

ICS371

:3.0

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HCI and GUI Design

- Human–Computer Interaction
- Graphical User Interface Design



HCI

Human–computer interaction is a discipline

concerned with the:

- design,
- evaluation
- implementation

...of interactive computing systems for human use.

HCI

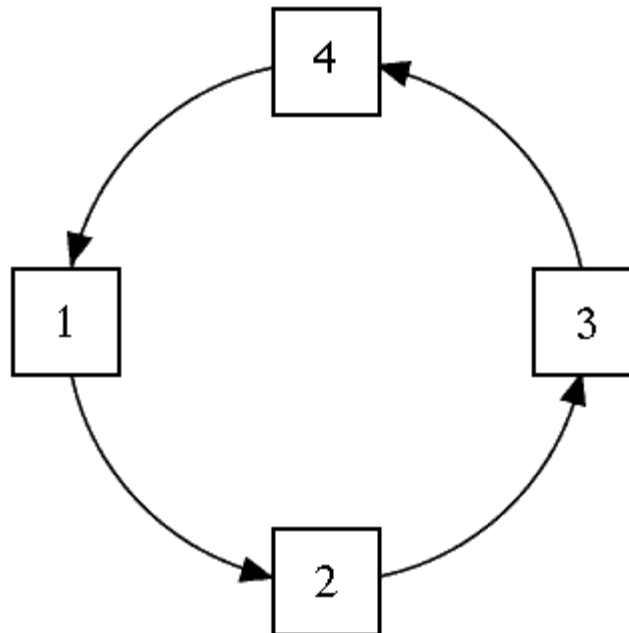
- It involves the interaction between a person and a computer, the person using a:
 - keyboard
 - keypad
 - mouse
 - voice
 - Joystick, etc.
- and the computer using
 - menus
 - graphics
 - images
 - sound, etc.

Two extremes of HCI:

- Batch input = users provides all the input at once and leaves the computer to complete the task.
- Direct manipulation = users constantly provide instructions and receive feedback.

Models of interaction

- Help us understand HCI and looks at the interaction in terms of goals and actions of the user.
 - A popular model is Norman's **execution-evaluation cycle**.



Norman's Execution-Evaluation Cycle

- the user makes a plan of action
- the user executes the plan using the computer interface
- the computer carries out the commands from the input
- the computer may output some information during or after the command has completed
- the user observes the interface to see what has happened
- the user evaluates the observation and compares it to the original plan
- the user determines any further action

Norman's Execution-Evaluation Cycle

- Norman's model of interaction can be subdivided into the following stages:
 1. Establish the goal
 2. Forming the intention
 3. Specifying the action sequence
 4. Executing the action
 5. Perceiving the system state
 6. Interpreting the system state
 7. Evaluating the system state with respect to the goals and intentions

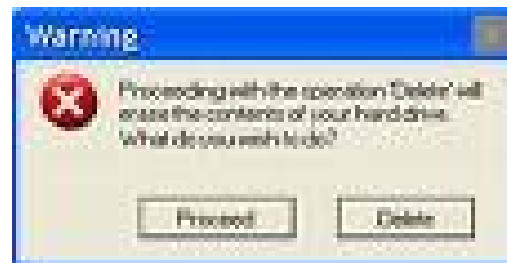
HCI

Q. What happens when you copy a file using Windows?



HCI is not just input!

- Notice that steps 5 & 6 in Norman's Execution-Evaluation Cycle require observation of the system state.
- System state can be given by feedback to the interface.
- Therefore the interface is important for output as well as input.



Interaction Styles:

- command line interface
- menus
- natural language
- question/answer and query dialog
- form-fills and spreadsheets
- point and click
- 3D interfaces
- WIMP

Command Line Interface

- first interactive dialog style
- text-based input without mouse
- function keys, abbreviations, switches and whole word commands
- offers direct to system functionality
- powerful for experienced users
- non-intuitive for novices
- obscure commands are difficult to learn

File Edit View Terminal Tabs Help

```
shalini@shalini:~$ cd glassfish/bin/  
shalini@shalini:~/glassfish/bin$ ./asupgrade -c
```

Valid values for source and Target are as follows :

If Upgrading from SJSAS8, specify Domain directory for Source. The Target directory should be the Domains Root.

Enter the Domain directory of the source:

Menu

- Menu driven interface gives users an option using numbers or keys.
- Options are visible therefore easier for the user.
- Hierarchical order means that the required option is not always available at the top layer.

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Prestige 652R Main Menu

Getting Started

- 1. General Setup
- 2. Dial Backup Setup
- 3. LAN Setup
- 4. Internet Access Setup

Advanced Applications

- 11. Remote Node Setup
- 12. Static Routing Setup
- 15. NAT Setup

Advanced Management

- 21. Filter and Firewall Setup
- 22. SNMP Configuration
- 23. System Password
- 24. System Maintenance
- 25. IP Routing Policy Setup
- 26. Schedule Setup
- 27. VPN/IPSec Setup

- 99. Exit

Enter Menu Selection Number: █

Natural Language

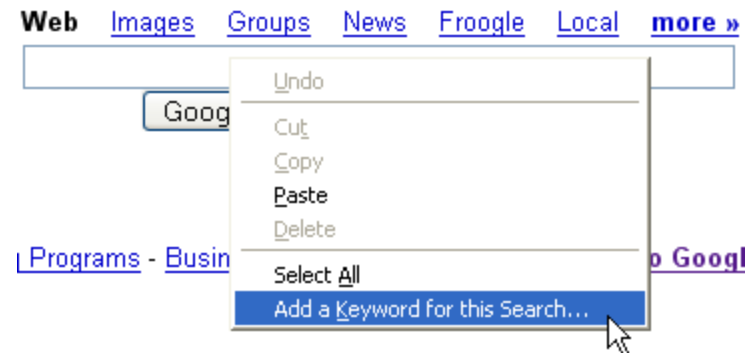
- Users type in full sentences.
- Sentence structure is usually ambiguous.

"The boy hit the dog with the stick."

- Q. Who had the stick?
- Computers require precise instructions.

Question/answer and Query Dialog

- Application forms.
- Easy to learn and use.
- Limited functionality.
- Wizards.
- Web search engines
- Query languages construct queries to retrieve information.



Query languages

- Query languages construct queries to retrieve information.

SQL (Structured Query Language)

```
SELECT sp.*, city  
FROM sp, s  
WHERE sp.sno=s.sno
```

Form-fills and Spreadsheets

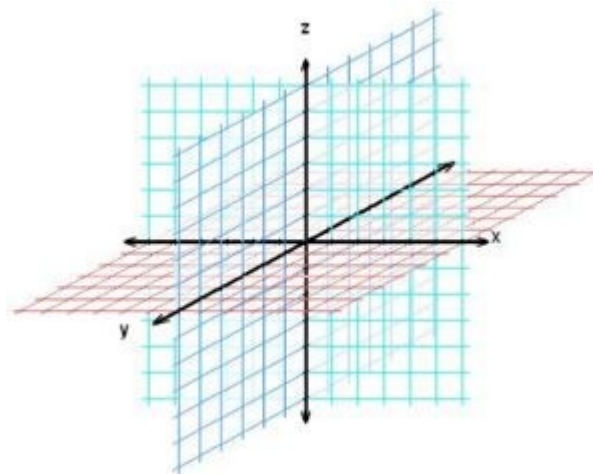
- Web based information gathering
 - Online registration
 - Require built-in verification and allow corrections.
-
- Spreadsheets allow users to manipulate values and see instant calculations on their input.
 - Users can define formula and restrict data types which can be entered.

Point-and-click Interfaces

- The preferred method for Multimedia and web browsers.
- Related to the WIMP style.
- Point-and-click navigation was popularised by hypertext links and the web.

3D Interfaces

- Three dimensional interfaces are usually associated with virtual reality and 3D gaming.
- The z dimension is usually displayed on a two dimensional screen.
- 3D uses directional and navigational elements that we find in real life.



WIMP

= Windows Icons Menu Pointers

or

= Windows Icons Mice Pull-down menus

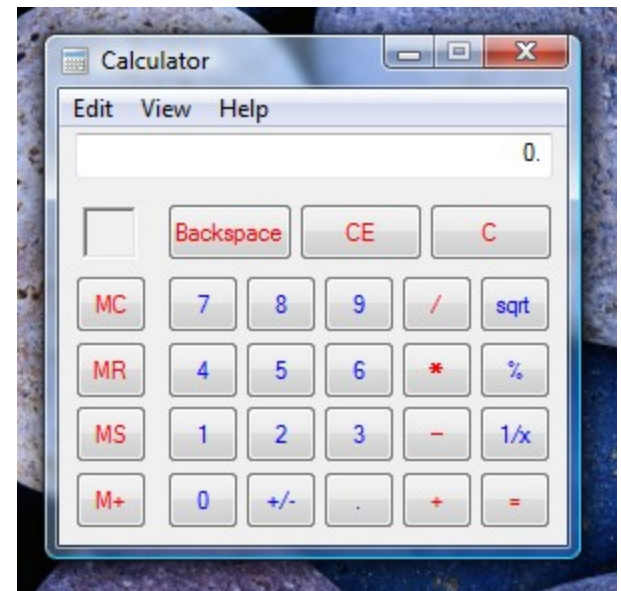
GUI operating systems

- MS Windows
- MacOS
- Linux

Windows

(not the Microsoft OS)

- Areas on the screen that behave as individual views of the system.
- Resizable, scroll bars, layering, etc.
- Create new windows.
- Close and quit windows.



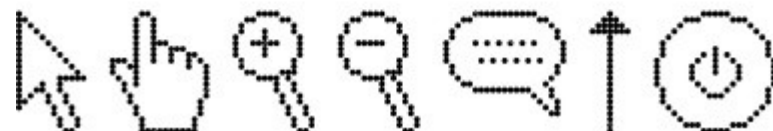
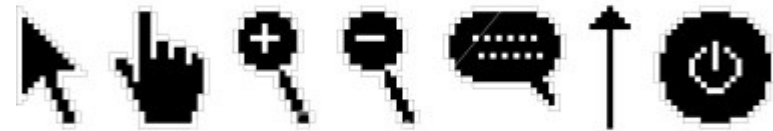
Icons

- Small picture used to represent a file or program or service (waste basket).
- The icon is usually is a realistic representation of the object.



Pointers (Mouse)

- The WIMP interface relies heavily on the mouse/trackball/touch pad.
- The pointer is represented by a cursor on the screen.
- The cursor style can change when different actions are to be carried out.
 - Links
 - Inserting text
 - Moving items



Menus (Pull-down menus)

- A choice of options arranged in hierarchical order.
- The names of the options provide clues to their features and submenus.
- Menus are inefficient when there are too many items.
- Cascading menus are used when there are many items.

Other Elements of WIMP

- Buttons
- Toolbars
- Palettes
- Dialog boxes

Buttons

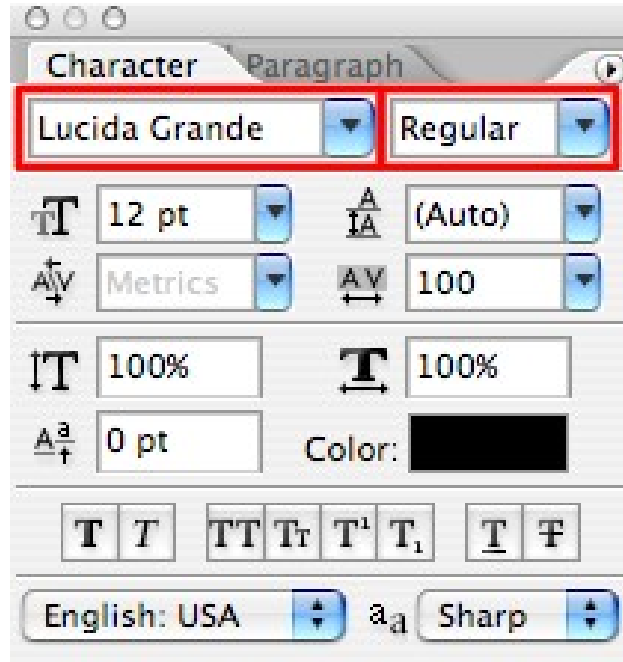
- Can be 'pushed' and usually look like they have been de-pressed.
- Usually highlight when moused over.
- Radio buttons - allow selection from one of a number of options.
- Check boxes - allow to select an on/off state.

Toolbars

- A collection of small buttons and icons.
- Usually the toolbar can be moved to a convenient location.

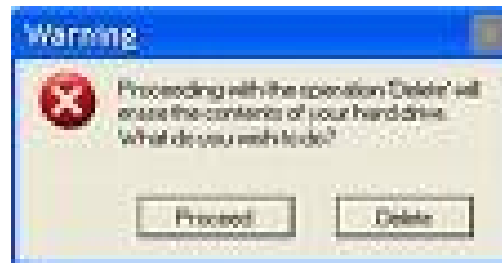
Palettes

- Sections of a menu that contain related items.
- Usually a collection of icons that visually represent the choices that can be selected.



Dialog boxes

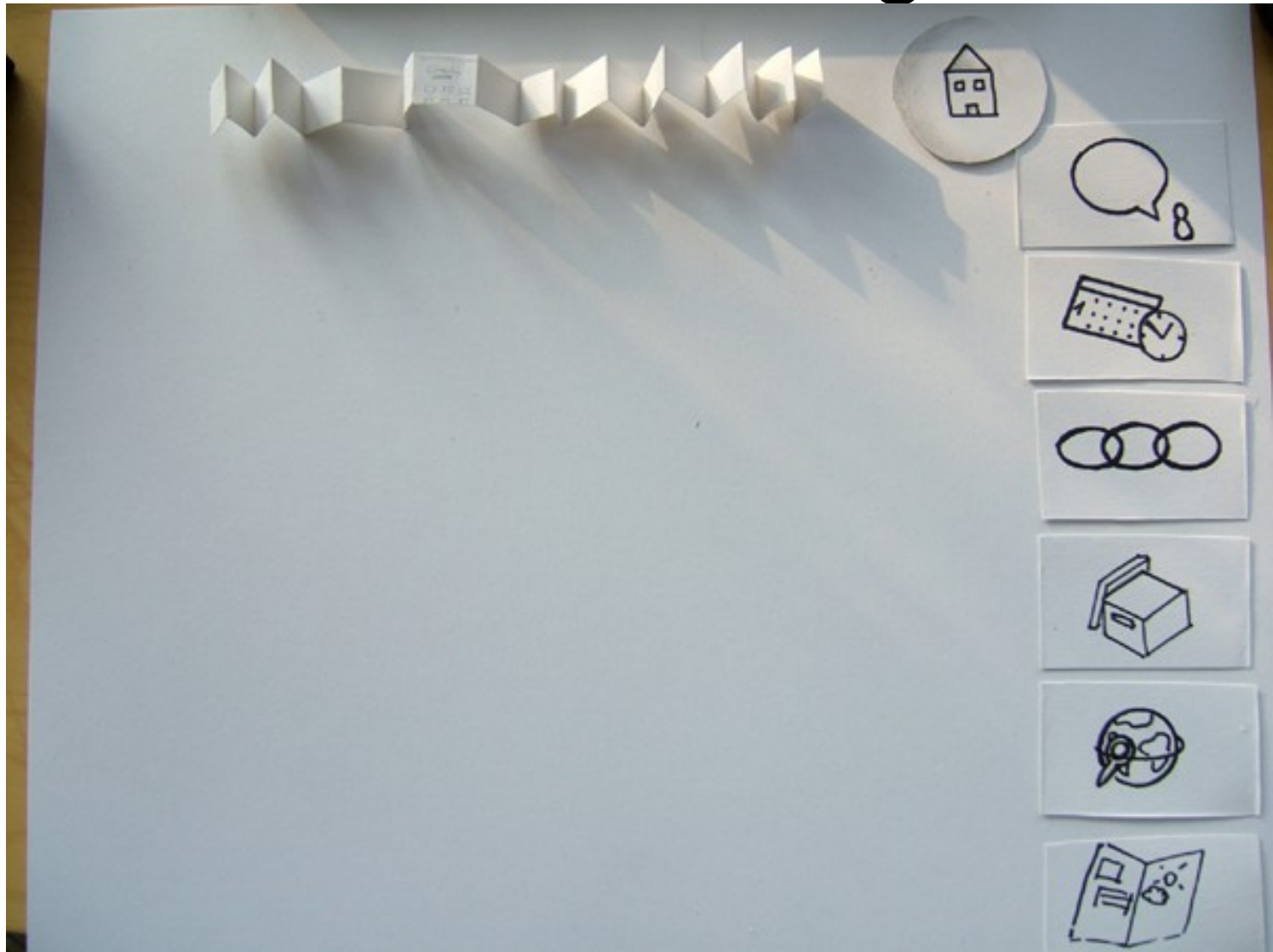
- Information that is presented to the user.
- Usually an error, warning or requiring confirmation of a task.
- May require additional information.
- Example: Saving a file, specifying a new file name.



Short-cuts

- Pointers are easy to use but can slow experienced users down.
- Clicking on an icon or drilling into a menu requires that you take your hand off the keyboard.
- Short-cuts provide quick access to the most used commands for experienced users.
 - Examples: ctrl+s ctrl+0 ctrl+x ctrl+c ctrl+v
 - Function Keys: F11 (web browser- view fullscreen)

Interface Design



Design: Match the process

- Systems should match the way people do the job, not the other way around.
- Users (not designers) should test the interface to give feedback on what does, and doesn't work.
- If the system doesn't match the way people work, they will have to figure out a "work around".

Design: Interface consistency

- One mouse click or two?
- Link colours.
- Icon and button locations.

Design: Readability

- The text must be large enough to read.
- Information must be concise
- Font types must be clear so as to distinguish between different characters.
- Lowercase is quicker to read.
- Uppercase stands out more.
- Single letters are clearer in uppercase.
(press Y or N)

Design for slow responses

- Don't assume the computer will react instantly.
- Give feedback about progress.
(ie telephone gives audio clues when dialing)

Usability:

- **Experience** is difficult to define.
- It requires our senses and our emotions.
- It may be a 'good' experience or a 'frustrating' one, or something completely different (surprise, etc.)

Don't Reinvent the Wheel!

