
The Interaction

Overview

- notion of interaction, interaction frameworks
- ergonomics
- interaction styles
- context of interaction

Interaction Frameworks

Interaction: the communication between the user and the system

Why have a framework?

Allows contextualisation, presents a global view

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

Some systems are harder to use than others

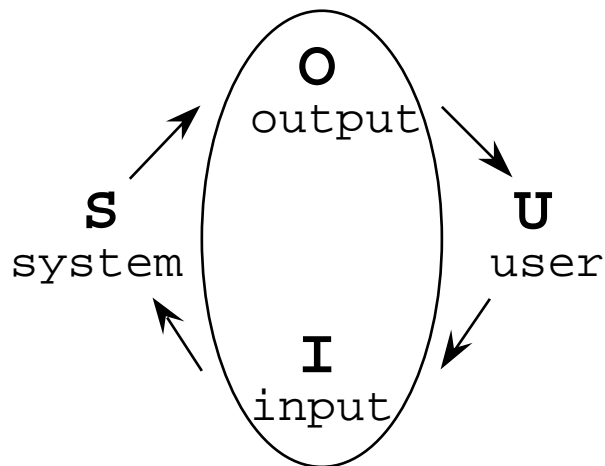
- Gulf of Execution - user's formulation of actions may be different to those actions allowed by the system
- Gulf of Evaluation - user's expectation of the changed system state may be different to the actual presentation of this state

Norman's model concentrates on user's view of the interface only

Extended by Abowd and Beale:

their interaction framework has 4 parts

- user
- input
- system
- output



Each has its own unique language. Interaction necessitates translation between languages; problems in interaction occur when translation between one language and the next is difficult, or impossible.

User intentions translated into actions at the interface, translated into alterations of system state, which in turn are reflected in the output display, which is interpreted by the user.

These are general frameworks for understanding interaction

- not restricted to electronic computer systems
- identifies all the 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*.

Considers things such as

- 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, environmental conditions (temperature, humidity), lighting, noise
- use of colour
e.g. use of red for warning, green for okay, awareness of colour-blindness

etc.

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

Interaction styles

Interaction can be seen as a dialogue between the computer and the 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. Can be function keys, single characters, short abbreviations, whole words, or a combination.

- Suitable for repetitive tasks
- Better for expert users than novices
- Offer 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 so demand less recall - 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, or
- can have graphical component, with menu appearing in box and choices made either by typing initial letter, or moving around with arrow keys

Restricted form of full WIMP system

Natural language

An attractive option: familiar

speech recognition or typed natural language can be used

Problems

- vague
- ambiguous

One solution - try to understand a subset

Query interfaces

Question/answer interfaces - user is led through interaction via a series of questions.

Suitable for novice users but restricted functionality.

Often used in information systems.

Query languages (e.g. SQL) used to construct queries to retrieve information from database.

Effective use requires understanding of database structure and language syntax, hence requires some expertise.

Form-filling interfaces

- Primarily for data entry or data retrieval.
- Screen like paper form.
- Data put in relevant place.
- Requires good design and 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

- VISICALC first (early 1980s)
- Lotus 1-2-3, Excel common today

sophisticated variation of form-filling:

- grid of cells, each of which can 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 and spreadsheet will maintain consistency and ensure formulae are correct

WIMP Interface

- Windows
- Icons
- Menus
- Pointers

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

Default style for majority of interactive computer systems today, 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

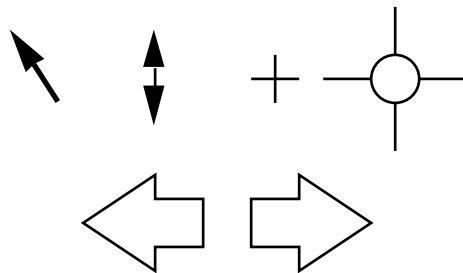
Small picture or image, used to represent some object in the interface, often a window. Windows can be closed down to this small representation (iconised) allowing many windows to be accessible.

Icons can be many and various - highly stylized or realistic representations.

Pointers

Important component, since WIMP style relies on pointing and selecting things such as icons and menu items.

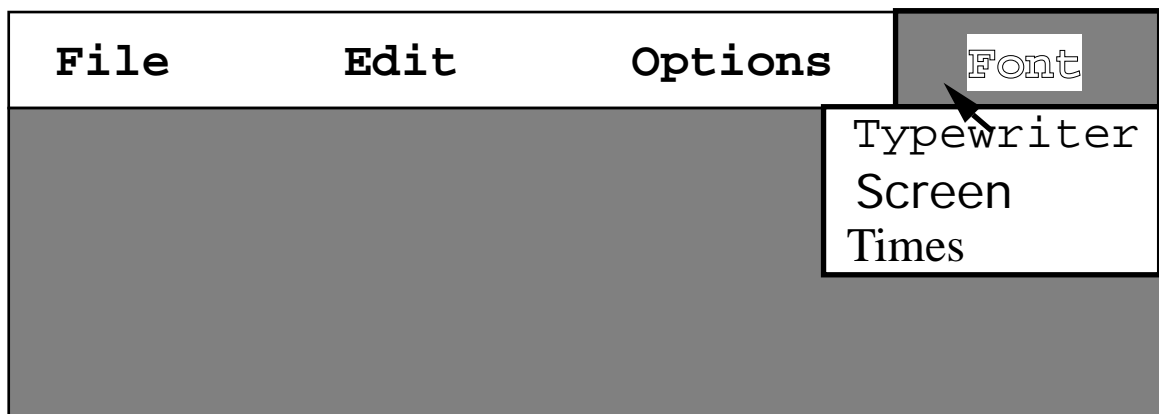
- usually achieved with mouse
- joystick, trackball, cursor keys or keyboard shortcuts are also used
- wide variety



Menus

Choice of operations or services that can be performed offered on the screen.

Required option selected with pointer



- problem - menus can take up a lot of screen space
- solution - use pull-down or pop-up menus
 - pull-down menus are dragged down from a single title at the top of the screen
 - pop-up menus appear when a particular region of the screen (maybe designated by an icon) is clicked on

Some menus are pin-up menus - they stay on the screen until explicitly requested to go away. Another type is the fall-down menu - similar to the pull-down, but the bar doesn't have to be explicitly selected.

- also cascading menus - one menu selection opens another menu adjacent to it, and so on.
- pie menus - menu options arranged in a circle. Easier to select item (larger target area) and quicker (same distance to any option)

Keyboard accelerators sometimes offered - key combinations that have same effect as selecting the menu item

General problem: what to include in menus at all, and how to group items.

WIMP additions

There are additional things associated with WIMP systems

- buttons - individual and isolated regions within a display that can be selected to invoke an action.
 - radio buttons - set of mutually exclusive choices
 - check boxes - set of non-exclusive choices
- palettes - indicate the set of possible modes available, plus the current mode. Usually a collection of tiled icons
Example: a drawing package may have a palette indicating whether boxes, circles, lines or text are being drawn, another that indicates the set of fill patterns available, and another that indicates the colours available
- dialogue boxes - information windows that pop up to inform of some important event or request certain information.
Example: 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.

Collectively known as *widgets* .

A particular style of drawing these widgets, and their behaviour when activated, makes up the *look and feel* of an interface.

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