The Interaction

- notion of interaction
- interaction frameworks
- ergonomics
- interaction styles
- context of interaction
Interaction Frameworks

Interaction:

communication between the user and the system

Why have a framework?

• allows contextualisation
• presents a global view
Interaction Frameworks - 2

Donald Norman’s Interaction framework
- user establishes the goal
- formulates intention
- specifies actions at interface
- executes action
- perceives system state
- interprets system state
- evaluates system state with respect to goal

Norman’s model concentrates on user’s view of the interface
Some systems are harder to use than others

**Gulf of Execution**

user’s formulation of actions

\[ \neq \] actions allowed by the system

**Gulf of Evaluation**

user’s expectation of changed system state

\[ \neq \] actual presentation of this state
extended by Abowd and Beale: their interaction framework has 4 parts

- user
- input
- system
- output

each has its own unique language

interaction ⇒ translation between languages

problems in interaction = problems in translation
Interaction Frameworks - 5

user intentions translated into actions at the interface
→ translated into alterations of system state
→ reflected in the output display
→ interpreted by the user

general framework for understanding interaction

• not restricted to electronic computer systems
• identifies all major components involved in interaction
• allows comparative assessment of systems
• an abstraction
Ergonomics

Study of the physical characteristics of interaction

Also known as *human factors*.

Ergonomics good at defining standards and guidelines for constraining the way we design certain aspects of systems.
Ergonomics - examples

• arrangement of controls and displays
  e.g. controls grouped according to function
  or frequency of use, or sequentially

• surrounding environment
  e.g. seating arrangements adaptable to cope with all sizes of user

• health issues
  e.g. physical position, lighting, noise,
  environmental conditions (temperature, humidity

• use of colour
  e.g. use of red for warning, green for okay,
  awareness of colour-blindness etc.
Interaction styles

Interaction: dialogue between computer and user

Some applications have very distinct styles of interaction.

We can identify some common styles

- command line interface
- menus
- natural language
- question/answer and query dialogue
- form-fills and spreadsheets
- WIMP
Command line interface

Way of expressing instructions to the computer directly.
function keys, single characters,
short abbreviations, whole words, or a combination

• suitable for repetitive tasks
• better for expert users than novices
• offers direct access to system functionality
• command names/abbreviations should be meaningful

Typical example: the Unix system
Menus

Set of options displayed on the screen

Options visible
  – less recall - easier to use
  – rely on recognition so names should be meaningful

Selected by using mouse, numeric or alphabetic keys

Often options hierarchically grouped: sensible grouping is needed

Menu systems can be
  • purely text based, with options presented as numbered choices
  • graphical selected by arrow keys
  • graphical selected by mouse
  • combination (e.g. mouse plus accelerators)

Restricted form of full WIMP system
Natural language

Familiar to user

Use speech recognition or typed natural language

Problems
  • vague
  • ambiguous
  • hard to do well!

Solutions
  • try to understand a subset
  • pick on key words
Query interfaces

Question/answer interfaces
- user led through interaction via series of questions
- suitable for novice users but restricted functionality
- often used in information systems

Query languages (e.g. SQL)
- used to retrieve information from database
- requires understanding of database structure and language syntax, hence requires some expertise
Form-fills

Primarily for data entry or data retrieval

Screen like paper form.

Data put in relevant place.

Requires
  • good design
  • obvious correction facilities

Go-faster Travel Agency
Bookings

Please enter details of journey:

Start from: York
Destination: Pittsburgh
Via: Birmingham

First Class/Second Class/Bargain
Single/Return
Seat Number:
Spreadsheets

first spreadsheet VISICALC first; followed by Lotus 1-2-3
MS Excel most common today

sophisticated variation of form-filling.

• grid of cells contain a value or a formula

• formula can involve values of other cells
e.g. sum of all cells in this column

• user can enter and alter data
• spreadsheet maintains consistency
WIMP Interface

- Windows
- Icons
- Menus
- Pointers

(or windows, icons, mice, and pull-down menus)

default style for majority of interactive computer systems, especially PCs and desktop machines
Windows

Areas of the screen that behave as if they were independent terminals

- can contain text or graphics
- can be moved or resized
- can overlap and obscure each other, or can be laid out next to one another (tiled)
- *scrollbars* allow the user to move the contents of the window up and down or from side to side
- *title bars* describe the name of the window
Icons

- small picture or image
- represents some object in the interface
  often a window or action
- windows can be closed down (iconised)
  small representation ⇒ many accessible windows
- icons can be many and various
  highly stylized or realistic representations.
Pointers

- important component
  - WIMP style relies on pointing and selecting things
- usually achieved with mouse
- also joystick, trackball, cursor keys or keyboard shortcuts
- wide variety of graphical images

[Diagram of pointers]
Menus

Choice of operations or services offered on the screen.

Required option selected with pointer

- problem - menus can take up a lot of screen space
- solution - menu appears when needed
Kinds of Menus

Menu Bar at top of screen (normally), menu drags down
- pull-down menu - mouse hold and drag down menu
- drop-down menu - mouse click reveals menu
- fall-down menus - mouse just moves over bar!

Contextual menu appears where you are
- pop-up menus - actions for selected object
- pie menus - arranged in a circle
  - easier to select item (larger target area)
  - quicker (same distance to any option)
  ... but not widely used!
Menus extras

Cascading menus
- hierarchical menu structure
- menu selection opens new menu
- and so in ad infinitum

Keyboard accelerators
- key combinations - same effect as menu item
- two kinds
  - active when menu open - usually first letter
  - active when menu closed - usually Ctrl + letter
  - usually different !!!
Menus design issues

- which kind to use
- what to include in menus at all
- words to use (action or description)
- how to group items
- choice of keyboard accelerators
WIMP look and feel

Lots of things you can interact with:

- main WIMP components (windows, menus, icons)
- buttons
- dialogue boxes
- pallettes

Collectively known as *widgets*

appearance + behaviour  =  *look and feel*
Buttons

individual and isolated regions within a display that can be selected to invoke an action.

Special kinds

- radio buttons - set of mutually exclusive choices
- check boxes - set of non-exclusive choices
dialogue boxes

information windows that pop up to inform of an important event or request information.

*E.g:* when saving a file, a dialogue box is displayed to allow the user to specify the filename and location. Once the file is saved, the box disappears.
Pallettes and tear-off menus

Problem
  • menu not there when you want it

Solution
  • tear-off off and pin-up menus stay around when
  • pallettes little windows of actions shown/hidden via menu option
    e.g. available shapes in drawing package
Social and Organizational Context

Interaction affected by social and organizational context

- other people
  - desire to impress, competition, fear of failure

- motivation
  - fear, allegiance, ambition, self-satisfaction

- inadequate systems
  → cause frustration and lack of motivation