

SWE 432 -Web Application Development

Fall 2022



George Mason
University

Dr. Kevin Moran

Week 13: Visual Design





Administrivia

- HW Assignment 4 - Due Soon!
- HW Assignment 5 - Out now, Due on December 1st!



Class Overview

- Visual Design
 - Quick Lecture
 - Creating a Design Language (if we have time)

Overview of Visual Design





Elements of Visual Design

label

label

label

label

label

label

label

label

label

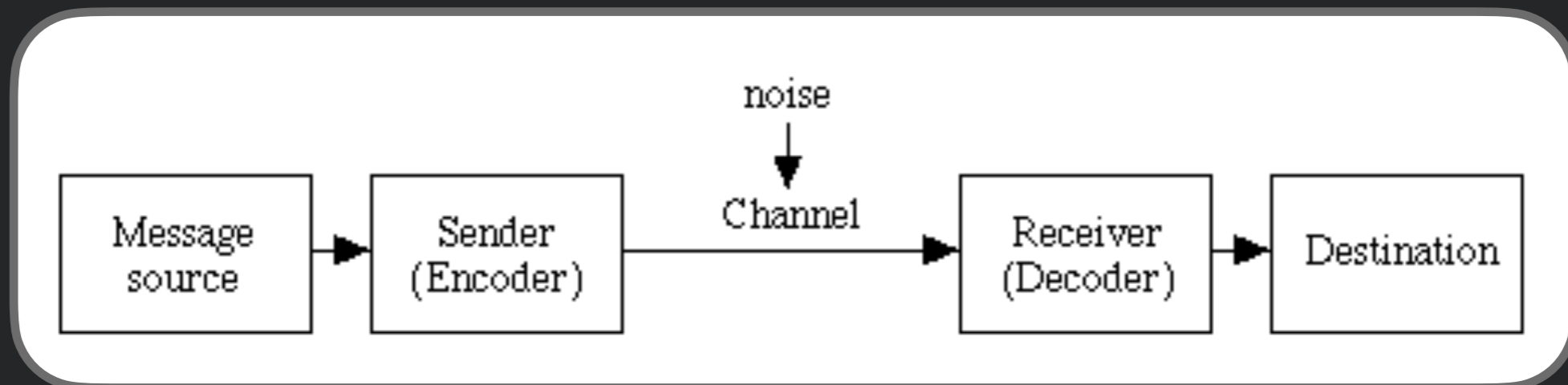


Visual Design

- 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



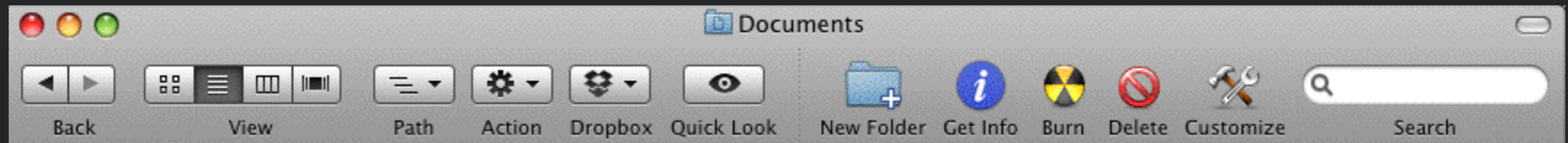
Marc Berthier. Tykho Radio. 1997. Synthetic rubber and other materials, 5 1/2 x 5 1/2 x 1 5/8" (14 x 14 x 4.1 cm). Manufactured by Lexon, France. The Museum of Modern Art, New York. Gift of the manufacturer.

Reducing a Design to its Essence

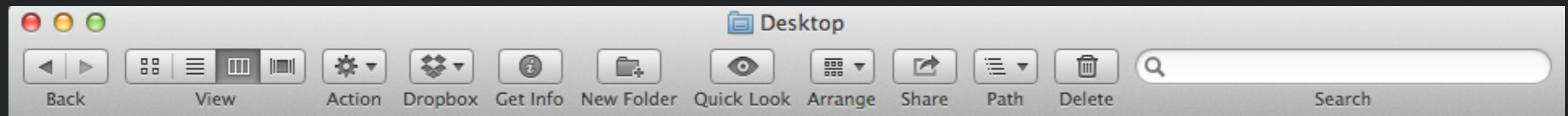


- Make design simple, bold, and direct by removing inessential details & elements
 - Even essential elements may be suggested
1. *Determine essential qualities & information to be conveyed*
 2. *Critically examine each element & ask how design would suffer without it.*
 3. *Try removing elements. What happens?*

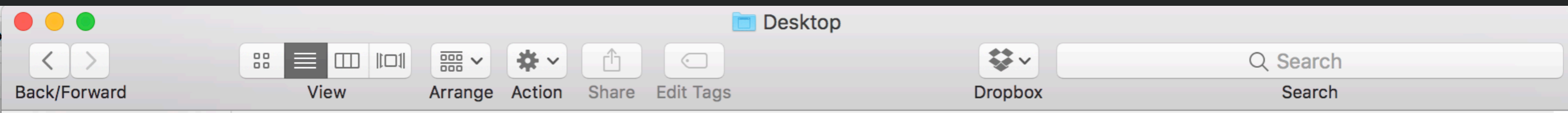
Trade-offs in Simplicity



OSX c.2010



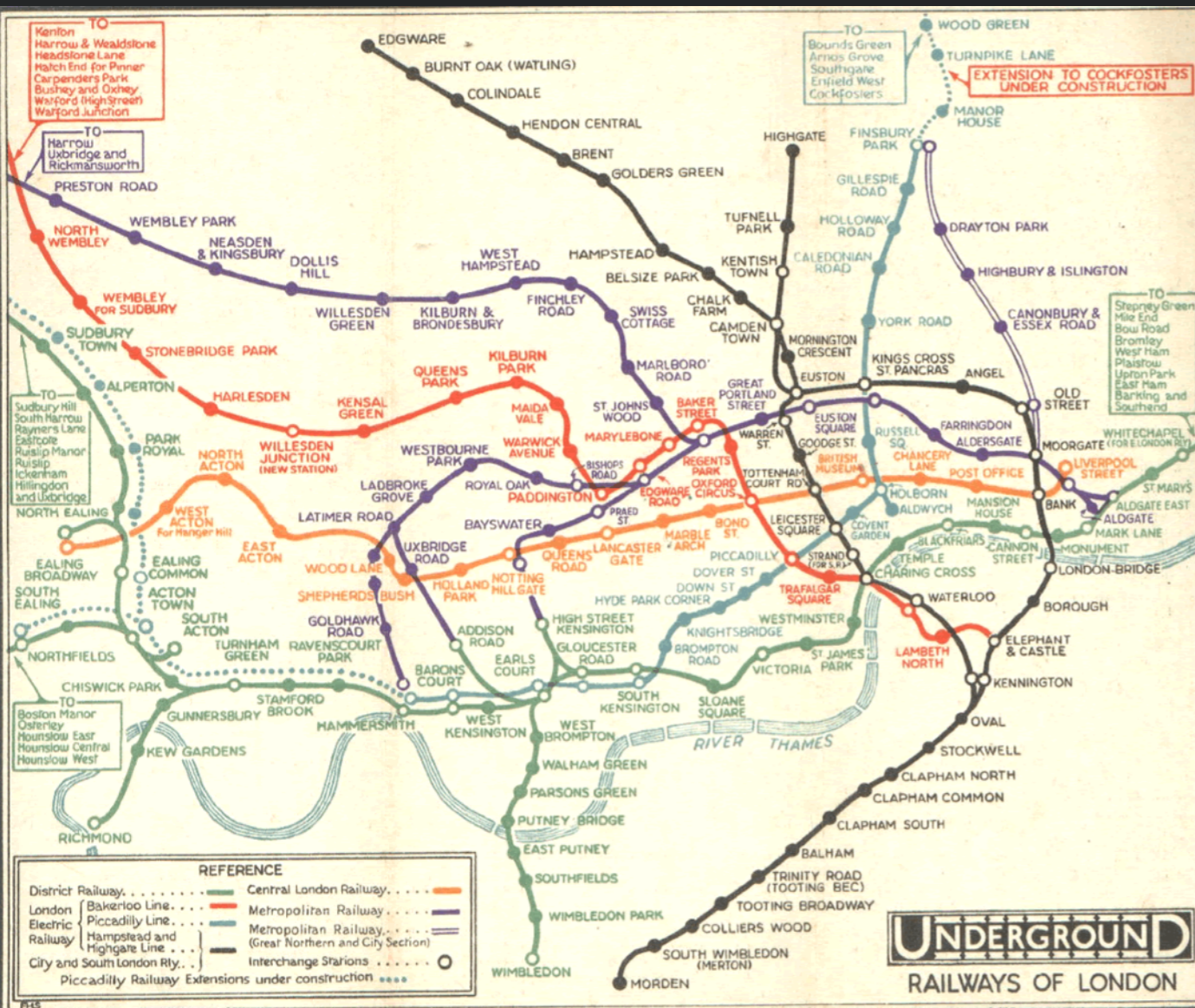
OSX c.2011



OSX c.2016



Guidelines for Visual Design



Reduction in new map: relative distances don't matter

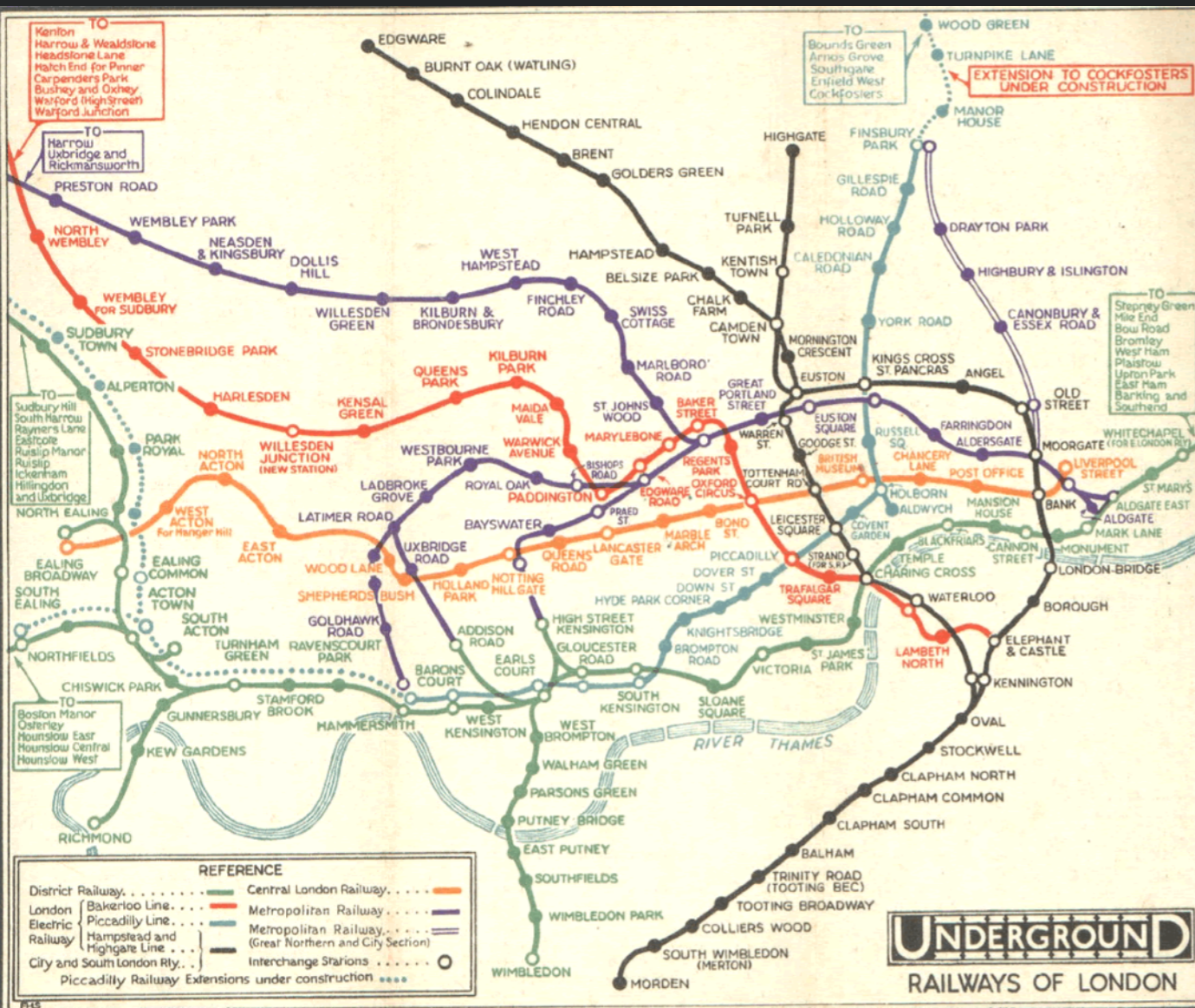


Regularizing the Elements of a Design

- 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



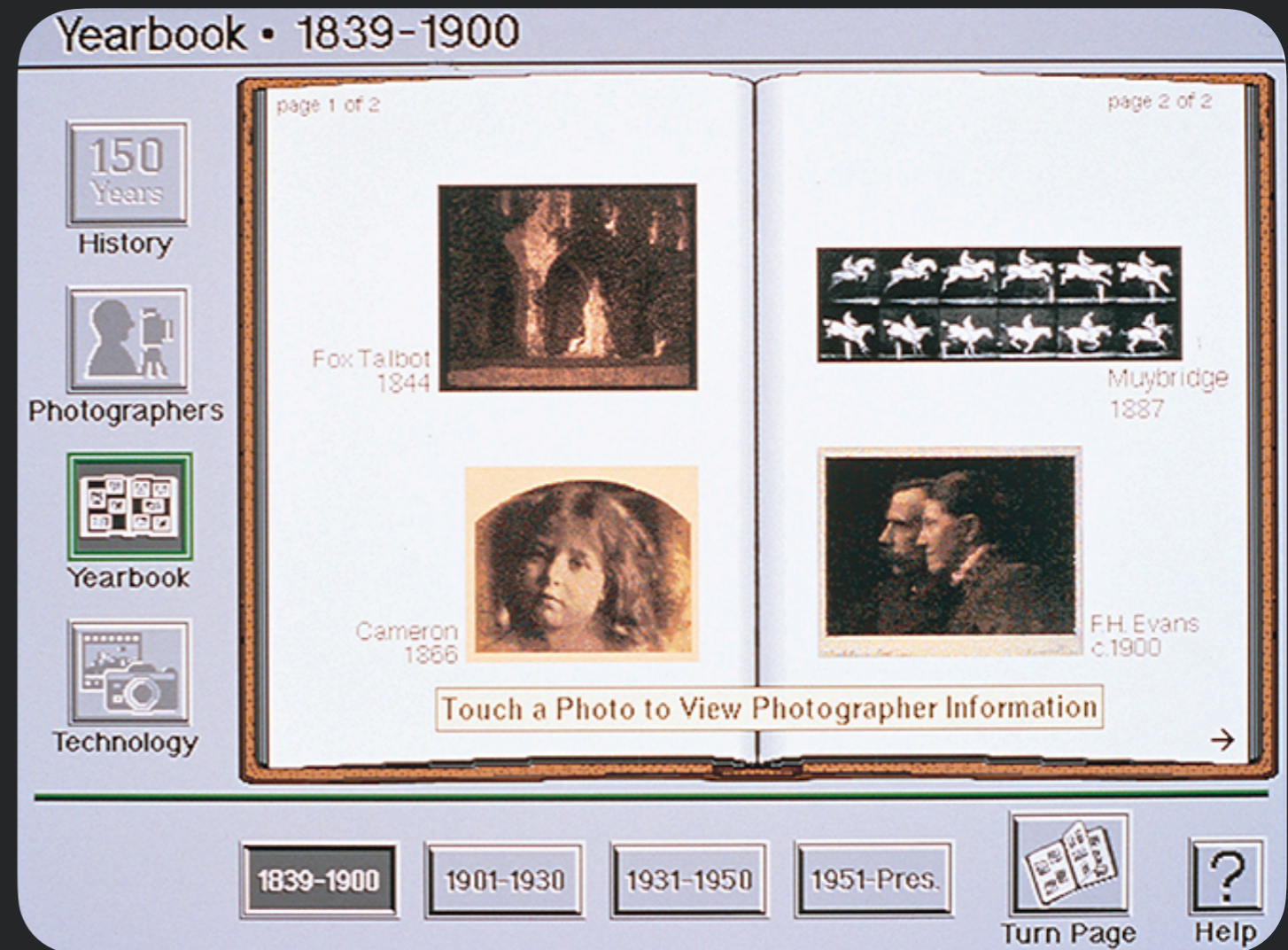
Guidelines for Visual Design



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



Calendars

Invitations (0)

Day

Week

Month

Year

List

Search

July 2013

Wednesday July 3

Ted Faszzer'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 8:45 AM to 9:45 AM

Thursday July 18

Richard Gintowt's Birthday all-day

Jacks birthday 11 AM to Noon

Monday July 22

Alisha Campbell's Birthday all-day

Saturday July 27

Ted Faszzer's Birthday

Details

Wednesday, July 3, 2013

all-day events

Mike Yutzy's Birthday

Ted Faszzer's Birthday

2 PM

3 PM

4 PM

5 PM

6 PM

7 PM

8 PM

9 PM

Today

Jun Jul 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 Aug

+

November 2016

Day
Week
Month
Year



Sun	Mon	Tue	Wed	Thu	Fri	Sat
	<ul style="list-style-type: none"> SWE 432 	Noon				
20	<ul style="list-style-type: none"> SWE meeting 	21 11 AM <ul style="list-style-type: none"> Office Hours SWE 432 	22 10:30 AM Noon	23 <ul style="list-style-type: none"> SWE 432 	24 Noon	25
27		28 <ul style="list-style-type: none"> Office Hours SWE 432 	29 10:30 AM Noon	30		
				Dec 1 Noon <ul style="list-style-type: none"> SWE 432 	2	3
4	5	<ul style="list-style-type: none"> Office Hours SWE 432 	6 10:30 AM Noon	7	8 Noon <ul style="list-style-type: none"> SWE 432 	9
11	12	<ul style="list-style-type: none"> Office Hours 	13 10:30 AM	14	15	16
						17

Scale, Contrast, & Proportion



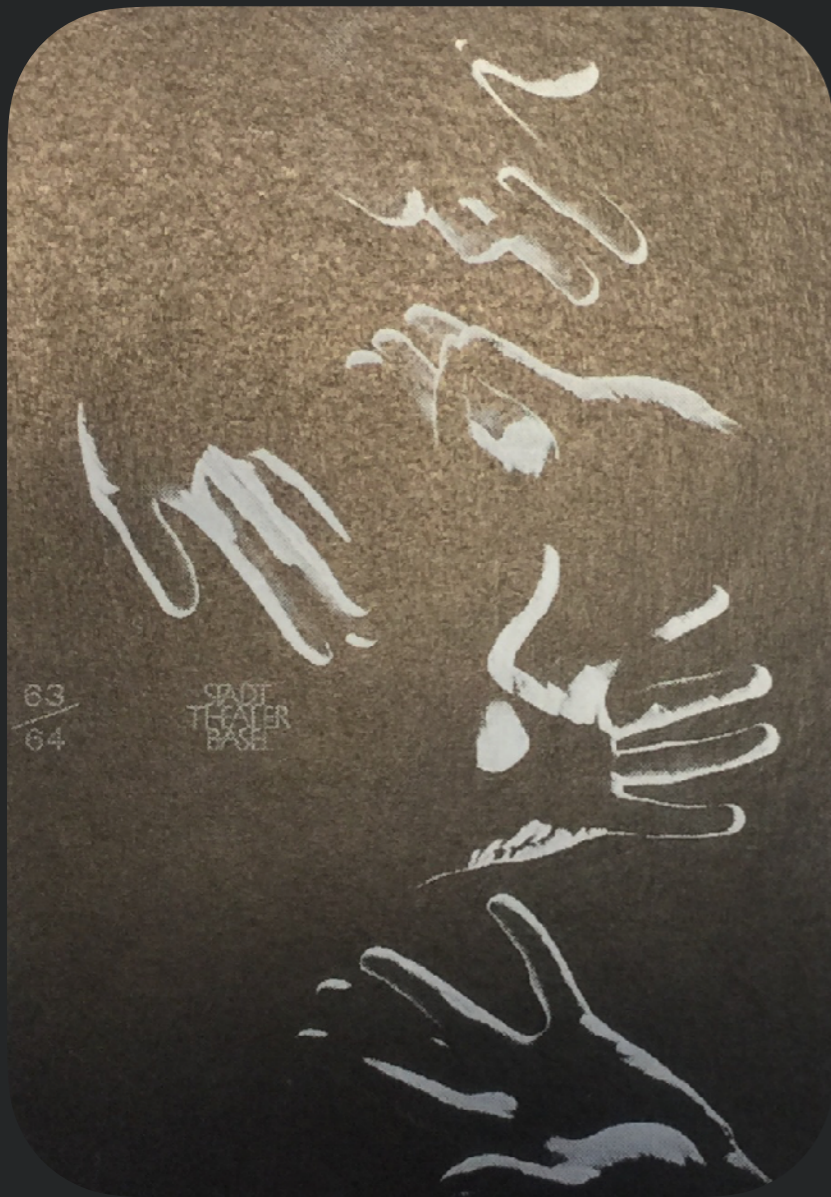


Scale, Contrast, & Proportion

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

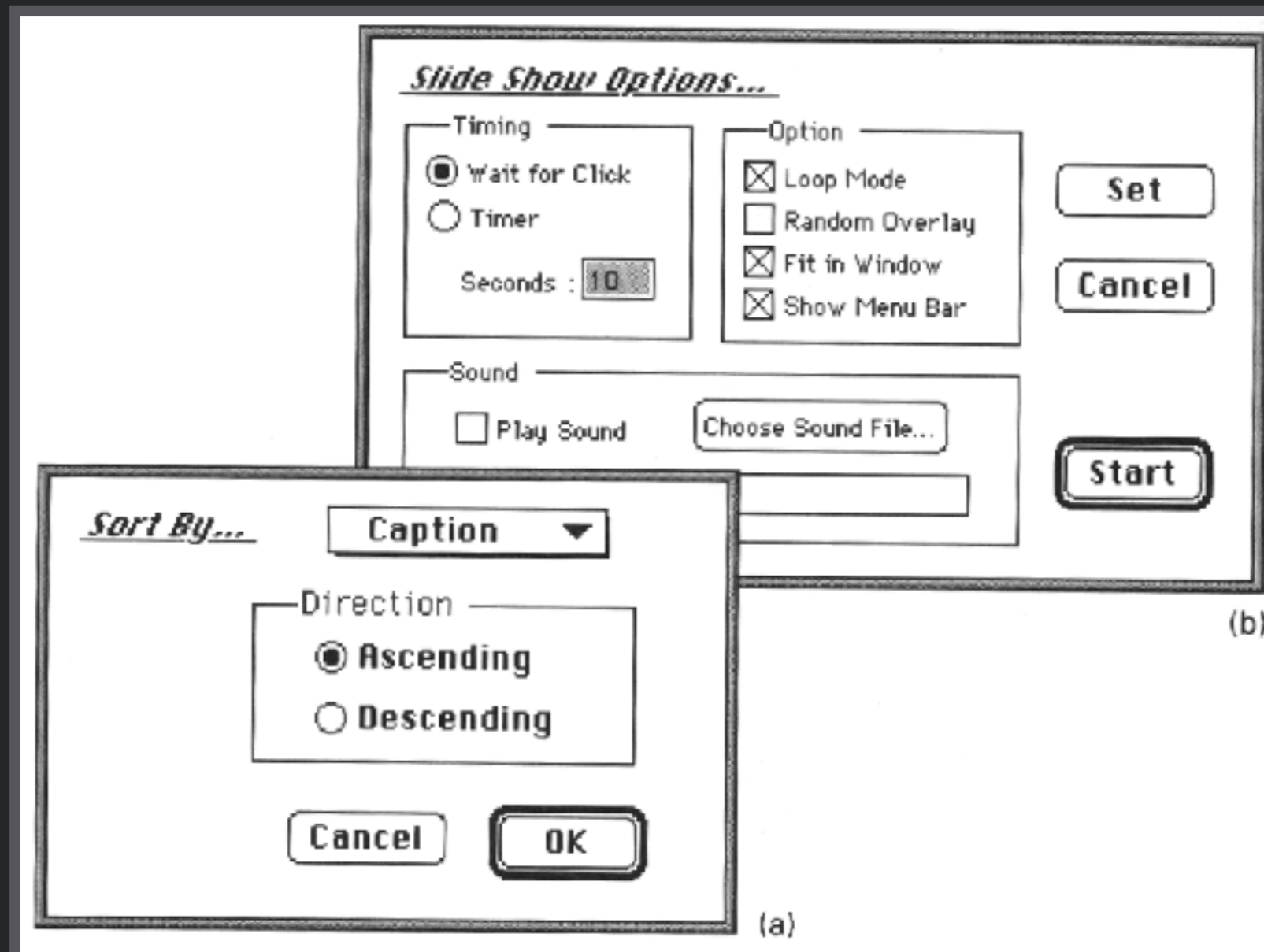


Principles

- **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

Marshalling Signals



PROCEED;
WATCH SIGNALS



THIS WAY



PROCEED TO
NEXT SIGNALMAN



TURN LEFT



TURN RIGHT



MOVE AHEAD



STOP



START ENGINES



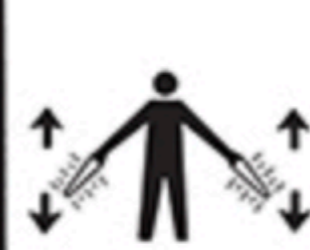
INSERT CHOCKS



PULL CHOCKS



CUT ENGINES



SLOW DOWN



SLOW DOWN
LEFT ENGINES

MARSHALLING SIGNALS



PROCEED;
WATCH SIGNALS



THIS WAY



PROCEED TO
NEXT SIGNALMAN



TURN LEFT



TURN RIGHT



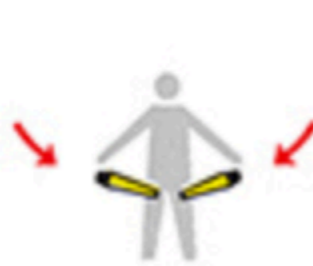
MOVE AHEAD



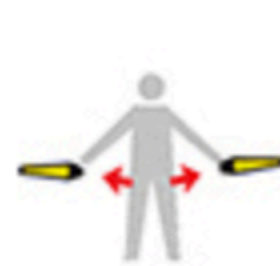
STOP



START ENGINES



INSERT CHOCKS



PULL CHOCKS



CUT ENGINES



SLOW DOWN



SLOW DOWN
LEFT ENGINES

Organization & Structure





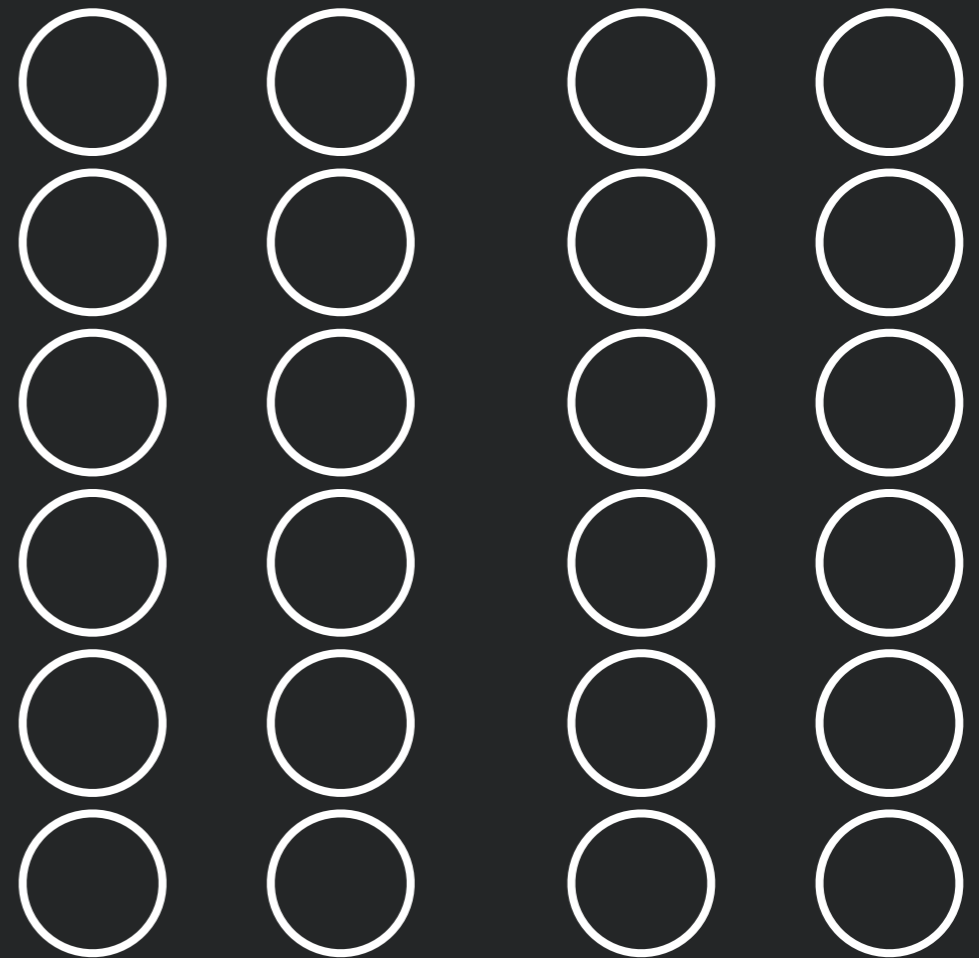
Organization & Structure

- 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

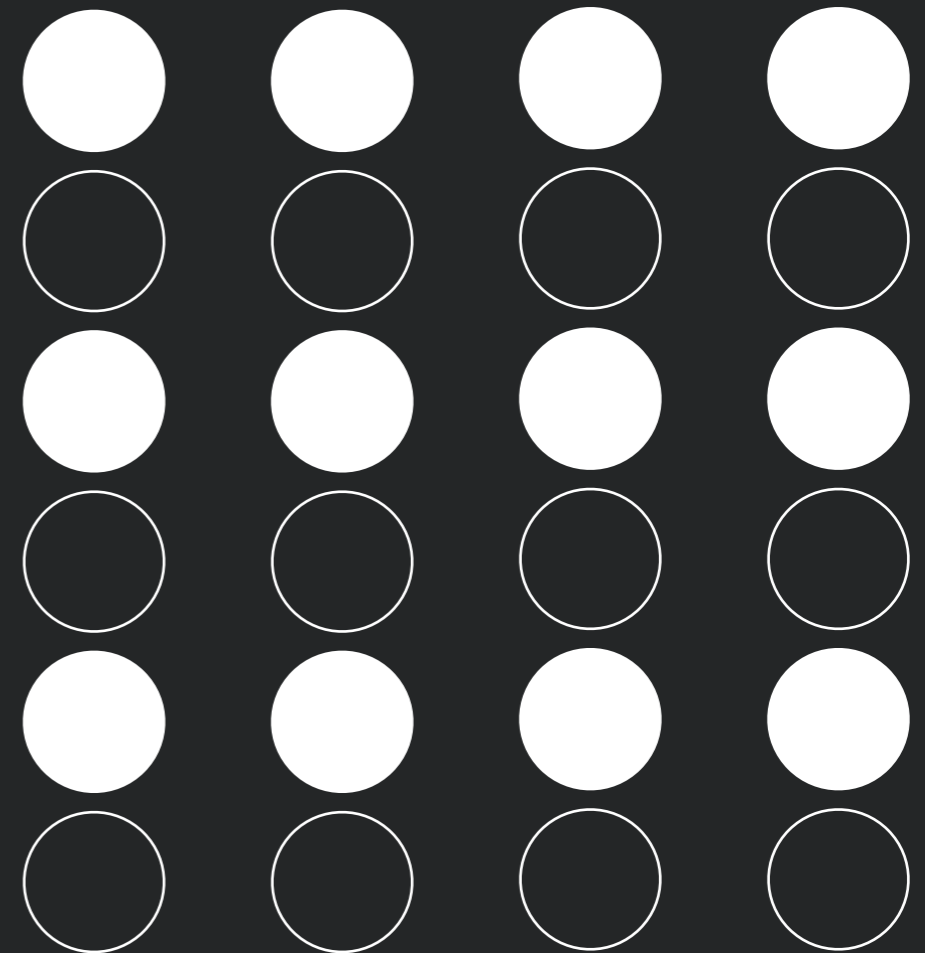
parsed as 4 columns based on close vertical spacing
then parsed as two sets of two columns based on spacing



Gestalt Principle - Similarity

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

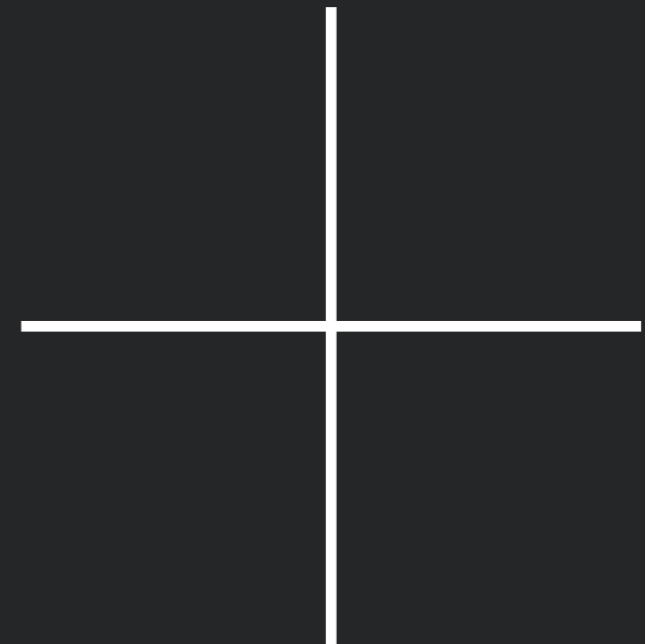
parsed as rows based on fill similarity,
despite closer column spacing



Gestalt Principle - Continuity

- Preference for *simplest* physical explanation of complex figure

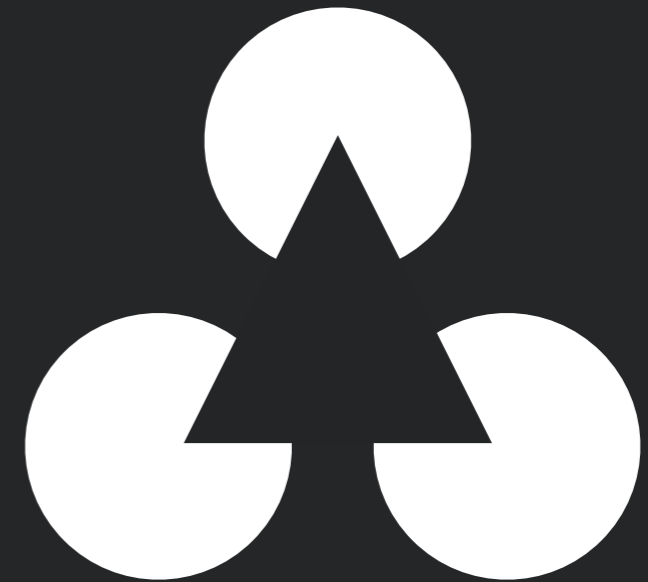
parsed as two lines, rather than 4
separate lines or 4 opposing angles



Gestalt Principle - Closure

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

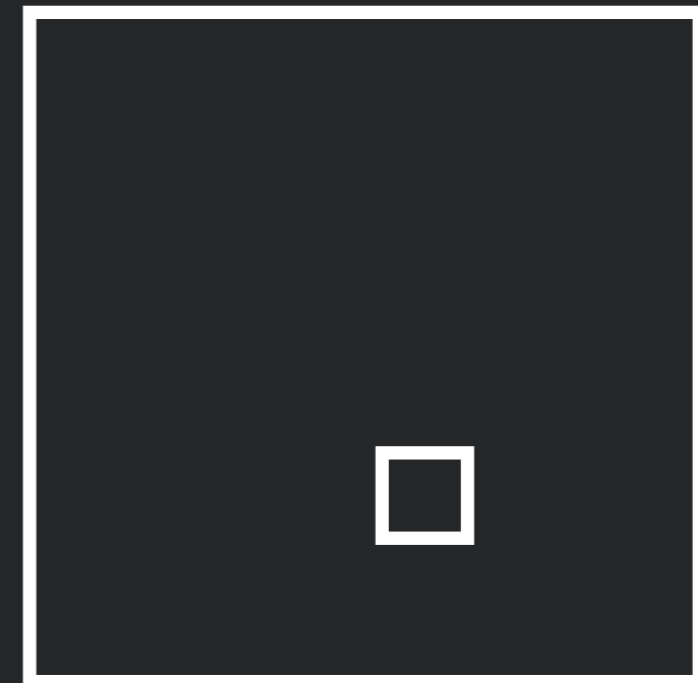
Parsed as triangle superimposed on 3 complete circles, even though none of these is actually present



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

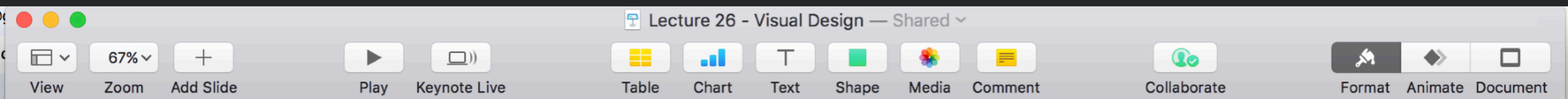
- Preference to interpret ambiguous form as multiple symmetric elements

Parsed as two overlapping objects rather than 3 separate shapes

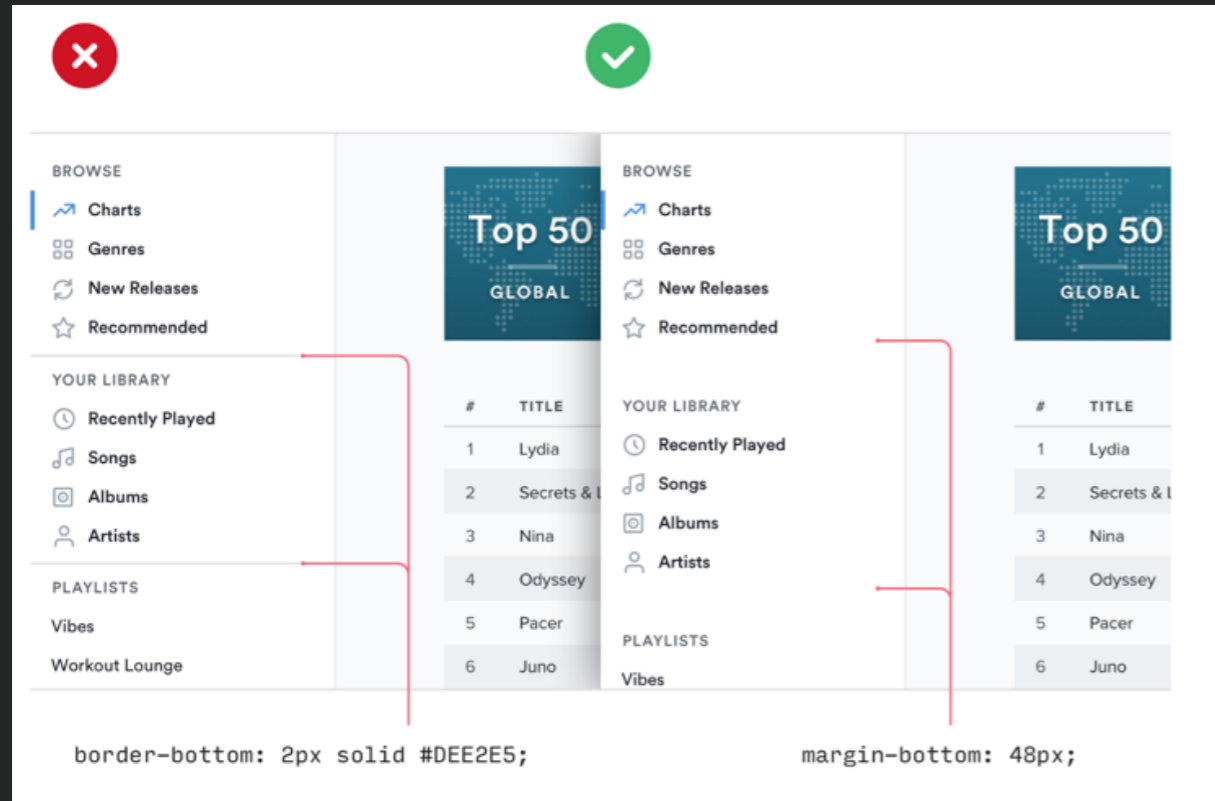


Grouping

- 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

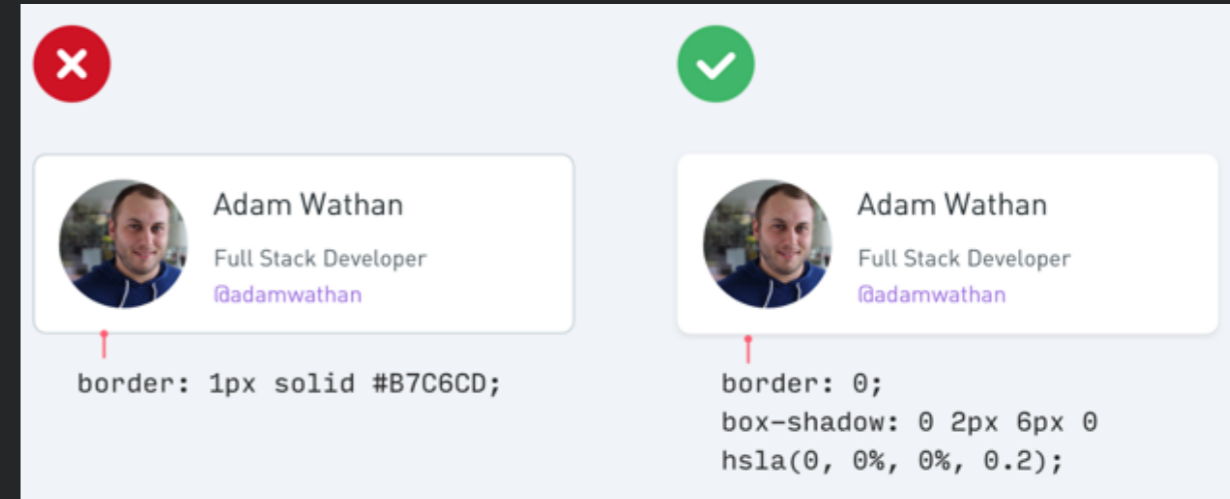


Use Fewer Borders

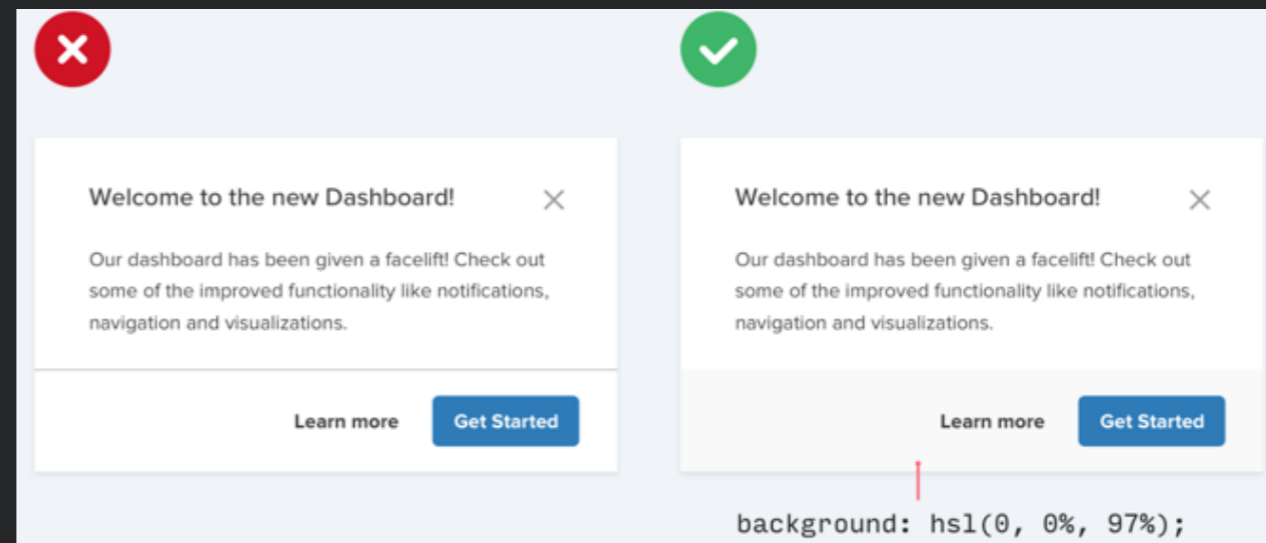


negative space

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



box shadows



different backgrounds

Hierarchy

Order groups based on perceptual prominence corresponding to intended reading sequence

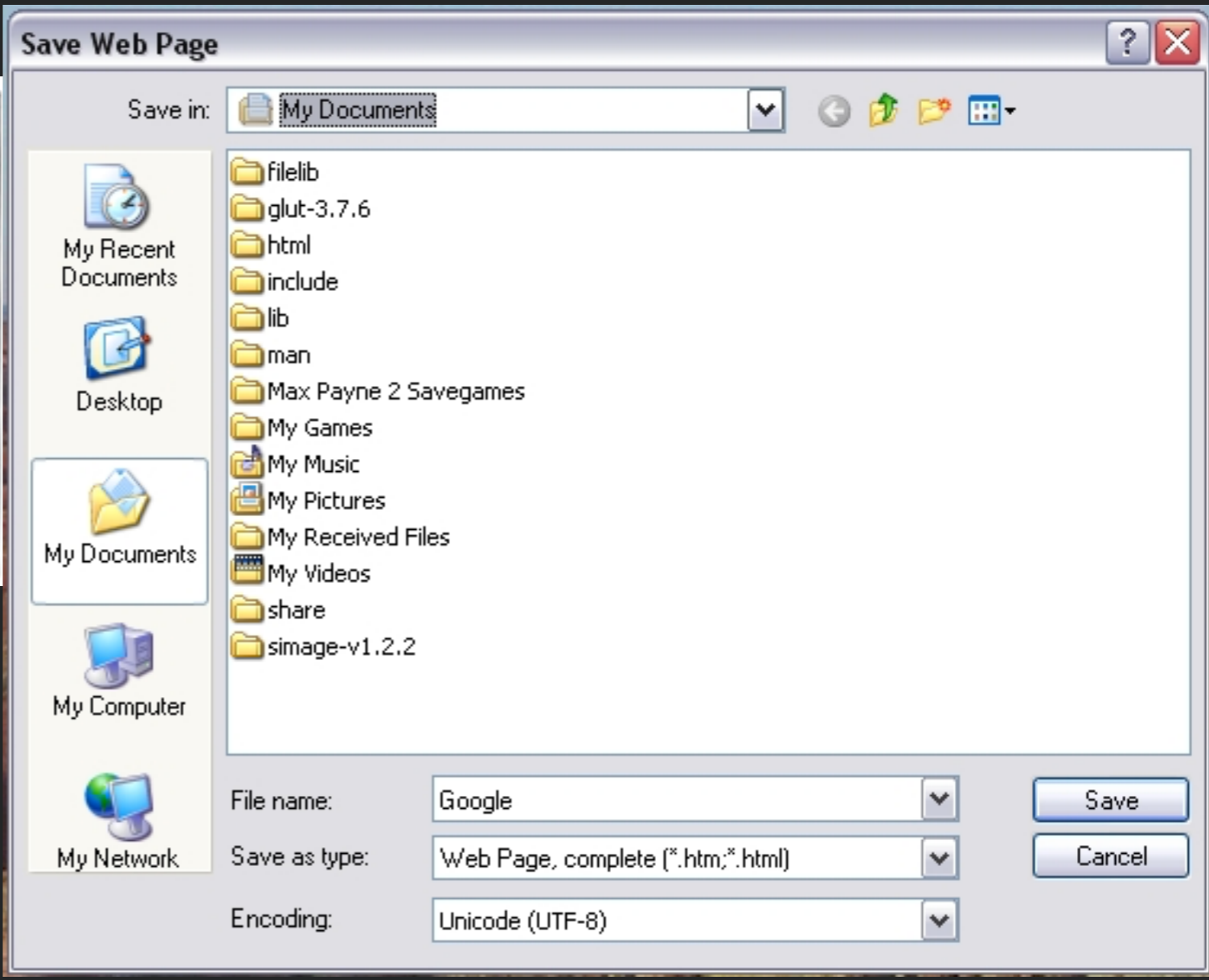
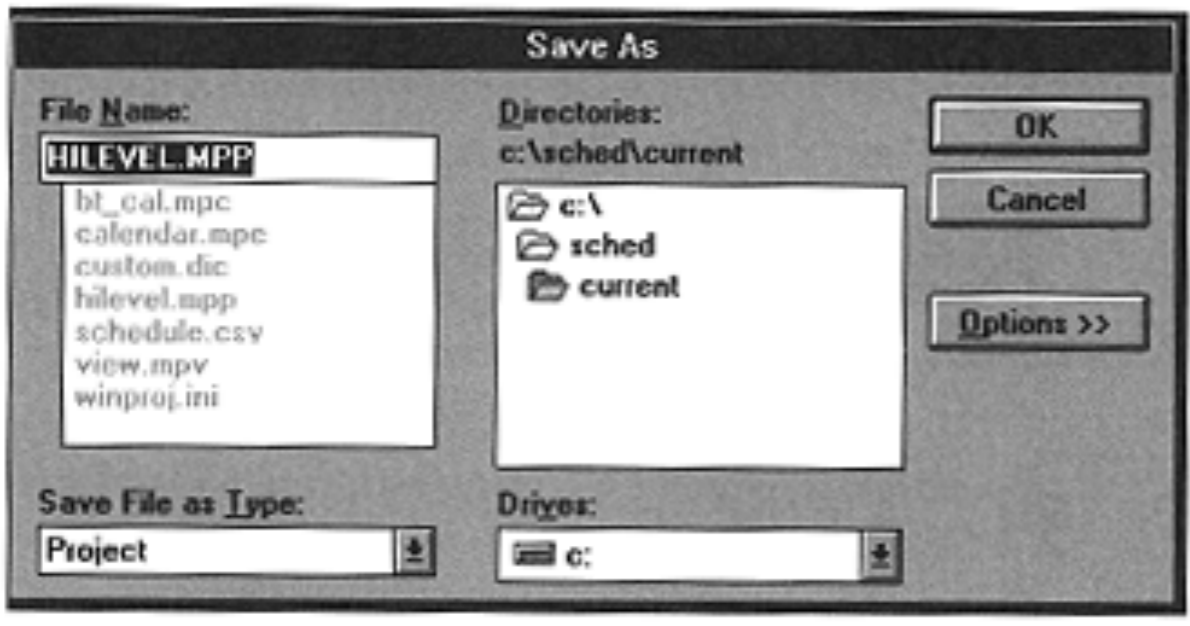
Can help solve “skimming” problems

Structure can help people focus attention on key parts

Key points might **get lost though.**

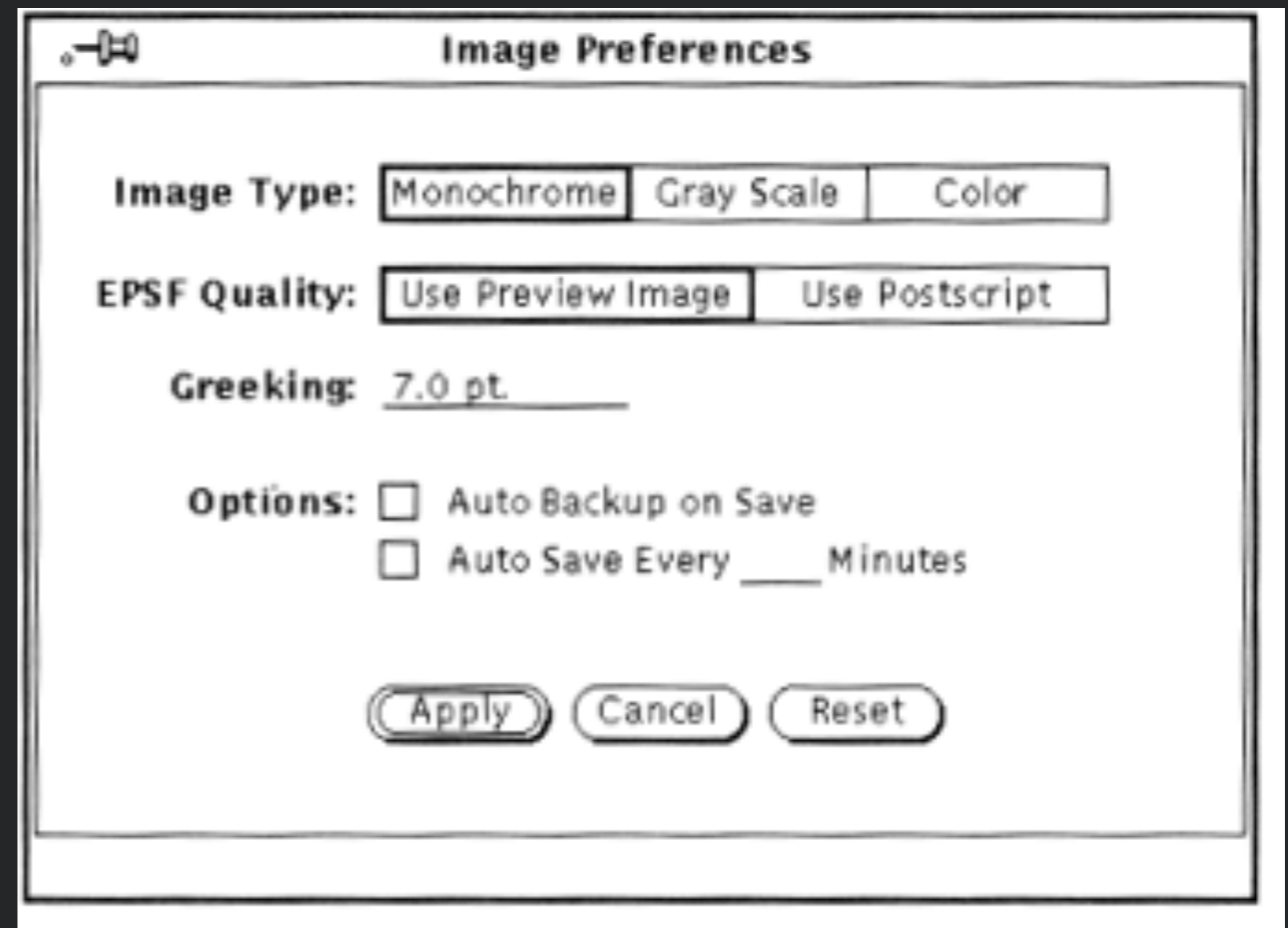
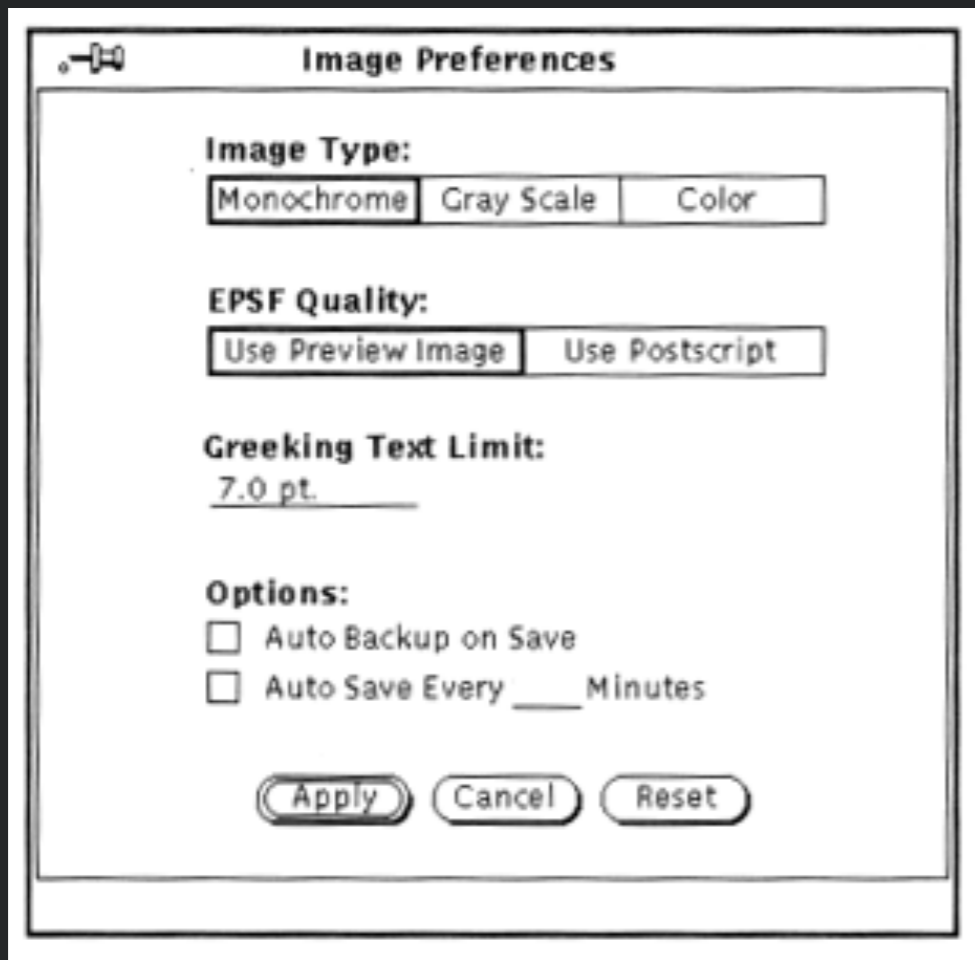
But bolding helps! Plus this obnoxious red arrow and text in a totally different font!





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

Amsterdam Walking Tour

Explore popular tourist destinations as well as hidden local favorites.

\$17 per person*

★★★★★ 28 reviews

*Prices may vary depending on selected date.

Book now

Bolder not bigger

Amsterdam Walking Tour

Explore popular tourist destinations as well as hidden local favorites.

\$17 per person*

★★★★★ 28 reviews

*Prices may vary depending on selected date.

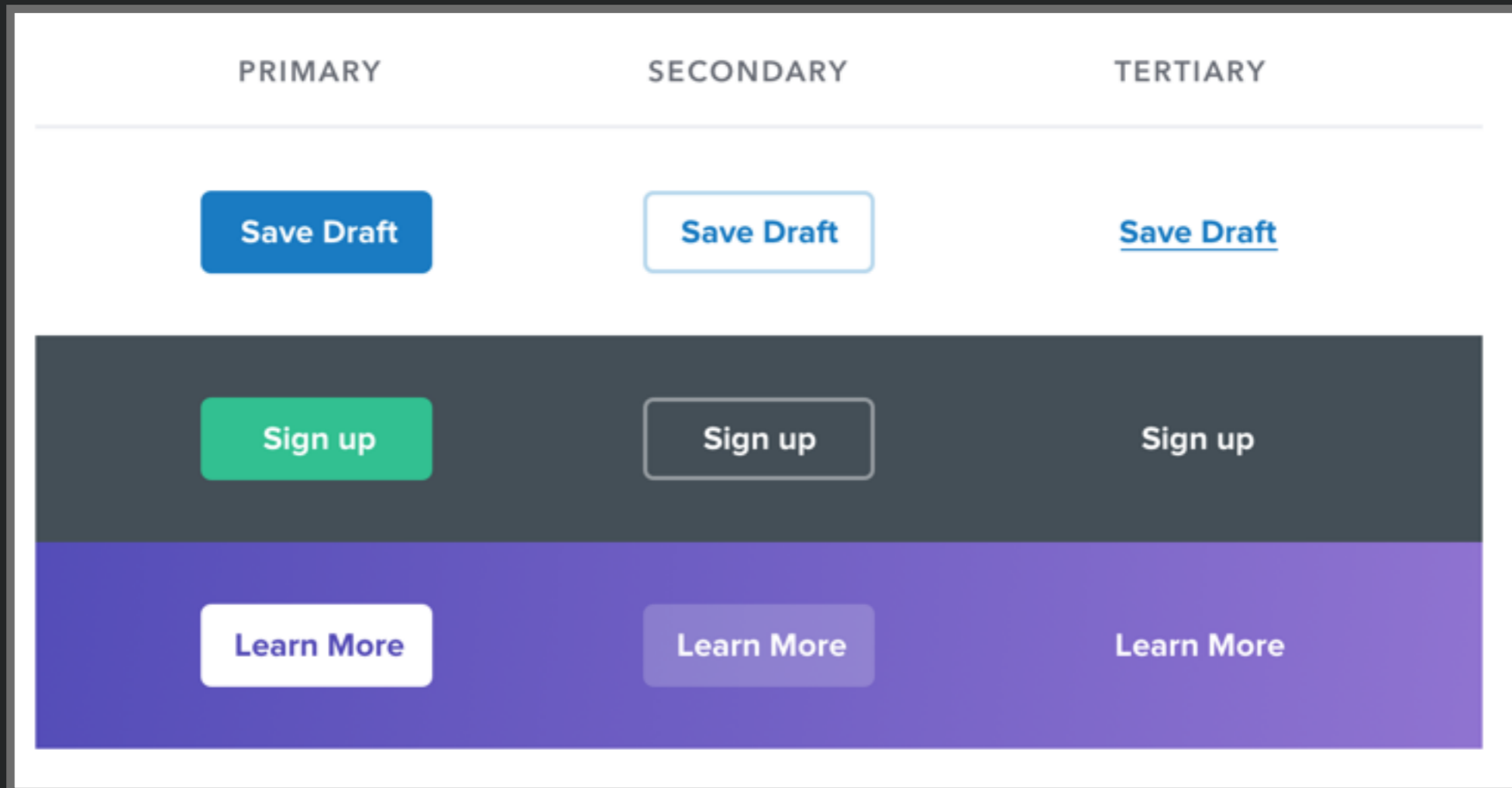
Book now

Lighter not smaller

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



Signal Importance of Action



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

Images & Icons



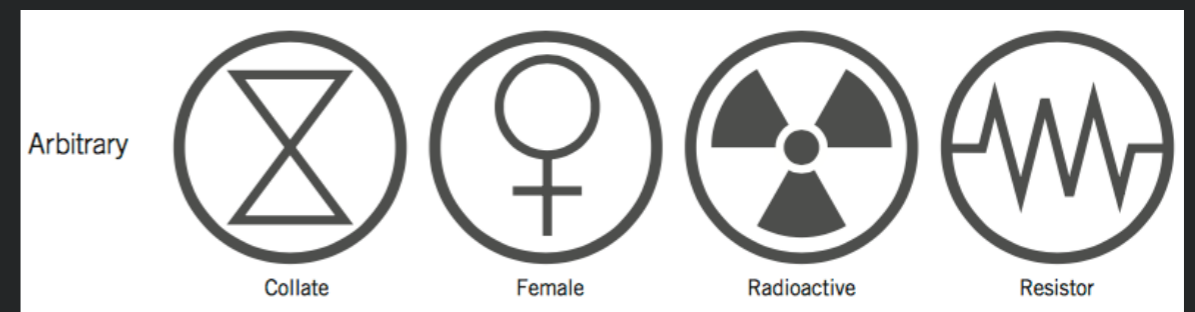
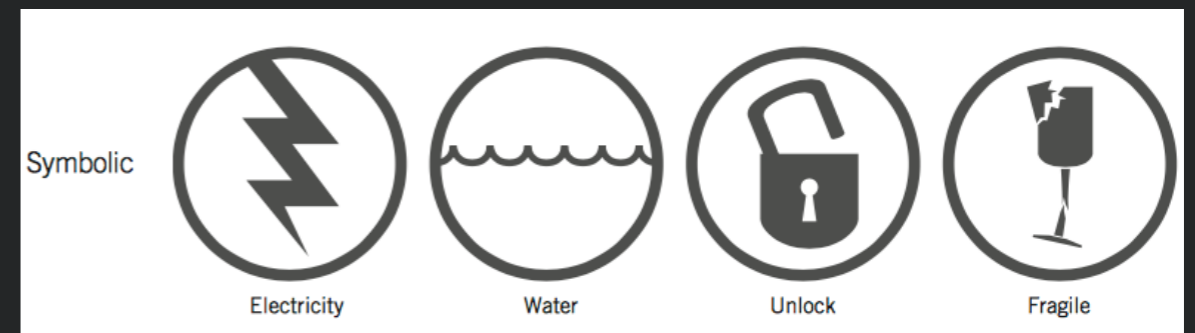
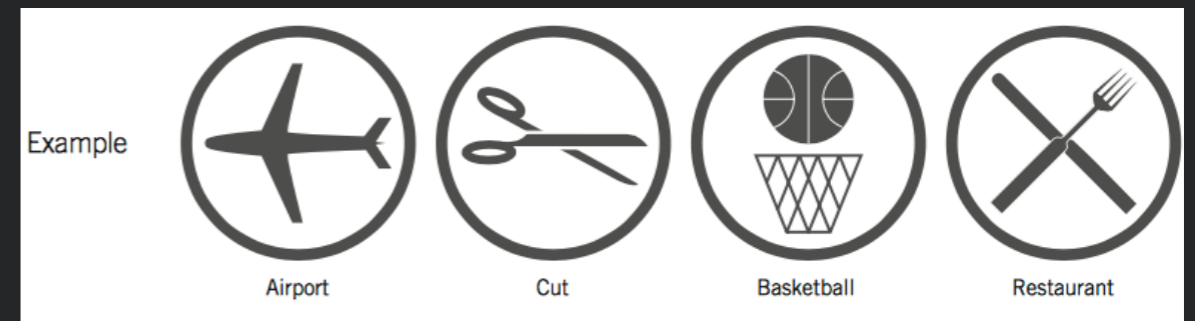


Images & Icons

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

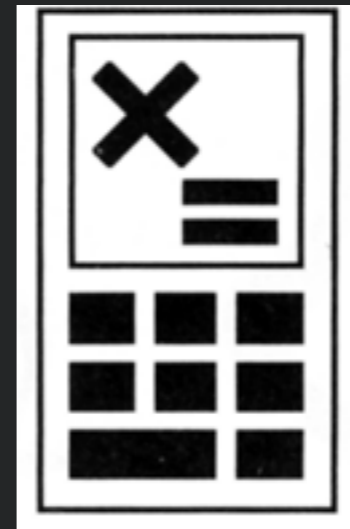
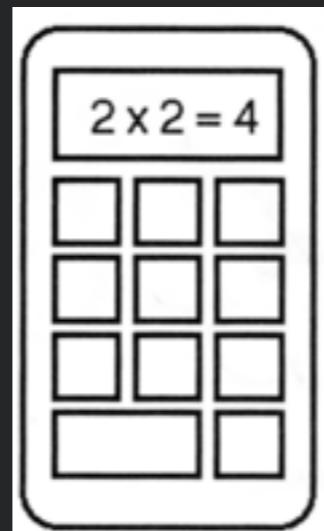
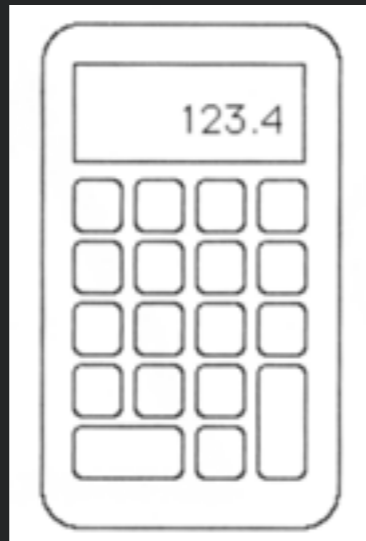
Types of Iconic Representation

- 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*

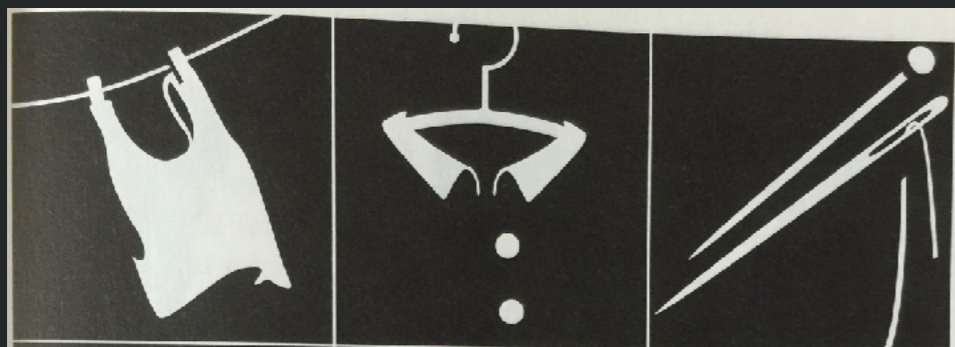
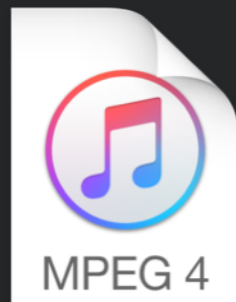
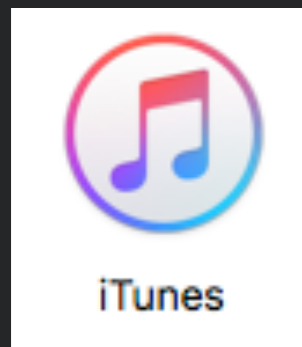


Use of Abstraction

- 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

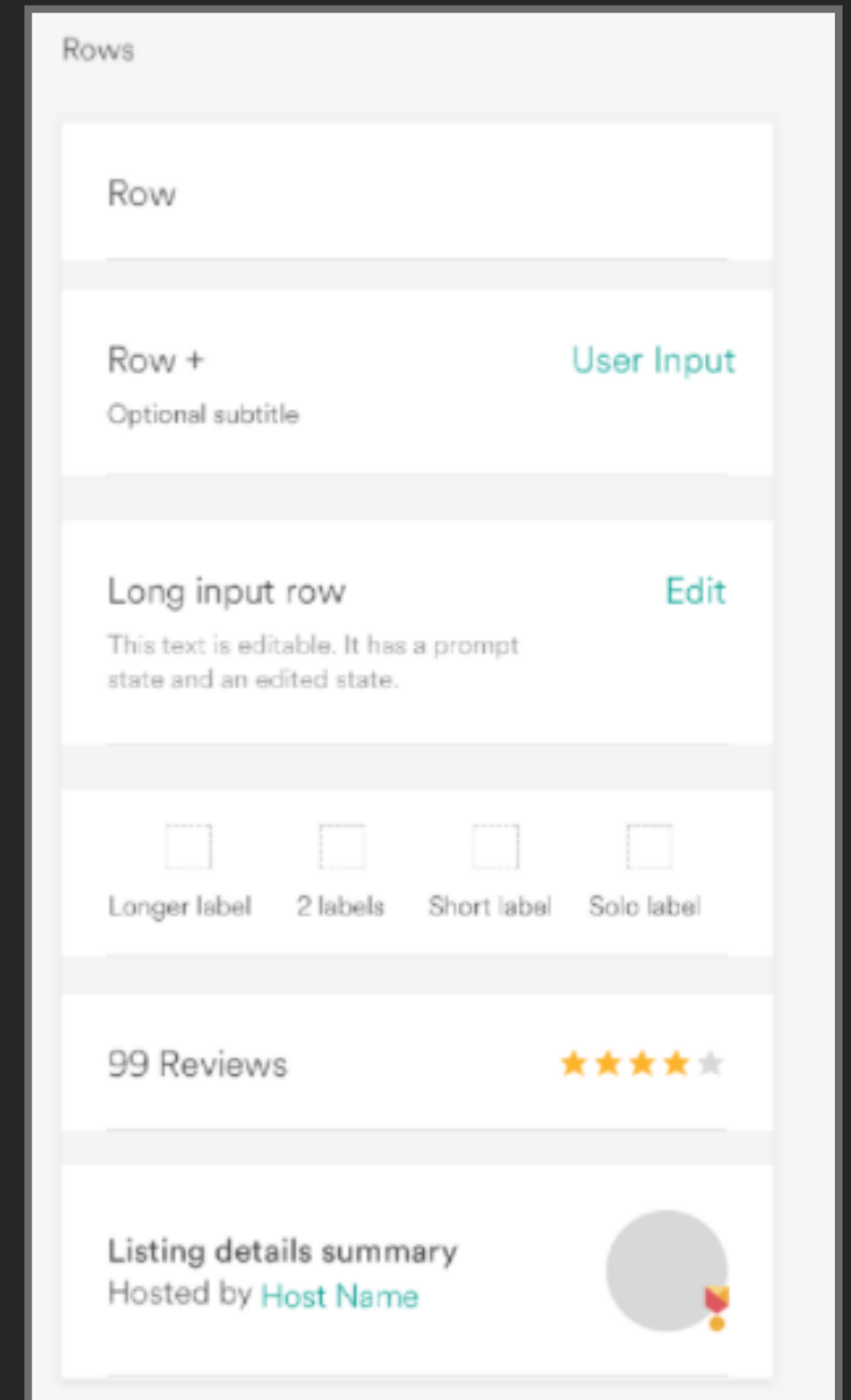


Design Languages



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

[Images](#) [Groups](#) [News](#) [Froogle](#)

All sizes - [Large](#) - [Medium](#) - [Small](#) **view**

1 2 3 4 5 6 7 8 9 10 **Sorted by relevance** [Sort by date](#)

[World »](#)  **Groups** **where**

[Top Stories](#)
[World](#)

[New York Times - all 633 related »](#) [www.cmu.edu/](#) Oct 1, 1996 by Andy Harper **source**

cmu [definition]. (0.48 seconds) 1 - 37 of 37 **details**

4,285,199,774 web pages found 16 minutes ago

Reuters ©2004 Google Sponsored Links **fluff**
 (Note: Setting preferences will

[Graduating? Cor](#) [more »](#) [at CMU](#) [Inbox \(2\)](#) [Compose Mail](#)

action

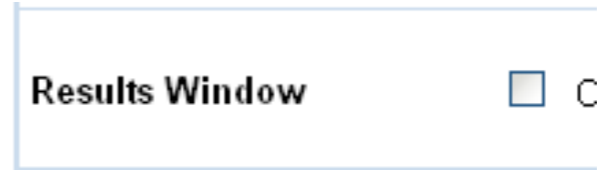
[Invite 7 frie](#) [New Featu](#) **New!** Never lose ai **act now**

Example: Syntax, Google 2004

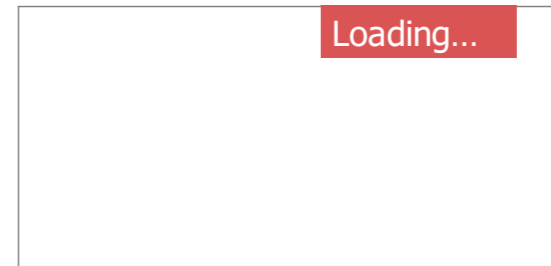
task

Find results

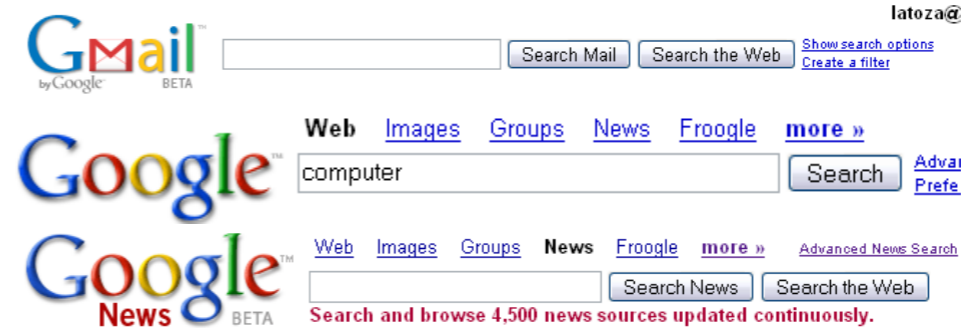
with **all** of the words
with the **exact phra**
with **at least one** of
without the words



placeholder



toolbar



list

- (unknown sender) (no subject) - Received: from ima
- (unknown sender) (no subject) - Received: from ima
- (unknown sender) (no subject) - Received: from ima
- (unknown sender) (no subject) - Received: from ima
- (unknown sender) (no subject) - Received: from ima
- Thomas LaToza » FW: Bb F04-17651: My apologies
- (unknown sender) (no subject) - Received: from ima



Carnegie Mellon University
Prospective Students Faculty Visitors Researchers General Visitors Corporate Visitors Alumni Current Students Faculty & Staff Site Index Contact Us google, ...
[www.cmu.edu](#) - 19k - Oct 18, 2004 - [Cached](#) - [Similar pages](#)

Central Michigan University
... For a more interactive version of the CMU home page, please enable JavaScript in your browser window and reload this page. Otherwise ...
[www.cmich.edu](#) - 90k - Oct 18, 2004 - [Cached](#) - [Similar pages](#)

Software Engineering Institute (SEI) Home Page
... services, courses, and events, contact Software Engineering Institute Carnegie Mellon University Pittsburgh, PA 15215-3850 412-268-5800 <http://www.sei.cmu.edu> ...
[www.sei.cmu.edu](#) - 20k - [Cached](#) - [Similar pages](#)

RhymeZone rhyming dictionary and thesaurus
RhymeZone ...
[www.rhymezone.com](#) - 10k - Oct 18, 2004 - [Cached](#) - [Similar pages](#)

SCHOOL OF COMPUTER SCIENCE/Carnegie Mellon University
... Fall SCS Calendar Submit an event! Seminar Series CMU Calendar Academic Calendar Home SCS Home website @ cs.cmu.edu ARCHIVES.
[www.cs.cmu.edu](#) - 35k - Oct 18, 2004 - [Cached](#) - [Similar pages](#)

Welcome to Lycos!
Search: The Web Shopping News Pictures: People Search, Yellow Pages; Search Advertising, Advanced Search, Fun Search, Cast Instant Love ...
[lycos.cs.cmu.edu](#) - 19k - Oct 18, 2004 - [Cached](#) - [Similar pages](#)

The Robotics Institute
... RI Seminar Nafab Core Technologies Jay Gowdy & Rob MacLachlan, SAIC & CMU, Oct 15 2004, 3:30 PM, NSH 1305 ... This page maintained by robotwebmaster@ri.cmu.edu
[www.n.cmu.edu](#) - 46k - Oct 18, 2004 - [Cached](#) - [Similar pages](#)

Collegiate Readership Program initiated at CMU
The Tartan, PA - Oct 18, 2004
By Louisa Kinosh, by Louisa Kinosh, Carnegie Mellon is currently sponsoring a free one-month trial of the USA Today Collegiate Readership ...
John Kerry, Condoleezza Rice to appear on campus The Tartan
From the desk: Student government always seeks to respond to you The Tartan
[all 2 related >](#)

Huskie tailback Wolfe darts to second MAC Player of the Week title
Details Daily Chronicle, IL - 11 hours ago
... Central Michigan. "The offensive line and our tight ends did a great job (blocking)," Wolfe said after the CMU game. "They make my life easier." ...
Wolfe runs away with MAC POW award Northern Star Online
An all-access pass to the NU locker room Northern Star Online
Northern Illinois joins CMU 42-10 DelNews.com
Northern Star Online - Northern Star Online - [all 31 related >](#)


CMU students prepare for Solar Decathlon
The Tartan, PA - Oct 18, 2004
by Ann Wootton, by Ann Wootton, Carnegie Mellon students are leading the Pittsburgh Synergy team designing and building a solar house ...
Frope turns on the heat at the Chili Cook-off The Carnegie Pulse
[all 2 related >](#)

Rocker to Rally for Kerry at CMU
KDKA, PA - Oct 18, 2004
Pittsburgh (KDKA) For the second time in six months, singer Jon Bon Jovi will perform in Pittsburgh for a political cause. The New ...

Video From The CMU Robotics Institute Showcase
Slashdot - Oct 18, 2004
mpost writes "This last week the CMU Robotics Institute showed off some of the stuff they were doing. They were showing the new stuff they were working on ..."

Northern Illinois Rolls by CMU 42-10
Gathered.com - Oct 16, 2004
... The win dropped CMU's record to 2-4 for the season and 1-2 in MAC action. NU is now 4-0 in the league and

Examples: Google 2016



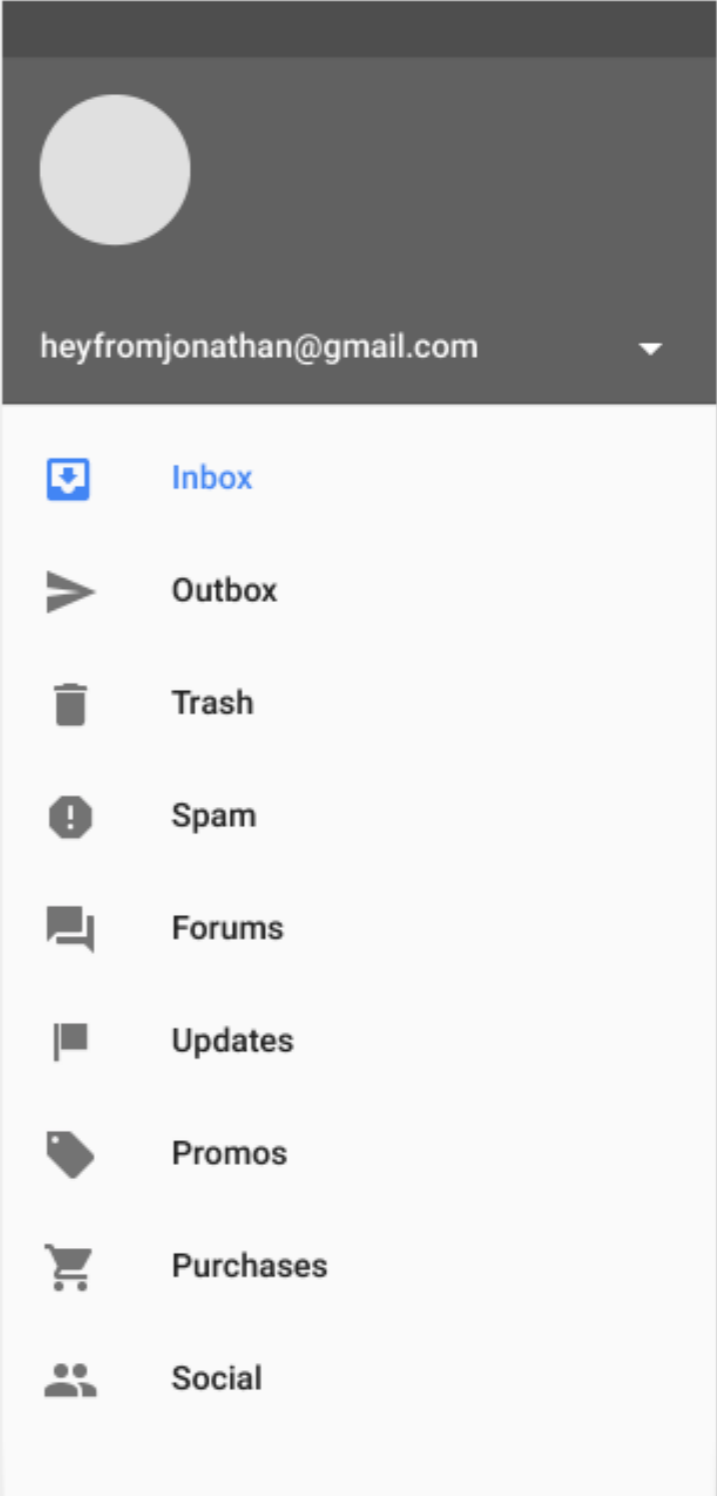
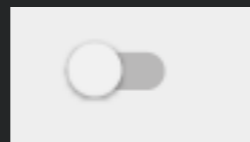
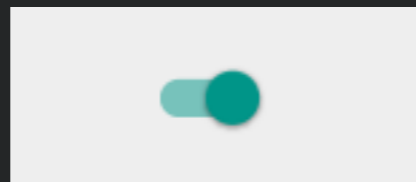
Top 10 Australian beaches

Number 10
Whitehaven Beach
Whitsunday Island, Whitsunday Islands

[SHARE](#) [EXPLORE](#)

NORMAL

PRESSED

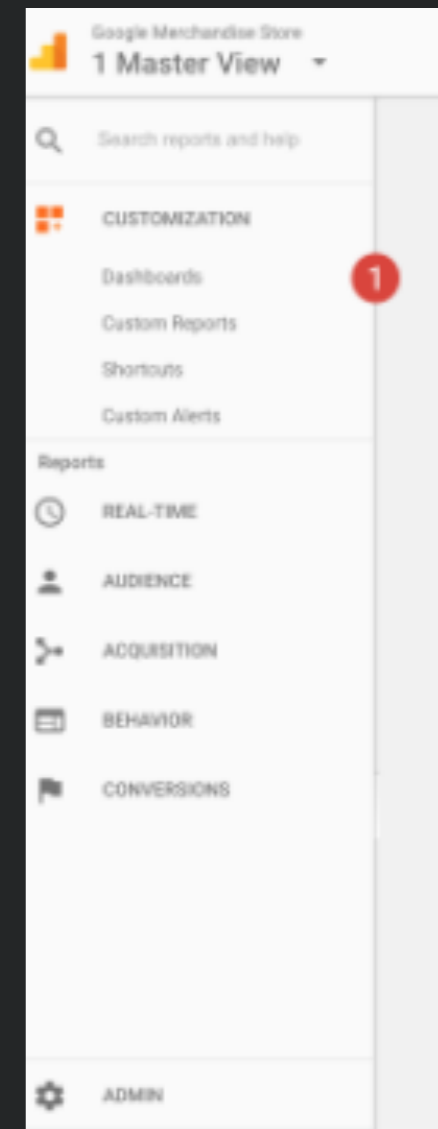
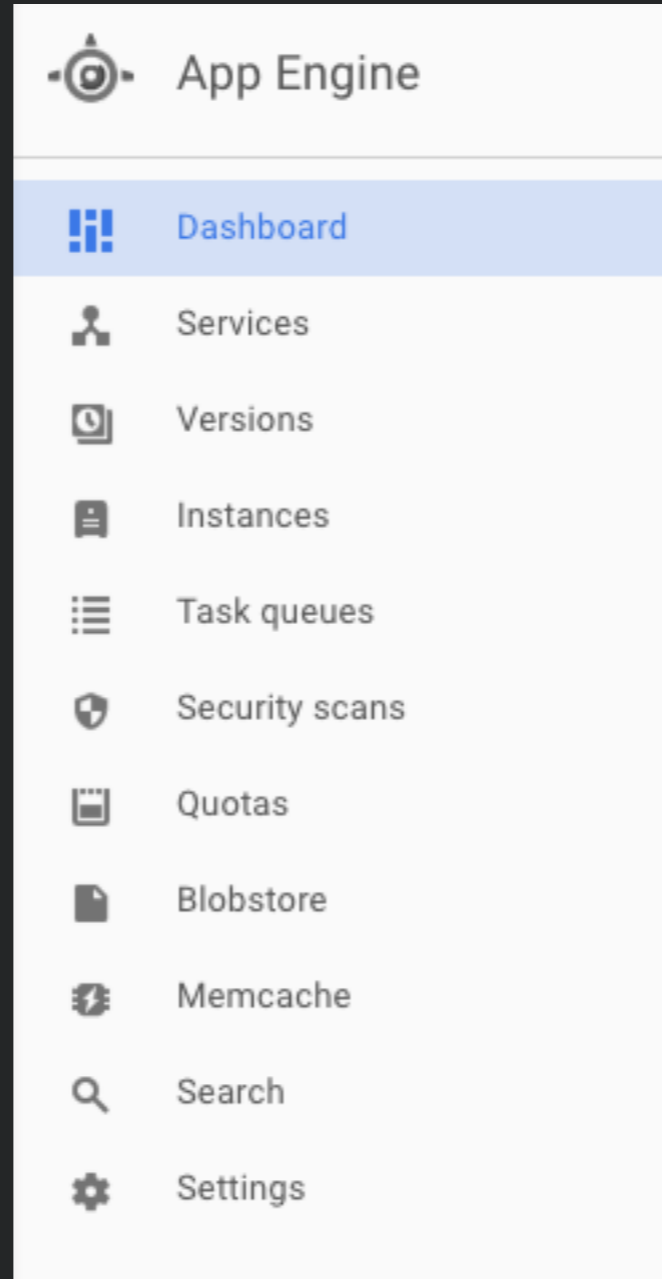
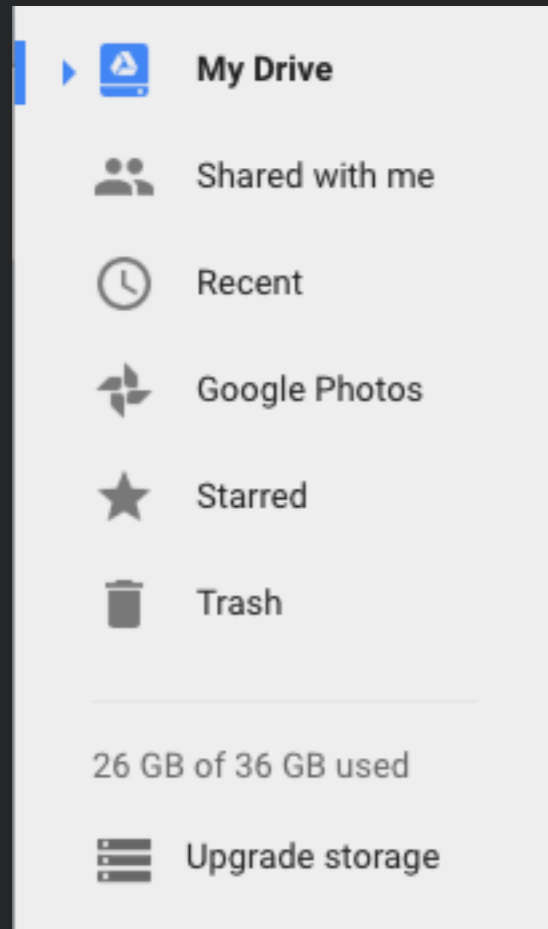


heyfromjonathan@gmail.com

- Inbox**
- Outbox**
- Trash**
- Spam**
- Forums**
- Updates**
- Promos**
- Purchases**
- Social**

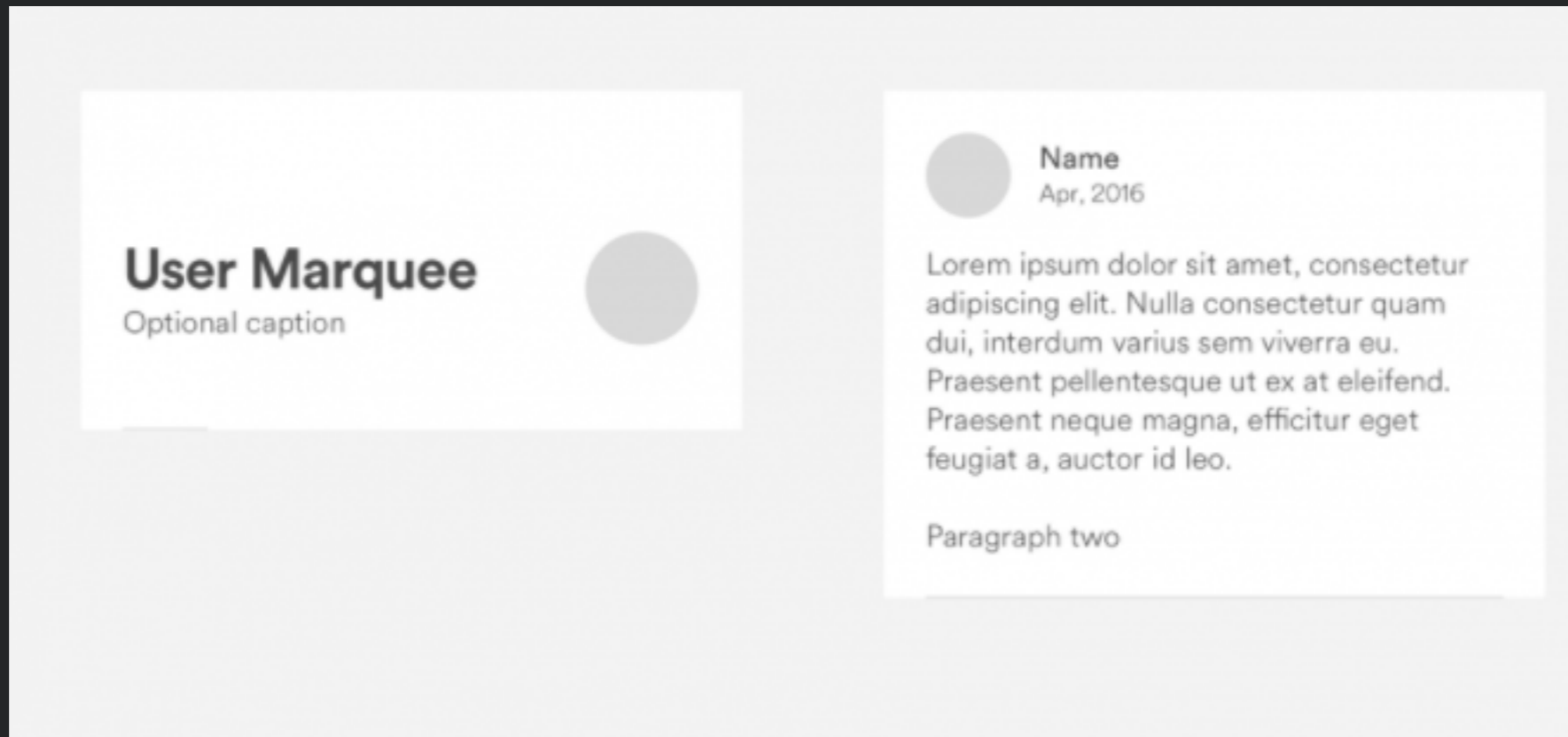


Examples: Google 2016

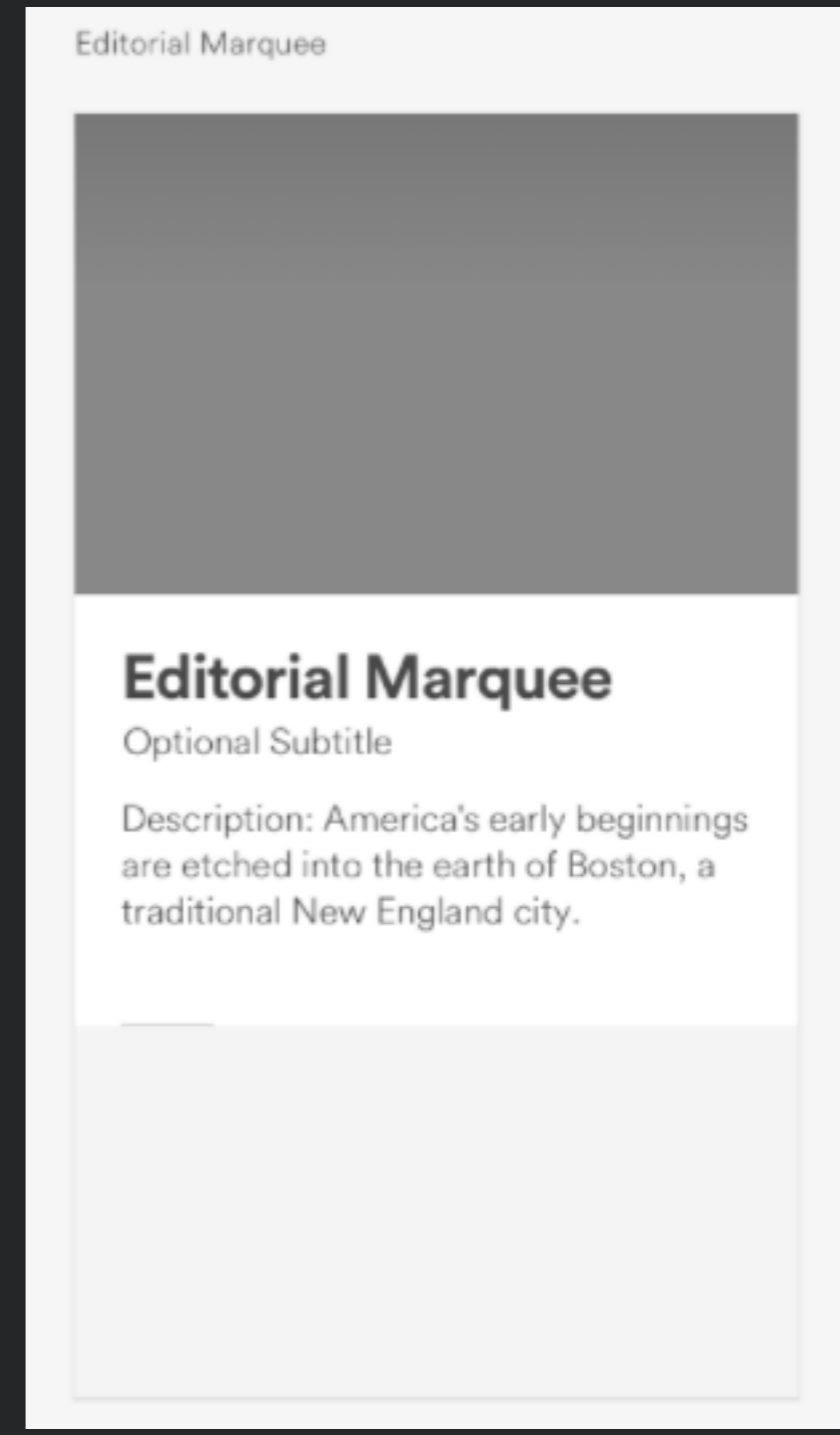
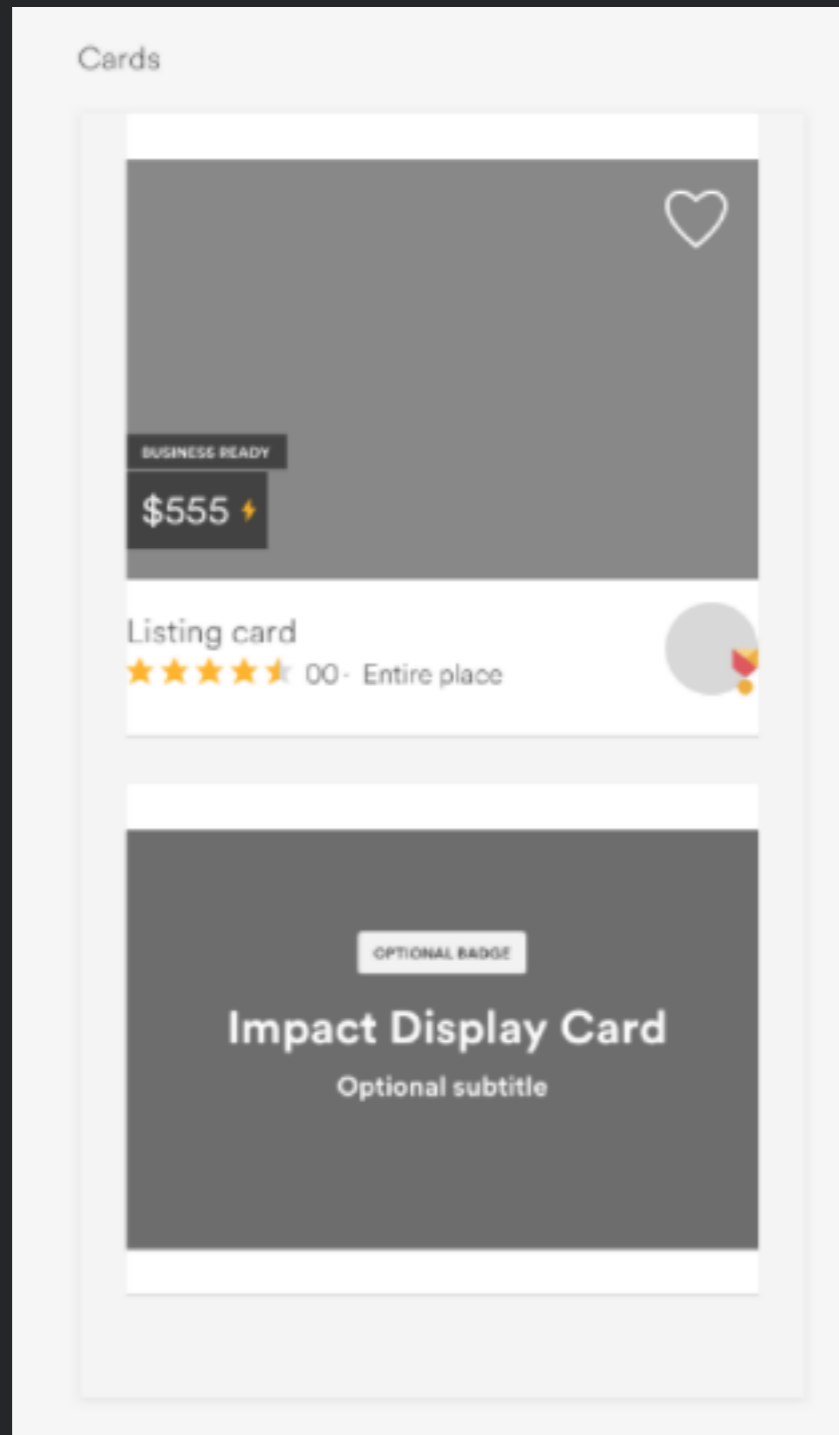




Examples: AirBnb

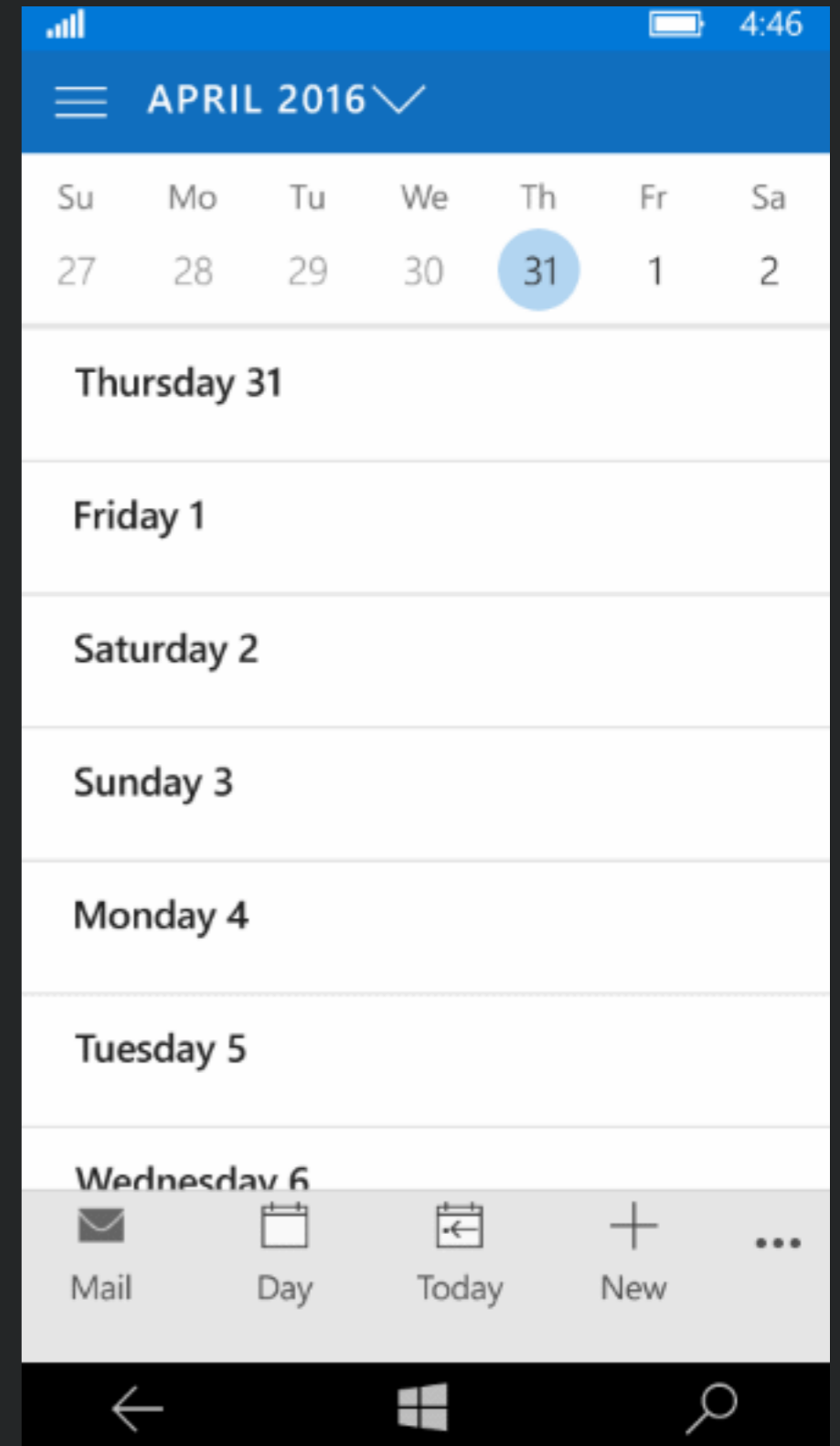
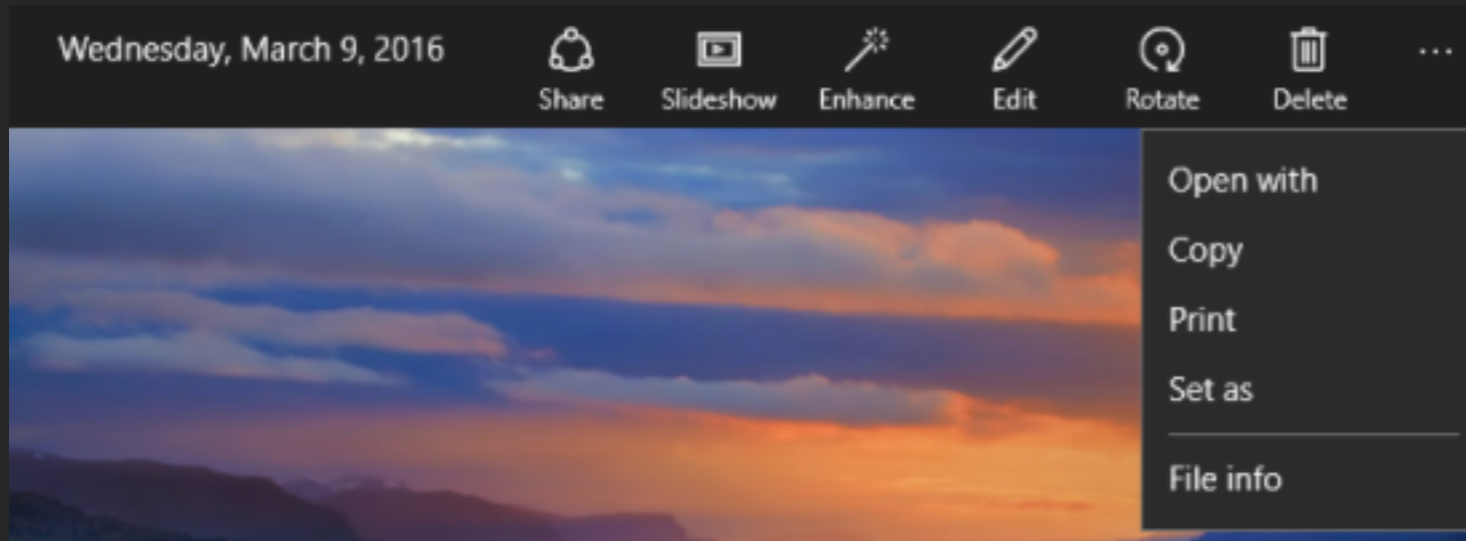


Examples: AirBnb

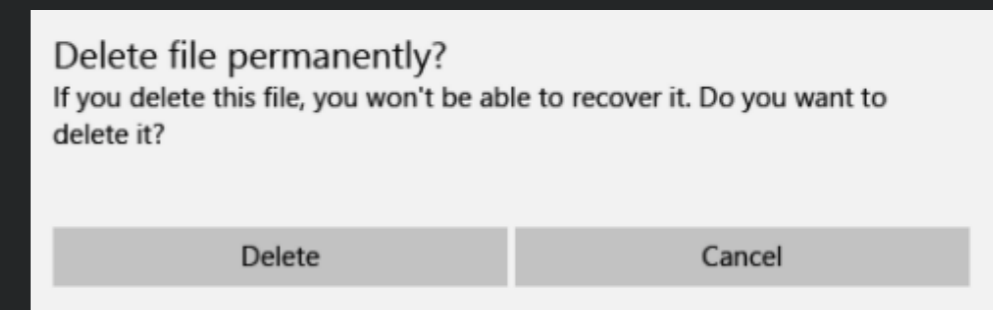
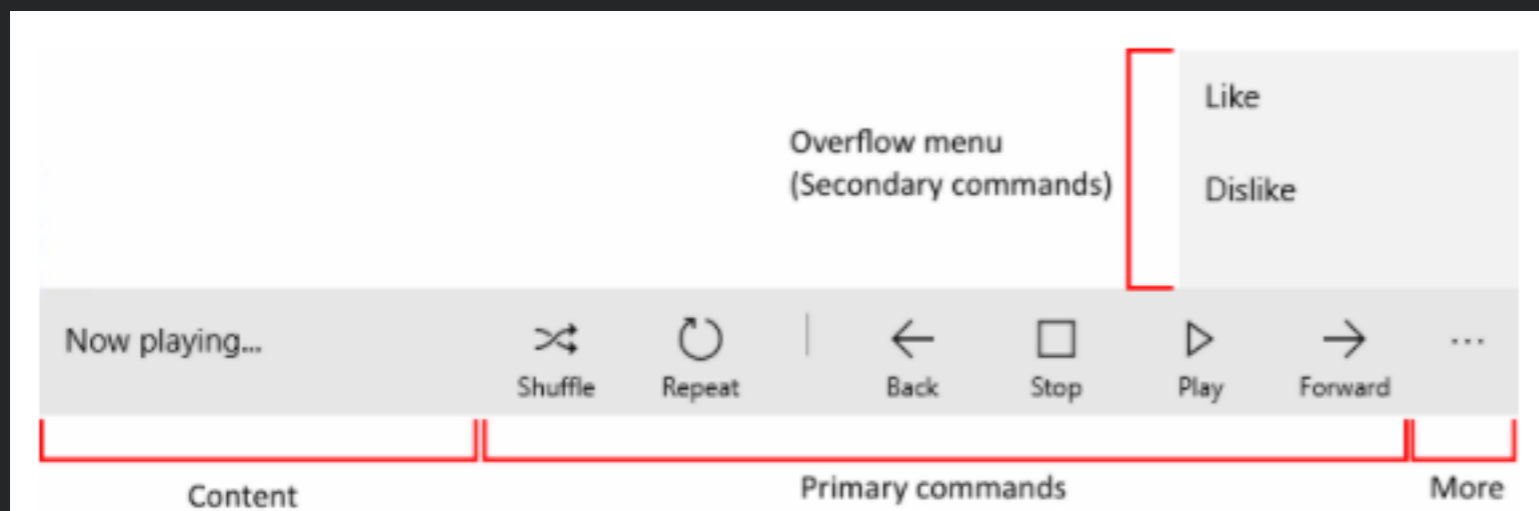
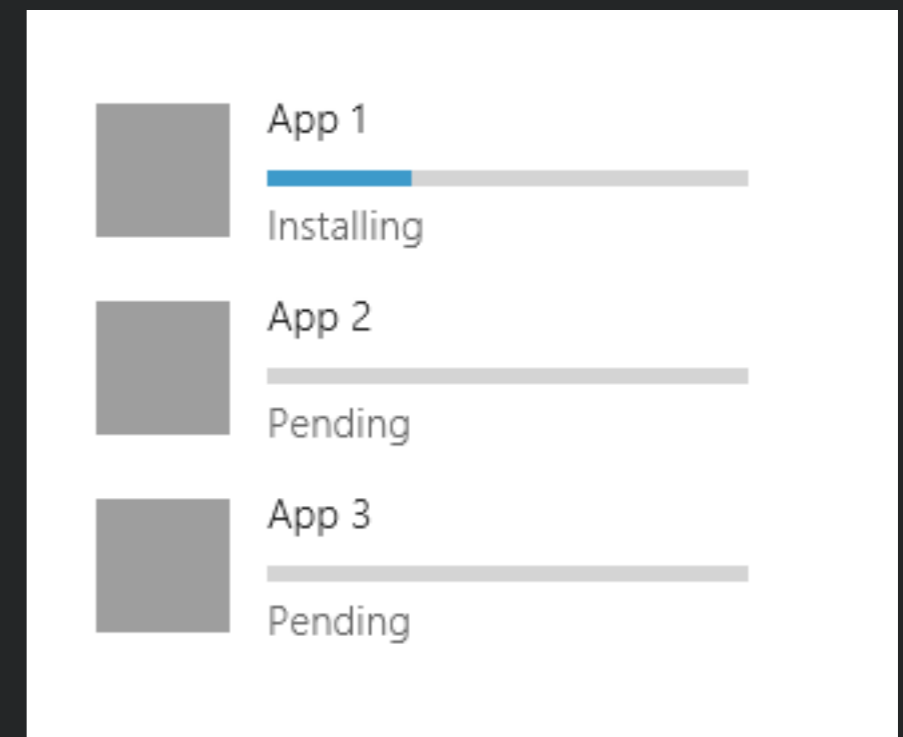




Examples: Microsoft

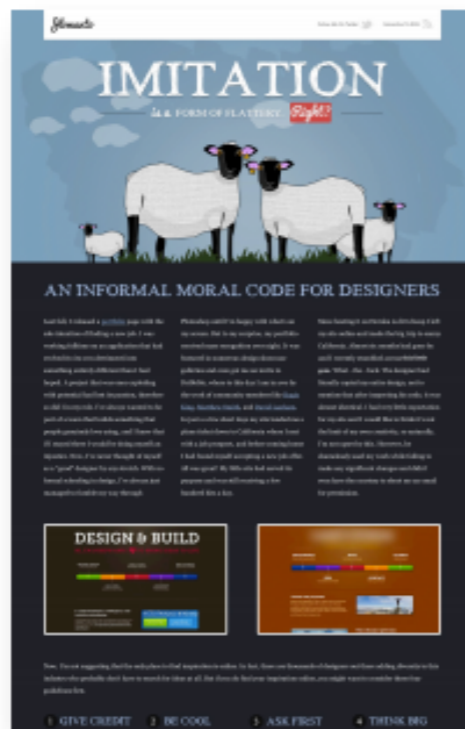
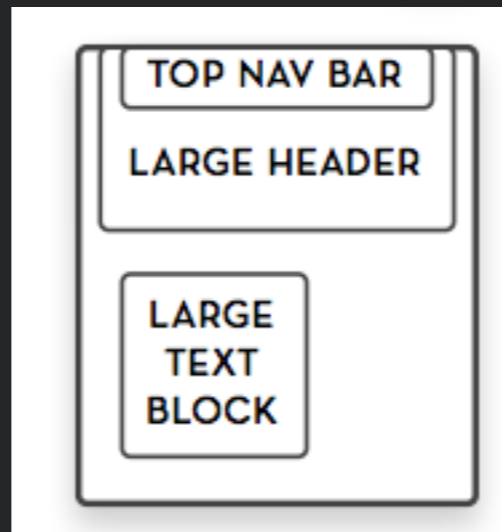


Examples: Microsoft



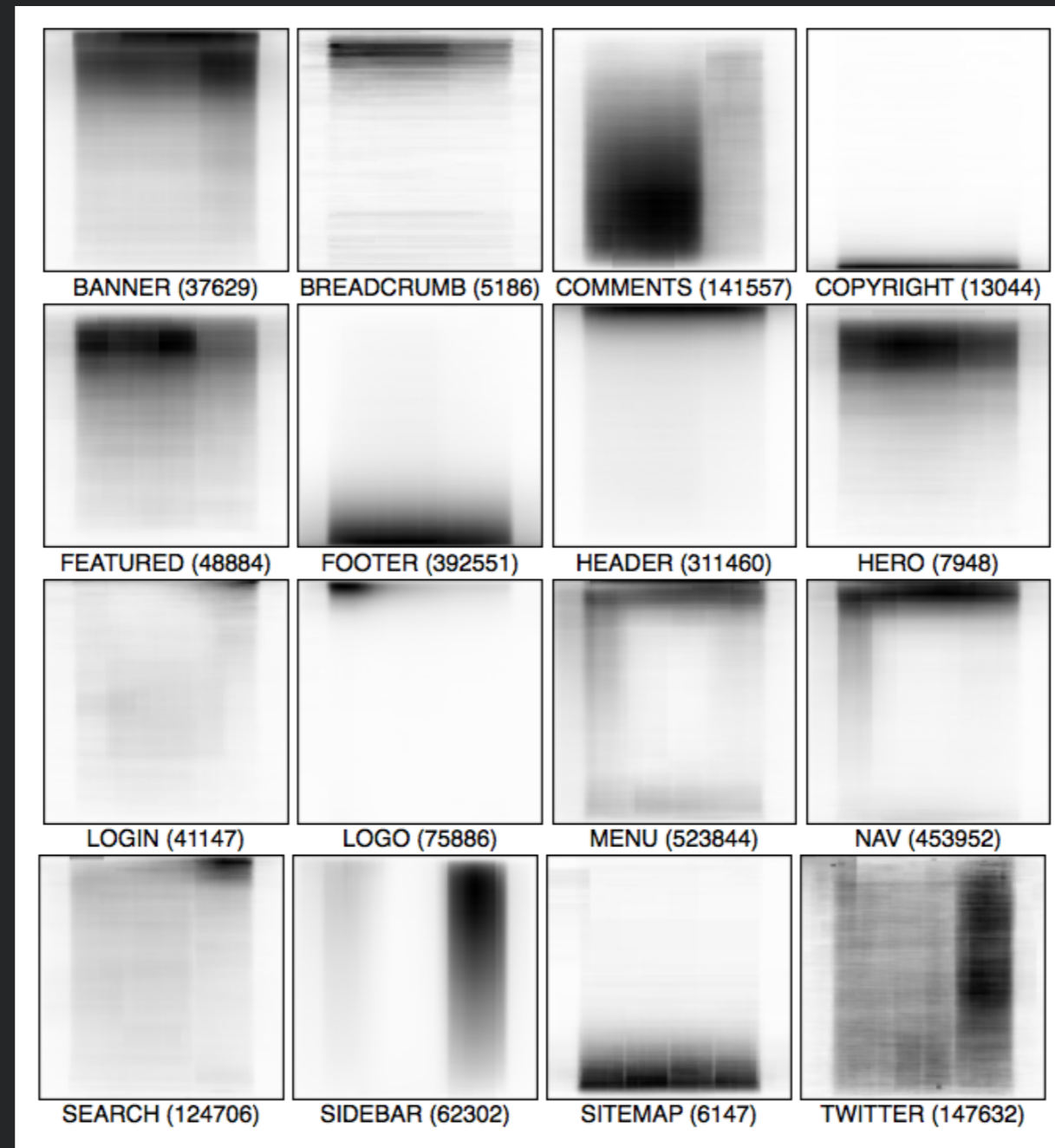


Example: Header with text blocks layout

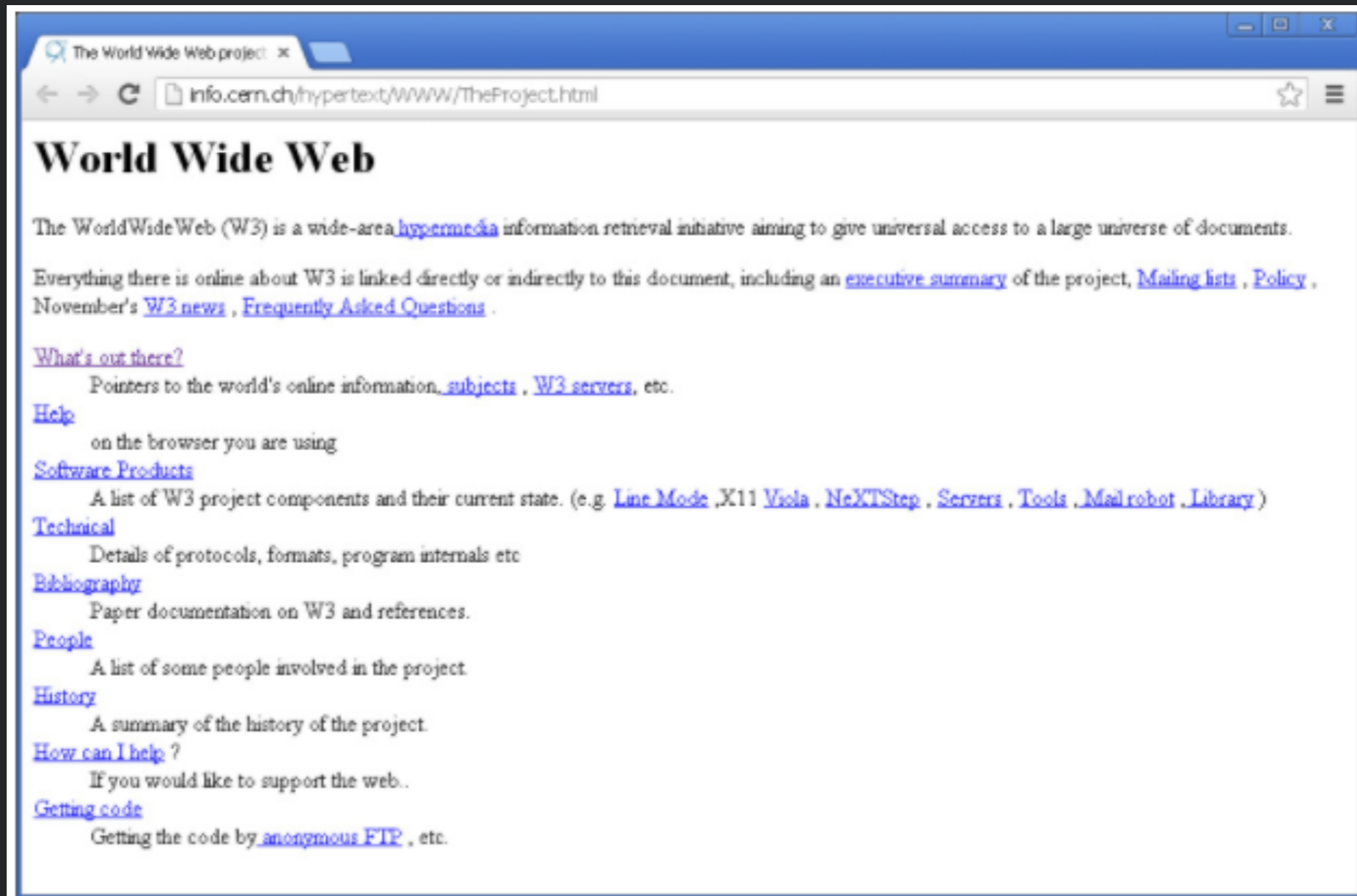


<http://ranjithakumar.net/resources/webzeitgeist.pdf>

Position Encodes Meaning and Function



Web Design Languages Over Time



<https://blog.hubspot.com/marketing/look-back-20-years-website-design#sm.00000ip14jejk1d51u53crk6cwrns>

Web Design Languages Over Time

Find It

- Product Information
- Customer Support
- Technology & Research
- Developer World
- Groups & Interests
- Resources Online
- About Apple

Apple Sites Worldwide

- Switzerland
- Taiwan
- Turkey
- UK & Ireland
- United States

WELCOME TO APPLE JULY 14 1997

Introducing CyberDrive
Register today for a free CD-ROM.

EMATE 300
Mobile, Affordable, & Smart

MOVIES FROM MARS
QuickTime VR Takes You Out of this World

What's Hot

Preorder Mac OS 8
Now you can [preorder Mac OS 8](#), described by Macworld as "the most comprehensive update to the Mac OS in years, sporting a bold new look, a speedier Finder, more

Be the First to Know
Learn about new Macintosh software releases the moment they become available. Check [Hot Mac Products](#) to hear about programs like Speed Demon, ReBirth RB-338 and



Web Design Languages Over Time



Web Design Languages Over Time

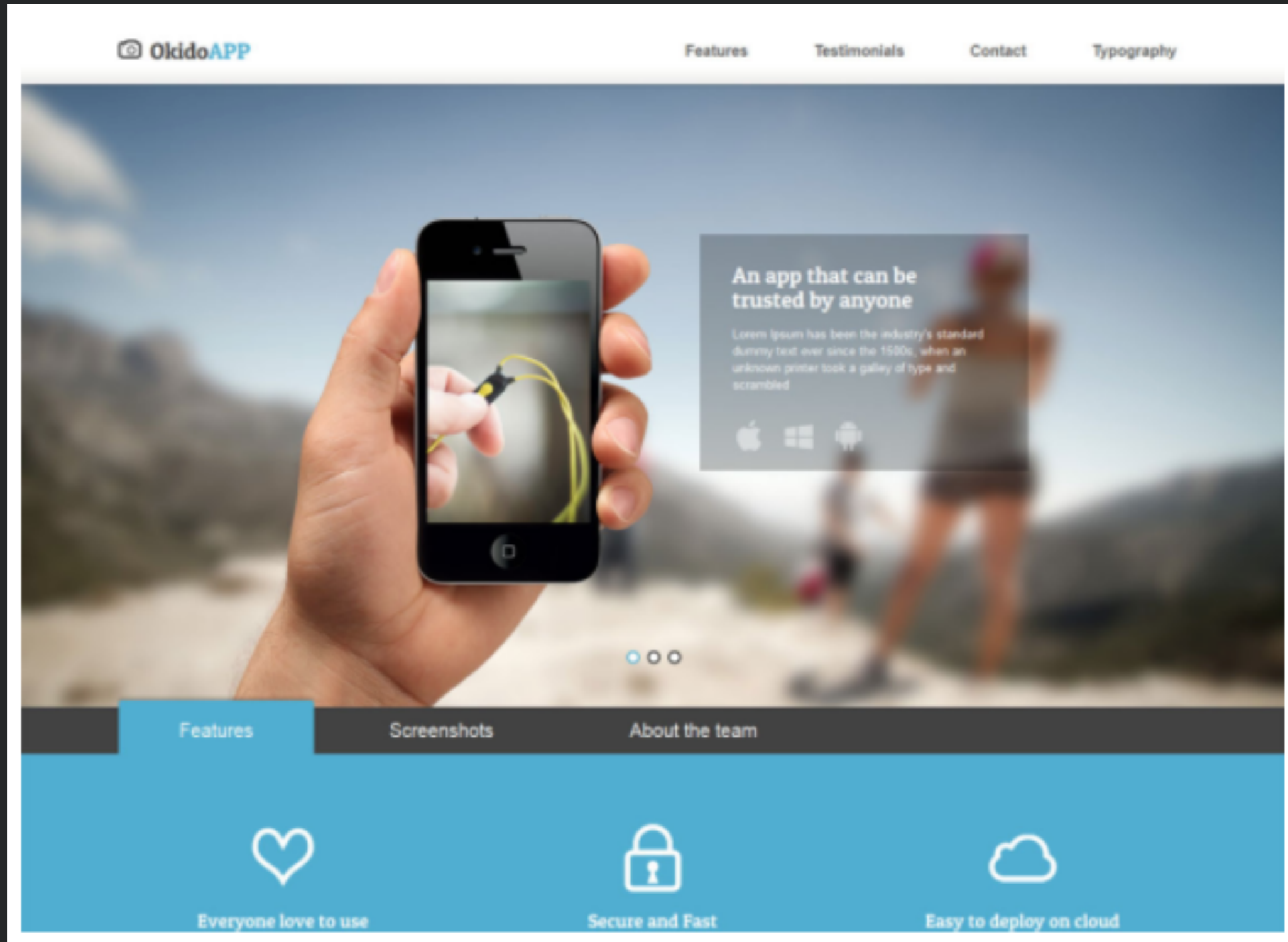
The screenshot shows the Polaroid website homepage. At the top left is the Polaroid logo. To the right are navigation links: Home, Site Map, and Search. Below these is a blue horizontal bar with links for Company Info, Product Catalog, Contact Us, Customer Support, and Dealer Locator. The main content area is divided into several sections. On the left, there is a 'News and Events' section with links for 'What's New', 'Instant Digital Printing Technology', and 'Other Events & Promotions'. Below this is a 'Consumer' section with a small image of a person and a list of links: 'View TV Ads', 'Instant', 'Digital', and 'Teens'. Further down is a 'Commercial' section with a small image of a person and a list of links: 'Polaroid Education Program', 'Promotional Products', 'OEM', 'Artist's Studio', 'Polaroidwork.com', and 'Eyewear'. In the center is a large image of three people (two women and one man) posing and holding cameras. To the right of this image is a 'CHECK THIS OUT' section featuring a small image of a camera and the text '600 Silver Express' followed by a promotional message and a link to the 'Full Product Catalog'. At the bottom of the main content area is an 'OTHER POLAROID SITES:' section with four circular icons and labels: 'i-Zone', 'Digital', 'Work', and 'Worldwide'. A blue horizontal bar at the very bottom contains the copyright notice: 'Copyright © 2001 - 2002 Polaroid Corporation / Polaroid Privacy Policy'.



Web Design Languages Over Time

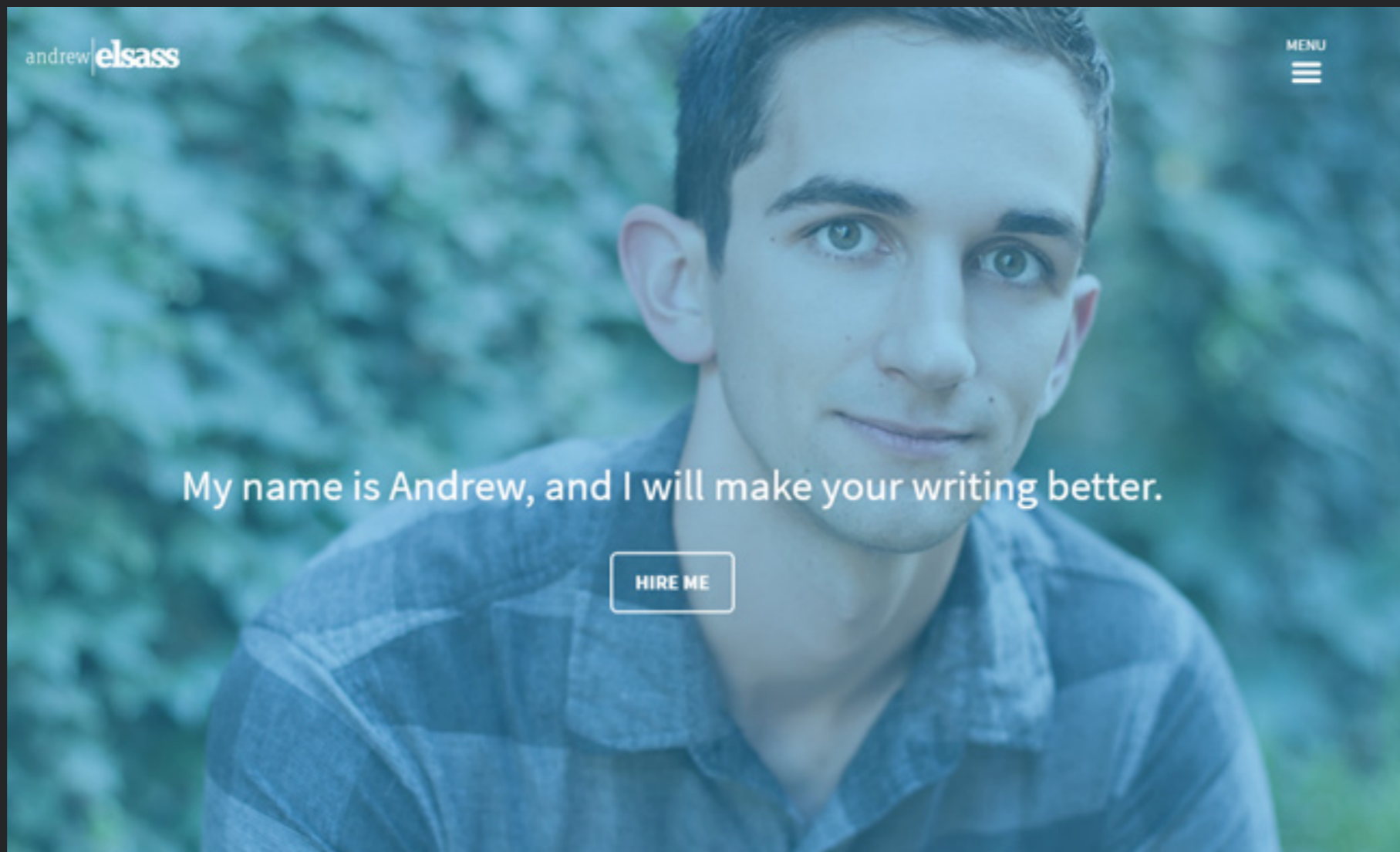


Web Design Languages Over Time



Common Visual Idioms, Circa 2016

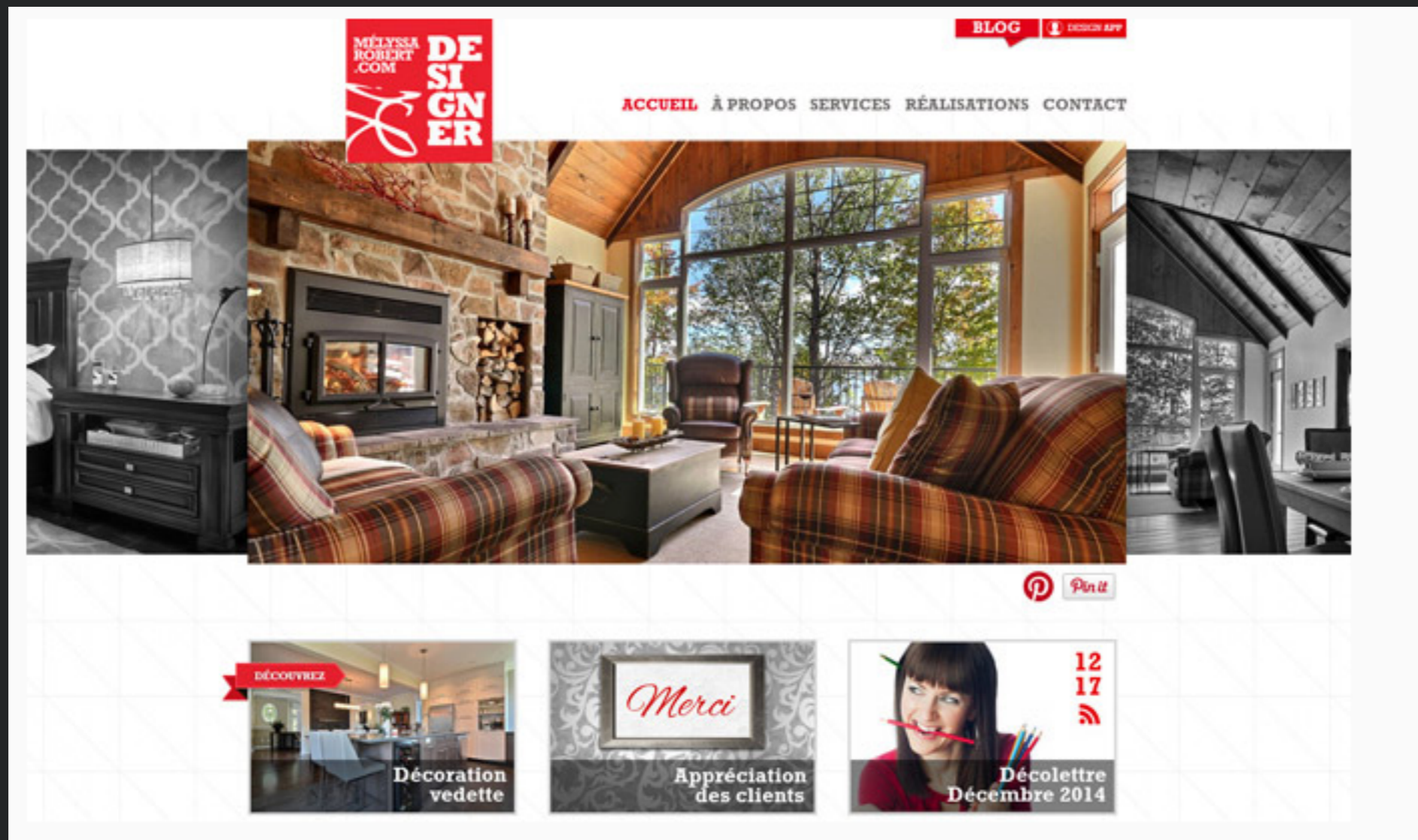
- Hero images: large attractive header image



<https://envato.com/blog/exploring-hero-image-trend-web-design/>

Common visual idioms, circa 2016

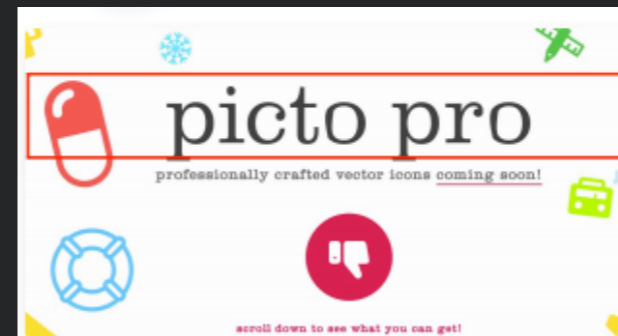
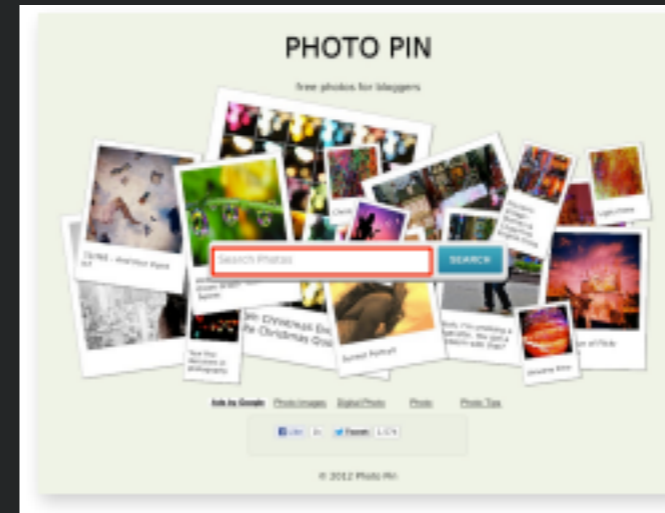
- Rotating image galleries (carousels)



<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

- Brainstorm an idea for a new company, and then design a Design Language for the new company.
- You should identify the key elements of the design language. Some of these key elements might include Typography, Colors, Translucency, and Animations.
 - For each element that you define you should identify:
 - What differentiates from other mainstream designs?
 - What does it mean/What is it's purpose?
 - In which situations can it be used?



Activity: Design a Design Language

- Some example visual design guidelines from well-known companies:
 - <https://developer.apple.com/design/human-interface-guidelines/macos/visual-design/>
 - <https://material.io/design>
 - <https://brand.gmu.edu>
 - <https://docs.microsoft.com/en-us/windows/uwp/design/>



Acknowledgements

- Slides adapted from Dr. Thomas Latoza's SWE 432 course