User Interface

Colors, Icons, Text, and Presentation

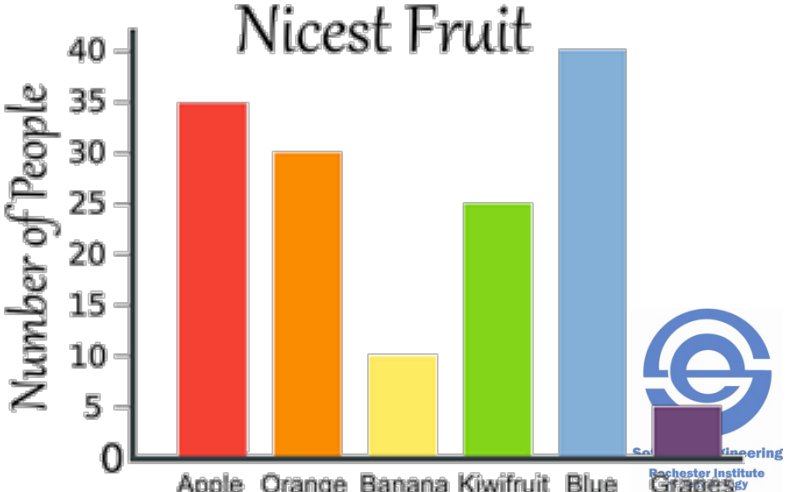
SWEN-444

Color Psychology

- Color can evoke:
  - Emotion – aesthetic appeal – “warm” versus “cold” colors

Colors can be used for Clarification, Relation, and Differentiation.

- Color can be used to clarify differences and similarities and communicate relationships
- Color codes can be used to support a logical information structure; e.g., multi-variable graph



Color can be used to catch the attention of the user.

- Searching
  - Keywords, string types

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<!-- This is the content area of the page  -->
<table cellpadding="2" cellspacing="2" border="1"
style="text-align:left; width:100%;">
<tbody>
<tr>
<td style="vertical-align:top; text-align:center;">

  When Netscape Navigator 7.1 displays the
source code of a web page, it colors the element
names purple, the attribute names black, the
attribute values blue, the comments green and
character entities orange.

</td>
</tr>
</tbody>
</table>
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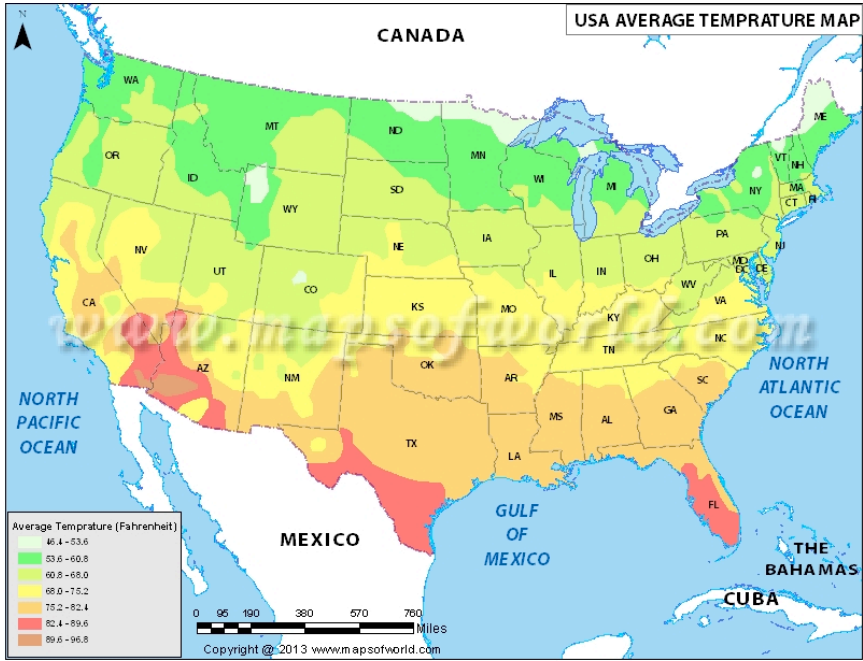
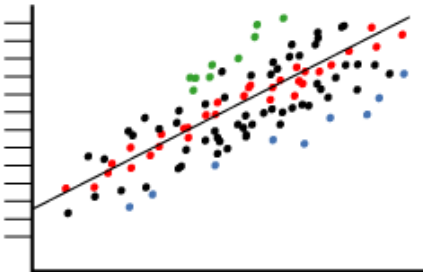
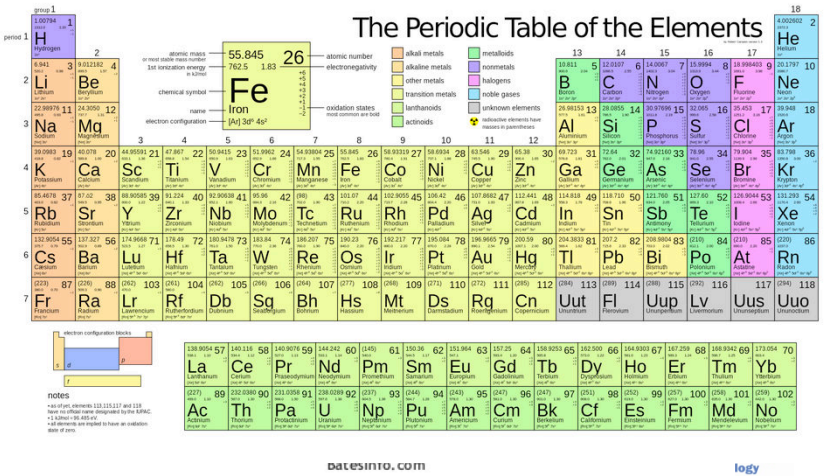


Colors can support Comprehension, Retention, and Recall.

- Color can enable us to comprehend patterns in complex data structures



- Color can aid in remembering and recalling information

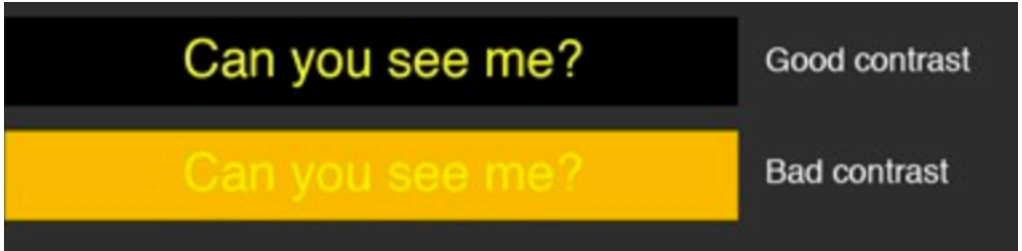


Redundancy is Good. Color alone is not enough.

- A clear HCI structure and presentation must already be present before color is introduced
- Use multiple sensory cues (e.g. color and shape)
- Don’t use color to delineate shapes – contrast issues

Color Concerns - Contrast

- Incompatible differences - some specific color combinations cause unique problems:
  - Colors at opposing ends of the spectrum such as red and blue
  - Positive contrast makes characters appear to glow (Halation)



Saturated yellow and green	Saturated yellow on green
Yellow on white	Yellow on white
Blue on black	Blue on black
Green on white	Green on white
Saturated red on blue	Saturated red on blue
Saturated red on green	Saturated red on green
Magenta on green	Magenta on green
Saturated blue on green	Saturated blue on green
Yellow on purple	Yellow on purple
Red on black	Red on black
Magenta on black	Magenta on black

Color Concerns - Foreground-Background

- An object's perceived color is affected by the background color

Color Concerns for Interaction Design

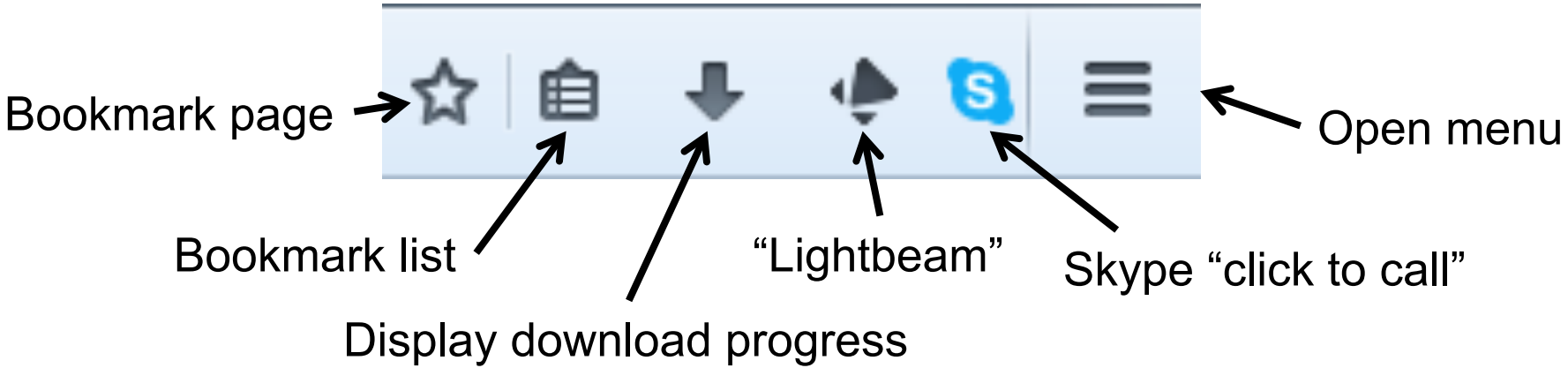
- Limitations in the perception of subtle color differences
- Number and choice of colors

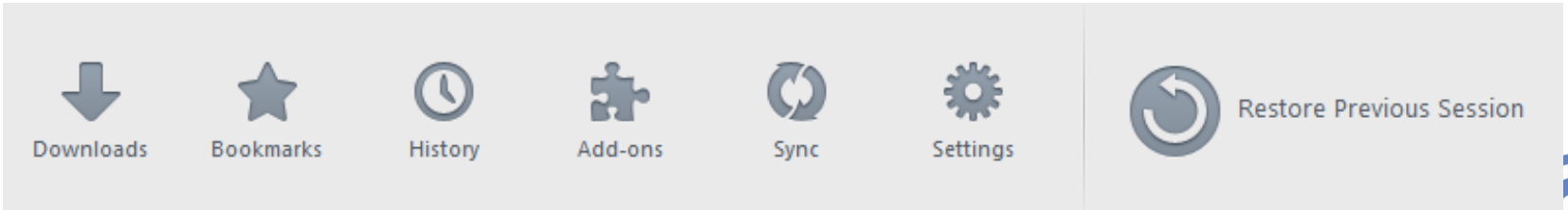
  - To aid in color recognition and recall, use only a few distinct colors
  - Red, green, blue, and yellow are best
  - Five to nine colors for coding information
  - Don’t distract the user or compete with content
  - Keep color perception limitations in mind
  - E.g., we see green and yellow best, so avoid small blue objects
  - Avoid saturated colors – can cause visual fatigue

Icons

An icon is a small image representing an object.

Firefox





Why are these better?

Human Issues Concerning Icons

- Recall of images is superior to that of text
- Images are more easily distinguished than text
- People perform better with icon targets than with text targets
- However, icons are not automatically self-explanatory
- The dual nature of icons
  - Perceived as representations of objects in the interface
  - Also perceived as the objects themselves
  - E.g., MS Office save icon
- Icon design should reflect metaphors of real world objects

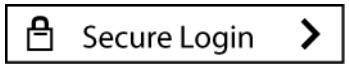
Using Icons in Interaction Design:

Follow Conventions

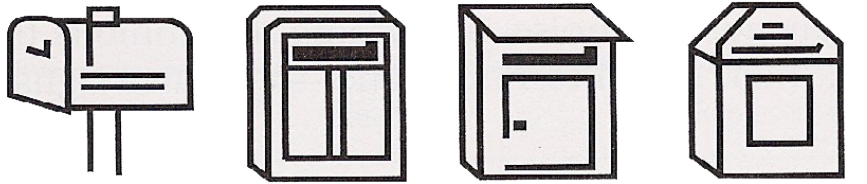
Audio icon—notes

Home icon

Secure Connection icon



Amazon.com shopping cart



http://glyphicons.com/

Android Material Design Icons

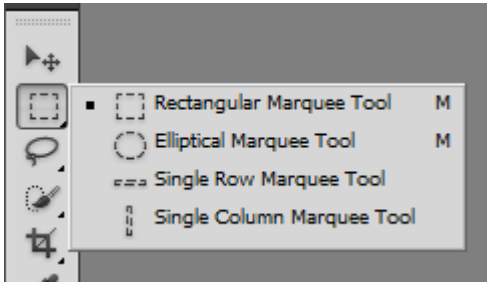
Using Icons in Interaction Design:

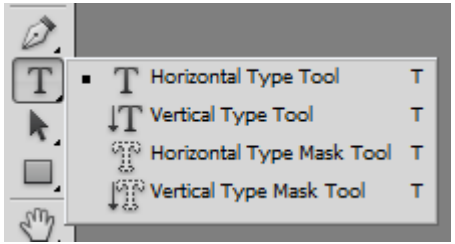
Context

- Context supplies a frame of reference
  - B I U vs B *I* U in Office applications
- Icons can be seen in many different contexts:
  - Physical - screen location, contrast, juxtaposition to each other, screen density
  - Cognitive – user knowledge and experience, culture
  - Metaphorical – real world meaning
  - Temporal – viewing context changes via screen navigation; e.g., icons may be grayed out or disappear

Principles for Icon Creation

- Simplicity/complexity – research is inconclusive on what is best; want high information signal to noise ratio
- Cohesiveness –families of related icons
  - Conceptual – perform related functions
  - Visual – share visual characteristics
- Distinctiveness of individual icons (within a group / family)





Technical Issues: Deconstructing Icons

- Icon size and shape
  - Typically square
  - Size standards exist for the different platforms
    - Application icons should be in 16-color and 256-color versions and in three sizes: 16x16 pixels, 32x32 pixels, and 48x48 pixels *(Microsoft Co., 2006)*
    - Finder icons are a 128 x 128 image. App icons should be 32 x 32, and 16 x 16 *(Apple, 2007)*
- Transparency and background
  - Icon on application background (icon background is transparent)
    - May need dark borders to contrast application backgrounds
  - Icon with background mask to contrast application background

Text

Humans and Text – The Reading Process

- Saccades – quick, jerky eye movements forward 8-10 letters at a time plus CR/LF to the next line
- Fixation – pauses on areas of interest for understanding
- Regression – backward saccade due to comprehension, legibility, readability
- Gutenberg rule – reading gravity pulls the eyes from the top left to the bottom right
- Upper case to identify single words, lower case is better for continuous reading
- We read extended text passages more quickly in lowercase/ mixed case than uppercase

Using Text in Interface Design

- Commentary text – information about the system or system functionality;
  - Contextual help - immediate assistance without requiring leaving the context of work.
  - Procedural help - steps necessary for carrying out a task.
  - Reference help - an online reference book.
  - Conceptual help - background information, feature overviews, or processes.
- Instrumental text – information directly related to user functionality
  - Controls – buttons, checkboxes, icons, menus, etc.
  - Hyperlinks

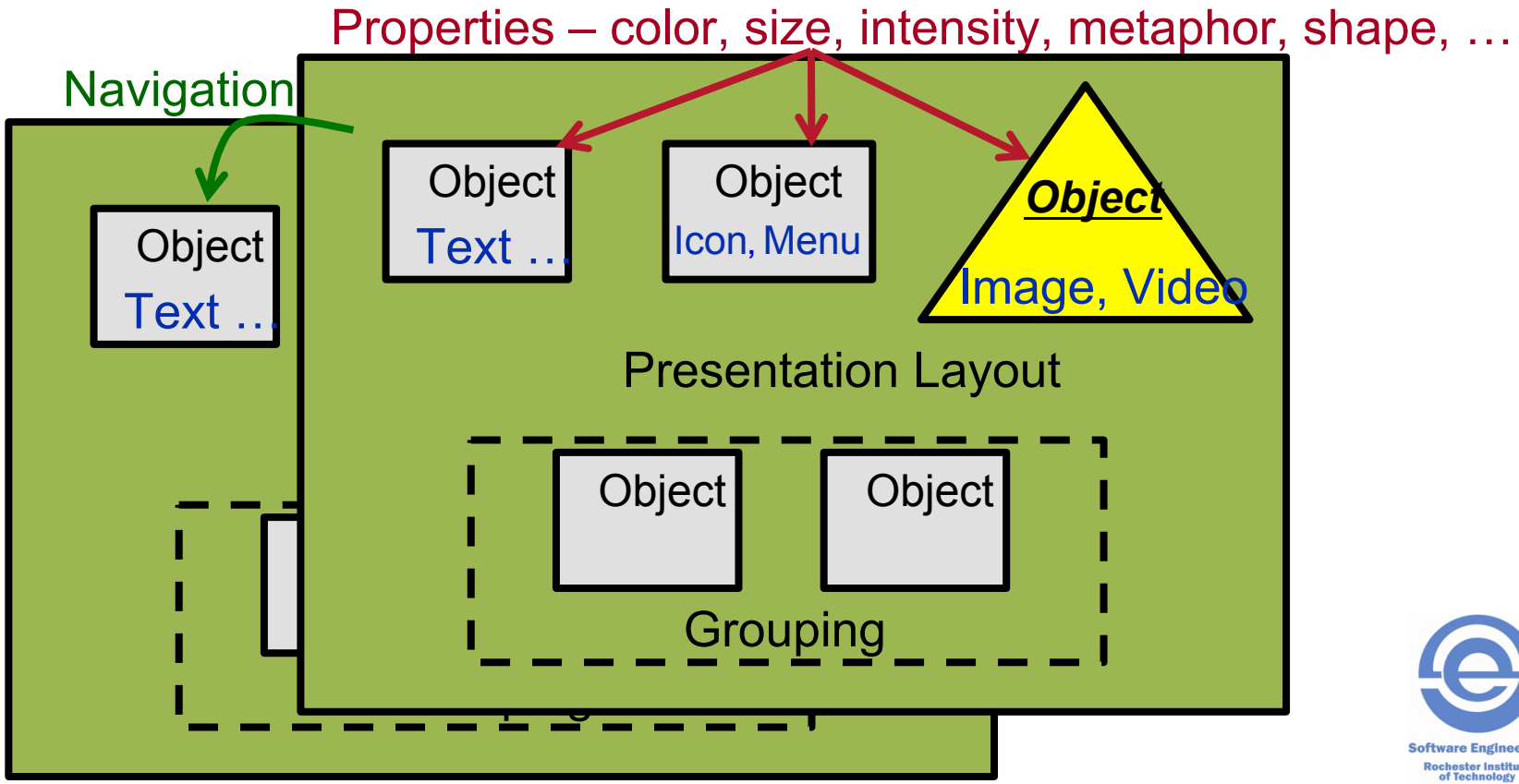
Design Issues in Using Text

- Legibility – to be able to distinguish characters and words
  - Display environment especially ambient light
  - User age and/or vision disabilities
  - Font size, foreground/background contrast
- Readability – comprehension of the text
  - User's language – avoid jargon, technical language, popular buzz words, specialized metaphors; e.g., "zip a file"
  - Ambiguity – misunderstood or unclear meaning of words
    - "Exit" "Quit" "Close"
    - "Hibernate" vs "sleep"
- Scrolling versus paging
  - The choice of paging versus scrolling depends on task and layout

Presentation Design Principles

Grouping
Contrast
Proportion

Usability Presentation Design Framework



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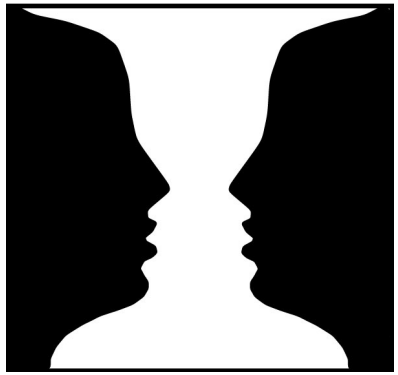
Presentation Design Principles

- **Grouping** – derived from the Gestalt psychological principles of perception
  - Proximity
  - Similarity
  - Common Fate
  - Closure
  - Good Continuity
  - Area
  - Symmetry
  - Surroundedness
  - Prägnanz

"Gestalt psychology tries to understand the laws of our ability to acquire and maintain meaningful perceptions in an apparently chaotic world. The central principle of gestalt psychology is that the mind forms a global whole with self-organizing tendencies." Wikipedia

Grouping: Gestalt Principles of Perception

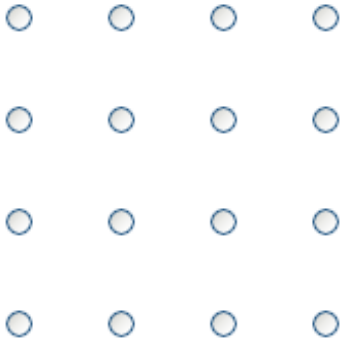
- Gestalt psychology strives to explain the factors involved in the way we group things :-)
  - Perception of the environment as whole entities even without complete information
  - Distinguish foreground objects from background
  - The viewer looks for the simplest solutions even when visually information is incomplete
- Useful to guide the placement and organization of screen elements; e.g., icons, structure menu items



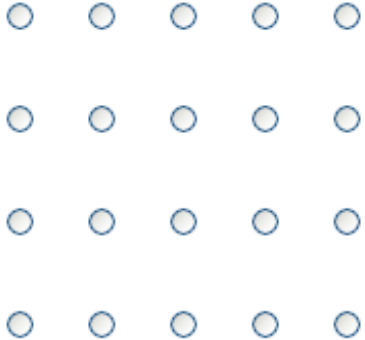
The Rubin Face/
Vase Illusion

Gestalt Principles of Perception

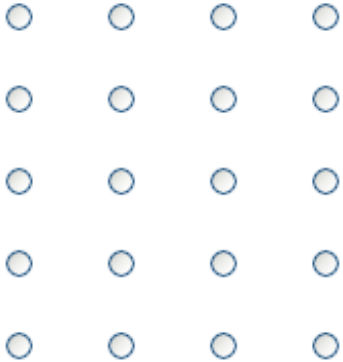
- Proximity Principle – Objects that are close to each other will be seen as belonging together



Equidistant



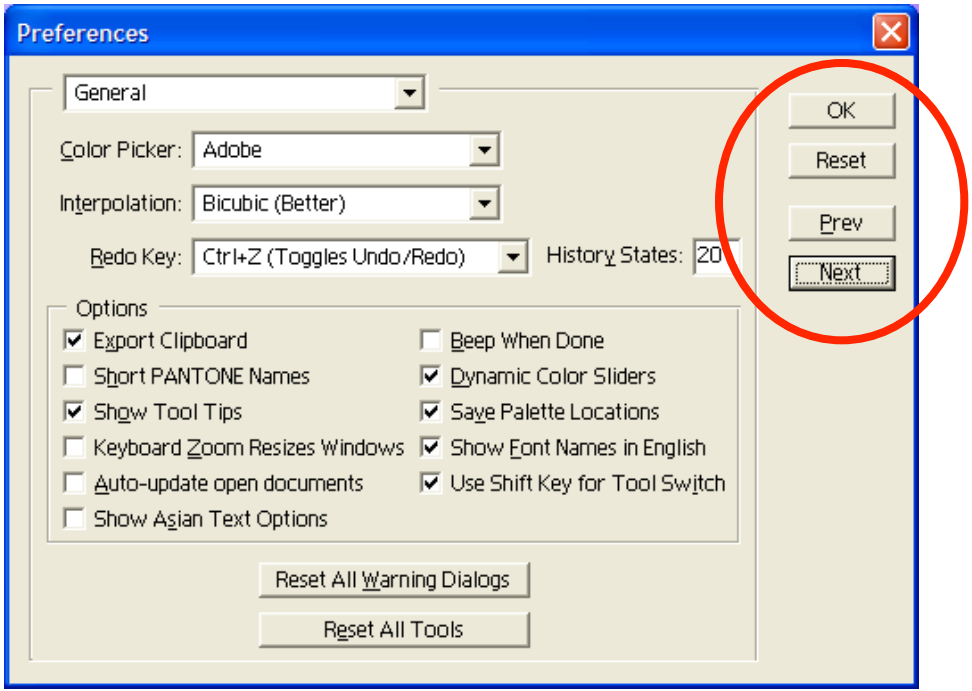
Horizontal Proximity



Vertical Proximity

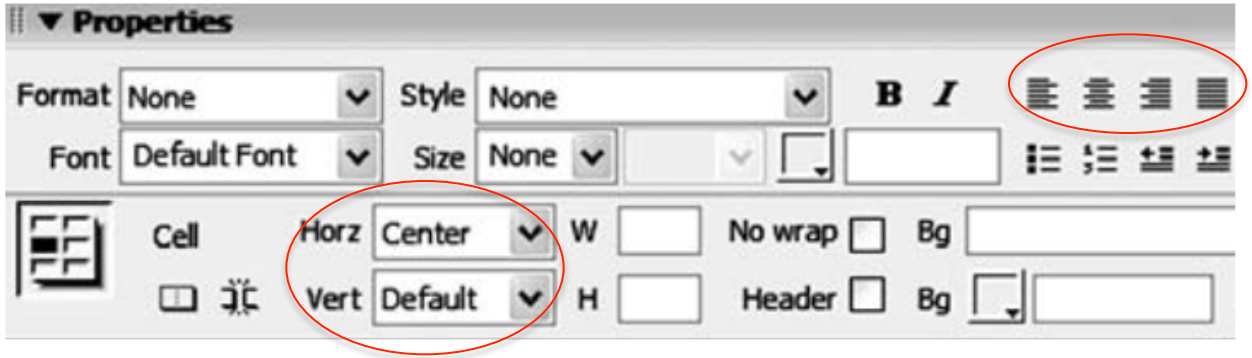
Gestalt Principles of Perception

- **Proximity** - Adobe PhotoShop Preferences Dialog



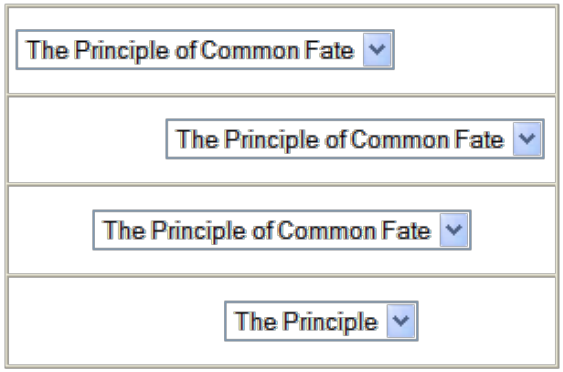
Gestalt Principles of Perception

- Similarity Principle – Objects that have similar visual characteristics, such as size, shape or color will be seen as a group and therefore related

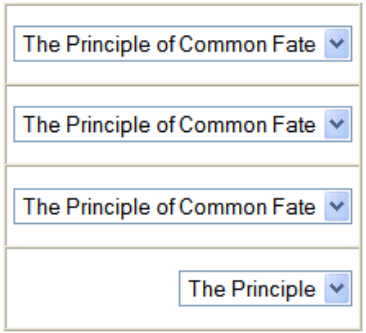


Gestalt Principles of Perception

- Common Fate Principle – Objects that move together (beginning, direction, end) are seen as related



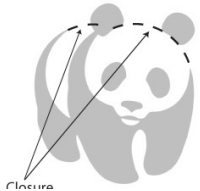
Unaligned Drop-Down Menus



Aligned Drop-Down Menus

Gestalt Principles of Perception

- Closure Principle – We tend to see things as complete objects even though there may be gaps in their shape



Gestalt Principles of Perception

- The Area Principle – Objects with small area tend to be seen as the figure, not the (back)ground (also called the smallness principle)

Gestalt Principles of Perception

- Surroundedness Principle – An area that is surrounded will be seen as the figure and the area that surrounds will be seen as the ground

Contrast

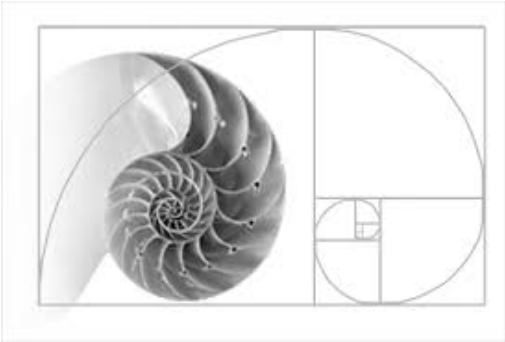
- Visual stimulus via contrast – we perceive visual differences of an object before its meaning

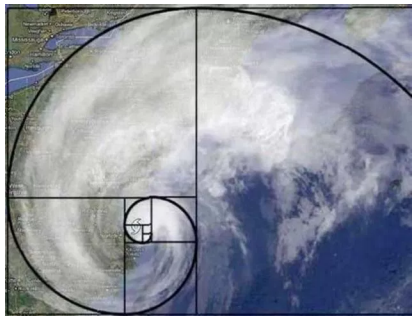
1	3	**5**	7
2	4	**6**	8
7	5	**3**	1
4	6	**6**	2

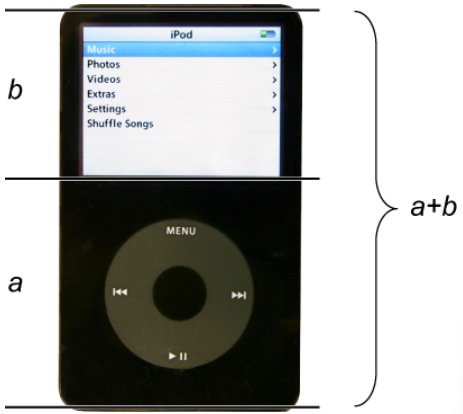
Proportion

- Proportion – relative size
  - E.g. – heading element hierarchy (this slide!)
  - Golden ratio – found in nature, pleasing visual proportions

$\varphi = 1.618$







Activity

- Review your project's design w.r.t Colors and Icons, Text and Grouping
- Write a report on your findings and your plan of improvement