

# Graphical Screen Design

## Examples of poor presentations

### Evaluation techniques

The squint test  
C.R.A.P.

### Design principles

C.R.A.P.  
Grids  
Consistency  
Implicit vs. explicit structure  
Avoiding spatial tension  
Employing negative space

Providing navigational cues  
The economy of visual elements  
Employing imagery  
Fonts and font effects  
Color and orientation  
Idioms

### Visual perception

The Gestalt laws  
Image-based recognition  
Visual and written languages

James Tam

## Recall: Representations Vs. Presentation

### First choose the representation



Mountain

### Next choose the presentation to be used for that particular representation

Mountain Mountain *Mountain* **Mountain**

James Tam

## Examples Of Poor Presentations: Input Vs. Output?

Form Title -- (appears above URL in most browsers and is used by WWW search engines)		Background Color:
Q&D Software Development Order Desk		FFFBFD
Form Heading -- (appears at top of Web page in bold type)		
Q&D Software Development Order Desk		Text Color:
		000080
E-Mail responses to (will not appear on Web page)	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="Prev Tab"/>		<input type="button" value="Next Tab"/>

Webforms

### •Problems:

- What Are The Input Fields?
- What Is Output Only?

### •Causes:

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

James Tam

## Examples Of Poor Presentations: No Regard For Order and Organization

Advanced FAX Settings

Aptiva Communication Center

Speaker setting

On  On until connect  Off

Wait 45 seconds for connection

Retry after 60 seconds Number of retries 3

Resolution

Fine  Standard

Maximum transmit rate: 14400 bps

Paper size: Letter (8 1/2 x 11 in)

Use custom editor: xe C:\Phoenix\Fax\_inst.wii

IBM's Aptiva Communication Center

James Tam

## Examples Of Poor Presentations: A Haphazard Layout

The screenshot shows a web-based bug reporting interface with a cluttered and inconsistent layout. At the top, there are several menu items: 'Load', 'Store', 'Submit', 'View', 'Print', 'Reset', 'Props', and 'Gen. Help'. Below these are fields for 'Bug Id:', 'Cc:', 'Mode: [Edit | Create]', and 'Update lists'. The main form area is divided into several sections:
 

- Category/Severity:** Includes dropdowns for 'Category', 'Subcategory', and 'State', along with radio buttons for 'Priority' and 'Severity' (options 1-5).
- Responsibility:** Fields for 'Resp Mgr.', 'Bug/Rfe' (with a dropdown set to 'bug'), and 'Responsible Engineer'.
- Synopsis:** A single-line text input field.
- Keywords:** A section with tabs for 'Description', 'Work around', 'Suggested fix', 'Comments', and 'Public summary'.
- State triggers:** A list of buttons for 'Evaluation', 'Commit to fix in rel.', 'Fixed in releases...', 'Integrated in releases...', 'Verified in releases...', 'Closed because', and 'Incomplete because'.
- Root cause:** A text input field.
- Fix affects docs:** A dropdown menu.
- Interest List:** A text input field.
- History:** A section with fields for 'Submitter', 'Date', 'Dispatch operator', 'Date', 'Evaluator', 'Date', 'Commit operator', 'Date', and 'Fluencester'.
- Generic SVR4 problem?:** A radio button set to 'no' with a 'yes' option.

Haphazard layout from Mullet & Sano page 105

James Tam

## Examples Of Poor Presentations: Repairing A Haphazard Layout

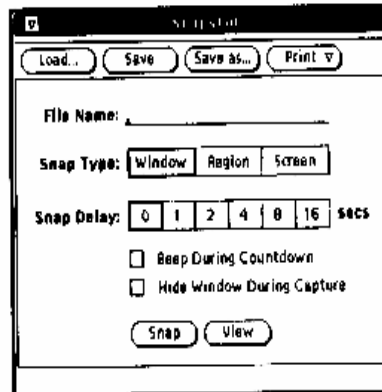
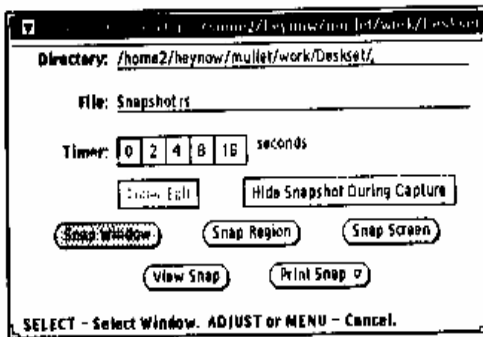
The screenshot shows a more organized and consistent version of the bug reporting interface. At the top, there are menu items: 'Report', 'View', 'Props', and 'Help', along with 'Mode: [Create | Edit]'. The form fields are arranged in a clear, logical order:
 

- Identification:** 'Bug ID:' (checkbox), 'Type:' (radio buttons for 'Bug' and 'RFE'), 'Category:' (checkbox), 'Subcategory:' (checkbox), 'Release:' (checkbox), and 'States:' (checkbox).
- Priority/Severity:** Radio buttons for 'Priority' and 'Severity' (options 1-5).
- Text Fields:** 'Synopsis:', 'Keywords:', 'Pub Summary:', 'See also:', and 'Interest List:'.
- Description:** A large text area with tabs for 'Description', 'Work Around', 'Suggested Fix', 'Comments', and 'Evaluation'.
- Root Cause:** A text input field with the value 'documentation-confusing'.
- Same as:** A text input field.
- Responsibility:** 'Resp Mgr.' and 'Resp Engr.' (both with radio buttons set to 'none'), and 'Hook 1:' and 'Hook 2:'.
- Flags:** Checkboxes for 'Fix Affects Documentation' and 'Generic SVR4 Problem'.

Repairing a haphazard layout from Mullet & Sano page 105

James Tam

## Examples Of Poor Presentation: Re-Factoring An Interface



Redesigning a layout using alignment and factoring from Mullet & Sano Page 119

James Tam

## Evaluating A Graphical Display

- The Squint test
- C.R.A.P.

James Tam

## The Squint Test

Used to determine what stands out or what elements appear to belong together



James Tam

## CRAP: An Important Tool For Graphical Screen Design & Evaluation

### **Contrast**

- Make different things even more different
- Brings out dominant elements & mute lesser elements

### **Repetition**

- Consistency
- Repeat conventions throughout the interface to tie elements together

### **Alignment**

- Visually associate related elements by lining them up

### **Proximity**

- Group related elements
- Separate unrelated elements

James Tam

## Contrasting Contrast

### **Laura Mathews**

1955 Knolls Drive  
Santa Rosa, California 95405  
707/987.1254

#### **Related Skills**

Excellent working knowledge of laboratory tests and their significance in oncology care through working in a clinical laboratory, reinforced while providing patient care. Assisted with bone marrow biopsy and aspirations, lumbar puncture, paracentesis, thoracentesis, and intrathecal chemotherapy administration. Promoted self-care skills and adaptation of the client to their disease and particular treatment program.

Extensive experience with at-home care of skin and cancer patients, including IV line maintenance, pain management, understanding of medicare reimbursement and social service referrals.

#### **Education**

1979 Associate in Science Nursing, High Honors  
Santa Rosa Junior College, Santa Rosa, California

#### **Experience**

1992-present Registered Nurse for Home Health Plus, Visit Division. At-home care of patients with multiple health problems, skin, and cancer patients.

1990-present Registered Nurse for Memorial Hospital Oncology Unit, Santa Rosa, California. Managed the care of 4-5 oncology patients. Assumed lead nurse responsibilities. Assisted with new RN orientation. Assisted with procedures, administered chemotherapy, assessed for side effects of chemotherapy and disease process.

1985-1986 Nurse's Aide for Mendocino Coast District Hospital, Fort Bragg, California. Assisted with patient care in Med-Surg and Obstetrical settings.

1985-1986 Lab Assistant for Mendocino Coast District Hospital, Fort Bragg, California. Computer skills while inputting data, cultured lab specimens.

#### **Personal Statement**

Previous work experience in a fast-paced, high-stress environment has fine-tuned my organizational skills. My experiences have made me comfortable with oncology patients and their families. Supervisors value my organizational skills, eagerness to learn and assume responsibilities, and my dedication to my job.

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From "The Non-Designers Design book by Robin Williams

James Tam

## Repetition

### **Mickey Mouse**

- Walt Disney Studios  
Anaheim, California  
58 years old, no children

#### **Employment**

- Walt Disney Studios
- Various television studios

#### **Education**

- Walt Disney Studios

#### **Favorite Activities**

- Driving steamboats
- Roping cattle

#### **Favorite Quote**

- Everybody can't be a duck.

From "The Non-Designers Design book by Robin Williams

James Tam

## Alignment

### **Honor Form**

Heresy rheumatic starry offer former's dodder, Violate Huskings, an wart hoppings darn honor form.

Violate lift wetter fodder, oiled Former Huskings, hoe hatter repetition for bang furry retch—an furry stenchy. Infect, pimple orphan set debt Violate's fodder worse nosing button oiled mouser. Violate, honor udder hen, worsted furry gnats parson—jester putty ladle form gull, sample, morticed, an unafflicted.

### **Tarred gull**

Wan moaning Former Huskings nudist haze dodder setting honor cheer, during nosing.

"Violate!" sorted dole former, "Watcher setting darn fur? Denture nor yore canned gat retch setting darn during nosing? Germ pup otter debt cheer?"

"Arm tarred, Fodder," resplendent Violate warily.

"Watcher tarred fur?" aster stenchy former, hoe dint half mush symphony further gull.

### **Feeder pegs**

"Are badger dint doe mush woke disk moaning! Ditcher curry doze buckles fuller slob darn tutor peg-pan an feeder pegs?"

"Yap, Fodder. Are fetter pegs."



"Ditcher mail-car caws an swoop otter caw staple?" "Off curse, Fodder. Are mult oiler caws an swapped otter staple, fetter checkings, an clammed upper larder inner checking-horse toe gadder

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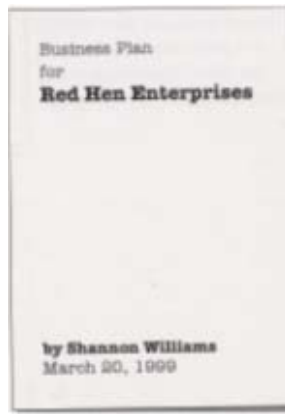
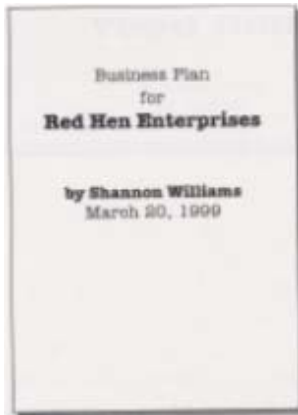
"Ditcher mail-car caws an swoop otter caw staple?" "Off curse, Fodder. Are mult oiler caws an swapped otter staple, fetter checkings, an clammed upper larder inner checking-horse toe gadder oiler aches, an wen darn tutor vestibule guarding two peck oiler bogs

From "The Non-Designers Design book by Robin Williams

James Tam

## Legibility And Readability: Center Alignment

- Some regard it as unprofessional and advocate against it's use.
- It's described as being unprofessional looking and plain.



From the Non-Designer's Design Book page 30

James Tam





## Legibility And Readability: Center Alignment



- If you are employing it to provide contrast then at least make it obvious



This text is **centered**.  
If you are going to  
center text,  
make it obvious.

See, in this paragraph it is  
difficult to tell if this text  
was centered purposely  
or perhaps accidentally.  
The line lengths are not  
the same, but they are not  
really different. If you can't  
instantly tell that the type  
is centered, why bother?

## Proximity

CD ROMs  
CD ROMs  
Children's CDs  
Educational CDs  
Entertainment CDs  
Laser discs  
Educational  
Early learning  
Language arts  
Science  
Math  
Teacher Tools  
Books  
Teacher tools  
Videos  
Hardware &  
Accessories  
Cables  
Input devices  
Mass storage  
Memory  
Modems  
Printers & supplies  
Video and sound

### **CD ROMs**

CD ROMs  
Children's CDs  
Educational CDs  
Entertainment CDs  
Laser discs

### **Educational**

Early learning  
Language arts  
Science  
Math

### **Teacher Tools**

Books  
Teacher tools  
Videos

### **Hardware & Accessories**

Cables  
Input devices  
Mass storage  
Memory  
Modems  
Printers & supplies  
Video and sound

## Design Techniques

- C.R.A.P.
- Employing grids
- Employing consistency
- Implicit vs. explicit structure
- Using mumble text
- Avoiding spatial tension
- Employing negative space
- Providing navigational cues
- The economy of visual elements
- The appropriate and effective use of imagery
- Rules of thumb for fonts and font effects
- Color and orientation
- Idioms

James Tam

## Grids

### Horizontal and vertical lines to locate window components

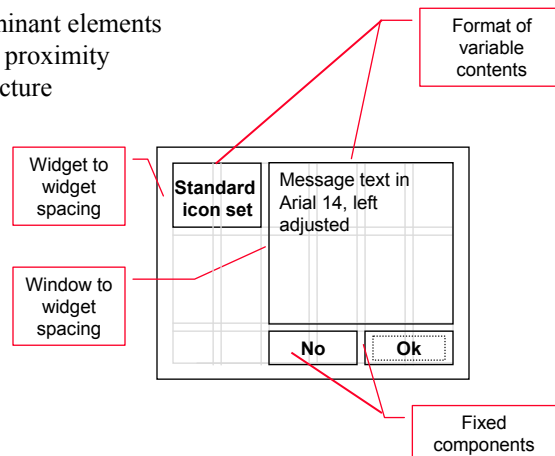
- Aligns related components

### Organizes the display:

- Contrast to bring out dominant elements
- Grouping of elements by proximity
- Show organizational structure
- Alignment

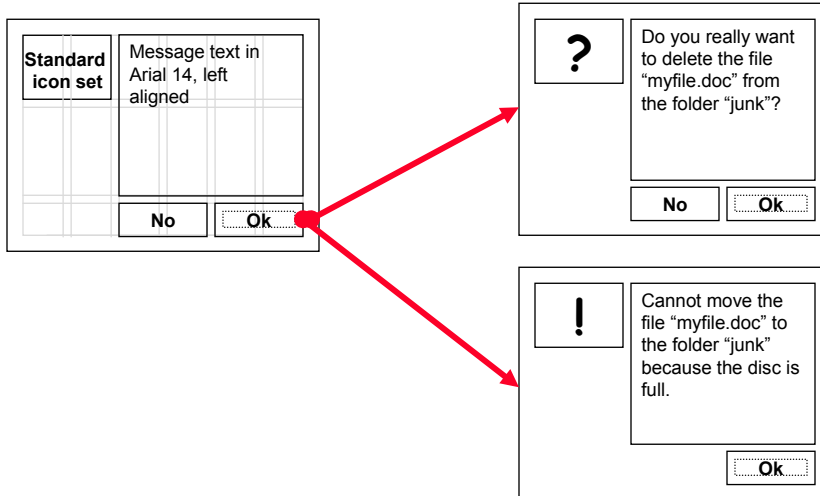
### Provides consistency

- Location
- Format
- Repetition
- Organization



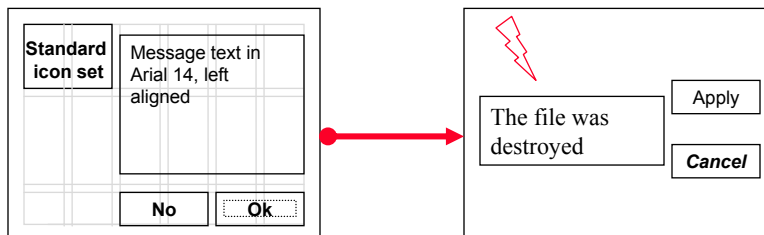
James Tam

## Using A Grid: Consistent



James Tam

## No Grid: Inconsistent



James Tam

## Another Grid Example

Two-level Hierarchy

- Indentation
- Contrast

Logic of organizational flow

**Grid for Form Type 1**

Heading 1

Label Text field

Label Combo1

Label Large multiline text field

Heading 1

Check box     Check box

Check box     Check box

Apply    Cancel

**Note Sender**

Send to

Name Saul Greenberg

Email saul@cpsc.ucalgary.ca

Message

Hi Saul  
Let's get together for lunch,  
Perhaps tomorrow?  
Judy

Instructions

Type Normal mail

Include attachments

Carbon copy

Apply    Cancel

Alignment connects visual elements in a sequence

Grouping by white space

James Tam

## Visual Consistency: Internal Consistency

- Unless there is a compelling reason all elements of the same program follow the same rules and conventions
- Application specific grids can be used to enforce this

**Doh!**

**Format AutoShape**

Colors and Lines    Size    Position    Picture    Text Box    Web

Fill

Color: No Fill

Transparency: 0%    100%

Line

Color:    Style:    Dashed:    Weight: 1 pt

Connector:    Arrows

Begin style:    End style:    Begin size:    End size:

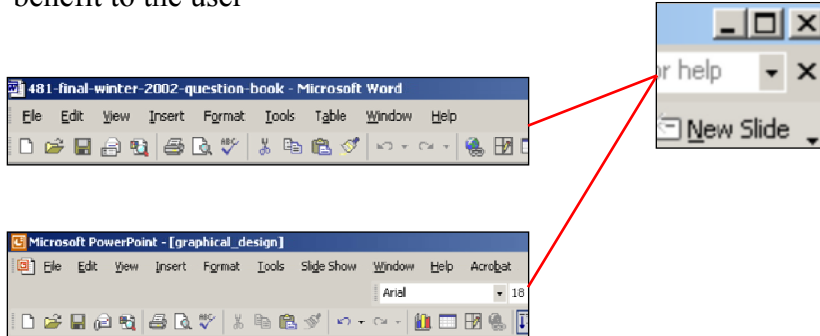
Default for new objects

OK    Cancel    Properties

James Tam

## Visual Consistency: External Consistency

- Follow interface and platform style conventions
- Use grids that are platform (e.g., Windows) and widget (e.g., Java Swing) specific
- Deviate from these conventions only when there is a clear benefit to the user



James Tam

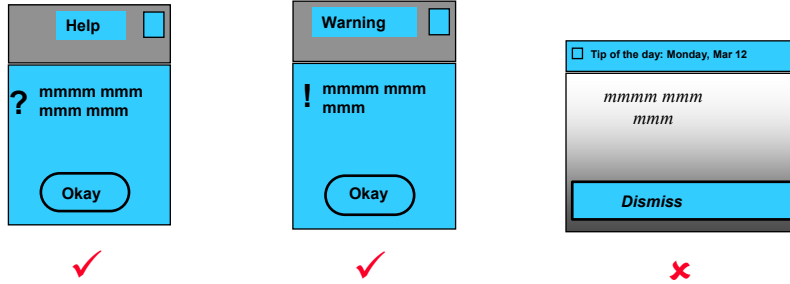
## External Consistency Violated

The screenshot displays a web application interface for 'LIGANDFIT'. The main content area is divided into three sections: 'Primary Task Information', 'Member Information', and 'Device Information'. The 'Primary Task Information' section includes the title 'LIGANDFIT', the subtitle 'CANCER RESEARCH PROJECT, PHASE II', a description of the project, and a progress bar showing 57% completion. The 'Member Information' section shows the name 'JimmyT', total points of 889891, and total CPU time of 5 years, 132 days, 15 h, 25 m, 23 s. The 'Device Information' section shows overall performance of 100, with a comparison device of 'High-end Desktop System' and this device being 'My Device'. The interface also includes a 'Learn about this Project' link and a 'View your scores and rewards' link. The footer features the 'UNITED DEVICES' logo and the text 'Primary task is executing...'.

The UD agent © United Devices: <http://www.grid.org/projects/cancer/>

James Tam

## A Tool For Ensuring Consistency: Mumble Text



James Tam

## Structure Is Difficult To Ascertain

sometimes be more a nuisance than a benefit. This was found to be the case in my own investigation of potential change display mechanisms summarized in Chapter 5 and published as Tam, McCaffrey, Maurer, and Greenberg (2000). During this study, many test participants expressed a desire for useful abstractions that combine rudimentary change information into one higher-level conceptual change. For example, one participant noted while watching the animated replay of a class name being shown, "...I don't need to see each and every character being typed just to see a name change!" Of course, care must be taken to make these abstractions understandable, e.g., by using already familiar representations or notations. This minimizes the cost of acquiring information while maximizing its benefits due to the added structure and organization.

Based upon my previous findings (to be discussed in Chapter 5), I add a third dimension, *persistence*, to Gutwin's classification. *Persistence* refers to how long the information is displayed (Figure 4.1 side pane). The display of information is *permanent* if it is always visible and *passing* if it only appears for a certain period. We noticed how study participants frequently complained when important information disappeared off the screen. Conversely, they also indicated that screen clutter might occur with the mechanisms that constantly displayed all changes. Thus, there's a need to classify change information according to how long it should stay visible.

With permanent persistence, the effort needed to find changes i.e., the acquisition cost is low because the information is always there. Ideally, a person merely has to shift their gaze over to see the information. Because people can become accustomed to the occurrence of workspace events, they can also ignore things that do not interest them and pay closer attention to things that are of interest (Gutwin 1997).

With passing persistence, information about changes is presented only for a limited duration. This is useful when the information applies only to a specific portion of the project (artifact or group of artifacts) being viewed, or when the change information otherwise becomes irrelevant. This is quite an important point for us. The matrix in Figure 4.1 suggests that these dimensions can be combined, giving eight possibilities. For example, a literal, situated and passing display of changes is depicted in Figure 4.2a. The figure shows an animation of a changed circle (by using a 'replay' technique) where the circle literally retraces the path that it took as it was moved. It is situated because the animation occurs in the same place that the change actually happened. The persistence is 'passing' because once an animation has replayed a change, the information is gone. Figure 4.2b shows two other examples within a concept map editor. The first illustrates the symbolic, situated and permanent octant, where color value (shades of gray) is used to indicate changed 'Jim' and 'Jack' nodes. Thus, it is symbolic because changes are mapped to a gray scale value, situated because the shading is applied directly to the node that was changed, and permanent because the color values are always on. Figure 4.2c also portrays an example of the symbolic, separate, and passing octant, where a person can raise a node's change details in a pop-up as a text description by mousing-over the node. Thus it is somewhat separate as the information appears outside the changed node, it is symbolic as it uses the text to describe the changes, and passing because the pop-up disappears when the person moves the mouse off the node (not quite on the node).

In summary, these three dimensions provide the designer with a means of classifying change information. I now turn to other display issues, where we need to represent the change information in an easily understood and readily accessible fashion.

James Tam

## Structure Is Difficult To Ascertain: Don't Impose An Explicit Structure

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James Tam

## Structure Is Implied With White Space

With permanent persistence, the effort needed to find changes i.e., the acquisition cost is low because the information is always there. Ideally, a person merely has to shift their gaze over to see the information. Because people can become accustomed to the occurrence of workspace events, they can also ignore things that do not interest them and pay closer attention to things that are of interest (Gutwin 1997).

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James Tam

## Structure Helps Determine Relationships Between Screen Elements

- Using white space (negative proximity) vs. forcing an explicit onscreen structure (e.g., the use of bounding boxes)

### No structure

Mmmm:

Mmmm:

Mmmm:

Mmmm:

Mmmm:

x

### Explicit structure

Mmmm:

Mmmm:

Mmmm:

Mmmm:

Mmmm:

x

### Implicit structure

Mmmm:

Mmmm:

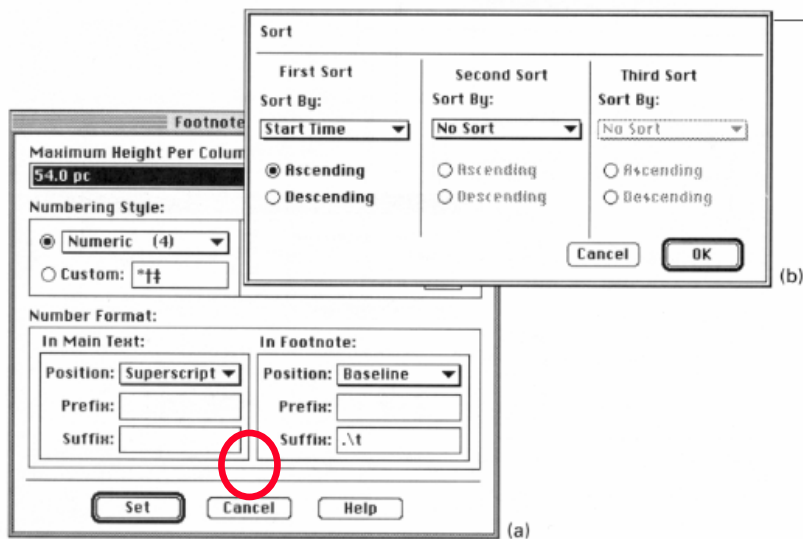
Mmmm:

Mmmm:

✓

James Tam

## Examples Of Explicit Structure





# Avoid Spatial Tension

The screenshot shows a financial website with a sidebar on the left containing various navigation links such as 'Symbol Lookup', 'Departments', 'Investments', 'Home & Mortgage', 'Insurance', 'Banking & Credit', 'Retirement', 'Life Events', and 'Taxes'. The main content area is divided into several sections: 'News' with a headline 'Stocks sacked' and a sub-headline 'U.S. stocks were slammed for beefy losses Wednesday as investors, voicing extreme displeasure with Tuesday's minimal interest-rate cut by the Federal Reserve, dumped holdings across a broad swath.'; 'Today on Personal Finance' with links for 'Home buying?' and 'Stock of the Week'; 'Financial Forums' with a poll about impeachment proceedings; 'Personal Finance Q&A' with a question about consolidating debts; and 'Mini Portfolio' which includes a table of stock prices and a list of products and promotions.

Symbol	Last	Change
Nasdaq	1693.84	-40.21
Dow	7842.62	-237.90
S&P 500	1017.05	-31.97
FMAGX	97.52	-2.94
INTU	46.56	+0.06
AOL	111.62	-5.75

The web site for Quicken: Web Centers/Personal Finance link

James Tam

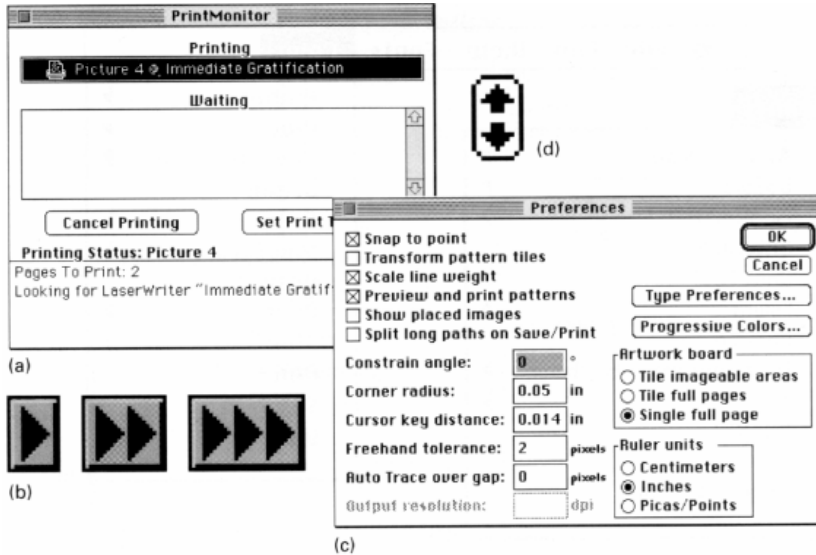
# Avoid Spatial Tension

This is the same screenshot as above, but with a large red bracket on the right side of the page, indicating that the layout is cramped and that finding information is difficult. The bracket encompasses the 'Mini Portfolio' table and the 'Products & Promos' section.

The layout is so cramped that finding information is difficult

James Tam

## More Examples Of Spatial Tension

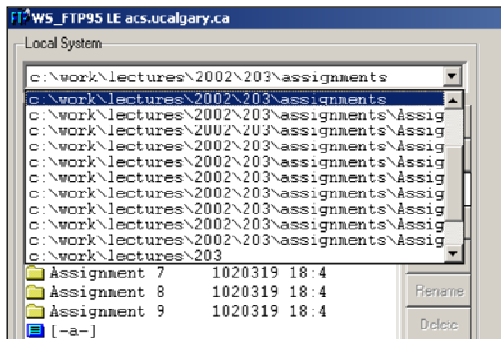


Spatial Tension from Mullet & Sano page 72

James Tam

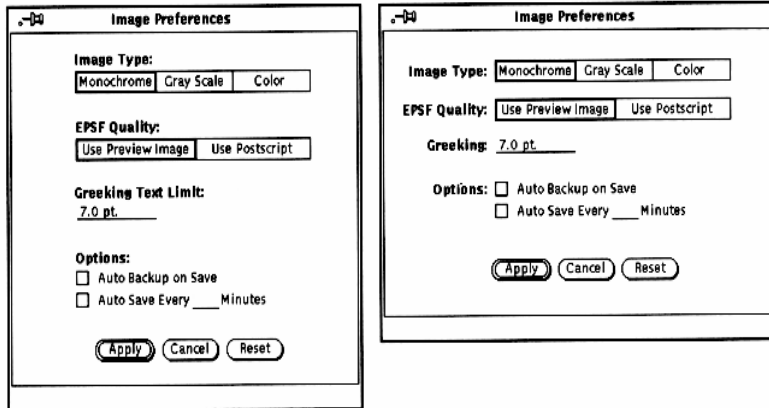
## Determining Relationships Between Screen Elements

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



James Tam

## The Importance Of Negative (White) Space



The importance of negative space from Mullet & Sano page 129

James Tam

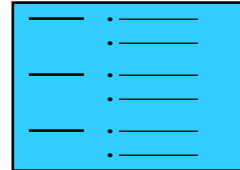
## Recall: Navigational Cues Are Important In The Real World



James Tam

## Navigational Cues

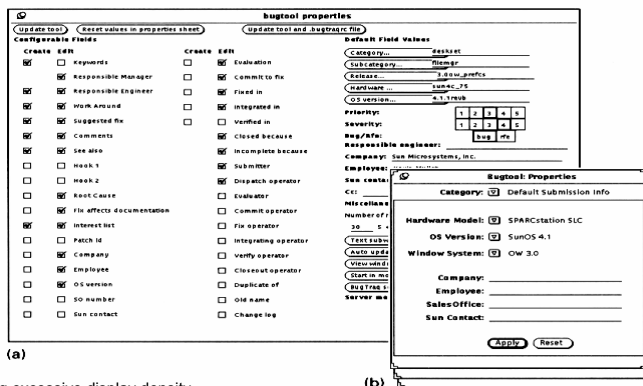
- Provide initial focus
- Direct attention to important, secondary, or peripheral items as appropriate
- Assist in navigation through material



James Tam

## 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)

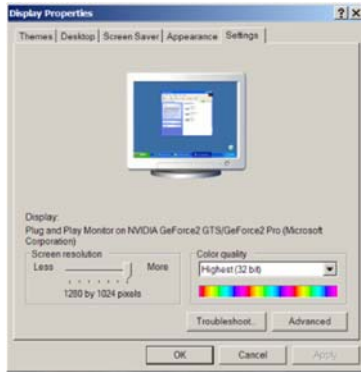
(b)

Repairing excessive display density  
from Mullet & Sano Page 111

James Tam

## Economy Of Visual Elements (Using Tabs)

Excellent means for factoring related items

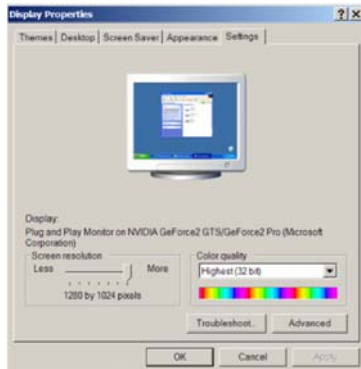


Windows display properties tab

James Tam

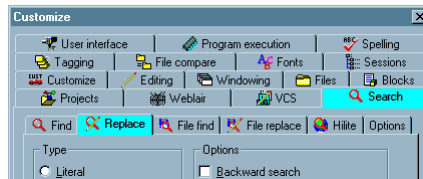
## Economy Of Visual Elements (Using Tabs)

Excellent means for factoring related items



Windows display properties tab

But it can be overdone



MultiEdit 8.0

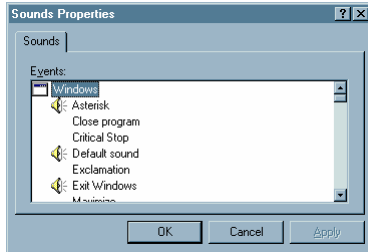


Website: Ottawa-Carleton Real Estate Board

James Tam

## Economy Of Visual Elements (Using Tabs): 2

The unnecessary use of a tab



Microsoft Windows

James Tam

## Employing Imagery

### Signs, icons, symbols

- Right choice within spectrum from concrete to abstract



**BOOZE!**



### Icon design *very* hard

- Except for most familiar, always label them



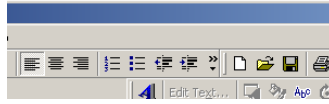
[www.baddesigns.com](http://www.baddesigns.com)

James Tam

## Employing Imagery (Continued)

### **Image position and type should be related**

- Image “family”



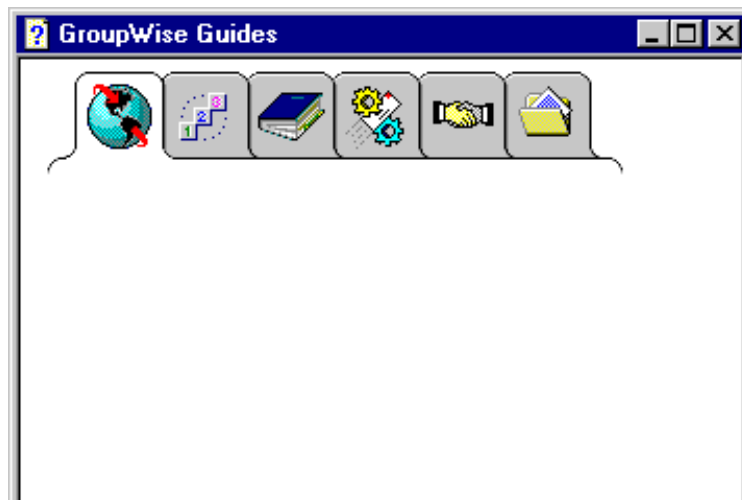
- Don't mix metaphors

### **Consistent and relevant image use**

- Not gratuitous
- Identifies situations, offerings...

James Tam

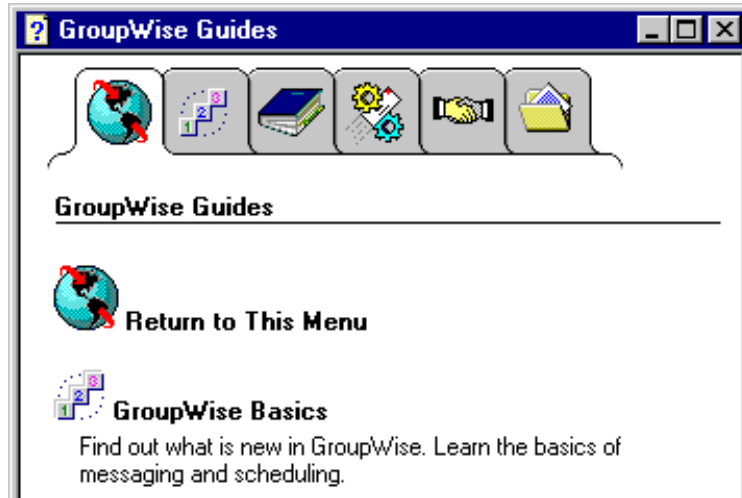
## Why Icon Design Is Hard: An Example



Novell GroupWise 5.1

James Tam

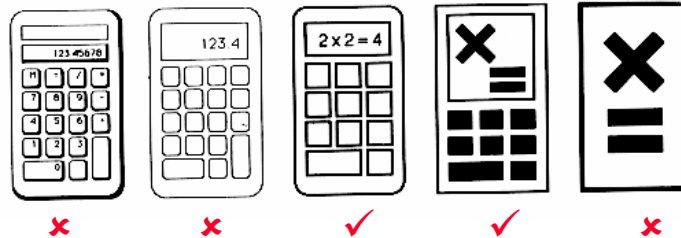
## Why Icon Design Is Hard: An Example



Novell GroupWise 5.1

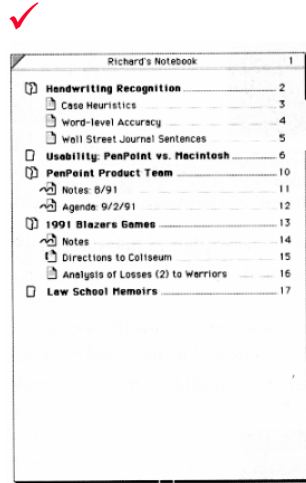
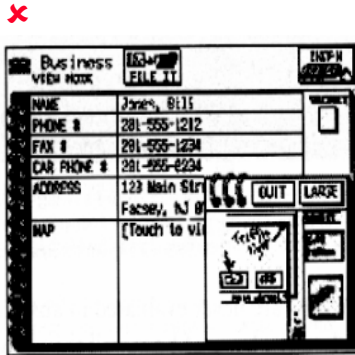
James Tam

## Icon Design: Use The Appropriate Level Of Detail





## Interface Design: Use An Appropriate Level Of Detail



Refined vs excessive literal metaphors from Mullet & Sano page 25

James Tam

## Legibility And Readability: Fonts And Font Effects

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

Text set in  
Helvetica

Text set in  
Times Roman



TEXT SET IN  
CAPITOLS

Text set in  
Braggadocio

Text set in  
Courier



James Tam

## Legibility And Readability: Fonts And Font Effects

(2)

### Proper use of typography

- 1-2 typographical effects (typeface or typography) - 3 max
  - Font types, normal, italics, bold, underline
- 1-3 fonts 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*



James Tam

## Legibility And Readability: Fonts And Font Effects

(3)

- 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



James Tam

## Legibility And Readability: The Effect Of Capitalization

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.

These choices must be really important, or are they?

## Legibility And Readability: The Effect Of Capitalization (2)

DO NOT OVERUSE CAPITALIZED TEXT BECAUSE CAPITAL LETTERS ARE HARD TO READ. ALTHOUGH SOME PEOPLE BELIEVE THAT USING CAPITAL LETTERS WILL DRAW ATTENTION TO THEIR MESSAGE AND MAKE THEM STAND OUT MANY PEOPLE TEND TO SKIP READING OVER CAPITALIZED TEXT.

Do not overuse capitalized text because capital letters are hard to read. Although some people believe that using capital letters will draw attention to their message and make them stand out many people tend to skip reading over capitalized text.

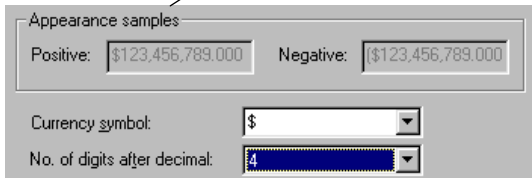
## Use Capitalization Sparingly



James Tam

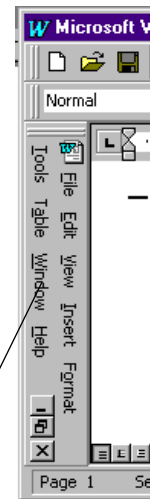
## Legibility And Readability: The Effect Of Color And Orientation On Text

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



Regional Preferences applet in Windows95

Text orientation makes it  
difficult to read



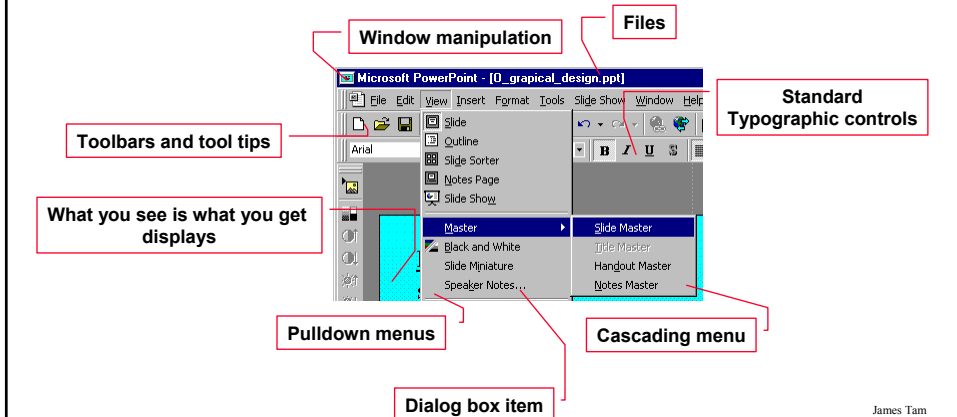
MS-Word James Tam

## Using 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

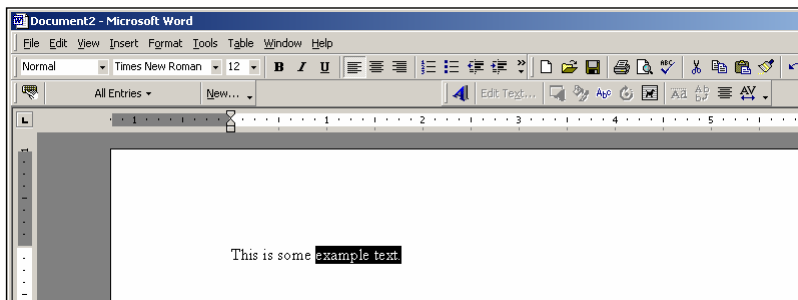
### Some examples



## General Points To Keep In Mind

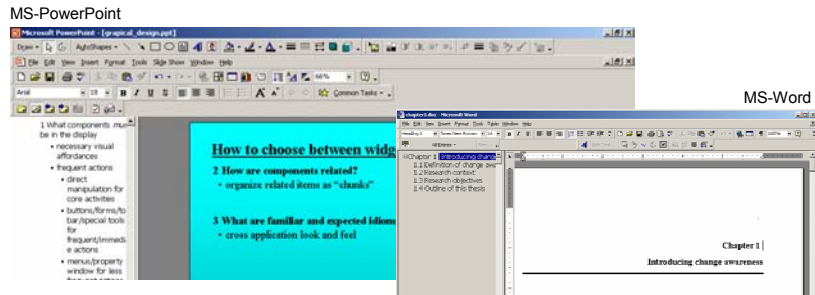
### 1) What components *must* be in the display

- Provide the necessary visual affordances
- Categorizing functions
  - 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



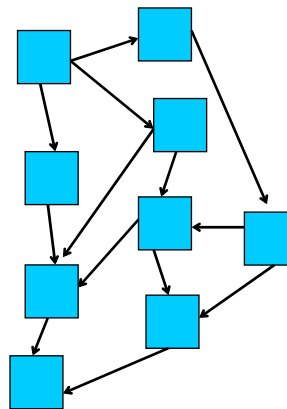
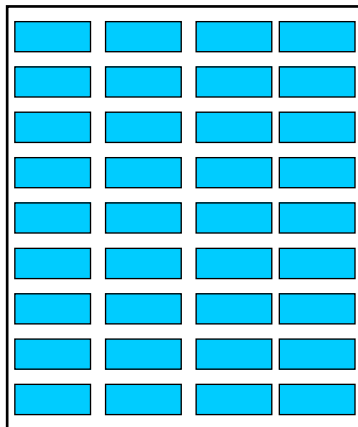
## General Points To Keep In Mind (2)

- 2) **How are components related?**
  - Organize related items as “chunks”
- 3) **What are familiar and expected idioms?**
  - Cross application look and feel



James Tam

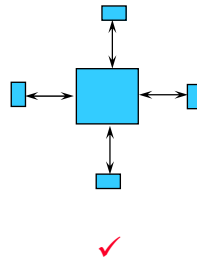
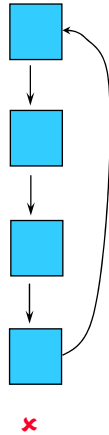
## Balance Between Too Many Controls On A Single Screen Vs. Too Many Screens



James Tam

## Screen Design And Complexity

- How can window navigation and clutter be reduced?
  - Avoid long paths
  - Avoid deep hierarchies
  - Re-factor/combine functions



James Tam

## Visual Perception

- The Gestalt laws
- Image-based recognition
- Visual and written languages

James Tam

## The Gestalt School Of Psychology

**Founded in 1912 to investigate the way that people perceive form:**

- How do people organize the world into meaningful units and patterns.



James Tam

## What Is A Gestalt?

- Gestalt: is German for ‘pattern’ or ‘configuration’.**
- Motto of the Gestalt psychologists:**
  - “The whole is more than the sum of it’s parts’.
  - What you perceive is greater than what you see.
  - Example one: Motion is perceived from a series of still images



James Tam



## What Is A Gestalt? (2)

- Example two: the following is more than just a series of splotches of light and dark (a pattern can be perceived).



James Tam

## The Gestalt Laws

**They are rules that describe the way that people see patterns in visual displays:**

1. Proximity
2. Similarity
3. Continuity
4. Symmetry
5. Closure
6. Relative size
7. Figure and ground

James Tam

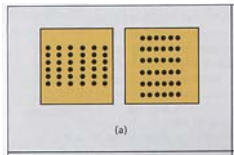
# 1. Proximity

**Things that are near to each other tend to be grouped together.**

- Example one:



- Example two:



James Tam

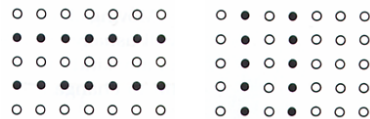
# 2. Similarity

- **Things that are alike tend to be perceived as belonging together.**

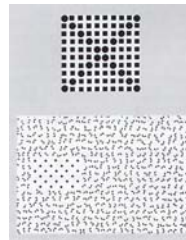
- **Similarity can be perceived in many ways:**

- Color
- Shape
- Size
- Etc.

Example one:



Example two:

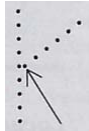


James Tam

### 3. Continuity

• **Lines and patterns tend to be perceived as continuing in time and space.**

• Example one:



• Example two:

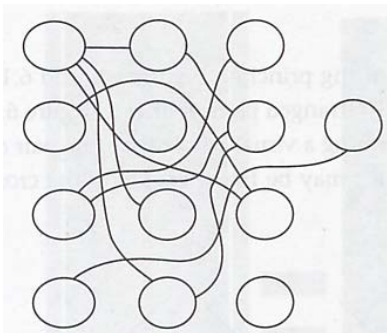


James Tam

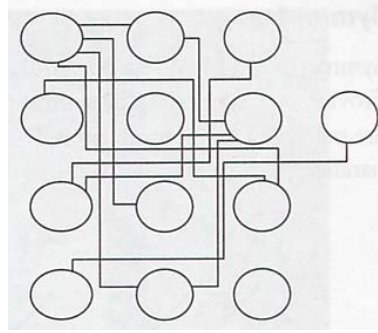
### 3. Continuity (2)

• **Visual entities (groupings) are more likely to be perceived out of visual elements that are smooth rather than elements with abrupt changes in direction.**

Smooth connections



Abrupt connections

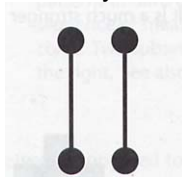


James Tam

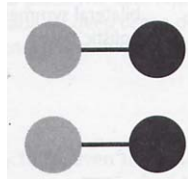
### 3. Continuity (3)

**Connectedness is a stronger grouping principle than:**

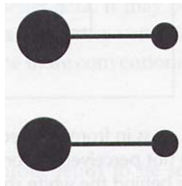
Proximity



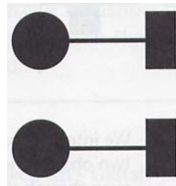
Value



Size



Shape

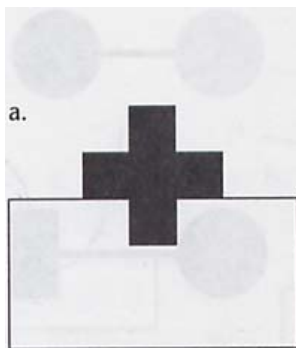


James Tam

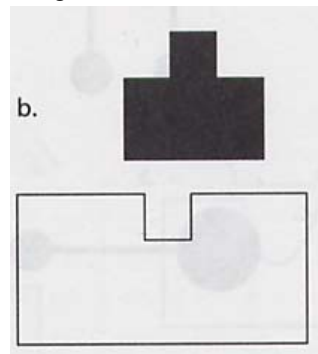
### 4. Symmetry

**People are more likely to perceive a grouping from something that's symmetrical than something that is not.**

Image: perceived as a cross in front of a rectangle (more symmetrical)



Rather than perceiving it as a less symmetrical image.



James Tam

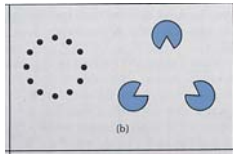
## 5. Closure

- **The human brain tends to fill in gaps in order to perceive complete forms. (Handy when the 'image' is less than perfect).**

- Example one:



- Example two:

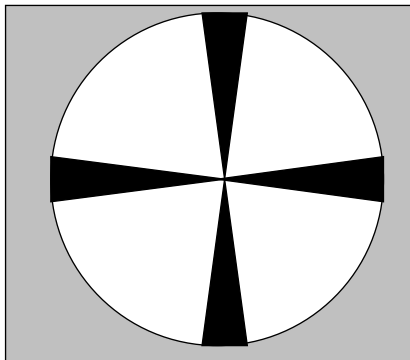


James Tam

## 6. Relative Size

- **Smaller components are more likely to be perceived as objects than larger ones.**

- Example:

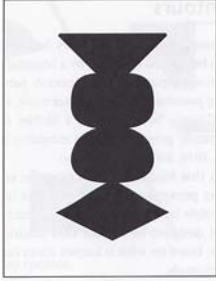


James Tam

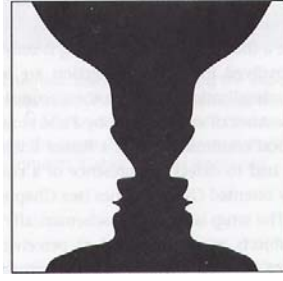
## 7. Figure And Ground

- **A figure:** something that is perceived to be in the foreground.
- **Ground:** what lies behind the figure.

Example one: figure-ground is clear



Example two: cues for figure vs. ground are balanced



James Tam

## Image-Based Object-Recognition

**People have a powerful ability to recognize images that they have previously seen.**

- e.g., Standing et. al. (1970)<sup>1</sup> had over a 90% accuracy rate with test subjects recognizing whether or not they had previously seen an image (out of 2560 viewed over several days)

Recognition: Viewing 'mug shots'



Recall: Trying to reconstruct a crime scene without visual aids



<sup>1</sup> Standing, L., Conezio, I., and Haber, R.N. (1970) Perception and memory for pictures: single trial learning of 2560 visual stimuli. *Psychonomic Science* 19: 73 – 74).

James Tam

## Images Vs. Words

- **Static images vs. words**
- **Animated images vs. words**

James Tam

## Static Images Vs. Words

- **An image is not always better than 1000 words!**
- **Consider the follow instructions that may be given to a mailroom clerk:**

**Original instructions:**

Take a letter from the top  
of the tray

Put a stamp on it.

Put the letter in the 'Out'  
tray

Continue until all the  
letters have stamps on  
them.

James Tam

## Static Images Vs. Words (2)

### Compare the natural language form vs. pseudo code

#### Original instructions:

Take a letter from the top of the tray

Put a stamp on it.

Put the letter in the 'Out' tray

Continue until all the letters have stamps on them.

#### Pseudo code:

Repeat

    Get a line of text from the input file

    Change all the lowercase characters to upper case

    Write the line to an output file

Until (there is no more input);

James Tam

## Static Images Vs. Words (2)

### Compare the language form vs. pseudo code

#### Original instructions:

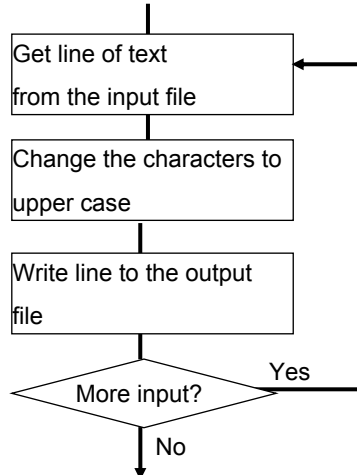
Take a letter from the top of the tray

Put a stamp on it.

Put the letter in the 'Out' tray

Continue until all the letters have stamps on them.

#### Flowchart:



James Tam



### Static Images Vs. Words (3)

**However images are better than text for showing structural relations.**

#### **Text**

Jane is Jim's boss.

Jim is Joe's boss.

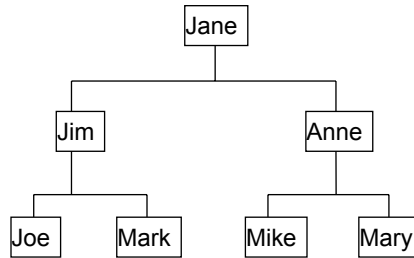
Anne works for Jane.

Mark works for Jim

Anne is Mary's boss.

Anne is Mike's boss.

#### **Structure diagram**



James Tam

### Static Images Vs. Words (4)

#### **Generally images should when:**

- Structural information must be shown (links between entities or groups of entities).
- A great deal of information needs to be remembered (images are more easily recalled than text except for abstract images e.g., when the concept being represented is new and must be represented abstractly by an image and out of context).

#### **Generally text or the spoken language should be used when:**

- Abstract concepts must be portrayed e.g., freedom, efficiency.
- The information is complex, procedural or non-spatial.

James Tam

## Animated Images Vs. Words

### **Generally animated images should be used when:**

- A cause-effect relation must be expressed
- When a structure is being transformed (e.g., the motion of a hinge) – but complex interactions may not be interpreted correctly.
- A sequence of data movements (e.g., sorting algorithms)

### **Generally text or the spoken language should be used when:**

- In general natural language is so widespread, elaborate and complete that written or spoken language should be used unless there is a compelling reason (above) to do otherwise.

James Tam

## What You Now Know

### **How to apply techniques for evaluating the layout of a visual presentation**

- The squint test
- C.R.A.P.

### **Some presentation principles**

- CRAP
- Using grids
- Employing consistency
- Implicit vs. explicit structure
- Avoiding spatial tension
- Employing negative space
- Providing navigational cues
- The economy of visual elements
- The appropriate and effective use of imagery
- Rules of thumb for fonts and font effects
- Color and orientation
- Idioms

James Tam

## What You Now Know

### General design principles for displaying information based on perception

- Gestalt Laws
- Image-based recognition
- Visual and spoken language

James Tam

