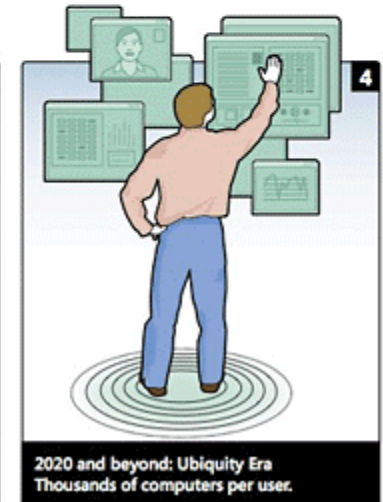
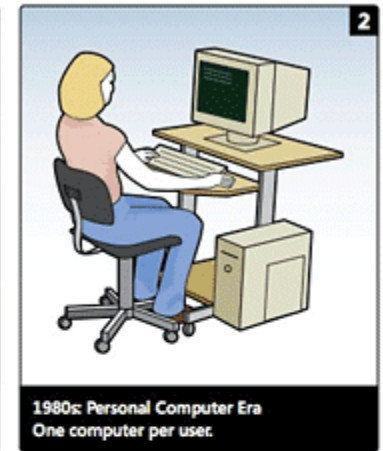


# Interface Design Elements & Principles

Tony Scarlatos

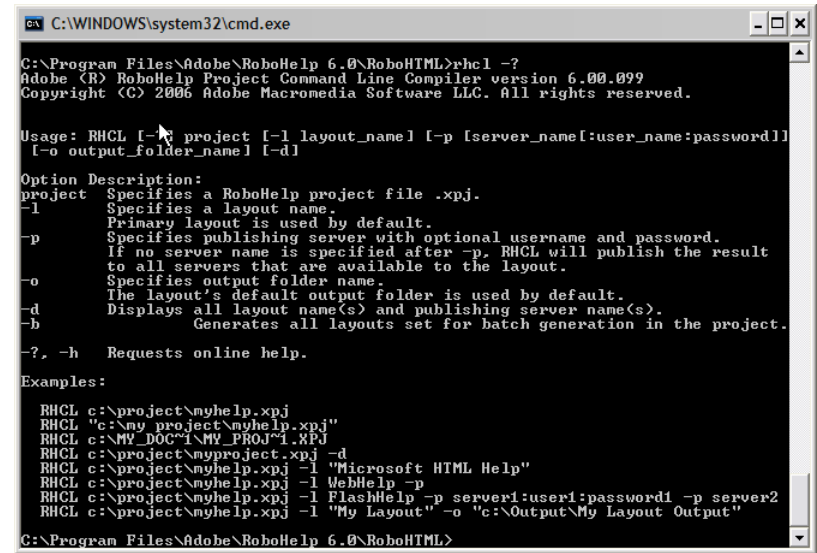
# Human-Machine Communication

- How do people send instructions and questions to the computer?
- How do computers communicate information, instructions, and further questions to the user?
- Computer interfaces may be characterized as being one of three basic styles:
  - Command
  - Menu
  - Direct Manipulation



# Command Line

- Command-based designs use a formal language with rigid limitations.
  - Single-letter commands are efficient but too restrictive
- Natural language interfaces are more expressive, but require much more typing on user's part and may raise expectations unrealistically.
  - Prone to syntax and typing error
- The rich language provided by a command interface may be difficult to remember, especially for first-time or infrequent users.
- Command abbreviations are helpful, but introduce ambiguity.



```
C:\WINDOWS\system32\cmd.exe
C:\Program Files\Adobe\RoboHelp 6.0\RoboHTML>rhcl -?
Adobe (R) RoboHelp Project Command Line Compiler version 6.00.099
Copyright (C) 2006 Adobe Macromedia Software LLC. All rights reserved.

Usage: RHCL [-h] project [-l layout_name] [-p [server_name[:user_name:password]]]
[-o output_folder_name] [-d]

Option Description:
project Specifies a RoboHelp project file .xpj.
-l Specifies a layout name.
Primary layout is used by default.
-p Specifies publishing server with optional username and password.
If no server name is specified after -p, RHCL will publish the result
to all servers that are available to the layout.
-o Specifies output folder name.
The layout's default output folder is used by default.
-d Displays all layout name(s) and publishing server name(s).
-b Generates all layouts set for batch generation in the project.
-?, -h Requests online help.

Examples:
RHCL c:\project\myhelp.xpj
RHCL "c:\my_project\myhelp.xpj"
RHCL c:\MY_DOC\1\MY_PROJ\1.XPJ
RHCL c:\project\myproject.xpj -d
RHCL c:\project\myhelp.xpj -l "Microsoft HTML Help"
RHCL c:\project\myhelp.xpj -l WebHelp -p
RHCL c:\project\myhelp.xpj -l FlashHelp -p server1:user1:password1 -p server2
RHCL c:\project\myhelp.xpj -l "My Layout" -o "c:\Output\My Layout Output"

C:\Program Files\Adobe\RoboHelp 6.0\RoboHTML>
```

# Menus

- Menus make choices and operations explicit.
- Advantages
  - Interface is easier to learn and remember
  - No problems with misspellings or improper use of syntax
- Disadvantages
  - Finite number of choices available



# Direct Manipulation

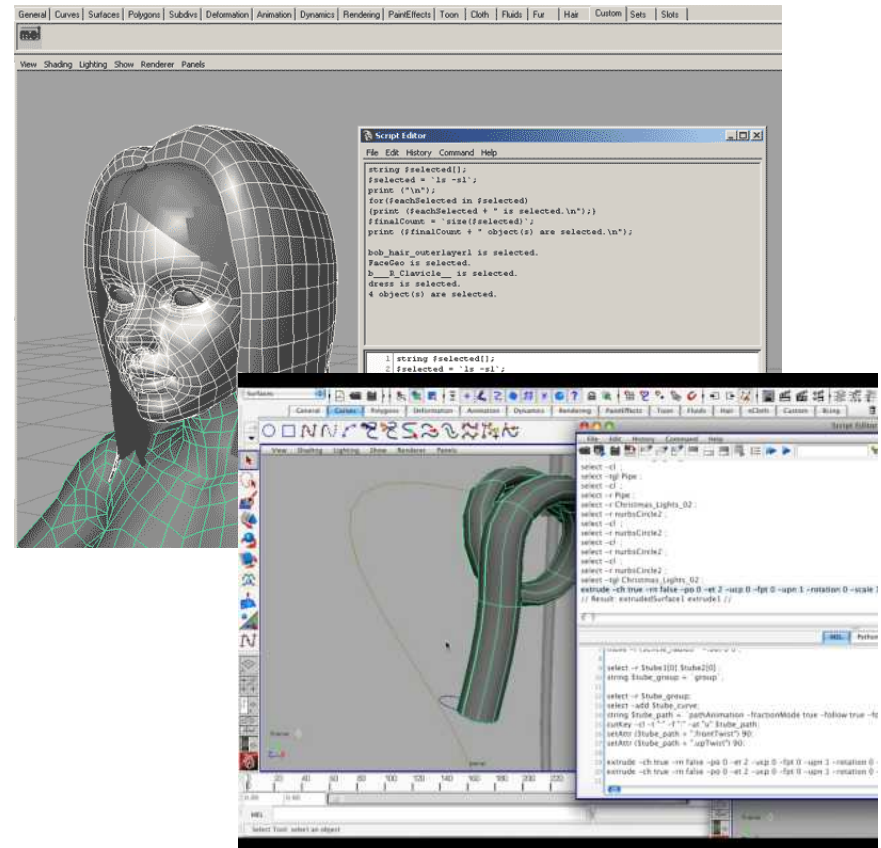
- WYSIWYG provides a concrete, literal concept model
- Advantages
  - Fluent
  - Instant feedback
- Disadvantages
  - Real-time response is required
  - May require specialized input devices, such as graphics tablets or data gloves



# Multimodal Interfaces

Although computer applications can use a mixture of styles, it's often not a good idea to provide more than one way to control the program simultaneously.

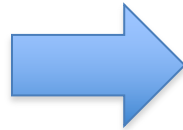
- The advantages of the various styles can be leveraged by matching a style with the appropriate task, or by matching it to the skill level of the user (as in Expert Mode).
- Multiple style modes are confusing, burdening the user with more things to remember.
- Implementation takes longer, so less time is spent on making one interface really good.



Maya's script editor can be confusing to animators

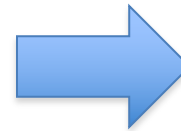
# GUI Elements and Principles

## Elements



- Windows
- Icons
- Menus
- Pointers
- Color
- Text
- Graphics
- Audio
- Animation
- Video

## *Principles*



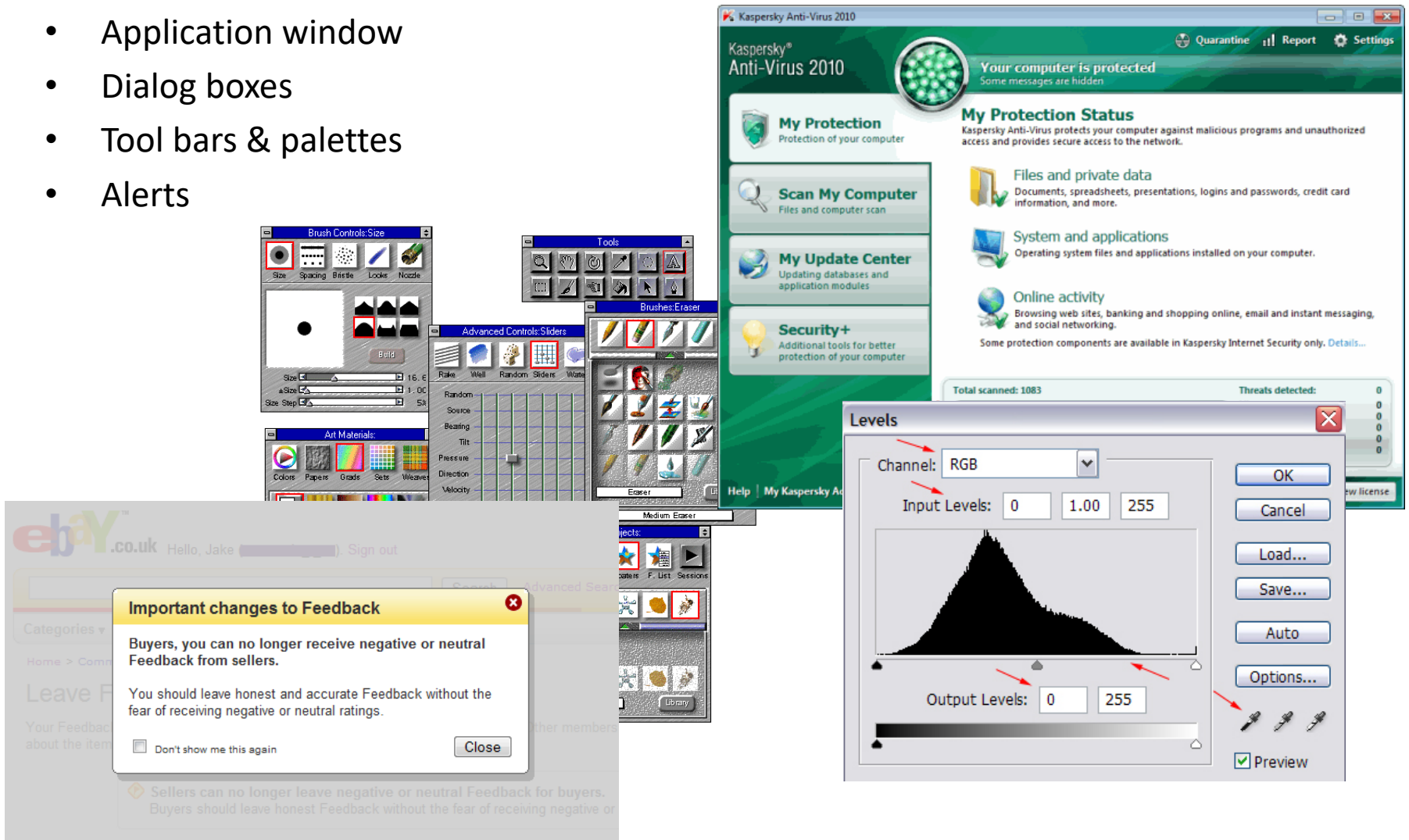
- *Consistency*
- *Clarity*
- *Predictability*
- *Economy*
- *Transparency*
- *Modality*
- *Sensitivity*
- *Understandability*
- *Conviviality*

## Product



# Windows

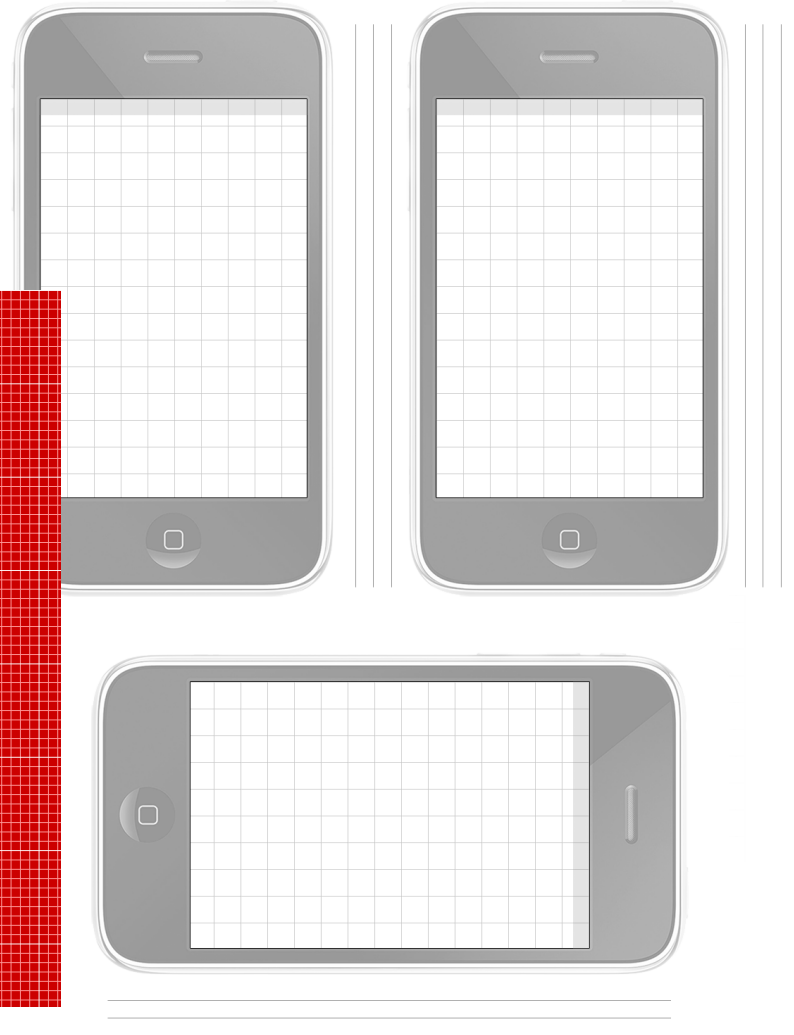
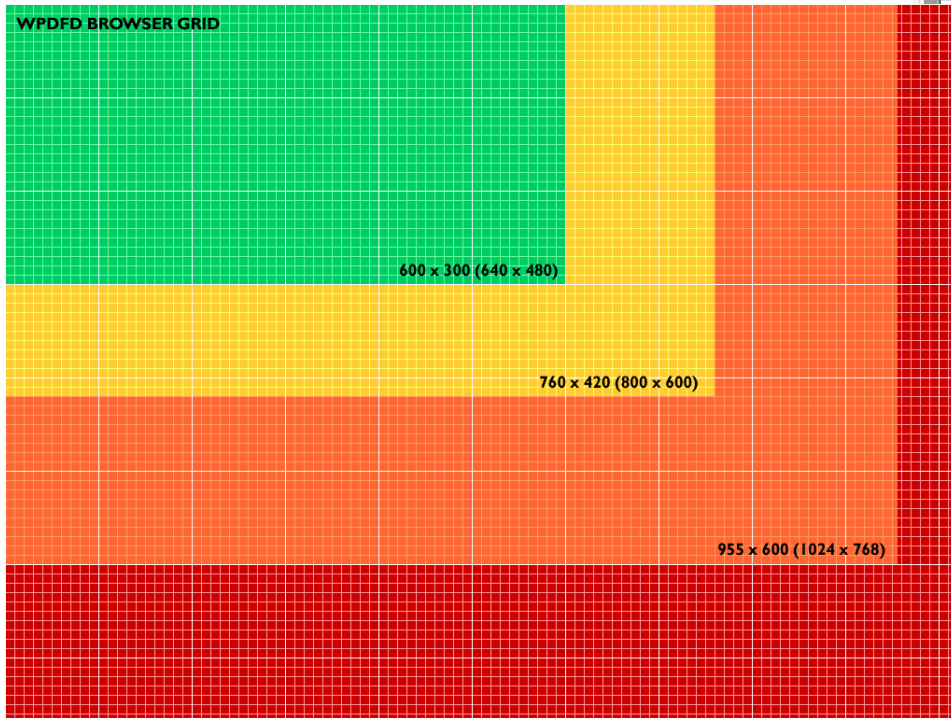
- Application window
- Dialog boxes
- Tool bars & palettes
- Alerts



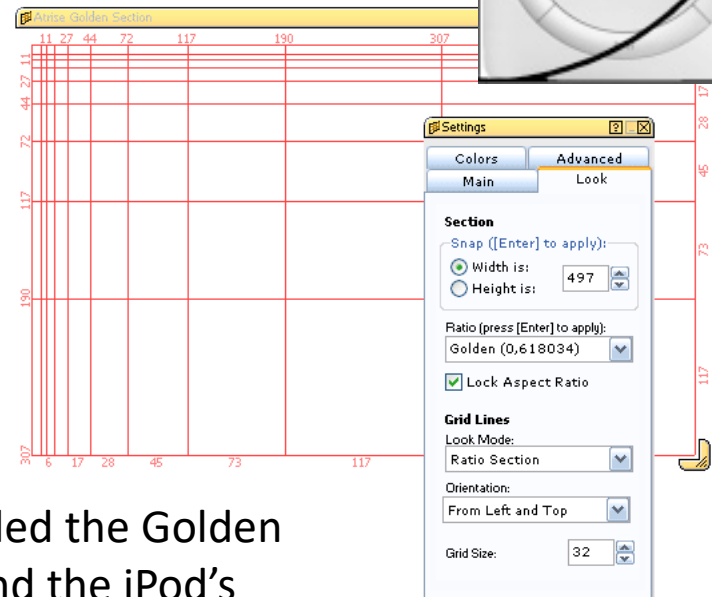
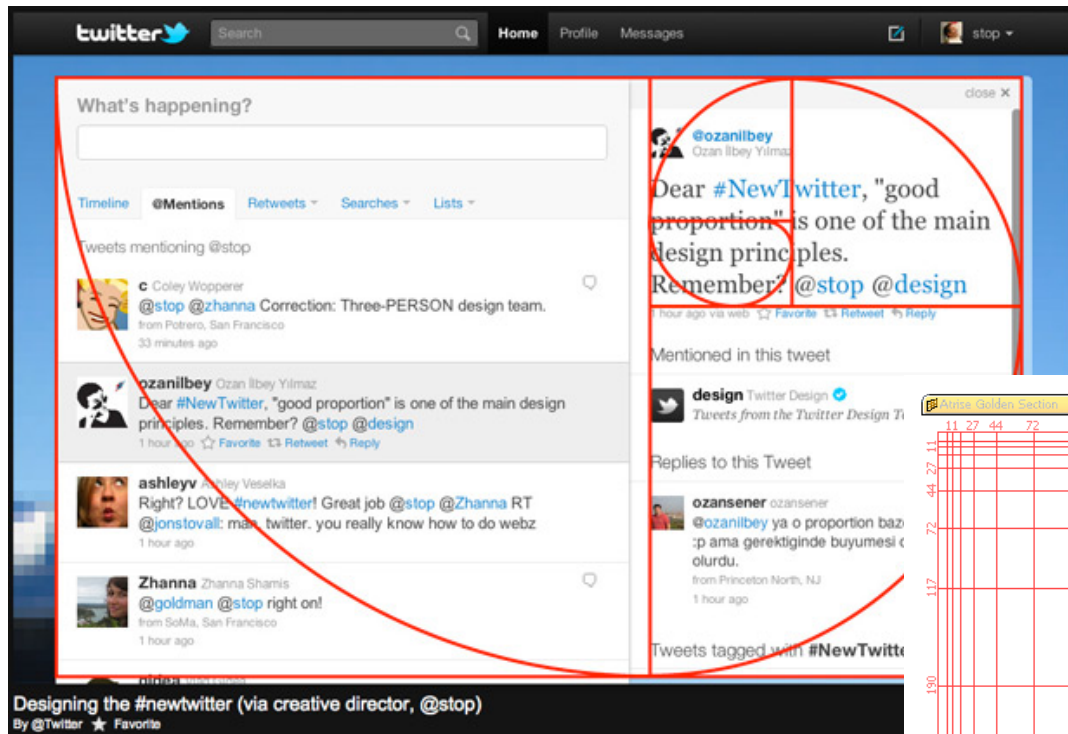


# Screen Layout

- Aspect Ratio & Orientation
  - The web and mobile devices make this challenging

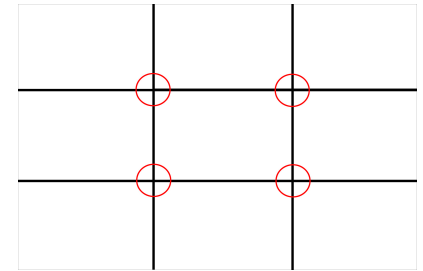


# The Golden Rectangle (Phi)

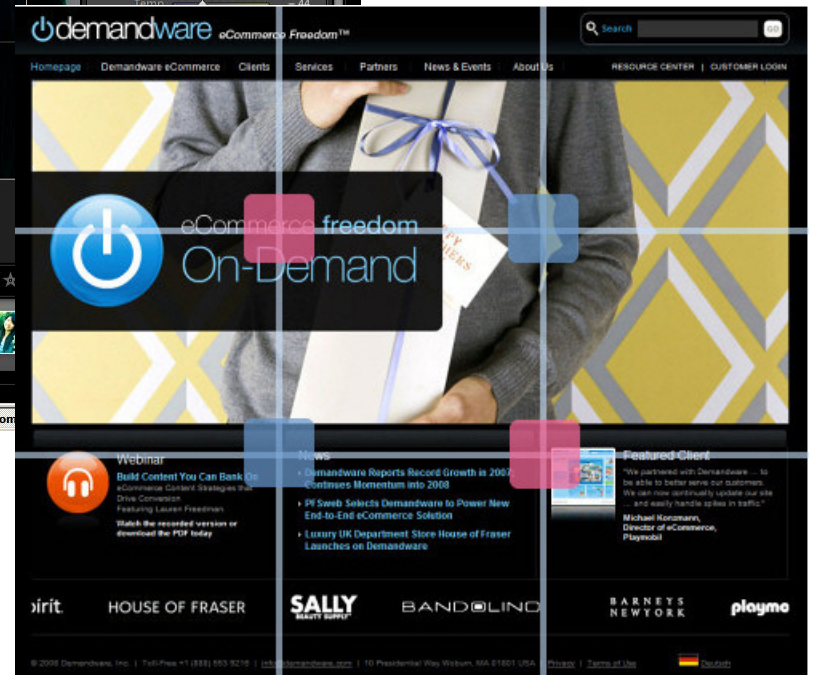


The Fibonacci Series yields a ratio of 1:1.61 (Phi) which is found throughout natural forms. The rectangle based on that ratio is called the Golden Rectangle. Above, the Twitter screen layout and the iPod's proportions are based on Phi. Software tools now help designers use the Golden Mean.

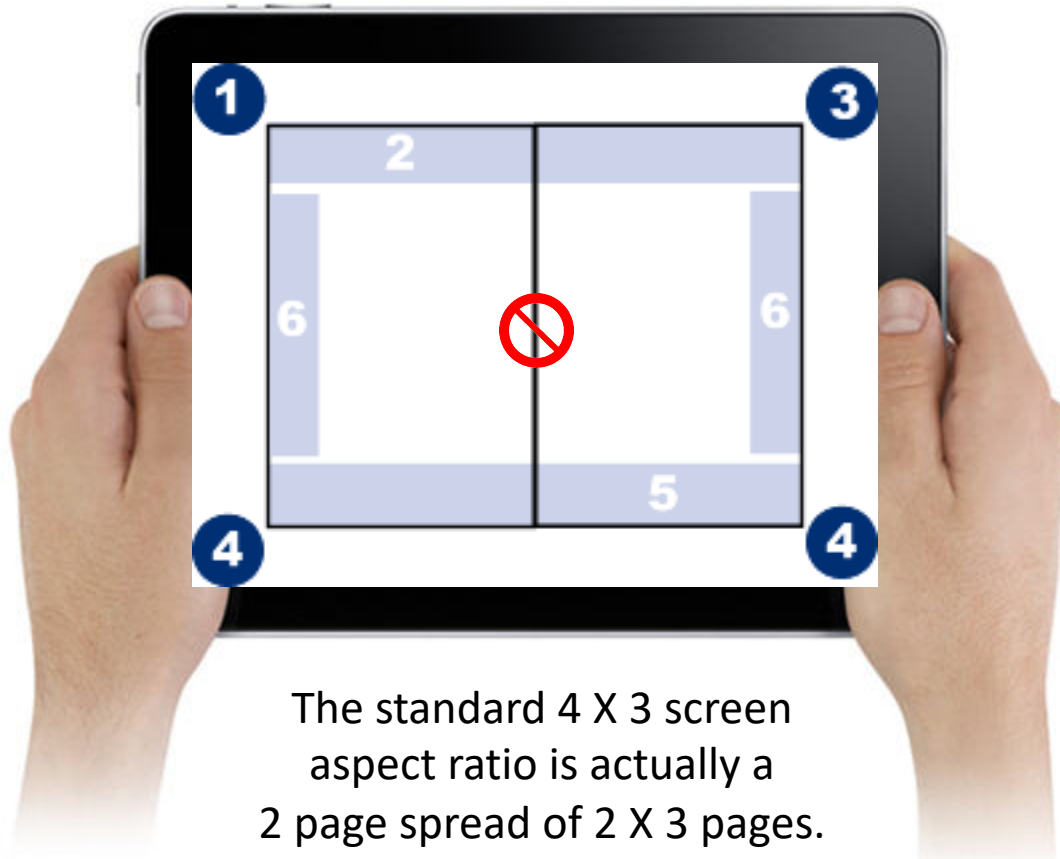
# The Rule of Thirds



The Rule of Thirds helps designers to find the points of emphasis in their interfaces and to balance their screen layouts.



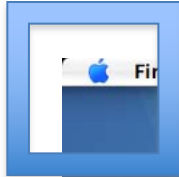
# Screen Prominence



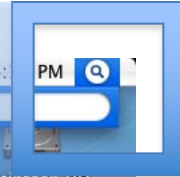
For Western cultures that read left to right, the upper left corner of the screen is the most prominent part of the screen, followed by the upper right, and the two lower corners. The center of the screen actually has the least prominence (it's the gutter of the book).

# Case In Point...

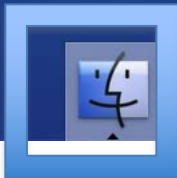
**Apple Menu:**  
Restart  
Shut Down  
Log off



**Spotlight:**  
Find Files

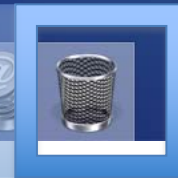


**Finder:**  
Directory  
Applications



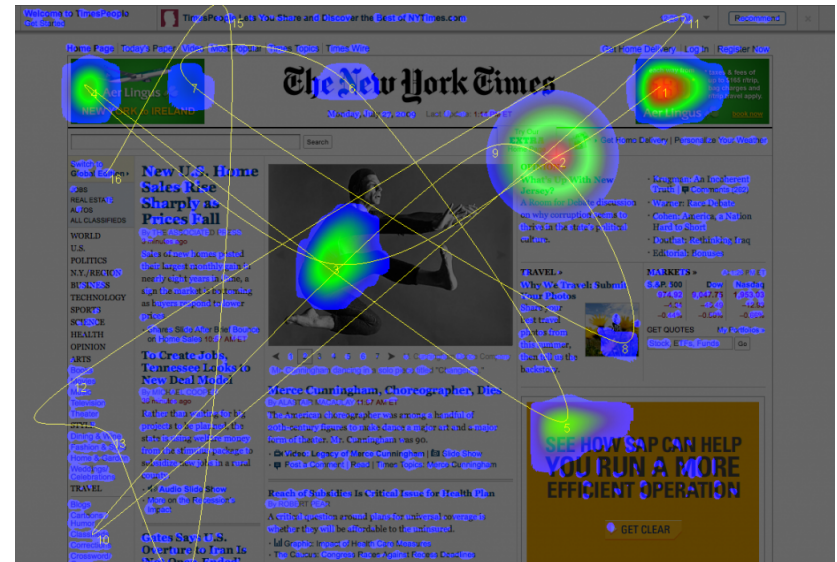
Disks  
Mount  
Along  
Right  
Edge

**Trash:**  
Eject  
Burn Media



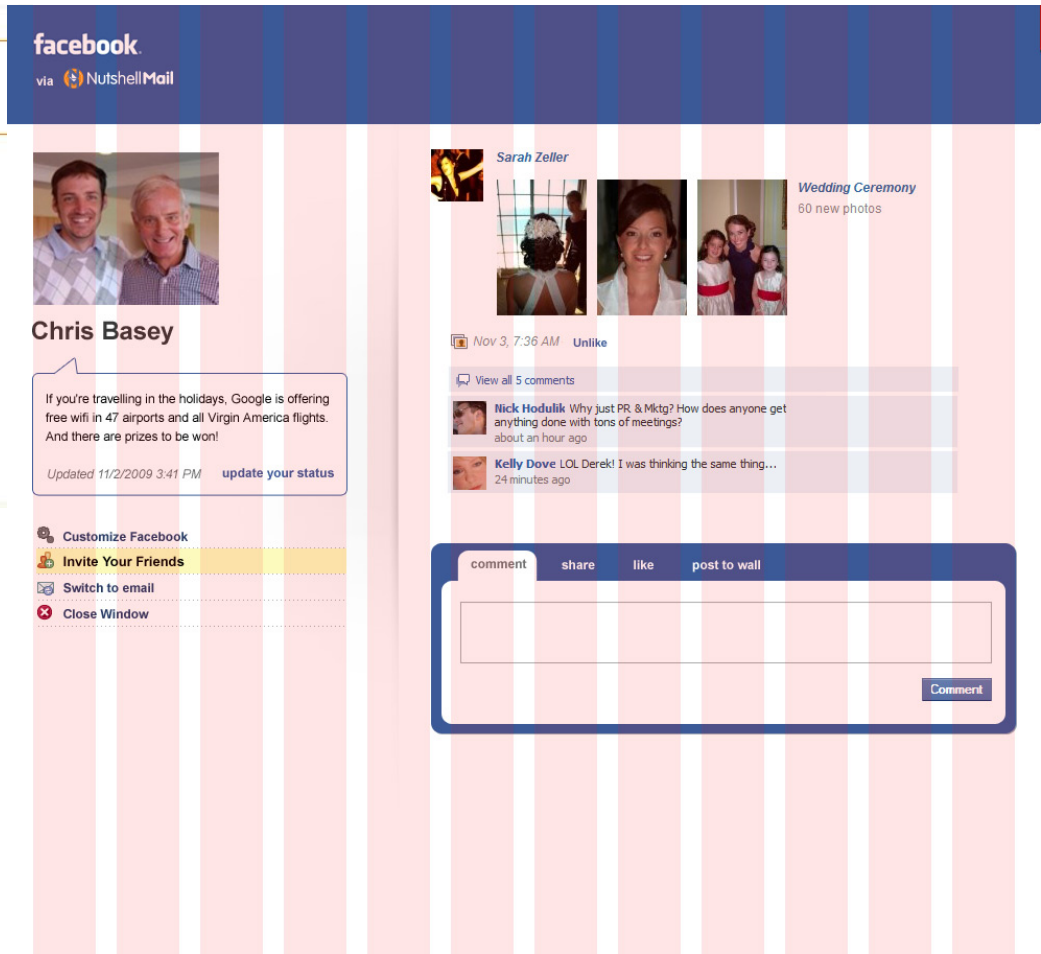
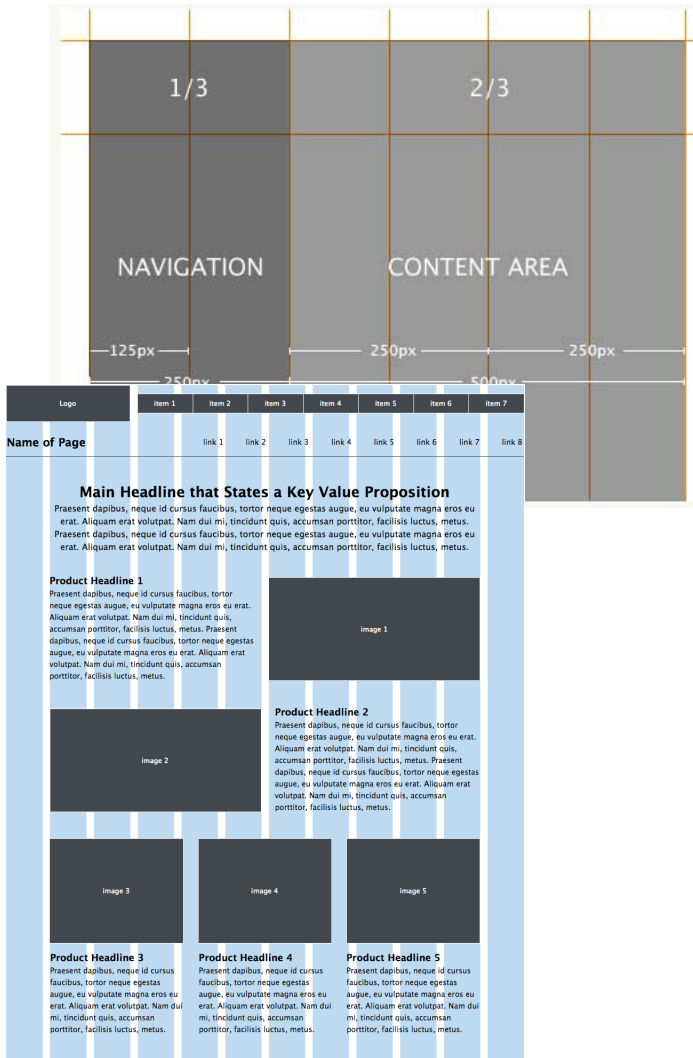
# Capturing the User's Attention

- Where the eye is drawn:
  - Moving pictures (video, animation)
  - Pictures (photos, graphics, illustrations)
  - Headlines (large, bold, or differently-colored text)
  - Body copy
- Visual prominence accrues to:
  - Larger regions of positive and negative space
  - Regions with greater contrast
  - Higher saturations of color
  - Warmer colors



An eye-tracking heat map of the NY Times online indicates where a user's gaze has been directed.

# Use of the Grid

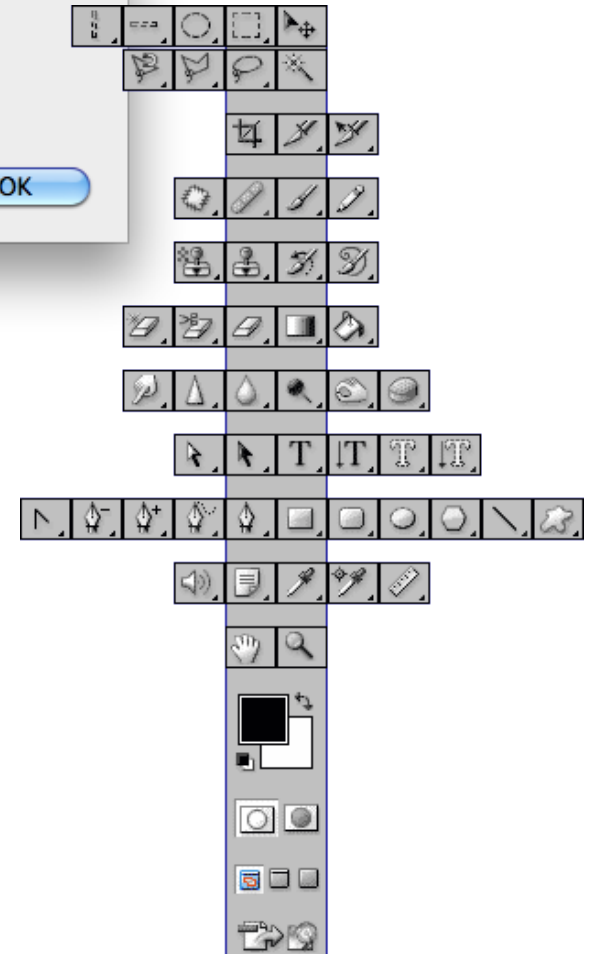
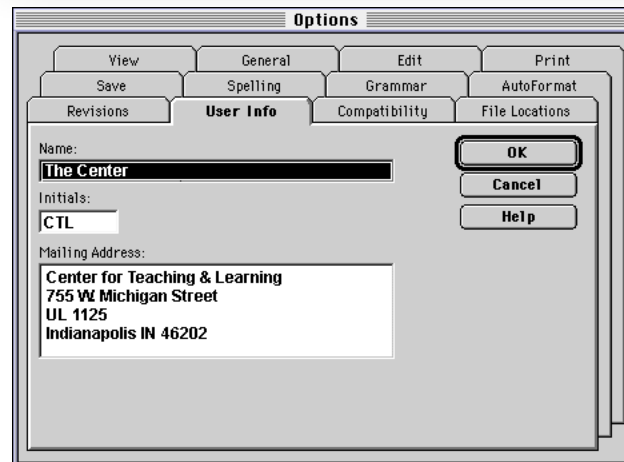
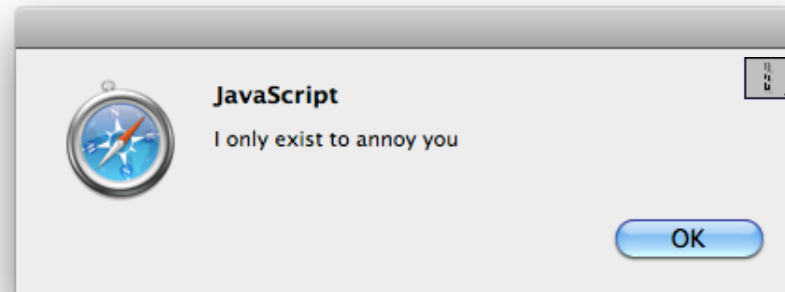


Grids organize the presentation of a variety of data, especially dynamic data.

# Avoid complication and clutter

With dialogs, alerts, and tool bars, avoid complexity and too many choices. Tools should be semantically organized.

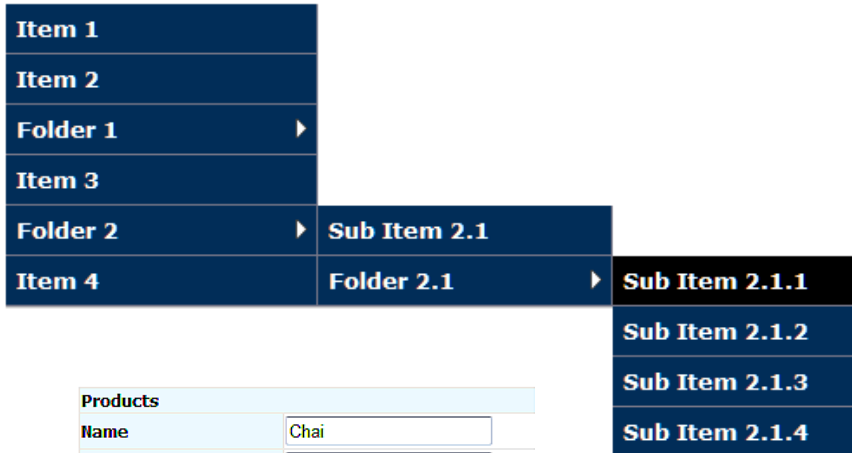
Use dialogs and alerts sparingly. Dialogs and alerts can interrupt the flow of interaction and make users lose their place.







# Menus



















Products	
Name	Chai
Price Per Unit	18.0000
Quantity Per Unit	10 boxes x 20 bags
Units In Stock	39
Units On Order	0
Category	Beverages
	Beverages
	Condiments
	Confections
	Dairy Products
	Grains/Cereals
	Meat/Poultry
	Produce
	Seafood



Minimize the number of nested menus to three, and the number of menu items to nine or less. Order the items semantically and in descending priority (i.e. frequency of use). Limit the number of icons used. Avoid cognitive overload.

# Pointers

Cursors provide feedback to the user about the mode the application is in – editing, processing, etc. Cursors can have color, and can be animated to show that a process is taking place. But complex pointer icons can also confuse users.

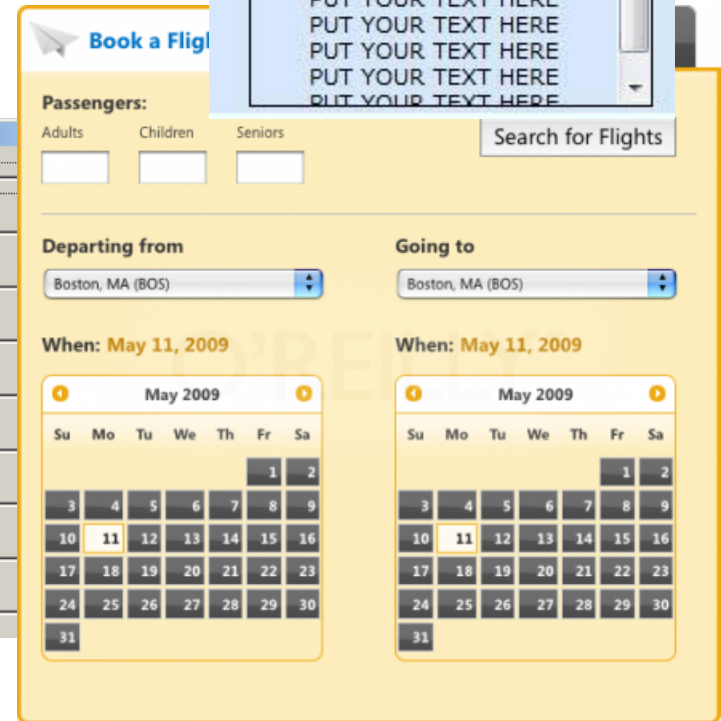
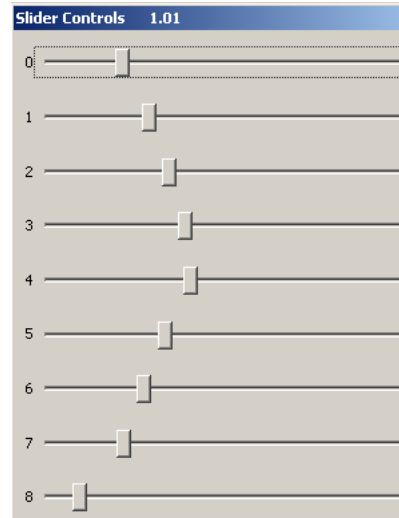
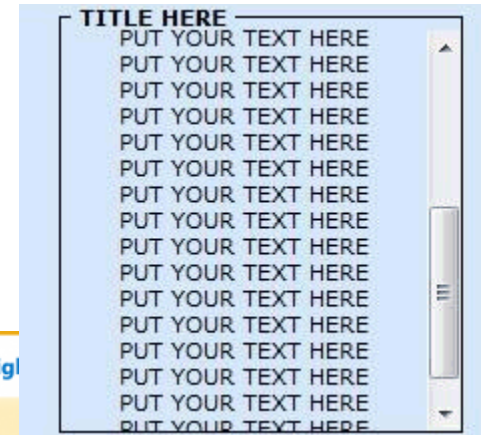
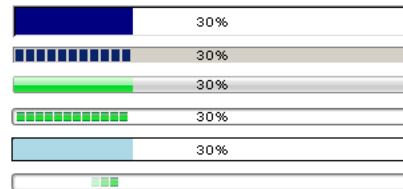
Normal Select		Vertical Resize	
Help Select		Horizontal Resize	
Working In Background		Diagonal Resize 1	
Busy		Diagonal Resize 2	
Precision Select		Move	
Text Select		Alternate Select	
Handwriting		Drag- make copy	
Unavailable		Drag - make shortcut	

## Common Cursor Types



# Widgets

Widgets are standardized mini-utilities such as calendars; but also include scroll bars, progress bars, sliders, etc. Scroll boxes in particular are over used, and often reflect a failure of design more than a useful feature.



# Controls

Interface controls are modeled after an actual artifact, like a switch or a knob. In practice controls like dials may be harder to use in a computer interface than their actual counterparts, since there is no tactile feedback. Buttons with multiple states can be a distraction in the interface.



# Color

- Layers and Separates
  - Distinguishes different types of information
- Sets the context for graphs and tables
- Emphasizes important items
  - Saturated colors are "active", neutral grey is "disabled"
- Labels
  - Groups similar functions by color
- Contributes to the “mood” of the application
- Color is never perceived in isolation. Use strong colors in small quantities, against large areas of quiet colors. More saturated colors draw our attention immediately. Use them sparingly.



Color perception stems from natural phenomena, like atmospheric distortion and the blue shift. Warmer, more saturated colors advance, and cooler, less saturated colors recede.

# UI Color Guidelines

- Use a limited palette of complementary colors
- Make sure your background *is* the background
- Don't use light blue for text, but it's great for backgrounds
- Older users need brighter colors to recognize them, and 10% of males have some form of color blindness
- Don't use highly saturated colors from opposite ends of the spectrum in close proximity



**Use Complementary Colors**

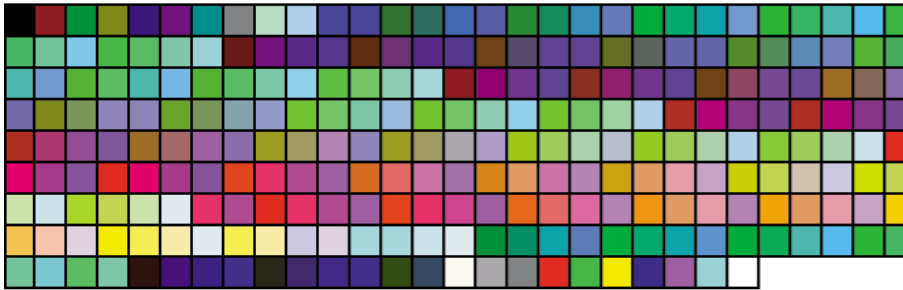
**Warm colors move forward**

**Cool backgrounds recede**

**This is very hard to read.**

**Don't Do This!**

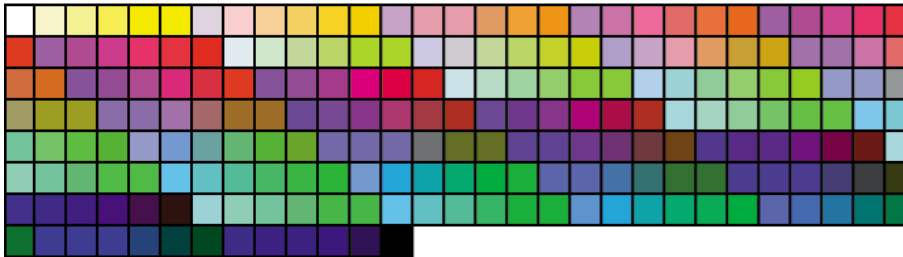
# Color Palettes



Windows palette  
(256 colors)



Macintosh palette  
(256 colors)

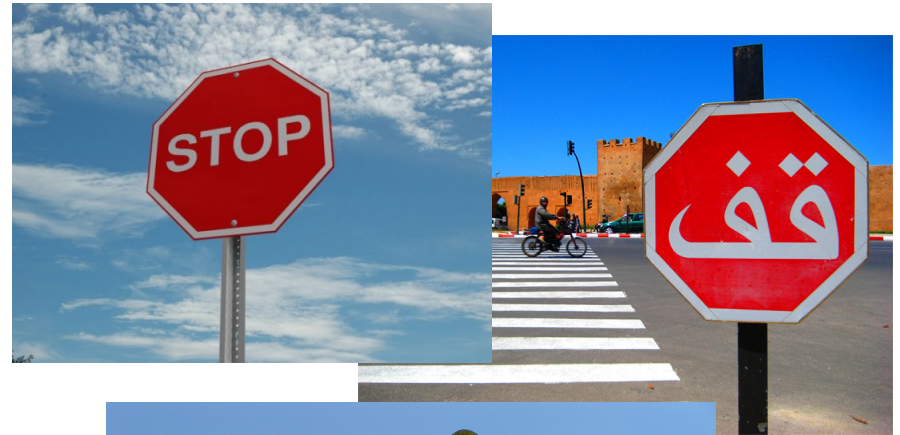


Web-safe palette  
(216 colors)



# Color Psychology: Warmer Colors

- Red
  - Rare in the natural world
  - Associated with fire, blood, danger
  - Commands attention
- Orange and Yellow
  - Color of the sun
  - Motivator, makes people happy and decide rapidly
- Green
  - Pastoral
  - Puts people at ease



# Color Psychology: Cooler Colors

- Blue
  - Most common color in the natural world
  - Color of the sky and the ocean
  - Light blue conveys access and assistance
  - Dark blue conveys authority
- Violet
  - Infrequent color in nature
  - It's unusual and exceptional
  - The color of royalty, intrigue and mystery



# Color Psychology: Neutral Colors

- **Brown**
  - Color of the earth
  - Dependable and full of promise
- **Black**
  - Color of night
  - Formality (and fear)
  - Judicial
  - Funerals in western cultures
- **White**
  - Color of clouds
  - Purity
  - Weddings in western cultures



# Text

- Legibility and quick comprehension are the primary goals.
- Screen resolution is much lower than print, and reading a lot of text can strain the user's eyes. Keep the use of text to a minimum.
- Users scan more than they read, so use text in readily "consumable" chunks.
- The minimum point size for text should be no less than 12 point. Older users and children require larger font sizes.
- With few exceptions, DO NOT USE all capital letters. Capitals are harder to read (and may imply impatience with the user).

12 point 24 point 48 point  
96 point

## Color Use in Design

While there is little hard evidence for many conventions that have grown around color use in publication, there is one area in which color use does follow hard-and-fast rules: cultural color psychology. The high visibility of red might make it appealing in the West, but in South Africa, where it is associated with mourning, it would not be seen on a cover about as often as black would be in the West. Blue is generally appealing to all of us irrespective of culture because of its calming influence, but is a turnoff when used for food. It's all about context. So while it may be somewhat useless to tell a designer how to use color, here's a helpful guide on how NOT to use it.

### Black

Black is complex; it can be sexy, authoritative, powerful, menacing, intriguing, rich, depressing, dull, glossy, textural, timeless...on many occasions it will be at least two of these at the same time. Avoid using black on the cover, where it can be too widely associated with death and tragedy, but on the inside pages of a magazine its use can be striking. In color psychology, many people think that it implies submission.

### White

White is almost complex as black. Innocence, cleanliness, wealth, and purity are some of the associations we make with white, but it can also be sterile and neutral to the point of blandness.

### Red

The extreme vibrancy of red has both good and bad points. It is confrontational and can render other elements on a page almost invisible. But it will definitely attract the eye and has been proved to create a strong emotional response in a viewer, stimulation faster heartbeats and breathing.

### Blue

Peaceful and tranquil, blue causes the body to produce calming chemicals. But choose it carefully - it can also be cold and depressing.

**There is one area in which color use does follow hard-and-fast rules: cultural color psychology... it's all about context.**

### Green

Green is the easiest color on the eye and is calming and refreshing. As the color of nature, most associations viewers make are positive ones. Additionally, dark green implies wealth and power.

### Yellow

Yellow is the most difficult color for the eye to take in, and thus is potentially overpowering - possibly why it's seen as an unpopular color choice for covers.

### Purple

Used in the right way, purple has associations of luxury, wealth, romance, and sophistication, but it can also appear overtly feminine or gauche.

### Orange

Our associations with orange are good: exciting, vibrant, and joyous. But it can be a difficult color to use - too red can overpower, too yellow is anemic.

### Brown

Another nature color with good associations. Light brown implies genuineness, while dark brown suggests wood or leather. The combination of these makes them appealing for men's subjects.

A good balanced text layout in Helvetica, but...

# Typography

- Limit the use of styles to at most four: headlines, subheads, body copy, and captions.
- The use of **bold** and *italic* fonts should be consistent and limited.
- Choose fonts that support the theme of the interface.
  - Serif fonts (e.g. **Times**) are classical and formal. They are more legible than sans-serif fonts and are good for body copy.
  - Sans-Serif fonts (e.g. **Arial**) are modern and informal. Usually best for headlines.
- Specialty fonts and typographic designs (e.g. logos) might have to be rasterized for distribution. Some applications, such as Flash, allow developers to embed fonts in their executable files (.swf).

Arial

**Arial Black**

**Comic Sans MS**

Courier New

Georgia

**Impact**

**Times New Roman**

**Trebuchet MS**

Verdana

Above, the “core nine” cross-platform (web-safe) fonts.

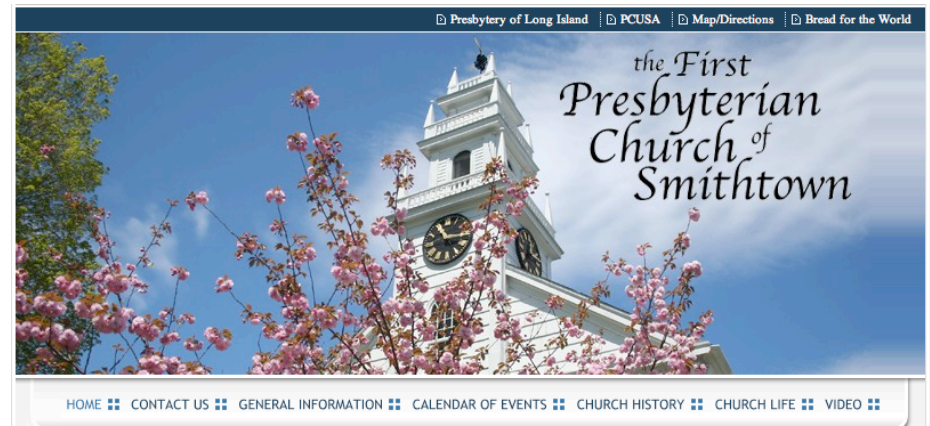
# Typography examples

the  
College of  
Engineering  
and  
Applied  
Sciences



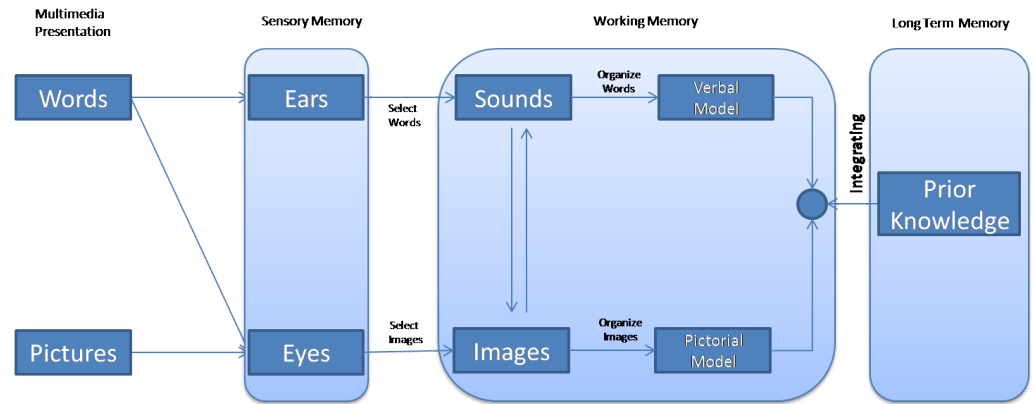
KERMIT95

the First  
Presbyterian  
Church of  
Smithtown

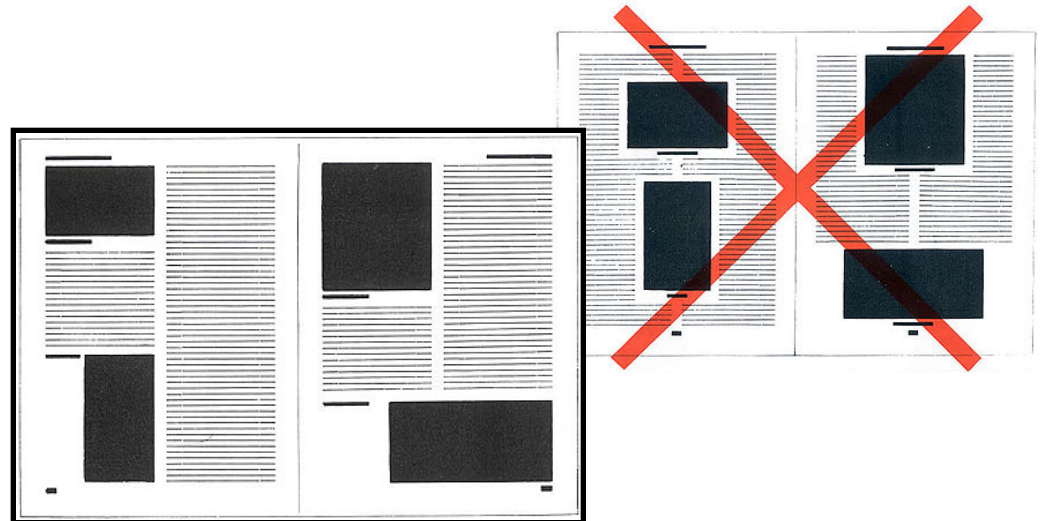


# Digital Media

- Richard E. Mayer (Prof. of Psychology, UC Santa Barbara): *Multimedia Learning*, Cambridge University Press, 2001
- **People learn better when multimedia messages are designed in ways that are consistent with how the human mind works and with research-based principles**



Cognitive Theory of Multimedia Learning; Nine Ways to Reduce Cognitive Load in Multimedia Learning; Mayer and Moreno, Educational Psychologist, 2003



# Principles for managing essential processing

- **Multimedia principle:** People learn better from words and pictures than from words alone.
- **Segmenting principle:** People learn better when a multimedia lesson is presented in learner-paced segments rather than as a continuous unit.
- **Pre-training principle:** People learn better from a multimedia lesson when they know the names and characteristics of the main concepts.
- **Modality principle:** People learn better from animation and narration than from animation and on-screen text.



# Principles for reducing extraneous processing

- **Coherence principle:** People learn better when extraneous words, pictures, and sounds are excluded rather than included.
- **Redundancy principle:** People learn better from animation and narration than from animation, narration, and on on-screen text.
- **Signaling principle:** People learn better when the words include cues about the organization of the presentation.
- **Spatial contiguity principle:** People learn better when corresponding words and pictures are presented near rather than far from each other on the page or screen.
- **Temporal contiguity principle:** People learn better when corresponding words and pictures are presented simultaneously rather than successively.

# Principles based on social cues

- **Personalization principle:** People learn better when the words are in conversational style rather than formal style.
- **Voice principle:** People learn better when words are spoken in a standard-accented human voice than in a machine voice or foreign-accented human voice.
- **Image principle:** People do not necessarily learn better from a multimedia lesson when the speaker's image is added to the screen

# Mayer's final principle

- **Individual differences principle:** Design effects are stronger for low-knowledge learners than for high-knowledge learners. Design effects are stronger for high-spatial learners than for low-spatial learners.