The Interaction

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Outline

- Introduction
- Models of Interaction
- Frameworks
- Ergonomics
- Interactions styles
- Elements of the WIMP Interface
- Screen Design
- The context of the Interaction

Introduction

- Interaction
  - communication between the user and the system
- Why have a framework?
  - allows contextualisation
  - presents a global view

Models of interaction

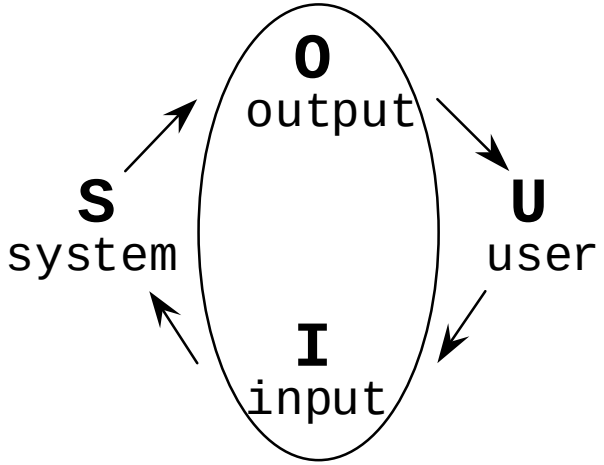
- Norman's Interaction framework
  - user establishes the goal
  - formulates intention
  - specifies actions at interface
  - executes action
  - perceives system state
  - interprets system state
  - evaluates system state with respect to goal

Models of interaction

- Some systems are harder to use than others
- Gulf of Execution
  - user's formulation of actions
    ≠ actions allowed by the system
- Gulf of Evaluation
  - user's expectation of changed system state
    ≠ actual presentation of this state
- Norman's model concentrates on user's view of the interface

Models of interaction

- extended by Abowd and Beale:
- their interaction framework has 4 parts
  - user, system
  - input, output
  - (input + output) = interface



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

- each has its own unique language
- interaction ⇒ translation between languages
- problems in interaction = problems in translation

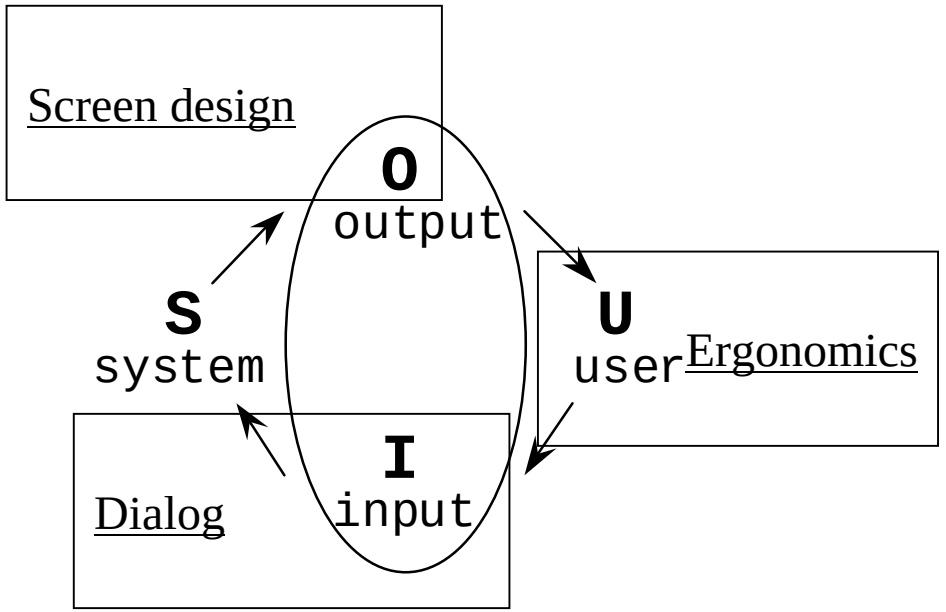
Models of interaction

- The user begins with the formulation of a goal and a task to achieve that goal. The only way the user can manipulate the machine is through the input, and so the task must be articulated within the input language
- The input language is translated into the core language as operations to be performed by the system
- The execution phase of the cycle is complete. The system is in a new state, which must be communicated to the user
- The current values of system attributes are rendered as concepts or features of the output
- The user observes the output and assess the result of the interaction relative to the original goal, ending the evaluation phase

Frameworks

- Frameworks provide a basis for discussing other issues that relate to the interaction

- ergonomics addresses issues on the user side
- dialog design and interface style can be placed along the input branch, addressing both articulation and performance
- the entire framework can be placed within a social and organizational context
- screen design and layout



Ergonomics

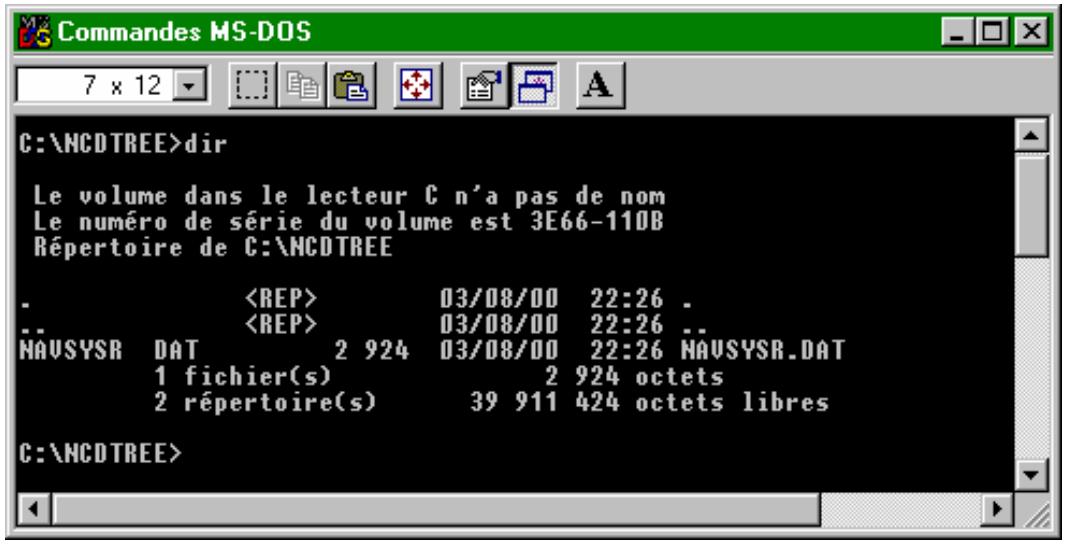
- Study of the physical characteristics of interaction
- Ergonomics good at defining standards and guidelines for constraining the way we design certain aspects of systems

- Arrangement of controls and displays
  - controls grouped according to function or frequency of use, or sequentially
- Surrounding environment
  - seating arrangements adaptable to cope with all sizes of user
- Health issues
  - physical position, lighting, noise, environmental conditions (temperature, humidity)
- Use of colour
  - use of red for warning, green for okay, awareness of colour-blindness etc.

Interaction styles

- Interaction: dialogue between computer and user
- The choice of interaction style has an effect on the nature of the dialogue
- We can identify some common styles
  - command line interface
  - menus
  - natural language
  - question/answer and query dialogue
  - form-fills and spreadsheets
  - WIMP
- Appropriate style depends on user and task

Command Line Interface



- Way of expressing instructions to the computer directly
  - short abbreviations, whole words, or a combination
- First interactive dialog style
- still widely used
- Today, it is supplementary to menu-based interfaces
- Examples: Unix shells, DOS

Command Line Interface

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- fast and flexible for experts
- supports user initiative
- programming language capabilities for macros
- simple to implement

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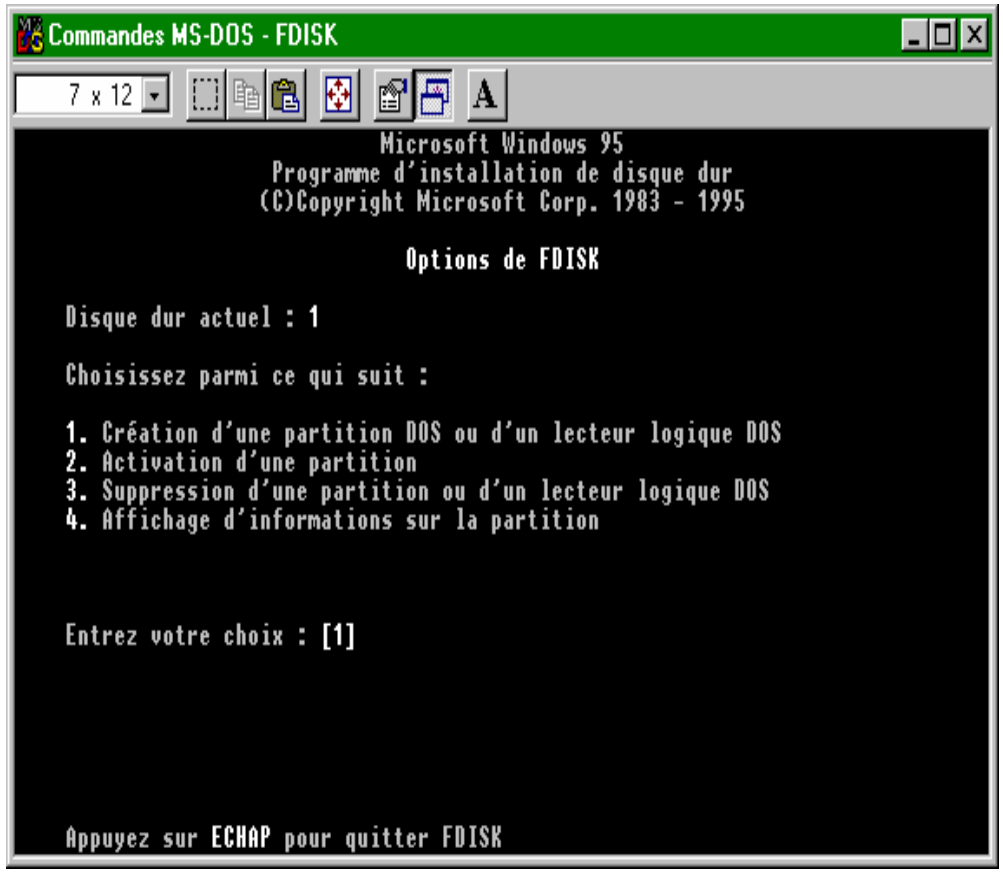
- hard for novices
- high error rates (3-53%) & poor error handling
- strict syntax means training and memorization

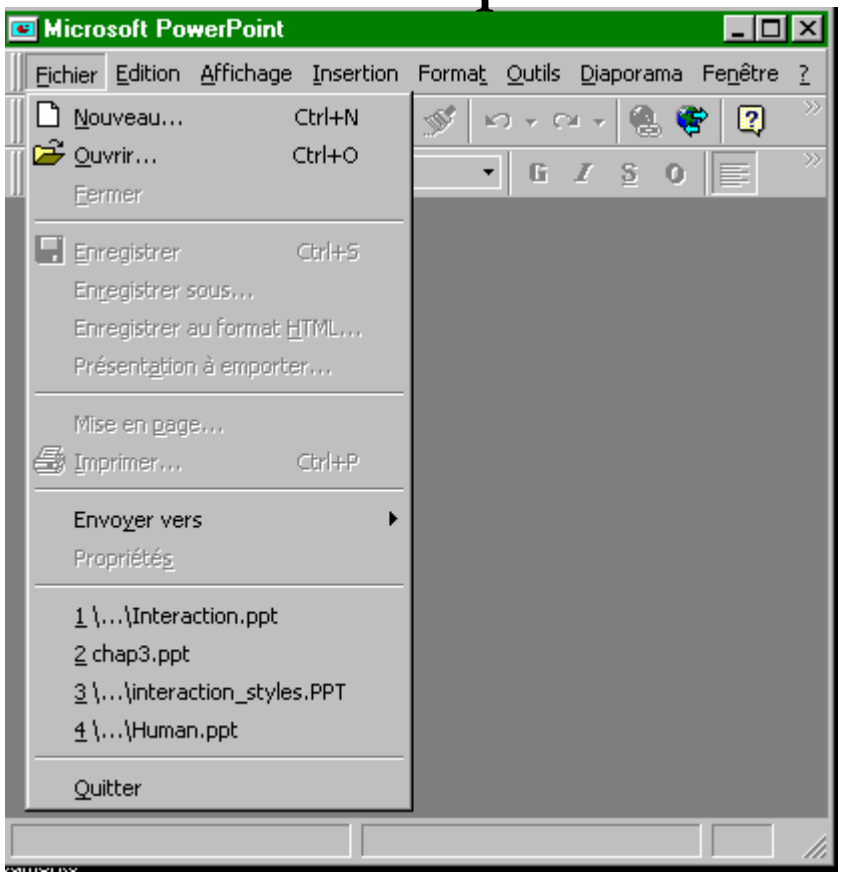
- better for expert users than novices
- offers direct access to system functionality
- command names/abbreviations should be meaningful

Menus

Text-based



Graphical



- Set of options available is displayed
- Selected by using mouse, numeric or alphabetic keys

Menus

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- Options visible: – less recall - easier to use
- very little training
- uses recognition (easier than generation)
- default/current/enabled selections

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- unusable if too many choices
- slow for experienced users

- Options need to be meaningful and logically grouped
- Do not have a lot of choices

Natural language

- The most attractive means of communicating
- Familiar to user

- Use speech recognition or typed natural language

- However, NLP is very difficult
- Problems: vague, ambiguous, hard to do well!
- Solutions: try to understand a subset

Question/Answer Dialog

- User led through interaction via series of questions
- Computer asks questions, user answers
- Examples: " Wizards" in Microsoft products, used in IS

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- easy for novices
- easy to implement

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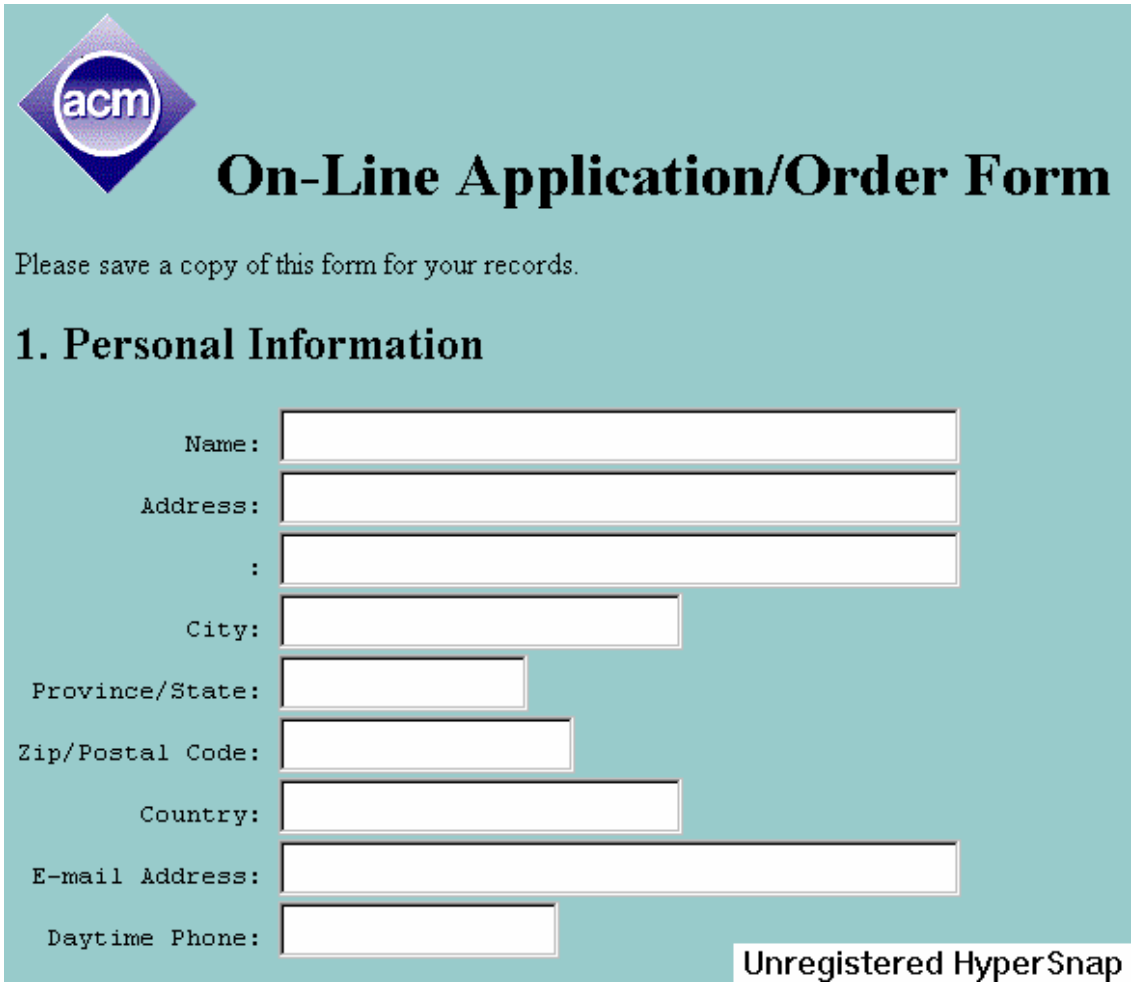
- harder to correct previous errors or change mind
- slower for experts
- limited in functionality and power

Query Dialog

- Used to retrieve information from database
- Example: SQL
- They use NL style phrases but require understanding of database structure and language syntax
- hence requires some expertise

Form fills

- Primarily for data entry or data retrieval
- Screen like paper form with fields that can be filled-in



Common (most UIs of this form)

- character terminals (sales lines, etc.)
- web pages
- Mac & Windows dialog boxes

Form fills

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- Options visible: – less recall - easier to use
- very little training
- uses recognition
- simplifies data entry

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- consumes screen space

- Data put in relevant place.
- Requires
  - good design
  - obvious correction facilities

WIMP Interface

- Windows
- Icons
- Menus
- Pointers

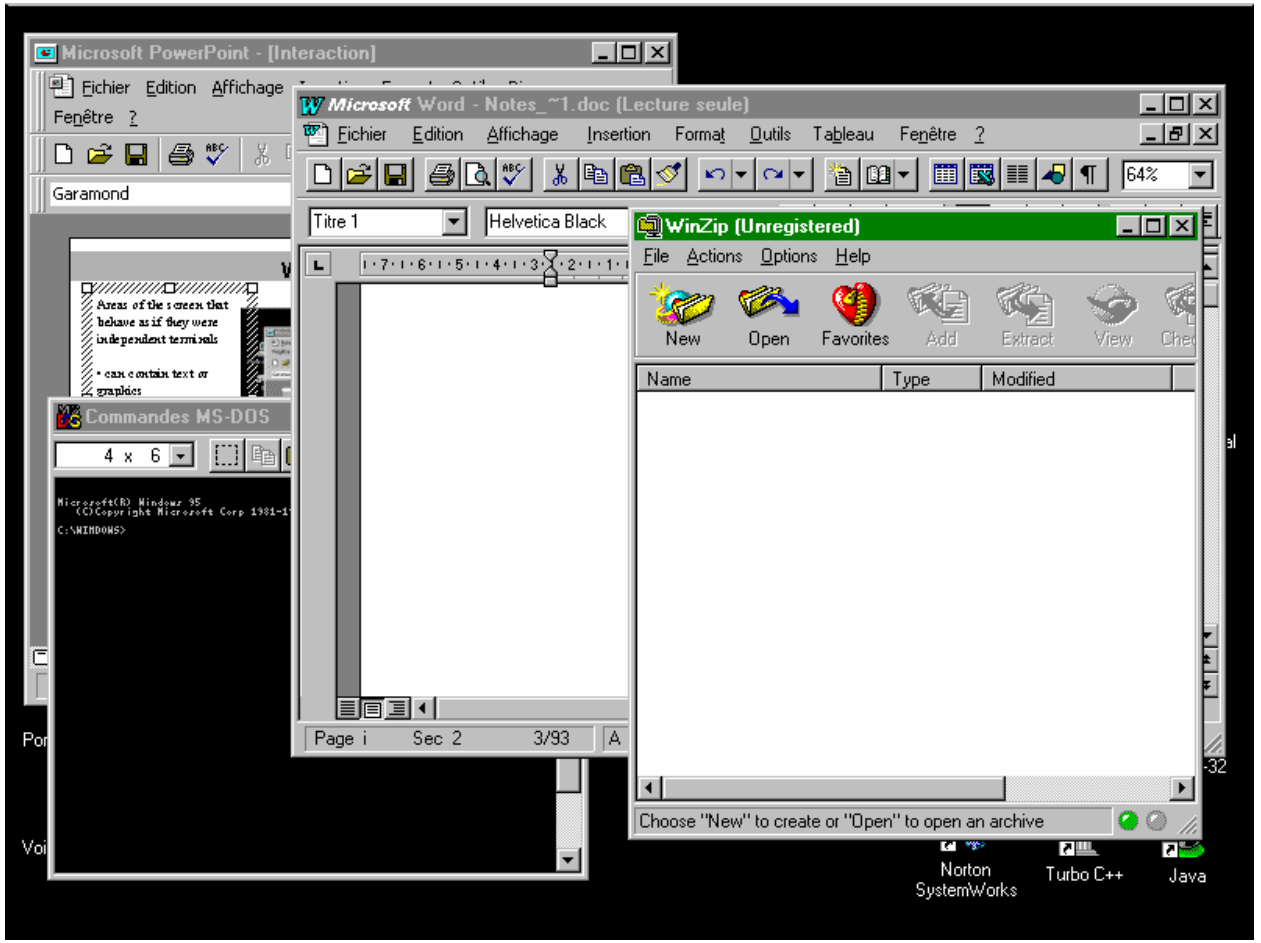
(or windows, icons, mice, and pull-down menus)

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

Windows

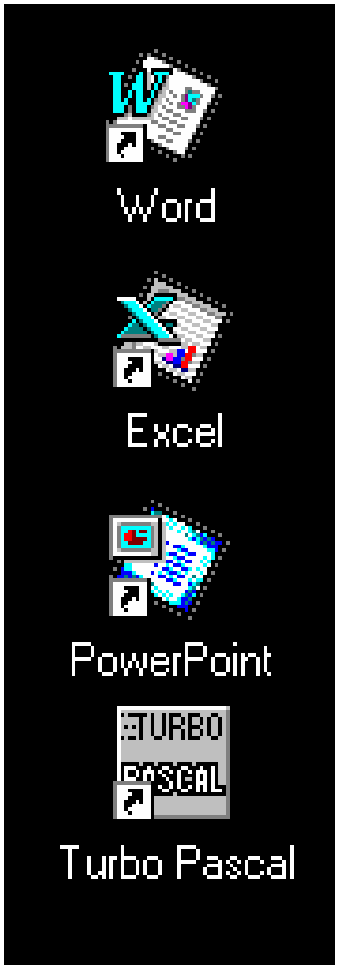
Areas of the screen that behave as if they were independent terminals

- can contain text or graphics
- can be moved or resized
- can be tiled
- *scrollbars* allow the user to move the contents
- *title bars* describe the name of the window



Icons

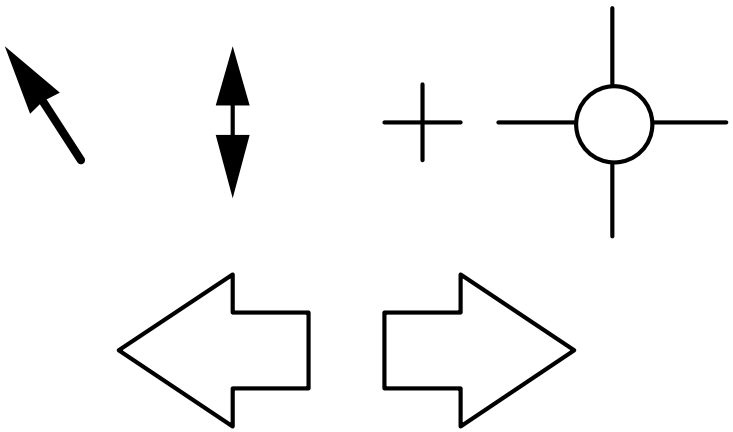
- small picture or image
- represents some object in the interface often a window or action
- windows can be closed down (iconised) small representation ⇒ many accessible windows
- icons can be many and various highly stylized or realistic representations.



Pointers

- important component

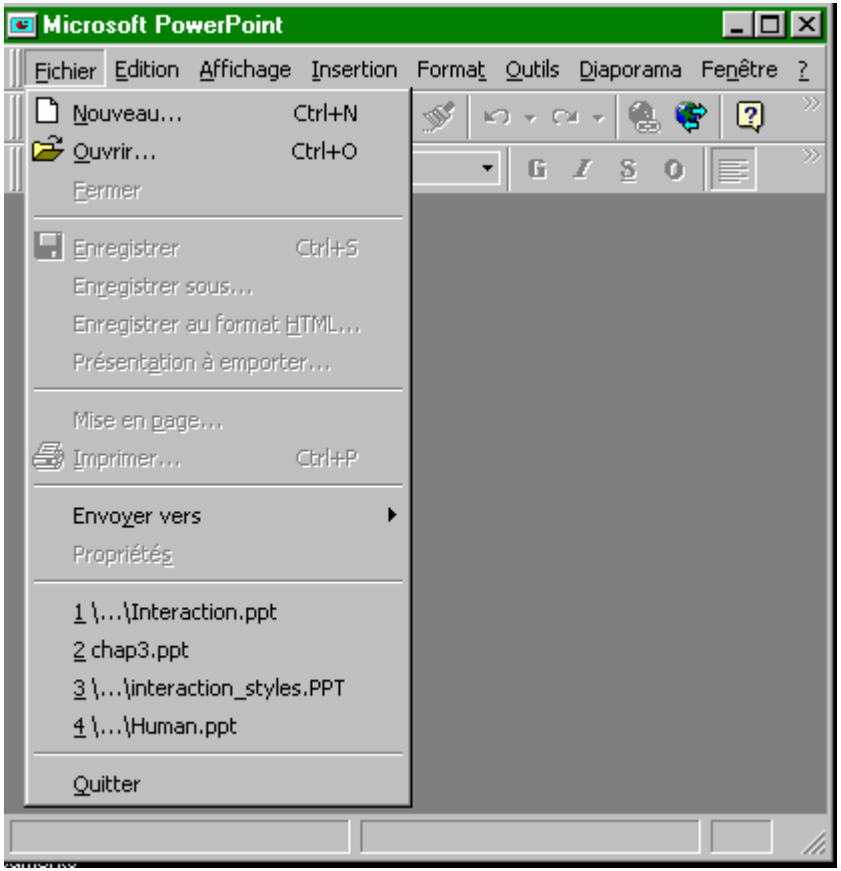
  WIMP style relies on pointing and selecting things
- usually achieved with mouse
- also joystick, cursor keys or keyboard shortcuts
- wide variety of graphical images



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

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:

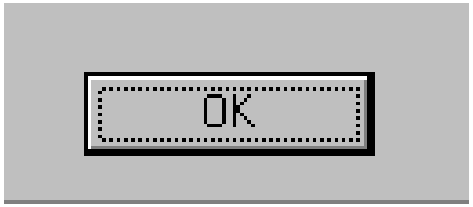
- main WIMP components (windows, menus, icons)
- buttons
- dialogue boxes
- pallettes

Collectively known as *widgets*

appearance + behaviour = *look and feel*

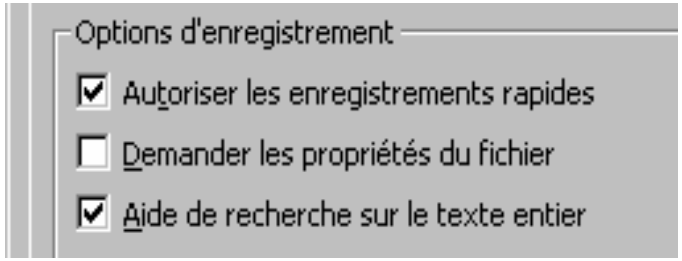
Buttons

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



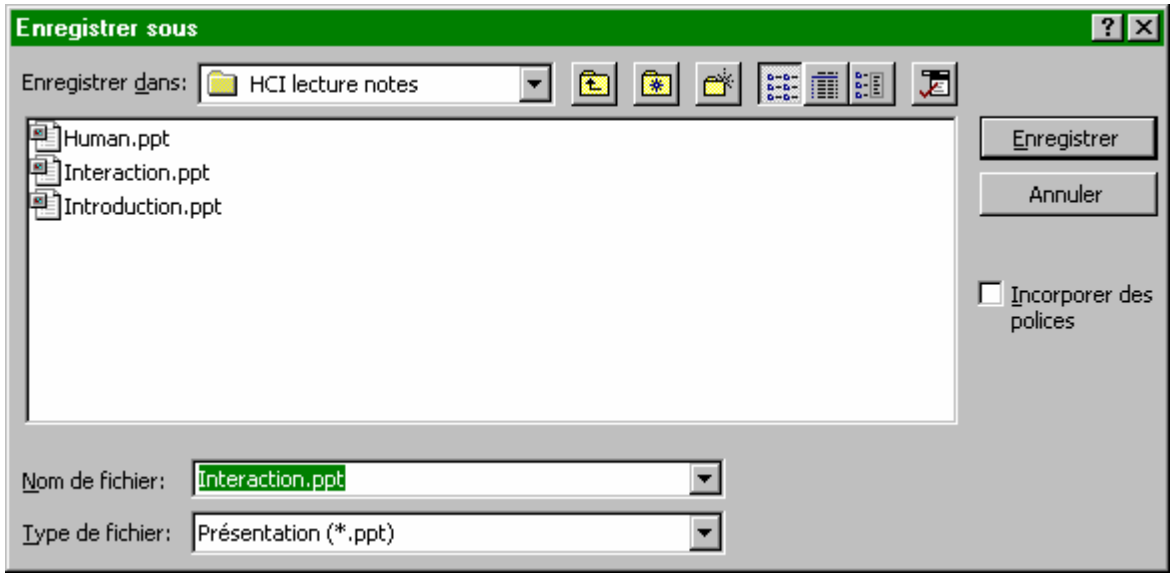
Special kinds

- 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.

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

Summary

- Interaction styles depend on
  - user
  - task
  - available devices (wide range)
- Many different styles exist
- Newer styles (gesture, speech, 3-d) are open areas of research