

Graphical Screen Design

Important graphical design concepts include

visual consistency
visual organization
navigational cues

visual relationships
legibility and readability
appropriate imagery
familiar idioms

Sheelagh Carpendale

Graphical Design

About guidelines:

- using them leads to good design
- inspired design transcends them
- “Method helps intuition when it is not transformed into dictatorship. Intuition augments method if it does not instill anarchy.”
Mihai Nadin - Interface Design and Evaluation: Semiotic Implications
- Not to have method is bad; to stop entirely at method is worse still”
The Mustard Seed Garden Manual of Painting

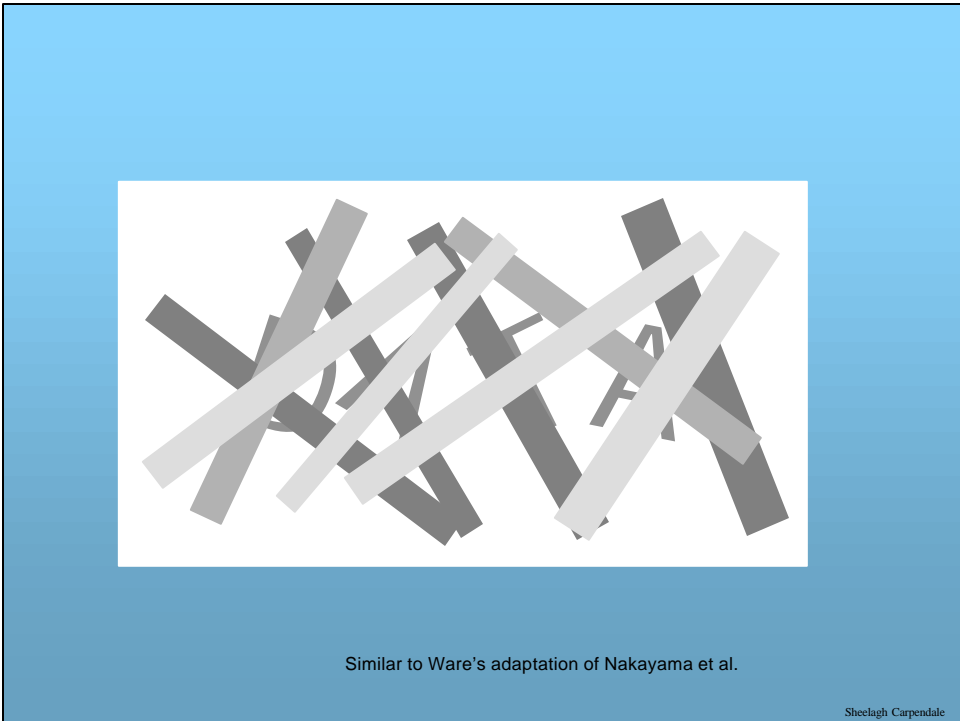
Sources:

- Principle of Effective Visual Communication for GUI design
Marcus in Baecker, Grudin, Buxton and Greenberg
- Designing Visual Interfaces
Mullet & Sano, Prentice Hall
- Information Visualization: Perception for Design
Colin Ware, Morgan Kaufmann

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Similar to Ware's adaptation of Nakayama et al.

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Form and Function

a principle from the designing of usable objects - architecture and crafts

Grouping:

- by related functions
- by task sequencing

Fitts Law

- The time to select a target is a function of the distance to the target and size of the target.

Seven plus or minus two

Visual richness

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Reading and short term memory

How many symbols can you remember?

Usually about 7

7+ or - 2

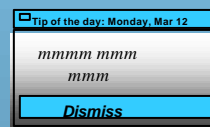
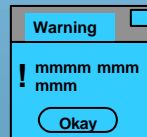
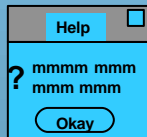
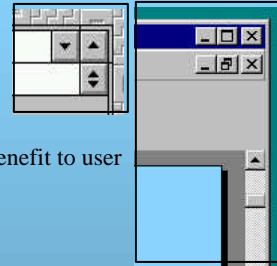
short term memory



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Visual Consistency

- internal consistency
 - same conventions and rules for all elements of the GUI unless strong reason
 - set of application-specific grids enforce this
- external consistency
 - follow platform and interface style conventions
 - use platform and widget-specific grids
 - deviate from conventions only when it provides a clear benefit to user



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Creating a Layout

One way to create structure is through use of a grid
- these are guidelines only !!!

- determine display size restrictions
- identify external consistency elements
 - window style, margins, borders, standard controls
- identify internal consistency elements
- start with rough sketches of the series of layouts to be produced

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Spatial Organization: Grids

Horizontal and vertical lines to locate window components

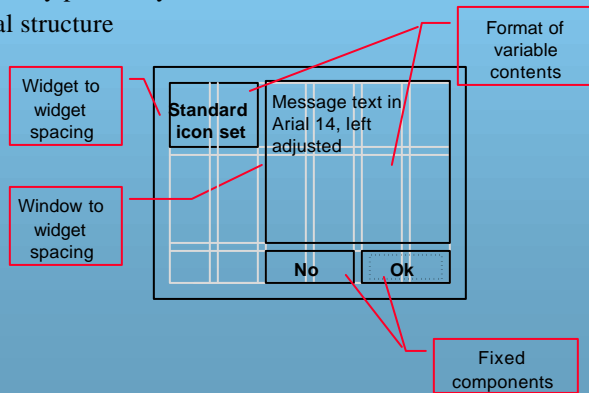
- aligns related components

Organization

- contrast to bring out dominant elements
- grouping of elements by proximity
- show organizational structure
- alignment

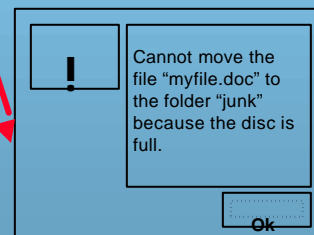
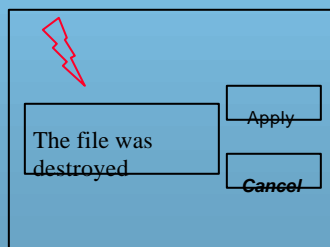
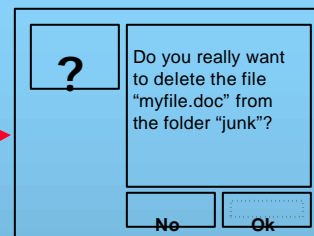
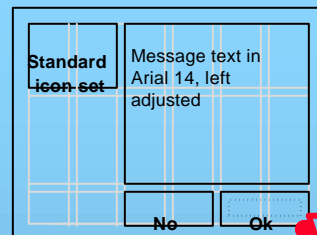
Consistency

- location
- format
- repetition
- organization



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Grids

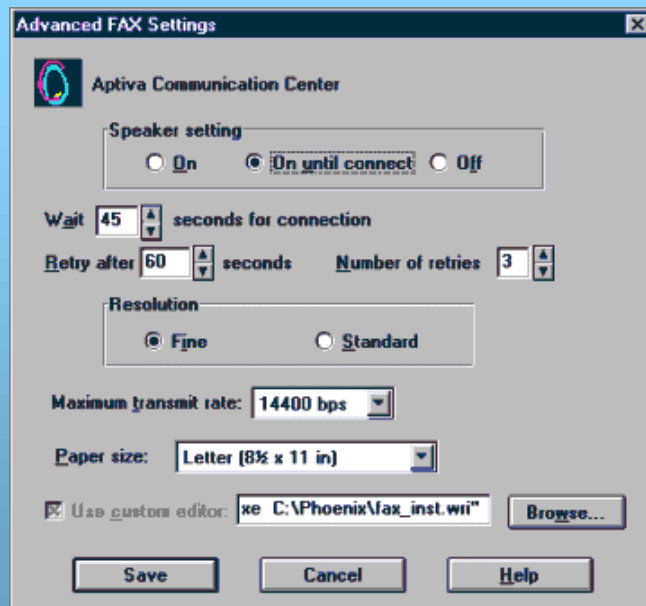


x

✓

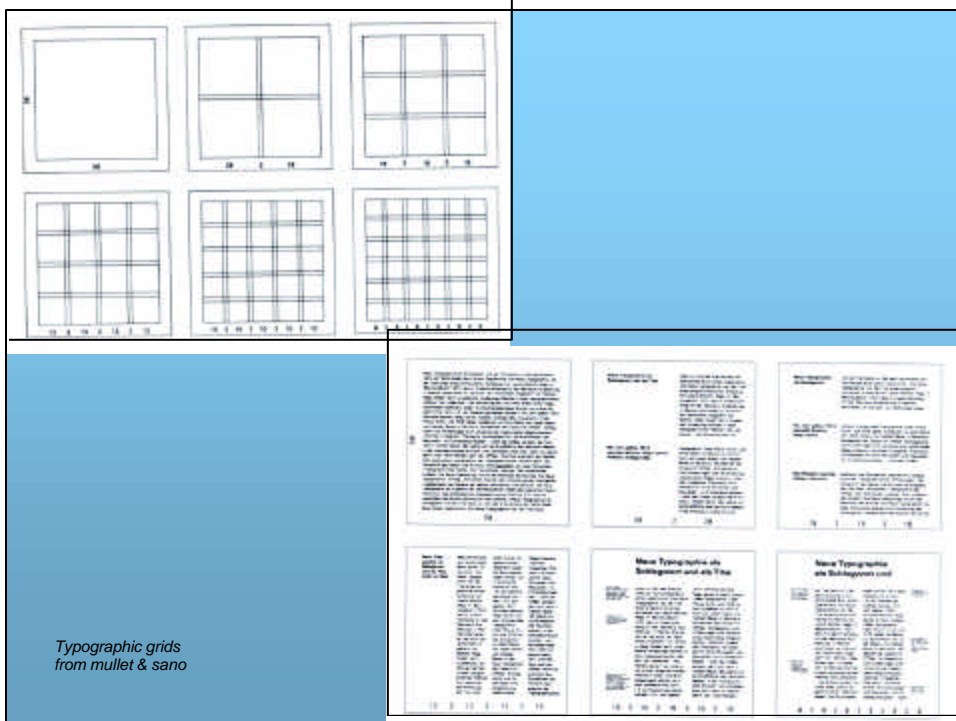
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No regard for order and organization



IBM's Aptiva Communication Center

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Typographic grids from mullet & sano

Creating a Layout (2)

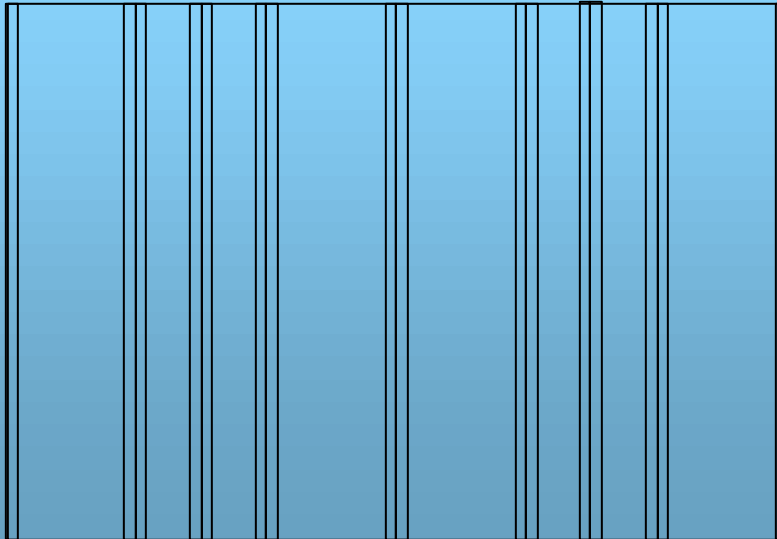
start with rough sketches of the series of layouts to be produced

- **determine module size requirements**
- **minimize number of units - ensure units combine readily**
- **establish a vertical unit**
 - use givens from external consistency
 - the vertical unit must allow for control labels and spacing
- **establish a horizontal unit**
 - often wider than vertical to allow for words (often 5-7 in display width)
- **consider establishing an axis of symmetry (vertical or horizontal)**
- **consider using vertical unit (or related unit) for horizontal spacing**

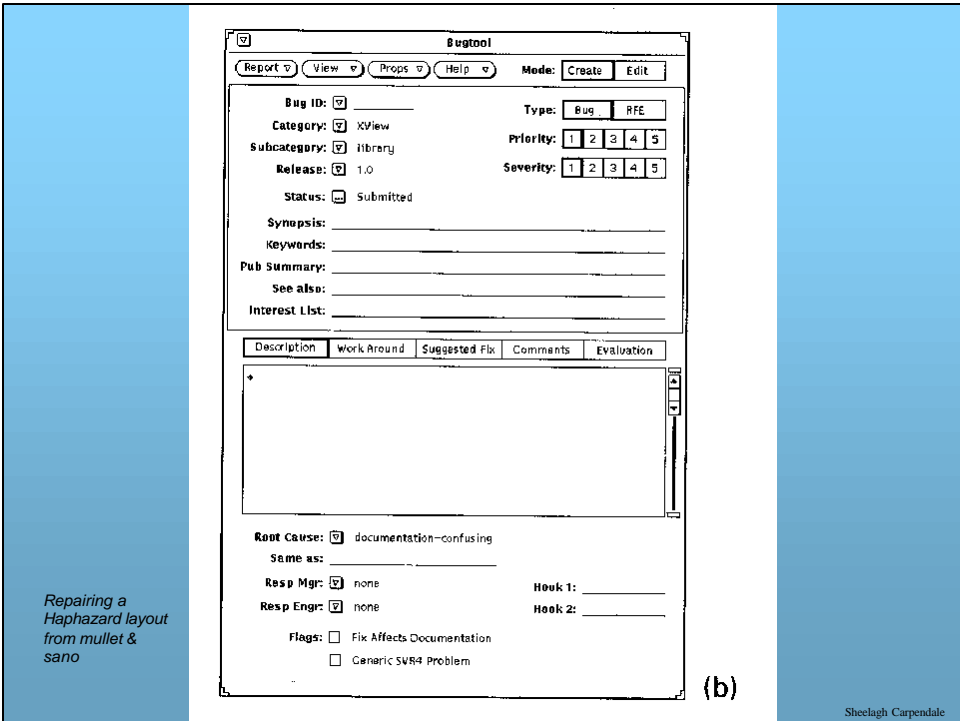
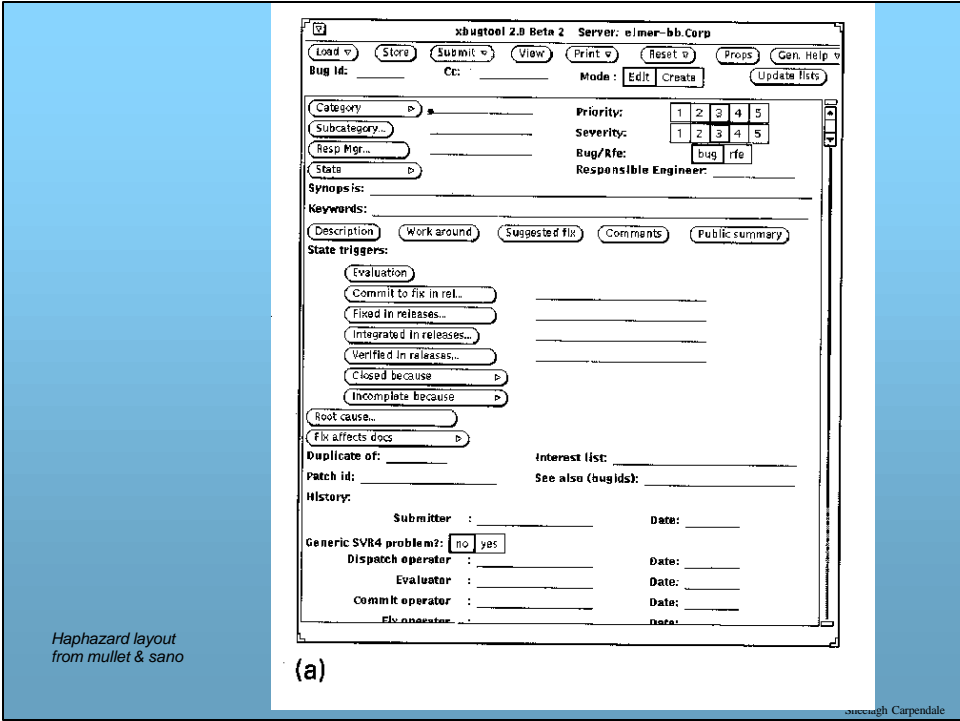
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Grids

A canonical grid



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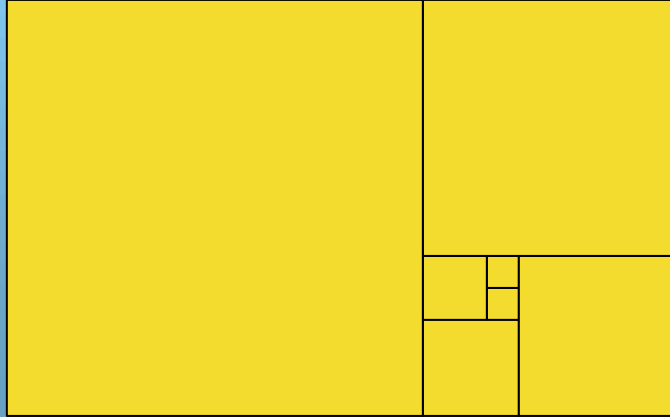


Spatial Organization



The Golden Mean:

- a ratio 1 : 1.618 that is present in the growth patterns, spiral formed shells or the curve of a fern
- derived by the ancient Greeks and used by artists and architects since then (Greek temples, Leonardo da Vinci, etc)



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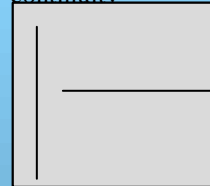
Visual Organization Background: perception

Based on visual gestalt (perception of 'wholeness')

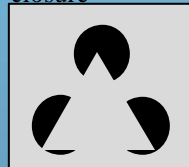
proximity similarity



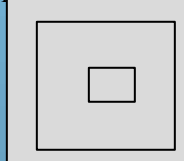
continuity



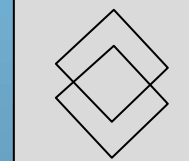
closure



figure/ground



symmetry



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Spatial Organization: Alignment

Link related elements, disassociate unrelated elements

- proxemic clusters
- white (negative) space
- alignment
- explicit structure

Mmmm: <input type="text"/>	Mmmm: <input type="text"/>	Mmmm: <input type="text"/>
Mmmm: <input type="text"/>	Mmmm: <input type="text"/>	Mmmm: <input type="text"/>
Mmmm: <input type="text"/>	Mmmm: <input type="text"/>	Mmmm: <input type="text"/>
Mmmm: <input type="text"/>	Mmmm: <input type="text"/>	Mmmm: <input type="text"/>
Mmmm: <input type="text"/>	Mmmm: <input type="text"/>	Mmmm: <input type="text"/>

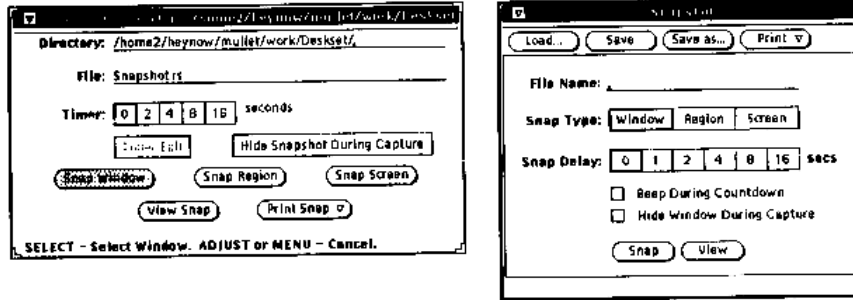
✘ ✔

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The image shows two overlapping dialog boxes from Microsoft Word. The 'Footnote' dialog box (a) is in the foreground, showing 'Maximum Height Per Column' set to 54.0 pc, 'Numbering Style' set to 'Numeric (4)', and 'Number Format' options for 'In Main Text' (Superscript) and 'In Footnote' (Baseline). The 'Sort' dialog box (b) is partially obscured behind it, showing 'First Sort' by 'Start Time', 'Second Sort' by 'No Sort', and 'Third Sort' by 'No Sort', with 'Ascending' selected for all three. A red circle highlights the 'Suffix' field in the 'In Footnote' section of the Footnote dialog, which contains the text '\t'.

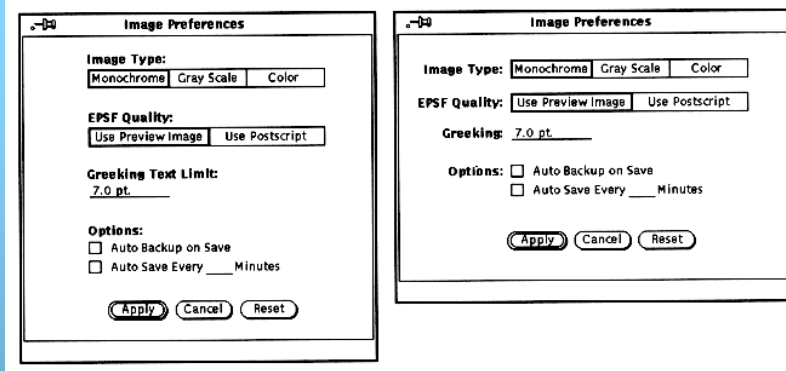
Using explicit structure as a crutch
from mullet & sano

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Redesigning a layout using alignment and factoring from mullet & sano

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The importance of negative space from mullet & sano

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Creating a Structure (3)

- draw the grid using vertical and horizontal units, paying attention to axis of symmetry and margins
- layout the interface modules and components
- adjust the sizes of these elements using the grid
- adjust as possible to enhance symmetry and balance
- consider dynamics of re-sizing (minimal acceptable size?)

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Navigational cues

- provide initial focus
- direct attention to important, secondary, or peripheral items as appropriate
- assist in navigation through material
- order should follow a user's conceptual model of sequences



x

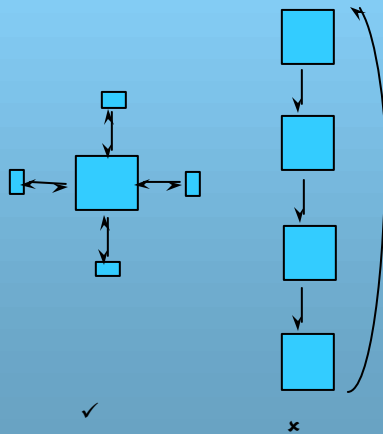


✓

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Widgets and complexity

- how can window navigation be reduced?
 - avoid long paths
 - avoid deep hierarchies



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Colour

colour is a complex subject

our understanding of it is incomplete and comes from many different subject areas

- physics, physiology, psychology, art and design

the colour of an object depends on

- the object itself, the light source, the surrounding colour, and the way it is perceived

it is heavily used, part of all cultures and as such has many different pre-assigned meanings

Why use colour?

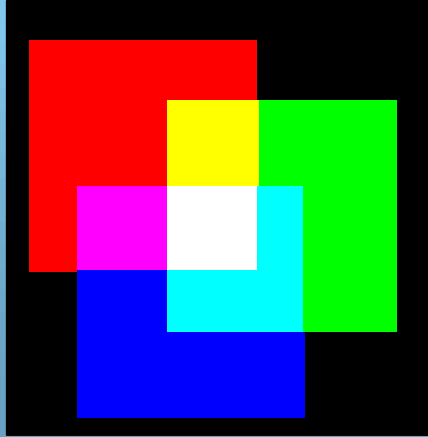
- to make the display more attractive
- to emphasize and draw attention
- to increase readability
- to encode meaning

- <http://msdn.microsoft.com/workshop/design/color/hess08142000.asp>
- <http://library.thinkquest.org/50065/art/effects.html>
- <http://www.colormatters.com/colortheory.html>

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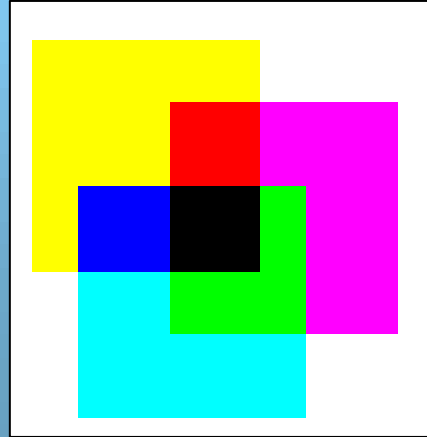
Color Addition

- computer monitors
- red, green, and blue
- absence all three colors gives black,
- all three gives white.



Color Subtraction

- printers ink
- cyan, magenta, and yellow
- absence all three colors gives white,
- all three gives black.



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Colour

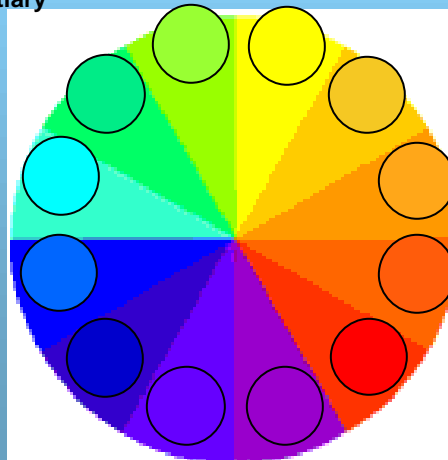
Colour wheel

- basically - do not over do colours - less is usually more
- in design - traditionally based on red, yellow and blue

primary



tertiary



secondary

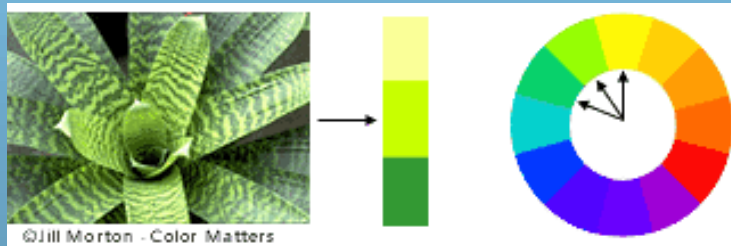
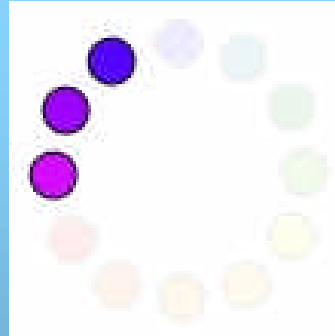


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Colour

Analogous Colours

- colours next to each other on the colour wheel with a common hue
- the common hue creates a feeling of unity in the design



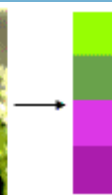
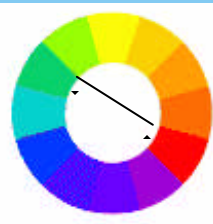
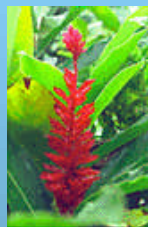
©Jill Morton - Color Matters

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Colour

Complementary Colors

- Complementary colors are opposite each other on the color wheel
- two pure complementary hues placed next to each other attract attention



©Jill Morton - Color Matters

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Colour

Complementary Colors

- Complementary colors are opposite each other on the color wheel
- two pure complementary hues placed next to each other attract attention



This is some sample text.

This is some sample text.

This is some sample text.

This is some sample text.

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Colour

Color Triads

Color triads is a color scheme composed of three colors spaced equally apart on the color wheel

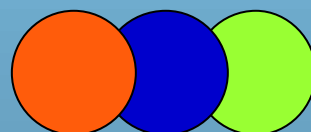
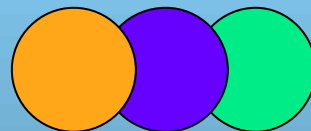
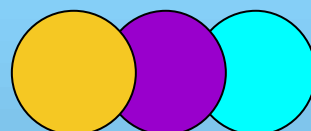
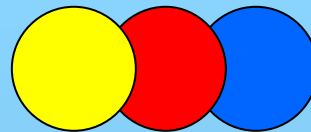
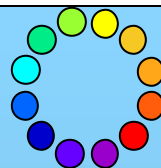
- tend to be uncomfortable
- good visual distinction

Primary colors form one triad

- (red, blue, yellow).

Secondary colors

- (orange, green, purple)



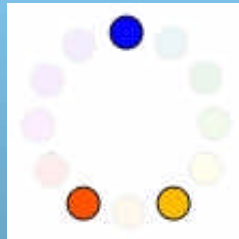
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Colour

Split Complements

hue and two colors on either side of its complement are used together.
similar to complementary colors

offers a little more variety to work with



This is a sample of colored text on top of a background tiled image. Can you read any of this?

This is a sample of colored text on top of a background tiled image. Can you read any of this?

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Colour

Warm and Cool Colors

two specific sets of analogous colors.

Cool

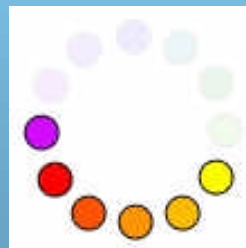
- blue, green and purple
- cold, icy feeling

Warm

- red, orange and yellow
- warm, sunny feeling.

When used together

- cool colors seem to move away
- warm colors move towards

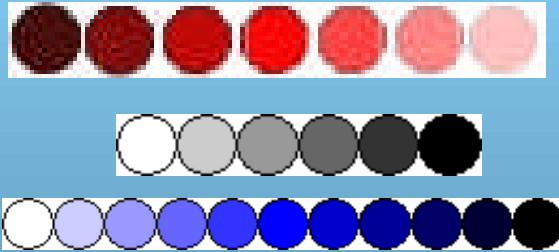


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Colour

Monochromatic Colors

- shades, tints and tones of only one color.
- causes an immediate unifying or harmonious effect.
- all parts of the design have something in common,
- pulls it all together.



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Colour

Hi-Key/Low Key Colours - changes in value

Hi-Key colour schemes

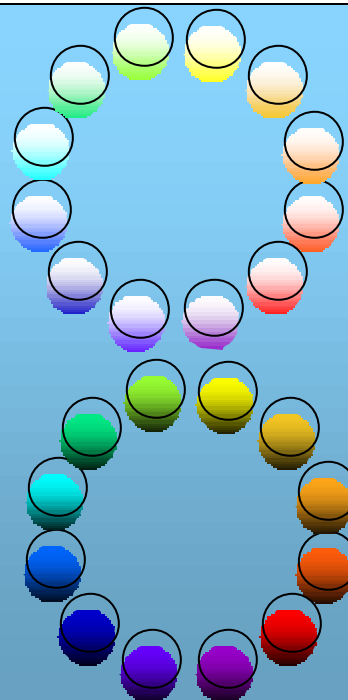
- tints of colours (paler)
- another way to unify
- bright, cheerful.

Low-Key colour scheme.

- shades of colours (darker)
- subdued gloomy mysterious

Degree of change

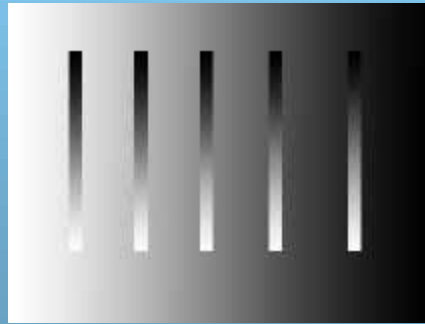
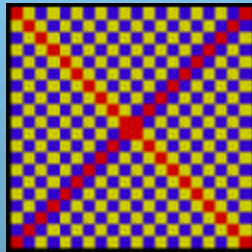
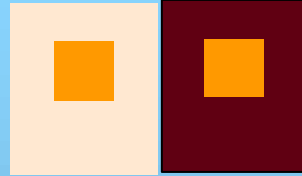
- gradual or small changes
 - calming
- rapid or extreme changes
 - nervous or active feeling.



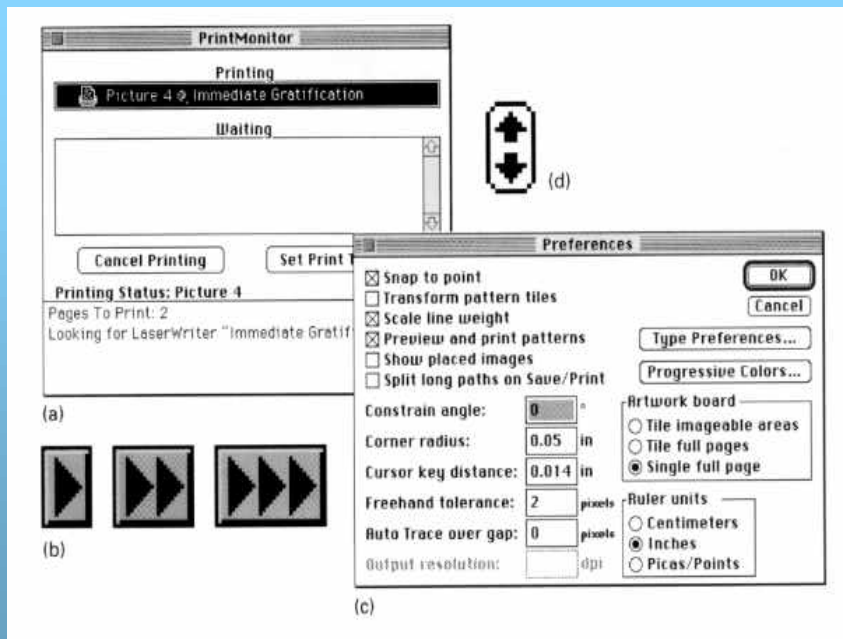
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Problems with just following these schemes

- colour constancy
- colour perception



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*Spatial Tension
from mullet & sano*

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Economy of visual elements

- minimize number of controls
- include only those that are necessary
 - eliminate, or relegate others to secondary windows
- minimize clutter
 - so information is not hidden

A diagram of a cluttered form. It features two main sections, each with a title (MMMM and NNNN) and two columns of labels (xxx:). Each section contains several input fields and buttons. The form is marked with an 'x' below it, indicating it is a poor example of design.

A diagram of a clean, simplified form. It features a single title (MMMM) and three labels (xxx:). The form is marked with a checkmark below it, indicating it is a better example of design.

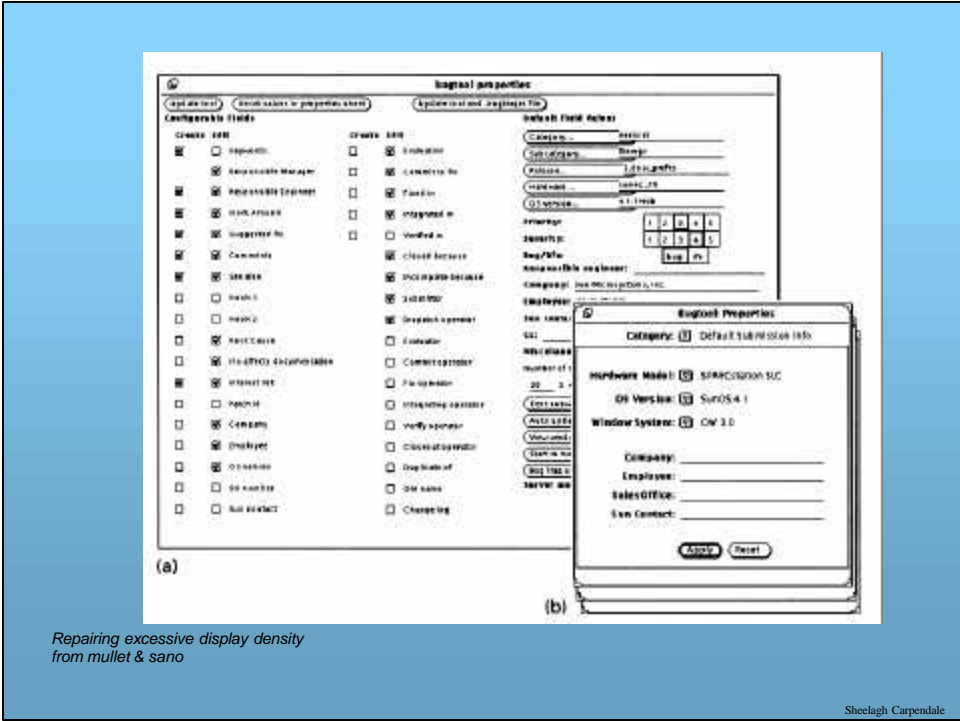
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A screenshot of a 'WebForms' 'Exporting' dialog box. The dialog has a title bar with 'Exporting' and standard window controls. It contains a 'Form to Export:' label above a dropdown menu. Below the dropdown are three radio buttons: 'Export to Access Database' (selected), 'Export to text file (CSV)', and 'Purge responses from original table' (unchecked). At the bottom are a help icon, 'OK', and 'Cancel' buttons.

WebForms

Overuse of 3-d effects makes the window unnecessarily cluttered

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Economy of visual elements

Tabs

- excellent means for factoring related items

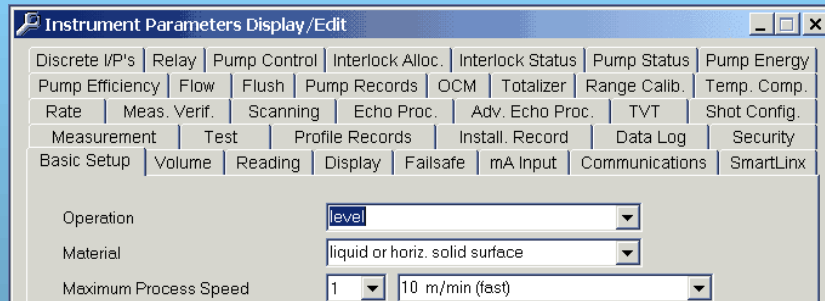


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Economy of visual elements

Tabs

- but can be overdone



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Legibility and readability

Whenever your local SMS Administrator sends you an actual software Package, the SMS Package Command Manager will appear (usually at network login time) displaying the available Package(s). The following screenshots display scenes similar to what you will see when you receive an actual SMS Package.

To start the demonstration, click the "OK" button.

Popkin Software's System Architect

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Legibility and readability

- Characters, symbols, graphical elements should be easily noticeable and distinguishable

Text set in
Helvetica

TEXT SET IN
CAPITOLS

Text set in
Times Roman

Text set in
Braggadocio

Text set in
Courier

✓

✗

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Legibility and readability

Proper use of typography

- 1-2 typefaces (3 max)
- normal, italics, bold
- 1-3 sizes max

Large
Medium
Small

Large
Medium
Small

Readable

Design components to be
inviting and attractive

Design components to be
inviting and attractive

✓

Unreadable

Design components to be
inviting and attractive

Design components to be
inviting and **attractive**

✗

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Legibility and readability

- typesetting
 - point size
 - word and line spacing
 - line length
 - Indentation
 - color

Readable

Design components to be inviting and attractive

Design components to be inviting and attractive



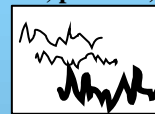
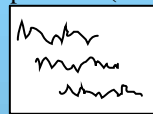
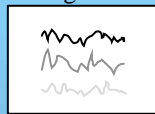
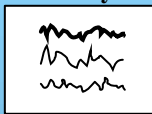
Unreadable: Design components to be easy to interpret and understand. Design components to be inviting and attractive



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Visual Organization Steps

- **classification** - grouping of related elements
- **hierarchy** - establishing relative importance (**size, value, position**)



- create **structure** to reflect these **relationships** and maintain **balance**
- ensure natural **sequencing**

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Legibility and readability

If you wish to add/change network information, please select one of the following options.

- I WANT TO CONNECT TO AN EXISTING TIME & CHAOS WORKGROUP OR MODIFY THE CONNECTION SETTINGS.
- I WANT TO BUILD A BRAND NEW WORKGROUP.

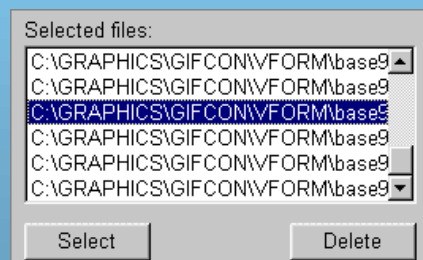
Time & Chaos

These choices must be really important, or are they?

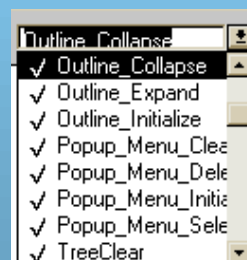
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Relationships between screen elements

How do you chose when you cannot discriminate screen elements from each other?



GIF Construction Set



Microsoft Access 2.0

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Legibility and readability

Greyed-out example text hard to read.
Why not make it black?

Appearance samples

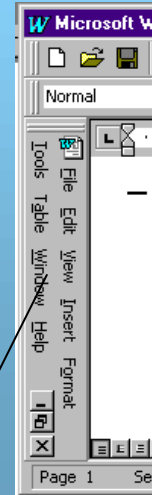
Positive:	\$123,456,789.000	Negative:	(\$123,456,789.000)
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Currency symbol: \$

No. of digits after decimal: 4

Regional Preferences
applet in *Windows95*

Text orientation makes it
difficult to read



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Webforms

Form Title -- (appears above URL in most browsers and is used by WWW search)		Background Color:
Q&D Software Development Order Desk		FFFBFD
Form Heading -- (appears at top of Web page in bold type)		Text Color:
Q&D Software Development Order Desk		000080
E-Mail responses to (will not appear on)	Alternate (for mailto forms only)	Background Graphic
dversch@q-d.com		
Text to appear in Submit button	Text to appear in Reset button	<input type="radio"/> Mailto
Send Order	Clear Form	<input checked="" type="radio"/> CGI
Scrolling Status Bar Message (max length = 200 characters)		
WebMania 1.5b with Image Map Wizard is here!		
<input type="button" value="Previous Tab <<"/>		<input type="button" value="Next Tab >>"/>

Bad alignment
Poor choice of colors to distinguish labels from editable fields

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Imagery

Signs, icons, symbols

- right choice within spectrum from concrete to abstract

Icon design *very* hard

- except for most familiar, always label them

Image position and type should be related

- image “family”
- don’t mix metaphors

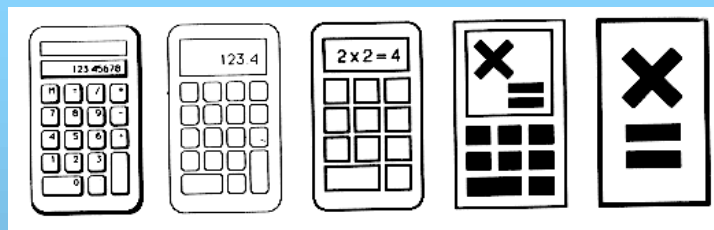
Consistent and relevant image use

- not gratuitous
- identifies situations, offerings...



Partial icon family

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x

x

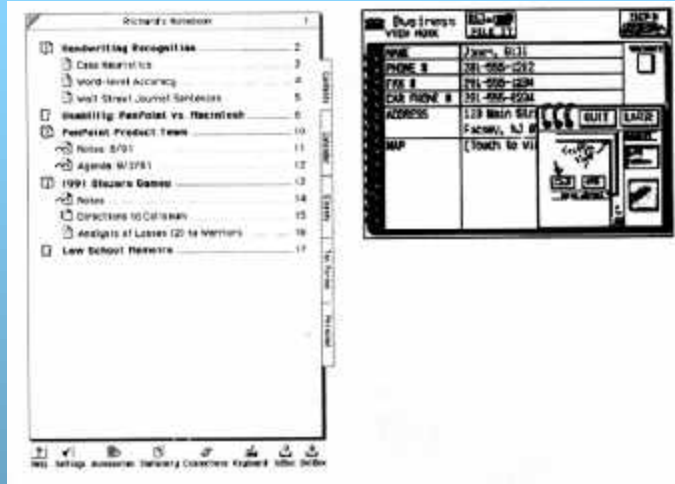
✓

✓

x

Choosing levels of abstraction
from mullet & sano

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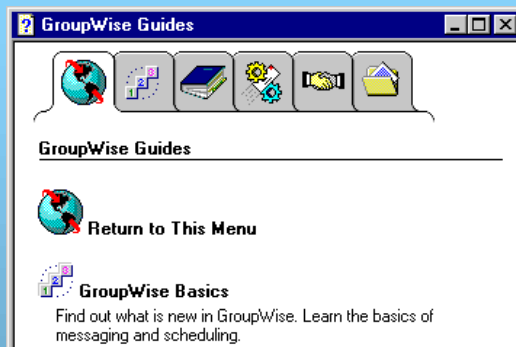


✓

✗

*Refined vs excessive literal metaphors
from mullet & sano*

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Novell GroupWise 5.1:

What do these images mean?

- No tooltips included
- One of the tabs is a glossary explaining these images! Which one?

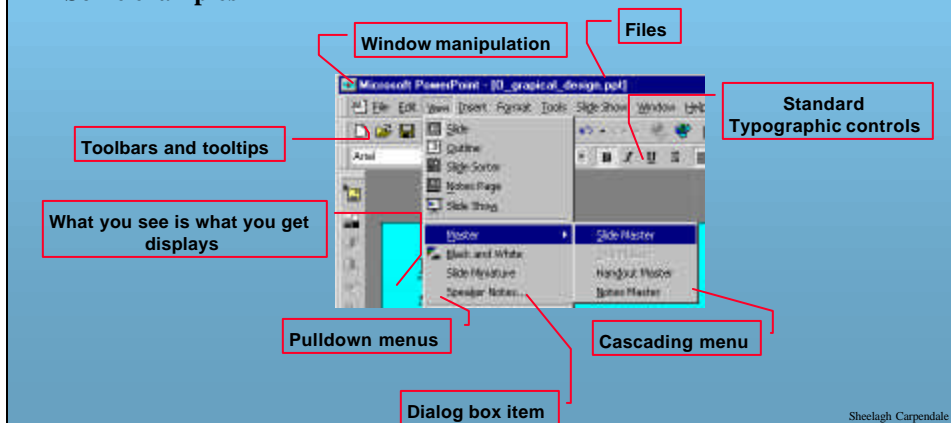
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Idioms

Familiar ways of using GUI components

- appropriate for casual to expert users
- builds upon computer literacy
- must be applied carefully in walk up and use systems

Some examples



How to choose between widgets

1 What components *must* be in the display

- necessary visual affordances
- frequent actions
 - direct manipulation for core activities
 - buttons/forms/toolbar/special tools for frequent/immediate actions
 - menus/property window for less frequent actions
 - secondary windows for rare actions

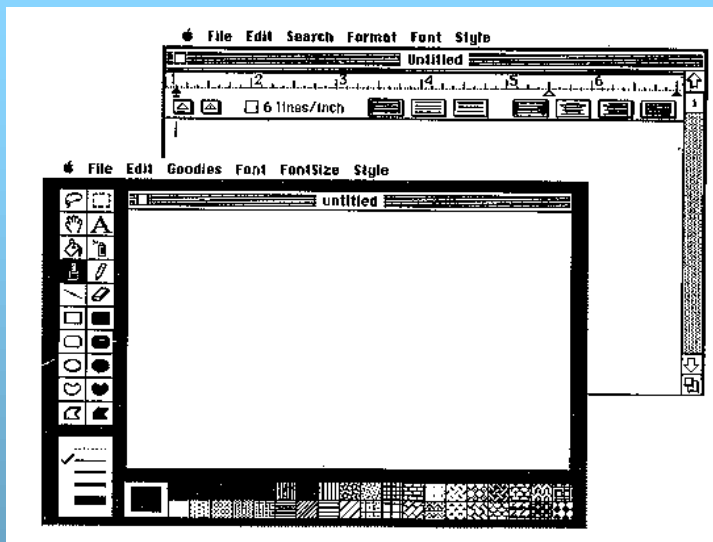
2 How are components related?

- organize related items as “chunks”

3 What are familiar and expected idioms?

- cross application look and feel

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*Displaying core functionality
from mullet & sano*

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What you now know

Grids are an essential tool for graphical design

Important visual concepts include

- visual consistency
 - repetition
- visual organization
 - contrast, alignment and navigational cues
- visual relationships
 - proximity and white space
- familiar idioms
- legibility and readability
 - typography
- appropriate imagery

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