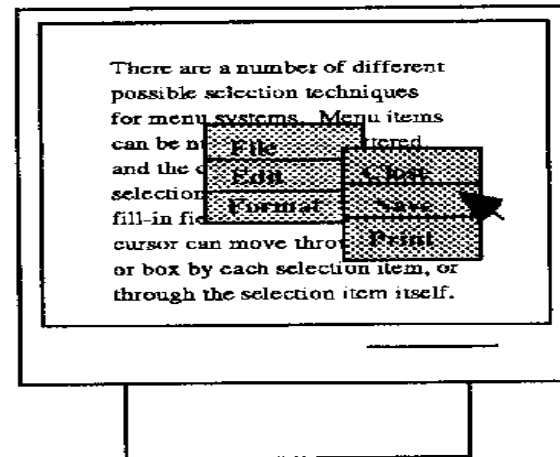
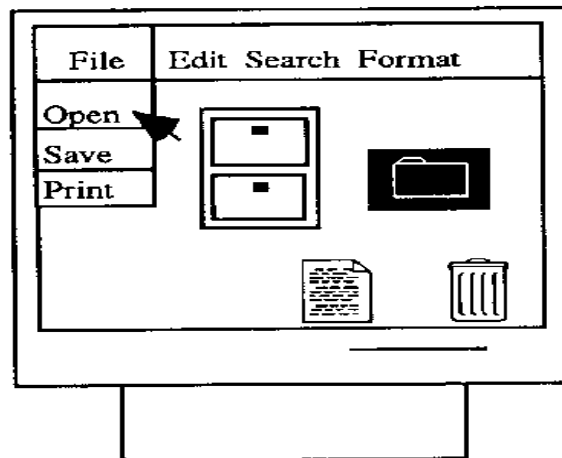
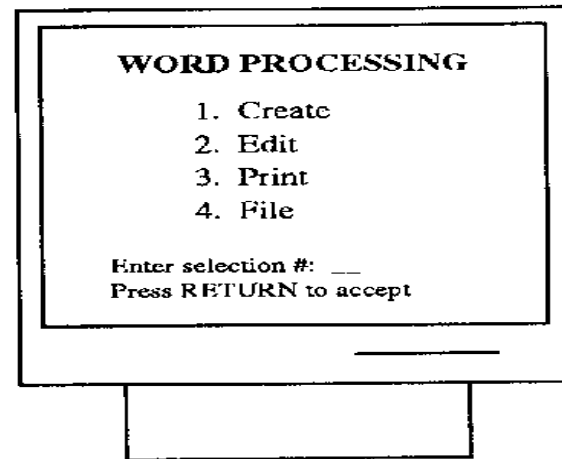
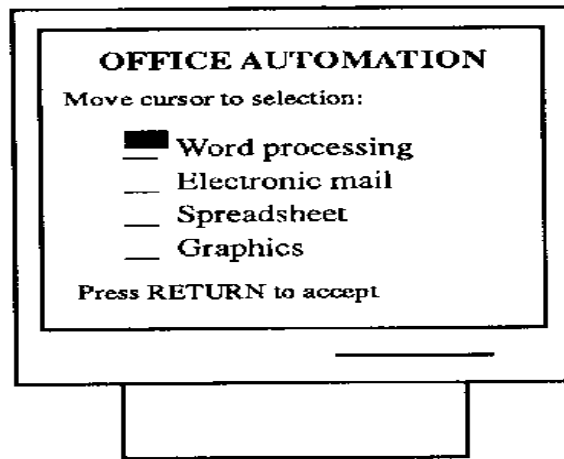


Interface Type and Screen Design

- Interface Type Design
 - Menu
 - Fill-in Form
 - Natural Language
 - Command Language
 - Window & Icon
- Screen Design

Menu

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



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 \Rightarrow 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

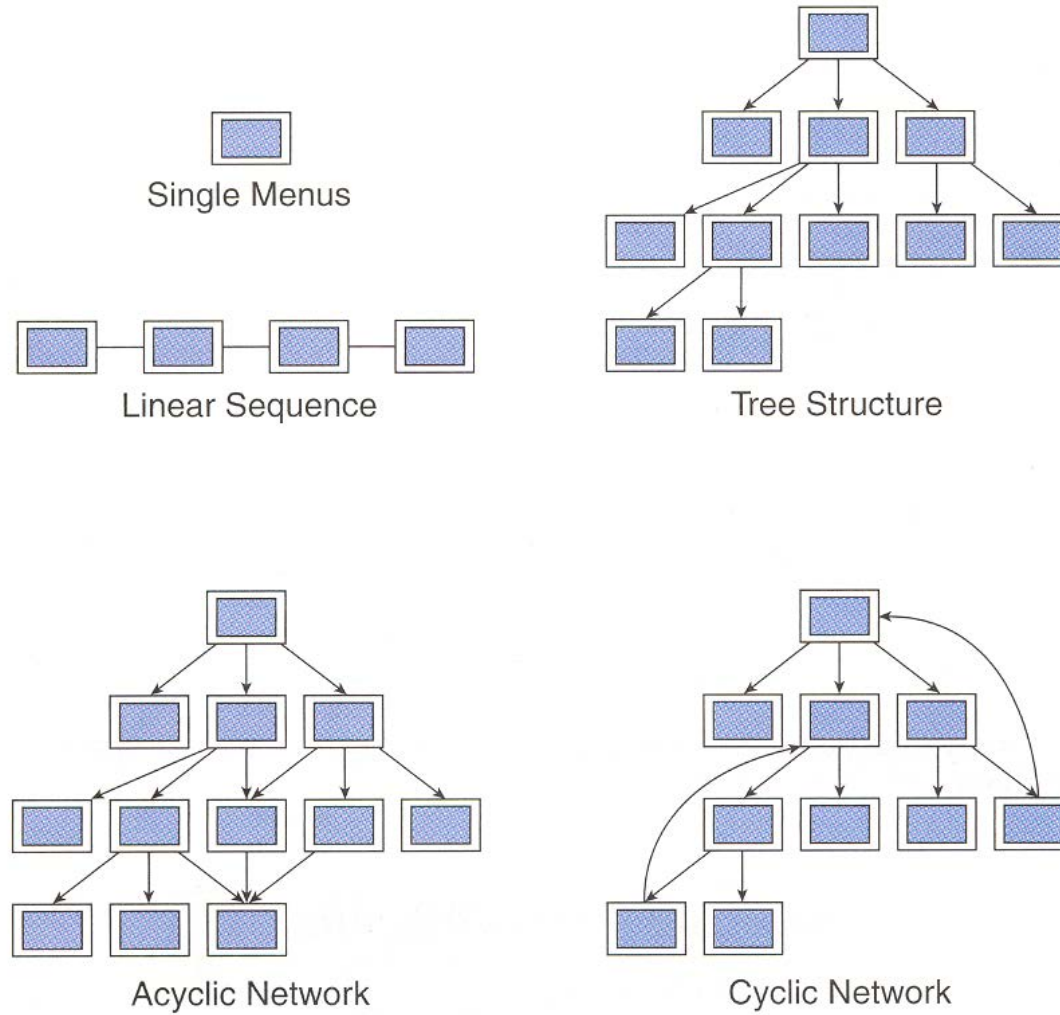
Menu

- 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:



Menu

- Single Menus: Simplest form
- Linear Sequence: Guide users through a sequence of choices, always in the same order and regardless of the choices made by the user
- Tree Structure: The sequence of menus depends on the choices made by user. This structure is conventional which allows only one way to reach each menu
- Acyclic Network: Some or all menus in the tree may be reachable by more than one sequence choices
- Cyclic Network: Special traversals may allow the user to jump around the menu tree, e.g., Web

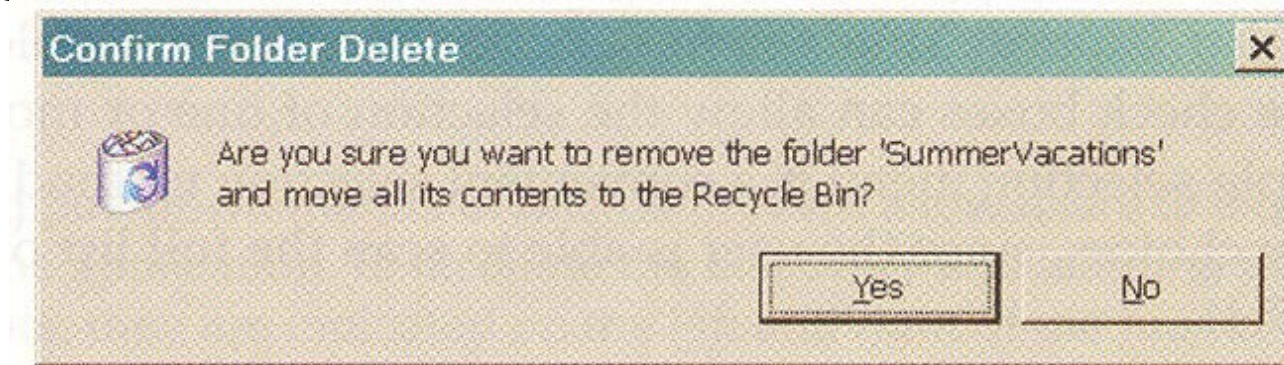
Menu

- **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

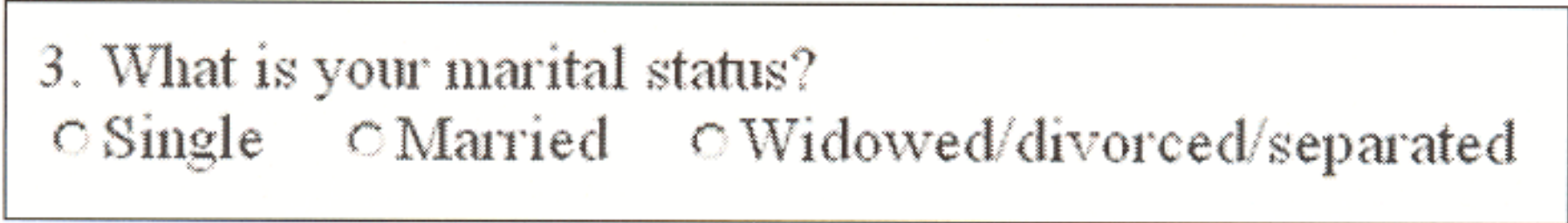
- e.g., choice of "Yes" or "No"



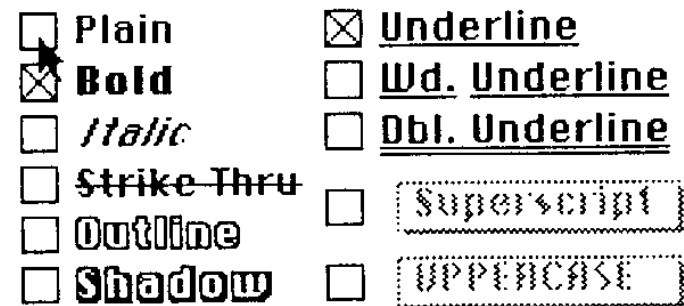
- Radio button

Menu

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

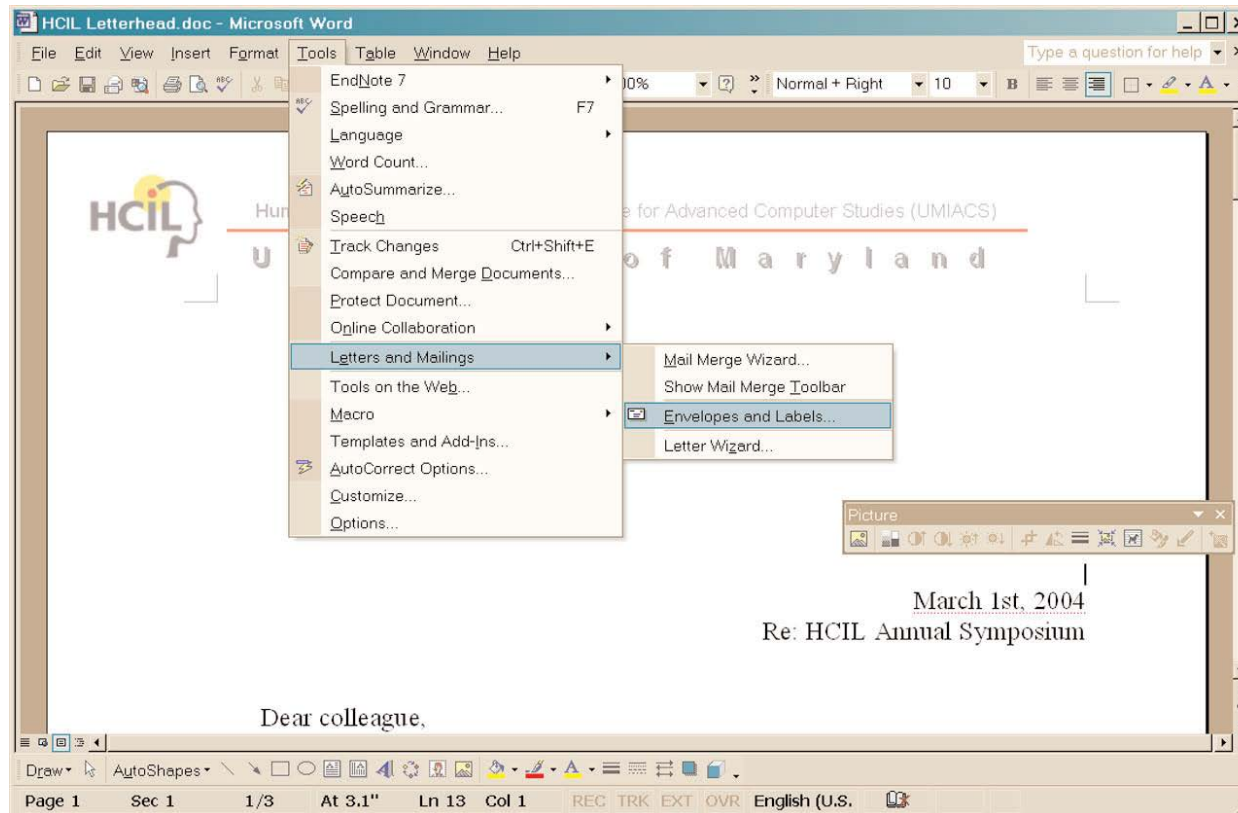


- 3. **Multiple** selection menu: allow selection of multiple items
 - Convenient for handling multiple choices since user is able to scan the full list of items while deciding



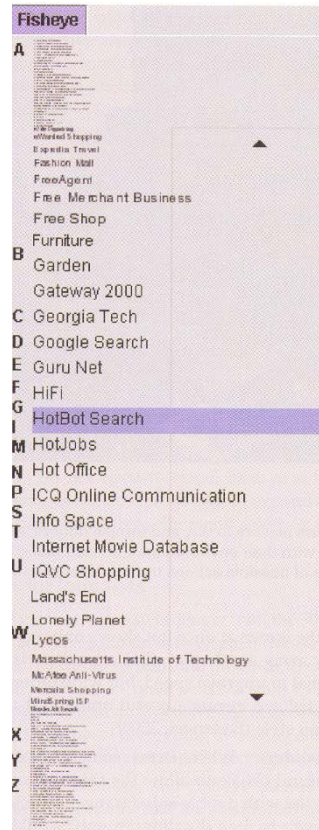
Menu

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
 - Not in an orderly enumeration of menu items
 - After clicking selected item, relevant information is displayed
 - e.g., appear in hypertext including Web pages

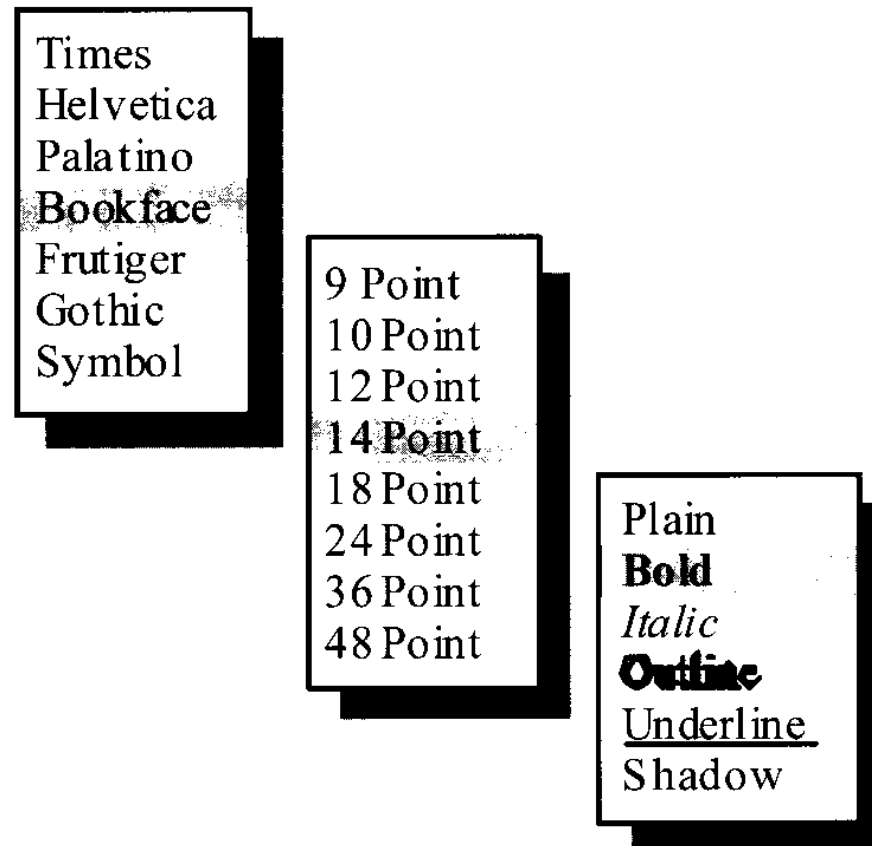
Menu



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

The screenshot shows the Shopping.compare jewelry website. At the top, there is a navigation bar with categories: Home, Clothing, Computers, Electronics, Home & Garden, Jewelry, Kids & Family, and More... Below this is a search bar with the text "What are you shopping for?" and a dropdown menu set to "Sunglasses". A "Find" button is next to the search bar. Below the search bar, there is a breadcrumb trail: "Back to: Jewelry and Watches" and "You found over 4,400 products in Sunglasses > \$100 - \$125".

Below the breadcrumb trail, there are four filter menus:

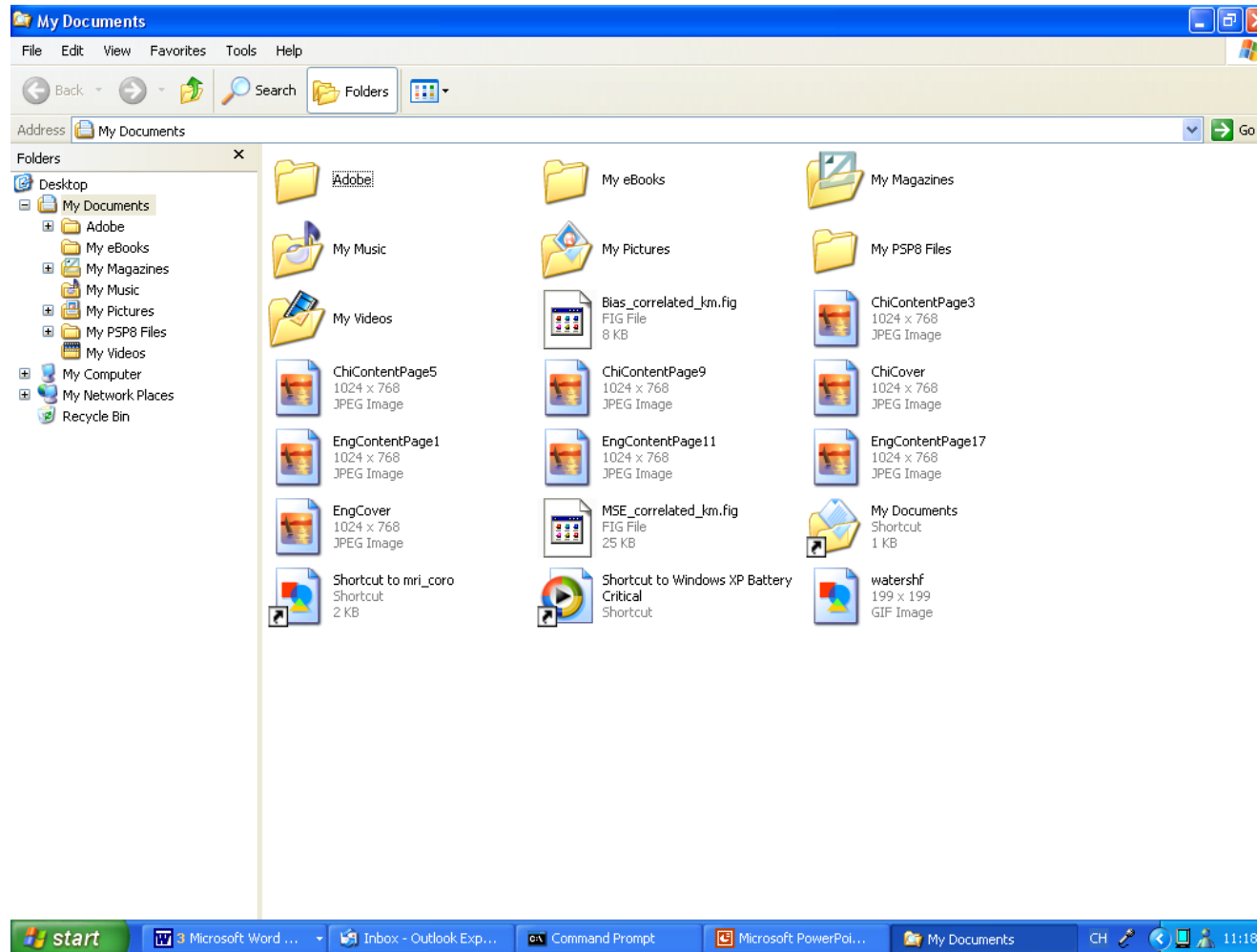
- Find by Brands:** Catorz (858), Costa Del Mar (320), Ray Ban (275), Adidas (141), Smith (132), More...
- Find by Sunglasses Features:** Polarized Lens (945), Photochromic Lens (907), UVA / UVB Protection (877), Interchangeable Lenses (415), Gradient Lens (374), More...
- Find by Frame Color:** Black (1,195), Metallic (461), Tortoise (365), Blue (265), Brown (199), More...
- Or Find By:** Lens Color, Store, Lens Material, Sport Type, Frame Material, Keyword

Below the filter menus, there is a navigation bar with "View in Rows" and "View as a Grid" options, and a "Sort by: Store Rating or Price" dropdown. The main content area displays three product listings:

Product Name	Price	Store
Predator Daddy-O Square Oval RB4002-604/84 Predator Daddy-O Square Oval RB... Frames:Brown 58mm Read full description at Go Get Glasses.com > See all 398 products from Go Get Glasses.com	\$101.49	GoGetGlasses Be the first to review this store
Predator Daddy-O Square Wrap RB2016-W2686 Predator Daddy-O Square Wrap RB2... Frames:Matte Black 59mm Read full description at Go Get Glasses.com > See all 398 products from Go Get Glasses.com	\$101.49	GoGetGlasses Be the first to review this store
OA-09-100 Oakley Sunglasses M Frame Heater Black/Gray To maintain visual clarity in a world of performance-sinking distortion, Oakley has seared optics in an acid bath of innovation. POLARIC ELLIPSOID™ le... Read full description at Technical-Gear Sunglasses > See all 133 products from Technical-Gear Sunglasses	\$104.50	Technical-Gear.com Sports Sunglasses 7 store reviews

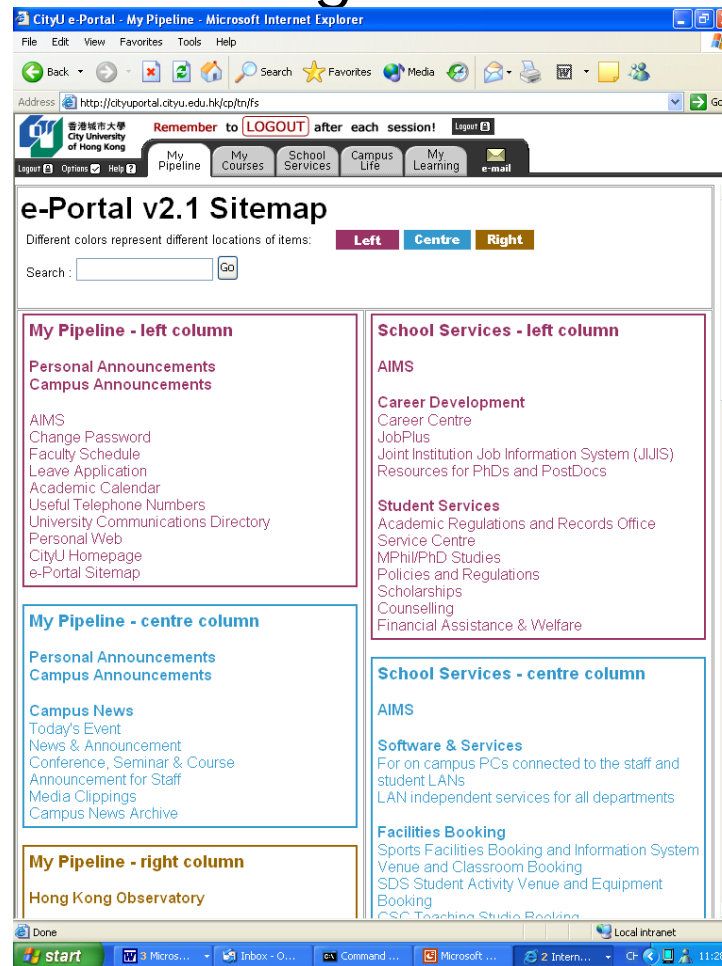
Menu

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**



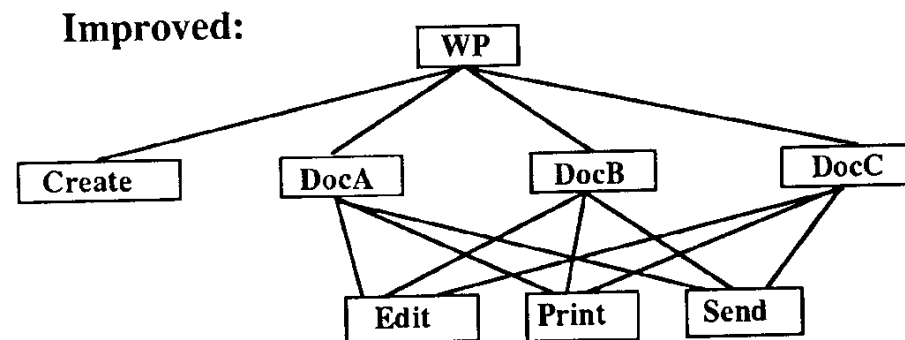
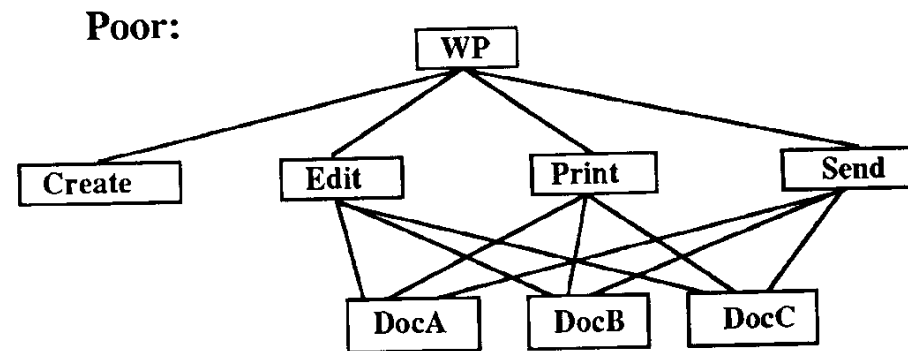
Menu

Design guidelines:

- **Structure**

1. Match menu structure to **task structure**

e.g.,



Menu

After invoking WP, user selects Edit, followed by DocA

After editing the document, user must then close DocA in order to get back to the second-level menu and select Print to print

After choosing Print, user is again presented with the directory menu and must choose DocA again

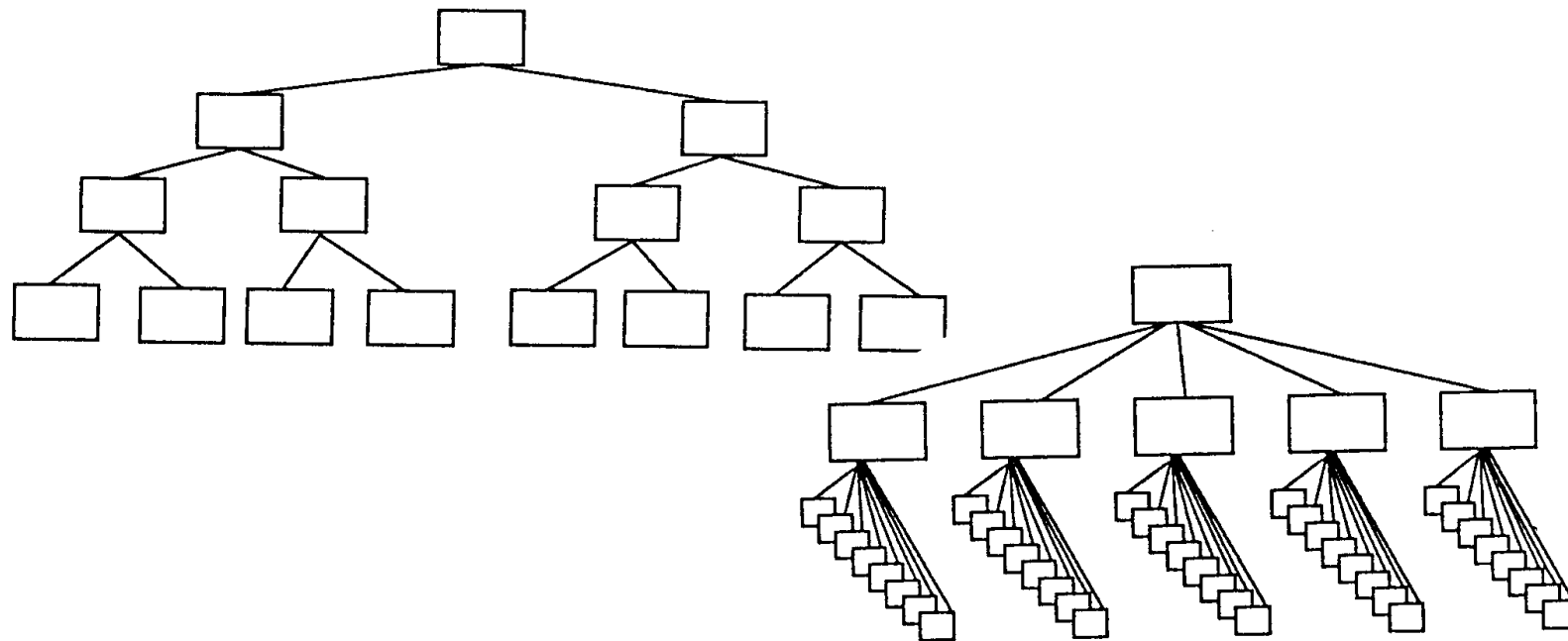
2. Provide easy way to **tailor** menu to task structure

It is because default menu structure may not be optimal in all cases

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

Menu

3. **Depth-breadth** (number of items per level) trade-off via considering decision-making time (user response time) & execution time (the time to execute a command)



Menu

- Long user response time if
 - Inexperience user
 - Choice items are complex
 - Choice items are not grouped

⇒ less breadth is desirable

- Long execution time when
 - System response time is long
 - Selection mechanism takes more time

⇒ more breadth is desirable

Menu

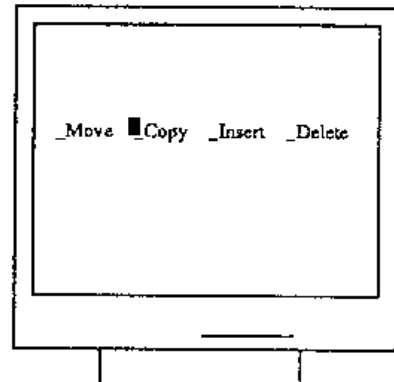
User/Task Variables	Maximum Optimal Breadth
Choice items <i>are</i> complex and/or Choice items <i>cannot</i> be grouped	Up to 10 choice items per screen
Choice items <i>are not</i> complex and Choice items <i>can</i> be grouped but Users are infrequent/casual users	11 to 20 choice items per screen
Choice items <i>are not</i> complex and Choice items <i>can</i> be grouped and Users are frequent/expert users	21 or more choice items per screen

Menu

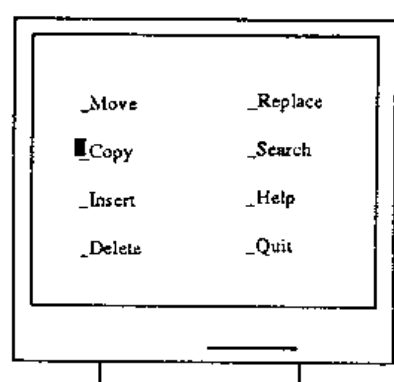
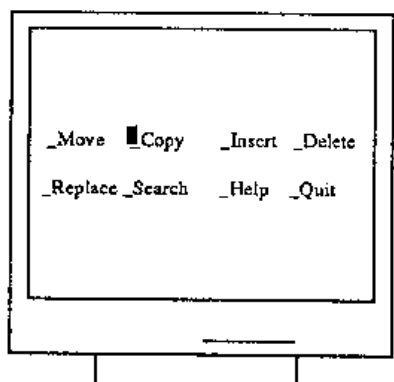
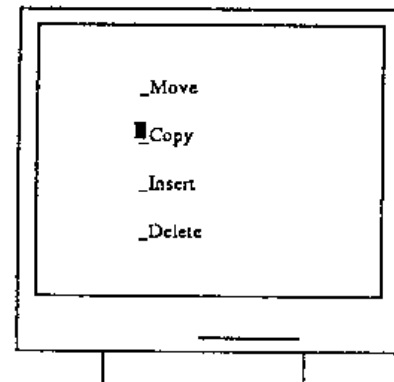
4. For full-screen text menu, present menu choice lists **vertically**



Poor:



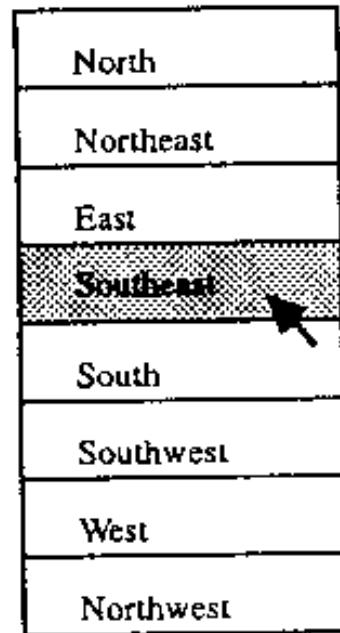
Improved:



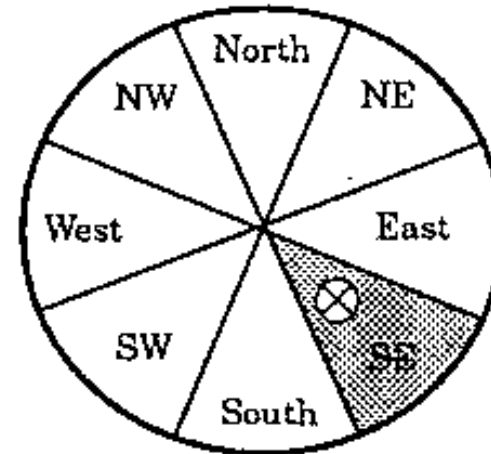
Menu

5. Consider pie-menu for one- or two-level mouse-driven menu hierarchies

Acceptable:



Improved:

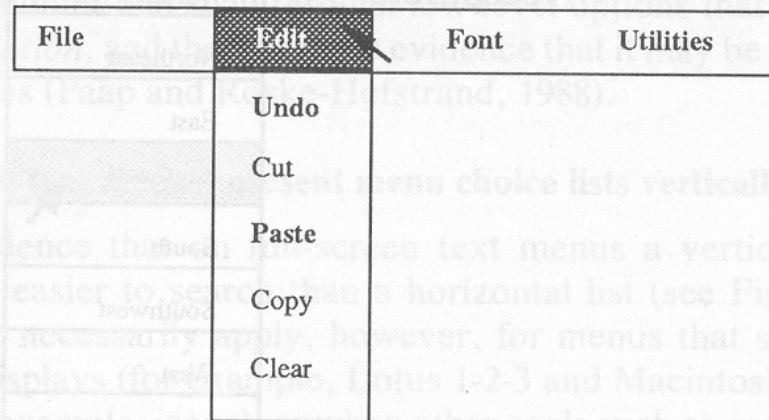


Why the pie-menu is better in this scenario?

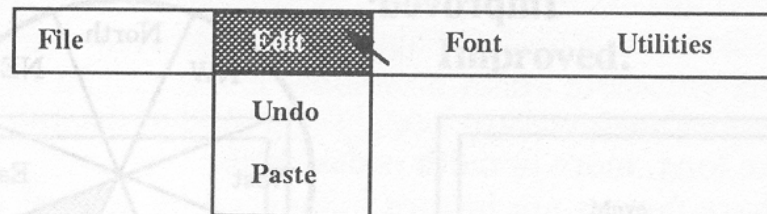
Menu

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

Grayed out:



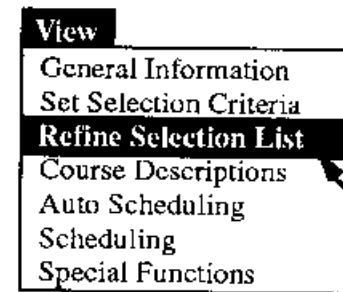
Deleted:



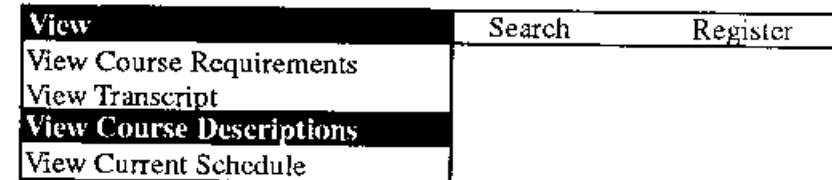
Menu

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

Poor:



Improved:

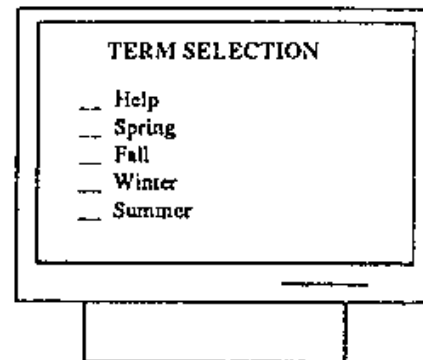
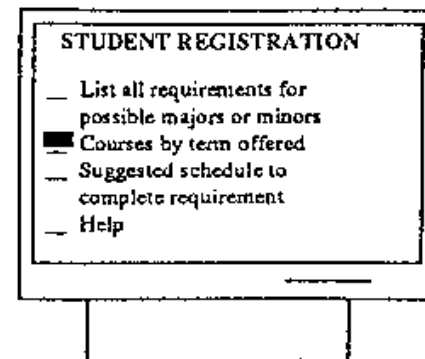


"Day" or "6:00a.m. – 6:00p.m." is more precise?

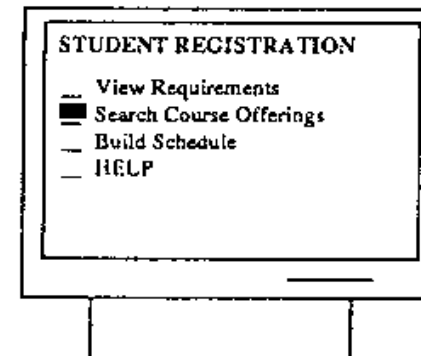
Menu

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

Poor:



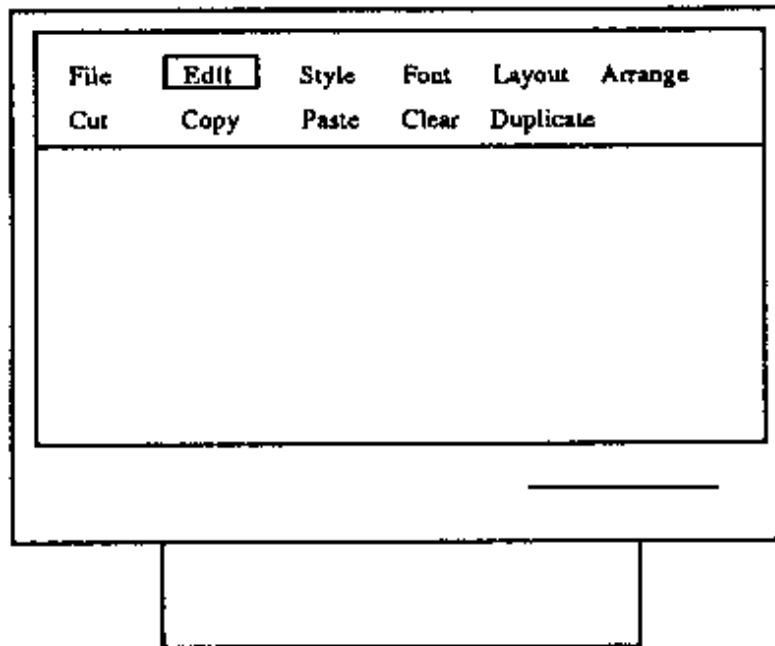
Improved:



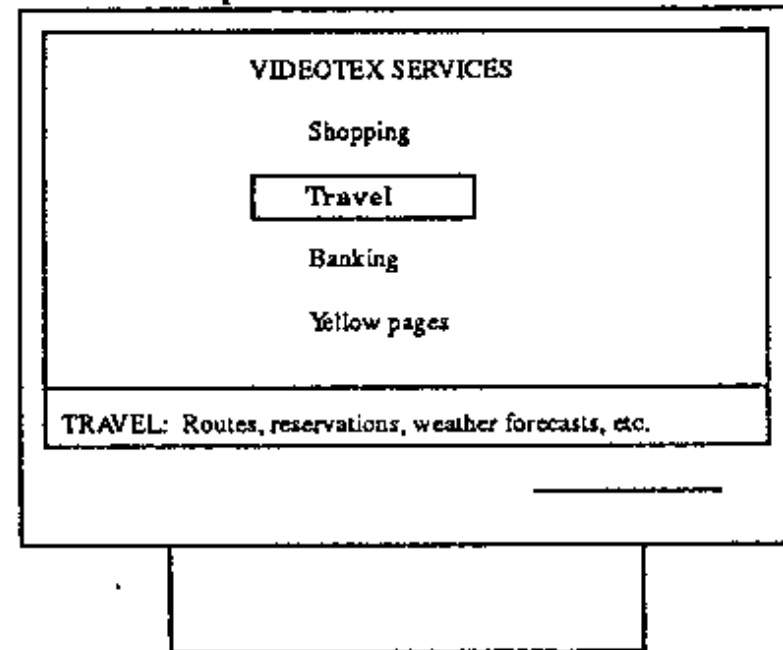
Menu

9. Consider **menu choice descriptors**, e.g., look-ahead & microhelp (increase satisfaction & decrease error)

Look-ahead:



Microhelp:

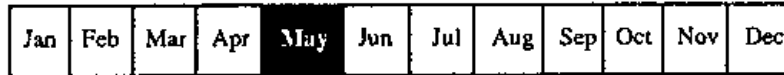


Menu

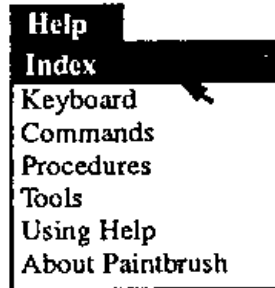
- **Choice ordering**
 - **Convention**: months of the year, days of the week, numbers, sizes
 - **Frequency of use**: choices are listed in order of expected frequency of use, e.g., Help: users are expected to most often consult “Index”
 - **Order of use**: choices are listed in the order users are expected to use them in a sequence
 - **Categorical**: choices are grouped according to semantic property
 - **Alphabetic**: choices are simply listed in alphabetic order

Menu

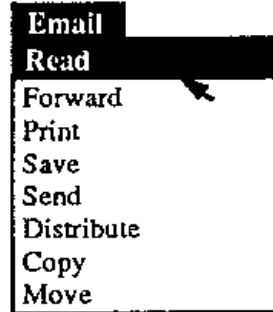
Conventional:



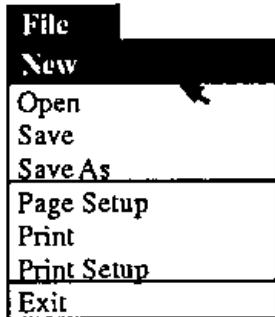
Frequency of use:



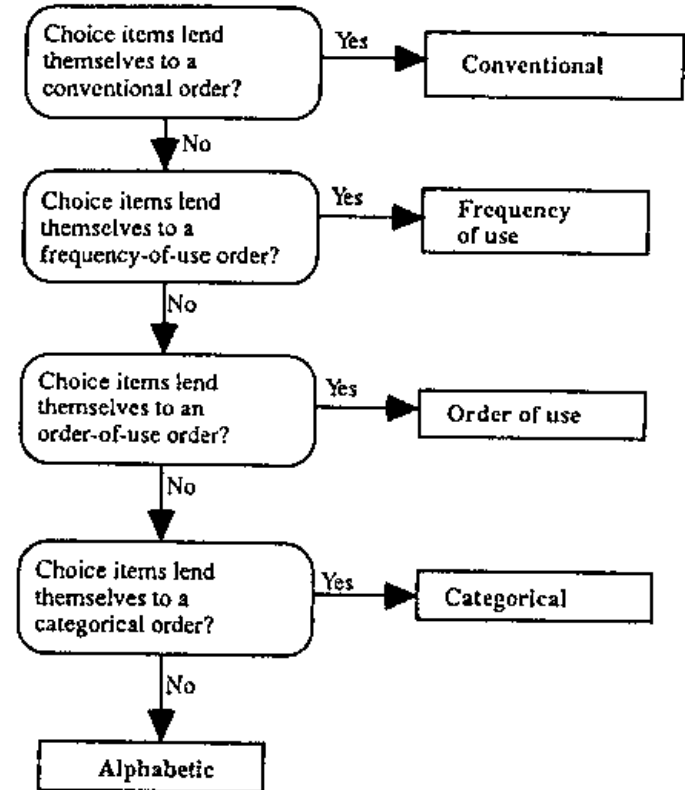
Order of use:



Categorical:



Alphabetic:



Menu

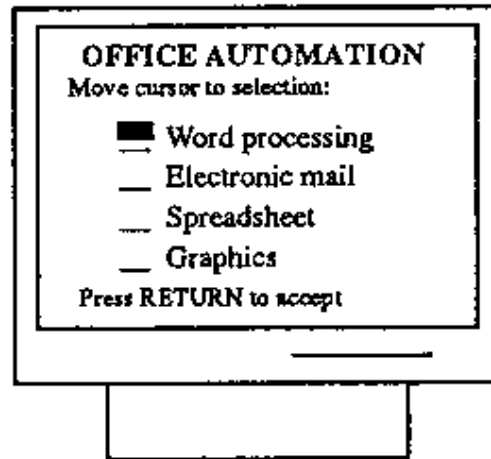
- **Choice selection**

1. For keyboard-driven menu:

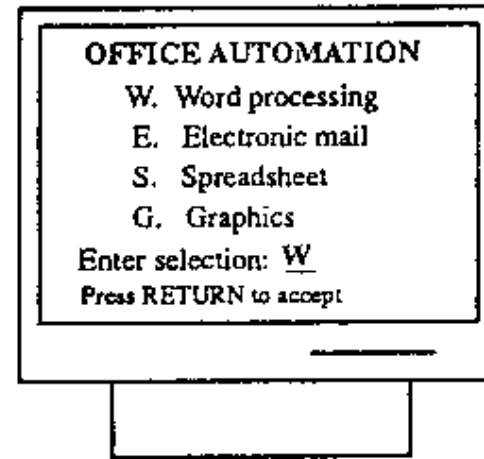
- **Cursor**: advantage- ease of learning & comfort, disadvantage- slow for many items
- **Mnemonic** letters: advantages - fast, no change when adding new items (e.g., “e” for “edit”)
- **Numbers**: fast, need change if adding new items
- **Non-mnemonic** letters: fast, need change if adding new items

Menu

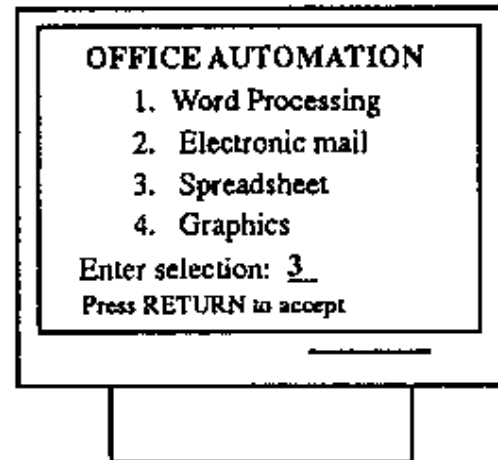
Cursor:



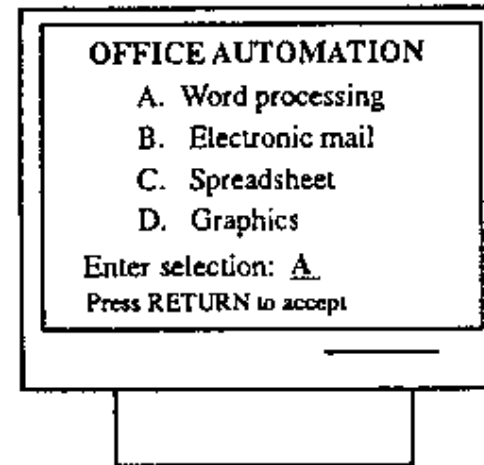
Mnemonic letters:



Numbers:



Nonmnemonic letters:



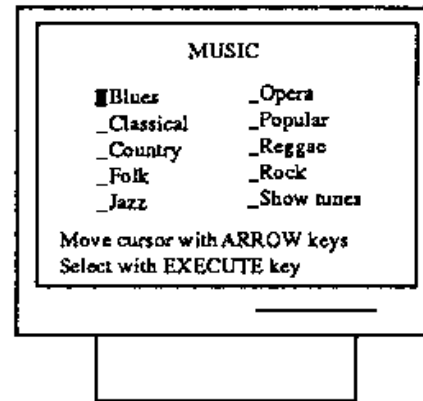
Menu

- Never start with zero
- **Left** justification
- Well labelled selection field appears below the choices
- Best: **combine** cursor movement with mnemonic letter codes
- Provide menu select **defaults** when possible

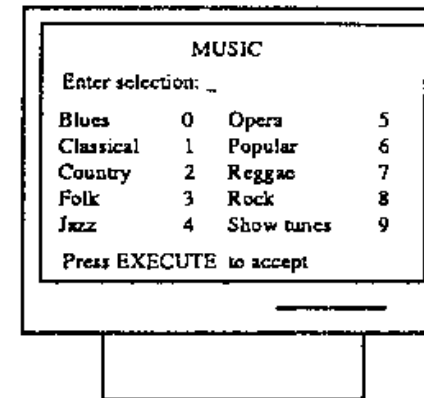
Menu

- Examples:

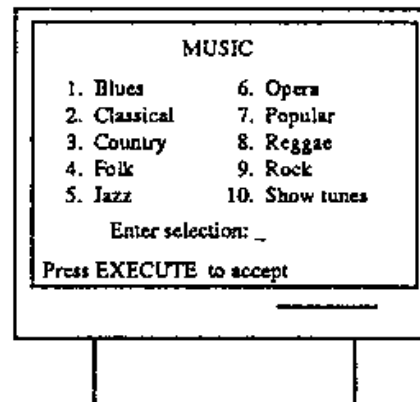
Poor:



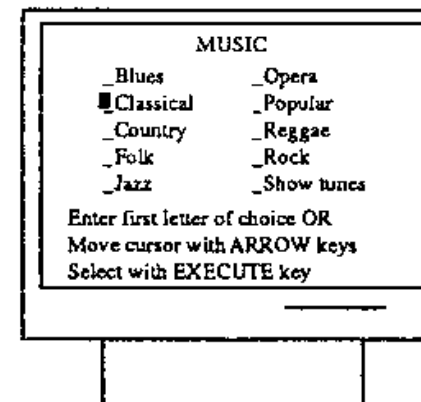
Still poor:



Better:



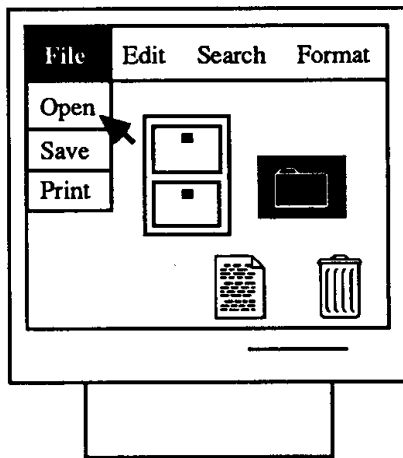
Best:



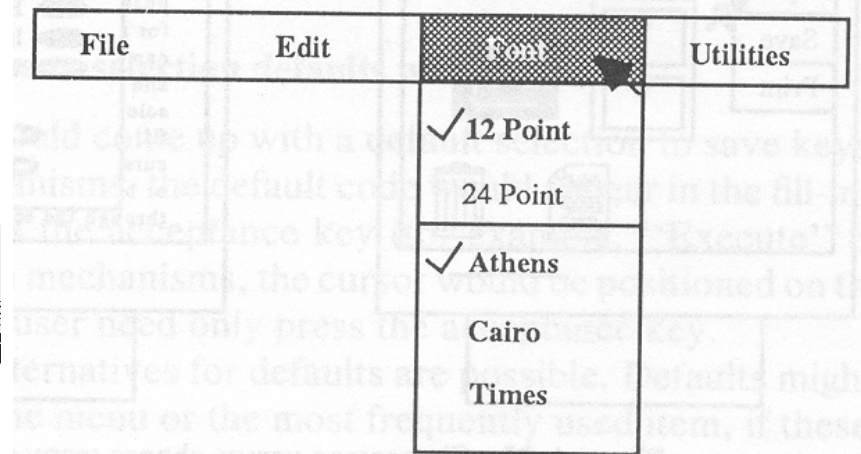
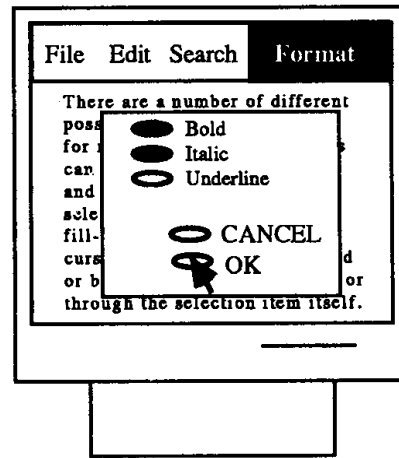
Menu

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

Choose one:



Choose many:



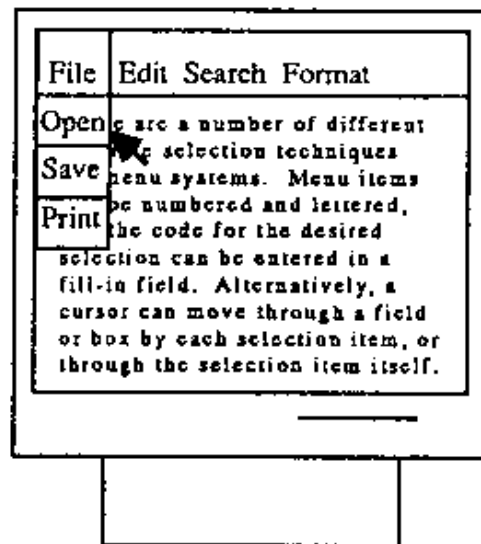
3. Provide menu selection feedback

Menu

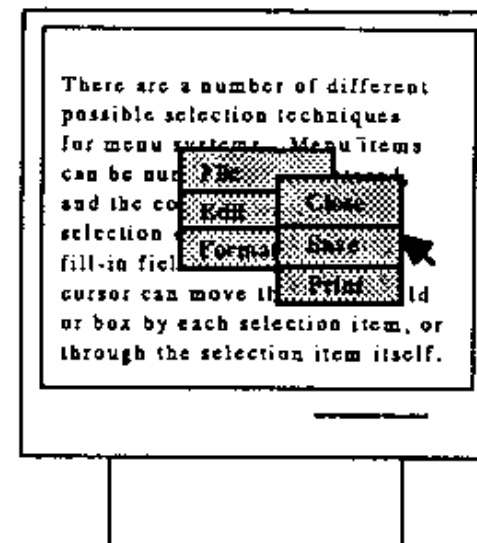
■ Invocation

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

Permanent:



User invoked:



Menu

Navigation

1. Establish **conventions** for menu design & apply them **consistently** on all menu screens within a system

Poor:

Improved:

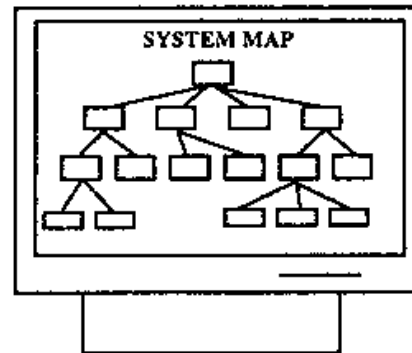
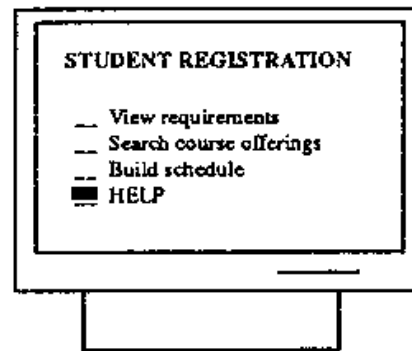
The 'Poor' examples show inconsistent button placement and missing title bars. The 'Improved' examples show consistent button placement, title bars, and version numbers.

Menu

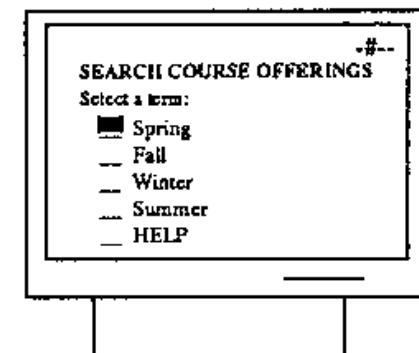
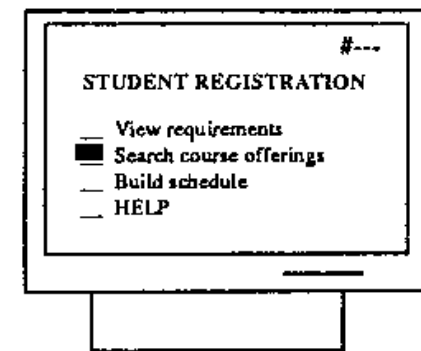
2. Use menu maps, or place markers as navigation aids in complex menu systems

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

Menu maps:



Place markers:



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

A dialog box titled "International - Currency Format" with a close button in the top-left corner. It contains four input fields: "Symbol Placement:" with a dropdown menu showing "\$1"; "Negative:" with a dropdown menu showing "(\$123.22)"; "Symbol:" with a text box containing "\$"; and "Decimal Digits:" with a text box containing "2". On the right side, there are two buttons: "OK" and "Cancel".

A dialog box titled "LOAN APPLICATION" with a close button in the top-left corner. It contains several input fields: "Name:" with a text box containing "Dr. Deborah J. Mayhew"; "Address:" with a text box containing "Box 248, W. Tisbury, MA 02575"; "Date:" with a text box containing "4/8/91"; "Amount:" with an empty text box; "Rate:" with an empty text box; and "# Months:" with an empty text box. On the right side, there are two buttons: "OK" and "Cancel". At the bottom, there is a "HINT: Date: mm/dd/yy format - no leading zeroes".

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 broad 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** ⇒ 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**

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

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

e.g., search engine \Rightarrow allow user to input information in a flexible order, such as “human computer interaction” = “computer human interaction”

Fill-in Form

2. Organize groups of items by:

- **Categorical** grouping
- **Sequence** of uses: order of the fields aligns with 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

First: _____ M.: _____ Last: _____
Street: _____
City: _____ State: _____ Zip: _____

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

Last Name: _____
Zip: _____
State: _____
City: _____
First name: _____
Middle name: _____
Street: _____

Fill-in Form

- 3. Use **white** space to create balance and symmetry
- 4. **Separate** logical groups by spaces, lines, color or other visual cues

Print request
Document name: -----
Pitch: - (1=pica, 2=elite)
Print notes: - (y or n)
Number of copies: --- (000-999)
Paper size: ~ (1=letter, 2=legal)
Print summary: - (y or n)
Font: - (press ?)
Print from page: --- (000-999)
Print to page: --- (000-999)

PRINT REQUEST

Document Name: -----	
Print from page: ---	Paper size: --
Print to page: ---	Font: -- (press ?)
Number of copies: ---	Pitch: -- (1=pica, 2=elite)
Print notes: - (y or n)	
Print summary: - (y or n)	

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

Name:	<input type="text"/>	Major:	<input type="text"/>	Year:	<input type="text"/>	Status:	<input type="text"/>
ID:	<input type="text"/>	Co-op Track:	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Number	Title	Section	Sequence				
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>				
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>				
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>				
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>				
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>				
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>				
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>				
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>				

Improved:

STUDENT REGISTRATION							
STUDENT							
Name:	<input type="text"/>	*Major:	<input type="text"/>	Year:	<input type="text"/>		
ID:	<input type="text"/>	Track:	<input type="text"/>	Status:	<input type="text"/>		
COURSES							
Number	*Title	Section	Sequence				
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>				
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>				
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>				
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>				

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**

```
LOAN APPLICATION
Name:  Mayhew, Deborah J.      (Last, First M.)
Address: Box 1, Anytown, ST 01010 (Street, City, ST Zip)

Date: 1/1/90 (mm/dd/yy)      Amount: 5000.00 (xxxx.xx)
Rate: 10.25 (xx.xx)          # Months: 36 (xxx)

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

```
LOAN APPLICATION
Name:  Mayhew, Deborah J.      (Last, First M.)
Address: Box 1, Anytown, ST 01010 (Street, City, ST Zip)

Date: 1/1/90 (mm/dd/yy)      Amount: 5000.00 (xxxx.xx)
Rate: 10.25 (xx.xx)          # Months: 36 (xxx)

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

Fill-in Form

Alamo.com Membership Enrollment Form

Login and Password * Required Fields

Title

First Name* Middle Initial

Last Name*

Suffix

Email Address*

Confirm Email Address*

Create a Login Name*
(or use email address)

Create a Password* Min. 6 characters and must contain at least one number

Confirm Password*

Password Clue

In case you forget your password this clue will help us retrieve and E-mail your password to you.

What is your mother's maiden name?*

Type of Travel

Do you travel more on Leisure or Business

Alamo Programs

If you are a member of Quicksilver or our Corporate program, please enter your ID number below.

Quicksilver ID
(The number begins with an 'F')

Corporate ID#

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 \geq 65)
Senior citizen discount: ■ _ %

Best:

Name: John Doe
Age: 23■

Senior citizen discount: ■ _ %

Name: John Doe
Age: 66

Senior citizen discount: ■ _ %

Fill-in Form

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"

Poor	Improved
DATE: _____ (e.g.1/12/90) DATE: _____ (e.g.011290)	DATE: __/__/__ (e.g.011290)
TIME: _____ (e.g.8:15AM) TIME: _____ (e.g.0815am)	DATE: __: __pm (e.g.0815am)
CARD #: _____ (1234567891234567) CARD #: _____ (1234-5678-9123-4567)	CARD #: _____-_____-_____-_____ (1234567891234567)

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.: Mayhew, Deborah J.

Improved:

LOAN APPLICATION

NAME: ■
ADDRESS:

DATE: --/--/-- AMOUNT: ----,--
RATE: ---,-- # 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

POLICY APPLICATION

APPLICANT		VEHICLE	
NAME: █	-----	YEAR: ---	
POLICY #: █	-----	MAKE: -----	
		NEW/USED: .	
DRIVER		LIENHOLDER	
NAME: -----		VEHICLE #: -----	
BIRTHDATE: -----		NAME: -----	
MARITAL STATUS: .		ADDRESS: -----	
GENDER: .			

Press TAB to move cursor forward by field

POLICY APPLICATION ** Page 1 of 4 **

APPLICANT		VEHICLE	
NAME: -----		YEAR: ---	
POLICY #: -----		MAKE: -----	
		TYPE: <input type="radio"/> NEW <input checked="" type="radio"/> USED	
DRIVER		LIENHOLDER	
NAME: -----		VEHICLE #: -----	
BIRTHDATE: -----		NAME: -----	
MARITAL ST.: <input type="radio"/> M <input type="radio"/> S		ADDRESS: -----	
GENDER: <input type="radio"/> M <input type="radio"/> F			

Press TAB to move cursor forward by field
Press HELP for additional navigation commands

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)

LOAN APPLICATION

NAME: Mayhew, Deborah J. _____ (Last, First Middle)
ADDRESS: 1 C St., Town, MA, 00000 ____ (Street, City, State Zip)

DATE: 2/1/87 (MM/DD/YY) AMOUNT: 3500.00 (XXXX.XX)
RATE: 11.5 - (XX.XX) # MONTHS: 36 - (XXX)

Press ARROWS to move cursor
Press ENTER to accept input

Illegal date

LOAN APPLICATION

NAME: Mayhew, Deborah J. _____ (Last, First Middle)
ADDRESS: 1 C St., Town, MA, 00000 ____ (Street, City, State Zip)

DATE: 2 1 87 (MM/DD/YY) AMOUNT: 3500.00 (XXXX.XX)
RATE: 11.5 - (XX.XX) # MONTHS: 36 - (XXX)

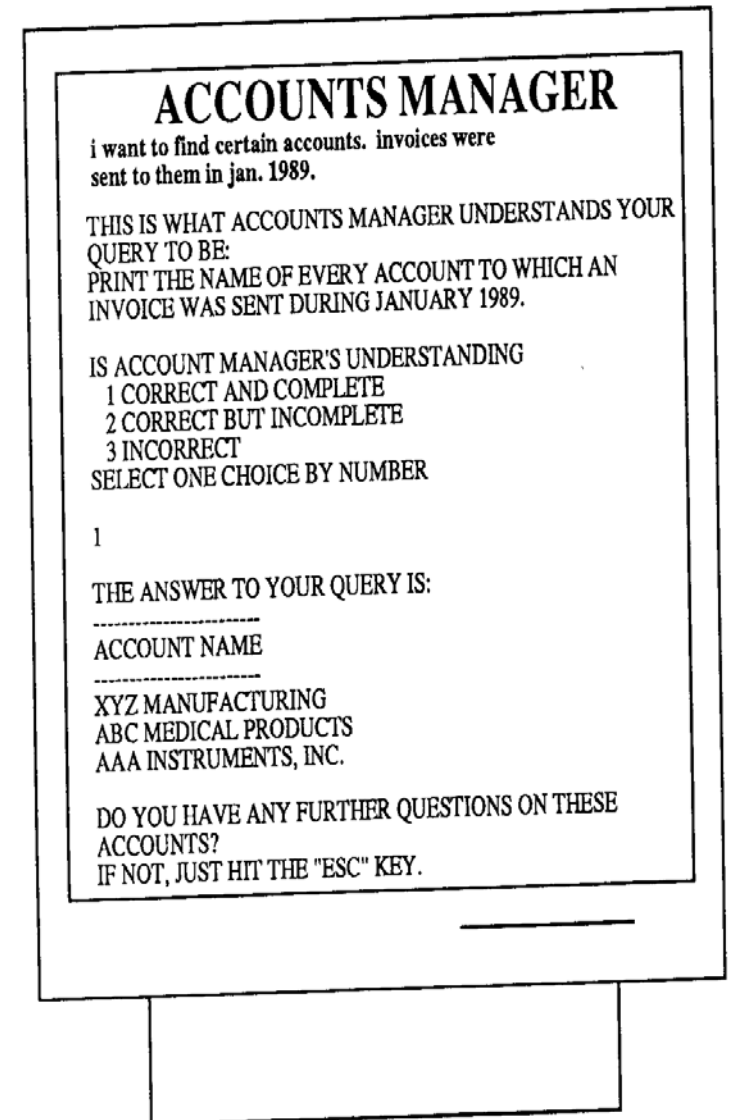
To move cursor, Press ARROWS
To accept input, Press ENTER

****ERROR**** Alph characters not accepted in DATE field

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



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** \Rightarrow more user error
 - Enhancements are **invisible**
 - **Vagueness** & **ambiguity**: makes it very difficult for a machine to understand \Rightarrow 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 jule
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
-

Poor

> show all projects begun in
jule
Can't recognize "jule". 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

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 punctuation
4. Allow **defaulting** of optional parameters
5. Command name abbreviation: **simple & consistent**

Poor:

VolB!FileA!D\$\$

FileA!VolB!ER\$L!:KO:!*\$\$

Improved:

search (for) filea (in) volb.

open filea (in) volb. list all
lines with "KO".

OR

s filea volb.

o filea volb. lal "KO".

Command Language

Name	Abbreviations	
	Poor:	Improved:
Move forward	MovF	MovF
Move backward	Mvb	MovB
Insert	I	Ins
Delete	DI	Del
Replace	Repl	Rep
Search	Srch	Sea
Delete	X	Del
Send	Sn	Sen
Print	Prt	Pri
Search	Srch	Sea
Send	Sn	Sen
Find	Fi	Fin
Choose	Ch	Cho

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 \Rightarrow must be learned



(a)



(b)



(c)



(d)

Windows & Icons

Design guidelines:

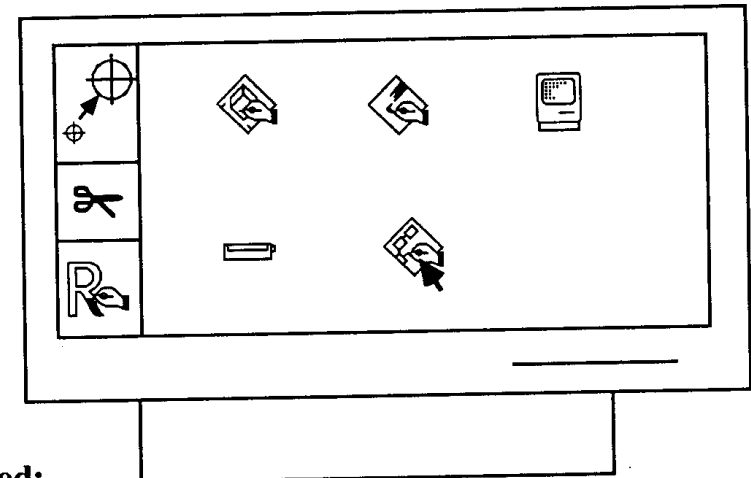
1. Choose a **consistent** icon design scheme

e.g., In "Poor", "magnify" is designed by depicting a *before & after*

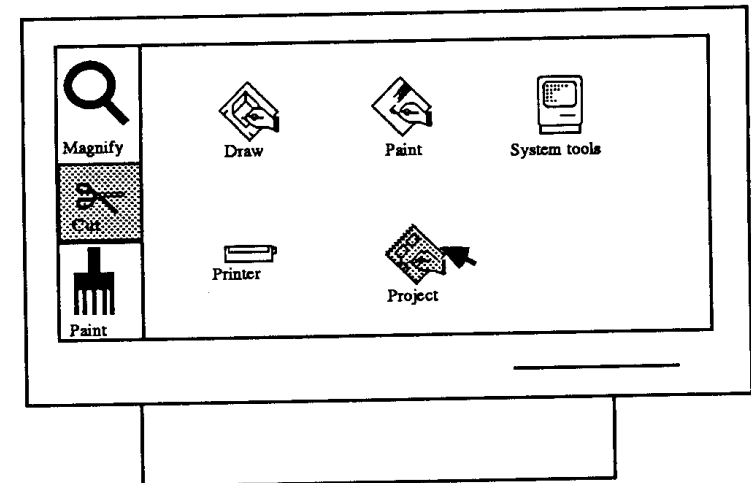
representation; "cut" is designed by depicting *tool* that is used to accomplish operation; "paint" is designed by depicting *action*

In "Improved", all are designed by depicting *the tool that is used to accomplish the operation*

Poor:















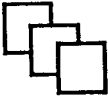

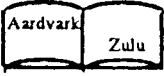

Improved:





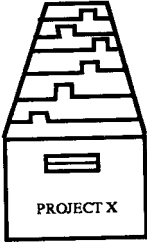
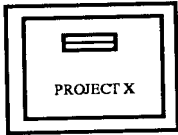


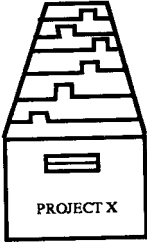
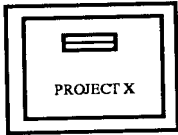
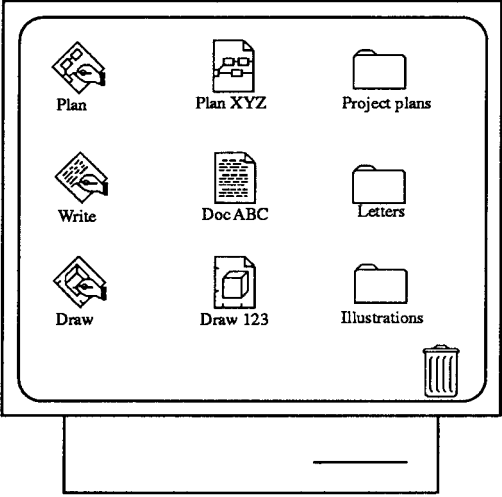






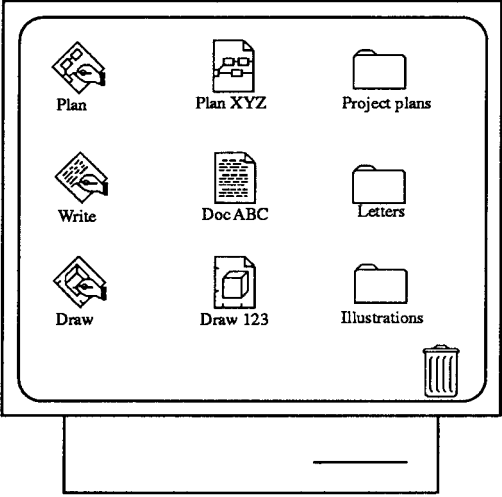








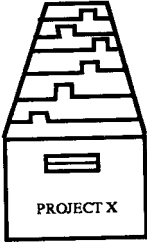
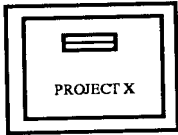
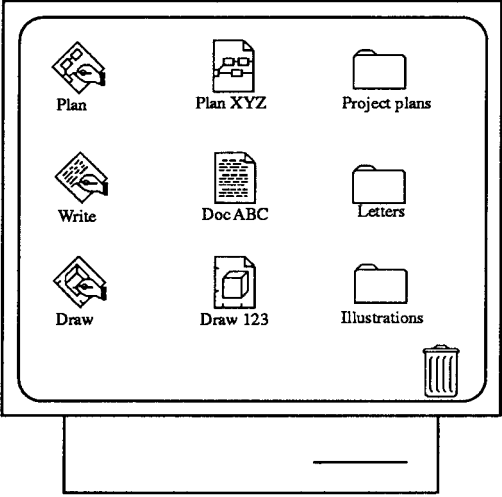






Windows & Icons

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

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

	Concrete/Familiar	Abstract/Unfamiliar		Dictionary	Phonebook
Folder			Conceptual similarity		
Telephone Book			Conceptual distinctiveness		
Clock			Visual similarity		
Database			Visual distinctiveness		

Windows & Icons

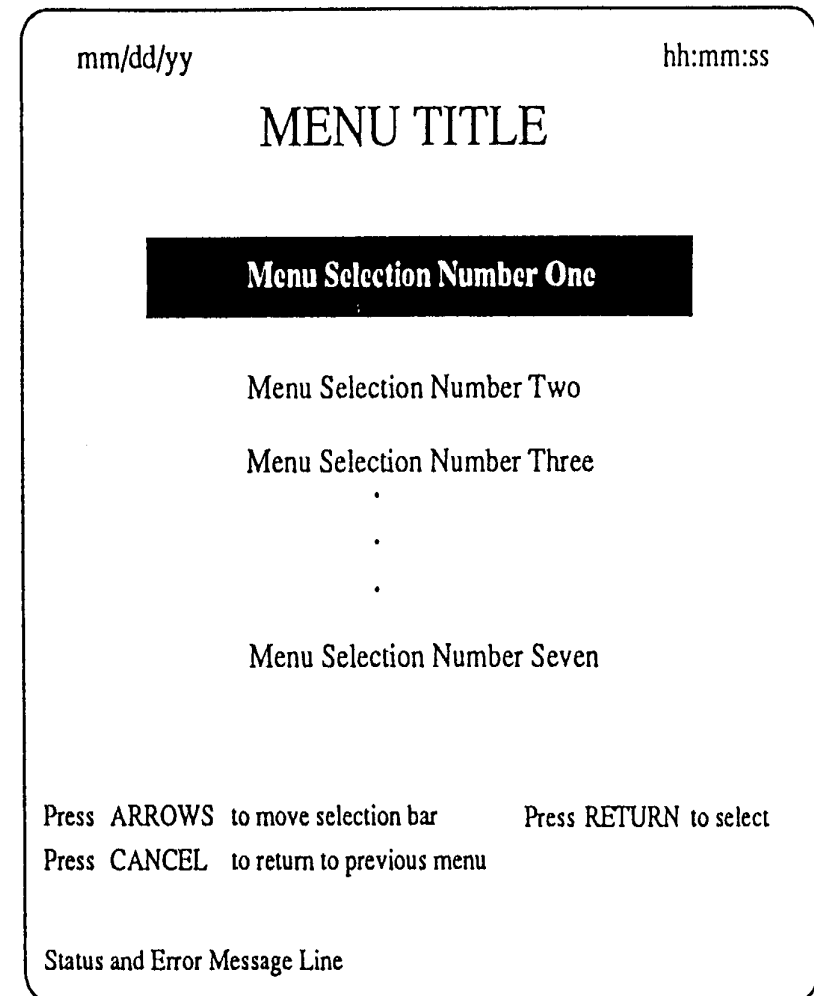
<h3>4. Avoid excessive detail in icon design</h3>	<h3>5. Design icons to communicate object relations & attributes whenever possible</h3>																								
<table border="0"><tr><td>Poor:</td><td>Improved:</td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr></table>	Poor:	Improved:					<table border="0"><tr><td></td><td>Poor:</td><td>Improved:</td></tr><tr><td></td><td>STATUS:</td><td></td></tr><tr><td></td><td>Planned</td><td> Job #1 Install Pole</td><td> Job #1 Install Pole</td></tr><tr><td></td><td>In progress</td><td> Job #1 Install Pole</td><td> Job #1 Install Pole</td></tr><tr><td></td><td>Complete</td><td> Job #1 Install Pole</td><td> Job #1 Install Pole</td></tr></table>		Poor:	Improved:		STATUS:			Planned	 Job #1 Install Pole	 Job #1 Install Pole		In progress	 Job #1 Install Pole	 Job #1 Install Pole		Complete	 Job #1 Install Pole	 Job #1 Install Pole
Poor:	Improved:																								
																									
																									
	Poor:	Improved:																							
	STATUS:																								
	Planned	 Job #1 Install Pole	 Job #1 Install Pole																						
	In progress	 Job #1 Install Pole	 Job #1 Install Pole																						
	Complete	 Job #1 Install Pole	 Job #1 Install Pole																						

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

COURSE OFFERINGS

QUARTER COLLEGE
 SPRING 86 ALL

SEQUENCE 02 PROFESSOR ALL

COURSE NUMBER	COURSE NAME	NUMBER CREDITS	PROFESSOR
COM1200	DATASTRUC	04	SMITH
PSY0001	INTRODUCT	04	JONES
BIO0032	GENETICS	04	RUBIN
COM0987	FORTRANLA	01	MICHEALS

COURSE OFFERINGS

QUARTER: Spring COLLEGE: All
 SEQUENCE: 2 PROFESSOR: All

NUMBER	NAME	CREDITS	PROFESSOR
COM 987	Fortranla	1	Michaels
COM 1200	Datastruc	4	Smith
BIO 32	Genetics	4	Rubin
PSY 1	Introduct	1	Jones

Press **ARROW KEYS** to scroll Press **< RETURN >** to go back

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

	Poor:	Improved:
(1)	The processing of the text editor yielded 23 pages of output	Output 23 pages
(2)	Error in DRESS SIZE field	Error: DRESS SIZE range is 4 to 16
(3)	Cannot exit before saving file	Save file before exiting
(4)	Bad/illegal/invalid file name	Maximum file name length is 8 characters
(5)	Syntax error 1542	Unmatched left parenthesis in line 210
(6)	Enter command	Ready for command

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)

(1)	Position cursor and press return	Position cursor Press return to accept
(2)	SIZE: ___	SIZE: ___ (4 to 16)
(3)	The message is sent by pressing TRANSMIT	To send message, Press TRANSMIT
(4)	Do not return to menu before completing entry	Complete entry before returning to menu
(5)	Page forward after entering address	Enter address, then page forward
(6)	Press backtab to go up, tab to go down	To go <i>up</i> , Press BACKTAB To go <i>down</i> , Press TAB
(7)	Press U for up Hit D for down	For <i>up</i> , Press U For <i>down</i> , Press D

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 a number of different ways you can peruse through text that is not currently visible on the screen, otherwise known as scrolling. First, the arrow keys are available for moving the cursor, and when the cursor reaches a border or edge of the screen, then the text will scroll in the appropriate direction, such as left from the right border, up from the bottom border etc. Alternatively, one can choose to scroll by pagefuls, and the next and previous keys are available for this purpose. Next takes you to the next pageful, and Prev

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 when unnecessary & non-standard
- Break up long numbers into groups of 3 to 4 digits
- Use standard separators when they apply; otherwise use spaces

Poor:	Improved:
10 100 1,000 10,00	10 100 1,000 10,000
100.00 25.2563 5,432.48 1.45491	5,432.48 1.45491 100.00 25.2563
10:1 p.m 02/07/87 002 100 013	10:01 p.m. 2/7/87 2 100 13
6173954686 028405554 1234567890 135792468	617-395-4686 028-40-5554 1,234,567,890 135 792 468

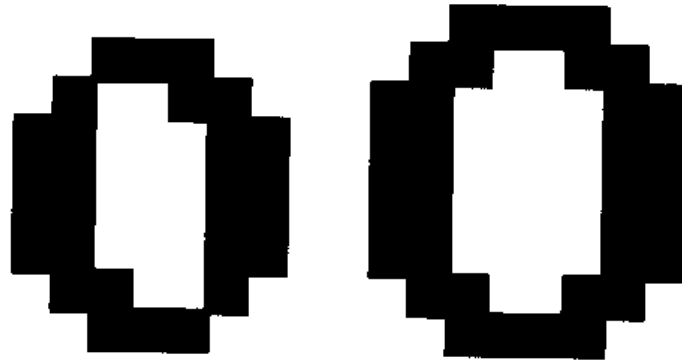
Screen Design

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:



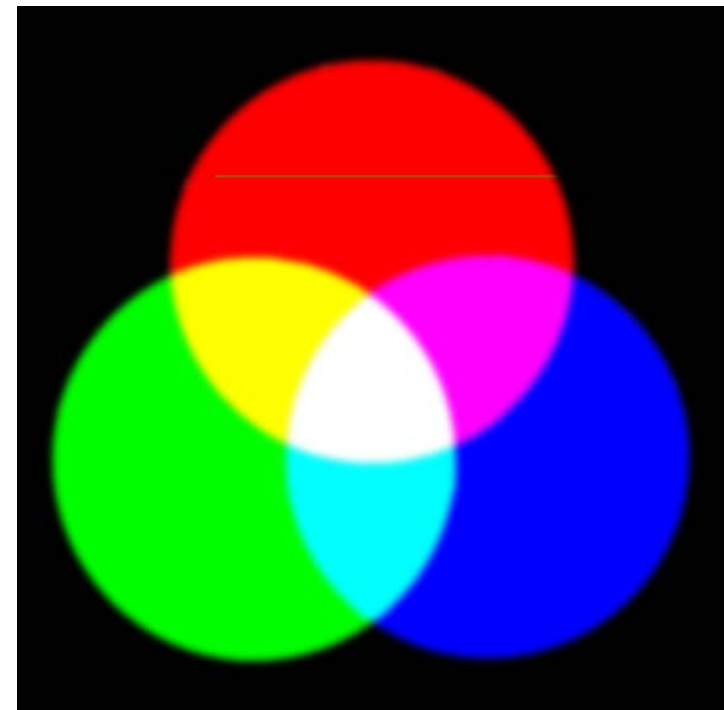
- In Times New Roman, there are two places where pixels touch only at their corners while Georgia has a smoother appearance
 - Size of Georgia is a bit larger
- ⇒ Georgia is a screen friendly font especially for small font sizes

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:

Concept	Chinese		American	
	Color	%	Color	%
Safe	Green	62.2	Green	61.4
Cold	White	71.5	Blue	96.1
Caution	Yellow	44.8	Yellow	81.1
Go	Green	44.7	Green	99.2
On	Green	22.3	Red	50.4
Hot	Red	31.1	Red	94.5
Danger	Red	64.7	Red	89.8
Off	Black	53.5	Blue	31.5
Stop	Red	48.5	Red	100.0

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.

	Color	R	G	B	
Text	Yellow	255	255	0	
Background	White	255	255	255	
Difference		No	No	Yes	Not a good combination
Text	Brown	64	64	0	
Background	White	255	255	255	
		Yes	Yes	Yes	Good combination

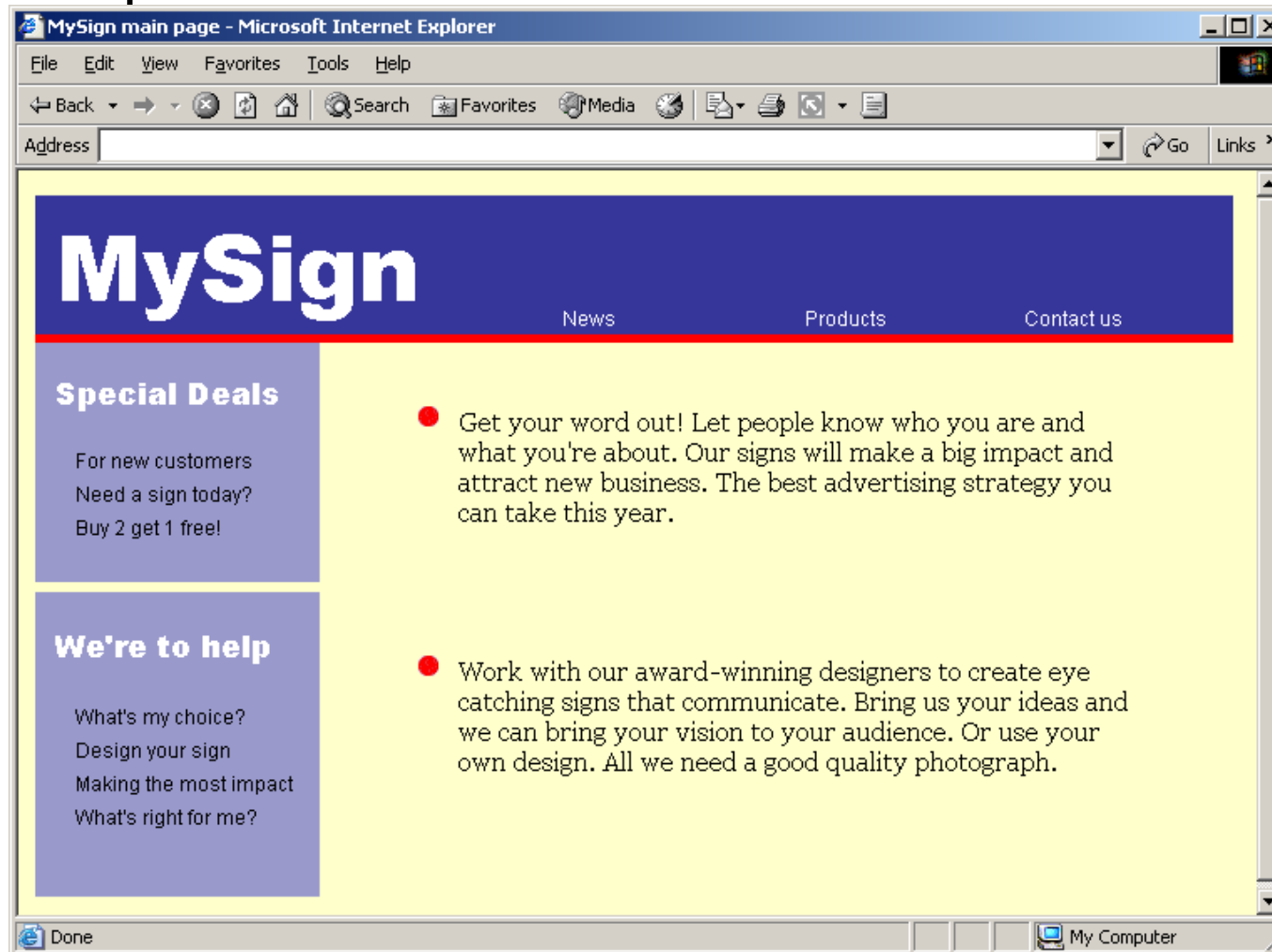
Screen Design

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

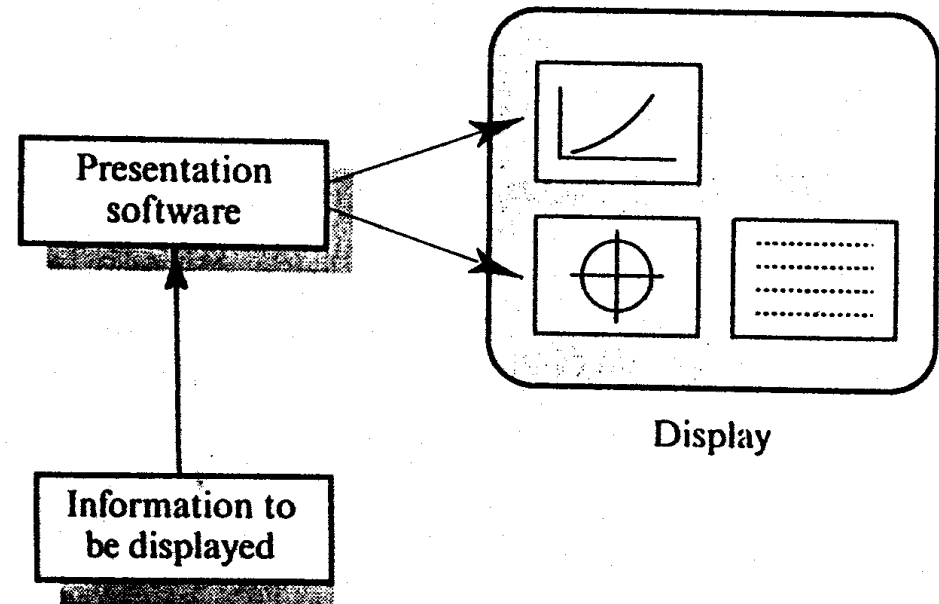
- Use color to communicate organization and establish relationship



Screen Design

7. Information presentation

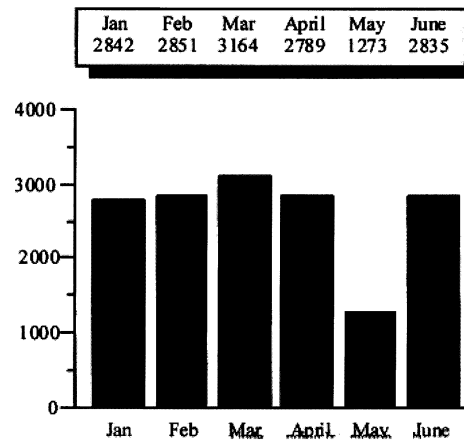
- **Static** information
 - Initialized at the beginning of a session; it does not change during the session
 - May be either numeric or textual, e.g., power indicator



- **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



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
close out 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

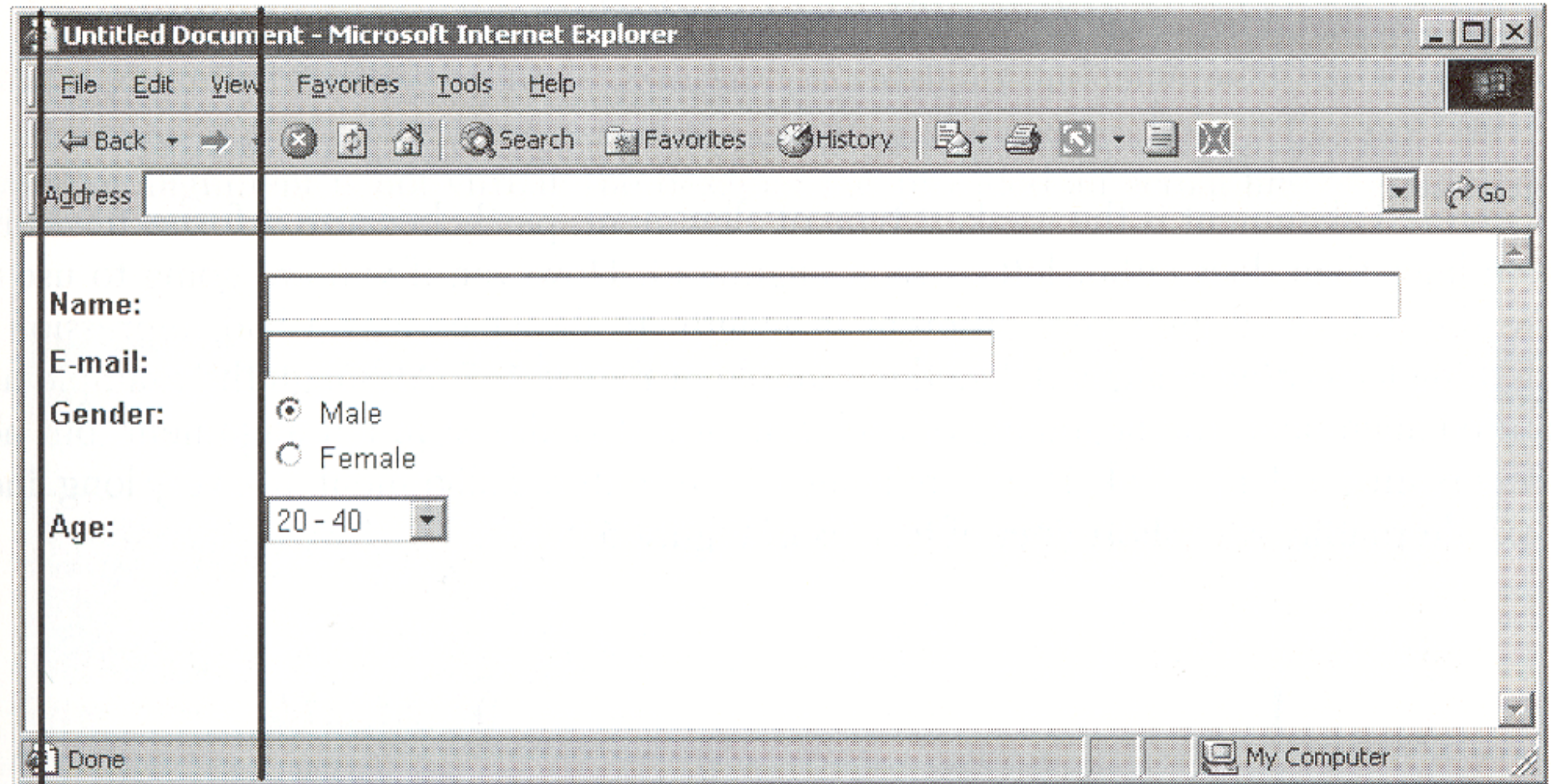
Open an account
Your account status

Checkout

Email us

Better? Which principle is used?

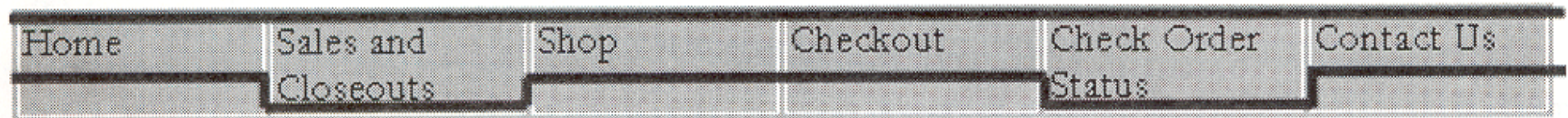
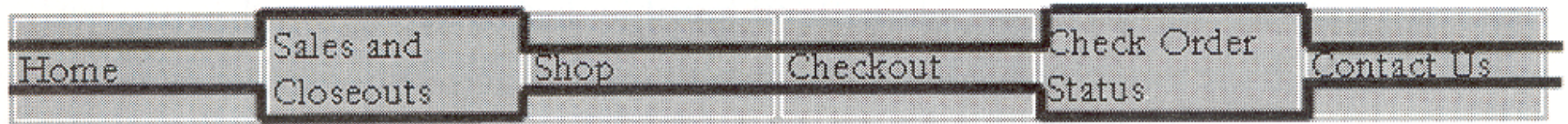
Screen Design



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



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School of Computer Science, Telecommunications
and Information Systems DePaul University

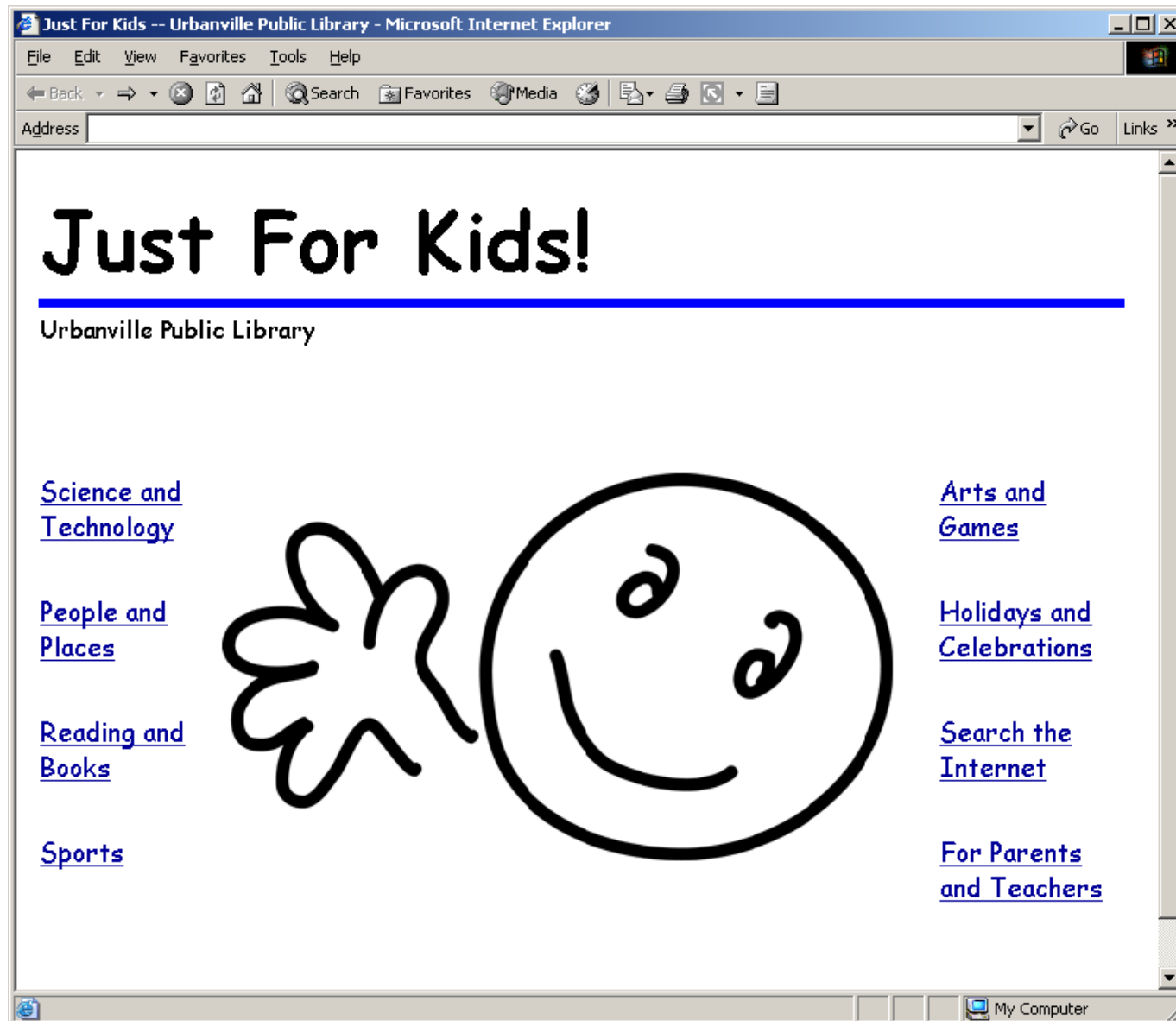
Division
of Computer Graphics and Animation

School of Computer Science, Telecommunications
and Information Systems

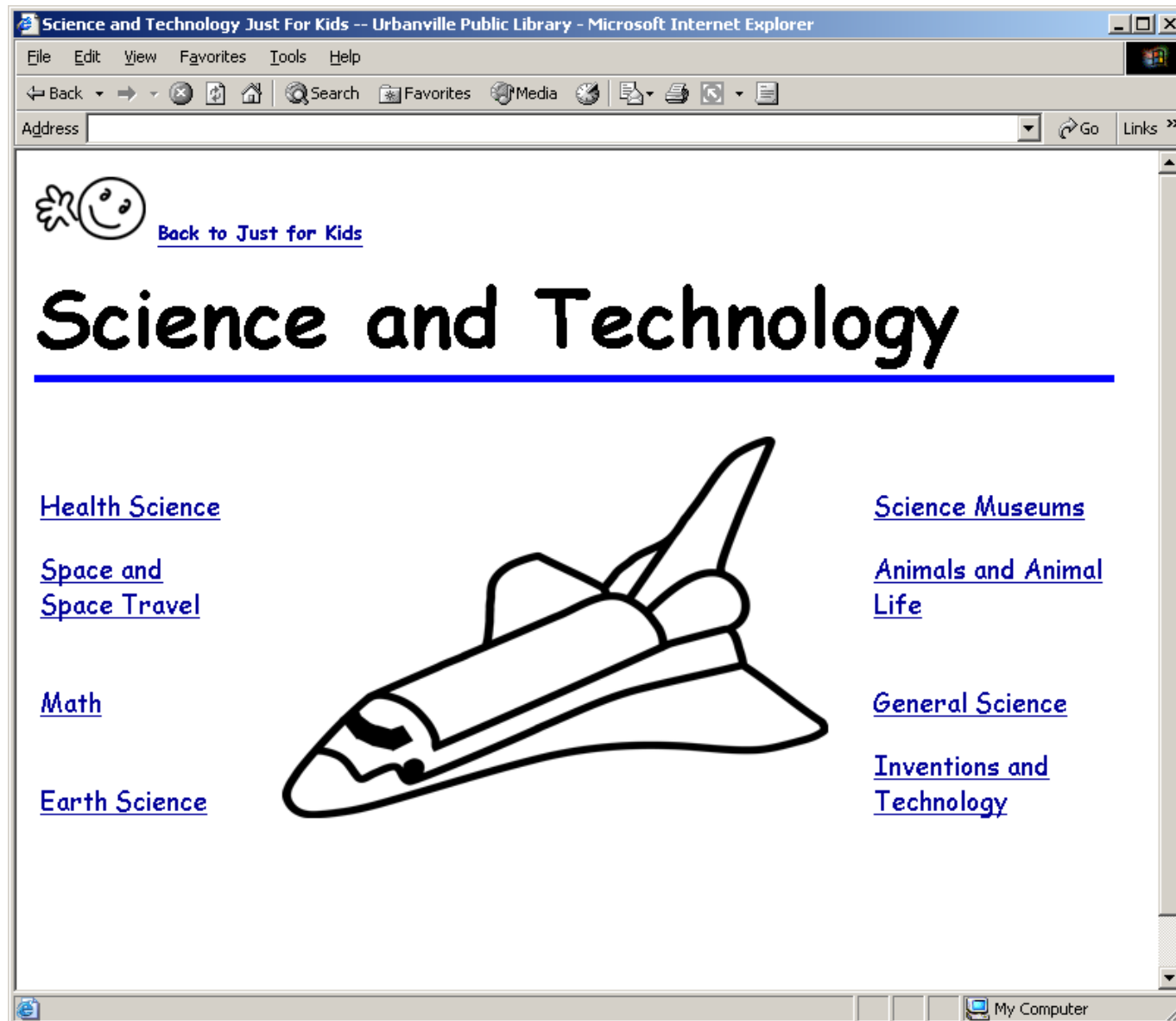
DePaul University

Which one is better?

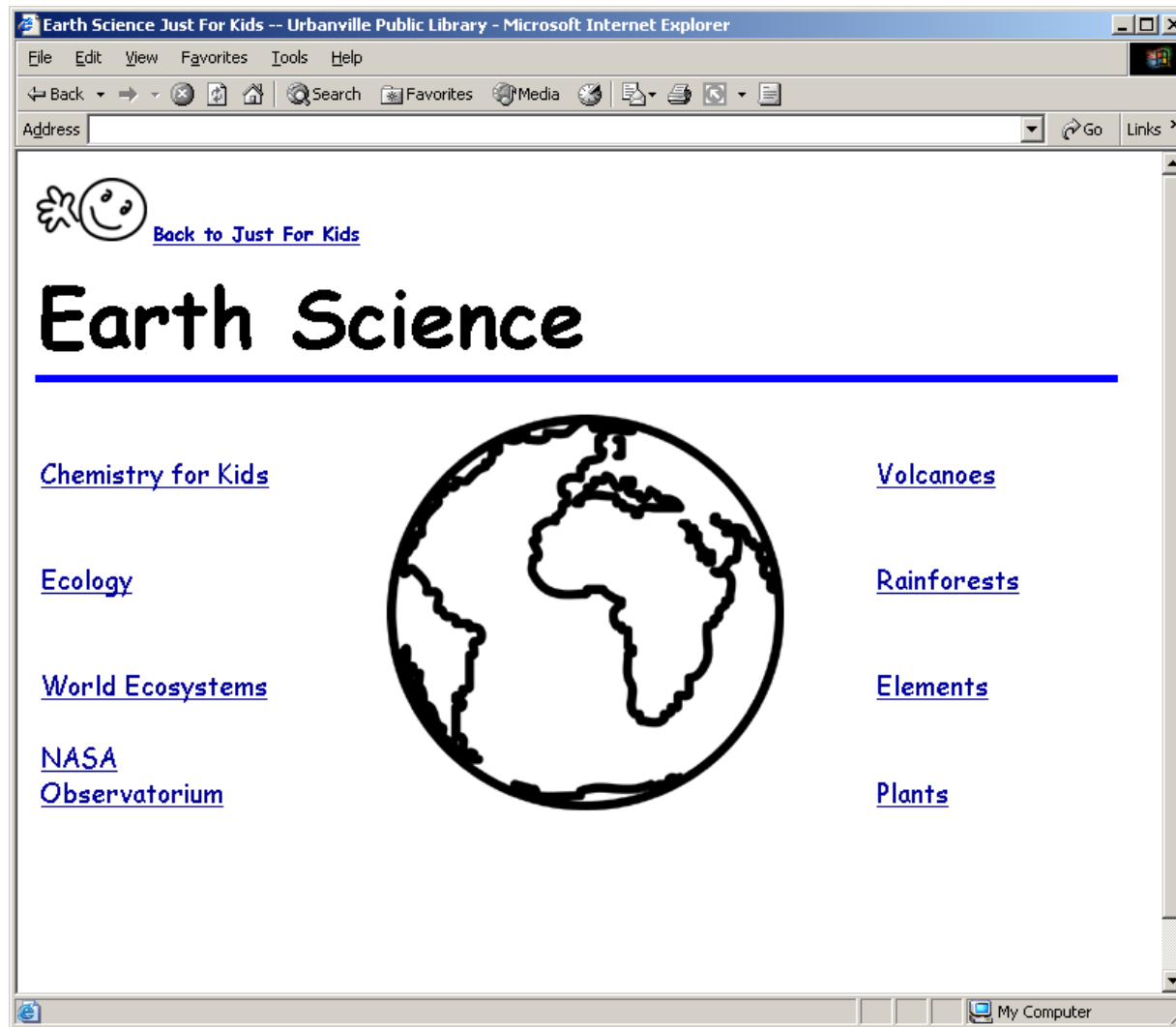
Screen Design



Screen Design

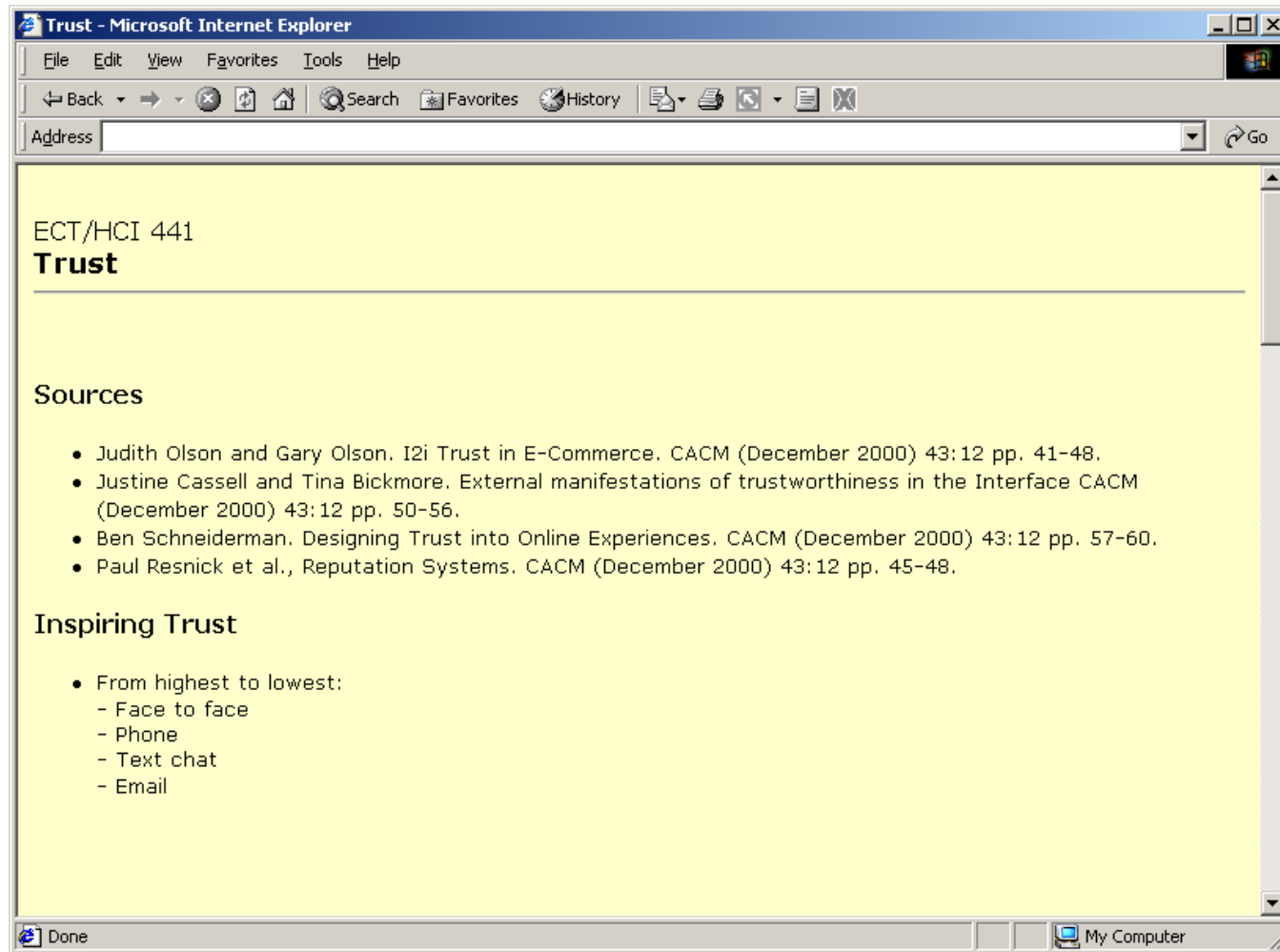


Screen Design



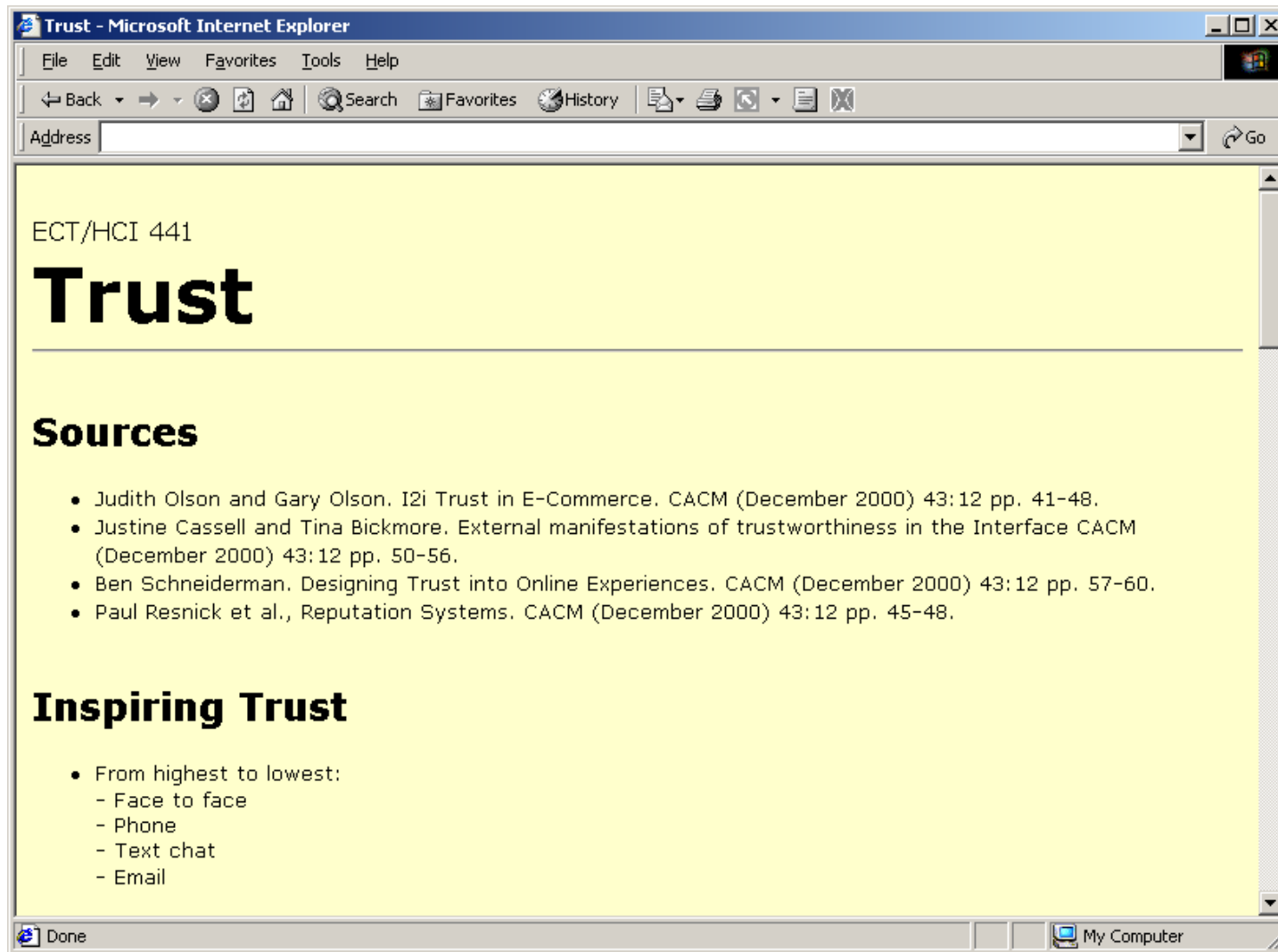
Which principle is used?

Screen Design



Sound interesting?

Screen Design



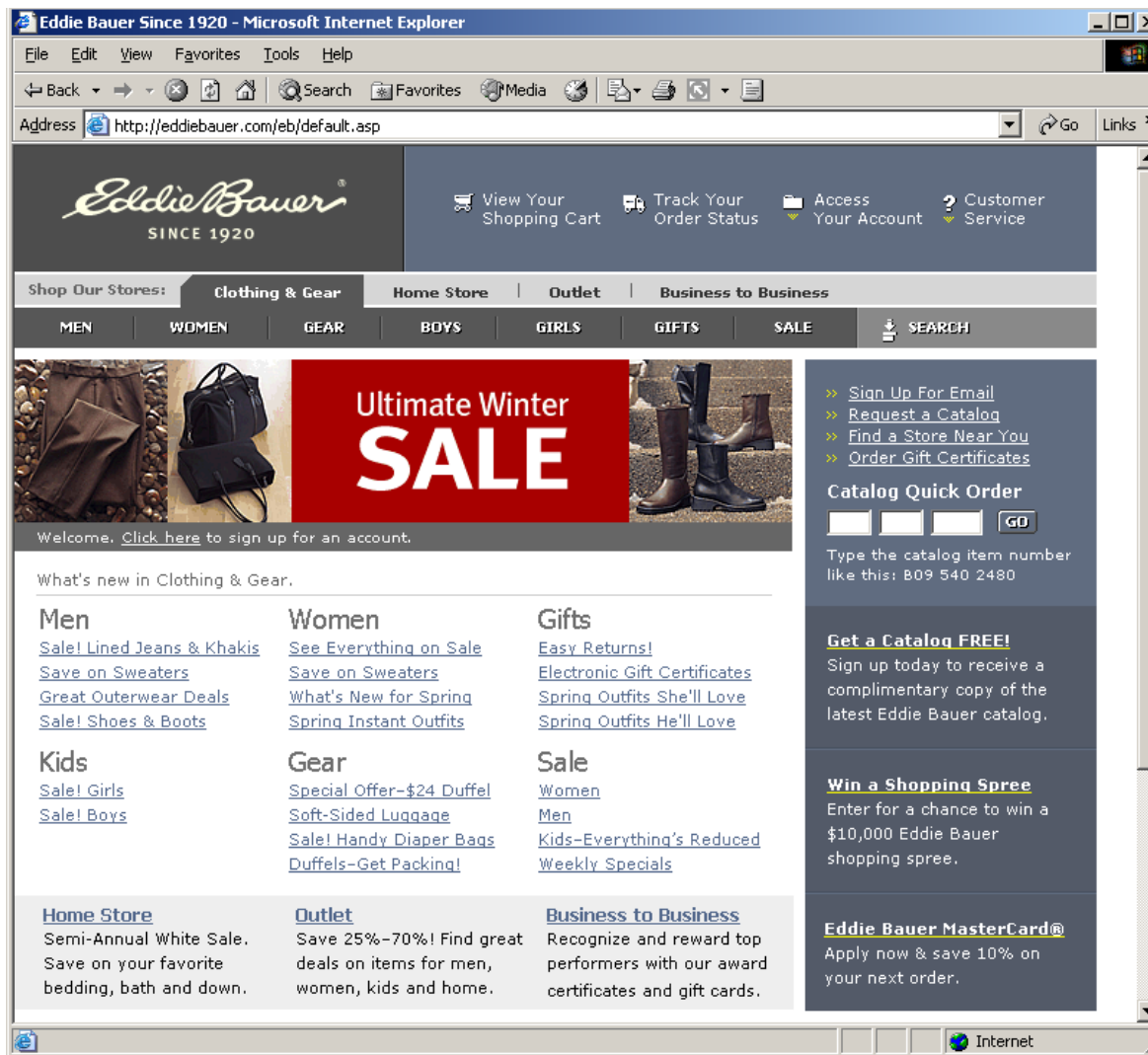
Better? Which principle is used?

Screen Design



Which principle(s) is/are used?

Screen Design



Which principle(s) is/are used?