Visual Design
SWE 632
Fall 2023

With at least 30 new things you won't believe!
Administrivia

• HW6 due on 11/14
Class Overview

1. *Overview of Visual Design*: What it is and Why it Matters


3. *Scale, Contrast, & Proportion*: Formatting Matters

4. *Organization & Structure*: Information Conveyance

5. *Images & Icons*: Getting the Right Picture Across

6. *Design Languages*: Unifying your Design
Overview of Visual Design
Elements of Visual Design
Visual Design

• Solving **communications problems** in ways that are both functionally effective and aesthetically pleasing.

• Creating a visual language containing a vocabulary of design elements characterized by
  • Visual variables—shape, size, position, orientation, color, texture, …
  • Organizational relations between elements—balance, structure, proportion, …
  • Visual syntax—rules for assembling elements w/in design language
Visual Design as Communication

• Goal: **efficiently** & **accurately** transmit information from system to user

• Visual variables & organization encode information
Goals for Visual Design

- Successfully *transmit* information
- Present coherent & consistent design that reduces ambiguity and potential confusion
- Reduce visual *search* time through layout & organization
- Create desired *emotional* reactions through aesthetic choices
General Guidelines for Visual Design
Elegance & Simplicity

- **Elegance**—derives from Latin eligere, to “select carefully”

- **Judicious** selection of elements and economy of expression revealing an intimate understanding of problem

- Removing & combining superfluous elements until only the necessary remains
Benefits of Simplicity

• **Approachability** - rapidly understood affordances, allowing glanceable understanding of possible interactions

• **Immediacy** - greater emotional impact because interactions can be quickly understood
Reducing a Design to its Essence

• Make design simple, bold, and direct by removing inessential details & elements
  • Even essential elements may be suggested

1. Determine essential qualities & information to be conveyed

2. Critically examine each element & ask how design would suffer without it.

3. Try removing elements. What happens?
Trade-offs in Simplicity

OSX c.2010

OSX c.2011

OSX c.2016

OSX c.2021
Guidelines for Visual Design

Reduction in new map: relative distances don’t matter
Regularizing the Elements of a Design

• Reduce information by repeating elements according to a rule, principle or rhythm

• Enable user to scan ahead

• Use irregularity where needed to clarify that something is irregular!

  1. Use *regular* geometric forms, simplified controls, muted colors where possible

  2. If multiple similar forms required, make them *identical* as much as possible in size, shape, color, texture, spacing, alignment

  3. *Limit variation* in typography to a few sizes

  4. Make sure critical elements intended to stand out are *not* regularized
Guidelines for Visual Design

Regularization in new map: Straight lines result in station names laid out in a line, rather than bouncing around
Error - Excessive Skeuomorphism

- Skeuomorphism - making visual design resemble reality (like metaphors)
- Excessive skeuomorphism is distracting and wastes potential visual bandwidth that could encode meaningful information
- Trend towards "flat" interfaces
July 2013

Wednesday, July 3

Ted Faszer’s Birthday all-day

Mike Yutzy’s Birthday all-day

Thursday, July 4

Cherie Yvette’s Birthday all-day

Monday, July 15

Allie Johnson’s Birthday all-day

Dr Stoll from 8:45 AM to 9:45 AM

Thursday, July 18

Richard Gintowt’s Birthday all-day

Monday, July 22

Jacks birthday from 11 AM to Noon

Monday, July 22

Alisha Campbell’s Birthday all-day

Saturday, July 27

Ted Faszer’s Birthday all-day
Scale, Contrast, & Proportion
Scale, Contrast, & Proportion

Information consists of differences that make a difference. (Edward Tufte, Envisioning Information)

Individual visual variables of design that encode information
Terminology

• Scale - *relative* size or magnitude of element in comparison to related elements

• Contrast - visually noticeable *distinctions* along a common visual dimension

• Proportion - ratio and *balance* between elements

• Emphasis - contrasts can emphasize important elements or areas & add visual *interest* by creating tension & drama
Principles

- **Clarity** - contrasts should be clear and easily differentiated, not slight and subtle
- **Harmony** - proportions and ratios should be harmonious
- **Activity** - use contrasts to maintain orientation & context within design
- **Restraint** - contrasts should be conscious, strong, few in number, and never overwhelming
Error - Excessive Typographic Contrasts

5 different types sizes in 3 different fonts (!!)
Layers

- Contrasting color, value, texture can segregate information into separate layers

- Supports *overlapping* information in displays, allowing selective processing of specific sets of elements

- Allows different layers to be read and interpreted *separately*
Creating Layers

1. Group items into categories based on intended use
2. Determine rank & importance of groups
3. Use perceptual variables (size, value, hue, etc.) to establish layering effect
4. Maximize differences between groups while minimizing differences within groups
5. Use squint test to ensure elements in group retain together but visually separated
Organization & Structure
Organization & Structure

• Organization needs to be designed

• Benefits
  • Unity - ties together related elements so that they work together
  • Integrity & readability - offers structure that helps user to easily scan & make comparisons
  • Control - determines where user will focus attention in the design
• Gestalt -> psychology of perception
Gestalt Principle - Proximity

• Elements associated *most* strongly w/ nearby elements

parsed as 4 columns based on close vertical spacing
then parsed as two sets of two columns based on spacing
Gestalt Principle - Similarity

- Elements associated more strongly when share common visual attributes than when they differ

parsed as rows based on fill similarity, despite closer column spacing
Gestalt Principle - Continuity

- Preference for *simplest* physical explanation of complex figure

parsed as two lines, rather than 4 separate lines or 4 opposing angles
Gestalt Principle - Closure

- Preference to interpret figures as complete, even when missing information

Parsed as triangle superimposed on 3 complete circles, even though none of these is actually present.
Gestalt Principle - Area

- Preference to interpret smaller overlapping elements as figure, larger as ground

Small rectangle parsed as small rectangle on top of larger, rather than hole
Gestalt Principle - Symmetry

- Preference to interpret ambiguous form as multiple symmetric elements

Parsed as two overlapping objects rather than 3 separate shapes
Grouping

- Binding UI elements tightly together while distinguishing them from surrounding controls
- “Showing” not “telling”
- Can be achieved through
  - Bounding boxes (not recommended)
  - Negative space & contrasts
  - Arrangement & alignment
Use Fewer Borders

- box shadows
- negative space
- different backgrounds

https://medium.com/refactoring-ui/7-practical-tips-for-cheating-at-design-40c736799886
Hierarchy

Order groups based on perceptual prominence corresponding to intended reading sequence

Can help solve “skimming” problems

Structure can help people focus attention on key parts

Key points might get lost though.

But bolding helps! Plus this obnoxious red arrow and text in a totally different font!
Hierarchy in UIs
Use Negative Space

- Directs **attention** to critical regions of display

1. Review design, prioritizing groups

2. Add extra **space** to ensure spatial separation & emphasis, particularly for important elements
Creating Hierarchy: Color and Weight Instead of Size

---

[Image: Two examples of how to create hierarchy using color and weight instead of size.]
## Signal Importance of Action

<table>
<thead>
<tr>
<th>PRIMARY</th>
<th>SECONDARY</th>
<th>TERTIARY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Save Draft</td>
<td>Save Draft</td>
<td>Save Draft</td>
</tr>
<tr>
<td>Sign up</td>
<td>Sign up</td>
<td>Sign up</td>
</tr>
<tr>
<td>Learn More</td>
<td>Learn More</td>
<td>Learn More</td>
</tr>
</tbody>
</table>

https://medium.com/refactoring-ui/7-practical-tips-for-cheating-at-design-40c736799886
Images & Icons
Images & Icons

• Benefits
  • Identification - images are easy to recognize
  • Expression - breadth of artistic expression that can make design more engaging & enjoyable
Types of Iconic Representation

- **Similar** - visually *analogous* to action, object, concept
- **Example** - things that exemplify or are commonly associated
- **Symbolic** - represent concept at higher level of *abstraction*
- **Arbitrary** - little or no relationship to concept, must be learned through *standard*
Use of Abstraction

- Simplifying highly concrete, realistic representations makes them easier to interpret up to the point at which further abstraction obscures icon’s semantics

- Makes icon more generic, more canonical, less complex
Principles of Icon Design

• Immediacy - can be perceived effortlessly & involuntarily by being **bold**, clear, balanced

• Generality - represents a **class** of items, rather than an individual element, by removing details that may vary

• Cohesiveness - set of icons that function **together** by sharing visual variables

• Characterization - call to mind one or more **distinctive** features
Selecting the Right Type of Icon

- If concept is concrete, familiar, tangible, use similar or example icon
- If concept will be used repeatedly, consider using more symbolic or arbitrary icon based on convention
- If concept is abstract process or subtle, use textual label
Activity: OS 10.2 Preferences Icons

Best 3, worst 3 and why? Then: How to make worst 3 better?
Activity: OS 10.15 Preferences Icons
Design Languages
Design Languages

• Many, *many* choices about visual variables and syntax of composition
  • How do you ensure choices are made consistently across web app?
• Solution: design language
  • Describes how to express ideas and concepts in the interface
  • May be communicated through Human Interface Guideline documentation
• (Example of consistency and standards)
Example: Elements, Google 2004
Example: Syntax, Google 2004
Examples: Google 2016

Top 10 Australian beaches

Number 10
Whitehaven Beach
Whitsunday Island, Whitsunday Islands

NORMAL

PRESSED
Examples: Google 2016
Examples: IBM
Examples: IBM

![Graph showing system metrics]

- **Domain**: Streams1
- **Instances**: 4
- **Jobs**: 96
- **Hosts**: 7945
- **PEs**: 5671
- **Operators**: 5671
- **Streams**: 10000+

**Alerts**:
- PE 157 failed
- Service SWS failed
- Host streams8.sv.ibm.com failed
- Stream connection broken
- Stream "Wattage filtered" congested
- Host streams8.sv.ibm.com overloaded
- Stream "Wattage filtered" congested
- Host streams8.sv.ibm.com overloaded
- Stream "Wattage filtered" low on memory
- Host streams8.sv.ibm.com overloaded

**Streams**:
- Wattage
- SG Filter
- Zero usage
- Cust high val
- KHz
- Time sequence
- NE region usage
- SE region usage
- SW region usage
- Sensors

**Operators**

**Jobs**
- Height CPU
- Width CPU
- Color Health

**Hosts**

![Bar chart showing host usage]
### Examples: IBM

**Application data**

<table>
<thead>
<tr>
<th>Title</th>
<th>Value</th>
<th>Date</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Imperial</td>
<td>true</td>
<td>9 456 234</td>
<td>21. Feb 2014</td>
</tr>
<tr>
<td>Hard</td>
<td>false</td>
<td>987 345</td>
<td>21. Feb 2014</td>
</tr>
<tr>
<td>Cider</td>
<td>false</td>
<td>43 567</td>
<td>21. Feb 2014</td>
</tr>
<tr>
<td>Anaerobic</td>
<td>true</td>
<td>324 543</td>
<td>21. Feb 2014</td>
</tr>
<tr>
<td>Cold filter</td>
<td>false</td>
<td>432 456</td>
<td>20. Feb 2014</td>
</tr>
<tr>
<td>Barrel hand</td>
<td>true</td>
<td>32 432</td>
<td>20. Feb 2014</td>
</tr>
<tr>
<td>Pump wort</td>
<td>true</td>
<td>4 567</td>
<td>20. Feb 2014</td>
</tr>
<tr>
<td>Dry hopping</td>
<td>false</td>
<td>34 567</td>
<td>20. Feb 2014</td>
</tr>
<tr>
<td>Carbonation</td>
<td>true</td>
<td>434 567</td>
<td>20. Feb 2014</td>
</tr>
<tr>
<td>Mash tun</td>
<td>false</td>
<td>9 456 234</td>
<td>20. Feb 2014</td>
</tr>
<tr>
<td>Bittering hops</td>
<td>true</td>
<td>987 345</td>
<td>20. Feb 2014</td>
</tr>
<tr>
<td>Heat exchanger</td>
<td>false</td>
<td>43 567</td>
<td>19. Feb 2014</td>
</tr>
<tr>
<td>Lauter aerobic</td>
<td>false</td>
<td>324 543</td>
<td>19. Feb 2014</td>
</tr>
<tr>
<td>Abbey seidel</td>
<td>true</td>
<td>432 456</td>
<td>19. Feb 2014</td>
</tr>
<tr>
<td>Brewhouse</td>
<td>false</td>
<td>32 432</td>
<td>19. Feb 2014</td>
</tr>
<tr>
<td>Brewpub adjunct</td>
<td>true</td>
<td>4 567</td>
<td>19. Feb 2014</td>
</tr>
<tr>
<td>Dextrin seidel</td>
<td>true</td>
<td>34 567</td>
<td>19. Feb 2014</td>
</tr>
<tr>
<td>Aau beer</td>
<td>false</td>
<td>434 567</td>
<td>19. Feb 2014</td>
</tr>
<tr>
<td>Krug abv</td>
<td>true</td>
<td>434</td>
<td>19. Feb 2014</td>
</tr>
</tbody>
</table>
Examples: AirBnb
Examples: AirBnb
Examples: Microsoft
Examples: Microsoft
Example: Header with text blocks layout

http://ranjithakumar.net/resources/webzeitgeist.pdf
Position Encodes Meaning and Function

http://ranjithakumar.net/resources/webzeitgeist.pdf
Web Design Languages Over Time

https://blog.hubspot.com/marketing/look-back-20-years-website-design#sm.00000ip14jejk1d51u53crk6cwrms
Web Design Languages Over Time
Web Design Languages Over Time
Web Design Languages Over Time
Web Design Languages Over Time
Common Visual Idioms, Circa 2016

• Hero images: large attractive header image

https://envato.com/blog/exploring-hero-image-trend-web-design/
Common visual idioms, circa 2016

- Rotating image galleries (carousels)

https://envato.com/blog/exploring-hero-image-trend-web-design/
Why it Matters

• Users will have idioms they expect to see, particularly if suggested by other related elements

• Branding: Users will see your website and have particular associations based on what it exemplifies
Goals in Designing a Design Language

• Offer guidance and options on
  • Colors: examples of color palettes
  • Typography: justification, sizes, fonts, different heading levels
  • Organization

• Support different resolutions, devices
• Support universal design
  • Visually impaired, color blind users
In-Class Activity
Activity: Design a Design Language

• In groups of 2 or 3, brainstorm an idea for a new company, and then design a Design Language for the new company.

• Your design language should include at least 10 types of elements. For each type of element you should:
  • (1) To identify each category of element, describe (1.1) what is its purpose (e.g., marque image caption, detail text, footer detail text), (1.2) in what situations might it be used
  • (2) Define a style, describing its visual characteristics.

• Deliverables
  • Brief description of company
  • Description of design language with at least 10 types of elements
  • Brief description of how design language helps establish and communicate the brand of the company
  • Due at 7:10pm
Activity: Design a Design Language

• Some example visual design guidelines from well-known companies:
  • https://developer.apple.com/design/human-interface-guidelines
  • https://m3.material.io
  • https://docs.microsoft.com/en-us/windows/uwp/design/