Graphic Design and Gestalt Principles

CS160: User Interfaces
Maneesh Agrawala

Keepin' it Real: Pushing the Desktop Metaphor with Physics, Piles and the Pen [Agarawala 06]

VIDEO
Due Soon

Interactive Prototype (due Apr 6)
- Redesign interface based on lofi feedback
- Create \textit{first} working implementation
  - Can include Wizard of Oz parts where \textit{justified}
  - Can include pre-built (canned) functionality \textbf{but only if} \textit{heavily justified}

In class Presentations (Apr 13, 15, 20)
- 10 min slide presentation (be careful about timing)
- Focus on showing prototype
- Feedback from class (you will need to provide feedback on each presentation on the wiki)

Upcoming Lectures

Apr 6: Stephen Few
- Information display

Apr 8: Aaron Marcus
- UI design consultant
- \textbf{Elected to CHI Academy this year}
Talk You Should Attend

Bjoern Hartmann
- HCI faculty candidate
- Works on design, implementation and evaluation of authoring tools for UIs

Mon Apr 13: 1-2:30pm Wozniak Lounge

Lofi Prototype

Graded: Pick up at end of lecture
- Avg 67.13 Stdev: 5.77

Videos great!
- Example: Dashr
  Carol Chen
  Timofey Titov
  David Burban
  Matthew Can

- Some videos lacked context
Topics

- Graphic design
- Simplicity and elegance
- Color
- Gestalt principles
- Grid-based design

Graphic Design
Design is about Communication

Principal organs & vasculature
[Leonardo da Vinci ca. 1490]

Strange immersion of torus in 3-space
[Curtis 92]
Design is about Form and Function

- Form – good designs should be a pleasure to use
- Function – good design supports users’ tasks

Modern Design

Russian constructivism (1920s) was the first big influence. It had two themes:
- Technology
- Human behavior and rhythms
Modern Design

The biggest influence on 20th century design was the Bauhaus School in Germany.

Formed after the collapse of the German monarchy and loss in WWI, it was part of a cultural renaissance in Germany.

The Russian and German movements sought to escape “ornamentation” which linked to their imperial past.

Principles of Modern Design

1. Form follows function
Principles of Modern Design

2. Economy of form - limited vocabulary - minimalism

3. Integrity of materials
   – Use materials’ natural affordances, don’t hide them
Principles of Modern Design

3. Integrity of materials – not just a modern principle

![Shaker Furniture](image1)

![Wood Veneer](image2)

Principles of Modern Design

4. Integrity of structure
   – Show the structure how it supports and shapes the object

![Image of structure](image3)
Principles of Modern Design

4. Integrity of structure

Steal Good Design Ideas

“Good artists borrow (from other artists), but great artists steal!” - Pablo Picasso

Compelling visual design takes practice and experience—a natural part of which is study and critique of other’s work.
Simplicity and Elegance

Simplicity

Simple, minimalist designs are usually the most effective.
**Elegance**

**Reduction:** Only include essential elements

**Regularization:** Use one set of shapes, colors, forms etc.

**Leverage:** Use elements in multiple roles
  - scrollbar allows scrolling and indicates position in document

**Benefit: Approachability**

Visual elements rapidly understood - invite further exploration
Benefit: Recognizability

Less visual clutter makes it easier to recognize what is there

Benefit: Immediacy

Eye is immediately drawn to important visual elements
- Details that remain are more prominent
Unity

One path to simplicity & elegance is through unifying themes:
- Forms, colors, components with like qualities

Refinement

Draw viewers’ attention to essential information
- Straighten subway lines to emphasize sequence of stops
Fitness

Match design to capabilities of technology and user

The Quick Brown Fox Jumps Over The Lazy Dog.

Chicago screen font designed for early low-res Macintosh display
- Thick verticals ensure visibility after applying 50% gray pattern
- Used as default font 1984-1997

Mistakes: Clutter & Noise
Mistakes: Interference

Shortcuts interfere with menu labels in (a) not in (b).
Different shapes cause confusion in alignment tools

Mistakes: Too Much Structure

Bounding boxes in (a) adds unnecessary structural information
Simpler structure in (b) using space rather than lines is better
Mistakes: Belaboring the Obvious

Mistakes: Gratuitous use of 3D
Mistakes: Excessive Embellishment

Minimalists hate it, but sometimes users like embellishments (i.e. Apple’s designs)

Color
Color Spaces

RGB
Additive
Electronic Media

CMY
Subtractive
Printed Media

Parameters of color space driven by technology

Technology-Centered Colors

• Nice RGB Hex codes, “evenly” distributed
• But, lime green and hot pink?
**Perceptual Organization**

- **Lightness**
- **Colorfulness**
- **Hue**

Parameters of color space driven by perception

**Munsell Color Space**

Perceptually uniform book of painted chips

Hue vs. Chroma vs. Value

Munsell Color Utility: www.wallkillcolor.com
Tips for Picking Colors

• Use a small palette (6 color Java look and feel)

• Don’t use all fully saturated colors

• Ensure good color contrast for text

Let Someone Else Pick For You

Imhof, Cartographic Relief Projection
Let Someone Else Pick For You

Binary

Qualitative

Diverging

Sequential

Gestalt Principles
Principles

- figure/ground
- proximity
- similarity
- symmetry
- connectedness
- continuity
- closure
- common fate
- transparency

Figure/Ground

Principle of surroundedness

Principle of relative size

http://www.aber.ac.uk/media/Modules/MC10220/visper06.html
Figure/Ground

Dots that are near one another are grouped
Dots that are concentrated are grouped

Proximity

[from Ware 00]

http://www.aber.ac.uk/media/Modules/MC10220/visper06.html
Elements that are near each other will seem to be related...

<table>
<thead>
<tr>
<th>Dinner</th>
<th>Farm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bison</td>
<td>Calf</td>
</tr>
<tr>
<td>Chicken</td>
<td>Elk</td>
</tr>
<tr>
<td>Salmon</td>
<td>Goat</td>
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Proximity

Think about which elements are logically related – draw a graph if necessary. Then lay them out so that the graph is as untangled as possible.

Use size and typeface to allow scanning for groups.

Proximity

Tuesday, November 4
Election Day
An American Menu $75

Caesar salad with anchovies, egg, and Parmesan cheese
Clam chowder with Maine lobster and pancetta
Grilled chicken with house-made barbeque sauce with potato purée and greens
Apple and raspberry pecan crisp with vanilla ice cream
Similarity

Rows dominate due to similarity [from Ware 04]

Symmetry

Bilateral symmetry gives strong sense of figure [from Ware 04]
**Connectedness**

Connectedness overrules proximity, size, color shape [from Ware 04]

**Continuity**

We prefer smooth not abrupt changes [from Ware 04]

Connections are clearer with smooth contours [from Ware 04]
Continuity: Vector Fields

Prefer field that shows smooth continuous contours [from Ware 04]

Closure

We see a circle behind a rectangle, not a broken circle [from Ware 04]

Illusory contours [from Durand 02]
Common Fate

Dots moving together are grouped

http://coe.sdsu.edu/eet/articles/visualperc1/start.htm

Transparency

Requires continuity and proper color correspondence [from Ware 04]
Grid-Based Design

Grid Systems
**Web Page Layout**

Grids can shape layout without over constraining it
- Grid is not always obvious from page layout
- Produces good repetition of size and shape

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**Alignment**

Every item on a screen has a relationship to the other items. Elements that are almost collinear should be aligned.

Left, right and both-justified alignments create strong boundaries around a piece of text.

It's best to stick with one kind of justification within a page.
Common Mistakes

- Arbitrary component positions and dimensions
- Random window sizes and layouts
- Unrelated icon sizes and imagery
- Poor alignment

Techniques

Reinforce structure through repetition
- Repeat design elements across the layout
- Stylesheets can help
Techniques

Canonical Grid
- Six-column grid with column separators and label templates
- Covers most common grid-based layouts
- Can be implemented with HTML tables

Summary

- Design is about communication, form and function
  - Simplicity and elegance are keys to good design
  - Minimalism constrains you and reduces chances of bad design
- Use a small palette of colors
  - Let others pick them for you (colorbrewer.org)
- Human vision is organized by Gestalt Principles
  - Be aware of these principles as you design the visual look
- Avoid common layout mistakes using grid-based design
Next Time

Visualization