Interaction Style and Screen Design

- Interaction Style Design
  - Menu
  - Fill-in Form
  - Natural Language
  - Command Language
  - Window & Icon
- Screen Design
Menu

List of **options** from which user **selects** the desired choice

**OFFICE AUTOMATION**

Move cursor to selection:
- Word processing
- Electronic mail
- Spreadsheet
- Graphics

Press RETURN to accept

**WORD PROCESSING**

1. Create
2. Edit
3. Print
4. File

Enter selection #: __

Press RETURN to accept

There are a number of different possible selection techniques for menu systems. Menu items can be moved up and down and the cursor can move through or box by each selection item, or through the selection item itself.
Menu

Advantages:

- **Self-explanatory**: Easy to learn - make both the semantics (what can be done) and the syntax (how to do it) explicit
- **Require little human memory**: Users need not to remember command names as the interface always presents all valid options; Menus rely on recognition rather than recall memory
- **Few keystrokes**: Typing effort is minimal ⇒ less user error
- **Easy error handling**: Limited set of valid inputs at any one time
- **Enhancements are visible**: If we add new functions into the system, they will appear on the menu screen
Menu

- Disadvantages:
  - **Inefficient**: In a complex menu system with many choices on each screen and many levels in the hierarchy ⇒ Difficult to find the desired function
  - **Inflexible**: Menus also force a user through set sequences of steps; The dialog is system rather than user controlled to a greater extent
  - **Impractical for numerous choices**: If there are too many options at any one time, this may make a menu dialog style to become too complex ⇒ Difficult to read & respond
  - **Take up screen space**: It will compete with other aspects of a display

**Can we overcome the disadvantages of menu?**
Menu

Menu Types:

- Single Menus
- Linear Sequence
- Tree Structure
- Acyclic Network
- Cyclic Network
Menu

- Single menu
  - Allow users to choose between 2 or more items, or multiple selections
  - Remain permanent or in a pop up mode

1. Binary menu: allow users to choose between 2 options
   - E.g., choice of “Yes” or “No”

- Radio button
- Button choice
Menu

2. **Multiple** item menu: allow users to choose between >2 options
   - E.g., choice of marital status

<table>
<thead>
<tr>
<th>What is your marital status?</th>
</tr>
</thead>
<tbody>
<tr>
<td>◯ Single ◯ Married ◯ Widowed/divorced/separated</td>
</tr>
</tbody>
</table>

3. **Multiple** selection menu: allow selection of one or more items
   - Convenient for handling multiple choices since user is able to scan the full list of items while deciding
Menu

4. **Pull-down** menu: always available to the user by making selections on a top menu bar
   - Allow keyboard shortcuts, e.g., expert can use “Ctrl C” for copying
Menu

5. **Pop-up menu:** appear on a display in response to a click with a pointing device
6. **Fisheye menu:** allow rapid selection in a very large menu
Menu

7. Two-dimensional menu: a multiple column menu which allows rapid selection among numerous items
Menu

8. Embedded menu: items are embedded in text or graphics
   - Permit items to be viewed in context & eliminate the need for a distracting & screen-wasting enumeration of items
   - Keep users focused on their tasks & on objects of interest
Menu

- Combinations of multiple menus
  1. **Linear** menu sequence: guide users through a series of choices in which they see a sequence of menus:
Menu

2. **Simultaneous** menus: present multiple active menus at the same time and allow users to enter choices in any order.
3. **Tree-structured menu**: form categories of similar items to create a tree structure.
Menu

4. **Menu map menu:** avoid “getting lost” particularly in a menu tree with a large number of levels or **depth**
Menu
Design guidelines:

- **Structure**

1. Provide easy way to *tailor* menu to task structure
e.g., report of a science student will involve many
   equations, he can edit the report using WORD more
efficiently by putting the equation editor on menu bar

2. **Depth-breadth** (number of items per level) trade-off:
Menu

3. For full-screen text menu, present menu choice lists vertically.

Poor:

Improved:
4. **Consider pie-menu** for one- or two-level mouse-driven menu hierarchies

Why the pie-menu is better in this scenario?
Menu

5. Consider graying out or deletion of inactive menu items (depend on user experience)
Menu

6. Use familiar terminology, but ensure that items are distinct from one another

Poor:

<table>
<thead>
<tr>
<th>View</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Information</td>
</tr>
<tr>
<td>Set Selection Criteria</td>
</tr>
<tr>
<td>Refine Selection List</td>
</tr>
<tr>
<td>Course Descriptions</td>
</tr>
<tr>
<td>Auto Scheduling</td>
</tr>
<tr>
<td>Scheduling</td>
</tr>
<tr>
<td>Special Functions</td>
</tr>
</tbody>
</table>

Improved:

<table>
<thead>
<tr>
<th>View</th>
</tr>
</thead>
<tbody>
<tr>
<td>View Course Requirements</td>
</tr>
<tr>
<td>View Transcript</td>
</tr>
<tr>
<td>View Course Descriptions</td>
</tr>
<tr>
<td>View Current Schedule</td>
</tr>
<tr>
<td>Search</td>
</tr>
<tr>
<td>Register</td>
</tr>
</tbody>
</table>

午夜後到天亮前這段時間 = 凌晨？或 清晨？

7. Labels should be **brief, consistent** in grammatical style & placement, & matched with corresponding menu titles

**Poor:**

- **STUDENT REGISTRATION**
  - List all requirements for possible majors or minors
  - Courses by term offered
  - Suggested schedule to complete requirements
  - Help

- **TERM SELECTION**
  - Help
  - Spring
  - Fall
  - Winter
  - Summer

**Improved:**

- **STUDENT REGISTRATION**
  - View Requirements
  - Search Course Offerings
  - Build Schedule
  - HELP

- **SEARCH COURSE OFFERINGS**
  - Select a term:
    - Spring
    - Fall
    - Winter
    - Summer
    - HELP
8. Consider menu choice descriptors, e.g., look-ahead & microhelp (increase satisfaction & decrease error)
Menu

- Choice ordering

  - Convention: months of the year, days of the week, numbers, sizes

  - Frequency of use: choices are listed in order of expected frequency of use, e.g., Help users are expected to most often consult the general Help index

  - Order of use: choices are listed in the order users are expected to use them in a sequence

  - Categorical: choices are grouped according to semantic property

  - Alphabetic: choices are simply listed in alphabetic order
Menu

- Choice selection

1. For keyboard-driven menu:

   - **Cursor**: advantage - ease of learning & comfort, disadvantage - slow for many items

   - **Mnemonic** letters: advantages - fast, no change when adding new items (e.g., “e” for “edit”)

   - **Numbers**: fast, need change if adding new items

   - **Non-mnemonic** letters: fast, need change if adding new items
Menu

Cursor:

OFFICE AUTOMATION
Move cursor to selection:

- Word processing
- Electronic mail
- Spreadsheet
- Graphics

Press RETURN to accept

Mnemonic letters:

OFFICE AUTOMATION
W. Word processing
E. Electronic mail
S. Spreadsheet
G. Graphics
Enter selection: W
Press RETURN to accept

Numbers:

OFFICE AUTOMATION
1. Word Processing
2. Electronic mail
3. Spreadsheet
4. Graphics

Enter selection: 3
Press RETURN to accept

Nonmnemonic letters:

OFFICE AUTOMATION
A. Word processing
B. Electronic mail
C. Spreadsheet
D. Graphics
Enter selection: A
Press RETURN to accept
Menu

- Never start with zero

- Left justification

- Well labelled selection field appear below the choices

- Best: combine cursor movement with mnemonic letter codes

- Provide menu select defaults when possible
Menu

- Examples:

**Poor:**

```
MUSIC
- Blues    - Opera
- Classical - Popular
- Country  - Reggae
- Folk     - Rock
- Jazz     - Show tunes
Move cursor with ARROW keys
Select with EXECUTE key
```

**Still poor:**

```
MUSIC
Enter selection:
- Blues 0  Opera  3
- Classical 1  Popular  6
- Country 2  Reggae  7
- Folk 3  Rock  8
- Jazz 4  Show tunes  9
Press EXECUTE to accept
```

**Better:**

```
MUSIC
1. Blues  6. Opera
2. Classical 7. Popular
4. Folk 9. Rock
5. Jazz 10. Show tunes
Enter selection:
Press EXECUTE to accept
```

**Best:**

```
MUSIC
- Blues    - Opera
- Classical - Popular
- Country  - Reggae
- Folk     - Rock
- Jazz     - Show tunes
Enter first letter of choice OR
Move cursor with ARROW keys
Select with EXECUTE key
```
Menu

2. Distinguish between “choose one” and “choose many” menus (allow users to choose the choices in one pass).

Choose one:

Choose many:

3. Provide menu selection feedback
Menu

- Invocation

1. **Permanent** menus are more preferred
2. Pop-up or **user invoked** menus for expert users & situation where screen space is small
Menu

- Navigation

1. Establish **conventions** for menu design & apply them consistently on all menu screens within a system
Use menu maps, or place markers as navigation aids in complex menu systems

- **Menu map** is the overview of menu hierarchy
- **Place marker** is a symbol to signify the position
Menu

3. Facilitate *backward* navigation or allow jumps to previous and main menu

- **Layout**

1. Menu designers should establish guidelines for consistency of at least these menu components:
   - **Title** - centered or left justification is acceptable
   - **Item** - item is left justified with item number or letter preceding the item description; blank lines (& other methods, such as box or border) should be used to separate meaningful groups of items
   - **Instructions / error messages** - should be identical in each menu, & should be placed in same position
Fill-in Form

Similar to paper fill-in form

Field for typing in data

Caption for each field to indicate data type

Possible data types: user-typed strings, user choices from a list, default values, required and optional values, & dependent values
Fill-in Form

- Advantages:
  - Self-explanatory
  - Require little memory
  - **Efficient use of screen real estate**: traditional menu system asks only one question per screen; with fill-in form, multi-questions can be asked on one screen
  - Accommodate parameters with many possible input values
  - **Provide context**: because there are usually several or many fill-in fields on a single screen, users can get a board context information
  - Enhancements are visible
Fill-in Form

- Disadvantages:
  - Assume knowledge of valid input
e.g., “Married:__” (Y/N)? or (S/M)?.
e.g., “Size” UK or US standards?
  - Assume typing skill \(\Rightarrow\) more user error
  - Assume knowledge of special keys: in keyboard
    driven case, users need to use “Tab”, “Cursor key”,
    “Return”, “Backspace”
  - Inflexible: most fill-in forms make it difficult to fill in
    fields in any order other than the order in which the
    fields appear

Can we overcome the disadvantages of fill-in form?
Fill-in Form

Design guidelines:

- **Organization & layout**

2. Organize the form to **support** task

   e.g., if the fill-in form is an online version of the paper form ⇒ both layouts should be similar, such as credit card application form

   e.g., search engine ⇒ allow user to input information in a flexible order, such as “human computer interaction” = “computer human interaction”
Fill-in Form

3. Organize groups of items by:

- **Categorical grouping**
- **Sequence of uses**: order of the fields according to the familiar order
- **Frequency of uses**: most frequently filled-in fields located at the top of groups, e.g., document name
- **Relative importance**: most important fields located at the top of groups; optional fields should appear at the bottom

Avoid presenting name and address fields in an unfamiliar order, such as:

<table>
<thead>
<tr>
<th>Last Name:</th>
<th>Street:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zip:</td>
<td>State:</td>
</tr>
<tr>
<td>City:</td>
<td>First name:</td>
</tr>
<tr>
<td></td>
<td>Middle name:</td>
</tr>
<tr>
<td></td>
<td>Street:</td>
</tr>
</tbody>
</table>
Fill-in Form

3. Use **white** space to create balance and symmetry

4. **Separate** logical groups by spaces, lines, color or other visual cues
Fill-in Form

- Caption & field design

1. For single fields, place the caption to left; for listed fields place the caption above, left justified above alpha lists, right justified above numeric lists

2. Provide distinctive field group & section headings in complex form
Fill-in Form

3. Distinguish captions from fields

4. Brief, familiar & descriptive captions
e.g., Telephone Number or Phone?
e.g., First line of street address or Address Line 1?

5. Indicate when fields are optional
Fill-in Form

- **Input format**

1. Provide system *completion* of unambiguous partial input
   - e.g., “Ja” or “1” ⇒ January
   - e.g., “Jun” ⇒ June

2. When user moves the cursor to the next field, the *completed* information in the previous field should be displayed

3. Provide *default* whenever possible

4. Should be *case blind*
Fill-in Form

5. Avoid complex rules for entering data in various fields of a form e.g., provide relevant fields which depend on users.

**Poor:**
- Name: John Doe
- Age: 23
- Senior citizen discount: □ _%

**Better:**
- Name: John Doe
- Age: 23
- (Fill-in only if age ≥ 65)
- Senior citizen discount: □ _%

**Best:**
- Name: John Doe
- Age: 23
- Senior citizen discount: □ _%
6. Meaningful groupings to break up long input formats e.g., Break the input into groups of three to four characters separate by space, dashes, etc., e.g., "EMP-SAL-235" is better than "EMPSAL235"

<table>
<thead>
<tr>
<th>Poor</th>
<th>Improved</th>
</tr>
</thead>
<tbody>
<tr>
<td>DATE:____________ (e.g.1/12/90)</td>
<td>DATE: <strong>/</strong>/__ (e.g.011290)</td>
</tr>
<tr>
<td>DATE:____________ (e.g.011290)</td>
<td></td>
</tr>
<tr>
<td>TIME:____________ (e.g.8:15AM)</td>
<td>DATE: __:__pm (e.g.0815am)</td>
</tr>
<tr>
<td>TIME:____________ (e.g.0815am)</td>
<td></td>
</tr>
<tr>
<td>CARD #:____________________ (1234567891234567)</td>
<td>CARD #:<strong><strong>-</strong></strong>-<strong><strong>-</strong></strong> (1234567891234567)</td>
</tr>
</tbody>
</table>
Fill-in Form

7. For display of fields:
   - Alphabetic fields are customarily left justified on entry & on display
   - Numeric fields may be left justified on entry but then become right justified on display
   - Avoid entry & display of leftmost zeros in numeric fields
   - Numeric fields with decimal points should line up on the decimal points
   - Special attention on
     Phone number: (_ _ _) _ _ _ _ _ _ _ _
     ID: ( _) _ _ _ _ _ _ ( _ )
     Time: _ _ : _ _ : _ _
     Date: _ _ / _ _ / _ _ _ _
Fill-in Form

- Prompt & instruction

1. Prompt should be **brief & unambiguous**

2. Place prompts to right of fields or in Microhelp line at the bottom of the screen

3. Use **consistent** terminology & consistent grammatical form & style instructions
Fill-in Form

Poor:

LOAN APPLICATION
NAME: ____________________________
(Put last name first, then first, then middle)
ADDRESS: ____________________________
(First enter street, then city, state and zip)
DATE: (MM/DD/YY) _______ AMOUNT: (XXXX.XX) ____
RATE: (XX.XX) ___ # MONTHS: (XXX) ___
TO MOVE CURSOR PRESS ARROWS
HIT ENTER TO ACCEPT INPUT

Acceptable:

LOAN APPLICATION
NAME: ____________________________
(Last, First Middle)
ADDRESS: ____________________________
(Street, City, State Zip)
DATE: __/__/__ (MM/DD/YY) AMOUNT: _______ (XXXX.XX)
RATE: ___/(XX.XX) ____ # MONTHS: ___ (XXX)

To move cursor, Press ARROWS
To accept input, Press ENTER

Improved:

LOAN APPLICATION
NAME: ____________________________
(Last, First Middle)
ADDRESS: ____________________________
(Street, City, State Zip)
DATE: __/__/__ (MM/DD/YY) AMOUNT: _______ (XXXX.XX)
RATE: ___/(XX.XX) ____ # MONTHS: ___ (XXX)

To move cursor, Press ARROWS
To accept input, Press ENTER

MicroHelp: ex.: Maybrow, Deborah J.

Improved:

LOAN APPLICATION
NAME: ____________________________
ADDRESS: ____________________________
DATE: __/__/__ AMOUNT: _______ 
RATE: ___/(XX.XX) __ # MONTHS: ___

To move cursor, Press ARROWS
To accept input, Press ENTER

MicroHelp: NAME: Enter Last, First Middle
Fill-in Form

- **Navigation**

1. When a form is first entered, position the cursor in default position
2. Vertical groups are preferable than horizontal
3. Allow forward & backward movement
4. Provide titles & page number or place maker
Fill-in Form

- Error Handling
  1. Allow user to edit individual character in fields
  2. Error messages for unacceptable values
  3. Place cursor in error field
  4. Provide semantic & syntactic information in errors messages, e.g.
    - Illegal date (poor)
    - Characters not accepted in date field (syntactic)
    - February dates range from 1 to 29 (semantic)
Natural Language

Allows user to express requests to a software applications in their native language

A keyboard as an input device & a screen as an output device are assumed, although voice input & output are possible

ACCOUNTS MANAGER

I want to find certain accounts. Invoices were sent to them in Jan. 1989.

This is what Accounts Manager understands your query to be:
Print the name of every account to which an invoice was sent during January 1989.

Is Accounts Manager's understanding:
1. Correct and complete
2. Correct but incomplete
3. Incorrect
Select one choice by number.

1

The answer to your query is:

________________________
Account Name

________________________
XYZ Manufacturing
ABC Medical Products
AAA Instruments, Inc.

Do you have any further questions on these accounts? If not, just hit the "ESC" key.
Natural Language

- Advantages:
  - Powerful, fast & efficient: a simple command can set many functions
  - Flexible & user controlled
  - Use small screen space
  - Easy to learn & remember
Natural Language

- Disadvantages:
  - Assume typing skill ⇒ more user error
  - Enhancements are invisible
  - Vagueness & ambiguity: makes it very difficult for a machine to understand ⇒ may need to lengthy confirmation & clarification dialogs (In real word, much of our half of the conversation involves repeating & clarifying with our conversation parties)
  - Expensive to implement
Natural Language

Design guidelines:

1. Use consistent familiar terminology & simple brief grammatical form
e.g., “This is what I...” & “Your request...”)

2. Provide cooperative responses
e.g., handling simple errors: july or june for “jule”

3. Provide an optional clarification dialog

4. Distinguish between user input & system output with white space & visual cues

5. Provide a way to view dialog history

6. Provide instruction for navigation
Natural Language

- Example:

```
show all projects begun in july
I can't parse your request as it is.
Perhaps you have made a typing error
somewhere. Please try again.
show all projects begun in july.
This is what I understand your
query to be: List projects with
start date in July:
Is this correct? Y or N.
Y
Project    Start Date
Mars       July 2
Jupiter     July 20
Pluto      July 29
Who is the project leader of
Jupiter?
Your request is interpreted as
follows: List the project leader of
Project Jupiter: Is this correct?
Y or N.
Y
Project    Project Leader
Jupiter    Vader, Darth
```

```
> show all projects begun in july
Can't recognize "july". Choose one:
1 July
2 June
3 Enter word
4 Cancel query
> 1 REQUEST: List projects with
start date = July:
PROJECT START DATE
Mars       July 2
Jupiter    July 20
Pluto      July 29
> Who is the project leader of
Jupiter?
REQUEST: List project leader for
project = Jupiter:
PROJECT PROJECT LEADER
Jupiter    Vader, Darth
```

For instructions, Press HELP
To submit request, Press RETURN
To scroll, Press ARROWS
To cancel and quit, Press ESC
To save and quit, Press EXECUTE

Poor

Improved
Command Language

Original, traditional style of human-computer interface
User types in requests through an artificial language with its own unique semantics, vocabulary & syntax, e.g., “ping”, “rm”, “ls”

- Advantages:
  - Powerful, fast & efficient: a few keystrokes can express complex command
  - Flexible & user controlled
  - Use minimal screen space

- Disadvantages:
  - Difficult to learn & remember
  - Assume typing skill
  - Enhancements are invisible
Command Language

Design guidelines:
1. Provide consistency in syntax
e.g., VolB!FileA! & FileA!VolB!
2. Use action-object syntax, e.g., “del file.doc”
3. Avoid arbitrary use of punctuation
4. Allow defaulting of optional parameters
5. Command name abbreviation: simple & consistent

<table>
<thead>
<tr>
<th>Poor:</th>
<th>Improved:</th>
</tr>
</thead>
<tbody>
<tr>
<td>VolB!FileA!D$$</td>
<td>search (for) filea (in) volb.</td>
</tr>
<tr>
<td>FileA!VolB!ER$L!:KO!:*$$</td>
<td>open filea (in) volb. list all lines with &quot;KO&quot;.</td>
</tr>
<tr>
<td></td>
<td>OR</td>
</tr>
<tr>
<td></td>
<td>s filea volb.</td>
</tr>
<tr>
<td></td>
<td>o filea volb. lal &quot;KO&quot;.</td>
</tr>
</tbody>
</table>

## Command Language

<table>
<thead>
<tr>
<th>Name</th>
<th>Abbreviations</th>
<th>Abbreviations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Move forward</strong></td>
<td>MovF</td>
<td>MovF</td>
</tr>
<tr>
<td><strong>Move backward</strong></td>
<td>Mvb</td>
<td>MovB</td>
</tr>
<tr>
<td><strong>Insert</strong></td>
<td>I</td>
<td>Ins</td>
</tr>
<tr>
<td><strong>Delete</strong></td>
<td>Dl</td>
<td>Del</td>
</tr>
<tr>
<td><strong>Replace</strong></td>
<td>Repl</td>
<td>Rep</td>
</tr>
<tr>
<td><strong>Search</strong></td>
<td>Srch</td>
<td>Sea</td>
</tr>
<tr>
<td><strong>Delete</strong></td>
<td>X</td>
<td>Del</td>
</tr>
<tr>
<td><strong>Send</strong></td>
<td>Sn</td>
<td>Sen</td>
</tr>
<tr>
<td><strong>Print</strong></td>
<td>Prt</td>
<td>Pri</td>
</tr>
<tr>
<td><strong>Search</strong></td>
<td>Srch</td>
<td>Sea</td>
</tr>
<tr>
<td><strong>Send</strong></td>
<td>Sn</td>
<td>Sen</td>
</tr>
<tr>
<td><strong>Find</strong></td>
<td>Fi</td>
<td>Fin</td>
</tr>
<tr>
<td><strong>Choose</strong></td>
<td>Ch</td>
<td>Cho</td>
</tr>
</tbody>
</table>
Windows & Icons

- Advantages:
  - Easy to learn & remember
  - Flexible, easily reversible actions
  - Provide context, instant, visual feedback
  - Less error prone

- Disadvantages:
  - Can be inefficient
  - e.g., file copying in a directory with many files
  - May be difficult to design recognizable icons: e.g., How to design the icons, especially for actions, such as, "save", "quit", "change" or "undo"
Windows & Icons

Types of icons

- **Resemblance**: depict the underlying concept through an analogous image

- **Exemplar**: represents a typical example of a class of objects

- **Symbolic**: used to convey an underlying referent that is at a higher level of abstraction than the image

- **Arbitrary**: an arbitrary image → must be learned
Windows & Icons

Design guidelines:

1. Choose a **consistent** icon design scheme.
   e.g., In “Poor”, “magnify” is designed by depicting a **before & after representation**; “cut” is designed by depicting **tool that is used to accomplish operation**; “paint” is designed by depicting **action**. In “Improved”, all are designed by depicting **the tool that is used to accomplish the operation**.
## Windows & Icons

### 2. Design icons to be concrete & familiar

<table>
<thead>
<tr>
<th>Concrete/Familiar</th>
<th>Abstract/Unfamiliar</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Folder</strong></td>
<td>![Folder Icon]</td>
</tr>
<tr>
<td><strong>Telephone Book</strong></td>
<td>![Telephone Icon]</td>
</tr>
<tr>
<td><strong>Clock</strong></td>
<td>![Clock Icon]</td>
</tr>
<tr>
<td><strong>Database</strong></td>
<td>![Database Icon]</td>
</tr>
</tbody>
</table>

### 3. Design icons in a set to be visually & conceptually distinct

<table>
<thead>
<tr>
<th></th>
<th>Dictionary</th>
<th>Phonebook</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Conceptual similarity</strong></td>
<td>![Dictionary Icon]</td>
<td>![Phonebook Icon]</td>
</tr>
<tr>
<td><strong>Conceptual distinctiveness</strong></td>
<td>![Aardvark Icon]</td>
<td>![Aardvark Icon]</td>
</tr>
<tr>
<td><strong>Visual similarity</strong></td>
<td>![Aardvark Icon]</td>
<td>![Aardvark Icon]</td>
</tr>
<tr>
<td><strong>Visual distinctiveness</strong></td>
<td>![Aardvark Icon]</td>
<td>![Aardvark Icon]</td>
</tr>
</tbody>
</table>
## Windows & Icons

4. Avoid excessive detail in icon design

5. Design Icons to communicate object relations & attributes whenever possible

<table>
<thead>
<tr>
<th>Poor:</th>
<th>Improved:</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Poor Icon" /></td>
<td><img src="image2" alt="Improved Icon" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Poor:</th>
<th>Improved:</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image3" alt="Poor Icon" /></td>
<td><img src="image4" alt="Improved Icon" /></td>
</tr>
</tbody>
</table>

6. Accompany icons with **names**
Screen Design

Layout design guidelines:

1. Include ONLY/ALL information essential to decision making

2. Start in the upper-left corner (eye-tracking studies show that the eye tends to go to the upper-left corner of a display)

3. Consistent format

4. Group items logically (user can easily locate the items or fields)
Screen Design

5. Provide symmetry & balance through the use of white space

6. Avoid heavy use of all uppercase letters

7. Distinguish captions & fields
Screen Design

- **Text design guidelines:**

1. **Message**
   - Should be *brief & concise* (1)
   - Design the level of detail according to users' knowledge & experience (2)
   - Express message in the *affirmative* (3)
   - Should be *constructive*, not critical (4)
   - Should be *specific* & comprehensible (5)
   - Should imply that user is in *control* (6)
   - When message implies a necessary action, use words in message consistent with that action e.g., *There is no entry on the field?*  
     *The field is empty?*
     *Please fill in the field?*
### Screen Design

<table>
<thead>
<tr>
<th>Poor:</th>
<th>Improved:</th>
</tr>
</thead>
<tbody>
<tr>
<td>The processing of the text editor yielded 23 pages of output</td>
<td>Output 23 pages</td>
</tr>
<tr>
<td>Error in DRESS SIZE field</td>
<td>Error: DRESS SIZE range is 4 to 16</td>
</tr>
<tr>
<td>Cannot exit before saving file</td>
<td>Save file before exiting</td>
</tr>
<tr>
<td>Bad/illegal/invalid file name</td>
<td>Maximum file name length is 8 characters</td>
</tr>
<tr>
<td>Syntax error 1542</td>
<td>Unmatched left parenthesis in line 210</td>
</tr>
<tr>
<td>Enter command</td>
<td>Ready for command</td>
</tr>
</tbody>
</table>
Screen Design

2. Instructional prompts
   - Place prompts when & where needed (1)
   - Design the level of detail according to the users’ knowledge & experience (2)
   - Use active voice (3)
   - Avoid negatives (4)
   - Order prompts chronologically (5)
   - Format prompts using white space or other visual cues (6)
   - Apply consistency (7)

<table>
<thead>
<tr>
<th></th>
<th>Position cursor and press return</th>
<th>Position cursor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Press return to accept</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SIZE: ___ (4 to 16)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>To send message, Press TRANSMIT</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Complete entry before returning to menu</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Enter address, then page forward</td>
<td></td>
</tr>
<tr>
<td></td>
<td>To go up, Press BACKTAB</td>
<td></td>
</tr>
<tr>
<td></td>
<td>To go down, Press TAB</td>
<td></td>
</tr>
<tr>
<td></td>
<td>For up, Press U</td>
<td></td>
</tr>
<tr>
<td></td>
<td>For down, Press D</td>
<td></td>
</tr>
</tbody>
</table>
Screen Design

3. Instructions

- Make text simple & clear
- Use short sentences & simple & familiar words
- Keep paragraphs & separate them by at least one blank line
- Avoid hyphenation
- Avoid right justifying with unequal spacing

SCROLLING

There are three ways to scroll.

FIRST, move the cursor using the ARROW keys. When you reach any edge of the screen, the text will scroll.

If you reach the right edge, the text will scroll to the left. If you reach the bottom edge, text will scroll up, etc.

SECOND, the NEXT and PREV keys scroll by page.
## Screen Design

4. Screen number

- Right justify integers
- Decimal-align real numbers
- Avoid leading zero whey unnecessary & non-standard
- Break up long numbers into groups of 3 to 4 digits
- Use standard separators when they apply; otherwise use spaces

<table>
<thead>
<tr>
<th>Poor:</th>
<th>Improved:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>1,000</td>
<td>1,000</td>
</tr>
<tr>
<td>10,000</td>
<td>10,000</td>
</tr>
<tr>
<td>100.00</td>
<td>5,432.48</td>
</tr>
<tr>
<td>25.2563</td>
<td>1.45491</td>
</tr>
<tr>
<td>5,432.48</td>
<td>100.00</td>
</tr>
<tr>
<td>1.45491</td>
<td>25.2563</td>
</tr>
<tr>
<td>10:1 p.m</td>
<td>10:01 p.m.</td>
</tr>
<tr>
<td>02/07/87</td>
<td>2/7/87</td>
</tr>
<tr>
<td>002</td>
<td>2</td>
</tr>
<tr>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>013</td>
<td>13</td>
</tr>
<tr>
<td>6173954686</td>
<td>617-395-4686</td>
</tr>
<tr>
<td>028405554</td>
<td>028-40-5554</td>
</tr>
<tr>
<td>1234567890</td>
<td>1,234,567,890</td>
</tr>
<tr>
<td>135792468</td>
<td>135 792 468</td>
</tr>
</tbody>
</table>
Screen Design

5. Font

- Use **Georgia** or **Verdana** (Georgia and Verdana are the screen display versions of Times New Roman and Arial, respectively; Note the difference between printing on a paper, >600dpi and displaying on a screen 72-120 pixels per inch)

- Use 10 point to 12 point type

- Avoid bold or italic in body type, except for a few words for emphasis

- Use upper case only for the first word of sentences, proper names, etc.

- Use left alignment

- Use **dark** text on a light background
Screen Design

Illustration: a 12-point letter “o” is displayed in Times New Roman and Georgia. If we enlarge them:

- In Times New Roman, there are two places where pixels touch only at their corners while Georgia has a smoother appearance
- Size of Georgia is a bit larger

⇒ Georgia is a screen friendly font especially for small font sizes
Screen Design

6. Color

- Color adds an extra dimension to an interface & can help the user understand complex information structures
- No consumption on the dimension of screen
- Can be used to highlight exceptional events

RGB color model:
Screen Design

Design guidelines:
- Aware **concept** of color in different cultures:

<table>
<thead>
<tr>
<th>Concept</th>
<th>Chinese Color</th>
<th>%</th>
<th>American Color</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safe</td>
<td>Green</td>
<td>62.2</td>
<td>Green</td>
<td>61.4</td>
</tr>
<tr>
<td>Cold</td>
<td>White</td>
<td>71.5</td>
<td>Blue</td>
<td>96.1</td>
</tr>
<tr>
<td>Caution</td>
<td>Yellow</td>
<td>44.8</td>
<td>Yellow</td>
<td>81.1</td>
</tr>
<tr>
<td>Go</td>
<td>Green</td>
<td>44.7</td>
<td>Green</td>
<td>99.2</td>
</tr>
<tr>
<td>On</td>
<td>Green</td>
<td>22.3</td>
<td>Red</td>
<td>50.4</td>
</tr>
<tr>
<td>Hot</td>
<td>Red</td>
<td>31.1</td>
<td>Red</td>
<td>94.5</td>
</tr>
<tr>
<td>Danger</td>
<td>Red</td>
<td>64.7</td>
<td>Red</td>
<td>89.8</td>
</tr>
<tr>
<td>Off</td>
<td>Black</td>
<td>53.5</td>
<td>Blue</td>
<td>31.5</td>
</tr>
<tr>
<td>Stop</td>
<td>Red</td>
<td>48.5</td>
<td>Red</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Screen Design

- Make sure there is sufficient contrast between text and background colors
  e.g., avoid text and background colors that differ only in blue because human is less sensitive to this color

Offer expires 07/31/03. Offer available to new High Speed Internet subscribers only. May not be used in conjunction with any other offer. Service is not available in all areas.

<table>
<thead>
<tr>
<th>Color</th>
<th>R</th>
<th>G</th>
<th>B</th>
<th>Difference</th>
<th>Combination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Text</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Not a good combination</td>
</tr>
<tr>
<td>Yellow</td>
<td>255</td>
<td>255</td>
<td>0</td>
<td>No, No</td>
<td>Good combination</td>
</tr>
<tr>
<td>White</td>
<td>255</td>
<td>255</td>
<td>255</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Difference</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Text</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brown</td>
<td>64</td>
<td>64</td>
<td>0</td>
<td>Yes, Yes</td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>255</td>
<td>255</td>
<td>255</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Screen Design

Offer expires 07/31/03. Offer available to new High Speed Internet subscribers only. May not be used in conjunction with any other offer. Service is not available in all areas.

- Use color *sparingly*; design first in monochrome & optimize other aspects of screen layout & design, then add color only where it adds value

- Be **consistent** with color association in a system

- Use color to **draw attention**

- Use color to indicate **status**
Use of Color

- Use color to communicate organization and establish relationship

MySign

Special Deals

- Get your word out! Let people know who you are and what you’re about. Our signs will make a big impact and attract new business. The best advertising strategy you can take this year.

- Work with our award-winning designers to create eye-catching signs that communicate. Bring us your ideas and we can bring your vision to your audience. Or use your own design. All we need is a good quality photograph.

We’re to help

- What’s my choice?
- Design your sign
- Making the most impact
- What’s right for me?
Screen Design

Do they look good? Why?
7. Information presentation

- **Static** information
  - Initialized at the beginning of a session; it does not change during the session
  - May be either numeric or textual, e.g., power indicator

- **Dynamic** information
  - Change during a session & the changes must be communicated to the system user
  - May be either numeric or textual, e.g., clock
Screen Design

- Analogue & digital presentation
  - Digital presentation
    - Can be compact: take up little screen space
    - Precise values can be communicated
  - Analogue presentation
    - Easier to get an “at a glance” impression of a value
    - Possible to show relative values
    - Easier to see exceptional/extreme data values

![Graph showing data for different months: January to June. The data ranges from 2842 to 3164.]
Screen Design

8. Visual organization
Four Design principles:

▪ Proximity
  ▪ Group related content items close together
  ▪ Separate unrelated items

▪ Alignment
  ▪ Place related items along an imaginary line
  ▪ Align items of equal importance and indent subordinate items

▪ Consistency
  ▪ Make related items look the same
  ▪ Maintain high degree of uniformity in layout with a page and uniformity in layout across pages

▪ Contrast
  ▪ Make different items look different
Screen Design

Any improvement?

Dan's Clothing Store

Checkout
closeout on pink socks
Email us
July specials
Kid's clothes
Men's clothes
Open an account
Sale on rain wear
Special sizes
Store locations
Your account status
Women's clothes
Screen Design

Dan's Clothing Store

Women's clothes
Men's clothes
Kid's clothes
Special Sizes

July Specials
Sale on Rainwear
Closeout on pink socks

Store locations
Store hours

Open an account
Your account status

Checkout

Email us

Better? Which principle is used?
Screen Design

Which principle is used?
Screen Design

Good alignment maximizes the number of unbroken virtual lines

Which one is better?
Screen Design

Avoid centered alignment for lines that are of nearly equal length

Division of Computer Graphics and Animation
School of Computer Science, Telecommunications and Information Systems DePaul University

Division of Computer Graphics and Animation
School of Computer Science, Telecommunications and Information Systems
DePaul University

Which one is better?
Screen Design

Just For Kids!

Urbanville Public Library

Science and Technology
People and Places
Reading and Books
Sports

Arts and Games
Holidays and Celebrations
Search the Internet
For Parents and Teachers
Screen Design

Science and Technology

Health Science
Space and Space Travel
Math
Earth Science

Science Museums
Animals and Animal Life
General Science
Inventions and Technology
Screen Design

Which principle is used?
Screen Design

ECT/HCI 441
Trust

Sources
- Ben Schneiderman. Designing Trust into Online Experiences. CACM (December 2000) 43:12 pp. 57-60.

Inspiring Trust
- From highest to lowest:
  - Face to face
  - Phone
  - Text chat
  - Email

Sound interesting?
Screen Design

Trust

Sources

- Ben Schneiderman. Designing Trust into Online Experiences. CACM (December 2000) 43:12 pp. 57-60.

Inspiring Trust

- From highest to lowest:
  - Face to face
  - Phone
  - Text chat
  - Email

Better? Which principle is used?
Screen Design

Which principle(s) is/are used?
Screen Design

Which principle(s) is/are used?