Visual Information Design

Prof. James A. Landay
Computer Science Department
Stanford University

Autumn 2023
October 23, 2023

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

Palm Beach, Florida
Ballot 2000
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>REPUBLICAN</th>
<th>3</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>GEORGE W. BUSH • PRESIDENT</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>DICK CHENEY • VICE PRESIDENT</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>DEMOCRATIC</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>AL GORE • PRESIDENT AND JOE LIEBERMAN • VICE PRESIDENT</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>LIBERTARIAN</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>HARRY BROWNE • PRESIDENT AND ART OLIVIER • VICE PRESIDENT</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>GREEN</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>RALPH NADER • PRESIDENT AND WINONA LA DUKE • VICE PRESIDENT</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>SOCIALIST WORKERS</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>JAMES HARRIS • PRESIDENT AND MARGARET TROWE • VICE PRESIDENT</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>NATURAL LAW</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>JOHN HAGELIN • PRESIDENT AND NAT GOLDBADER • VICE PRESIDENT</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>REFORM</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>PAT BUCHANAN • PRESIDENT AND EZOLA FOSTER • VICE PRESIDENT</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>SOCIALIST</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>DAVID McREYNOLDS • PRESIDENT AND MARY CAL HOLLIS • VICE PRESIDENT</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>CONSTITUTION</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>HOWARD PHILLIPS • PRESIDENT AND J. CURTIS FRAZIER • VICE PRESIDENT</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>WORKERS WORLD</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>MONICA MOOREHEAD • PRESIDENT AND GLORIA LA RIVA • VICE PRESIDENT</td>
<td>12</td>
<td></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.

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William Lidwell, Kritina Holden, and Jill Butler  *Universal Principles of Design*
Visual Information Design

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The Model Human Processor

- **Parameters**
  - processors cycle time (T) \(\sim 100\) ms
  - memories capacity, decay time & type

- **Use MHP to make predictions**
  - min. frame rate (1/100ms)
  - Fitts’ Law for time to hit target

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{sensory buffers}

**Long-term Memory**

**Working Memory**

- Visual Image Store
- Auditory Image Store

**Perceptual Processor**

**Motor Processor**

**Cognitive Processor**

Eyes

Ears

Fingers, etc.
Outline

• Good Form
  – visual hierarchy, layout, proximity, small multiples & space
  – typography, grids & icons
• Team Break
• Color
• Group mood board exercise
• “Interesting Design”
Based on David McCandless
http://www.informationisbeautiful.net

interestingness

integrity

function

form

How well does it work?
How well does it communicate?

relevant
meaningful
new

proof of concept
experiment

truth
consistency
honesty
accuracy

eye candy

beauty
structure
appearance

easiness
usefulness
usability
fit

ugly
boring

useless
rubbish

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

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

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

source: http://52weeksofux.com/post/443828775/visual-hierarchy
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
Using **Proximity** to Indicate Relationships
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

Pittsburgh
30°
feels like 27°

39° / 27°
100%
3 mph

12am
4am
8am

29°
32°
31°

SUN MON TUE WED THU FRI SAT
10% 41° 48° 48° 52° 48°
10% 40% 37° 39° 28° 28°
10% 48° 41° 37° 23° 25° 25°
10% 34° 32° 23° 18° 12° 10%
10% 31° 30° 23° 18° 10° 10%
10% 37° 37° 37° 37° 37° 37°
10% 36° 36° 36° 36° 36° 36°
10% 35° 35° 35° 35° 35° 35°
10% 34° 34° 34° 34° 34° 34°
10% 31° 31° 31° 31° 31° 31°

Sunday, December 16

9am
10am
11am
12pm
1pm
2pm
3pm
4pm
5pm
6pm
7pm

Sunset 4:36pm

Autumn 2023
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°

Sunday, December 16

<table>
<thead>
<tr>
<th>Time</th>
<th>9am</th>
<th>10am</th>
<th>11am</th>
<th>12pm</th>
<th>1pm</th>
<th>2pm</th>
<th>3pm</th>
<th>4pm</th>
<th>5pm</th>
<th>6pm</th>
<th>7pm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weather</td>
<td>☀️ 10%</td>
<td>☀️ 10%</td>
<td>☀️ 10%</td>
<td>☀️ 10%</td>
<td>☀️ 10%</td>
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<td>☀️ 10%</td>
<td>☀️ 10%</td>
<td>☀️ 10%</td>
</tr>
<tr>
<td>Temperature</td>
<td>31°</td>
<td>34°</td>
<td>37°</td>
<td>37°</td>
<td>37°</td>
<td>37°</td>
<td>37°</td>
<td>35°</td>
<td>36°</td>
<td>35°</td>
<td>34°</td>
</tr>
</tbody>
</table>
Proximity & Small Multiples in Use

Today Weather
iOS App
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?
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>
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
Administrivia

- Web site
  - must be on web site by studio next week or grade will be docked
  - problem getting a web site up, talk to your CA now

- CS 194H
  - follow-on to CS147
  - offered this Winter
Assignment Grading Buckets

**Far exceeds expectations**: Reserved for ~ the top 1-3 submissions that can be used as examples in class. This is an A+, often a perfect or > 97% score.

**Fulfills the expectations** in the spec and **some elements exceed expectations**. Strong engagement with the design process. Excellent presentation of the work. This is an A range grade (93 - 97%).

**Fulfills the expectations** in the spec. Students engaged with the design process, though maybe **some small issues remain**. Presentation understandable. This is a B+/A- range grade (88 - 92%).

**Relatively complete, but there are components of unsatisfactory quality**. Presentation may fall short (e.g., poor image resolution, too much text). This is a B range grade (83 - 87%).

**Incomplete or multiple parts are of unsatisfactory quality**. Shows sub-par engagement with the design process. Presentation likely falls short in many ways. This is a C+/B- range grade (78 - 82%).

**Missing substantial assignment components and/or mostly poor quality**. Does not represent engagement with the design process. This is a C range grade or lower (< 78%).
TEAM BREAK
(FINISH LOW-FI PROTOTYPE OR SLIDES)
Color
Color Definitions (digital)

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

1. Anger
2. Art / Creativity
3. Authority
4. Bad Luck
5. Balance
6. Beauty
7. Calm
8. Celebration
9. Children
10. Gold
11. Compassion
12. Courage
13. Cowardice
14. Cruelty
15. Danger
16. Death
17. Decadence
18. Deceit
19. Desire
20. Earthly
21. Energy
22. Erotic
23. Eternity
24. Evil
25. Excitement
26. Family
27. Femininity
28. Fertility
29. Flamboyance
30. Freedom
31. Friendship
32. Fun
33. God
34. Gods
35. Good Luck
36. Gratitude
37. Growth
38. Happiness
39. Healing
40. Healthy
41. Heat
42. Heaven
43. Holiness
44. Illness
45. Insight
46. Intelligence
47. Initiation
48. Religion
49. Jealousy
50. Joy
51. Learning
52. Life
53. Love
54. Loyalty
55. Luxury
56. Marriage
57. Modesty
58. Money
59. Mourning
60. Mystery
61. Nature
62. Passion
63. Peace
64. Perfection
65. Power
66. Personal power
67. Party
68. Radicalism
69. Rational
70. Reliability
71. Repels evil
72. Respect
73. Royalty
74. Self-cultivation
75. Strength
76. Style
77. Success
78. Trouble
79. Truth
80. Trust
81. Unhappiness
82. Virtue
83. Warmth
84. Wisdom
The Basics of the Color Wheel
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 (Tetrad)</th>
<th>Square</th>
</tr>
</thead>
</table>

- **Complementary**
- **Analogous**
- **Triad**
- **Split Complementary**
- **Rectangle (Tetrad)**
- **Square**
This color scheme must be managed well so it is not jarring. Bad with Text!!

Christmas...maybe Everyday use...

Not so much!
Complimentary (e.g., Children’s Bedroom)
Analogous

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

split-complementary
Monochromatic or Grayscale
Start with Greyscale

... then *accent* or *enhance* with color
Poor Use of Color

CYCLE MORE

Beatrice Paddington
Made it. Proud it.

Phew! I wasn’t sure I’d make it today but since I’m amazing, I did.
2:34 PM, Thursday, June 13th

Brett & 3 others gave a bump!

Ewald Von Berl
2:34 PM Thursday,

Nice. Thought we were going to

Jessica Longname

TIME LEFT TODAY
07:32

3x'wk
7 wks.

PLAYED CARD

5 HOURS DELAY

LEFT FOR THIS WK
3 Days Off

Don Wilburforce

I'm not sure that I'll make it tonight.
Redesigned to Use 3 Actionable Colors
Tools that help with color selection

https://coolors.co/

http://color.adobe.com/

http://www.colourlovers.com

https://paletton.com/
Mood Boards

I am not what happened to me.
I am what I choose to become.
Mood Boards

LOREM IPSUM
DOLOR SIT AMET

AN EST NIBH ILLUM
CONCLUDATURQUE
Mood Boards – Team Exercise (10 min)

• Before starting your mood board, think of 3-5 adjectives giving vibe you’d like your solution to convey to users (write them down)
• From those adjectives, have each team member search online for images to convey that tone & compile them all onto a team slide
• From the images, choose the primary & secondary colors you want to use for your medium-fi

• Copy this slide deck to your team folder
Exit Ticket
Visual Design that is **Interesting**

[the wow factor]
Non Conventional Layouts

• Hard to get right & easy to overdo!

• Try new shapes
  – circular charts
  – hexagonal objects

• Like all techniques (color, etc) – restrict unconventional layouts to the most important information
Wilfred Castillo: Tide Prediction: http://www.wilfredcastillo.com/Tide-Prediction
Dynamic Movement / Animation

- 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. Some countries have started to clean up their act, while other countries continue to pump out carbon emissions.

This is a look at the four highest emitters in each region of the world as of 2023 and whether they have increased or decreased their total emissions in the years 2006 to 2023 (total change on the list of biggest emitters).

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

- **Wed**
  - CS 147 Film Festival
    - Come watch the best videos & vote on prizes
- **Studio on Friday**
  - present low-fi prototype/user study results – *key things learned*
  - work on sketching out new designs
- **Mon**
  - Conceptual Models & Interface Metaphors
  - Read
    - “The Psychology of Everyday Things" (Ch 1) from The Design of Everyday Things by Donald Norman