CTT534 – Thiết Kế Giao Diện
HK II 2013 – 2014

Interaction Styles

5/5/2014

Outline

- Interaction styles
  - Menus
  - Fill-in form
  - Direct manipulation
  - Command language
  - Function keys
  - Question and answer
  - Natural language
- Comparison of interaction styles

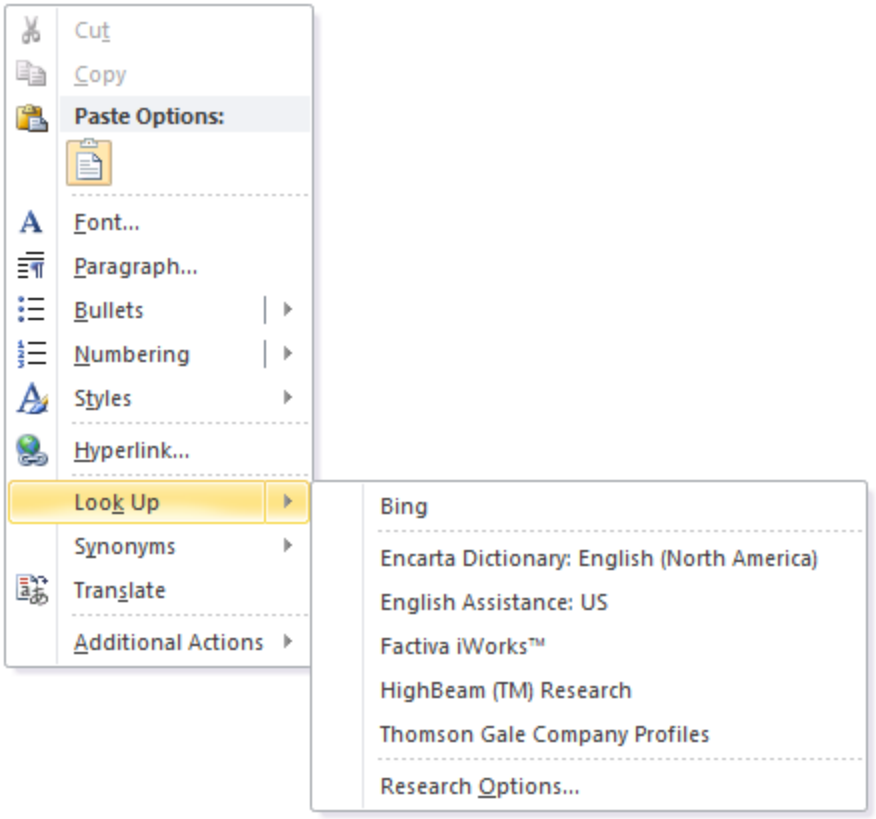
Dialog types

- Menu selection
  - Discriminator of options, recognition over recall
- Form Fill-in
  - Integrator of data values, higher skill, more flexible
- Question & Answer
  - Series of values, easy for untrained
- Function Keys
  - Hardware, software or labels
- Command Language
  - Naming and syntax issues

Dialog types (cont'd)

- Query Language
  - Specialized command language
- Natural Language
  - Most general purpose for untrained users
- Direct Manipulation
  - Physical properties reflected in objects
- Virtual Reality, Multimedia & Animation
  - Complete, realistic, interactive spaces
- Combinations of the above

Menu


Cut
Copy
Paste Options:
Font...
Paragraph...
Bullets
Numbering
Styles
Hyperlink...
Look Up
Synonyms
Translate
Additional Actions
Bing
Encarta Dictionary: English (North America)
English Assistance: US
Factiva iWorks™
HighBeam (TM) Research
Thomson Gale Company Profiles
Research Options...

Advantages of menu

- Self-explanatory
  - Reduces need for manuals
  - Requires little or no training
  - Makes both semantics and syntax explicit
- Requires little memory
  - Recognition vs. recall
- Few keystrokes
  - Less opportunity for user input error
- Easy error handling
  - Only limited valid inputs at any point
- Enhancements are visible

Disadvantages of menu

- Inefficient for experts and high frequency users
- Inflexible
  - System controlled
  - Forced choice
- Take up screen ‘real estate’
  - Only limited valid inputs at any point

When to use menu?

- Menu is most appropriate for
  - User psychology
    - Negative attitude
    - Low motivation
  - Knowledge and experience
    - Low typing skill
    - Little system experience
    - Low task experience
    - Low application experience
    - Frequent use of other systems
    - Low computer literacy
- Job and task characteristics
    - Low frequency of use
    - Little or no training
    - Discretionary use
    - High turnover rate
    - Low task importance, but high task structure

Menu design guidelines: structure

- Create logical, distinctive categories with clear meanings

Which is better?

CHOOSE ONE:

__ General Information
__ Set Selection Criteria
__ Refine Selection List
__ Course Descriptions
__ Scheduling
__ Special Functions

CHOOSE ONE:

__ View Requirements
__ View Status
__ Search Course Offerings
__ Plan a Schedule

Menu design guidelines: structure

- Menu items should be brief, consistent in grammatical style and placement, and matched with corresponding menu titles

Student Registration

__ List all requirements and student transcript
__ Courses by term offered
__ Suggested schedule to complete requirement
__ Help

Term Selection

__ Help
__ Spring
__ Fall
__ Winter
__ Summer

Which is better?

Student Registration

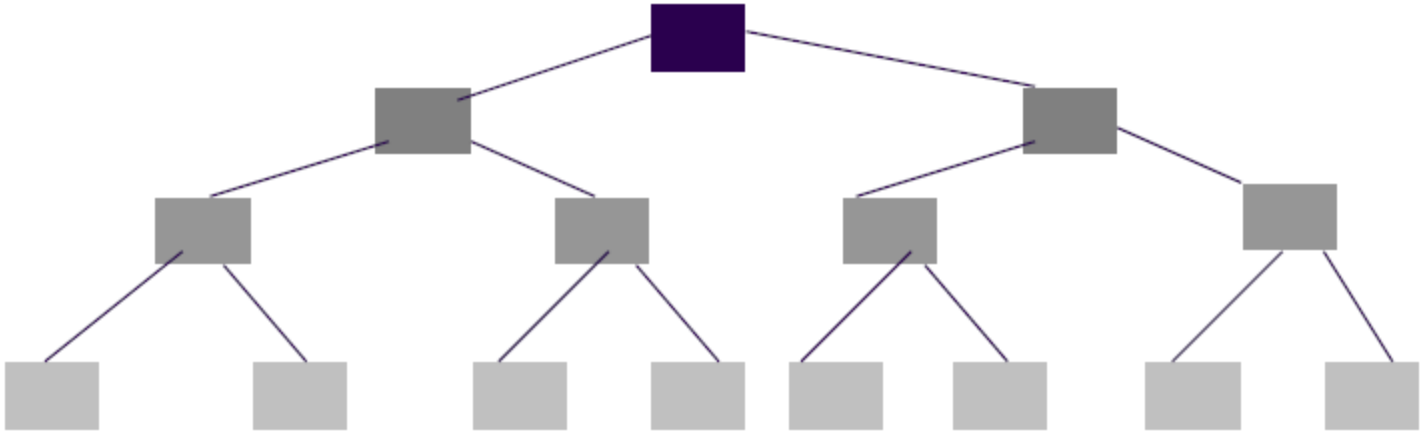
__ View requirements
__ Search courses offerings
__ Build schedule
__ HELP

Search Course Offerings

__ Spring
__ Fall
__ Winter
__ Summer
__ HELP

Menu design guidelines: structure

- Minimize menu hierarchy depth at the expense of breadth
- If going deep → slow response time



Menu design guidelines: ordering

- Order menu items according to functional groups, frequency of use, order of use and/or alphabetical order

E-Mail (grouped functionally)

__ Send
__ Forward
__ Distribute

__ Save
__ Copy
__ Move

__ Print
__ Read

E-Mail (grouped by frequency of use)

__ Read
__ Forward
__ Send
__ Copy

__ Save
__ Print
__ Distribute

E-Mail (grouped in order of use)

__ Read
__ Forward
__ Print
__ Save

__ Send
__ Distribute
__ Copy
__ Move

E-Mail (grouped alphabetically)

__ Copy
__ Distribute
__ Forward
__ Move

__ Print
__ Read
__ Save
__ Send

Menu design guidelines: navigation

- Establish conventions for menu design and apply them consistently on all menu screens

Student Registration

__ View requirements
__ Search courses offerings
__ Build schedule
__ HELP

Term Selection:
Enter Item #:___
Press RETURN to accept
1. HELP
2. SPRING
3. FALL
4. WINTER
5. SUMMER

Which is better

Student Registration

__ View requirements
__ Search courses offerings
__ Build schedule
__ HELP

Search course offerings

__ Spring
__ Fall
__ Winter
__ Summer
__ HELP

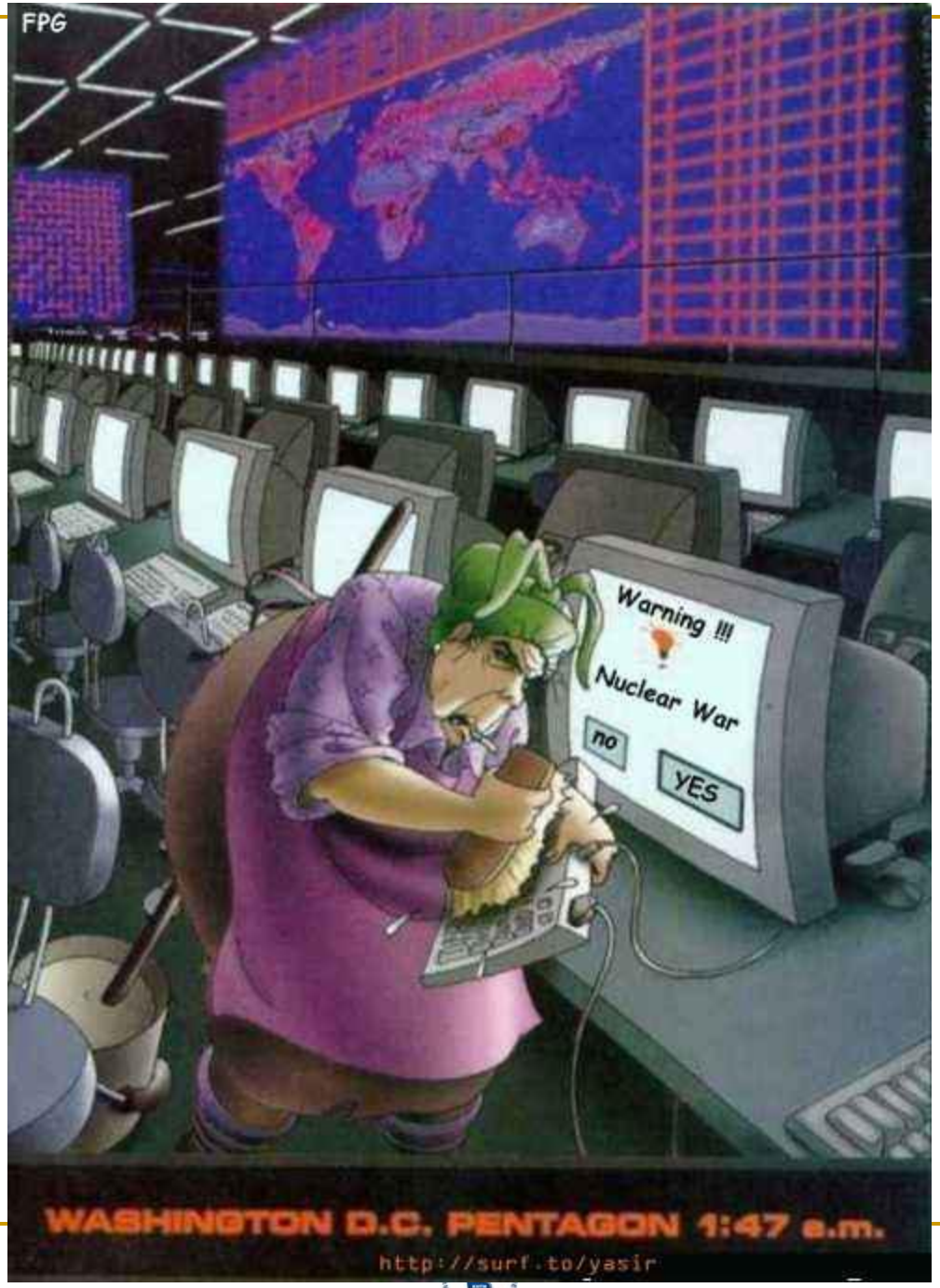
Between the menu on the left and right

Menu design guidelines

- Use task semantics to organize menus
- Prefer broad and shallow menus to narrow and deep ones
- Show position by graphics, numbers, or titles
- Use items as titles for sub trees
- Group items meaningfully
- Use brief items, begin with the keyword
- Use consistent grammar, layout, terminology

Menu design guidelines

- Allow type ahead, jump ahead, or other short cuts
- Enable jumps to previous and main menu
- Consider
  - online help
  - novel selection mechanisms
  - optimal response time, display rate
  - screen size


FPG
Warning !!!
Nuclear War
no
YES
WASHINGTON D.C. PENTAGON 1:47 a.m.
http://surf.to/yasir

Outline

- Interaction styles
  - Menus
  - Fill-in form
  - Direct manipulation
  - Command language
  - Function keys
  - Question and answer
  - Natural language
- Comparison of interaction styles

Fill-in forms

- These are especially useful for tasks where keyboard typing is better suited
- These are also useful when many fields of data are necessary
- Full complement of information is provided to the user

Fill-in forms

Advantages of fill-in forms

- Self-explanatory
  - reduces need for manuals
  - requires little or no training
  - makes both semantics and syntax explicit
- Requires little memory
  - recognition vs. recall
- Efficient use of screen “real-estate”
- Accommodates parameters with many possible values
- Provide context

Disadvantages of fill-in forms

- Assumes knowledge of valid inputs (semantic knowledge)
- Assumes typing skills and knowledge of special keys (e.g. TAB, RETURN, BACKSPACE)
- Required type-in creates opportunities for user error

When to use fill-in forms?

- Fill-in form is most appropriate for
  - User psychology
    - negative or neutral attitude
    - low to moderate motivation
  - Knowledge and experience
    - moderate to high typing skill
    - little to moderate system experience
    - moderate to high task experience
    - low to moderate application experience
    - moderate to frequent use of other systems
    - moderate to high computer literacy

Guidelines for fill-in forms

- Meaningful title
- Comprehensible instructions
- Logical grouping and sequencing of fields
- Visually appealing layout of the form
- Familiar field labels
- Consistent terminology and abbreviations

Guidelines for fill-in forms

- Visible space and boundaries for data-entry fields
- Convenient cursor movement
- Error correction for individual characters and entire fields
- Error prevention where possible
- Error messages for unacceptable values
- Marking of optional fields
- Explanatory messages for fields
- Completion signal to support user control


EVERYTHING THESE DAYS IS DOT-COM THIS AND DOT-NET THAT! I JUST CAN'T STAND IT ANYMORE!!!
I KNOW A WEB SITE THAT CAN HELP YOU...
GLASBERGEN
© 2000 Randy Glasbergen. www.glasbergen.com E-mail: randy@glasbergen.com

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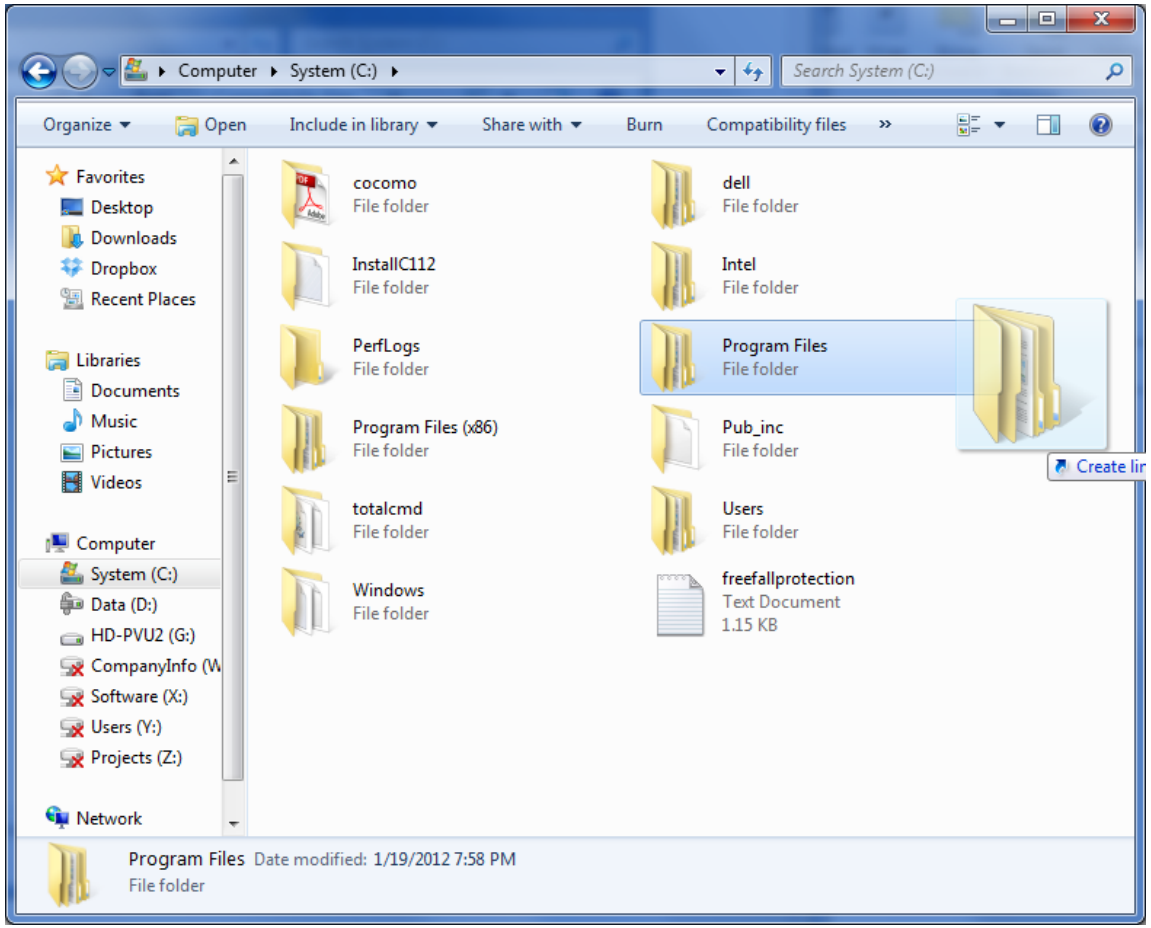
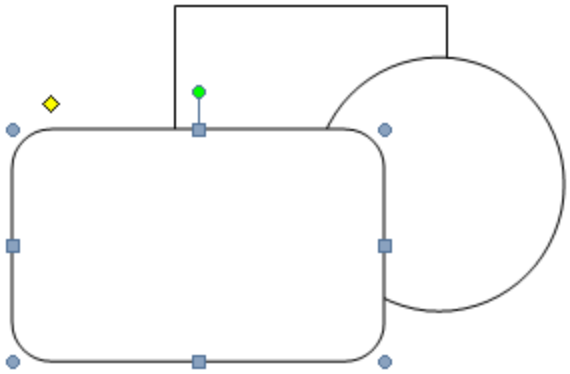
Direct manipulation

- Visual representation of the “world of actions”.
  - Objects and actions are shown.
  - Taps analogical reasoning.
- Rapid, incremental, and reversible actions.
- Replace typing with pointing/selecting.
- Immediate visibility of results of actions.

Direct manipulation - Example





Other examples

- Flight simulator
- Display-based text editor
- Personnel system
- Database query-by-example
- Video games
- CAD
- Programming of industrial robots
- Office automation systems
- Windowing systems
- Visual programming
- Touch-screen kiosk
- Touch-screen phones

Direct manipulation (cont'd)

- Benefits
  - Control/display compatibility.
  - Less syntax reduces error rates.
  - Faster learning and higher retention.
  - Encourages exploration.
- Concerns
  - Increased system resources, possibly.
  - Some actions may be cumbersome.
  - Macro techniques are often weak.
  - History/tracing may be difficult.
  - Visually impaired users have more difficulty.

Advantages of direct manipulation

- Easy to learn and remember
- Direct, intuitive, WYSIWYG
  - allows user to focus on task semantics rather than on system semantics and syntax
- Flexible, easily reversible actions
- Provides context and instant visual feedback
- Exploits human use of visual and spatial cues
- Low typing requirements and visual feedback means less opportunity for user error

Disadvantages of direct manipulation

- Can be inefficient for high frequency expert users and when there are more actions and objects than can be fit on one screen
- May be difficult to design recognizable icons for many objects and actions
- Icons take more screen real estate than words

When to use direct manipulation?

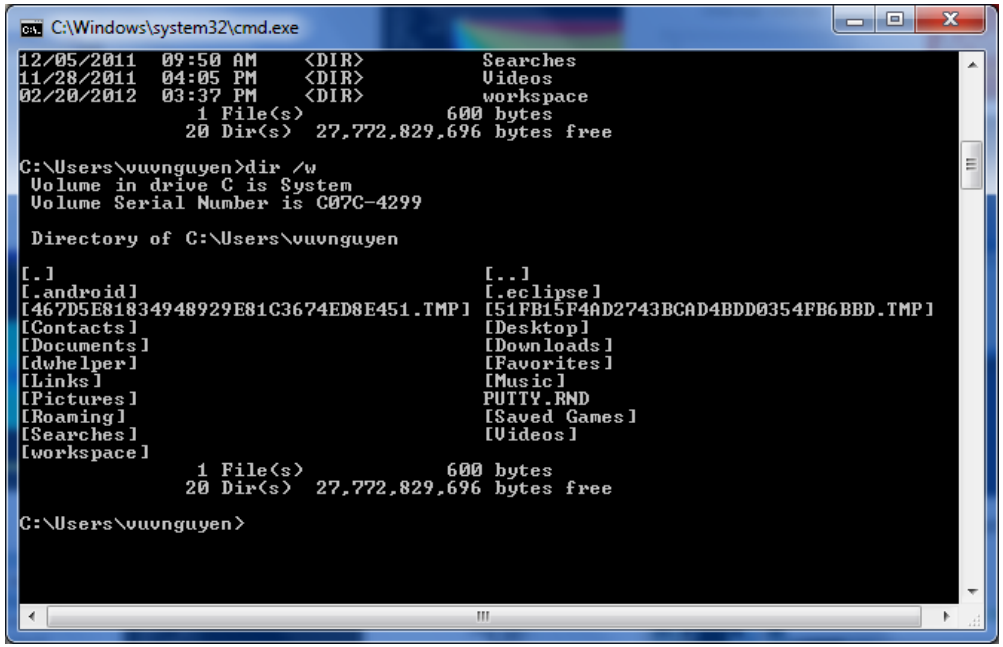
- Most appropriate for:
  - User psychology
    - Negative attitude
    - Low motivation
  - Knowledge and experience
    - Low typing skill
    - Low system experience
    - Low task experience
    - High frequency of use of other systems
    - Low computer literacy
  - Job and task characteristics
    - Low frequency of use
    - Little or no training
    - Discretionary use
    - High turnover rate
    - Low task importance
    - Low task structure

DM design guidelines

- Provide alternative interface for high frequency and expert users
- Choose a consistent icon design scheme
  - Depict “before and after”
  - Depict tool
  - Depict action
- Accompany icons with names
- Provide visual feedback for position selection and movement, and physical feedback for modes

Command language

- Interact with computer using text or voice commands
- Rely on naming and syntax
- Examples
  - Commands on DOS
  - Commands on UNIX



Advantages and disadvantages

- Advantages
  - Flexibility
  - Supports user initiative
  - Appeals to “power users”
  - Potentially rapid for complex tasks
  - Supports macro capability
- Disadvantages
  - Requires substantial training and memorization
  - Difficult to retain
  - Poor error handling

MS-DOS	Linux and Unix
attrib	chmod
backup	tar
dir	ls
cls	clear
copy	cp
del	rm
deltree	rm -R rmdir
edit	vi pico
format	fdformat, mount, and umount
move and rename	mv
type	less <file>
cd	cd chdir
more < file	more file
md	mkdir
win	startx

Command language guidelines

- Create explicit model of objects and actions
- Choose meaningful, specific, distinctive names
- Support consistent abbreviation rules
  - prefer truncation to one letter
- Offer frequent users the capability to create macros
- Limit number of commands and ways of accomplishing a task

- Consider command menus on high-speed displays

Function keys

- Dedicated function keys
  - F1, Esc, Window key, etc.
- Soft function keys (labels onscreen).
  - Self-explanatory
  - Easy to use
  - Flexible
  - Requires little human memory
  - Little or no onscreen real estate needed
  - Limited typing requirement

Function keys (cont'd)

- Concerns
  - Limited number of function keys exist
  - Application-specific
  - Inconsistence among applications
    - Ctrl + F on Office and Outlook
- Guidelines
  - Gray-out non-applicable functions
  - Combination of keys
    - E.g., Ctrl + Alt + Del, Ctrl + C
    - Keys should be easy to reach
    - Consistent grammar
      - E.g., Ctrl for special, Alt for alternative pointing methods

Question and answer style

- Combines some features of menus and fill-in forms
- User is posed with a single question, e.g.,
  - Wizard dialog
  - Prompt for missing parameters
- Appropriate for lowly-motivated, less-experienced users
- Requires little training

Q&A style example

This is Artificial Intelligence **Corporation's Intellect Query System**. I'm ready to answer questions about the employee file

```
Please enter your first request:
=> What's in the database?
Fields in the file of Employees:
Name        Job         Salary          Sex
Age         Family      City            State
```

Q&A style example (cont'd)

Next request:

=> Who works in New York City?

Print the job and name of all employees with City = New York.

Occupation	**Name**
Machinist	Angelin
Physician	Angus

Natural language interaction style

- Interact with computer using natural spoken or written language
- Examples
  - Voice command for GPS to find gas stations, food, directions, etc.
  - Google search voice command box

Natural language interaction style

- Limitations
  - Reducing syntactic load is not enough
  - Computer and task semantics are the hard part
    - Predicate calculus, Boolean algebra
    - Set theory, normalization theory
    - Database entities and values
    - Permissible operations and constraints
  - NLI often shows too little context
    - “world of action”

When to use NLI?

- NLI may work best for
  - Users who are knowledgeable about the task domain
  - Intermittent users who cannot retain syntax
  - Users with moderate computer skills
  - Limited access to other interaction styles
    - E.g., Voice used while driving
    - Disabled people, e.g., those cannot type

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Interaction style summary

User Profile | Dialog Style

User Psychology	Menu	Fill-in Forms	Question & Answer	Command Language
Attitude	Negative	Negative Neutral	Negative	Positive
Motivation	Low	Low Moderate	Low	High

Interaction style summary (cont'd)

Knowledge & Experience	Menu	Fill-in Forms	Question & Answer	Command Language
Typing Skill	Low	Moderate High	Moderate High	Moderate High
System Experience	Low	Low Moderate	Low Moderate	High
Task Experience	Low	Moderate High	Low	High
Application Experience	Low	Low Moderate	Moderate	High
Use of Other Systems	Frequent	Moderate Frequent	Moderate Frequent	Infrequent
Computer Literacy	Low	Moderate High	Low	High

Interaction style summary (cont'd)

User Profile

Dialog Style

User Psychology	Function Keys	Direct Manipulation	Natural Language
Attitude	Negative	Negative	Negative
Motivation	Low	Low	Low

Interaction style summary (cont'd)

Knowledge & Experience	Function Keys	Direct Manipulation	Natural Language
Typing Skill	Low	Low	High
System Experience	Low	Low	Low
Task Experience	Moderate High	Low	High
Application Experience	Moderate	Low	Low
Use of Other Systems	Low	High	High
Computer Literacy	Moderate High	Low	Low

Interaction style summary (cont'd)

Task Characteristics	Menu	Fill-in Forms	Question & Answer	Command Language
Frequency of Use	Low	Moderate High	Low	High
Primary Training	Little or none	Little or None	Little or None	Formal
System Use	Discretionary	Discretionary	Discretionary	Mandatory
Turnover Rate	High	Low Moderate	High	Low
Other Systems		Paper forms		
Task Importance	Low	Moderate	Low	High
Task Structure	High	High	High	Low

Interaction style summary (cont'd)

Task Characteristics	Function Keys	Direct Manipulation	Natural Language
Frequency of Use	Low	Low	Low
Primary Training	Little or none	Little or none	Little or none
System Use	Discretionary	Discretionary	Discretionary
Turnover Rate	Moderate	High	High
Other Systems			
Task Importance	Moderate	Low	Low
Task Structure	Low Moderate	Low	Low

Summary

- Interaction styles
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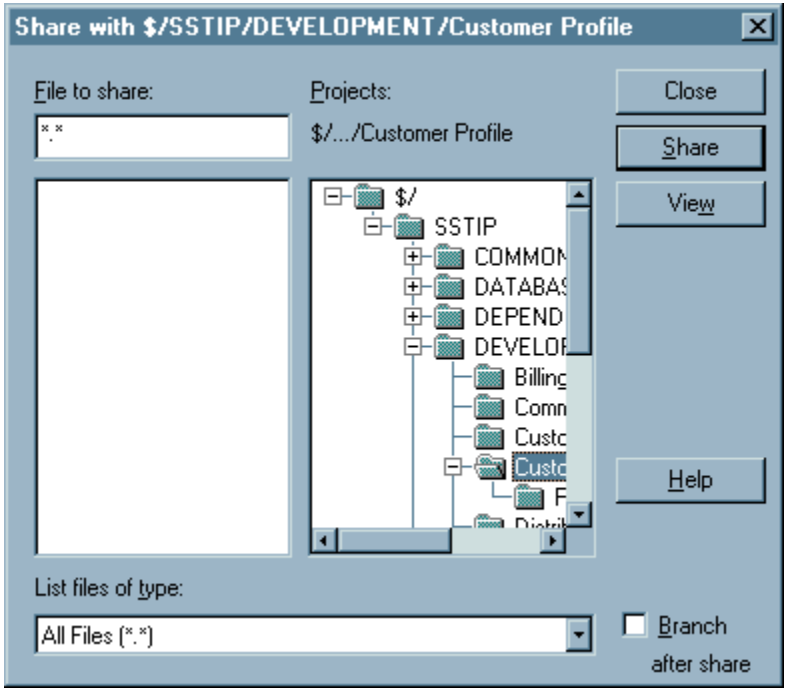
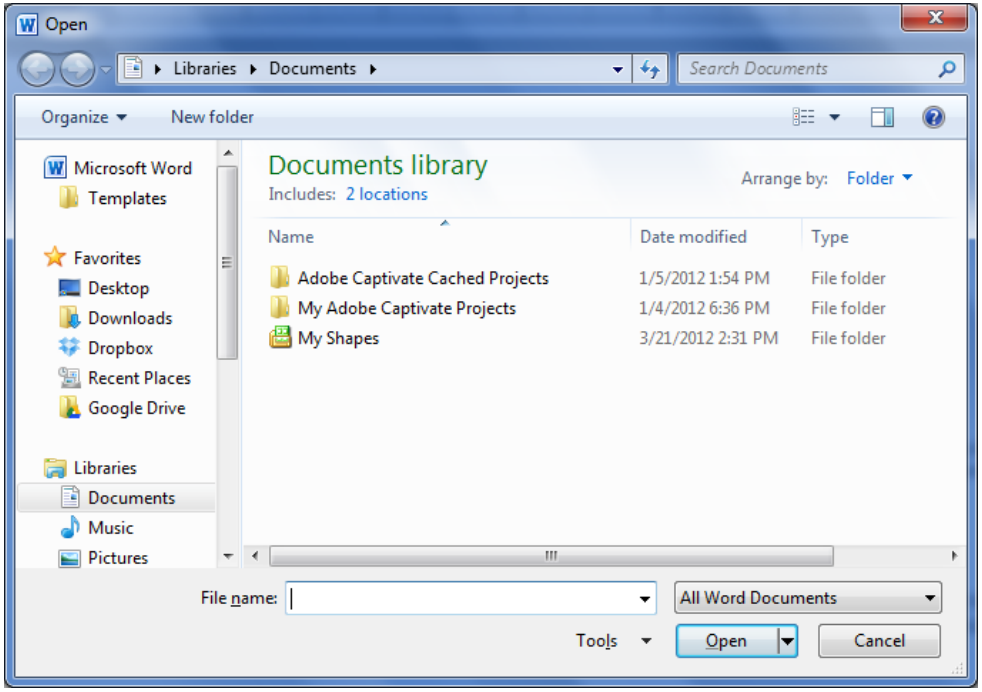
UI Hall of fame or shame

- MS Visual SourceSafe 5.0



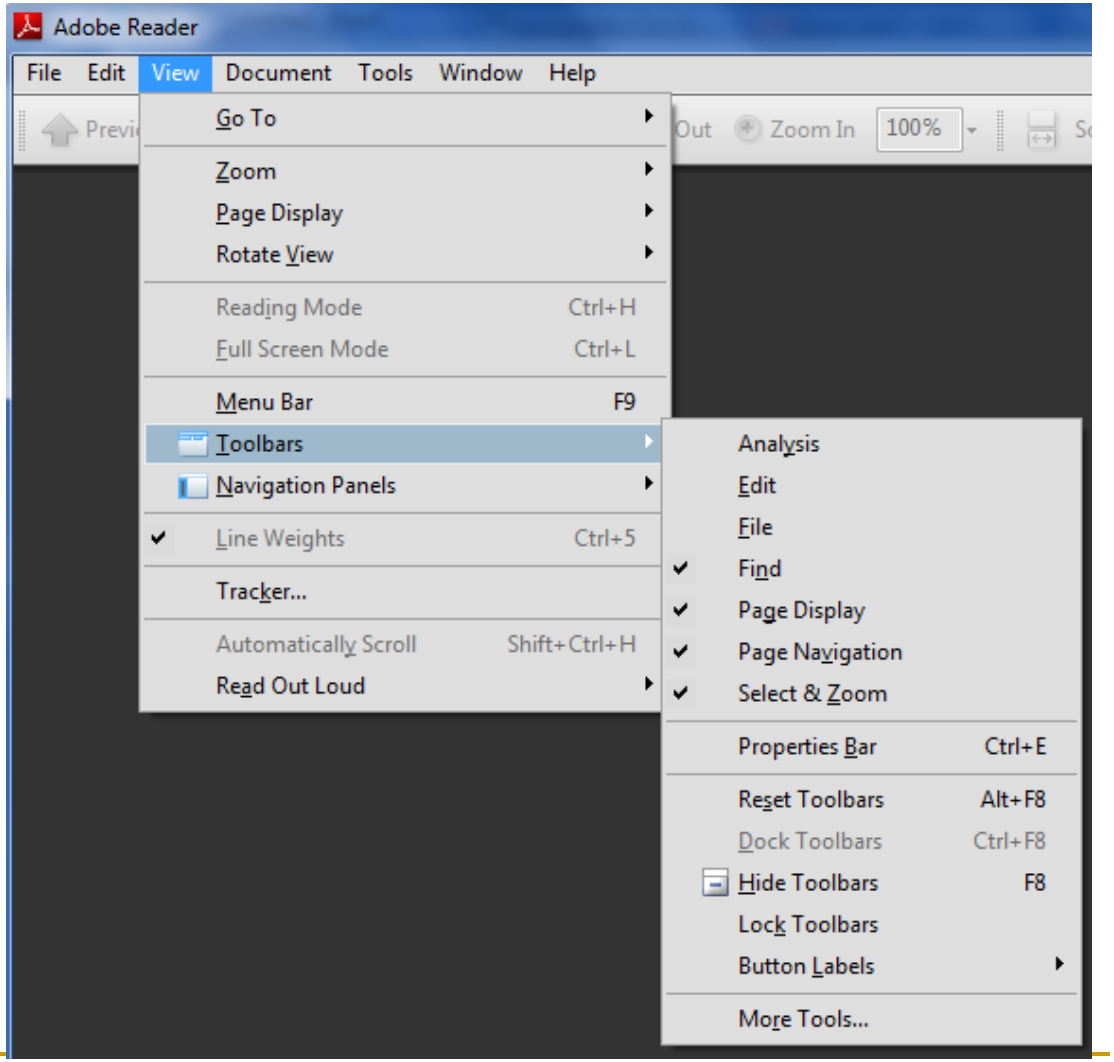
Open dialog of MS Word 2010



Source: Interface Hall of Shame

UI Hall of fame or shame

- Adobe reader



Video

- Augmented reality and magic
  http://www.youtube.com/watch?v=C4pHP-pgwlI