Design

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This material has been developed by Georgia Tech HCI faculty, and continues to evolve. Contributors include Gregory Abowd, Al Badre, Jim Foley, Elizabeth Mynatt, Jeff Pierce, Colin Potts, Chris Shaw, John Stasko, and Bruce Walker. Permission is granted to use with acknowledgement for non-profit purposes. Last revision: January 2007.
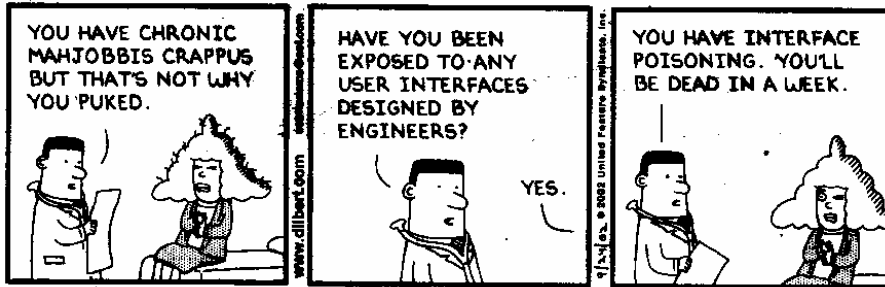

Agenda

- Design challenges

- Idea generation

- Design principles

- Graphic design

Design

Design

- Is it easy?

Difficulties

- Good design can be very challenging

- Why?

Why is Design Difficult?

- 1. Increasing complexity/pressure
  - Number of things to control has risen dramatically
  - Display is increasingly symbolic/artificial
  - Feedback is more complex and subtle
  - Errors are increasingly serious/costly

Norman
revisited

Why Difficult?

- 2. Marketplace pressures
  - Time is money
  - Adding functionality (complexity) is now easy and cheap
  - Adding controls/feedback is expensive
  - Design usually requires several iterations before success

Why Difficult?

- 3. People often consider cost and appearance over human factors design
  - Style over substance
  - Bad design may not be visible

Why Difficult?

- 4. Creativity is challenging
  - Can't just make a copy
  - Want creativity, but want pragmatism

Idea Creation

How do we create and develop new interface ideas and designs?

- Ideas come from
  - Imagination
  - Analogy
  - Observation of current practice
  - Observation of current systems

- Borrow from other fields
  - Animation
  - Theatre
  - Information displays
  - Architecture
  - …

Interface Metaphors

- *Metaphor* - Application of name or descriptive term to another object which is not literally applicable

  - Use: Natural transfer - apply existing knowledge to new, abstract tasks

  - Problem: May introduce incorrect mental model

Idea Creation

- Other methods for creating and developing interface ideas
  - ?

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
- 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

                                    Norman's advice

Design Guidelines/Principles

- General guidelines (advice) to help create more usable systems

&

- Can be subtle, even contradictory

Design Principles

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

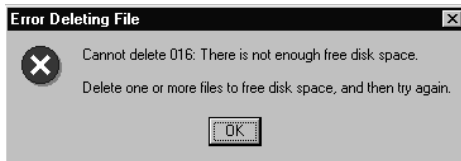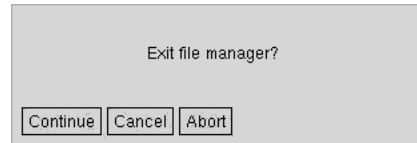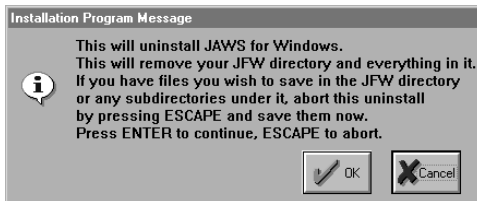| Insufficient funds to withdraw $100 | VS. | X.25 connection discarded due to network congestion. Local limits now in effect |

  - Present exactly info that user needs

  Less is more!

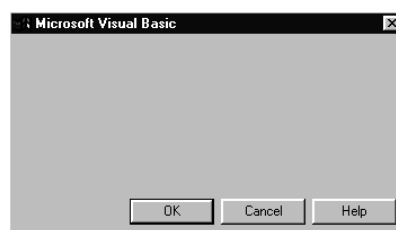 Fewer unnecessary windows, prompts, dialogs

"Fun" Examples

Installation Program Message

This will uninstall JAWS for Windows.
This will remove your JFW directory and everything in it.
If you have files you wish to save in the JFW directory
or any subdirectories under it, abort this uninstall
by pressing ESCAPE and save them now.
Press ENTER to continue, ESCAPE to abort.

[✓ OK] [✗ Cancel]

Exit file manager?

[Continue] [Cancel] [Abort]

Error Deleting File

Cannot delete 016: There is not enough free disk space.

Delete one or more files to free disk space, and then try again.

[OK]

Now click **Finish** to end this setup...

[<< Back] [Next >>] [Finish]

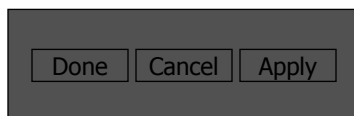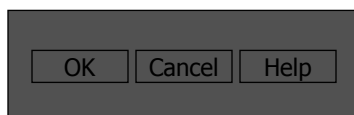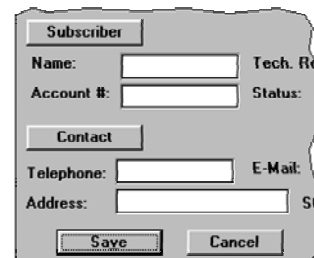
Design Principles

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

Subscriber

Name: ____ Tech. Re
Account #: ____ Status:

Contact

Telephone: ____ E-Mail:
Address: ____ St

[Save] [Cancel]

[OK] [Cancel] [Help]

[Done] [Cancel] [Apply]

Microsoft Visual Basic

[OK] [Cancel] [Help]

Design Principles

- 3. Provide informative feedback
  - Continuously inform user about what is occurring
  - Most important on frequent, substantive actions

Microsoft Data Link — Unexpected Error. Please investigate. OK

Netscape's Hidden Frame — OK

  - 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

  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)

Good & Bad Designs

- www.baddesigns.com
- www.iarchitect.com

Graphic Design

Let's explore the details more...

Who Needs Substance When You've Got Style?

Graphic Design

- The "look & feel" portion of an interface

- What someone initially encounters
  - Conveys an impression, mood

Graphic Design

- It shares aspects of design practices in engineering and CS, but focuses on the cultural, symbolic & affective aspects.

- "useful, usable, desirable"

Graphic Design

- As a practice, it has been around for thousands of years.

Graphic Design

- With the industrial revolution, art and design began to diverge

- Design for mass-production - of printing, of artifacts

Graphic Design

- In the US, graphic design develpoped into a profession after WWII

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Graphic Design

- Relies on a BALANCE and integration of:

objective
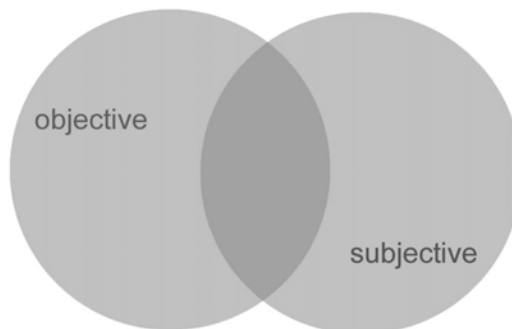
subjective

Graphic Design

- **Objective:** relies on quantitative studies, like usability testing

- Does the "look" <u>work?</u>
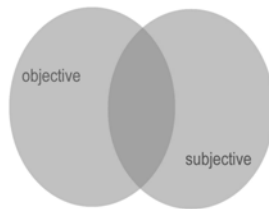
Graphic Design

- **Subjective:** "look" relies on subjective judgement by experts, and depends on <u>contextual</u> factors

- "look" is contextual, based on culture
  - Culture is learned
  - Cultural meanings change
  - There can be multiple meanings

- Uniqueness is valued (not programmable)
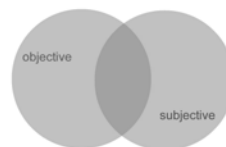
Graphic Design

- You cannot empirically measure the subjective aspects, but there is a discipline to its study

Graphic Design

- Is rigorous in its own realm

1. Graphic Design <u>experts</u>

    vs.

2. Applying graphic design principles
   Our goal in this course

Graphic Design

- **So what?**

- Knowing graphic design principles will:
  - Enhance your ability to communicate w/designers
  - Enable you to create more user-friendly interfaces

Design Philosophies

- My personal preferences:
  - Economy of visual elements
  - Less is more
  - Clean, well organized

Imagery   Color

Sequencing   Layout

Organization   Typography

Graphic Design Principles

- Metaphor

- Clarity

- Consistency

- Alignment

- Proximity

- Contrast

Metaphor

- Tying presentation and visual elements to some familiar relevant items
  - e.g., Desktop 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

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

Opinion?
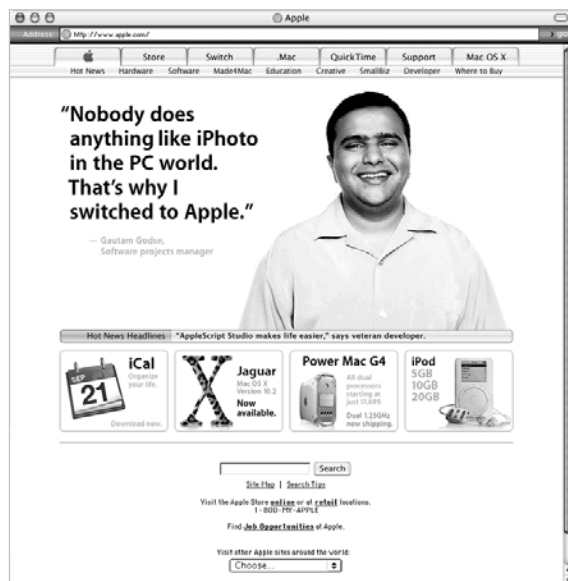
Consistency

- In layout, color, images, icons, typography, text, …

- Within screen, across screens

- Stay within metaphor everywhere

- Platform may have a style guide
  - Follow it!

Example

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

Save Picture

Save in: Desktop

My Computer
Network Neighborhood
My Briefcase
des10
des12
des6

des7
des8
des9

File name: operaopt

Save as type: GIF (*.gif)

Save

Cancel
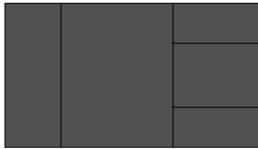
Alignment

- Left, center, or right

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

- Choose one, use it everywhere

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

Proximity

- Items close together appear to have a relationship

- Distance implies no relationship

Time   [　　　　]

Time: [　　　　]

Example

Name [____]

Addr1 [____]

Addr2 [____]

City [____]

State [____]

Phone [____]

Fax [____]

Name [____]

Addr1 [____]
Addr2 [____]
City [____]
State [____]

Phone [____]
Fax [____]

Name [____]

Addr1 [____]
Addr2 [____]
City [____]
State [____]

Phone [____]
Fax [____]

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
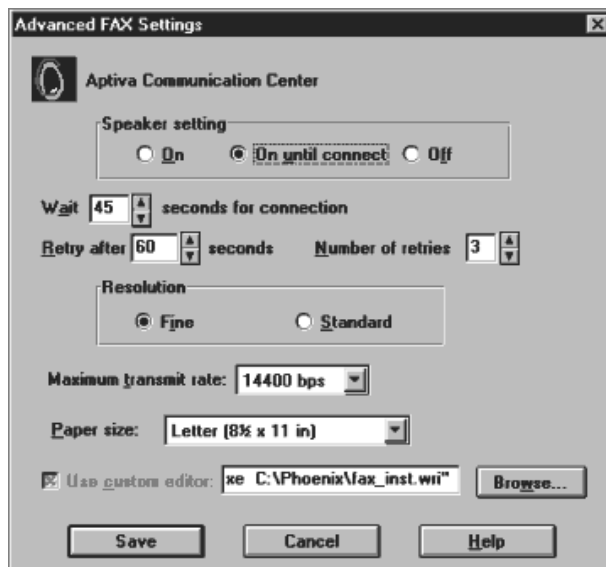

Example

Important element

Old
www.delta.com
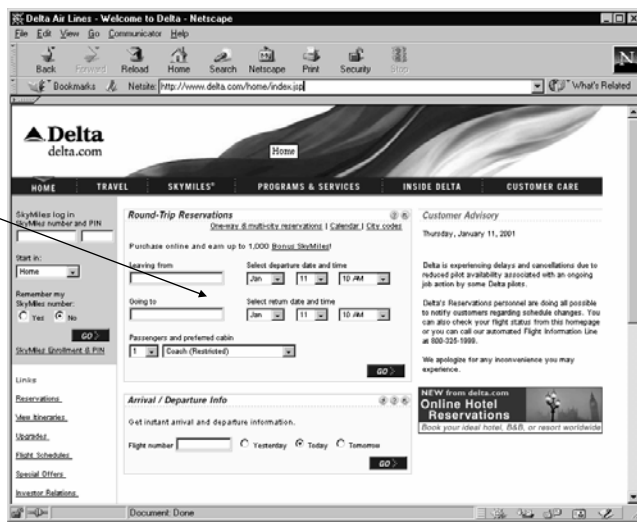
UI Exercise

- 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

Overuse of
3D effects

Economy of Visual Elements

- Less is more

- Minimize borders and heavy outlining, section boundaries (use whitespace)

- Reduce clutter

- Minimize the number of controls

Coding Techniques

- Blinking
  - Good for grabbing attention, but use very sparingly

- Reverse video, bold
  - Good for making something stand out
  - Again, use sparingly

Project Part 1

- Questions?

- Due on Thursday (2 copies, at start of class)

Upcoming

- Continuing graphic design

- Prototyping