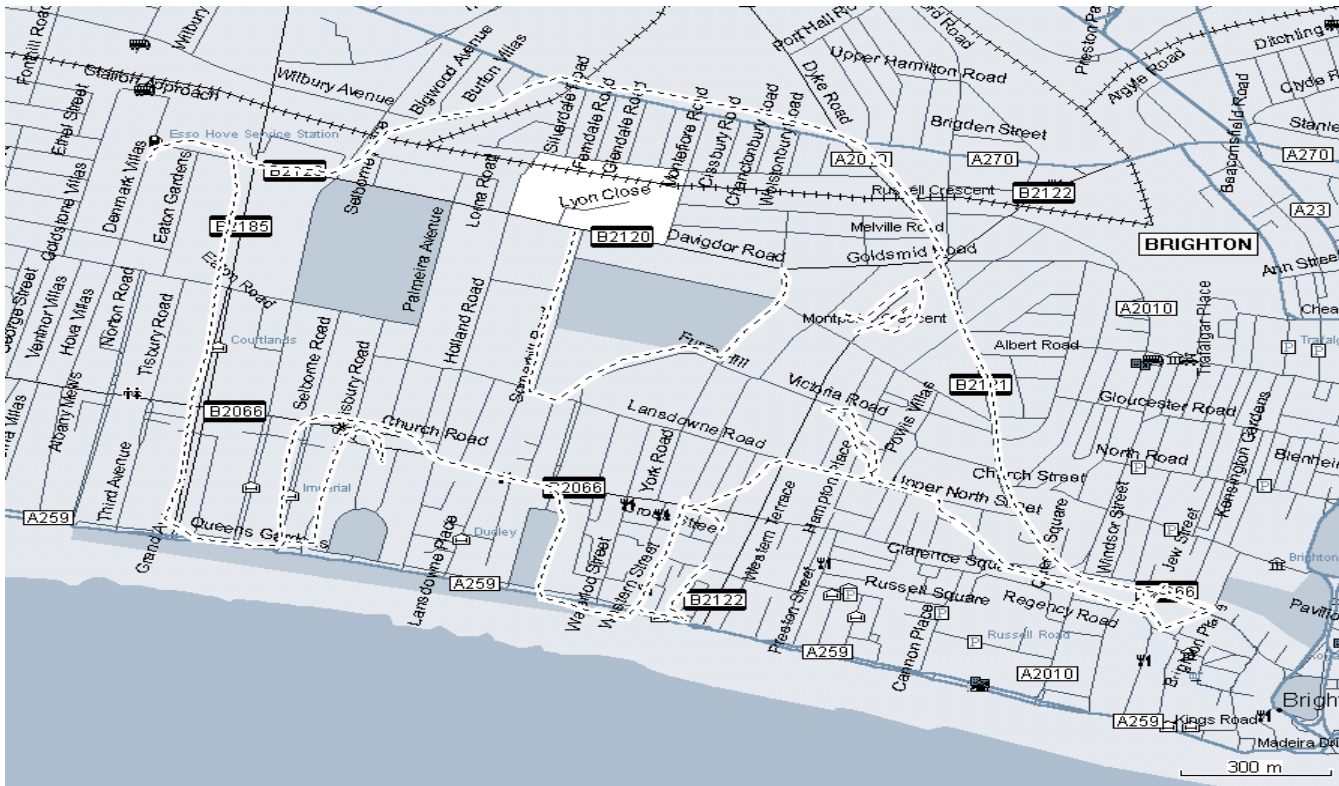


# GPRS enabled cell phone...

- Drawing an elephant by walking round the streets of a city (or other mode of transport) and entering data points along the way via the cell phone
- Example: Brighton and Hove(UK) by J. Wood by foot, track length 11.2km (see [www.gpsdrawing.com](http://www.gpsdrawing.com) for more examples)



# Walking in a city



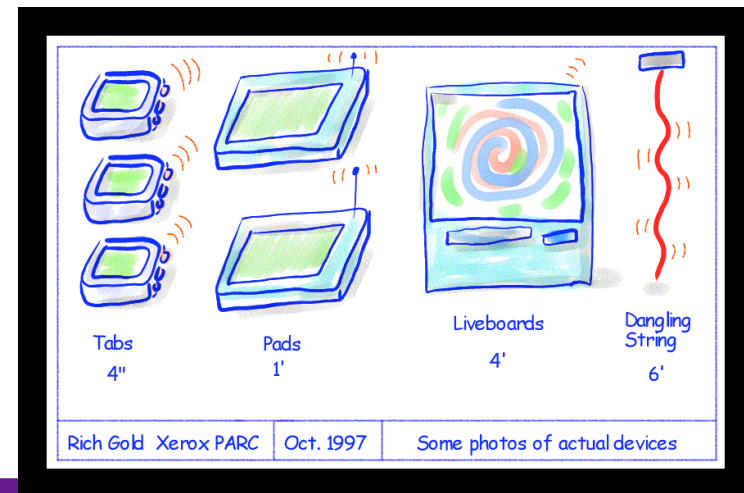
# Which interaction style to choose?

- Need to determine requirements and user needs
- Take the budget and other constraints into account
- Also will depend on suitability of technology for activity being supported



# Interaction paradigms

- Another form of inspiration for conceptual models
- From the desktop to ubiquitous computing (embedded in the environment)



# Examples of new paradigms

- Ubiquitous computing (mother of them all)
- Pervasive computing
- Wearable computing
- Tangible bits, augmented reality
- Attentive environments
- Transparent computing
  - and many more....

# Summary points

- Important to have a good understanding of the problem space
  - Fundamental aspect of interaction design is to develop a conceptual model
  - Interaction modes and interface metaphors provide a structure for thinking about which kind of conceptual model to develop
  - Interaction styles are specific kinds of interfaces that are instantiated as part of the conceptual model
  - Interaction paradigms can also be used to inform the design of the conceptual model
  - Chapter 2
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