Human Computer Interaction

The Interaction

Lecture # 5

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Contents

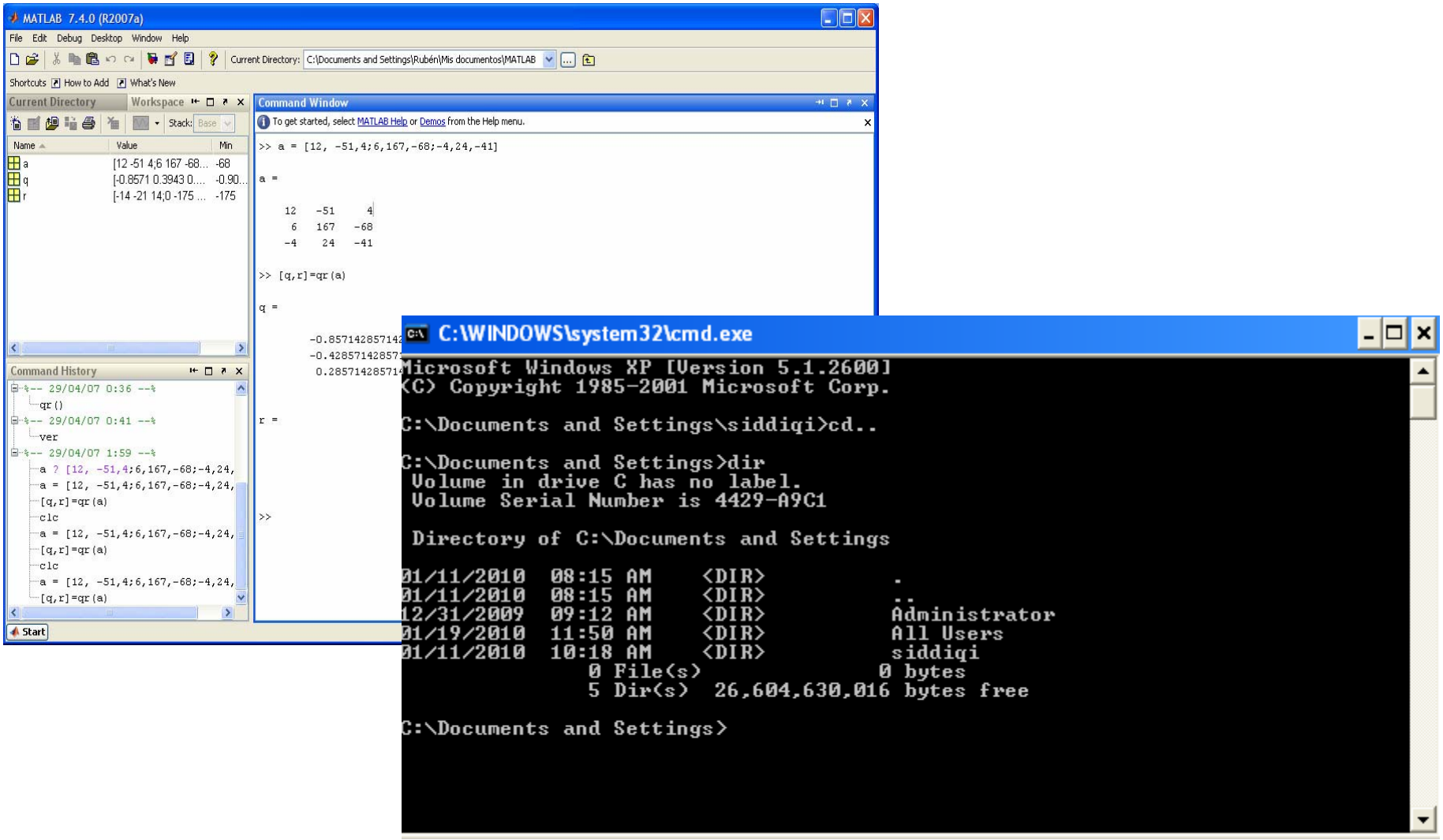
- Introduction
- Models of Interaction
- Ergonomics
- Interaction Styles
- Interactivity
- Experience, Engagement & Fun

Interaction Styles

Common Interaction Styles

- Command line interface
- Menus
- Natural language
- Question/answer and query dialogue
- Form-fills and spreadsheets
- WIMP
- Point and click
- Three–dimensional interfaces

Command Line Interface



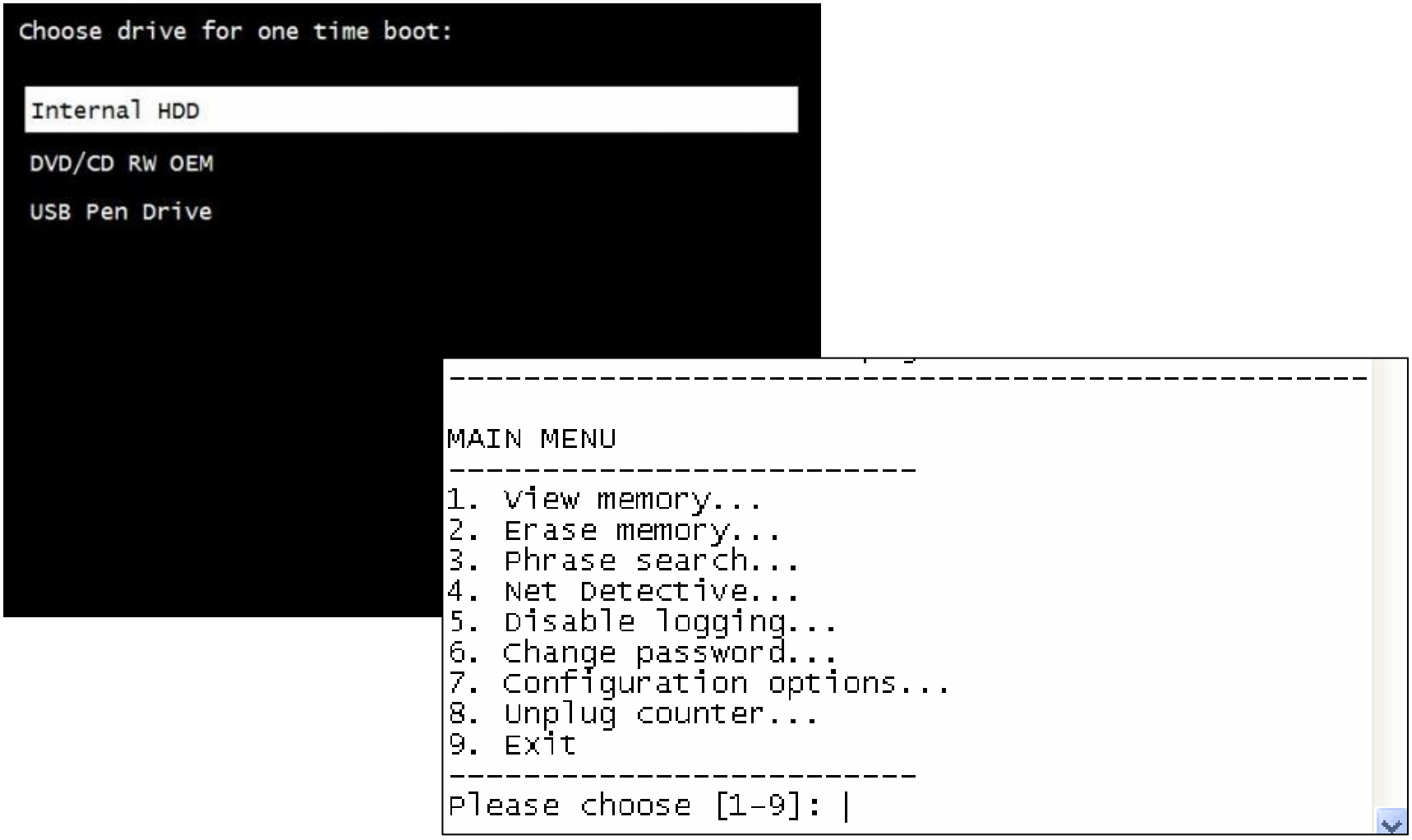
Command Line Interface

- Way of expressing instructions to the computer directly
- Function keys, single characters, short abbreviations, whole words, or a combination
- Powerful – Offers direct access to system functionality
- Better for expert users than novices
- Command names/abbreviations should be meaningful!

Menus

- Set of options displayed on the screen
- Options visible
  - Rely on recognition rather than recall
  - Easier to use
- Names should be meaningful
- Selection by:
  - numbers, alphabets, arrow keys, mouse
- Menus
  - Purely Text
  - May have a Graphical Component
- Restricted form of full WIMP system

Menus


Choose drive for one time boot:
Internal HDD
DVD/CD RW OEM
USB Pen Drive
MAIN MENU
1. View memory...
2. Erase memory...
3. Phrase search...
4. Net Detective...
5. Disable logging...
6. Change password...
7. Configuration options...
8. Unplug counter...
9. Exit
Please choose [1-9]:

Natural Language

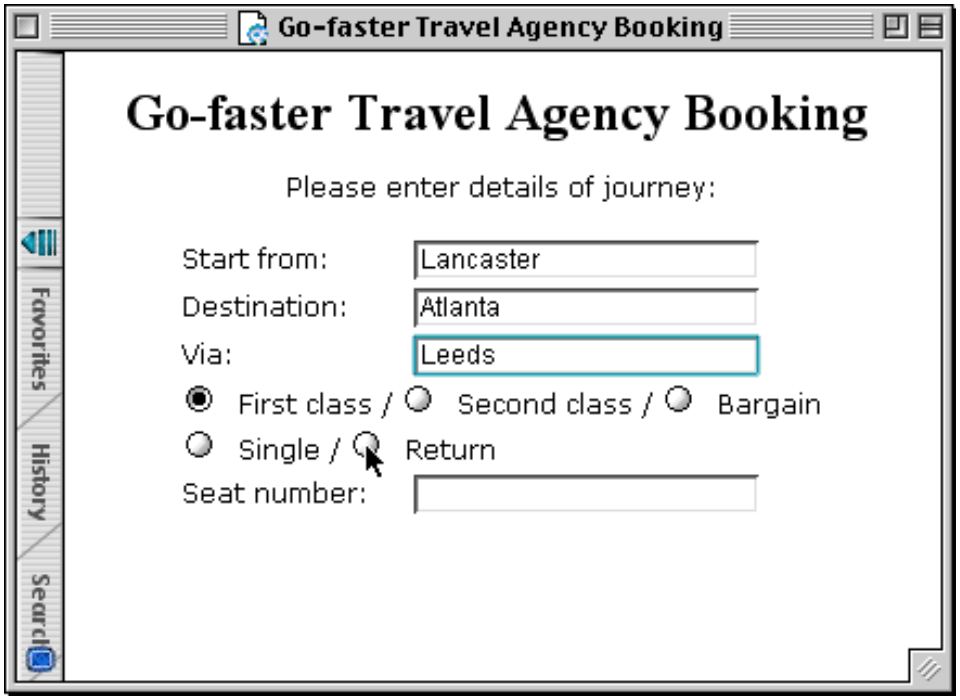
- Familiar to user
- Speech recognition or typed natural language
- Problems
  - Ambiguity at Phrase Level
    - *The boy hit the dog with the stick*
  - Ambiguity of Individual words
    - *Synonyms, Pronouns*
- General natural language interface – Unlikely
- Restricted domain – Known Vocabulary

Query Interfaces

- Question/answer interfaces
  - User led through interaction via series of questions
- Query languages (e.g. SQL)
  - Used to retrieve information from database
  - Natural-language-style queries
    - SELECT Name FROM Students WHERE GPA > 3.0
  - 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
- Easy to Use
- Generally allow
  - Blank Fields
  - Correction Facilities



Spread Sheets

- 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
- MS Excel – Most common spread sheet today

WIMP Interface

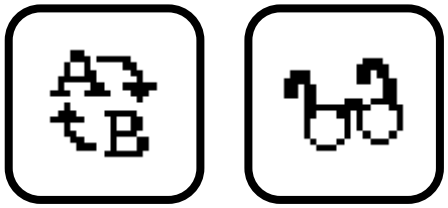
- Windows, Icons, Menu, Pointers
- Or Windows, Icons, Mice, and Pull-down menus
- Default style for majority of interactive computer systems, especially desktop machines
  - Windows, MAC

Point and Click Interfaces

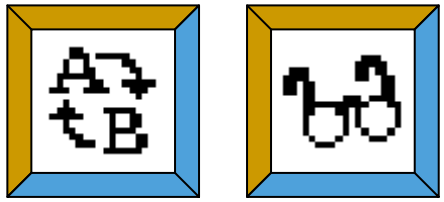
- Commonly Used in ..
  - Web browsers
  - Hypertext
- Just click something!
  - Icons, text links or location on map
- Minimal typing
- Web is a typical point and click interface
- Closely related to WIMP

Three Dimensional Interfaces

- Virtual Reality Interfaces
- Ordinary WIMP elements: 3D Appearance
  - Shading
  - Sculptured



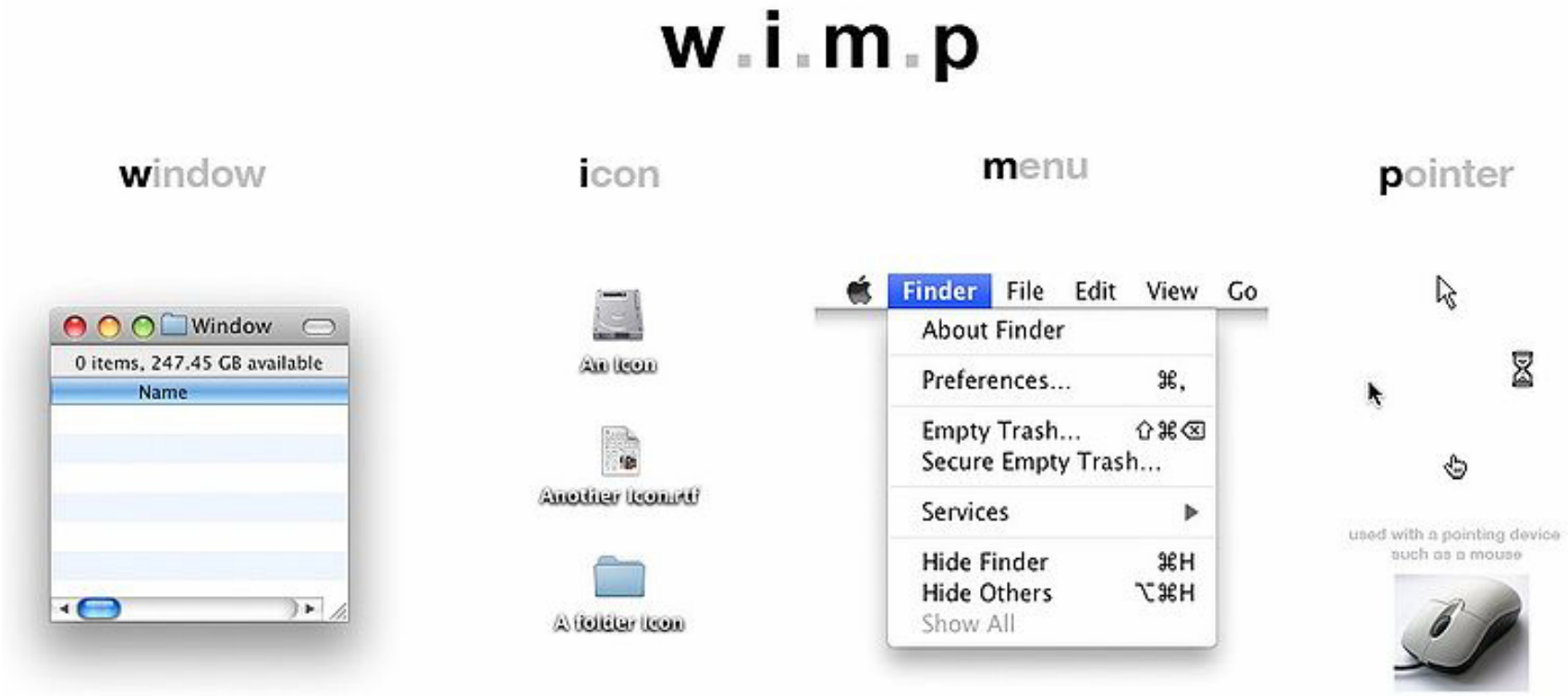
flat buttons …



… or sculptured

Elements of the WIMP Interface

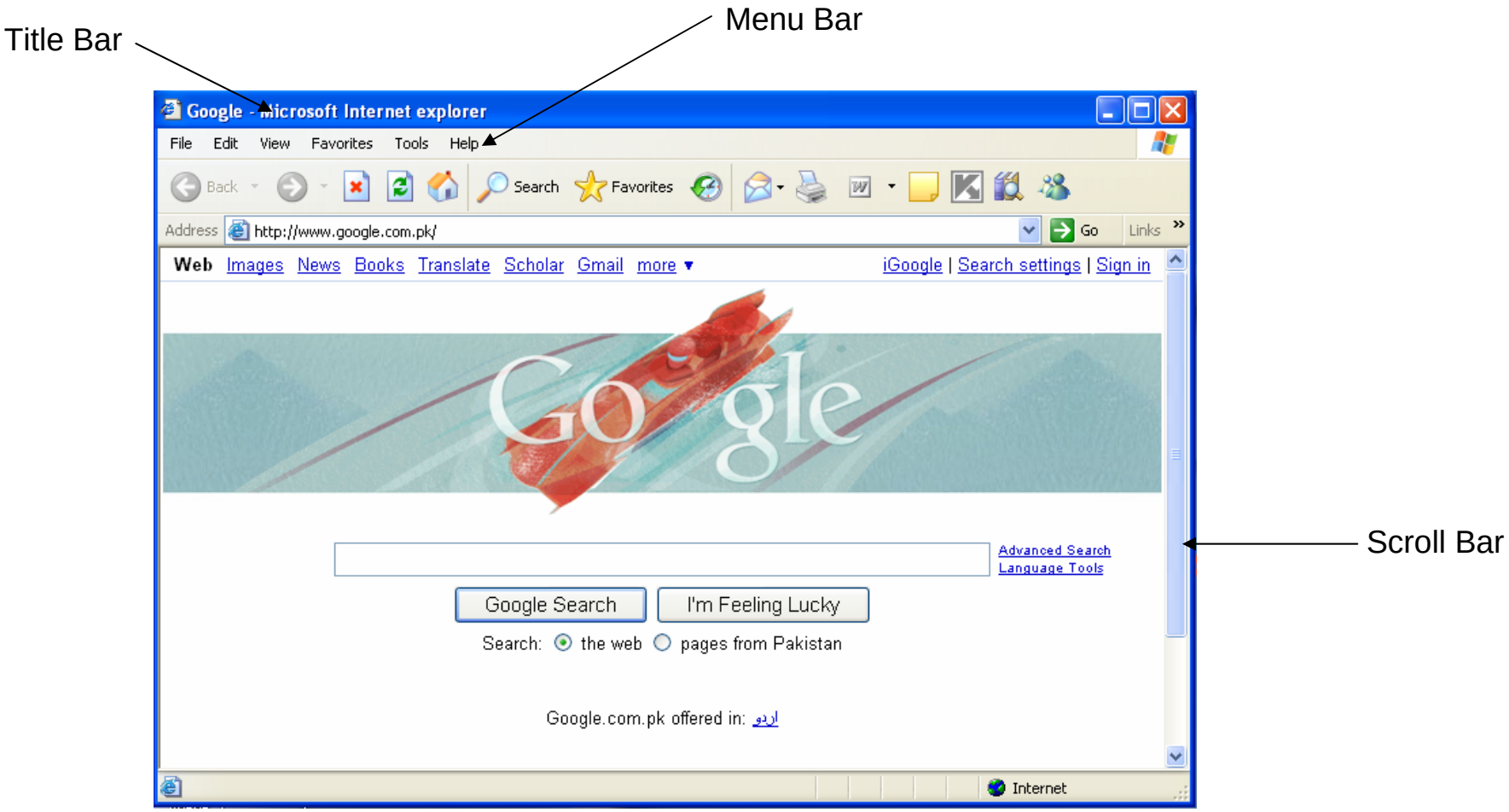
- Windows, icons, menus, pointers
- Buttons, toolbars, palettes, dialog boxes



Windows

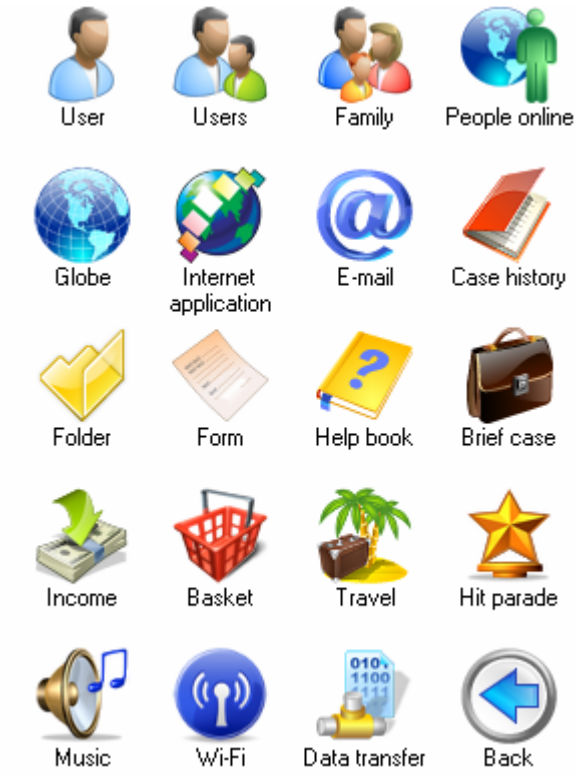
- Areas of the screen that behave as if they were independent
  - Can contain text or graphics
  - Can be moved or resized
  - Can overlap and obscure each other, or can be laid out next to one another (tiled)
- Scrollbars
  - Allow the user to move the contents of the window up and down or from side to side
- Title bars
  - Describe the name of the window

Windows


Title Bar
Menu Bar
Scroll Bar
Google - Microsoft Internet explorer
File Edit View Favorites Tools Help
Back Search Favorites
Address http://www.google.com.pk/
Go Links
Web Images News Books Translate Scholar Gmail more
iGoogle | Search settings | Sign in
Advanced Search
Language Tools
Google Search
I'm Feeling Lucky
Search: the web pages from Pakistan
Google.com.pk offered in: اردو
Internet

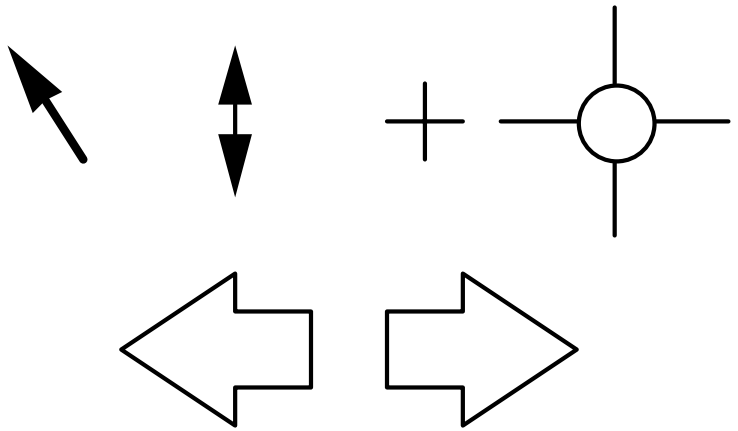
Icons

- Small picture or image
- Represents some object in the interface
  - Often a window or action
- Icons can take many forms
  - Highly stylized
  - Realistic representations



Pointers

- Important component
  - WIMP style relies on pointing and selecting things
- Uses mouse, trackpad, joystick, trackball, cursor keys or keyboard shortcuts
- Wide variety of Pointer Cursors
- Cursor *Hot-spot*
  - The location to which it points

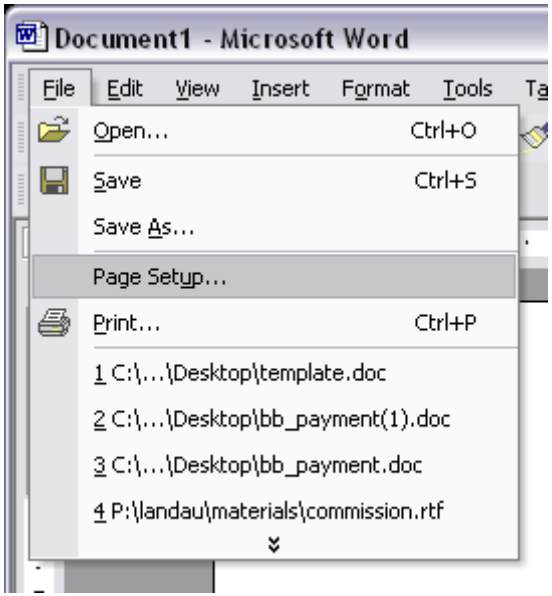


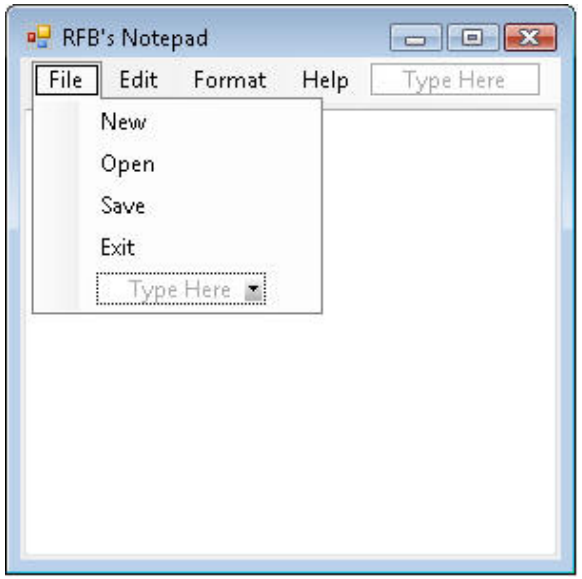
Pointers

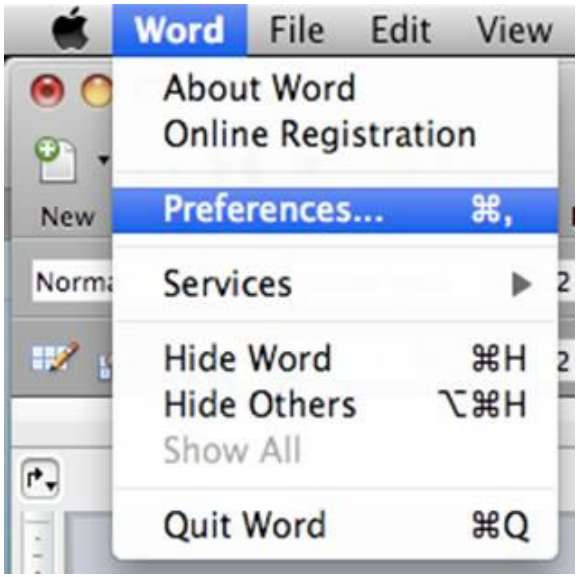

MOUSE POINTERS
Standard
Precision Select
Horizontal Resize
Link Select
Help Select
Vertical Resize
Text Select
Handwriting
Diagonal Resize (bltr)
Busy
Unavailable
Diagonal Resize (tlbr)
Busy in Background
Move

Menus

- Choice of operations or services offered on the screen
- Required option selected with pointer

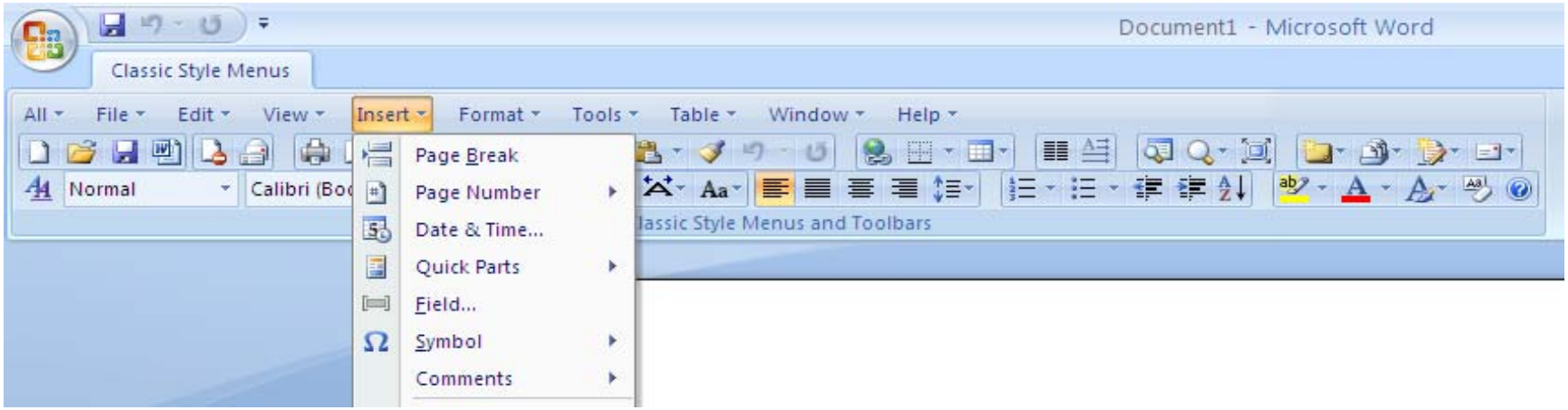






Menus

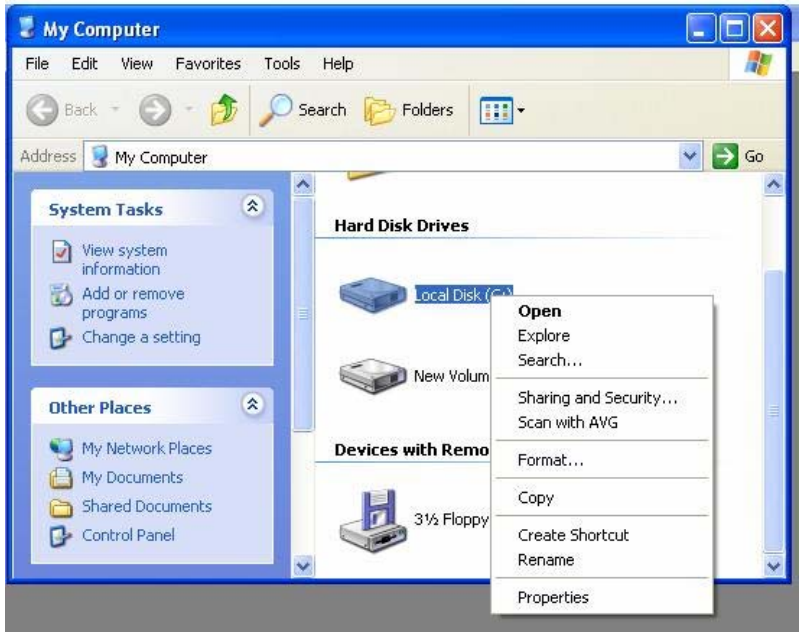
- Menu Bar at top of screen (normally), menu drags down



- Pull-down menu -Drags down on mouse click
- Fall-down menus - Mouse just moves over bar

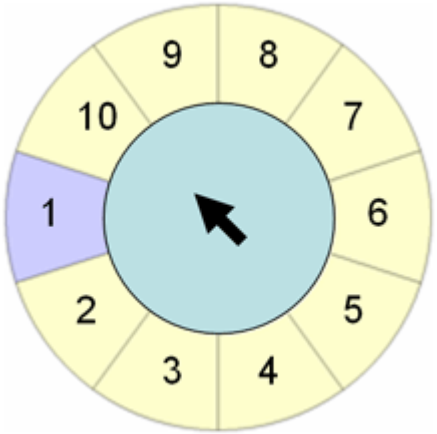
Menus

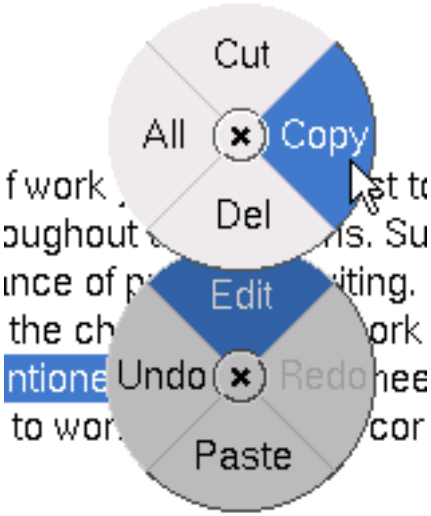
- Pin-up menus – ‘Pinned’ to the screen, hides when asked
- Pop-up menus
  - Contextual menu
  - Hidden – Pops up on request



Menus

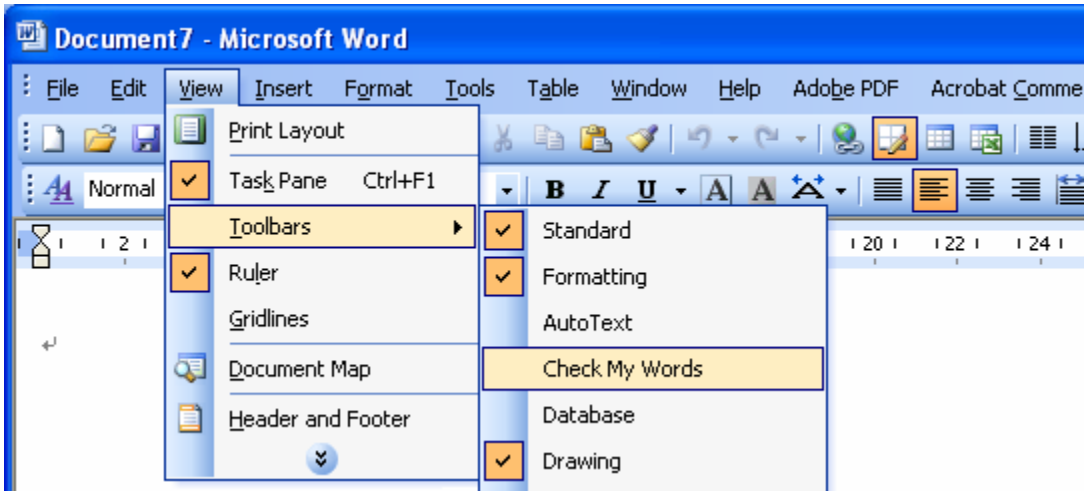
- Pie menus
  - Arranged in a circle
  - Easier to select item (larger target area)
  - Quicker (same distance to any option)
  - Take up more screen space – Not widely used!





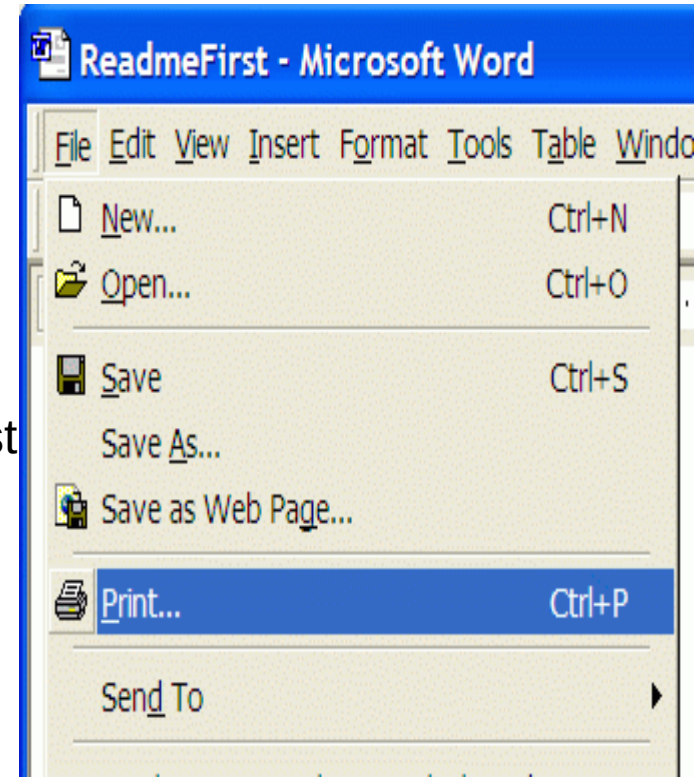
Menus

- Cascading menus
  - Hierarchical menu structure
  - Menu selection opens new menu



Menus

- Keyboard accelerators
  - Key combinations - same effect as menu item
  - Two types
    - Active when menu open – usually first letter
    - Active when menu closed – usually Ctrl + letter

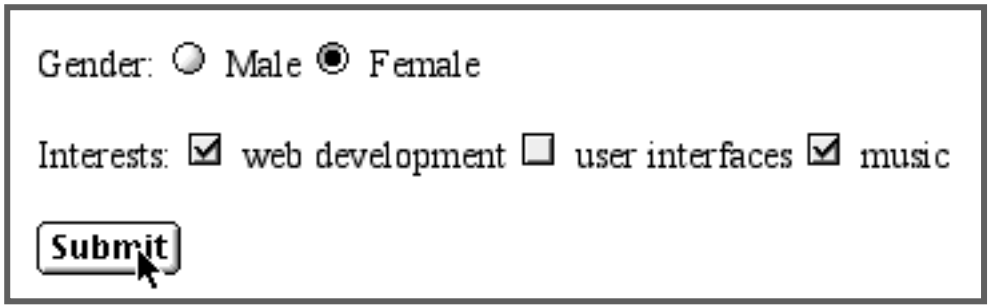


Menu Design Issues

- What to include in menus at all?
- How to group items?
- Order
  - Frequency and importance
  - Opposite functionalities
- Choice of keyboard accelerators

Buttons

- Individual and isolated regions within a display that can be selected to invoke an action
- Resemble ‘push buttons’
- Toggle buttons
  - Radio buttons
    - set of mutually exclusive choices
  - Check boxes
    - set of non-exclusive choices

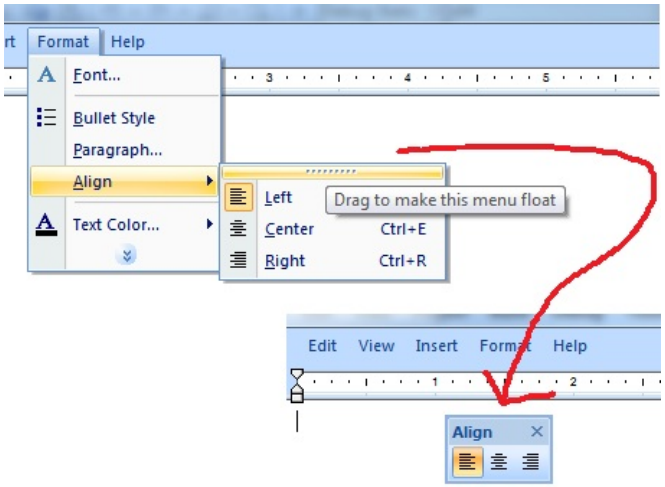


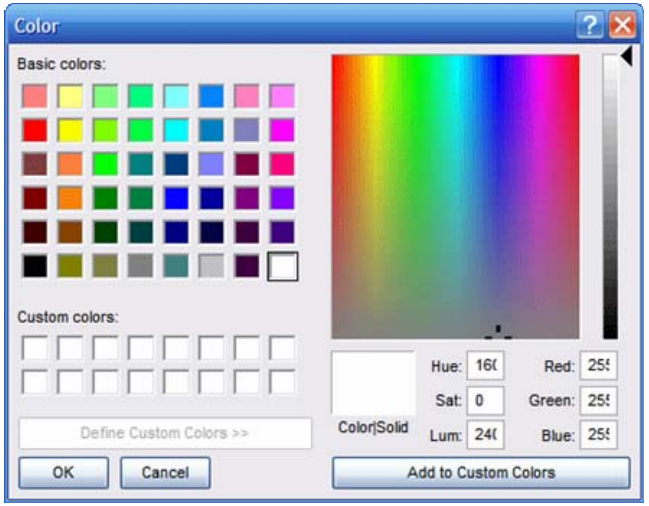
Toolbars

- Long lines of icons
- Fast access to common actions
- Often customizable
  - Choose *which* toolbars to see
  - Choose *what* options are on it

Palettes

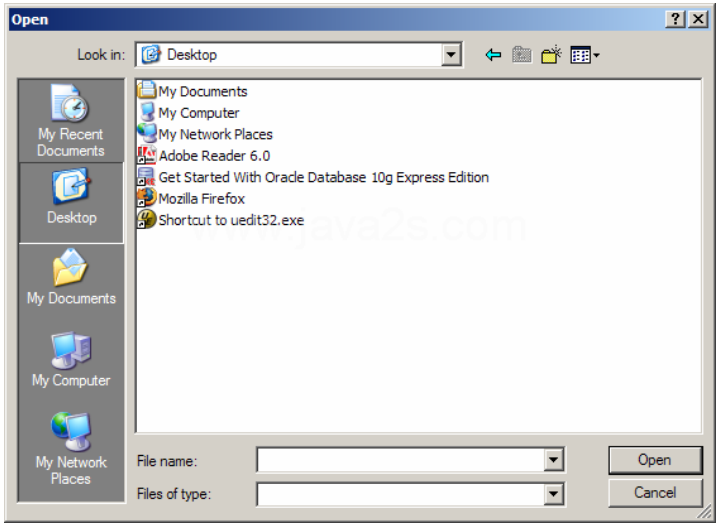
- Little windows of actions – Shown/hidden
  - e.g. available shapes in drawing package
- Menu ‘tears off’ to become palette





Dialog Boxes

- Information windows that pop up to inform of an important event or request information.
- E.g. Save file Dialog box
  - Specify the filename and location
  - Disappears once the file is saved



Interaction Styles - Usability

- An installation program

Interaction Styles - Usability

- Change of interaction style

- Text Based Menu

This program will install COCOS software in directory C:\COCOS.
Type:
1 - to install COCOS
2 - to change directory
3 - to exit without installation
Your choice: __

Is it clear what and how to do?

Interaction Styles - Usability

- Usability is affected by
  - Directness - Can users perform all operations they need? Can they perform them in a concise, natural way?
  - Flexibility - Can users easily perform any reasonable operation at any time?
  - Visibility - Can users see the actions they can perform? Is it clear which operations will be done by each action?
  - Consistency - Can users predict application's behavior, based on uniform screen design, similar representation of the similar operations, etc.?

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- Interactivity
- Experience, Engagement & Fun

Interactivity

- Defining feature of interactive system
- Speech driven interfaces
  - Rapidly improving
  - Still inaccurate
  - Speech based: Input is Difficult, Interaction is Easier
  - Yes/No Response – Reliable
  - System reflects back its understanding
  - E.g. Air line reservation
    - “you want a ticket from New York to Boston?”

Interactivity

- Error and Repair
- Can't always avoid errors …
- Make it easy to *detect* errors
  - …And then *repair* them

Sys: Hello, this is the Go Faster booking system. What would you like?
User: *I want to fly from New York to London*
Sys: You want a ticket from New York to Boston
User: *no*
Sys: Sorry, please confirm one at a time
Sys: Do you want to fly from New York
User: *yes*
… … …

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Engagement


EXPERIENCE


FUN.

What is important in HCI

- Usability
- Effectiveness
- Efficiency
- Satisfaction

People are going to work better if they enjoy what they are doing

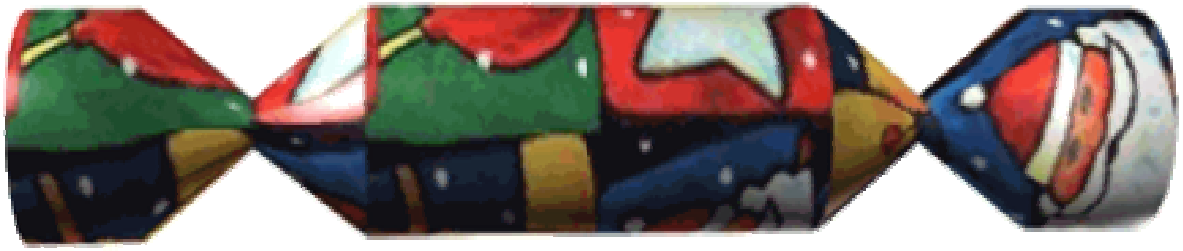
User Experience

- Example – Shopping
  - Internet stores
  - Going to shops, feeling the clothes, being with friends
  - Go shopping without spending
  - Shopping
    - Not an efficient financial transaction
    - It's an *experience*

Psychology of Experience

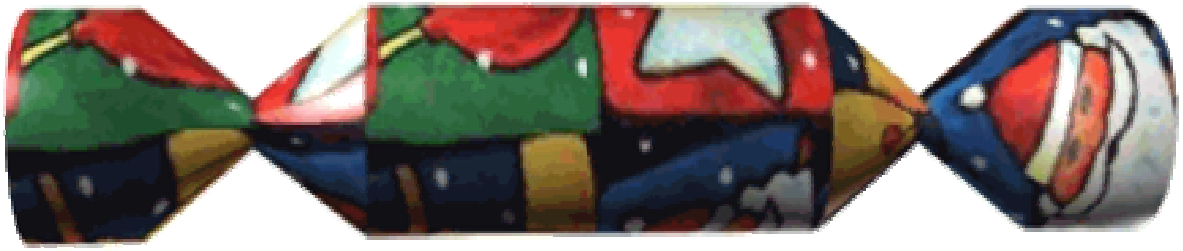
- Flow – Total Engagement
  - Doing something you know how to do?
  - Edge of your abilities - beyond your limits
  - Example: Rock Climbing
- Education
  - Zone of proximal development
  - Things you can do with some support (teacher, book etc.)
  - Learning at its best in this zone

Designing Experience (Simulation)



- Real Christmas crackers
  - Cheap and cheerful!
  - Joke, plastic toy, paper hat
  - Pull and bang

Designing Experience (Simulation)

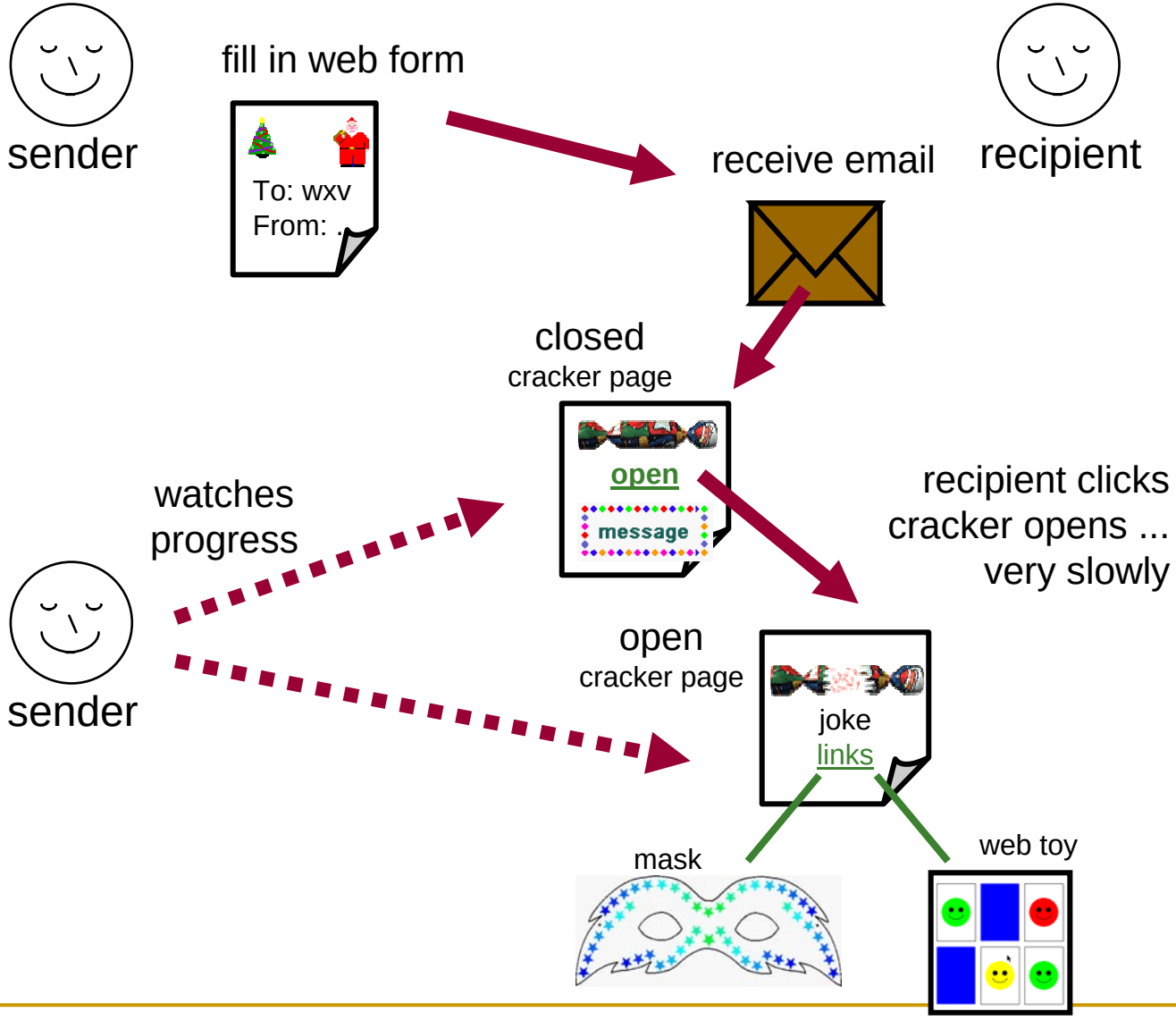


- Virtual crackers
  - Cheap and cheerful!
  - Joke, web toy, cut-out mask
  - Click and bang

Designing Experience (Simulation)

- Virtual crackers
  - Cheap and cheerful!
  - Joke, web toy, cut-out mask
  - Click and bang

How crackers work



Physical Design

- Design constraints
  - Ergonomic – minimum button size
  - Physical – high-voltage switches are big
  - Safety – high cooker controls
  - Context and environment – easy to clean
  - Aesthetic – must look good
  - Economic – … and not cost too much!
- Constraints may be self contradicting
  - Front Vs Back control for a cooking range

Managing Value

- If you want people to use your device/application
  - Understand their value
- People use something

ONLY IF

it has perceived value

AND

value exceeds cost

Managing Value

- Value
  - Helps me get my work done
  - Faster
  - Enjoyment (may not be calculated)
- Cost
  - Download time
  - Money £, $, €
  - Learning effort

General Lesson

If you want someone to do something …

- Make it easy for them!
- Understand their values

References

- Chapter 3 - Human Computer Interaction by Dix et al.
- User Interface Hall of Fame/Shame