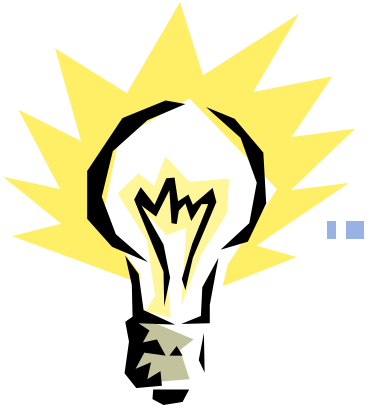
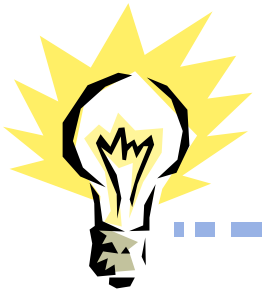


Design

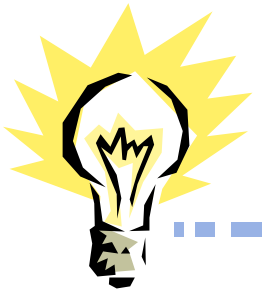
The light bulb goes on



Agenda

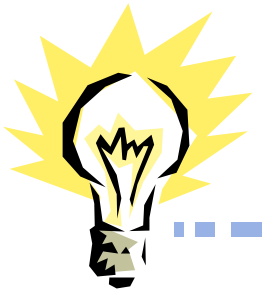
- Idea generation
- Design principles
- Poster, Exam, Project

Design Choices...



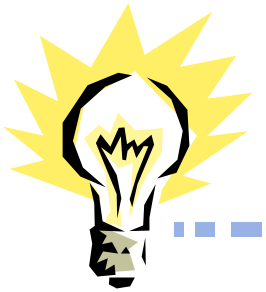
Design is Easy?

- Or is it . . .?



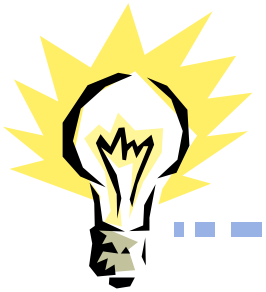
Design Process

- Fill the design space with ideas
  - Informed Brainstorming !!
- Pare down, combine
- Why is it so difficult?



Why Design is Hard

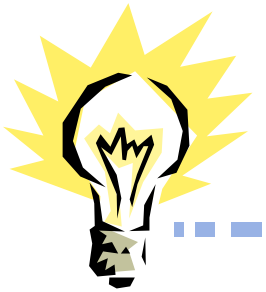
- Number of things to control has increased dramatically
- Displays are more virtual/artificial
- Marketplace pressure
  - Adding operations cheaper (computers)
  - Adding controls expensive (real estate, cost)
- Errors are becoming increasingly serious



Idea Creation

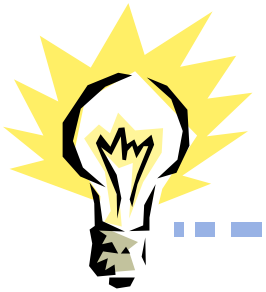
- Ideas come from
  - Imagination
  - Analogy
  - Observation of current practice
  - Observation of current systems
- Borrow from other fields
  - Animation
  - Theatre
  - Information displays
  - Architecture
  - …

Informed Brainstorming !!



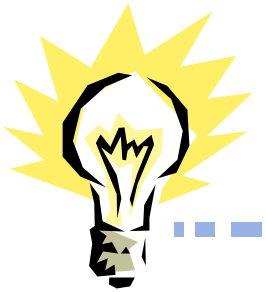
Idea Creation Methods

- 1. Consider new use for object
- 2. Adapt object to be like something else
- 3. Modify object for a new purpose
- 4. Magnify - add to object
- 5. Minimize - subtract from object



Idea Creation Methods

- 6. Substitute something similar
- 7. Rearrange aspects of object
- 8. Change the point of view
- 9. Combine data into an ensemble



Overall Guidelines for Design

- 1. Provide a good conceptual model
  - User has mental model of how things work
  - Build design that allows user to predict effects of actions
- 2. Make things visible
  - Visible affordances, mappings, constraints
  - Remind person of what can be done and how to do it

More Specific Design Principles

- 1. Use simple and natural dialog in user's language
  - Match user's task in a natural way
  - Avoid jargon, techno-speak

Insufficient funds to withdraw $100

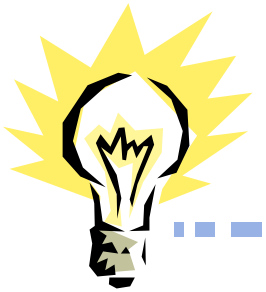
VS.

X.25 connection discarded due to network congestion. Local limits now in effect

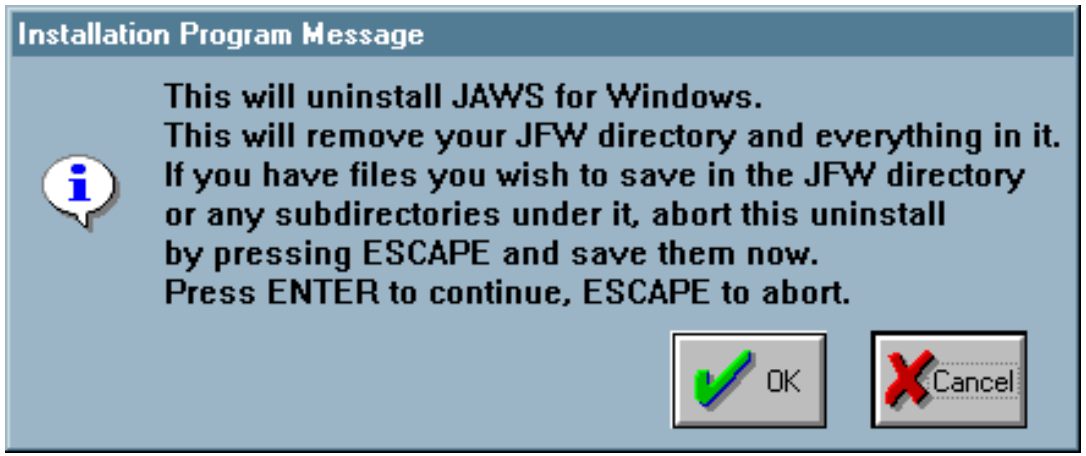
  - Present exactly info that user needs

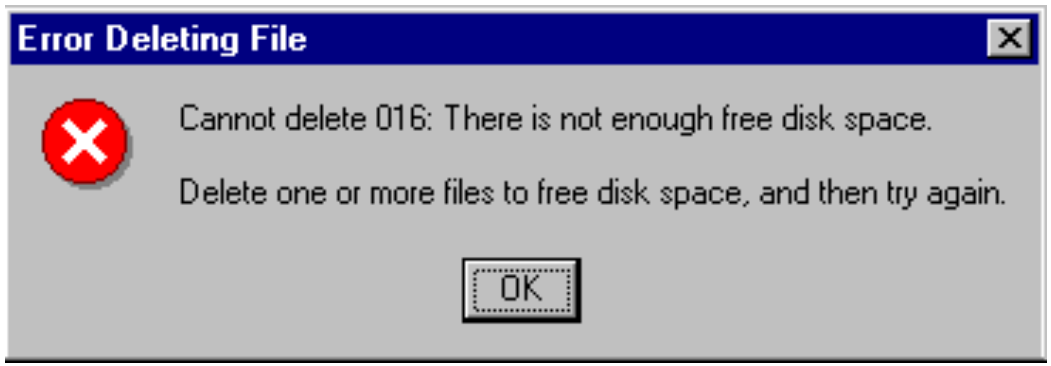
Less is more!

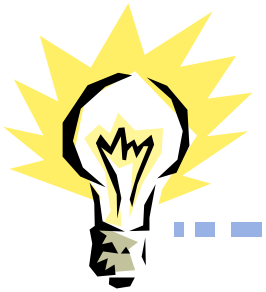
Fewer unnecessary windows, prompts, dialogs



“Fun” Examples

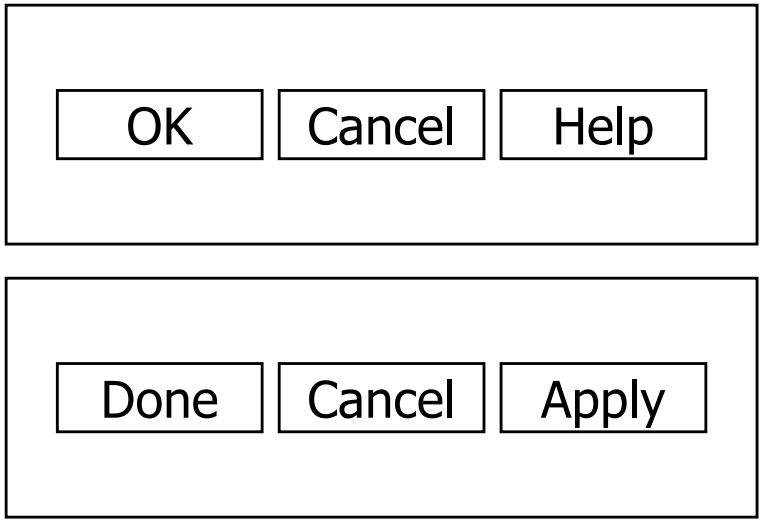


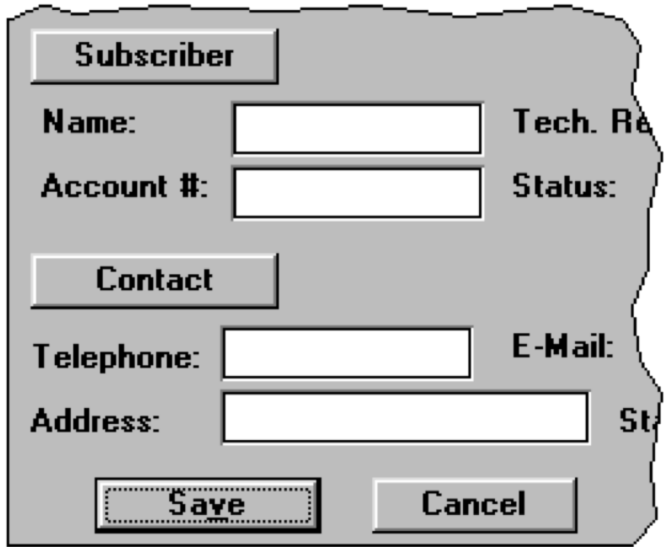


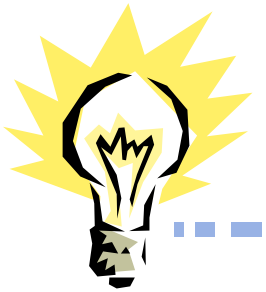


Design Principles

- 2. Strive for consistency
  - Sequences, actions, commands, layout, terminology
  - Makes more predictable

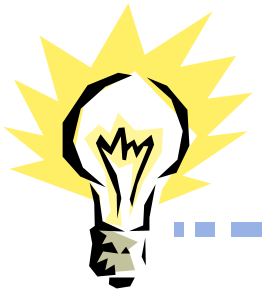






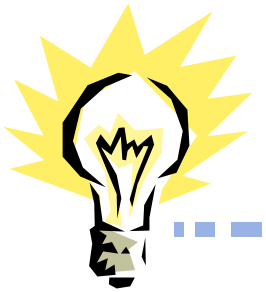
Design Principles

- 3. Provide informative feedback
  - Continuously inform user about what is occurring
  - Most important on frequent, substantive actions
  - How to deal with delays?



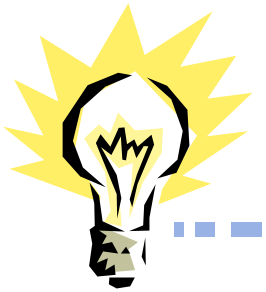
Design Principles

- 4. Minimize user's memory load
  - Recognition is better than recall
  - Describe required input format, include example and default
    - Date: _ _ - _ _ _ - _ _ (DD-Mmm-YY, e.g., 02-Aug-93)
  - Use small # of generally applicable commands



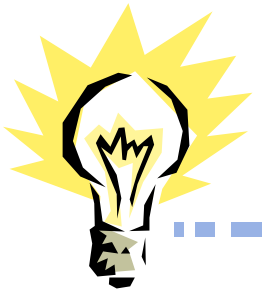
Design Principles

- 5. Permit easy reversal of actions
  - Undo!
  - Reduces anxiety, encourages experimentation



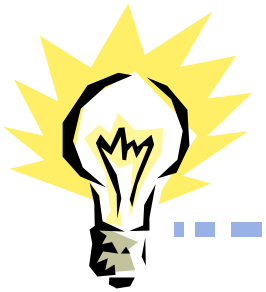
Design Principles

- 6. Provide clearly marked exits
  - Don't want the user to feel trapped
  - Examples
    - Cancel button on dialogs
    - Interrupt/resume on lengthy operations (modeless)
    - Quit - can exit anytime
    - Reset/defaults - restore on a property sheet



Design Principles

- 7. Provide shortcuts
  - Enable frequent users to perform often-used operations quickly
    - Keyboard & mouse
      - Abbreviations
      - Menu shortcuts
      - Function keys
      - Command completion
      - Double click vs. menu selection
    - Navigation between windows/forms
    - Reuse
      - Provide history system



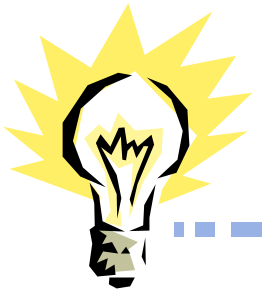
Design Principles

- 8. Support internal locus of control
  - Put user in charge, not computer
  - Can be major source of anxiety

System prompt: **Enter next command:**

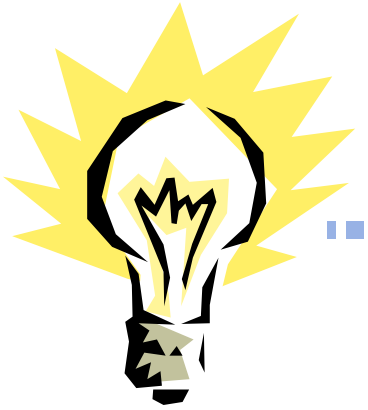
vs.

Ready for next command:



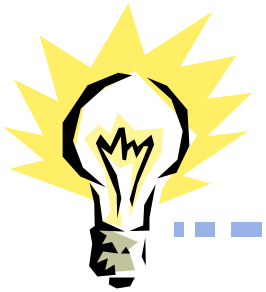
Design Principles

- 9. Handle errors smoothly and positively
- 10. Provide useful help and documentation
  - (More to come later in course on these two)



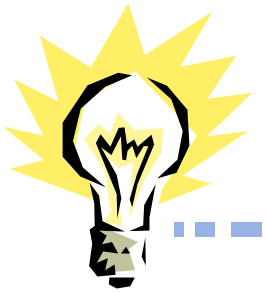
Graphic Design

The “look & feel”



Graphic Design

- The “look & feel” portion of an interface
- What someone initially encounters
  - Conveys an impression, mood



Design Philosophies

- Personal preferences:
  - Economy of visual elements
  - Less is more
  - Well organized (good info architecture!)

Imagery

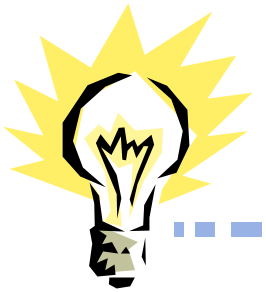
Color

Sequencing

Layout

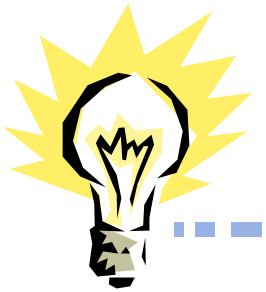
Typography

Organization



Graphic Design Principles

- Metaphor
- Clarity
- Consistency
- Alignment
- Proximity
- Contrast



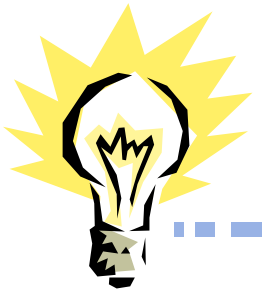
Metaphor

- Tying presentation and visual elements to some familiar relevant items
  - e.g., Desktop metaphor
  - e.g., Elevator metaphor
  - If you're building an interface for a grocery application, maybe mimic a person walking through a store with a cart

Example

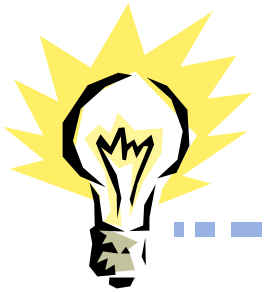
Overdone?

www.worldwidestore.com/Mainlvl.htm



Clarity

- Every element in an interface should have a reason for being there
  - Make that reason clear too!
- Less is more
  - Unless more is more…



Clarity

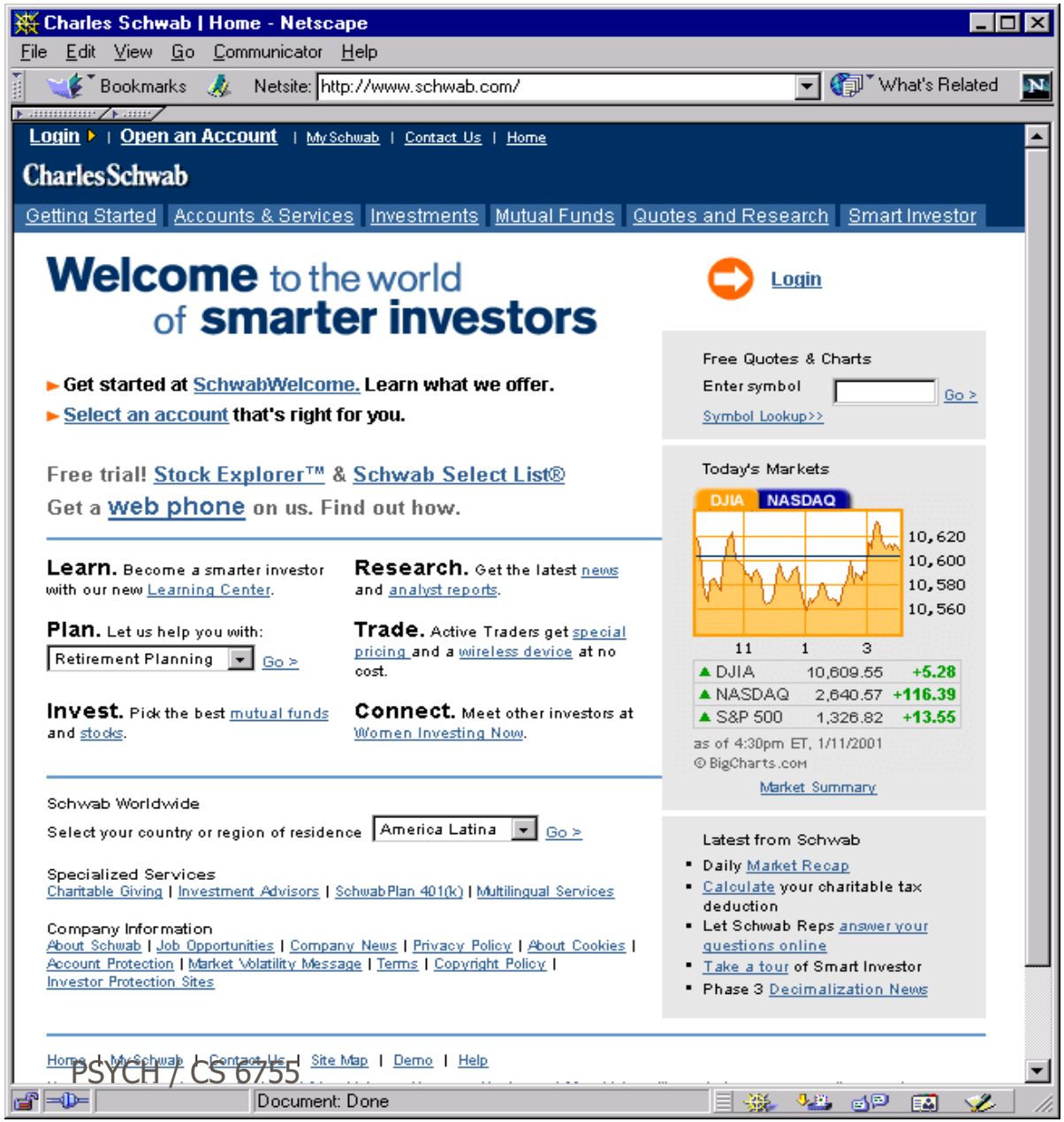
- White space
  - Leads the eye
  - Provides symmetry and balance through its use
  - Strengthens impact of message
  - Allows eye to rest between elements of activity
  - Used to promote simplicity, elegance, class, refinement

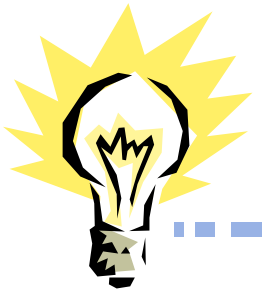
Example

Clear, clean Appearance

(?)

www.schwab.com



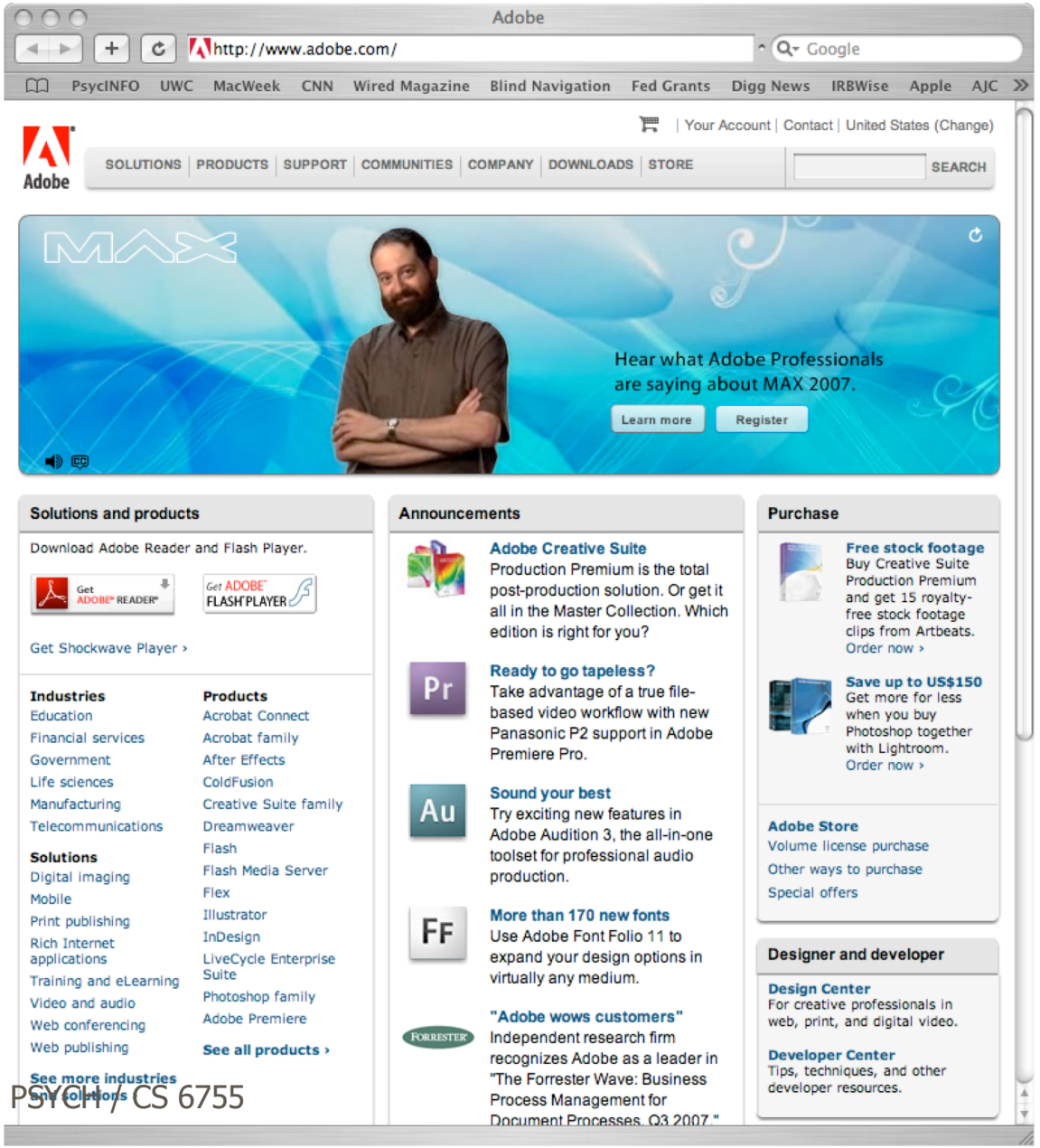


Example

Clear, clean Appearance

(?)

www.adobe.com

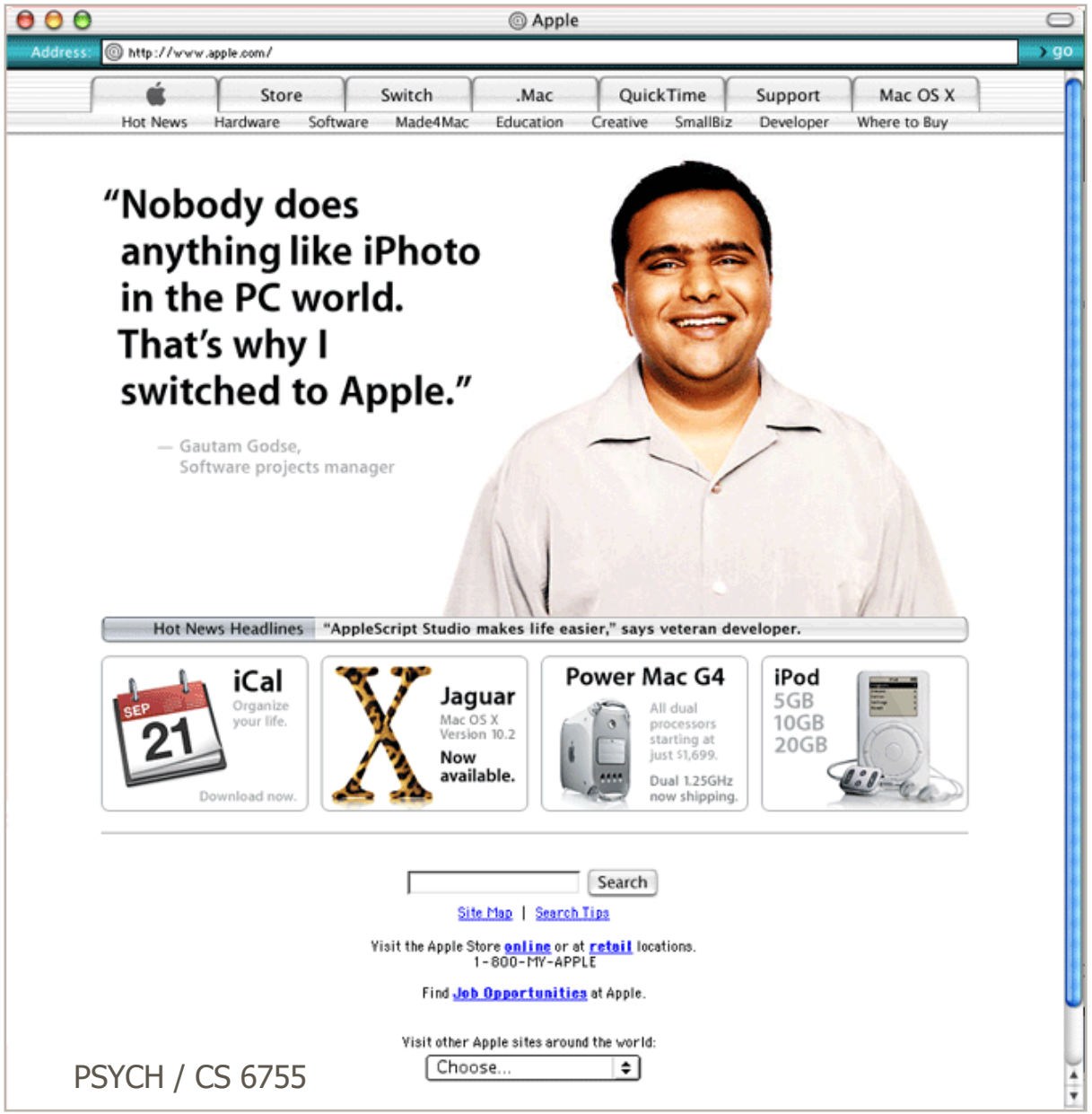


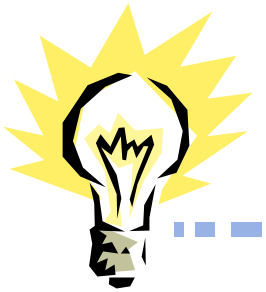
Example

Clear, clean Appearance

(?)

www.apple.com





Consistency

- In layout, color, images, icons, typography, text, …
- Within screen, across screens
- Stay within metaphor everywhere

- Platform may have a style guide
  - Follow it!

Example

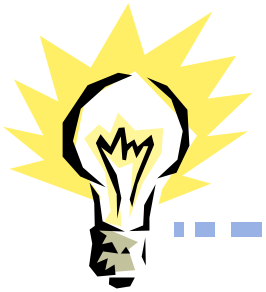
Logo-icon principle

Home page

Content page 1

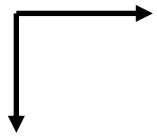
Content page 2

www.santafean.com

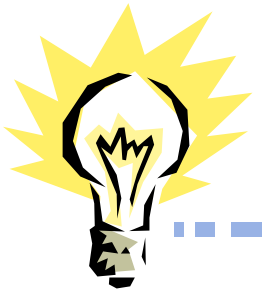


Alignment

- Western world
  - Start from top left

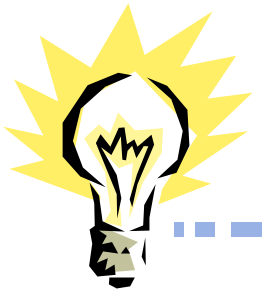


- Allows eye to parse display more easily
- “Read-flow” principle



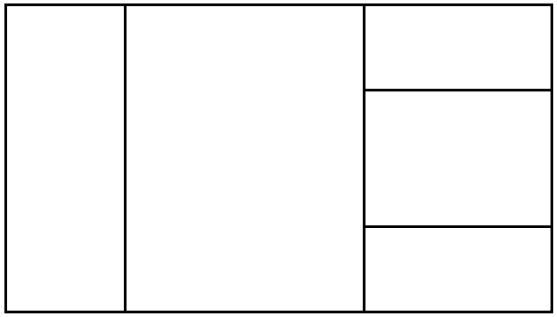
Alignment

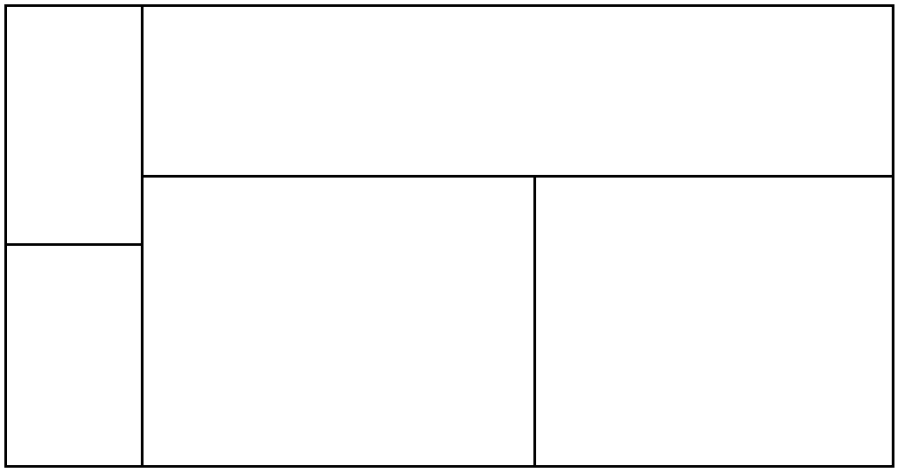
- Grids
  - (Hidden) horizontal and vertical lines to help locate window components
  - Align related things
  - Group items logically
  - Minimize number of controls, reduce clutter

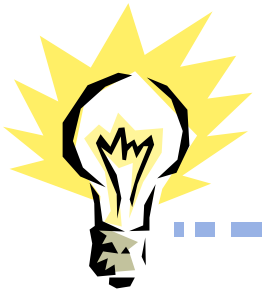


Alignment

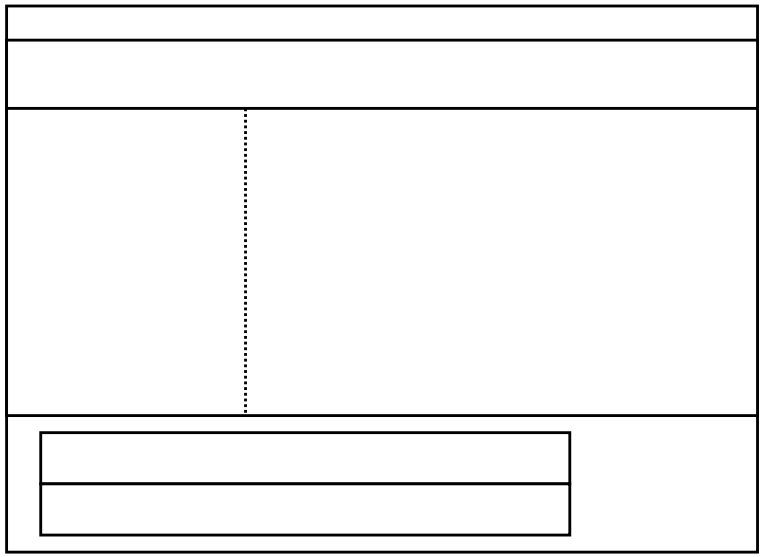
- Grids - use them

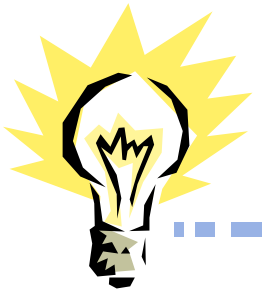






Grid Example





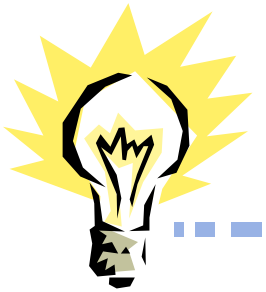
Alignment

- Left, center, or right?

Here is some new text	Here is some new text	Here is some new text

- Choose one, use it everywhere

- Novices often center everything
  - No definition, calm, very formal



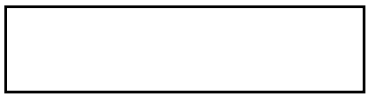
Proximity

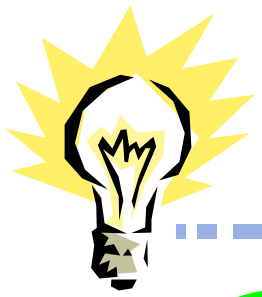
- Items close together appear to have a relationship
- Distance implies no relationship

Time

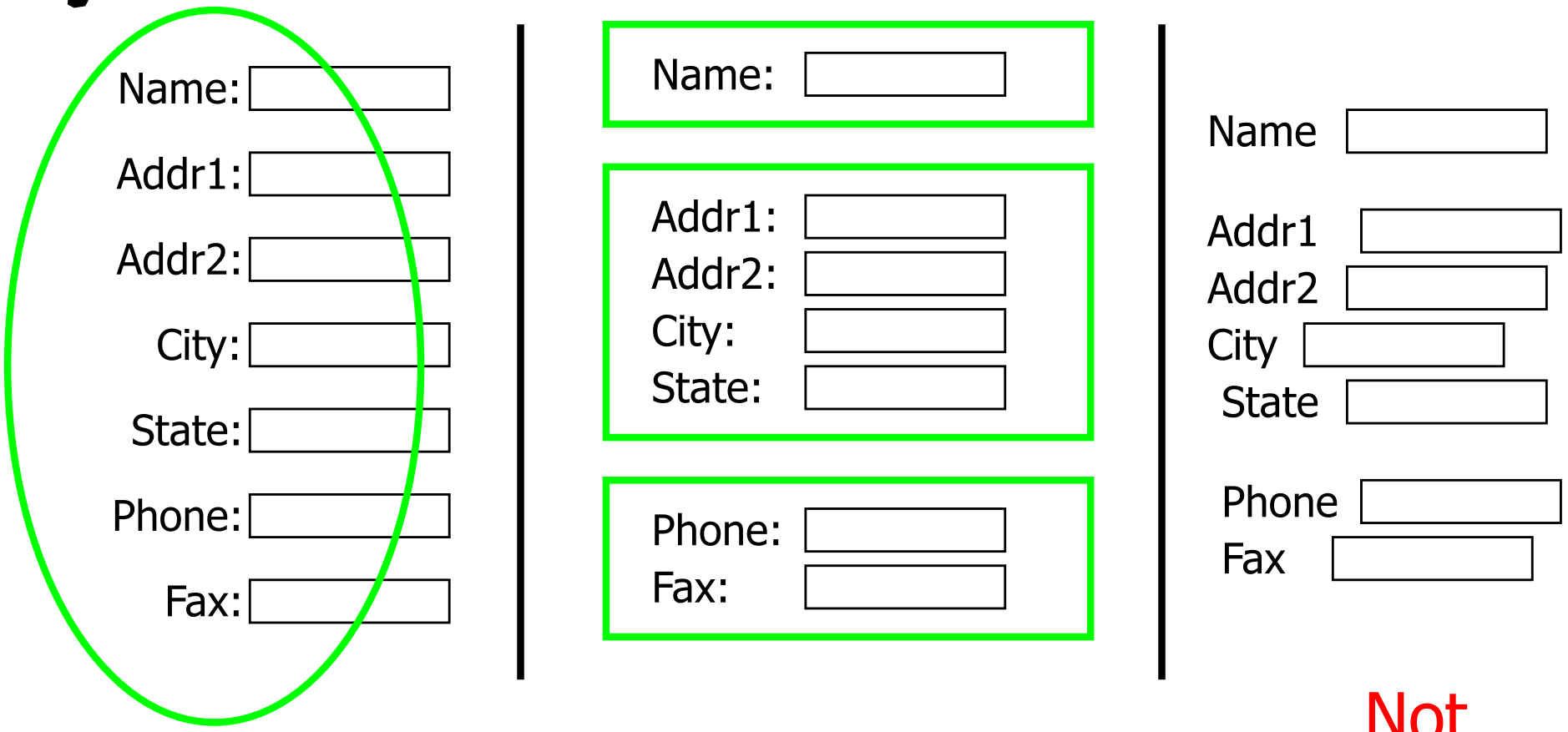
Time

- Colon ties label and field together

Time: 



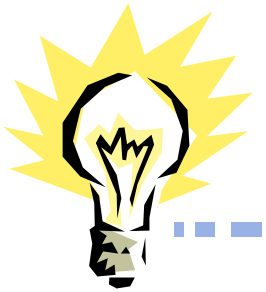
Example



Right-align
Field labels

Enhance grouping
With boxes

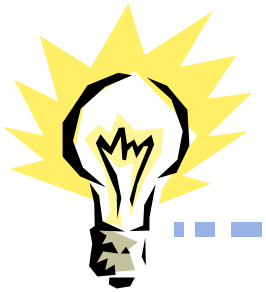
Not
zesty



Contrast

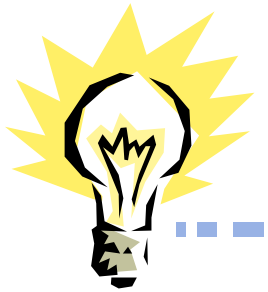
- **Pulls you in**
- Guides your eyes around the interface
- Supports skimming

- Take advantage of contrast to add **focus** or to energize an interface
- Can be used to distinguish active control



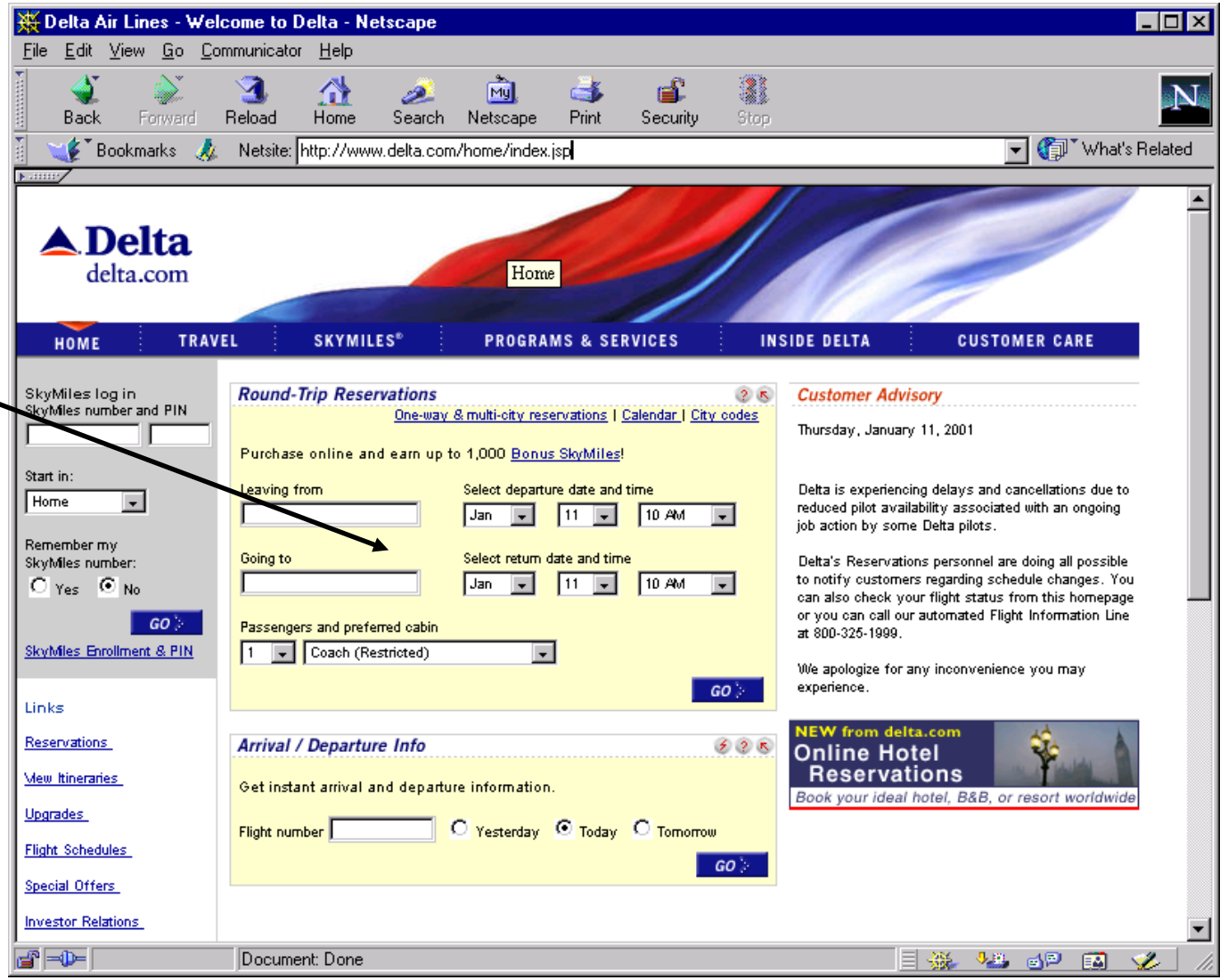
Contrast

- Can be used to set off most important item
  - Allow it to dominate
- Ask yourself what is the most important item in the interface, highlight it
- Use geometry to help sequencing

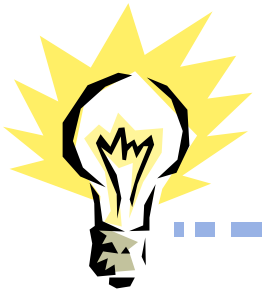


Example

Important element



www.delta.com

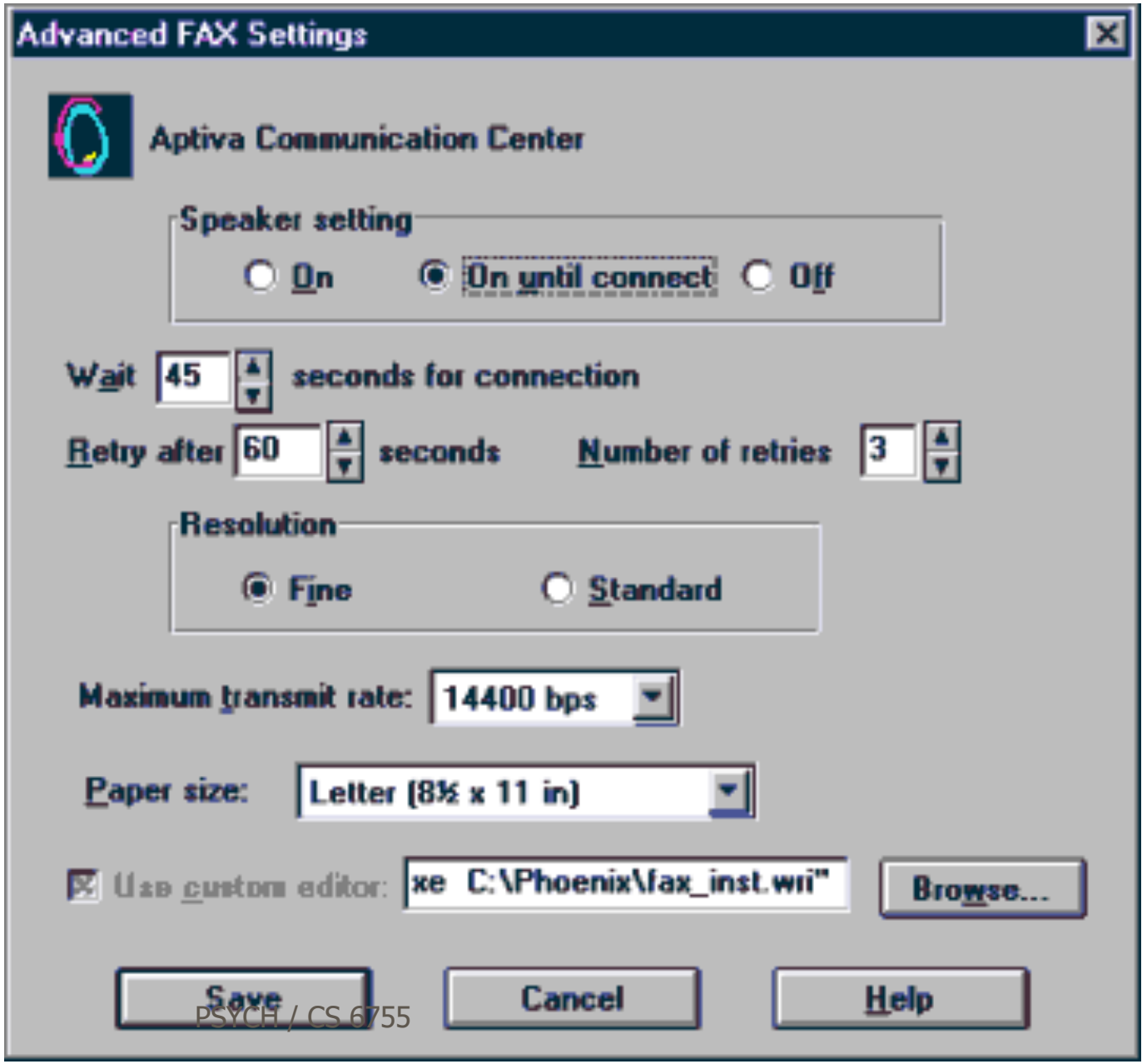


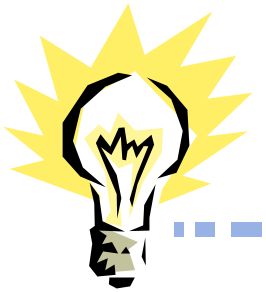
UI Exercise

- Look at interface and see where your eye is initially drawn (what dominates?)
- Is that the most important thing in the interface?
- Sometimes this can (mistakenly) even be white space!

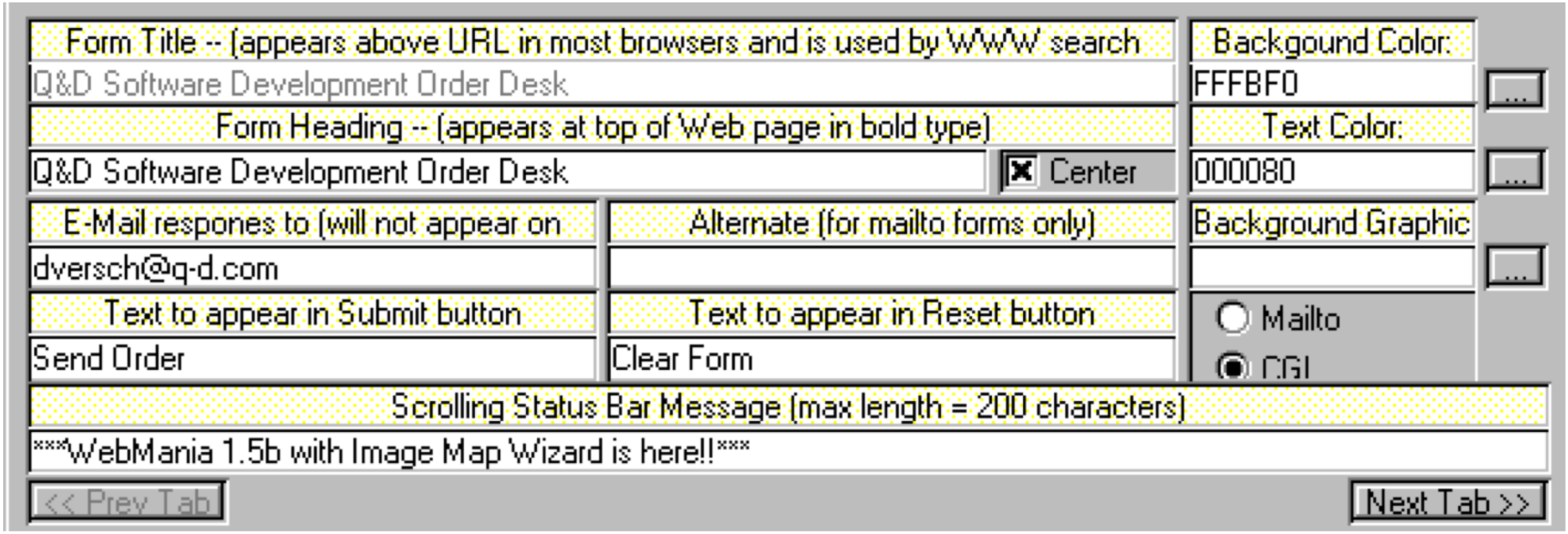
Example

Disorganized

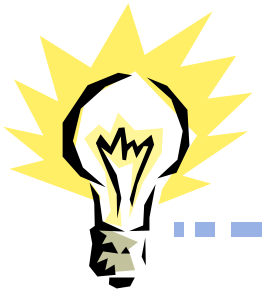




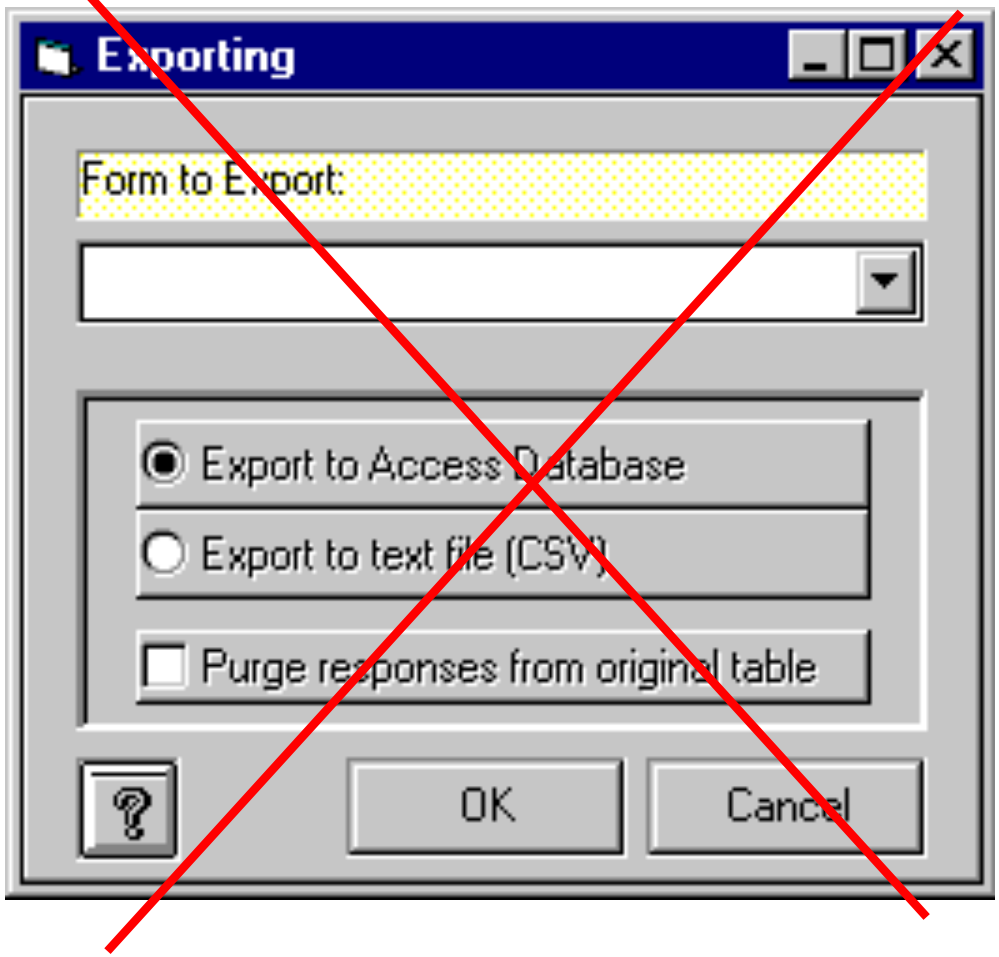
Example



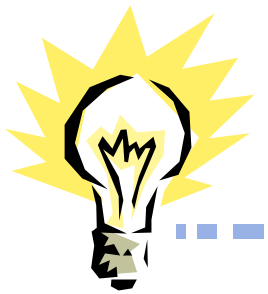
Visual noise



Example

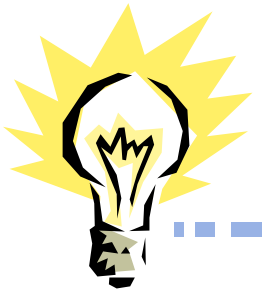

Exporting
Form to Export:
Export to Access Database
Export to text file (CSV)
Purge responses from original table
OK
Cancel

Exporting
Form to Export:
Export to Access Database
Export to text file (CSV)
Purge responses from original table
Cancel
OK



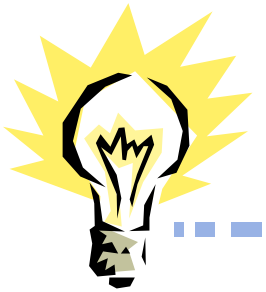
Example

Exporting
Form to Export:
Export to Access Database
Export to text file (CSV)
Purge responses from original table
Cancel
Export



Economy of Visual Elements

- Less is more
- Minimize borders and heavy outlining, section boundaries (use whitespace)
- Reduce clutter
- Minimize the number of controls

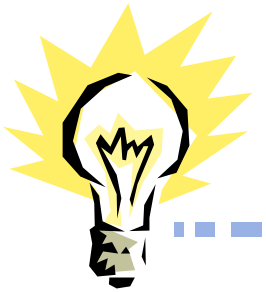


Typography

- Characters and symbols should be easily noticeable and distinguishable
  - Avoid heavy use of all upper case
  - Mixed case promotes faster reading

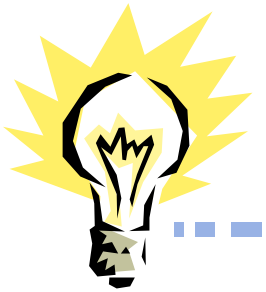
HOW MUCH FUN IS IT
TO READ ALL THIS TEXT
WHEN IT'S ALL IN
CAPITALS AND YOU
NEVER GET A REST

How much fun is it
to read all this text
when it's all in
capitals and you
never get a rest

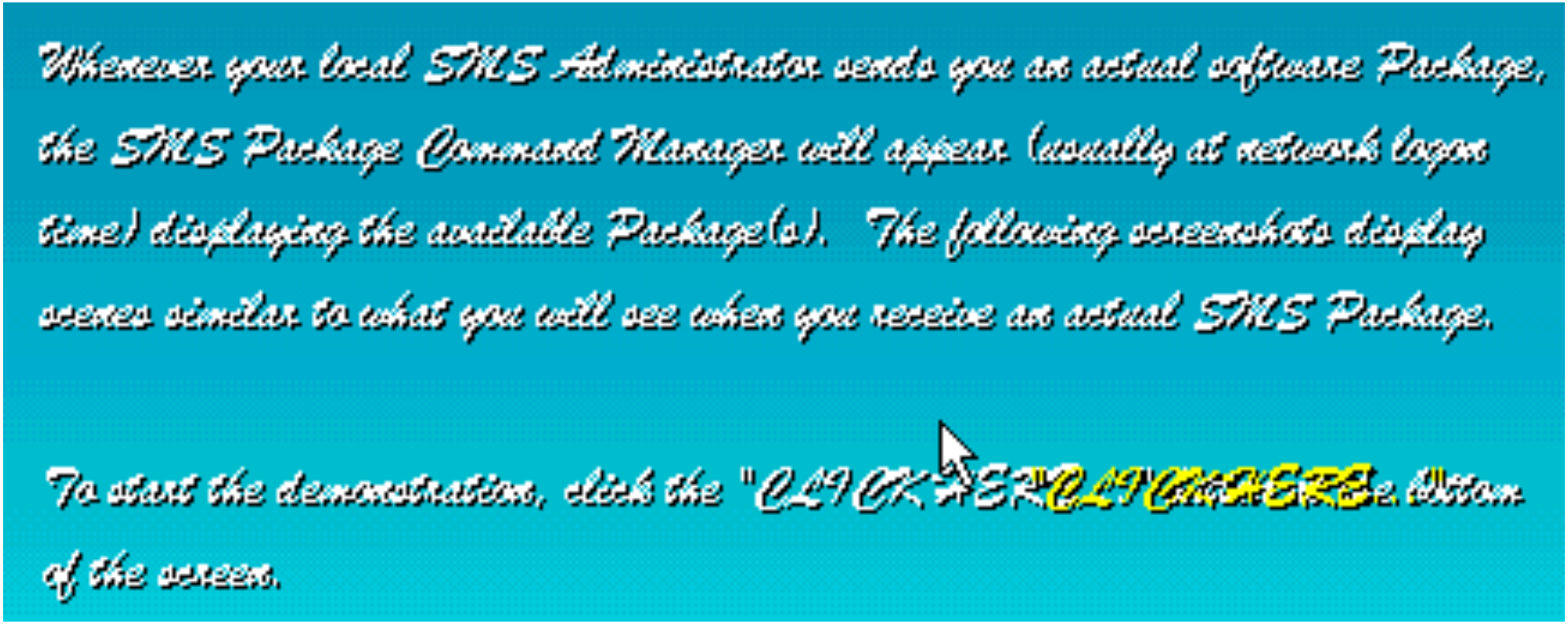


Typography

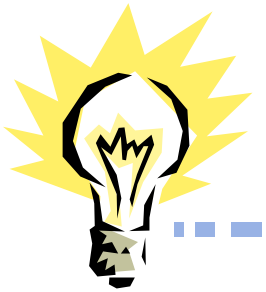
- Readability
  - How easy it is to read a lot of text
- Legibility
  - How easy it is to recognize a short burst
- Typeface = font
  (not really, but close enough)



Wow


Whenever your local SMS Administrator sends you an actual software Package,
the SMS Package Command Manager will appear (usually at network logon
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 "CLICK TO CONTINUE" button
of the screen.

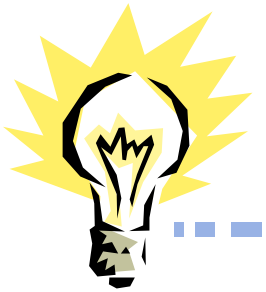
Yuk



Typography

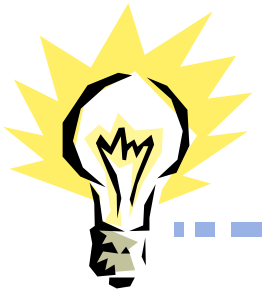
- Serif font - readability
- Sans serif font - legibility
  - (both are variable spaced)

- Monospace font



Fonts

- Serif
  - Times, Bookman
  - Palatino
- Sans serif
  - Tahoma, Arial
- Onscreen fonts
  - Georgia
  - Geneva
  - Verdana
- Decorative
  - Comic Sans
- Script
  - Script
- Monospaced
  - Courier, Lucida



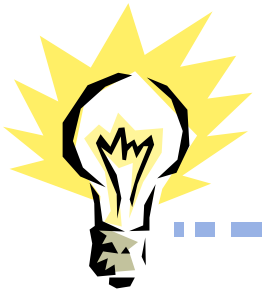
Typography

- Guidelines
  - Use serif for long, extended text; sans serif for “headlines”
  - Use 1-2 fonts/typefaces (3 max)
  - Use 1-3 point sizes max
  - Never use bold, italics, capitals for large sections of text
  - Be careful of text to background color issues

More Wow

PIRATES Tutorial
PIRATES is a multiplayer strategy game of piracy and plunder on the high seas. As a ship captain, you may trade with island merchants and make an honest living, or plunder local ships and other players. You will probably do a little of each!
Press arrow to move to next frame --->

HTML/Browse
WebForms™ 2.5 — ©1995,96 Q&D Softw



Example

Which do you prefer?

CRAFTS AND GAMES
ARTS FESTIVAL
OF ATLANTA AND DECATUR

SEPTEMBER 19-24

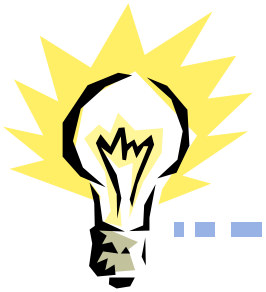
COME AND ENJOY

Crafts and Games:
Arts Festival
Of Atlanta and Decatur

September 19-24

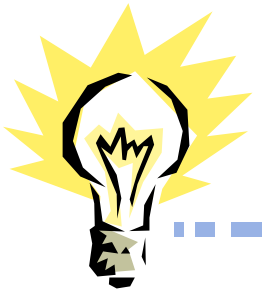
Come and Enjoy!

Applies lots of these principles



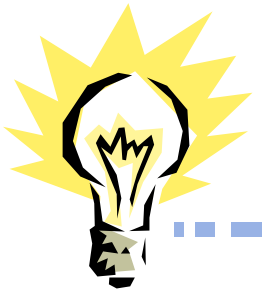
Color

- We see the world via a *reflective* color model
  - Light strikes a surface and is reflected to our eyes--Properties of surface dictate color
  - Printers
- Colors on display follow the *emitted* model



Color Attributes

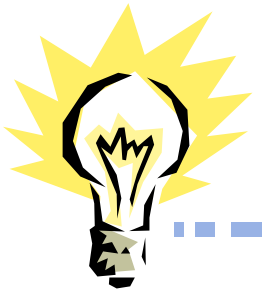
- Hue
  - native color, pigment
- Saturation
  - relative purity, brightness, or intensity of a color
- Value
  - lightness or darkness of a color



Color

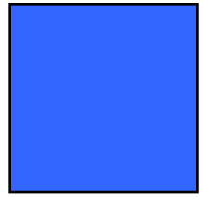
- On monitors, typically RGB scheme
  - 0-255 value each red, green, blue

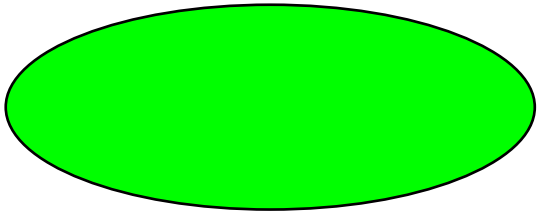
  - R: 170 G:43 B: 211

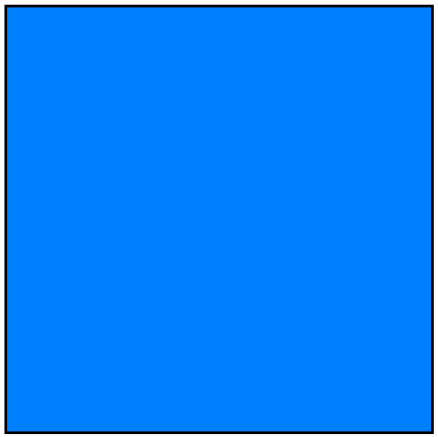


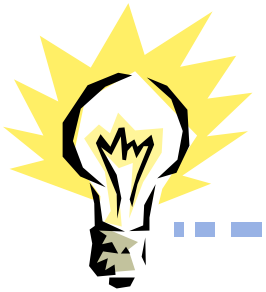
Color Guidelines

- Design in b/w then add color where appropriate
  - Print your design out in b/w to test it
- Use color to draw attention, communicate organization, to indicate status, to establish relationships
- Avoid using color in non-task related ways



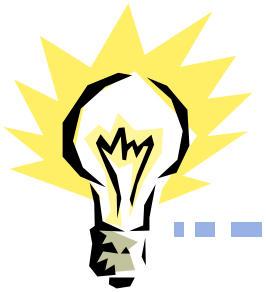






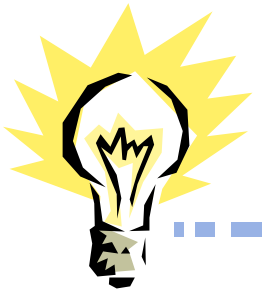
Color Guidelines

- Display color images on black background
- Choose bright foreground color (white, bold green,…)
- Avoid brown and green as background colors
- Be sure foreground colors contrast in both brightness and hue with bg colors



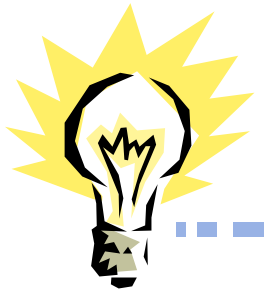
Color Guidelines

- Color is good for supporting visual search
- Do not use color without some other redundant cue
  - Color-blindness
  - Monochrome monitors (and printouts)
  - Redundant coding enhances performance
- Be consistent with color associations from jobs and cultures

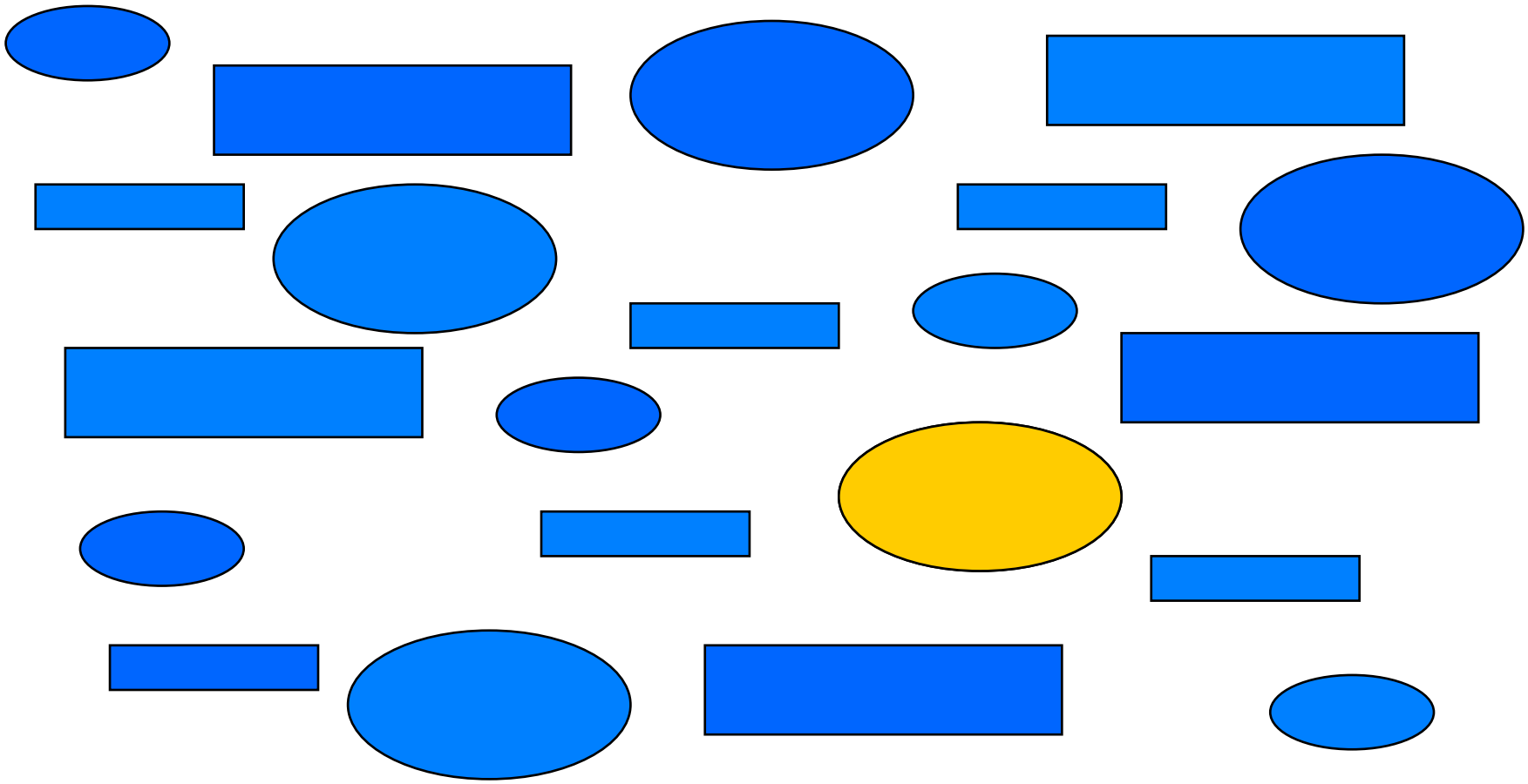


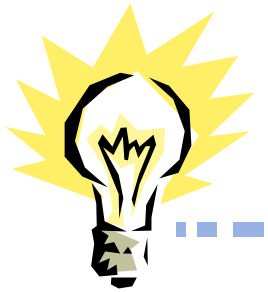
Color Guidelines

- Limit coding to 8 distinct colors (4 better)
- Avoid using saturated blues for text or small, thin lines
- Use color on b/w or gray, or b/w on color
- To express difference, use high contrast colors (and vice versa)

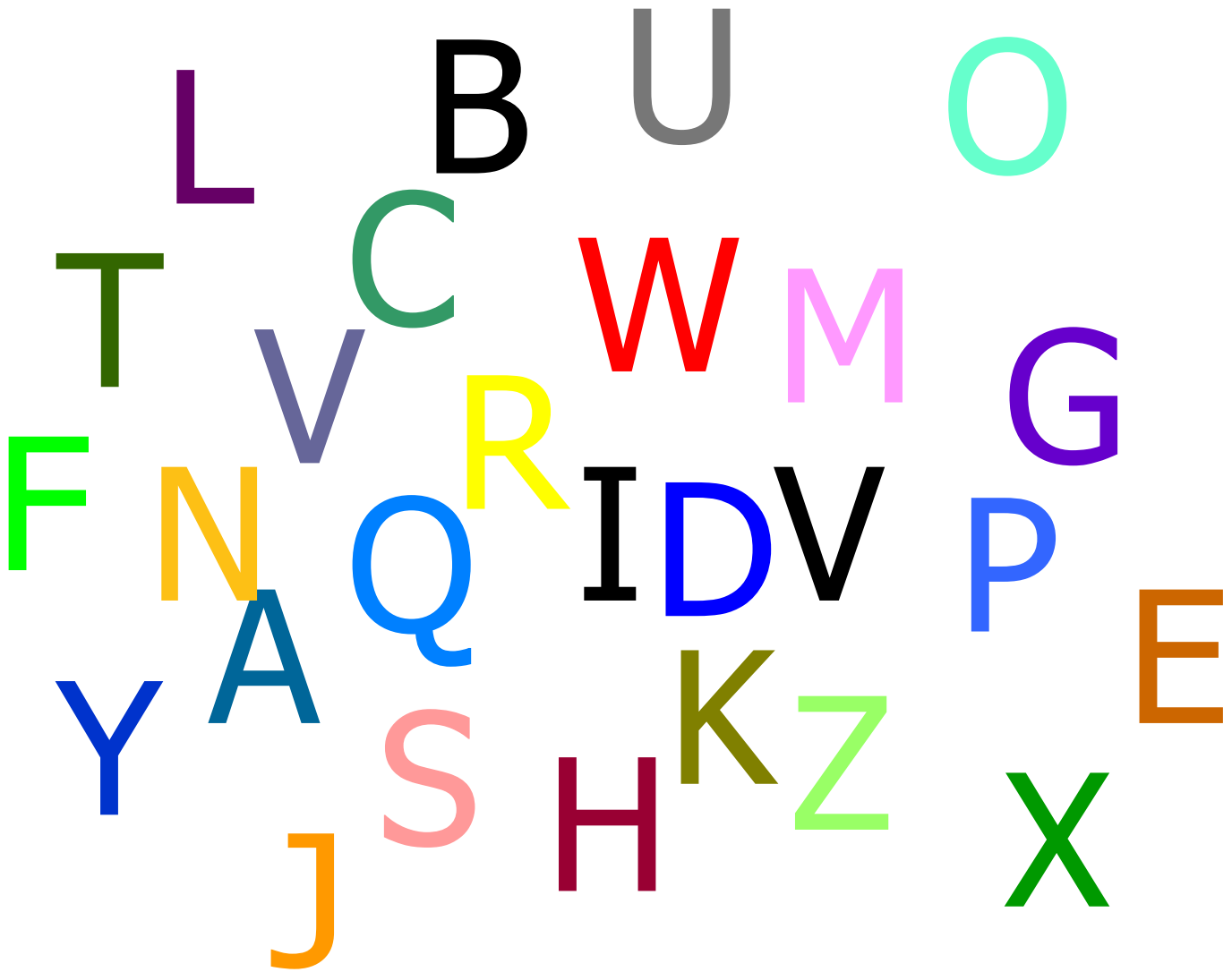


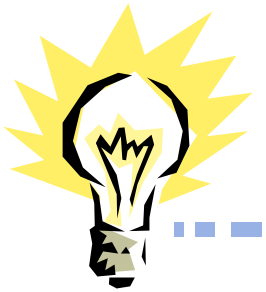
How many...





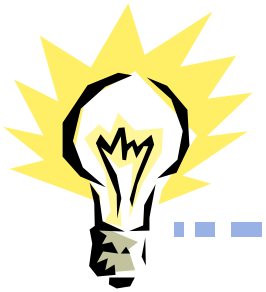
Find the...





Color Associations

- Red
  - hot, warning, aggression, love
- Pink
  - female, cute, cotton candy
- Orange
  - autumn, warm, Halloween
- Yellow
  - happy, caution, joy
- Brown
  - warm, fall, dirt, earth
- Green
  - lush, pastoral, envy
- Purple
  - royal, sophisticated, Barney



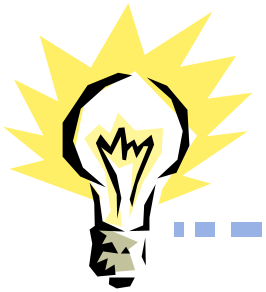
Color Suites

- Designers often pick a palette of 4 or 5 colors

Professional

Monochromatic

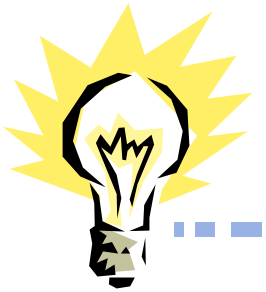
Southwestern



Icon Design

- Design task

- Represent object or action in a familiar and recognizable manner
- Limit number of different icons
- Make icon stand out from background



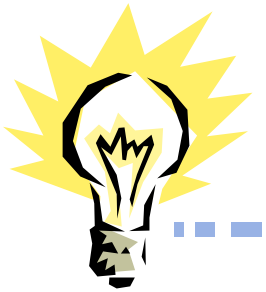
Icon Design

- Ensure that singly selected icon is clearly visible when surrounded by unselected ones
- Make each icon distinctive
- Make icons harmonious members of icon family
- Avoid excessive detail

Icon Design

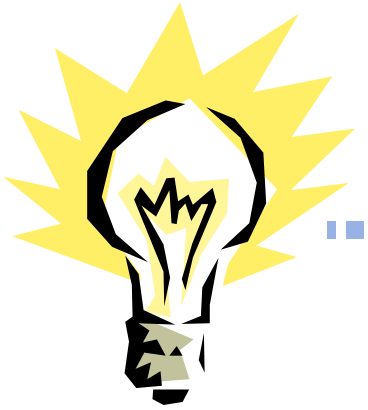
What do each of these signify?

Almost always want to accompany your icons by a text label



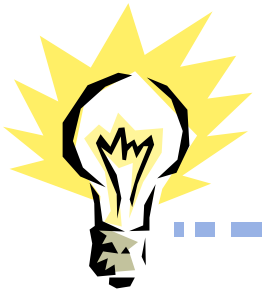
Good & Bad Designs

- www.baddesigns.com



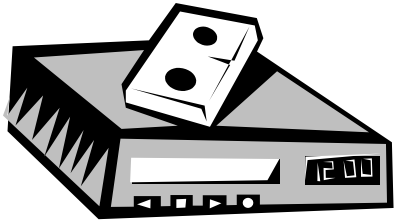
Design of Everyday Things

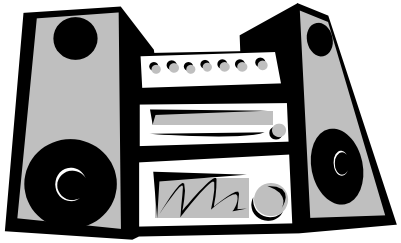
Don Norman

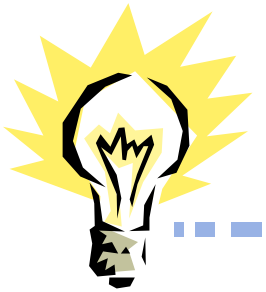


Daily Challenges

- How many of you can use all the functionality in your
  - VCR
  - Digital watch
  - Copy machine
  - Stereo system
  - Plumbing fixtures

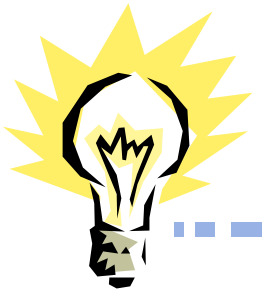






Important Concepts

- Affordances
- Conceptual models
- Visibility
- Mapping
- Feedback
- Constraints



Affordance

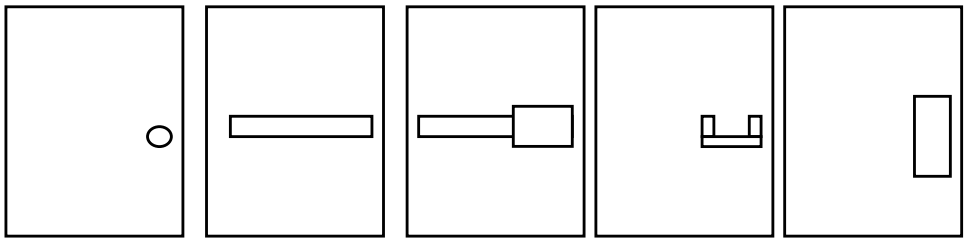
- Perceived and actual fundamental properties of an object that determine how it could be used
  - Chair is for sitting
  - Ball is for throwing
  - Button is for pushing
- Complex things may need explanation, but simple things should not

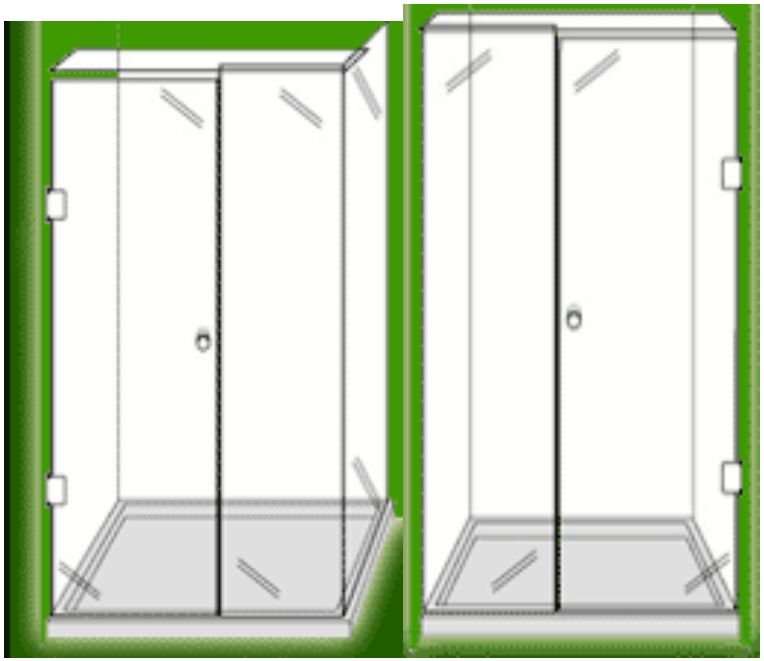
Fun Examples

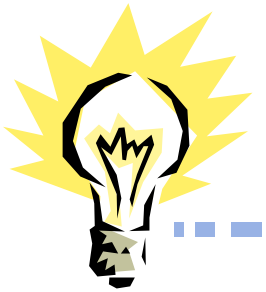
- Leitz slide projector
  - To move forward, short press
  - To move backward, long press
- What happens when you get frustrated?

Fun Examples

Doors

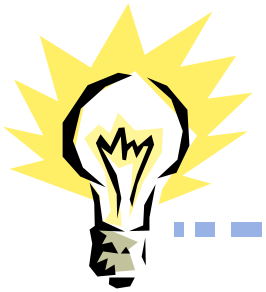






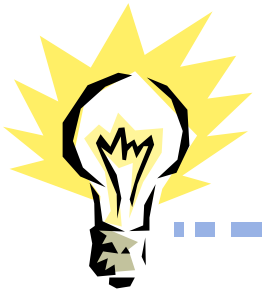
Designing for People

- Norman's 2 main principles
  - Provide a good conceptual model
  - Make things visible



Conceptual Models

- People build their own systems of how things work
  - Example - car
- Designer can help user foster an appropriate conceptual model
  - Appearance, instructions, behavior...

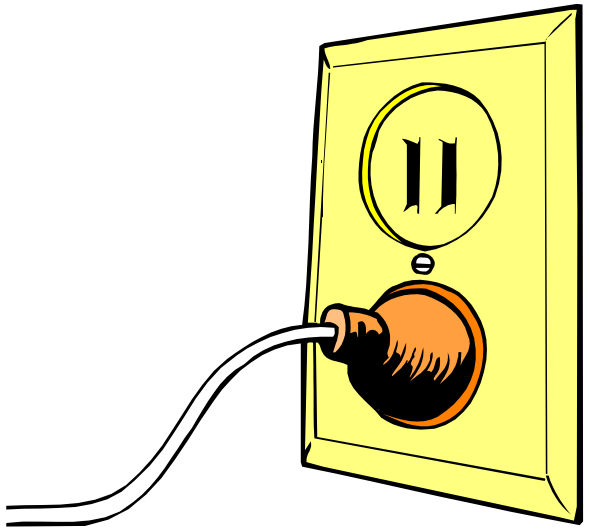


Visibility

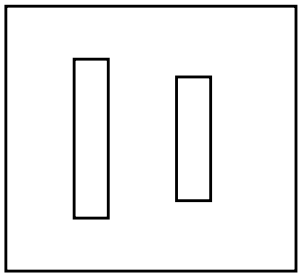
- When functionality is hidden, problems in use occur
  - Occurs when number of functions is greater than number of controls
- When capabilities are visible, it does not require memory of how to use
  - Remind person how to use something

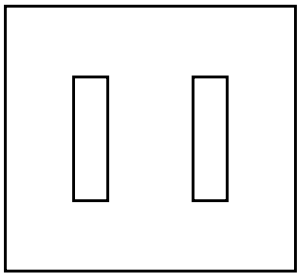
Simple Example

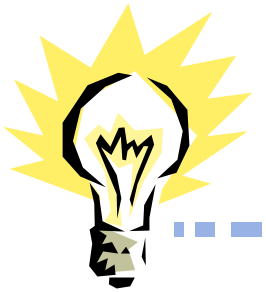
Electric plugs



What if both slots of the receptacle were “big” and you had to remember which side the “small” sid eof the plug went into?







Simple Example

- Bathroom faucets
  - Two functions
    - Hot/cold
    - Pressure

Bathroom Faucets 1

Can you figure out how to use it?

Are two functions clear and independent?

Bathroom Faucets 2

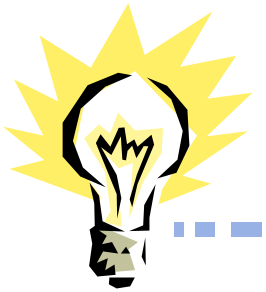
Can you figure out how to use it?

Are two functions clear and independent?

Bathroom Faucets 3

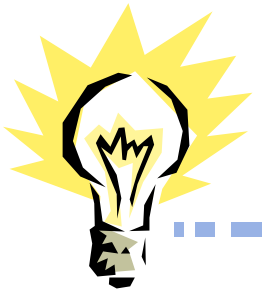
Can you figure out how to use it?

Are two functions clear and independent?



Two Important Principles

- Mapping
- Feedback



Mapping

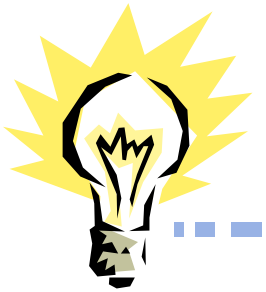
- Relationship between two objects, here, between control and action/result
  - Good:
    - Car, various driving controls
    - Mercedes Benz seat adjustment example
  - Bad
    - Car stereo - Knob for front/back speakers
    - Stoves

Mapping Examples

Money:
Euros vs. US Dollars
Size::value

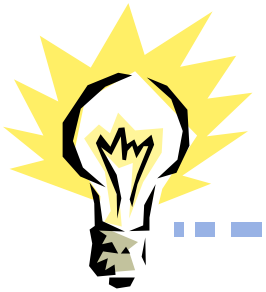
Why Not Design Better?

- Stoves



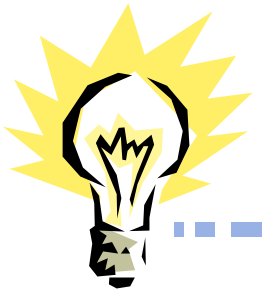
Feedback

- Let someone know what just occurred
  - Can be sound that's made
  - Can be change in physical state



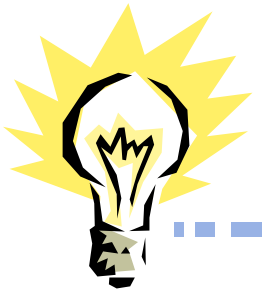
Individual Differences

- For whom do you design?
  - Everyone? Impossible
  - Average? Excluding half audience
  - 95%? Still may miss a lot
- Can't accommodate everyone



Individual Differences

- Designers are not representative of the user population for whom they are designing
- Don't expect users to think or act like you
- People vary in both physical attributes and mental/cognitive attributes



Example

Affordances - Insert something into holes

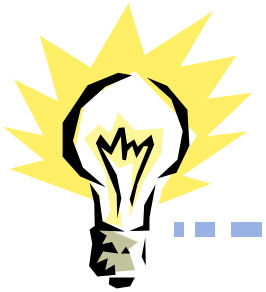
Constraints - Bigger hole for several fingers, small for thumb

Mapping - How to insert fingers into holes suggested by visible appearance

Conceptual model - Suggested by how parts fit together and move

Users - Often for right handed users only

Scissors



Try and Try Again

- Norman thinks that it often takes 5 or 6 tries to get something “right”
- Designer may not have luxury of time in a competitive business environment