Visual Information Design

Prof. James A. Landay
Computer Science Department
Stanford University

Winter 2022
February 2, 2022

* Based on slides by Luke Vink, Scott Klemmer, and James Landay
### Hall of Fame or Shame?

#### Palm Beach, Florida

**Ballot 2000**

<table>
<thead>
<tr>
<th>Electors for President and Vice President</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Republican</strong></td>
</tr>
<tr>
<td>George W. Bush - President</td>
</tr>
<tr>
<td>Dick Cheney - Vice President</td>
</tr>
<tr>
<td><strong>Democratic</strong></td>
</tr>
<tr>
<td>Al Gore - President</td>
</tr>
<tr>
<td>Joe Lieberman - Vice President</td>
</tr>
<tr>
<td><strong>Libertarian</strong></td>
</tr>
<tr>
<td>Harry Browne - President</td>
</tr>
<tr>
<td>Art Olivier - Vice President</td>
</tr>
<tr>
<td><strong>Green</strong></td>
</tr>
<tr>
<td>Ralph Nader - President</td>
</tr>
<tr>
<td>Winona LaDuke - Vice President</td>
</tr>
<tr>
<td><strong>Socialist Workers</strong></td>
</tr>
<tr>
<td>James Harris - President</td>
</tr>
<tr>
<td>Margaret Trowe - Vice President</td>
</tr>
<tr>
<td><strong>Natural Law</strong></td>
</tr>
<tr>
<td>John Hagelin - President</td>
</tr>
<tr>
<td>Nat Goldhaber - Vice President</td>
</tr>
<tr>
<td><strong>Reform</strong></td>
</tr>
<tr>
<td>Pat Buchanan - President</td>
</tr>
<tr>
<td>Ezola Foster - Vice President</td>
</tr>
<tr>
<td><strong>Socialist</strong></td>
</tr>
<tr>
<td>David McReynolds - President</td>
</tr>
<tr>
<td>Mary Cal Hollis - Vice President</td>
</tr>
<tr>
<td><strong>Constitution</strong></td>
</tr>
<tr>
<td>Howard Phillips - President</td>
</tr>
<tr>
<td>J. Curtis Frazier - Vice President</td>
</tr>
<tr>
<td><strong>Workers World</strong></td>
</tr>
<tr>
<td>Monica Moorehead - President</td>
</tr>
<tr>
<td>Gloria La Riva - Vice President</td>
</tr>
</tbody>
</table>

*Write-in Candidate*

To vote for a write-in candidate, follow the directions on the long stub of your ballot card.
Hall of Shame!

Palm Beach, Florida
Ballot 2000

Eye drawn to the wrong holes

If only 1% error rate, can still change a close election
### One Possible Redesign

<table>
<thead>
<tr>
<th>Party</th>
<th>Candidate</th>
<th>Ticket Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>REPUBLICAN</td>
<td>George W. Bush • President and Dick Cheney • Vice President</td>
<td>3</td>
</tr>
<tr>
<td>DEMOCRATIC</td>
<td>Al Gore • President and Joe Lieberman • Vice President</td>
<td>4</td>
</tr>
<tr>
<td>LIBERTARIAN</td>
<td>Harry Browne • President and Art Olivier • Vice President</td>
<td>5</td>
</tr>
<tr>
<td>GREEN</td>
<td>Ralph Nader • President and Winona La Duke • Vice President</td>
<td>6</td>
</tr>
<tr>
<td>SOCIALIST WORKERS</td>
<td>James Harris • President and Margaret Trove • Vice President</td>
<td>7</td>
</tr>
<tr>
<td>NATURAL LAW</td>
<td>John Hagedin • President and Nat Goldhaber • Vice President</td>
<td>8</td>
</tr>
<tr>
<td>REFORM</td>
<td>Pat Buchanan • President and Ezola Foster • Vice President</td>
<td>9</td>
</tr>
<tr>
<td>SOCIALIST</td>
<td>David McReynolds • President and Mary Cal Hollis • Vice President</td>
<td>10</td>
</tr>
<tr>
<td>CONSTITUTION</td>
<td>Howard Phillips • President and J. Curtis Frazier • Vice President</td>
<td>11</td>
</tr>
<tr>
<td>WORKERS WORLD</td>
<td>Monica Moorehead • President and Gloria La Riva • Vice President</td>
<td>12</td>
</tr>
</tbody>
</table>

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* Based on slides by Luke Vink, Scott Klemmer, and James Landay
Outline

- **Good Form**
  - visual hierarchy, layout, proximity, small multiples & space
- **Team Break**
- **Good Form (cont.)**
  - grids, typography & icons
- **Color**
- “Interesting Design”
- **Intro to Design Patterns & Design Systems**
How well does it work?
How well does it communicate?

Based on David McCandless
http://www.informationisbeautiful.net
The Art of Balance

Promotion & demotion of important objects

First Question for any design

➢ What are the most important things?

Information should be prioritized based on its importance to the user
**Visual Hierarchy and Reading Order**

Weak visual hierarchies provide little or no guidance on what is important.

Strong visual hierarchies guide visual & logical progression by showing what is important.

*Strong visual hierarchies create a sense of order and balance*
Gestalt Principles of Perception Group Information
## Gestalt Principles of Perception

<table>
<thead>
<tr>
<th>Perception Principle</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Proximity</strong></td>
<td>Elements close together</td>
</tr>
<tr>
<td><strong>Similarity</strong></td>
<td>Similarity of shape, size, or color</td>
</tr>
<tr>
<td><strong>Continuation</strong></td>
<td>Aligned along a line or curve</td>
</tr>
<tr>
<td><strong>Closure</strong></td>
<td>Individual elements form a single object</td>
</tr>
</tbody>
</table>
Watch Season 1 Now

He's the biggest hero the world has ever seen. But even Kong will need help to stop this army of high-tech beasts!
The First Read: Reading order pillars

1. size
2. color
3. layout
4. spacing
5. style

source: http://thenextweb.com/dd/2015/04/30/the-5-pillars-of-visual-hierarchy-in-web-design/#gref
Using Proximity to Indicate Relationships

Gestalt Psychology in information design

Information blocks should be grouped together if related, but unrelated elements should be located at some distance from each other.
Using **Proximity** to Indicate Relationships
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Using **Proximity** to Indicate Relationships

*Add color last and only if necessary. Start with position, size, space, & grayscale/luminance.*
Small Multiples

- Economy of line
- **Similarities enable us to notice differences**

Images from Edward Tufte’s *Envisioning Information*
International Women’s Day

SMALL MULTIPLES

Echeverria, Heriberto  1971
March 8 - International Women’s Day

Diaz, Estela  1974
March 8 - International Women’s Day

Revolucion!: Cuban Poster Art by Lincoln Cushing
http://www.amazon.com/Revolucion-Cuban-Poster-Lincoln-Cushing/dp/0811835820
Proximity & Small Multiples in Use

Today Weather
iOS App

<table>
<thead>
<tr>
<th>Time</th>
<th>Temperature</th>
<th>Chance of Rain</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>9am</td>
<td>10%</td>
<td>31°</td>
<td></td>
</tr>
<tr>
<td>10am</td>
<td>10%</td>
<td>34°</td>
<td></td>
</tr>
<tr>
<td>11am</td>
<td>10%</td>
<td>37°</td>
<td></td>
</tr>
<tr>
<td>12pm</td>
<td>10%</td>
<td>37°</td>
<td></td>
</tr>
<tr>
<td>1pm</td>
<td>10%</td>
<td>37°</td>
<td></td>
</tr>
<tr>
<td>2pm</td>
<td>10%</td>
<td>37°</td>
<td></td>
</tr>
<tr>
<td>3pm</td>
<td>10%</td>
<td>36°</td>
<td></td>
</tr>
<tr>
<td>4pm</td>
<td>10%</td>
<td>35°</td>
<td></td>
</tr>
<tr>
<td>5pm</td>
<td>10%</td>
<td>34°</td>
<td></td>
</tr>
<tr>
<td>6pm</td>
<td>10%</td>
<td>31°</td>
<td></td>
</tr>
<tr>
<td>7pm</td>
<td>10%</td>
<td>38°</td>
<td></td>
</tr>
</tbody>
</table>

Winter 2022
dt+UX: Design Thinking for User Experience Design, Prototyping & Evaluation
Proximity & Small Multiples in Use

Today Weather
iOS App

Pittsburgh
30°
feels like 27°

39° / 27°
12am 4am 8am
29° 32° 31°

Updated: 12/21/12, 8:26 PM

Winter 2022
dt+UX: Design Thinking for User Experience Design, Prototyping & Evaluation
Proximity & Small Multiples in Use

Today Weather
iOS App

Pittsburgh
30°
feels like 27°

39° / 27°
100%
3 mph
12am
4am
8am
29°
32°
31°

Sun Mon Tue Wed Thu Fri Sat
10% 10% 40%

Sunday, December 16
9am 10% 31°
10am 10% 34°
11am 10% 37°
12pm 10% 37°
1pm 10% 37°
2pm 10% 37°
3pm 10% 36°
4pm 10% 35°
5pm 10% 34°
6pm 10% 31°
7pm 10% 29°
Using Blank / White Space as an Object

- White space can be used to suggest importance or prestige.
- The more space around a group, the more valuable it should be for the user.
- Think of whitespace as an “element” – consider its position.
A higher plain

White Space = Value
What Are The Important Things Here?
Administrivia

- Grading on Assignment #4 – Concept Video
  - Will report & return tonight (sorry for delay)
- Web site
  - we are starting to look for them – midway check is soon
  - problem getting a web site up, talk to your CA
- Fill out studio team survey in studio this week
- CS 194H
  - follow-on to CS147
  - not offered this Spring (be back next year I hope)
TEAM BREAK
(FINISH LOW-FI PROTOTYPE OR SLIDES)
Jan Tschichold’s Revolution

Champion of Modernist Typography

Die Neue Typographie
Berlin, 1928

Bauhaus school
Dessau, 1925-26
Type Classifications

Typeface (Arial) vs Font (Arial Bold)

**Serifs**: Structural details in letters that (may) help the reader connect them

<table>
<thead>
<tr>
<th>Sans Serif</th>
<th>Serif</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Optima</strong></td>
<td><strong>Fenice Bold</strong></td>
</tr>
<tr>
<td>Roman</td>
<td>answ</td>
</tr>
<tr>
<td>Obliqued</td>
<td>answ</td>
</tr>
<tr>
<td>True italic</td>
<td>answ</td>
</tr>
</tbody>
</table>
Asymmetric Typography
JAN TSCHICHOLOD

How blocks used to be arranged in magazines. Schematic, thoughtless centering of blocks (= ugly).

The same blocks, correctly arranged in the same type-area. Constructive, meaningful, and economical (= beautiful).
Grid Systems

- A key pattern for implementing rationality, modernism, asymmetry
- Note that no elements are “centered”

Java Look and Feel Design Guidelines
Iconography: Differences that Make a Difference

www.jensondesign.com/1+1=3.pdf
Color
Color Definitions (digital)

- **Hue** is gradation of color (i.e., name: “yellow”)
- **Saturation** is purity of the hue (vividness)
  - how much gray
- **Luminance** is the brightness in an image
Color: Edward Tufte – by hue
Color: Edward Tufte – by luminance

IMAGE REMOVED
The Basics of the Color Wheel

WARM

COOL
Color **Harmonies**

“A pleasing arrangement of parts, whether it be music, poetry, color, or an ice cream sundae.”
Using Appropriate Color “Harmonies”

<table>
<thead>
<tr>
<th>Complementary</th>
<th>Analogous</th>
<th>Triad</th>
<th>Split Complementary</th>
<th>Rectangle (Tetradic)</th>
<th>Square</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Complementary" /></td>
<td><img src="image2" alt="Analogous" /></td>
<td><img src="image3" alt="Triad" /></td>
<td><img src="image4" alt="Split Complementary" /></td>
<td><img src="image5" alt="Rectangle (Tetradic)" /></td>
<td><img src="image6" alt="Square" /></td>
</tr>
</tbody>
</table>

Beginners should use these.
This color scheme must be managed well so it is not jarring. Bad with Text!!
Complimentary (e.g., Children’s Bedroom)
Always easy on the eyes, this type of color scheme always looks “natural”
Analogous (e.g., Beyond Oil)
Often a good choice for beginners, because it is difficult to mess up.
Split Complimentary

https://uxplanet.org/how-to-use-a-split-complementary-color-scheme-in-design-a6c3f1e22644
Start with Greyscale

... then accent or enhance with color
Action + Passive Colors
Poor Use of Color

- Beatrice Paddington
  Made it. Proud of it.
  2:34 PM THURSDAY, JUNE 13TH
  Brett & 3 others gave a bump!

- Gerald Von Berr
  2:34 PM THURSDAY, JUNE 13TH
  Nice. Thought we were going to

- Jessica Longname
  Cycling fitness
  3X/wk
  7Wks.
  07:32
  Played card
  5 hour delay

- Don Wilburforce
  Commented
  I'm not sure that I'll make it tonight.

Winter 2022
Redesigned to Use 3 Actionable Colors

plus a text color → 4 total colors
Action/Appears often

Immediate/Important

Special/Appears rarely

Analogous
Tools that help with color selection

http://colorschemedesigner.com/

http://color.adobe.com/

http://www.colourlovers.com

←https://colors.dopely.top/
(new one – I really like it!)
Mood Boards – Team Exercise (10 min)

- Start thinking about what images represent your solution space, and what colors & icons you want to use for medium-fi

- Don’t forget to pick primary and secondary colors!

- Copy this slide deck to your team folder (also posted in Slack)
Exit Ticket
Visual Design that is Interesting

[the wow factor]
Unconventional Layouts

• Hard to get right & easy to overdo!

• Try new shapes
  – circular charts
  – hexagonal objects

• Like all visual design techniques (color, etc) – restrict unconventional layouts to the most important information
Wilfred Castillo: Tide Prediction: http://www.wilfredcastillo.com/Tide-Prediction
Partly Cloudy
iOS App
Weather
(play the weather)
iOS App
Dynamic Movement

• Hard to get right & easy to overdo!

• Animation is best used to connect information & create “flow”

• Like size, color & unusual shapes, animation draws attention to the eye & suggests importance
Metaphors (using the real world to describe info)

• Hard to get right & easy to overdo!

• Very useful to provide meaning and connect information to logic

• The more direct or specific a metaphor, the more contextually relevant it is to a generation or time
GLOBAL EMISSIONS

As the world gets closer to the COP26 Climate Change conference, it's important to look at where the emissions around the world are coming from. This year, some countries have started to clean up their act, while others continue to pump out carbon dioxide.

This is a look at the top 20 highest emitters in terms of the world's carbon dioxide emissions. In 2021, even though they have decreased overall, there are still notable increases in some countries. This chart highlights the top 20 emitters from 2005 to 2021 and their change in the list of biggest emitters.

Metaphors
The best designs **balance** the techniques you have seen

and

The **less** techniques used, the easier it is to balance them
Overwhelming Use of Different Techniques
In other words,

Keep it Focused
Based on David McCandless
http://www.informationisbeautiful.net
Design = Solutions

- Design is about finding solutions
- Unfortunately, designers often reinvent
  - Hard to know *how* things were done before
  - *Why* things were done a certain way
  - *How to reuse* solutions
Design Patterns

Communicate common design problems & solutions

- First used in architecture [Alexander]
Using Design Patterns

• Not too general and not too specific
  - use a solution “a million times over, without ever doing it the same way twice”

• Design patterns are a *shared* language
  - for “building and planning towns, neighborhoods, houses, gardens, & rooms.”
A Web of Design Patterns

(8) Mosaic of Subcultures

(31) Promenade        (33) Night Life

(90) Beer Hall

(95) Building Complex

(179) Alcoves        (181) The Fire
Web Design Patterns

- Also used in UI design
- Communicate design problems & solutions
  - how to create navigation bars for finding relevant content…
  - how to create a shopping cart that supports check out…
  - how to make e-commerce sites where people return & buy…
Problem: Customers need a structured, organized way of finding the most important parts of your Web site.
NAVIGATION BAR (K2)

Solution diagram
- captures essence on how to solve problem

Link to home

First-level navigation

Second-level navigation
Design Systems

• Def. *A collection of repeatable components & standards for using them*
  - style guide or pattern library is often the starting point
  - design system adds the why & how to use them together
  - also includes mood/branding for company/product

• Workshop on Design Systems this Saturday at 1PM
This is our Design system

Primary

Display

https://blog.bitsrc.io/how-we-build-our-design-system-15713a1f1833
Summary

- Start with **context** – what is the nature of the information? What is the most important?
- Design first in grayscale to focus on **hierarchy**
- **Small changes** help us see key differences
  - e.g., small multiples
- Avoid clutter, focus on the essence of your tasks
- Use color properly – **not for ordering!**
- Only use 1-2 colors at a time (beyond background & text color), unless absolutely necessary
Further Reading

- Kevin Mullet and Darrell Sano, *Designing Visual Interfaces*
- Edward Tufte’s books and course
- Robin Williams, *The Non-Designer’s Design Book*
- Typography
  - Jan Tschichold, *The New Typography*
  - Robert Bringhurst, *The Elements of Typographic Style*
- Typography on the web
Next Time

• Mon
  – Designing the Future: Early & Future Visions of HCI
  – Read
    • As We May Think by Vannevar Bush
    • Tools For Thought Ch 9 (Engelbart Demo)
    • Listen to: Of Mice and Men (99% Invisible podcast)

• Studio on Friday
  – present low-fi prototype/user study results – key things learned
  – work on sketching out new designs

• Hybrid Lecture next week if numbers keep dropping