

Lecture 8-2: Graphical User Interfaces

- Elements of GUI Interaction Style
 - Menus
 - Depth versus Breath
 - Icons
 - Windowing Systems
 - Direct Manipulation
 - Cognitive Account of Direction Manipulation
 - Gulf of Execution / Gulf of Evaluation

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Graphical User Interfaces

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Definitions

Classifications by Display Technique

- Command Language
 - Direct instructions to computer using words, function keys, single characters, abbreviations.
 - Defined semantics and syntax
 - Examples:

```
XCOPY /F /D /E "D:\Web Sites\www.hblanchard.com\" F:\www.hblanchard.com\  
nohup find / -name "lost_file" -print >found 2> find.err  
F1
```
- Character User Interface (CUI)
 - Character-based screen display, but cursor-addressable
 - Examples: Nielsen and Molich toy application, MS-DOS only applications such as Lotus 123, etc.
- Graphical User Interface (GUI)
 - Bitmapped graphical displays

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Dialog Techniques

- Commands
- Menus
 - "A set of options displayed on the screen where the selection and execution of one (or more) of the options results in a change in the state of the interface." (Paap & Roske-Hofstrand, 1988 via Preece et al.)
- Question and Answer Dialogs
 - "Reversed" menu system, simple questions presented in sequence
 - Related to contemporary "Wizard" interface
- Forms
 - Information entered in labeled fields or elements like check boxes
- Direct Manipulation
 - Shneiderman definition quoted by Preece et al:
 - Visibility of objects of interest
 - Rapid, reversible, incremental actions
 - Replacement of complex command language syntax by direct manipulation of the object of interest

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Defining Elements of GUIs

- Menus
- Icons
 - Pictorial representations of objects, commands, processes, programs, options, etc. -- replacing or supplementing words
- Windows
 - Overlapping Windows
 - Tiled Windows
- Direct Manipulation
 - Pointing Device
 - Objects selected and moved on-screen to execute tasks
- Displays using pictures, diagrams, graphics, font techniques
- Metaphor
 - Desktop

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Brief History of the GUI

- Doug Engelbart (1960s) - Stanford Research Institute
 - Invention of Mouse and Windows
- Alan Kay (1970s) - Xerox PARC - Smalltalk, Dynabook
 - Overlapping Windows
 - Patent also owned by Bell Labs for Unix terminals
- Xerox PARC - Xerox Star and Alto workstations
 - Never commercially successful
- Steve Jobs (Apple) works out deal for detailed tour and briefing of Xerox PARC technology (1979)
- Apple Lisa (1980s) - precursor of Mac fails miserably
- Apple Macintosh (1984) - first commercially successful window system
- MIT X-window system opens door to Unix workstation window systems
- MS Windows introduced as MS-DOS application
 - Prompts famous Apple look-and-feel lawsuits which ultimately fail
- MS Windows 3.X becomes commercially accepted and successful

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Xerox Star Interface and Alto Workstation

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Guiding Principles of the Apple Lisa

1980 Apple Marketing Requirements (From Perkins, 1990)

- Fun to use, friendly, rewarding
- Minimal user training
- One standard method of interacting with a user in handling text, numbers, and graphics
- Gradual learning: user can do important tasks easily with minimal instruction, sophisticated features will be unobtrusive until they are needed
- Errors will be handled consistently in a friendly manner
- User will be protected from obvious errors
- personalization
- Allow the user to put computer on hold to attend to other tasks
- Graphics and "intuitive icons"

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Lisa Prototype Screens

- <http://home.san.rr.com/deans/prototypes.html>

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