

SWE 632 - Design & Development of User Interfaces

Spring 2021



George Mason
University

Dr. Kevin Moran

Week 11:
Visual Design



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

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

#10 will shock you!



Administrivia

- Project Checkpoint 5 Due Today
- Project Checkpoint 6 out now, Due April 14th
(next week)
- No Discussion Question this Week!



Class Overview

1. Overview of Visual Design: What it is and Why it Matters
2. Guidelines for Visual Design: Simplicity and Regularization
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
7. 7 Minute Break
8. Group Activity: Creating a Design Language
9. Tech Talk: Figma

Overview of Visual Design





Elements of Visual Design

label

label

label

label

label

label

label

label

label

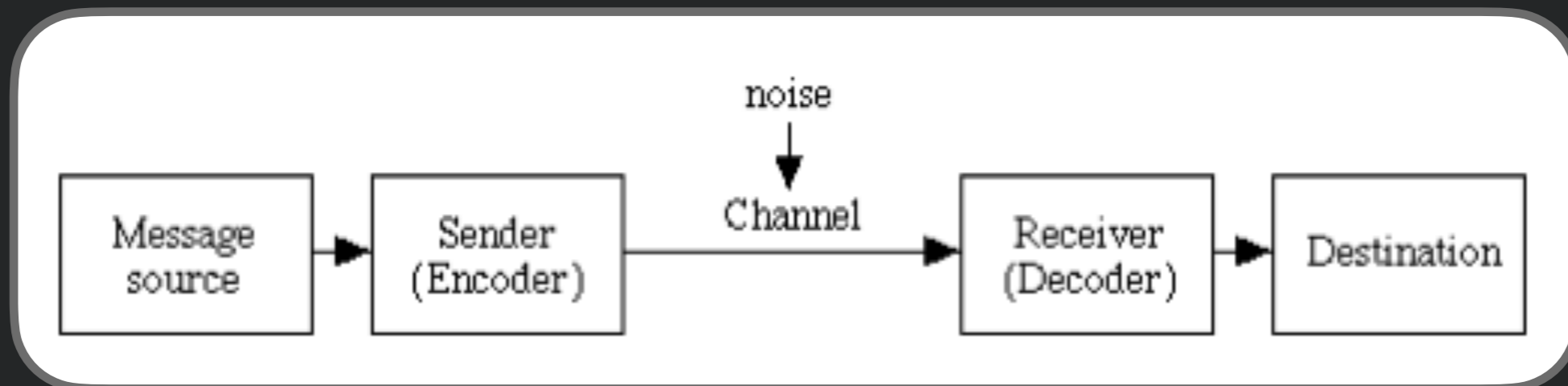


Visual Design

- 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



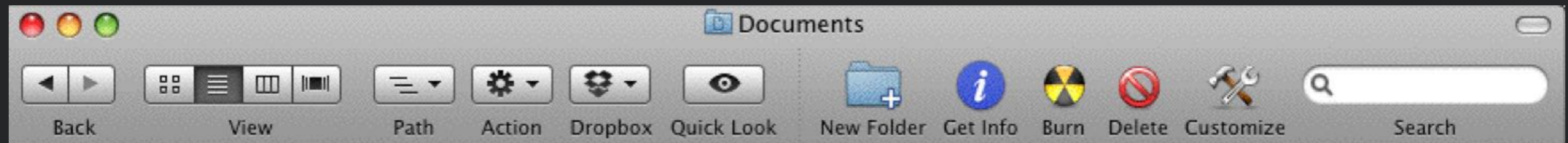
Marc Berthier. Tykho Radio. 1997. Synthetic rubber and other materials, 5 1/2 x 5 1/2 x 1 5/8" (14 x 14 x 4.1 cm). Manufactured by Lexon, France. The Museum of Modern Art, New York. Gift of the manufacturer.

Reducing a Design to its Essence

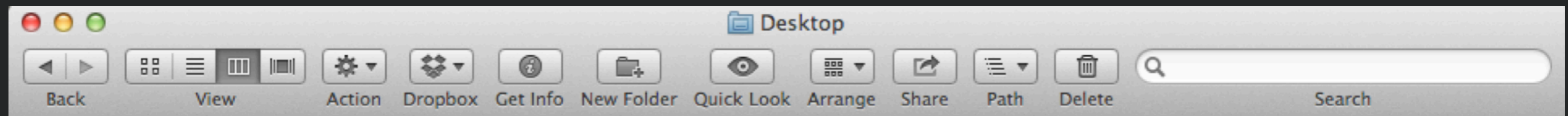


- Make design simple, bold, and direct by removing inessential details & elements
 - Even essential elements may be suggested
1. *Determine essential qualities & information to be conveyed*
 2. *Critically examine each element & ask how design would suffer without it.*
 3. *Try removing elements. What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

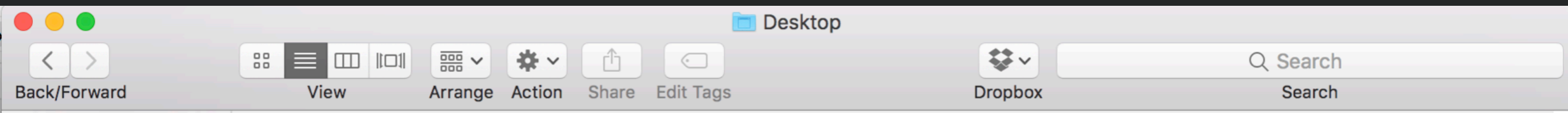
Trade-offs in Simplicity



OSX c.2010

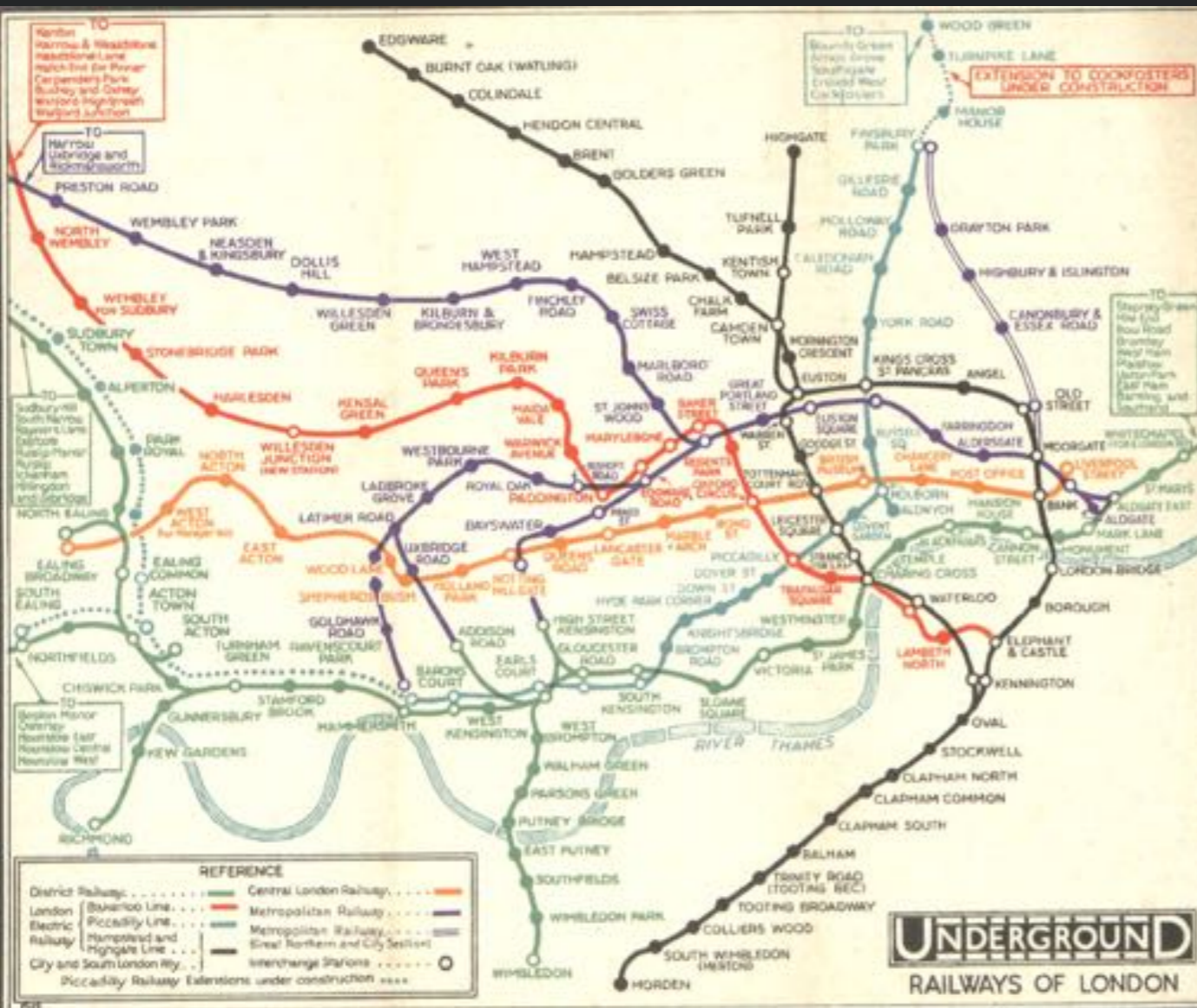


OSX c.2011



OSX c.2016

Guidelines for Visual Design



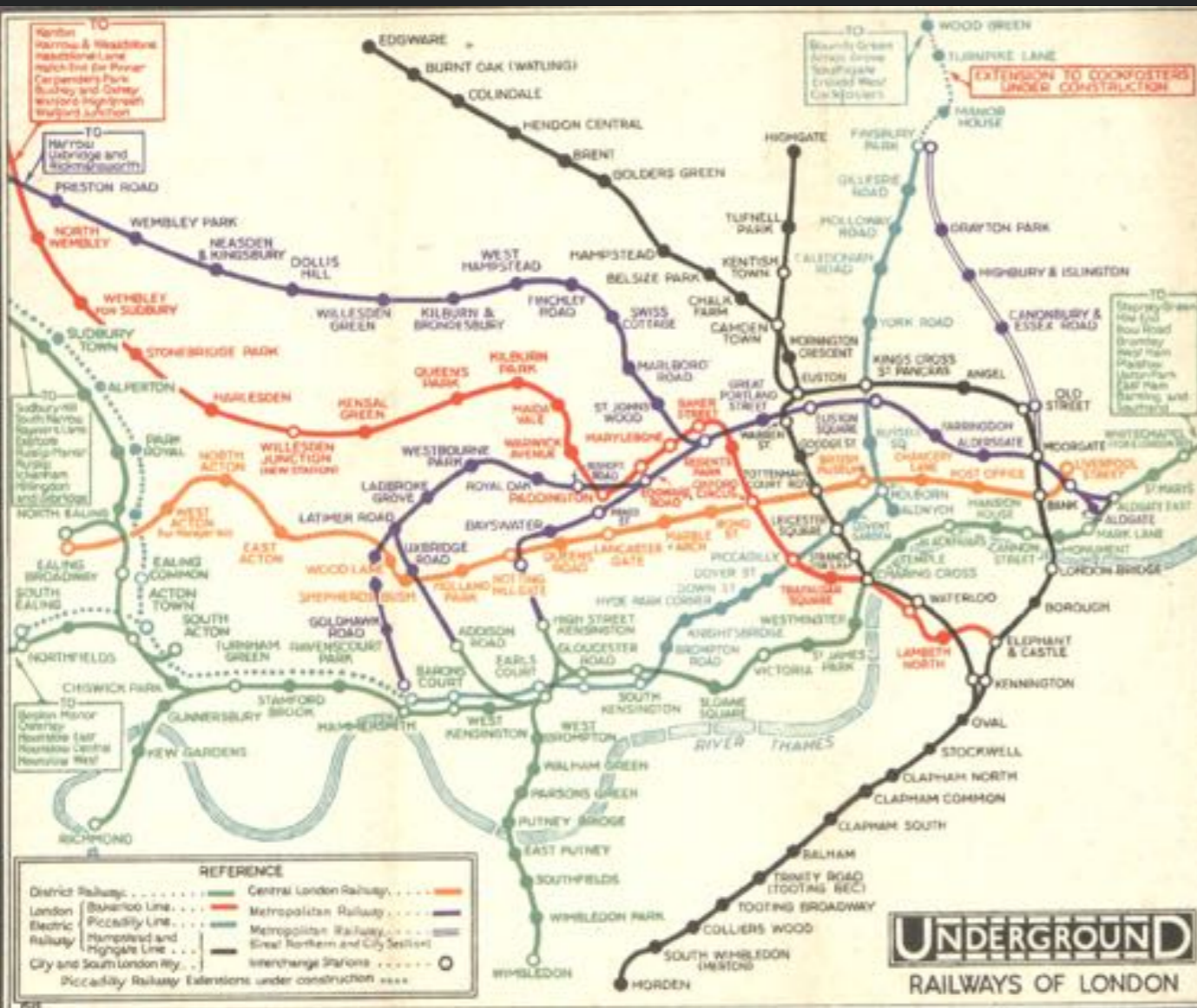
Reduction in new map: relative distances don't matter



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

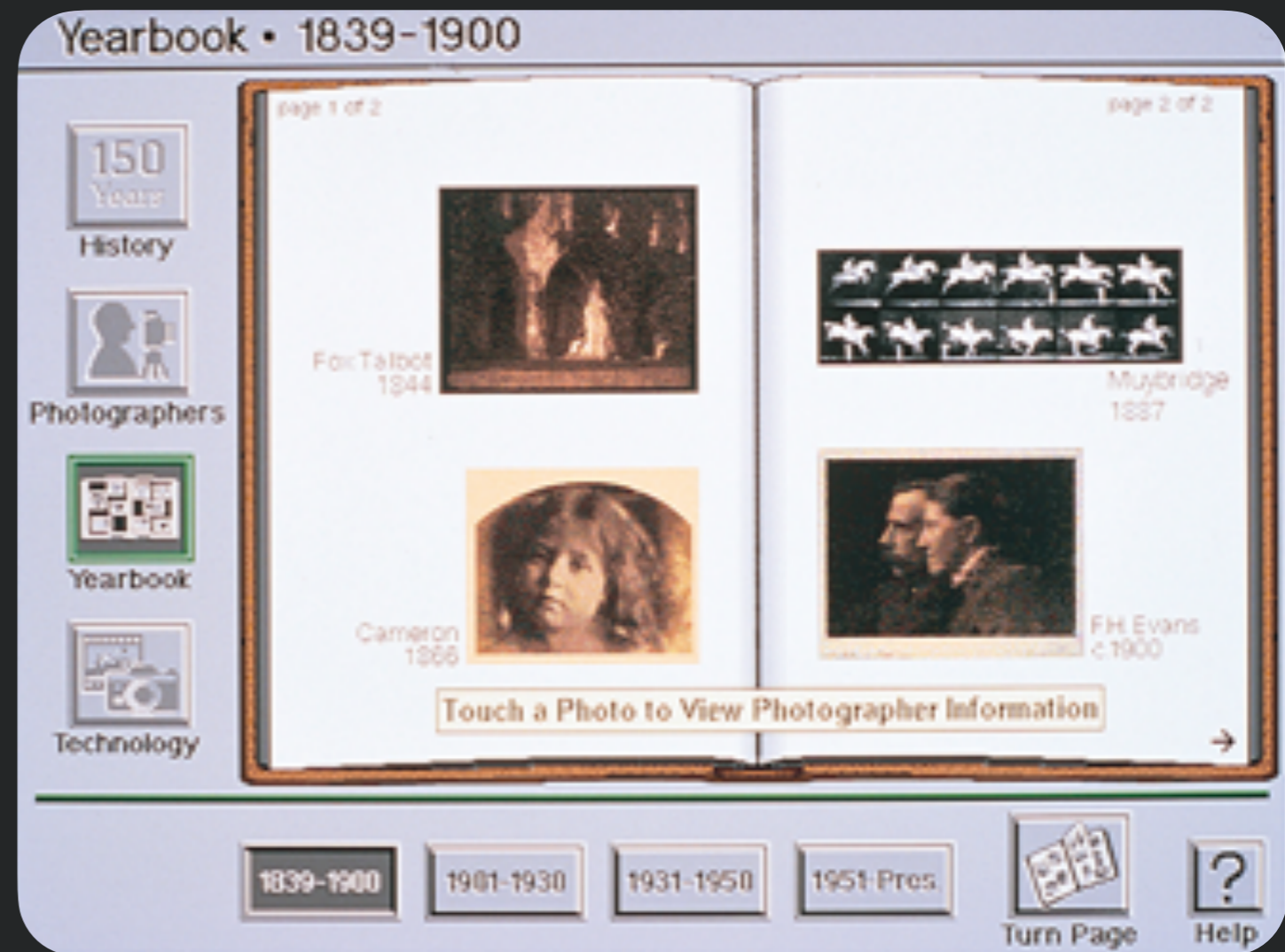
Guidelines for Visual Design



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

Continues 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

← 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	<small>None</small>				
20 <ul style="list-style-type: none">SWE meeting	21 <ul style="list-style-type: none">Office HoursSWE 432	22 <ul style="list-style-type: none">11:30 AMNone	23 <ul style="list-style-type: none">SWE 432	24 <ul style="list-style-type: none">None	25	26
27	28 <ul style="list-style-type: none">Office HoursSWE 432	29 <ul style="list-style-type: none">11:30 AMNone	30			
				Dec 1 <ul style="list-style-type: none">None	2	3
4	5 <ul style="list-style-type: none">Office HoursSWE 432	6 <ul style="list-style-type: none">11:30 AMNone	7 <ul style="list-style-type: none">SWE 432	8 <ul style="list-style-type: none">None	9	10
11	12 <ul style="list-style-type: none">Office Hours	13 <ul style="list-style-type: none">11:30 AM	14	15	16	17

Scale, Contrast, & Proportion



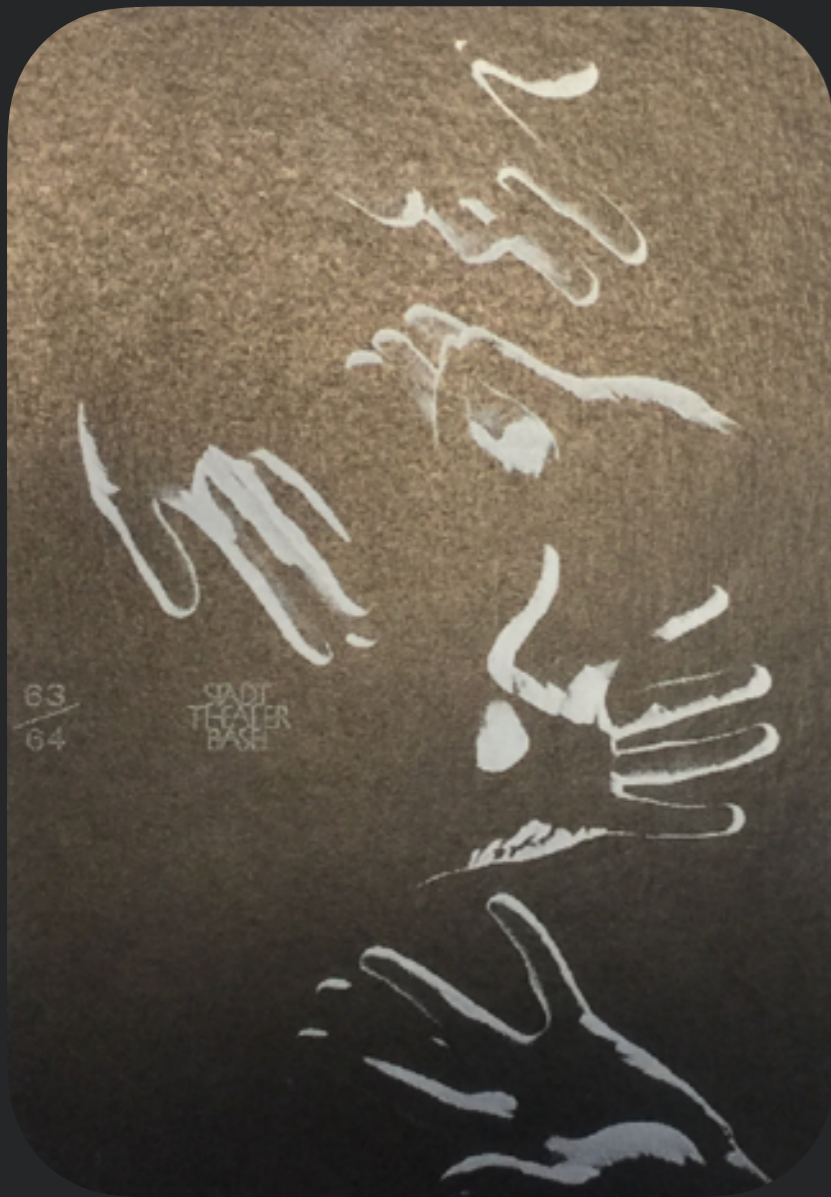


Scale, Contrast, & Proportion

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

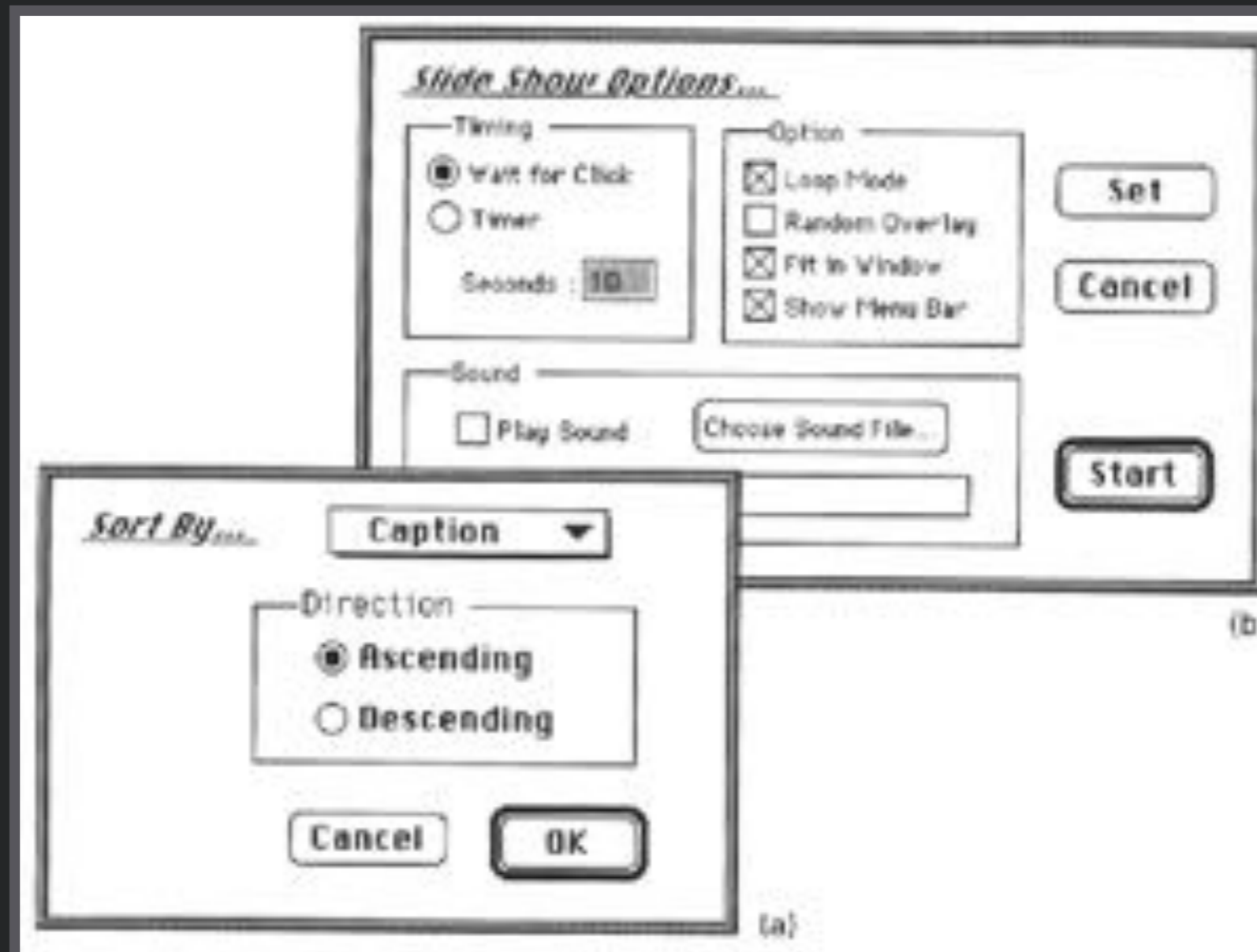


Principles

- **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



Layers





Organization & Structure



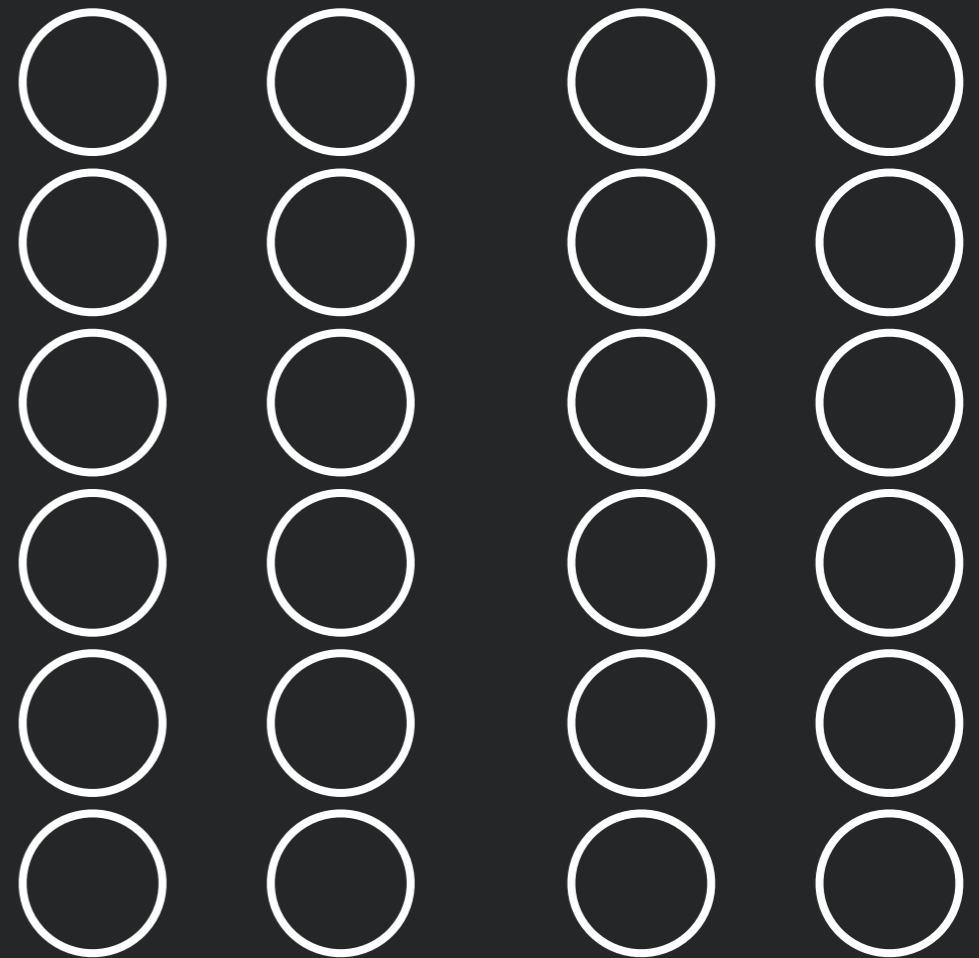
Organization & Structure

- 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

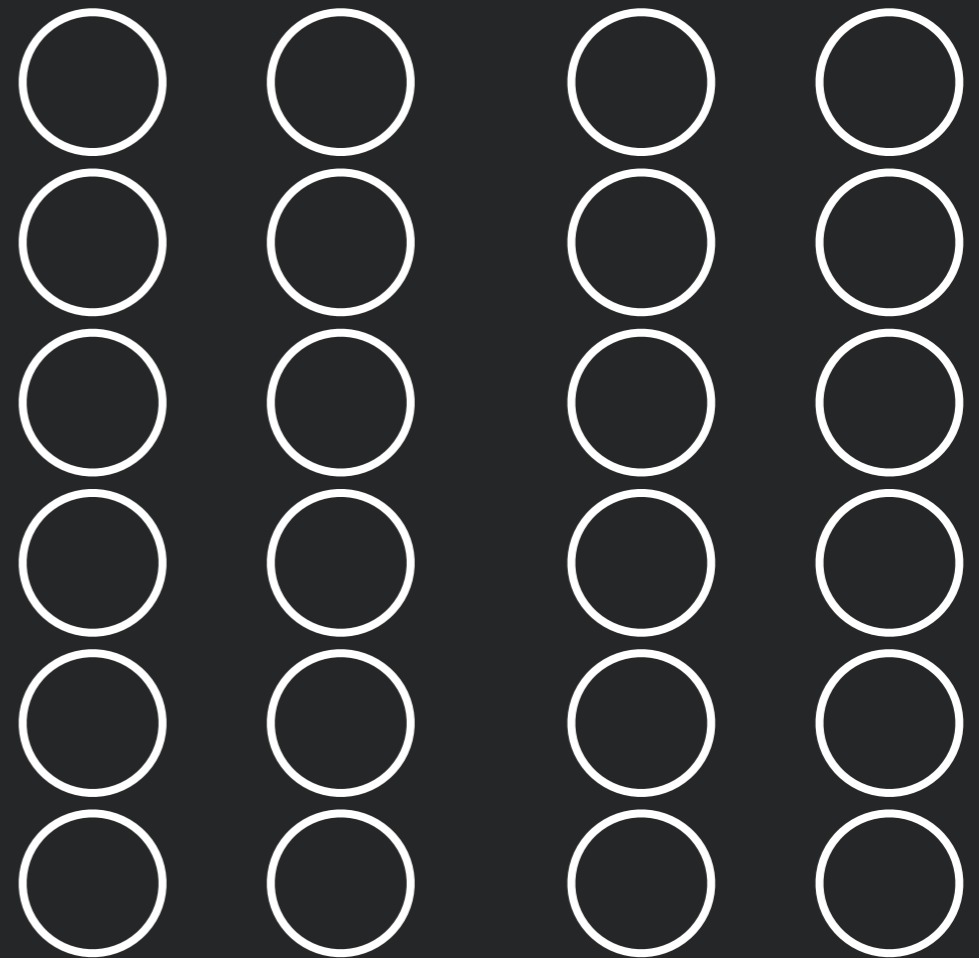
- Elements associated most strongly w/ nearby elements



Gestalt Principle - Proximity

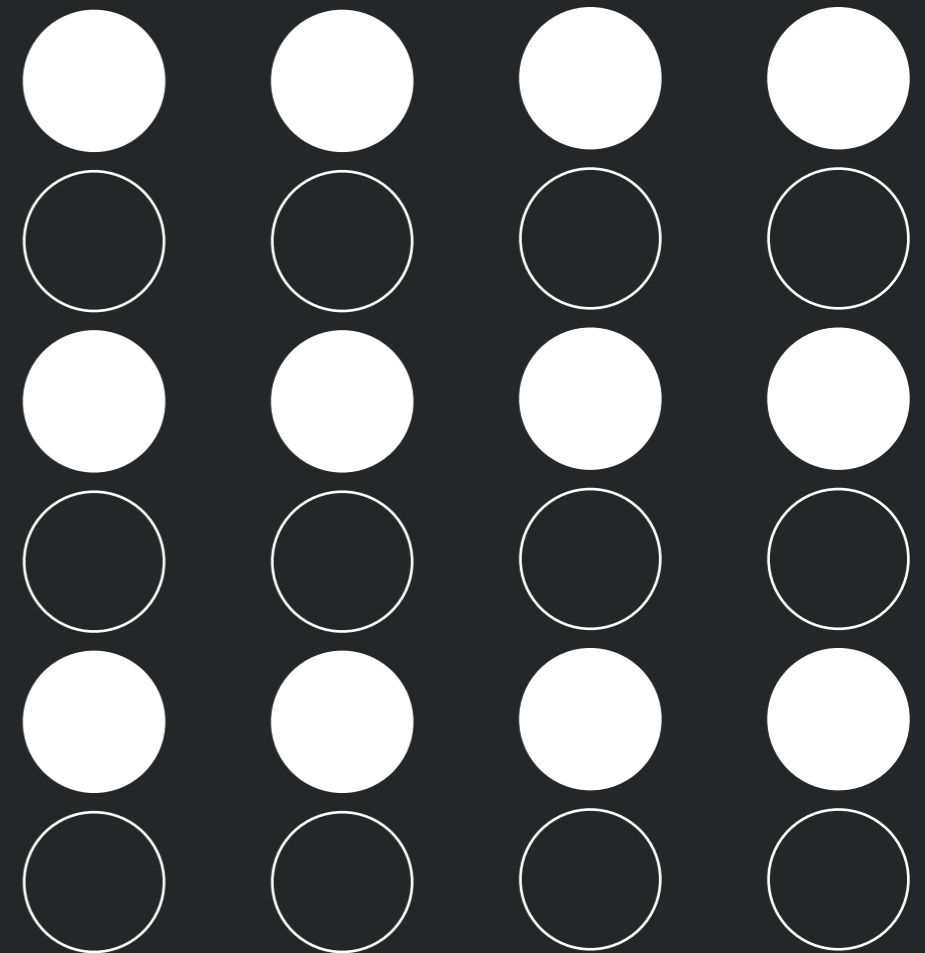
- Elements associated most strongly w/ nearby elements

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



Gestalt Principle - Similarity

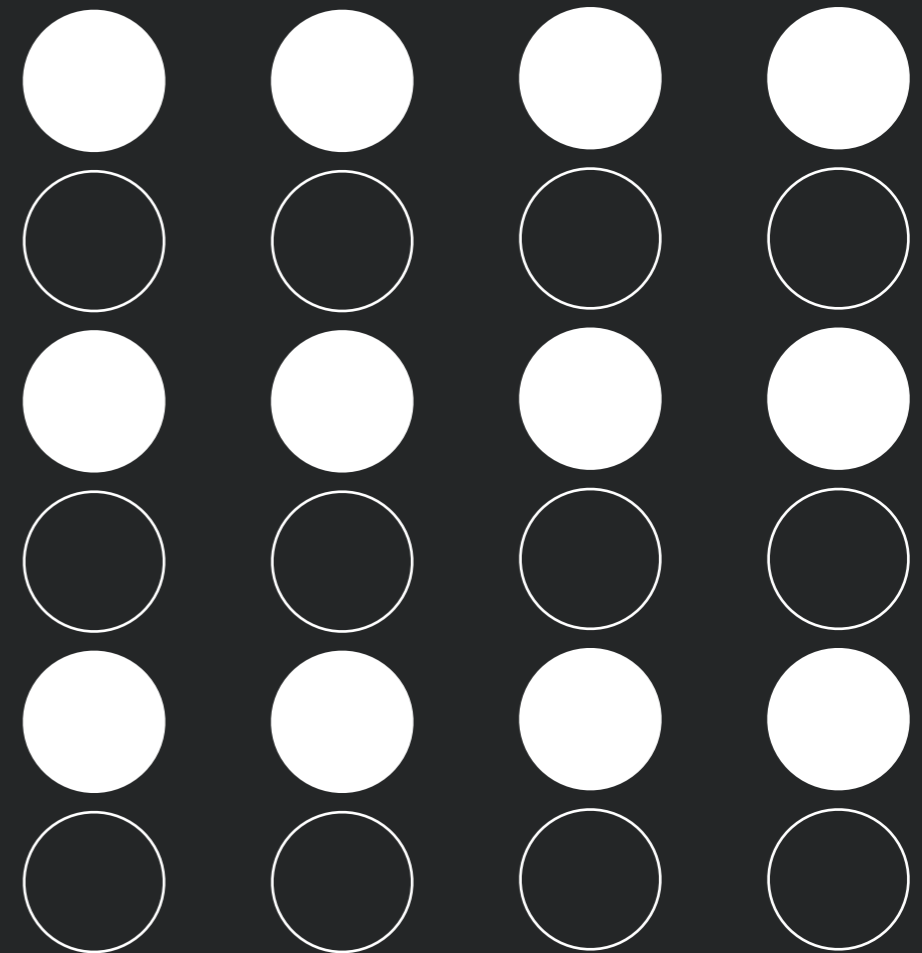
- Elements associated more strongly when share common visual attributes than when they differ



Gestalt Principle - Similarity

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

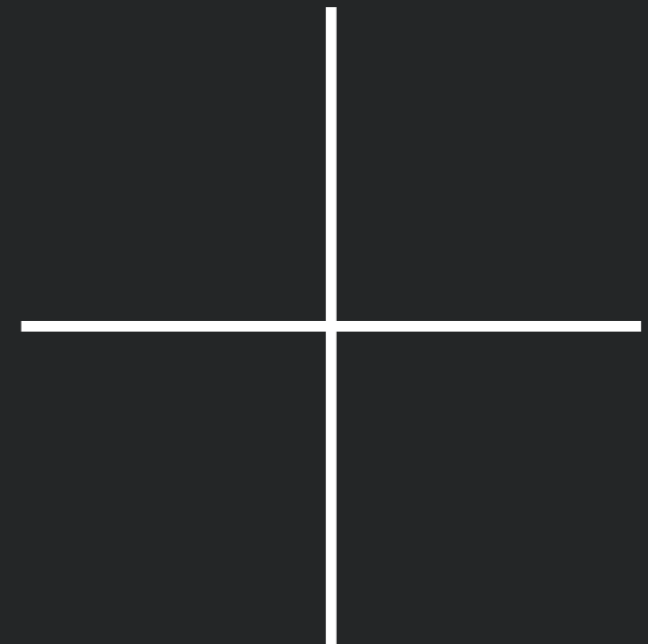
parsed as rows based on fill similarity,
despite closer column spacing





Gestalt Principle - Continuity

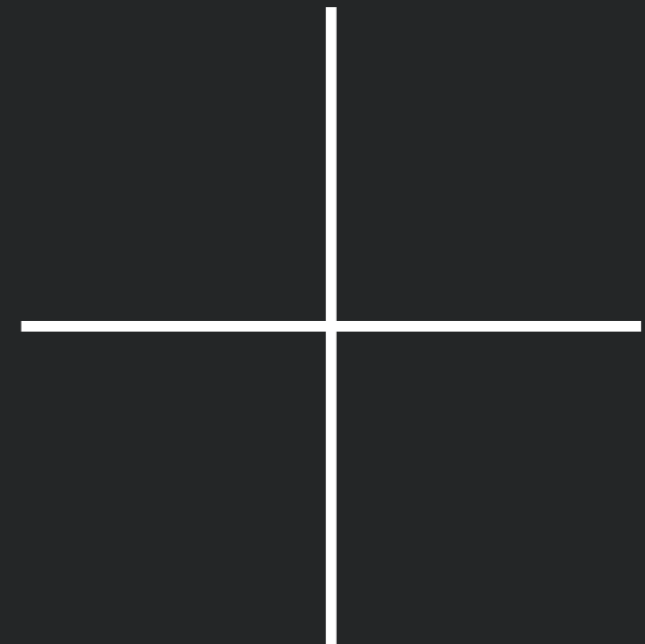
- Preference for *simplest* physical explanation of complex figure



Gestalt Principle - Continuity

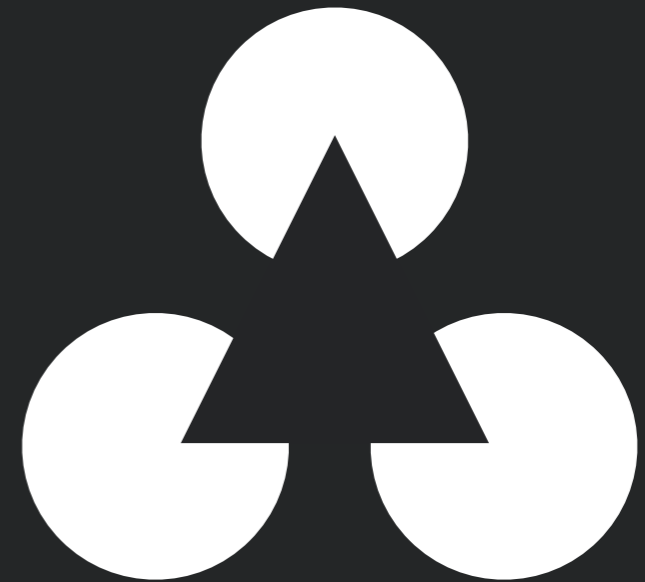
- Preference for *simplest* physical explanation of complex figure

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



Gestalt Principle - Closure

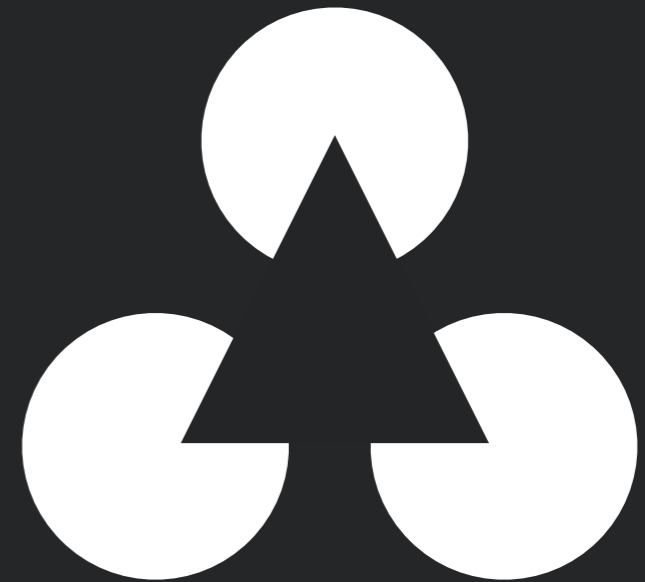
- Preference to interpret figures as complete, even when missing information



Gestalt Principle - Closure

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

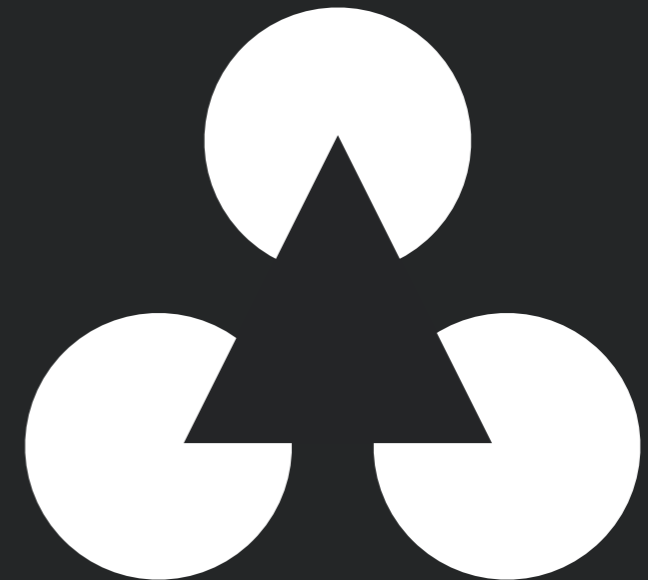
Parsed as triangle superimposed on 3 complete circles, even though none of these is actually present



Gestalt Principle - Closure

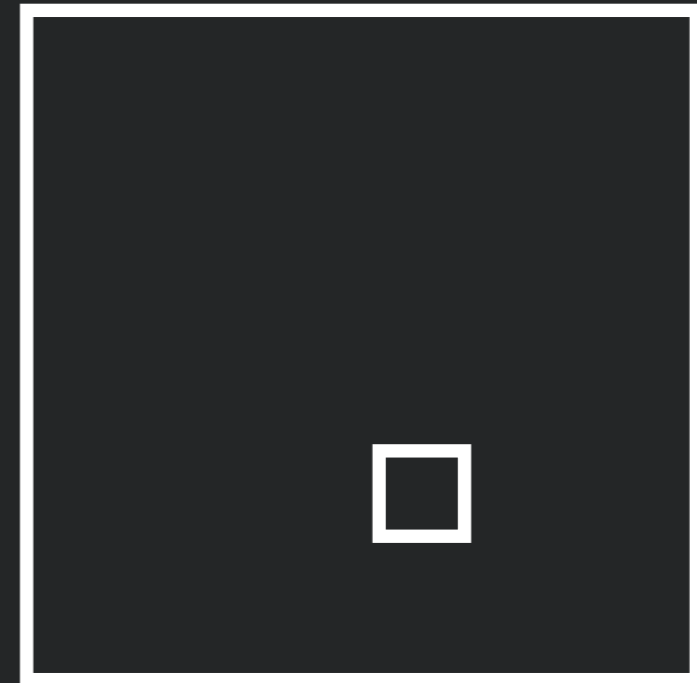
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Gestalt Principle - Area

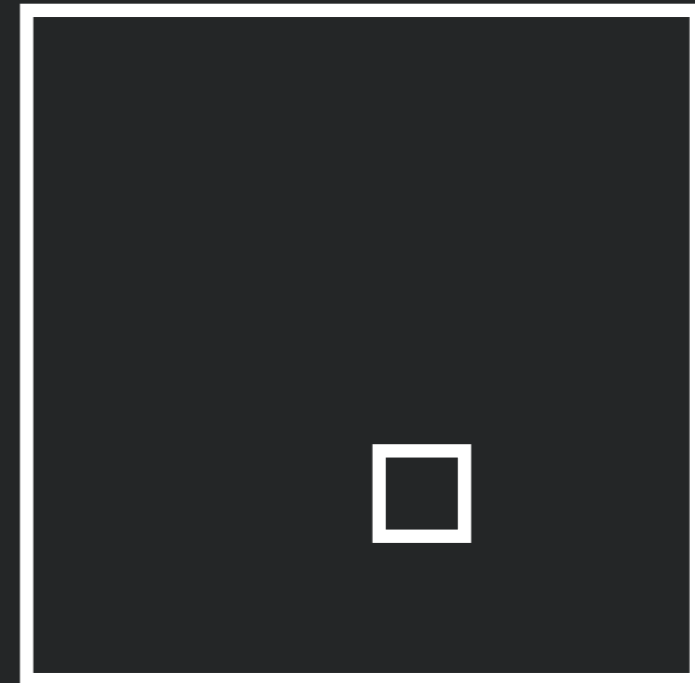
- Preference to interpret smaller overlapping elements as figure, larger as ground



Gestalt Principle - Area

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

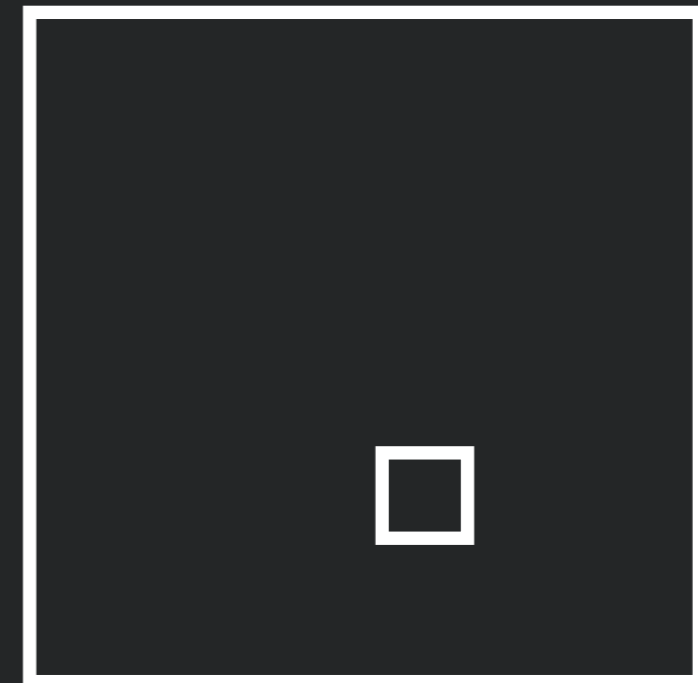
Small rectangle parsed as small rectangle
on top of larger, rather than hole



Gestalt Principle - Area

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

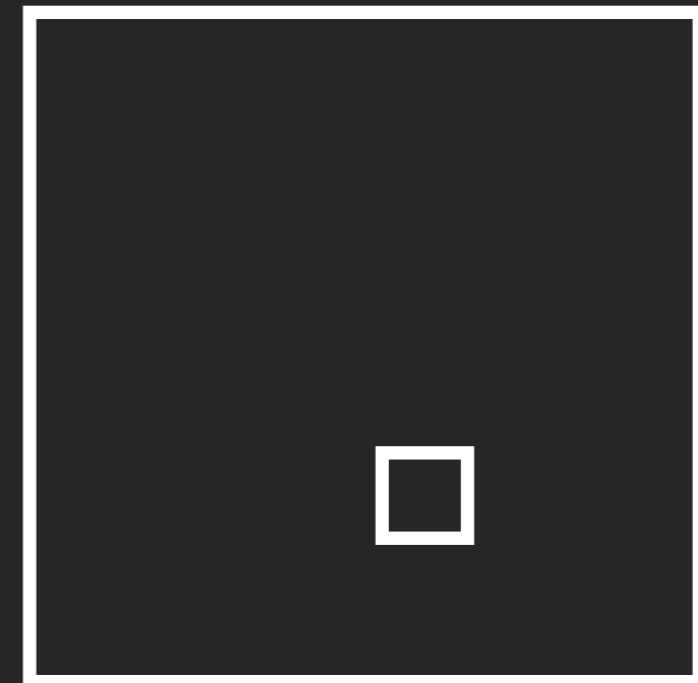
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Gestalt Principle - Area

- 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

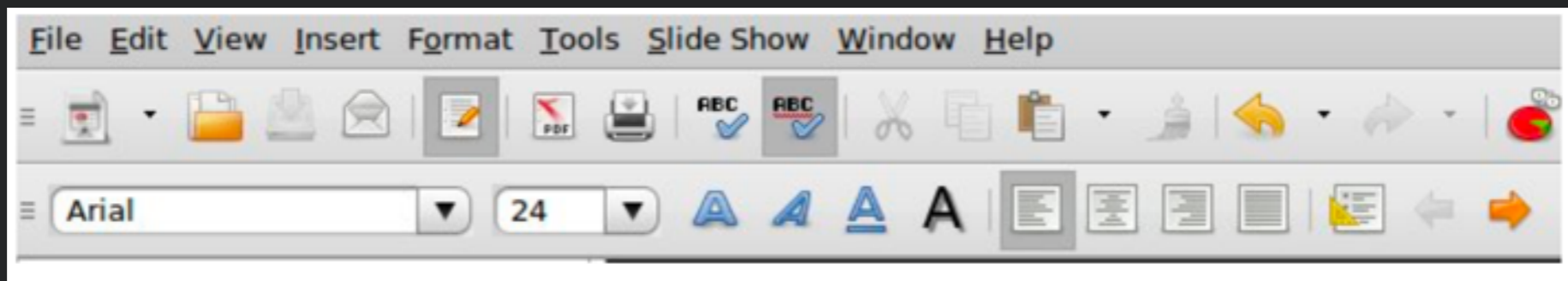
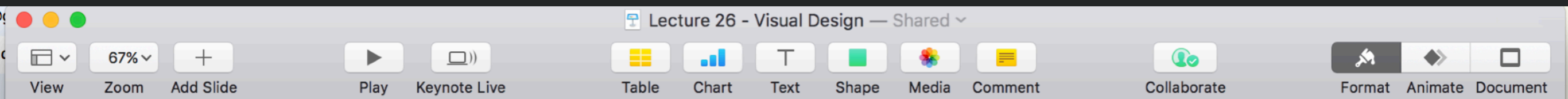
- Preference to interpret ambiguous form as multiple symmetric elements

Parsed as two overlapping objects rather than 3 separate shapes



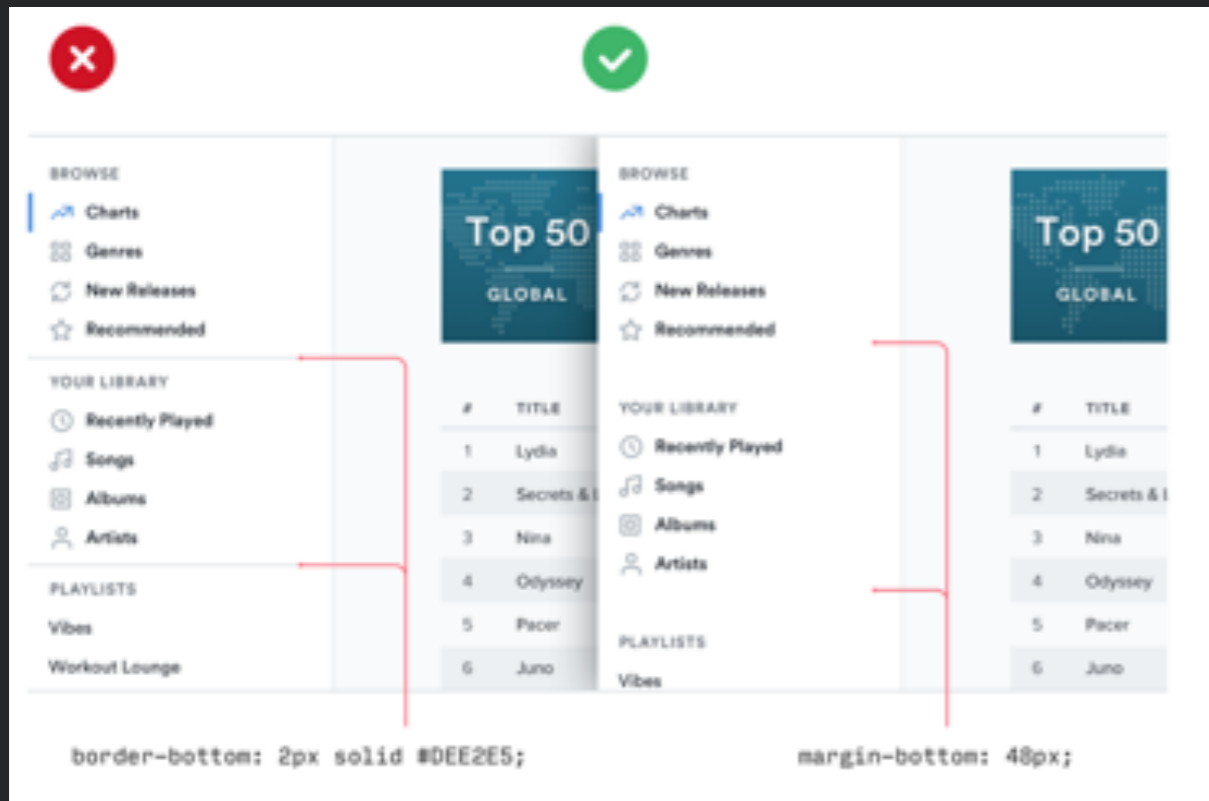
Grouping

- 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

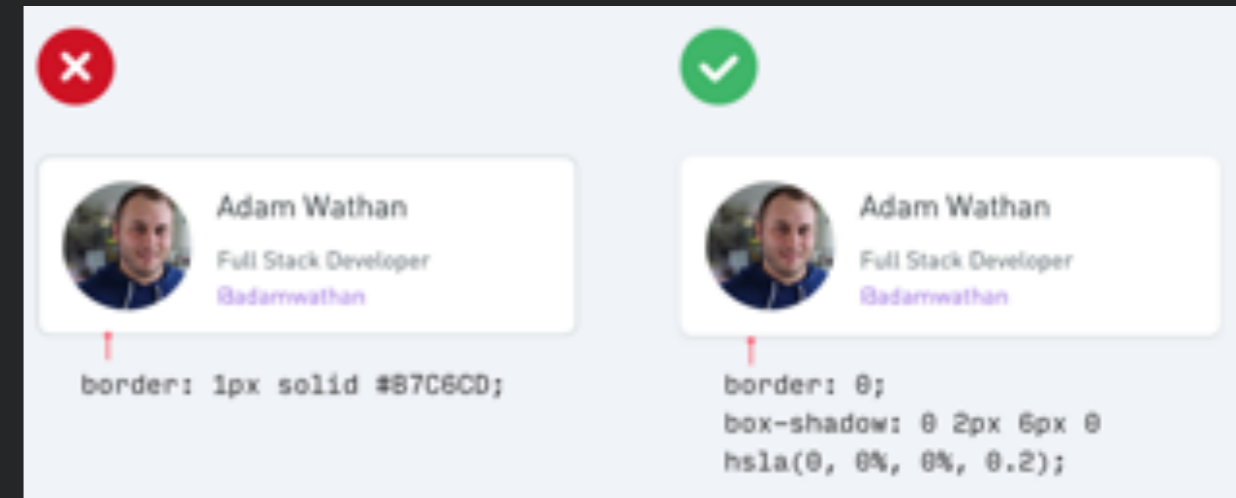


Use Fewer Borders

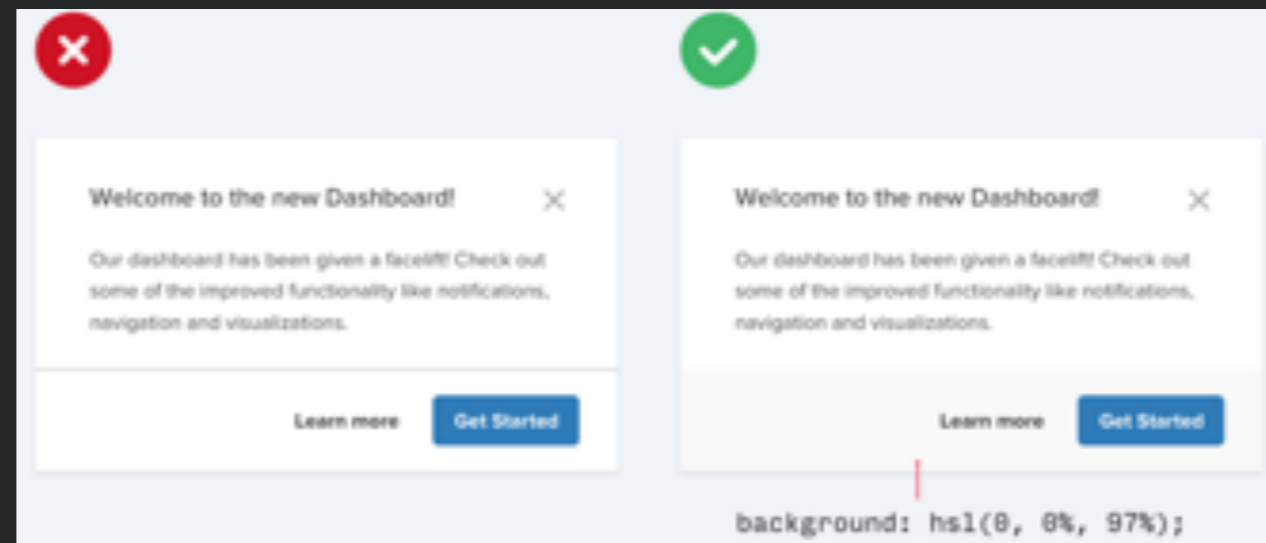
<https://medium.com/refactoring-ui/7-practical-tips-for-cheating-at-design-40c736799886>



negative space



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.**

Hierarchy

Order groups based on perceptual prominence corresponding to intended reading sequence

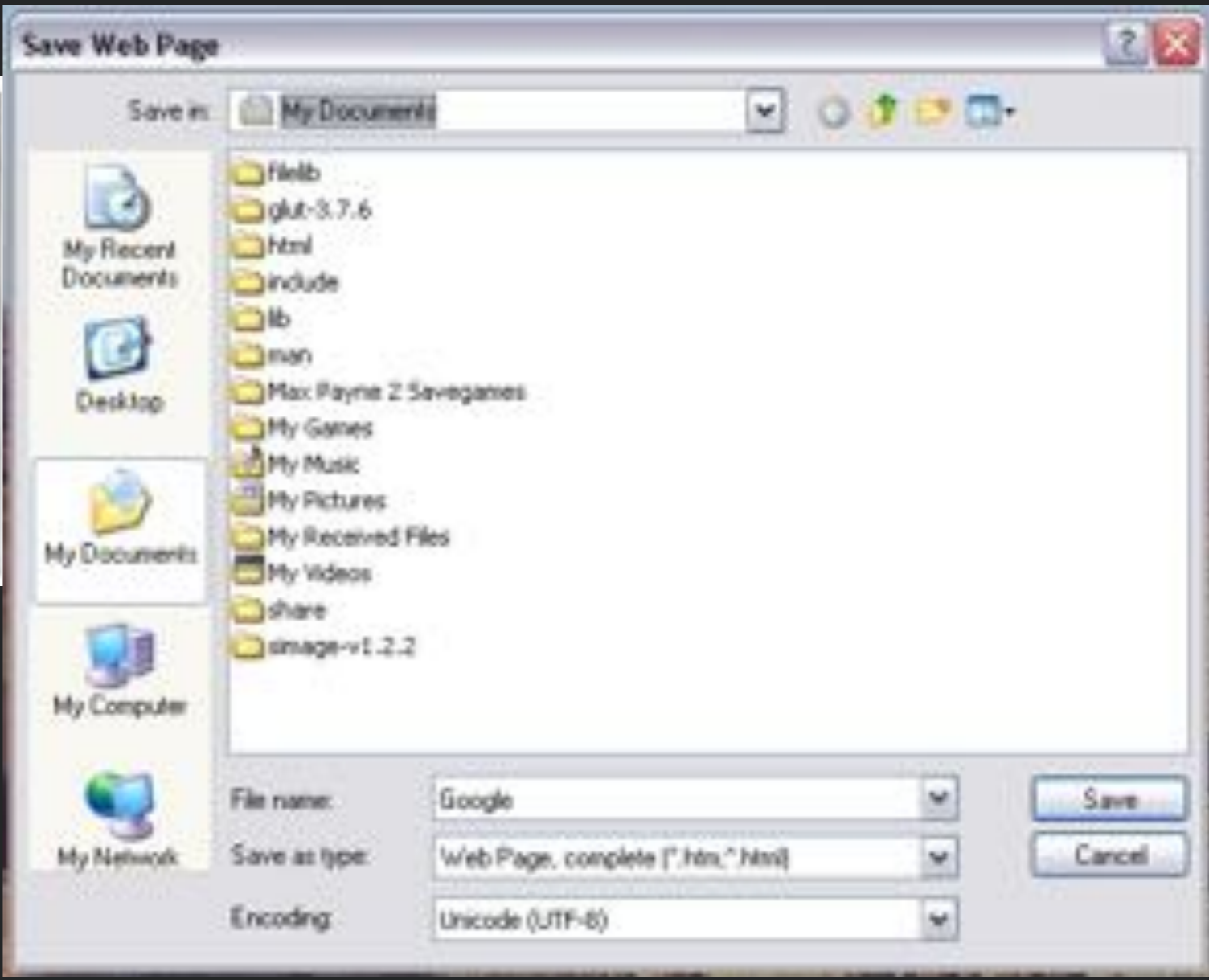
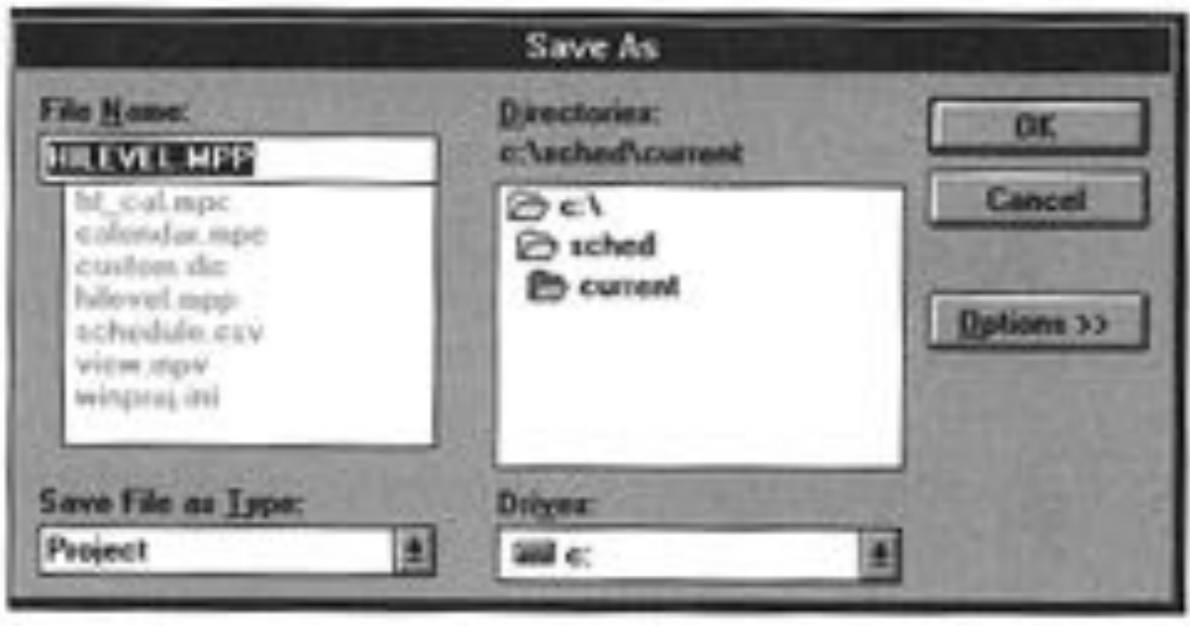
Can help solve “skimming” problems

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



Use Negative Space

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 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

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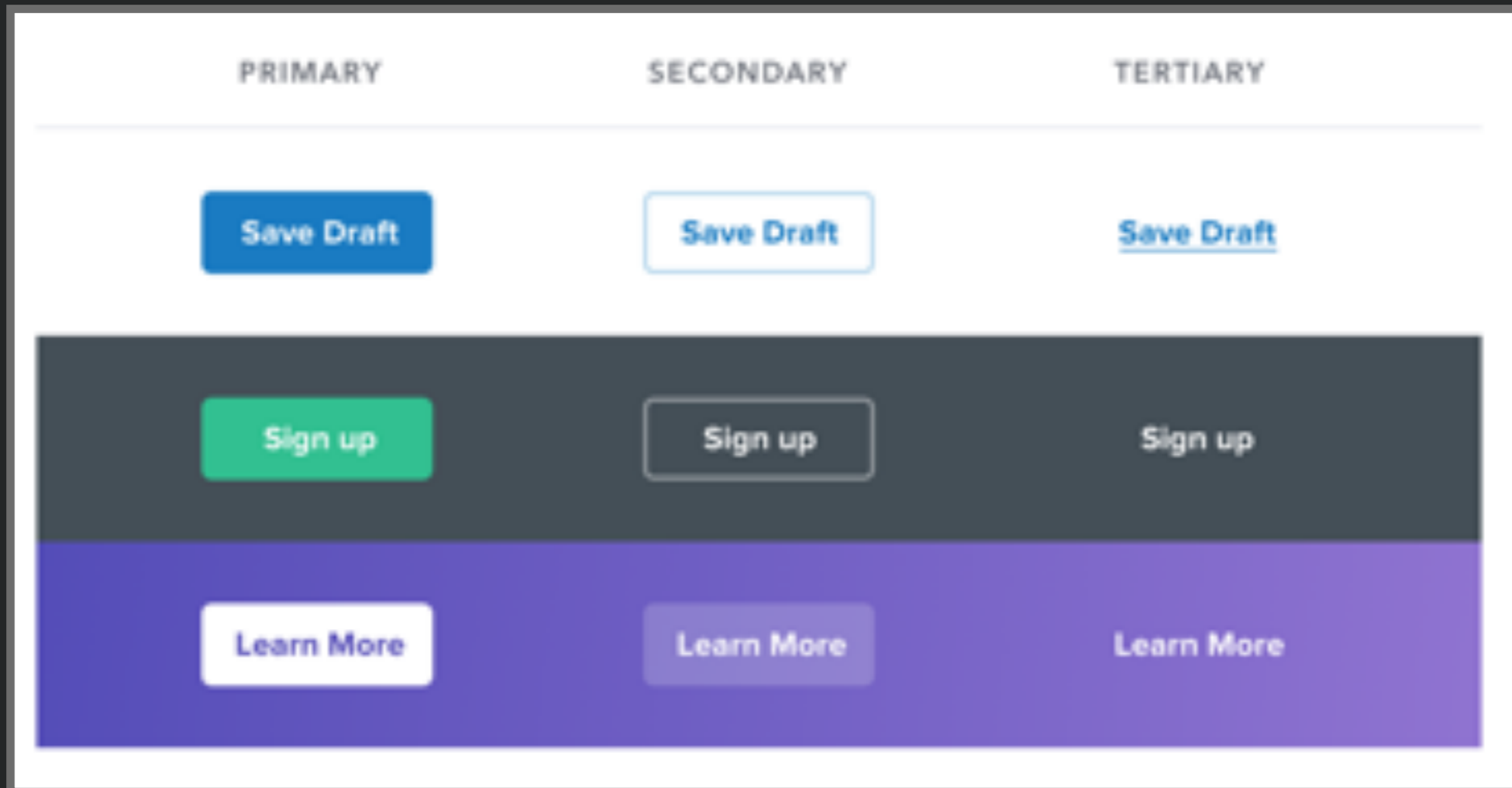
*Prices may vary depending on selected date.

Book now

Lighter not smaller



Signal Importance of Action



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

Images & Icons





Images & Icons

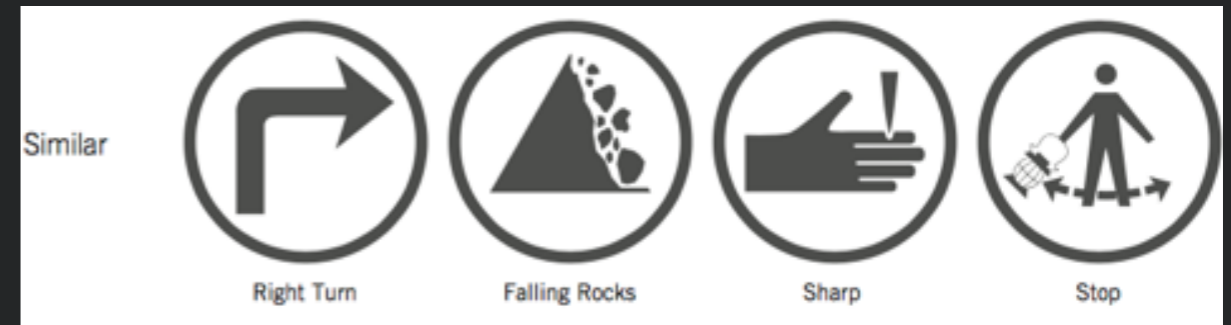
- Benefits
 - Identification - images are easy to recognize
 - Expression - breadth of artistic expression that can make design more engaging & enjoyable



Types of Iconic Representation

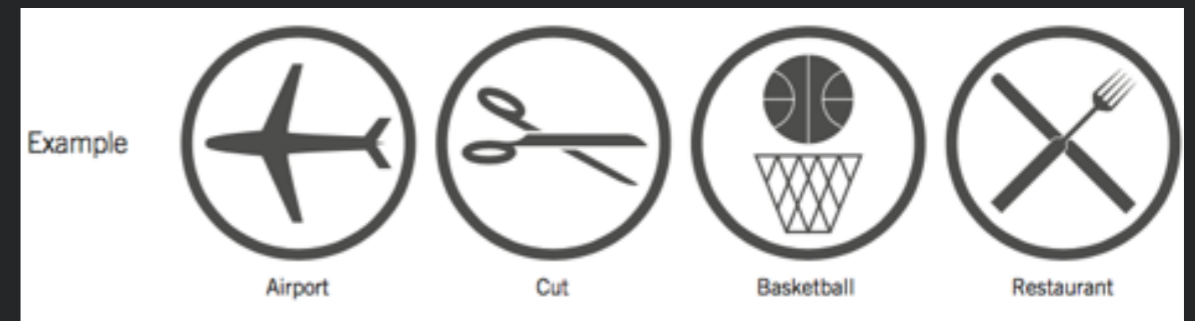
Types of Iconic Representation

- Similar - visually *analogous* to action, object, concept



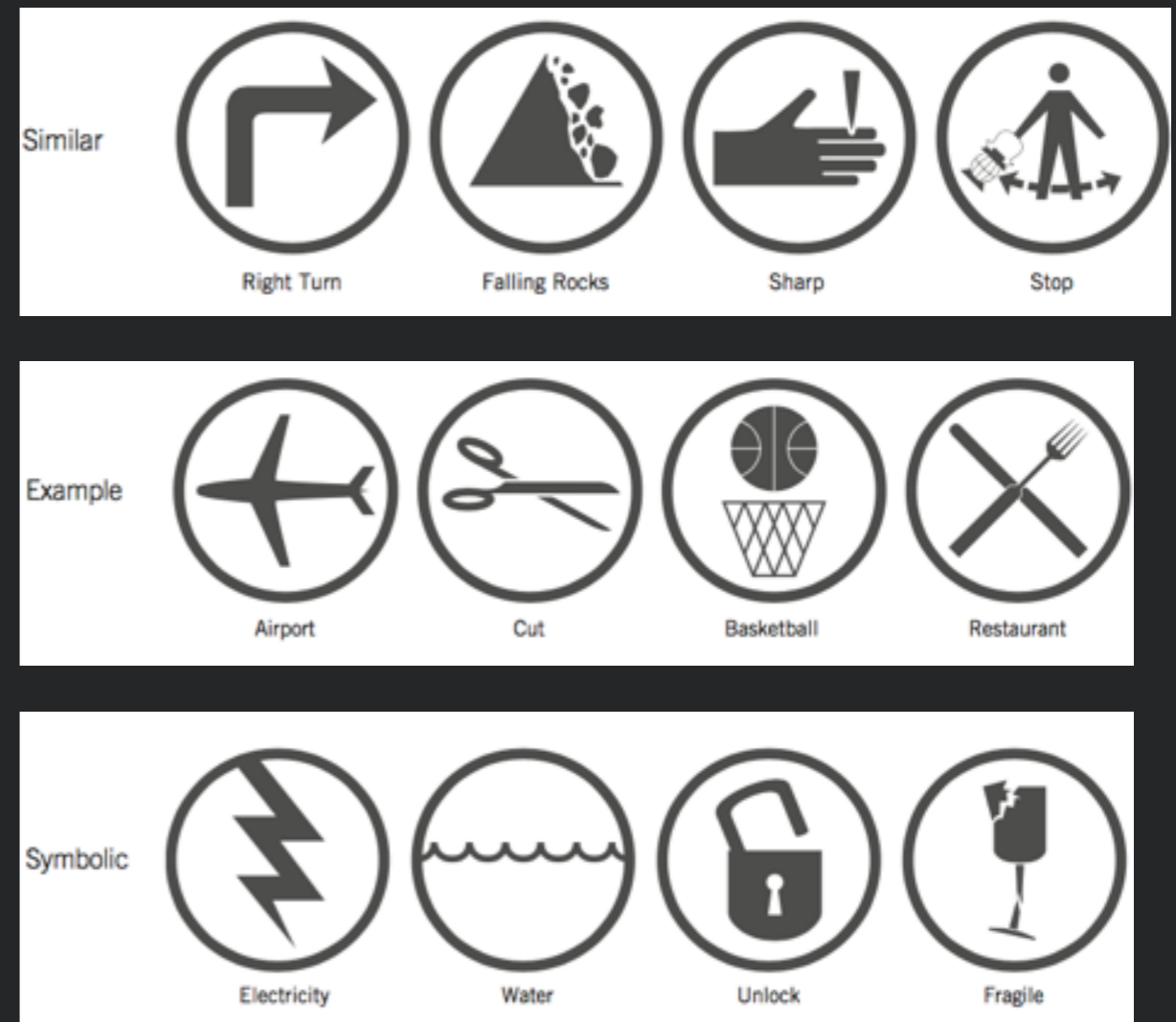
Types of Iconic Representation

- Similar - visually *analogous* to action, object, concept
- Example - things that exemplify or are commonly associated



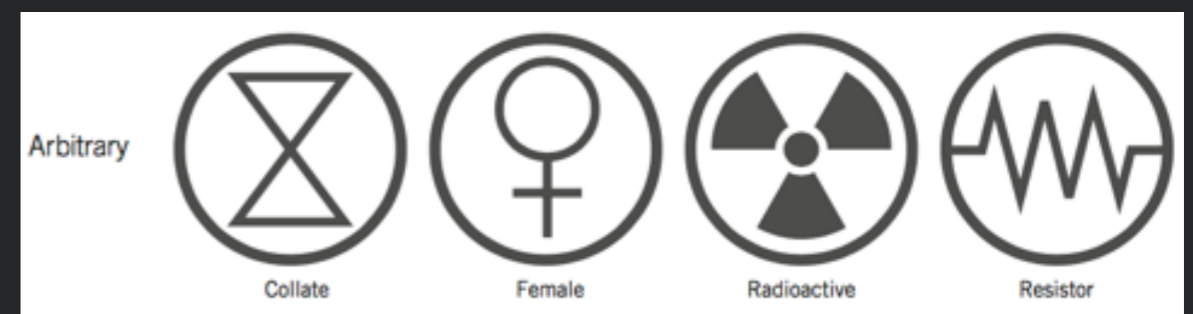
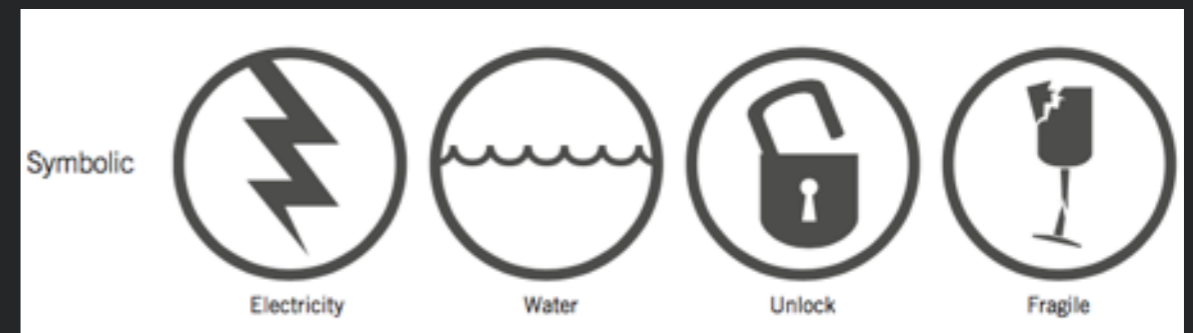
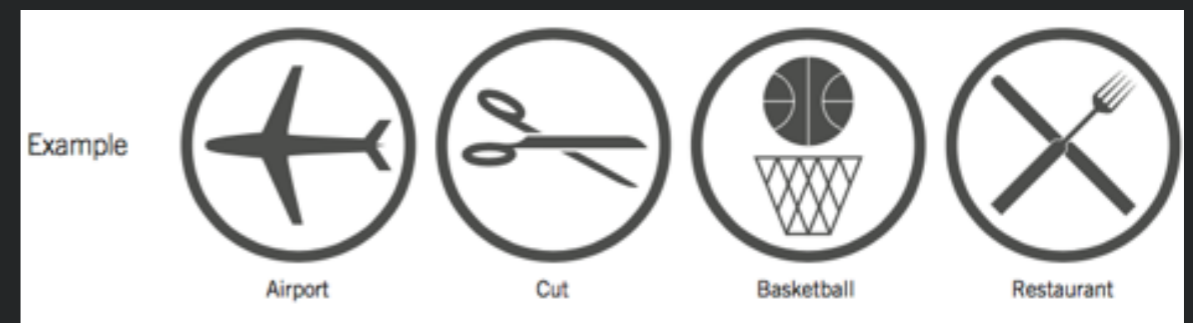
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- Similar - visually *analogous* to action, object, concept
 - Example - things that exemplify or are commonly associated
- Symbolic - represent concept at higher level of *abstraction*



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*



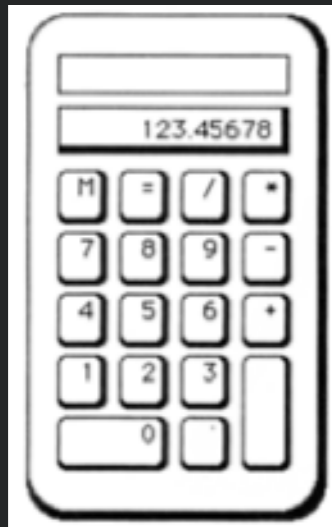


Use of Abstraction

- 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

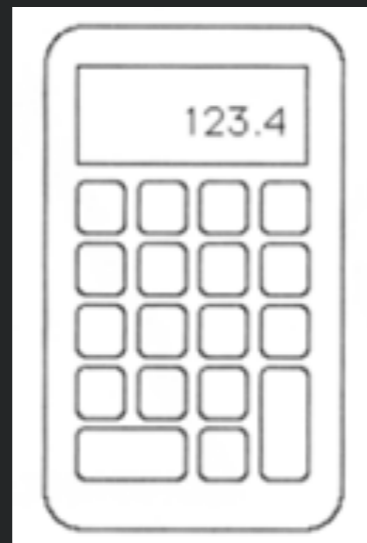
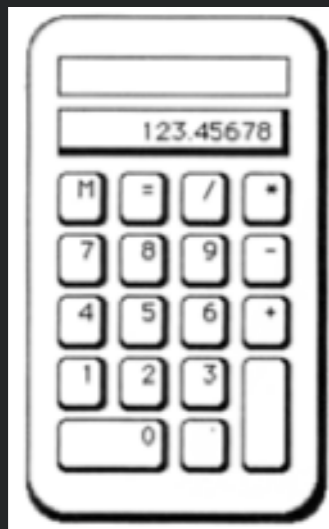
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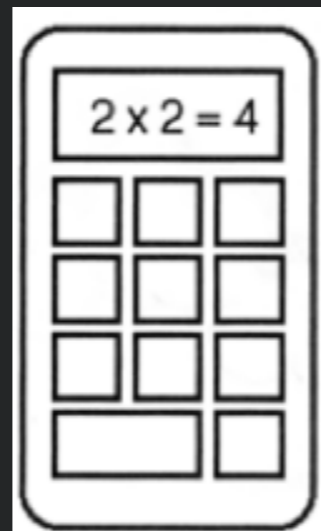
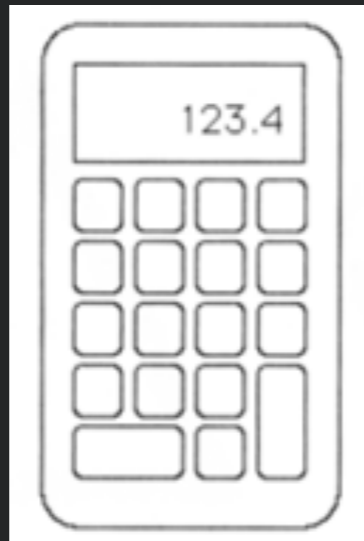
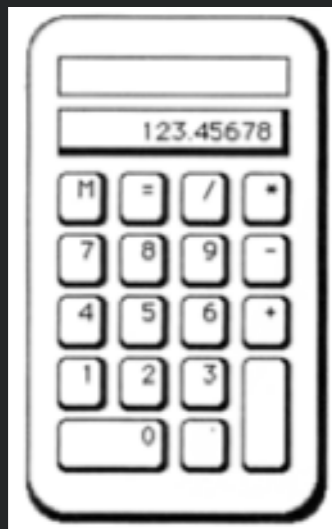
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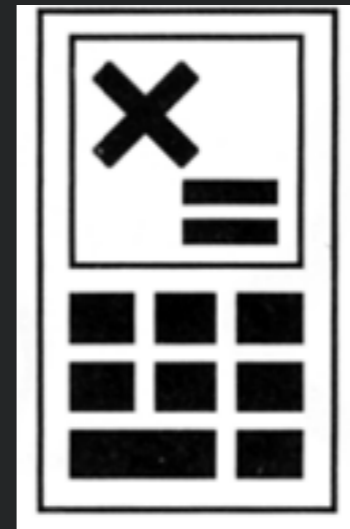
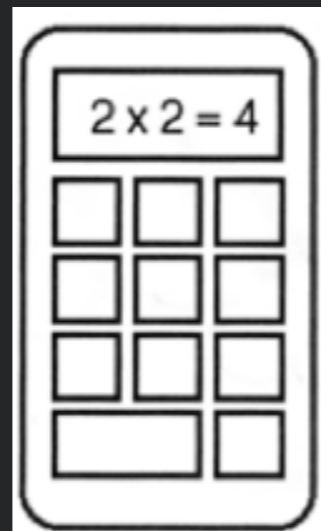
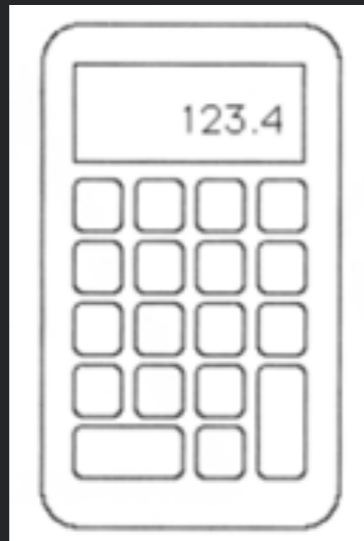
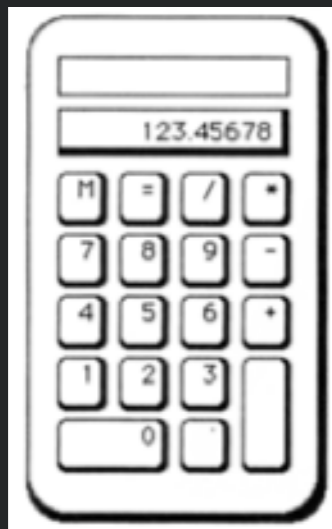
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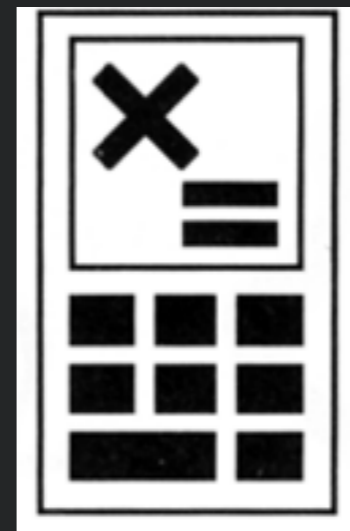
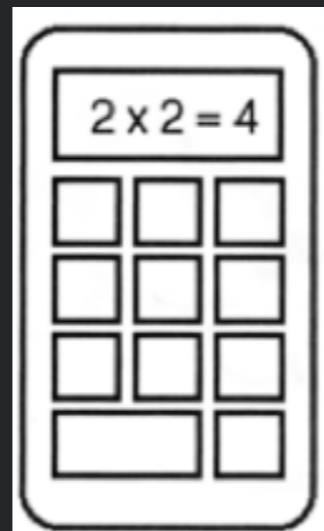
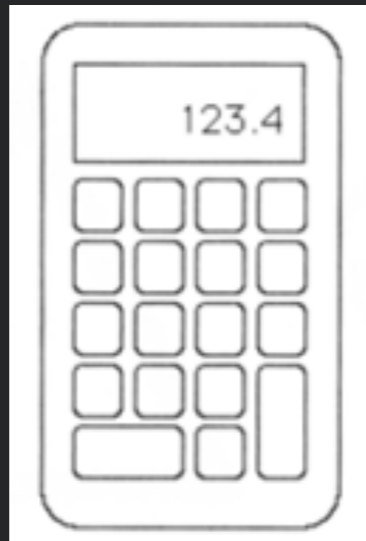
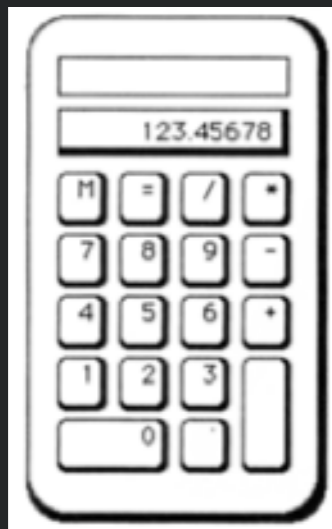
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Principles of Icon Design

Principles of Icon Design



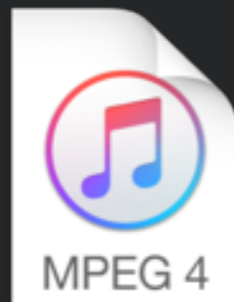
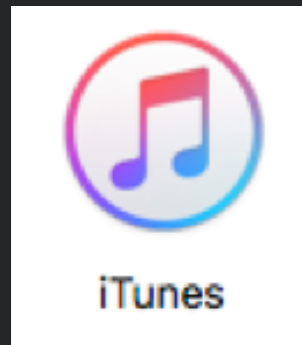
- Immediacy - can be perceived effortlessly & involuntarily by being **bold**, clear, balanced

Principles of Icon Design



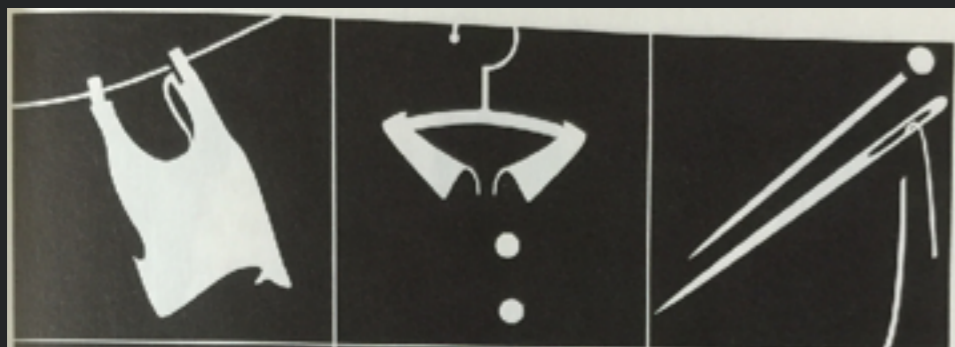
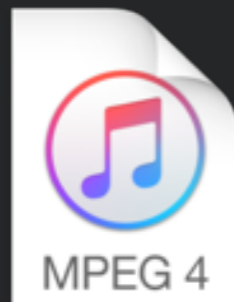
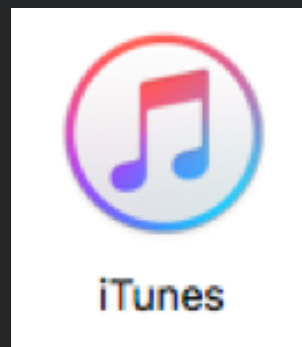
- Immediacy - can be perceived effortlessly & involuntarily by being **bold**, clear, balanced
- Generality - represents a **class** of items, rather than an individual element, by removing details that may vary

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

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

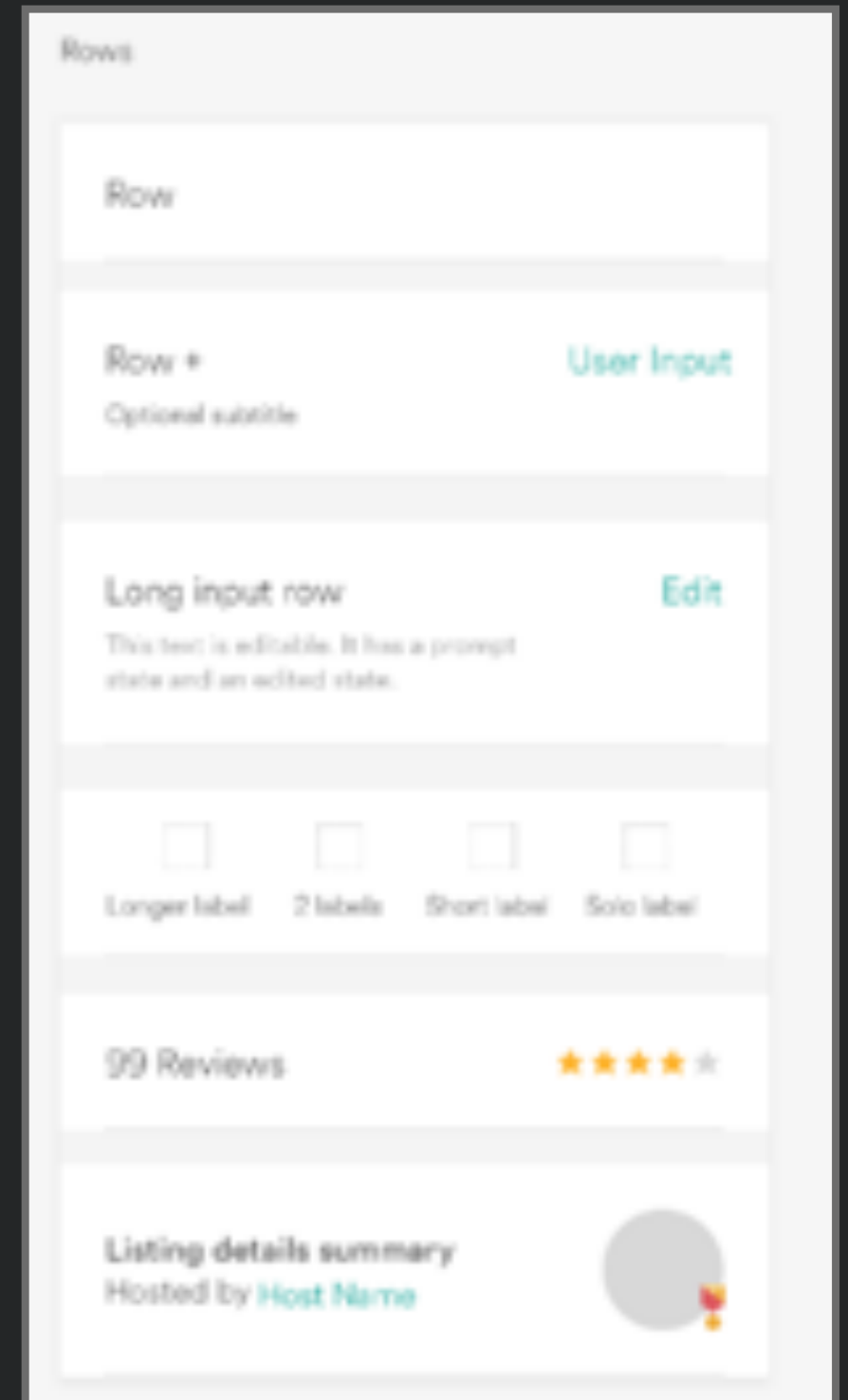


Design Languages



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

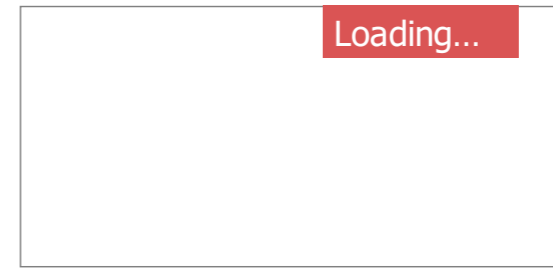
task

Find results

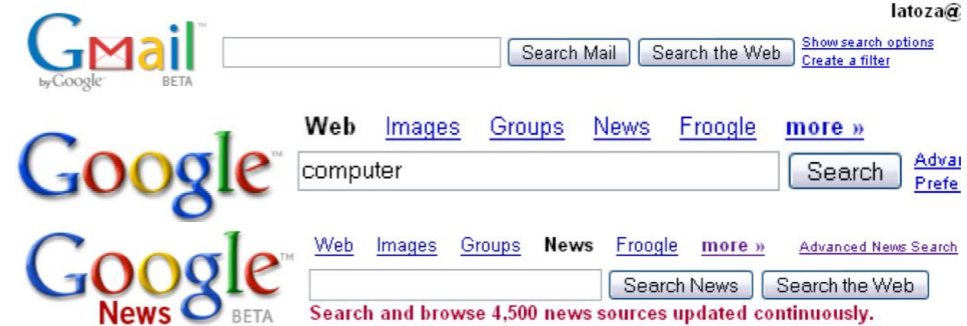
with **all** of the words
with the **exact phra**
with **at least one** of
without the words



placeholder



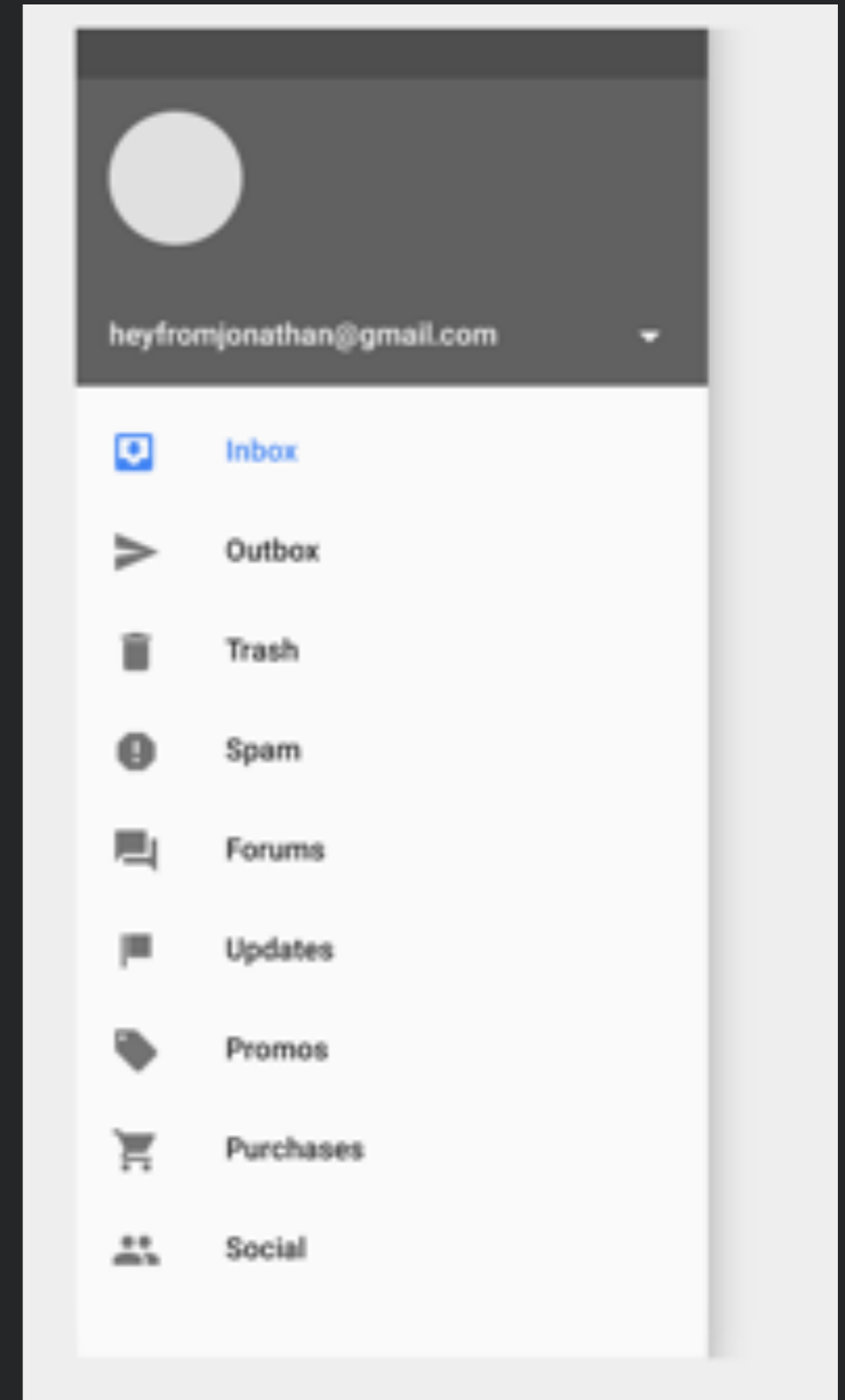
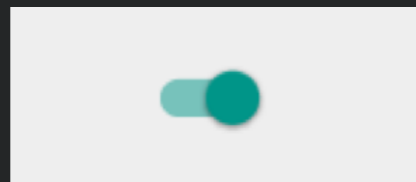
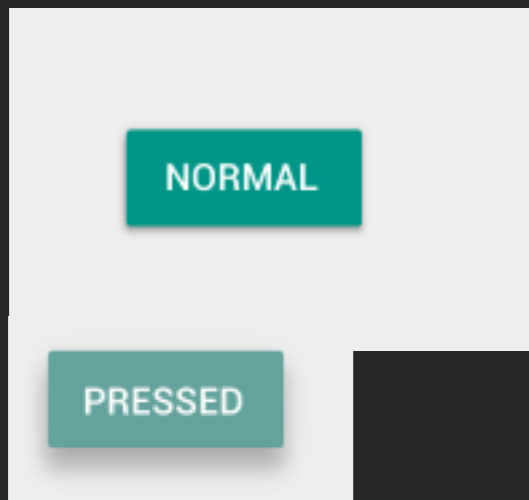
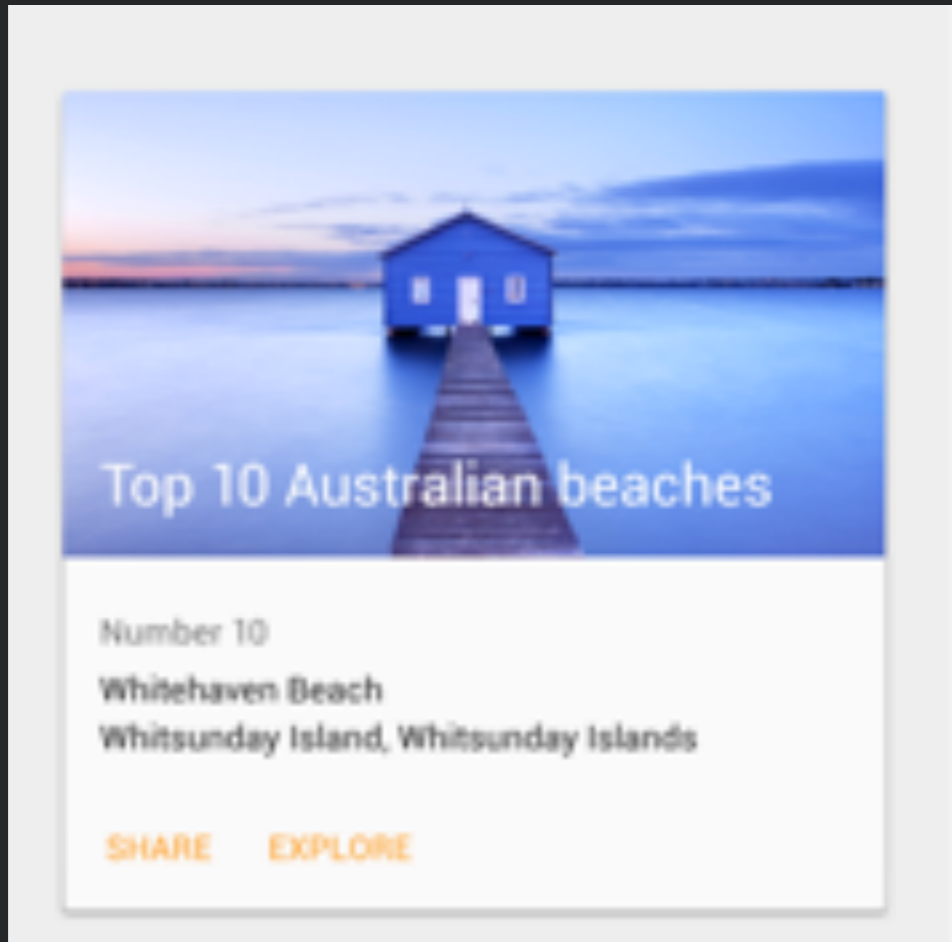
toolbar



list

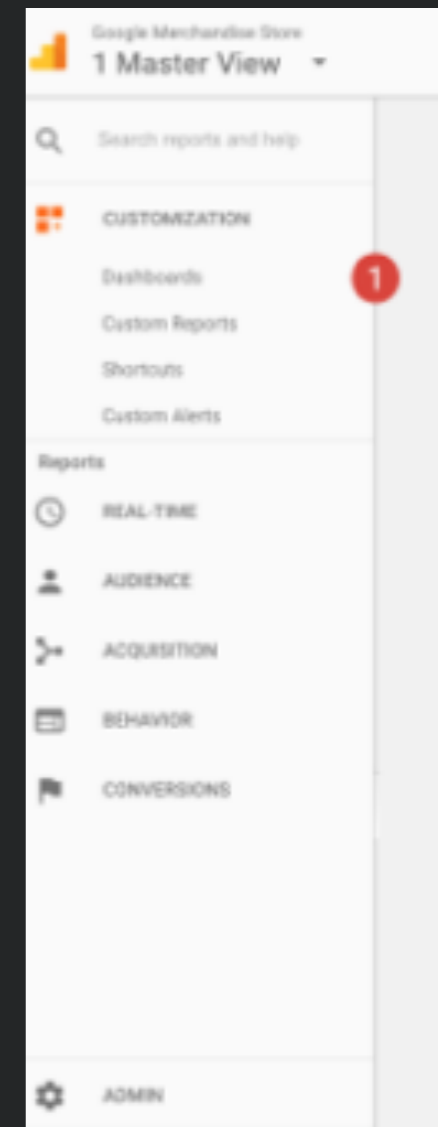
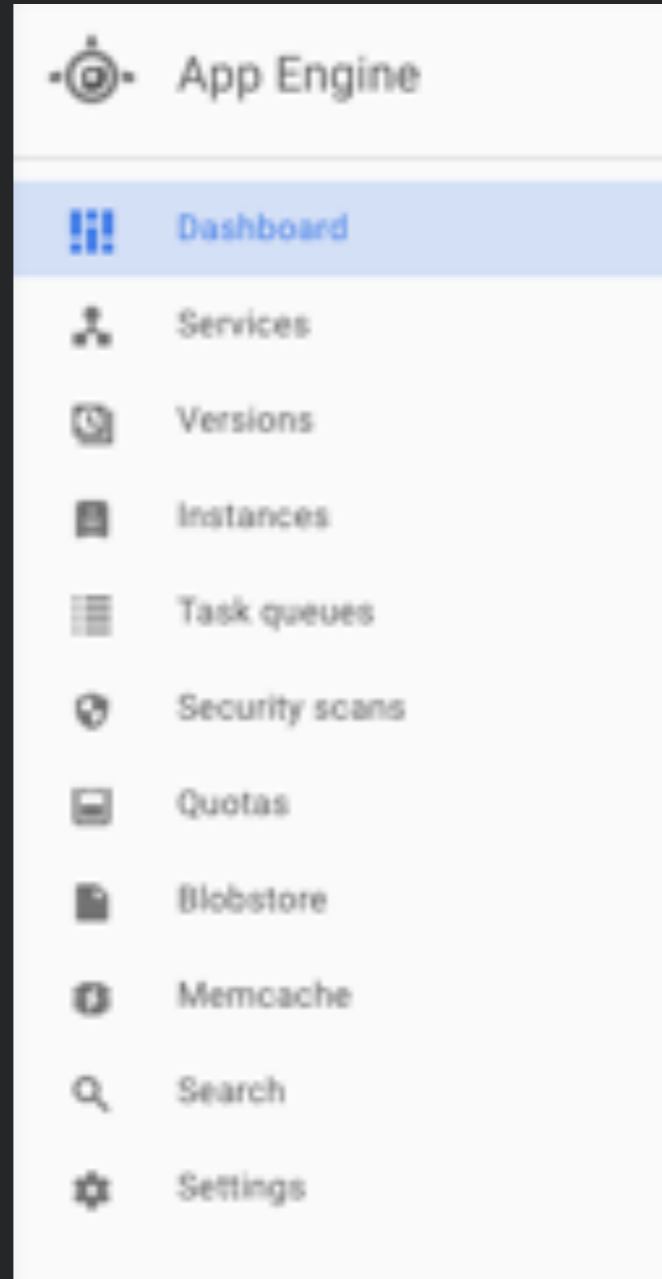
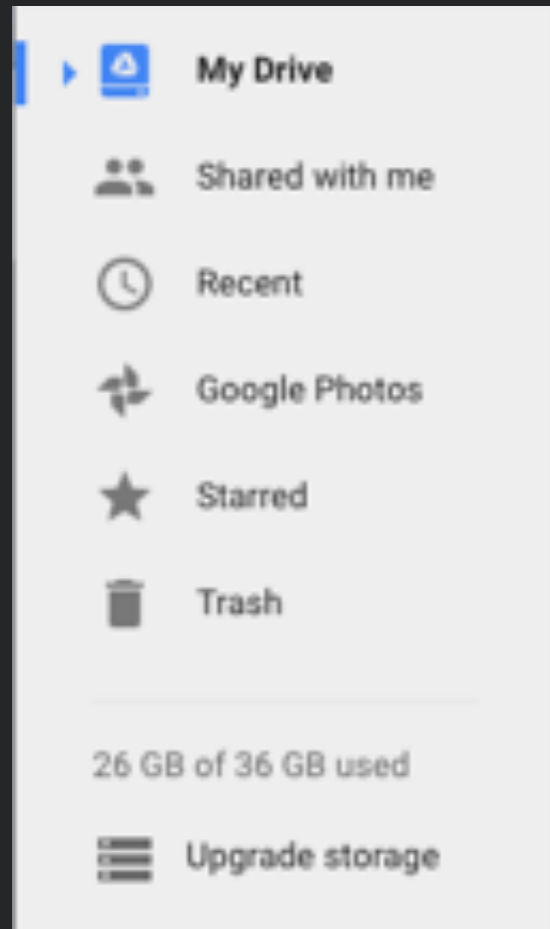
- (unknown sender) (no subject) - Received: from ima
- (unknown sender) (no subject) - Received: from ima
- (unknown sender) (no subject) - Received: from ima
- (unknown sender) (no subject) - Received: from ima
- (unknown sender) (no subject) - Received: from ima
- Thomas LaToza » FW: Bb F04-17651: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

Examples: Google 2016





Examples: Google 2016



Examples: IBM





Examples: IBM

Configure

People

Save

Chat

Application data

Title	Title	Value	Date	Value
Imperial	true	9 456 234	21. Feb 2014	9 456 234
Hard	false	987 345	21. Feb 2014	987 345
Cider	false	43 567	21. Feb 2014	43 567
Anaerobic	true	324 543	21. Feb 2014	324 543
Cold filter	false	432 456	20. Feb 2014	432 456
Barrel hand	true	32 432	20. Feb 2014	32 432
Pump wort	true	4 567	20. Feb 2014	4 567
Dry hopping	false	34 567	20. Feb 2014	34 567
Carbonation	true	434 567	20. Feb 2014	434 567
Mash tun	false	9 456 234	20. Feb 2014	9 456 234
Bittering hops	true	987 345	20. Feb 2014	987 345
Heat exchanger	false	43 567	19. Feb 2014	43 567
Lauter aerobic	false	324 543	19. Feb 2014	324 543
Abbey seidel	true	432 456	19. Feb 2014	432 456
Brewhouse	false	32 432	19. Feb 2014	32 432
Brewpub adjunct	true	4 567	19. Feb 2014	4 567
Dextrin seidel	true	34 567	19. Feb 2014	34 567
Aau beer	false	434 567	19. Feb 2014	434 567
Krug abv	true	434	19. Feb 2014	434

Configure

User

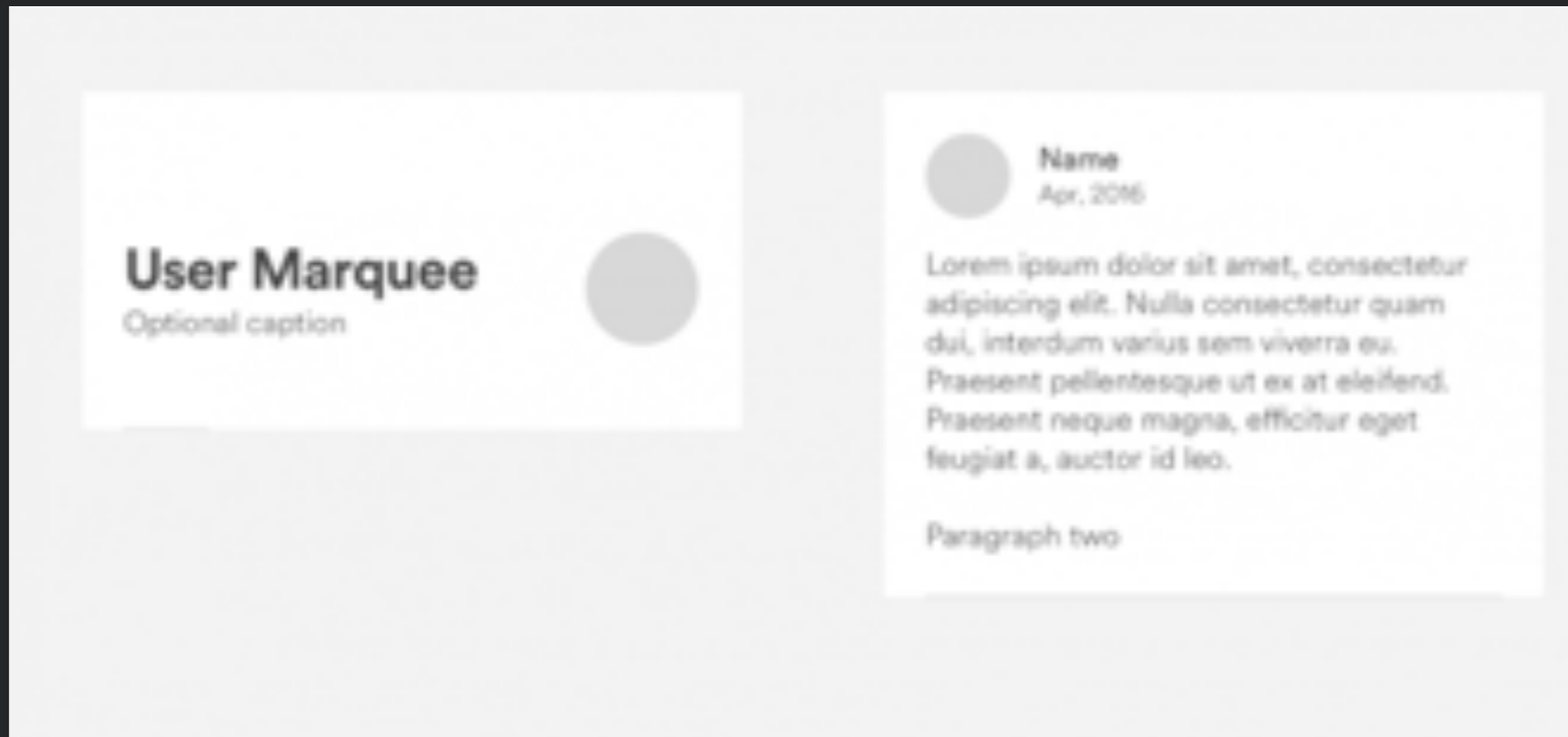
Save

Catalog

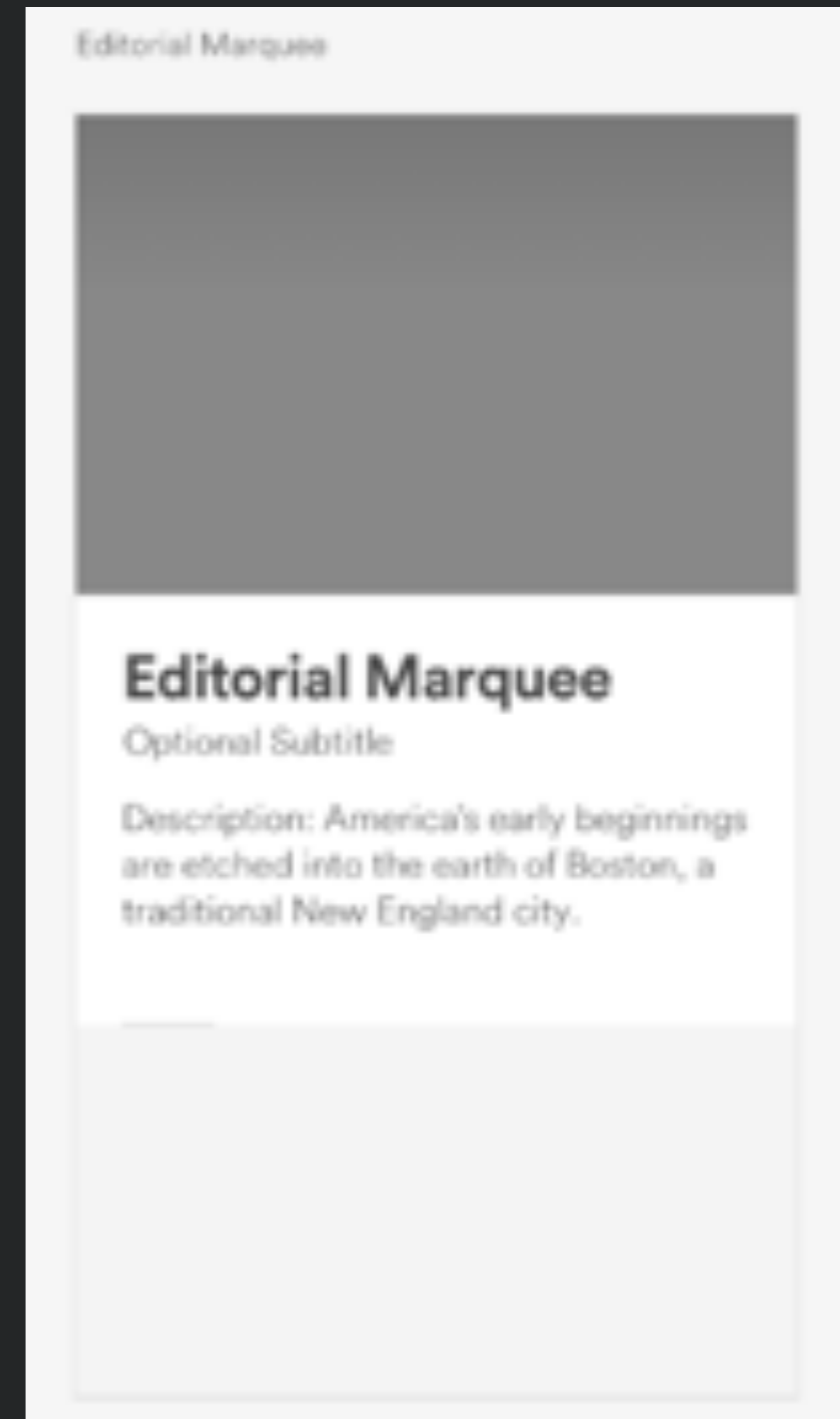
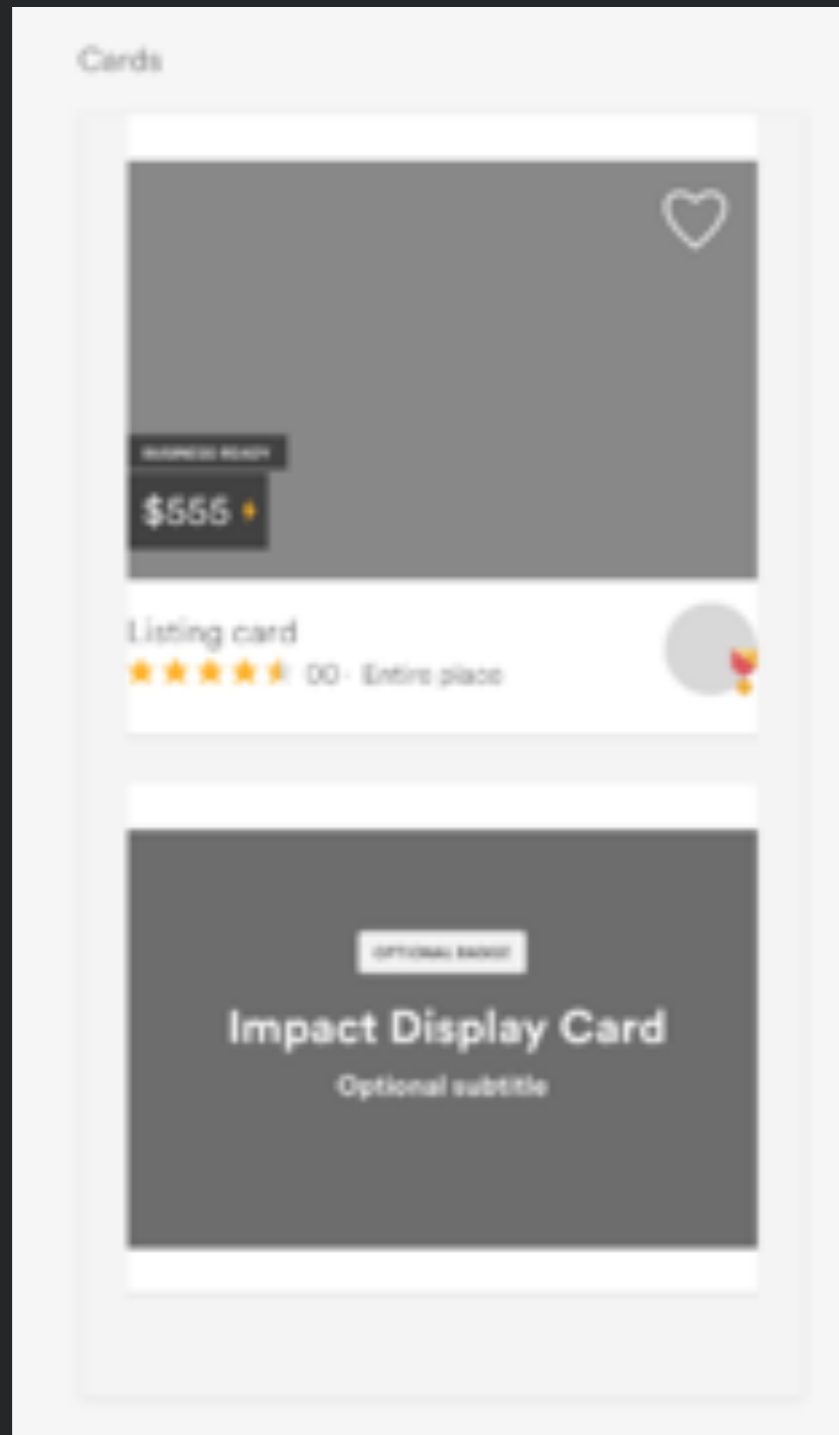
Chat

Repository

Examples: AirBnb

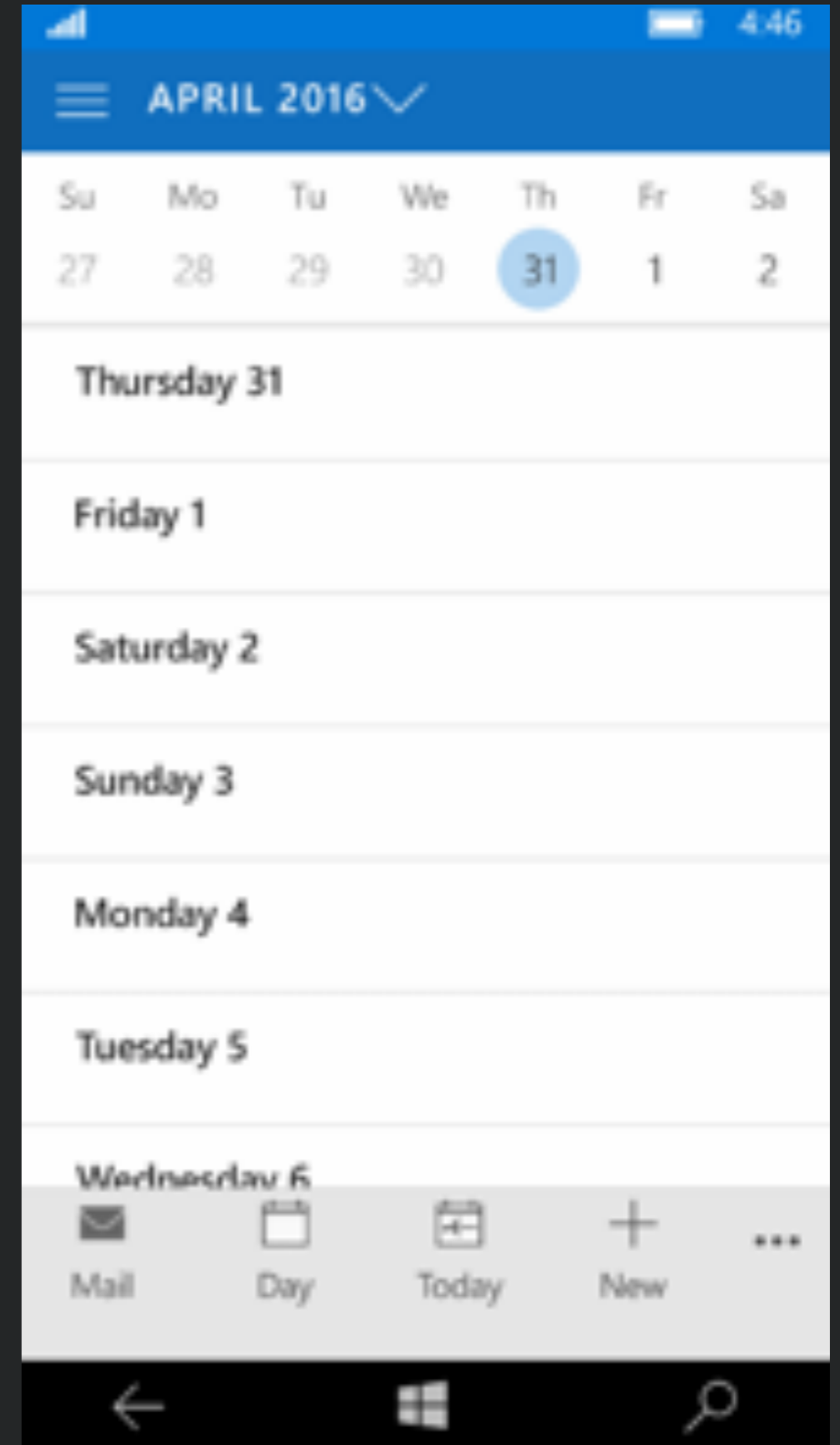
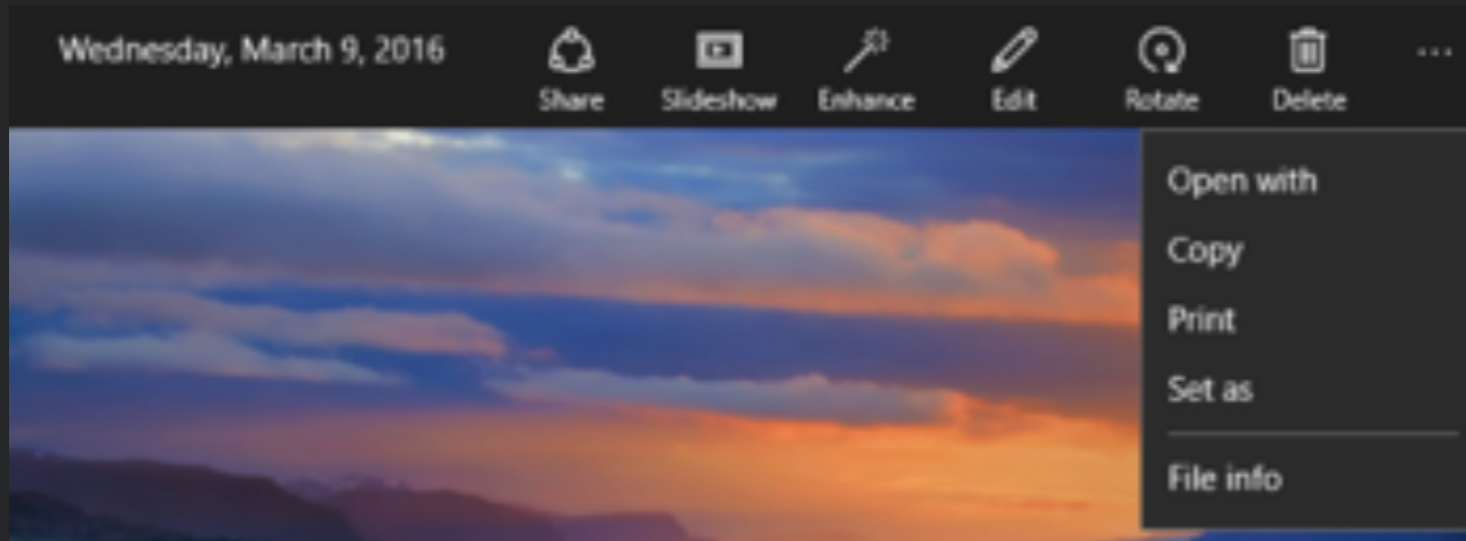


Examples: AirBnb

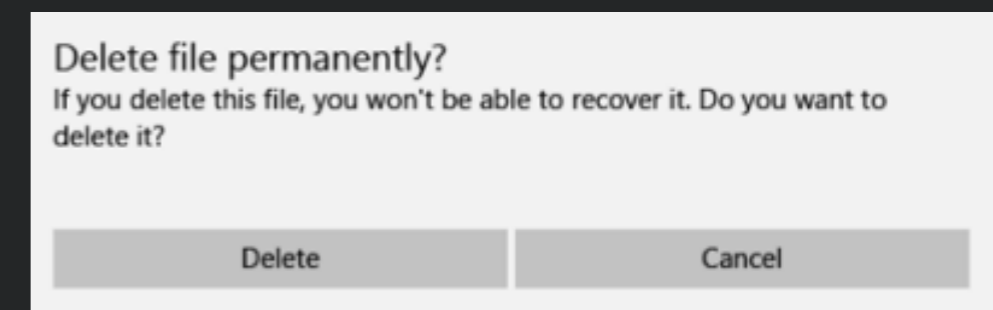
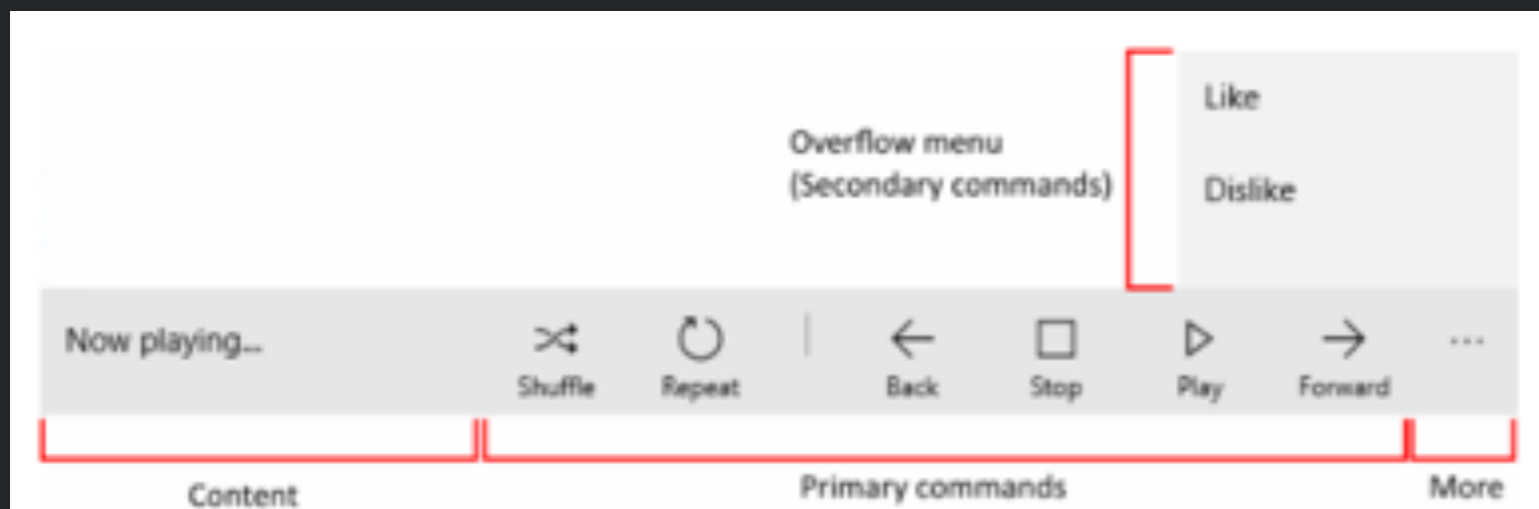
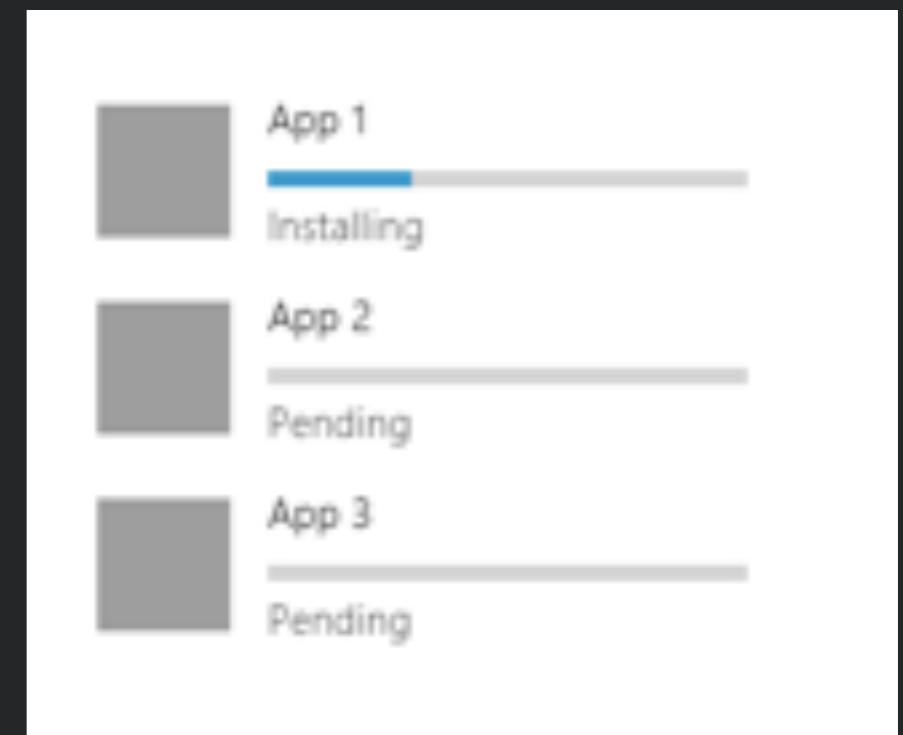




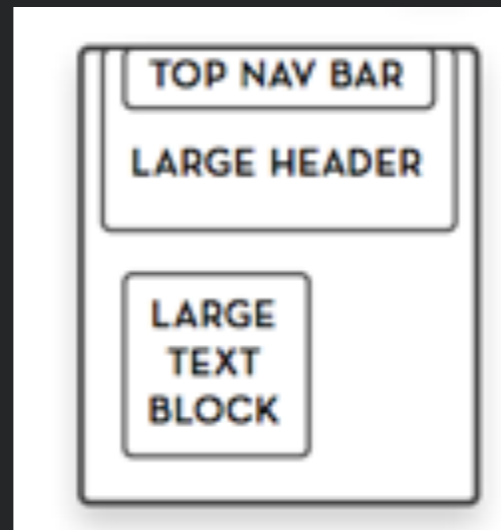
Examples: Microsoft



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>

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Web Design Languages Over Time



Web Design Languages Over Time

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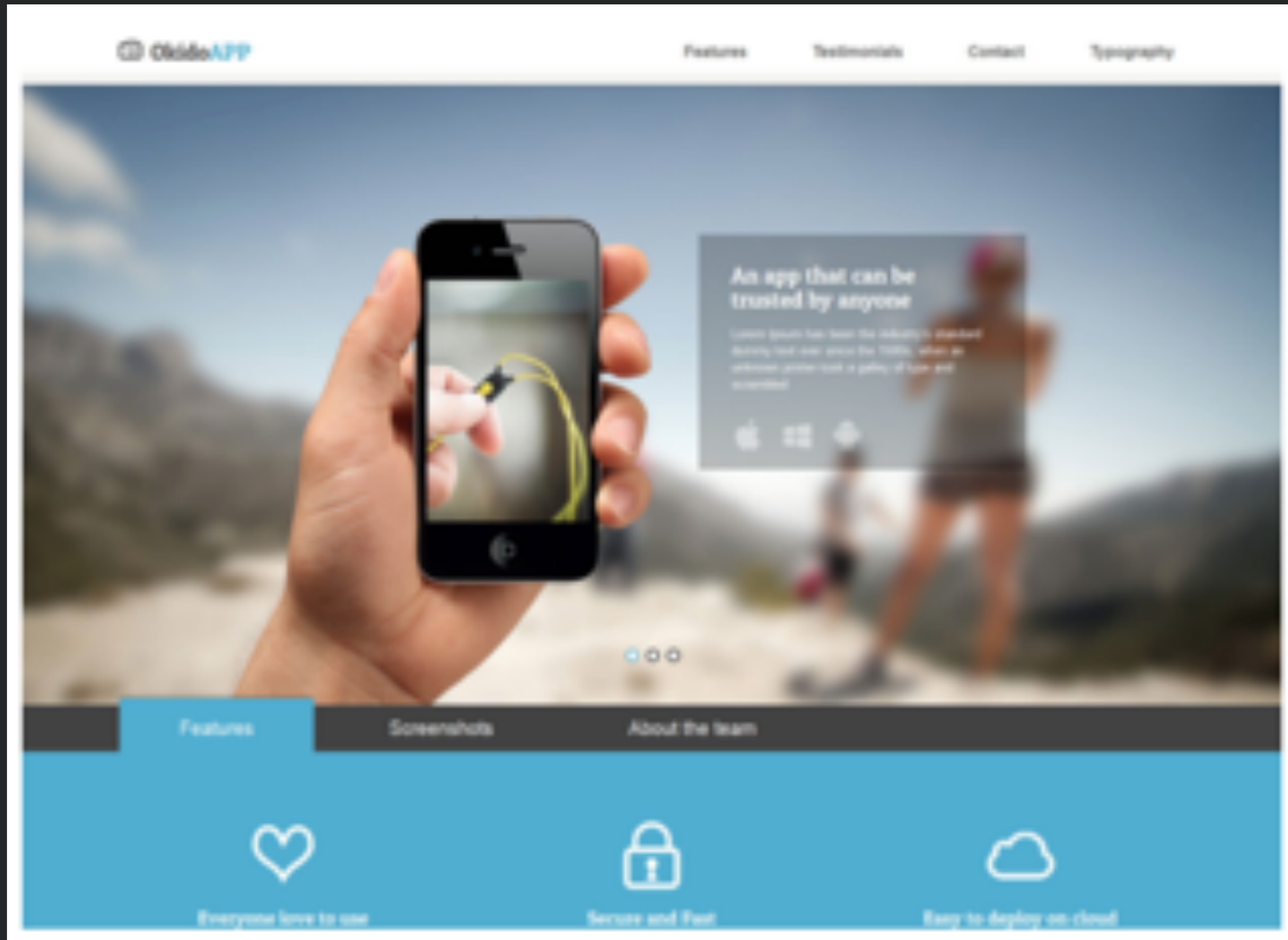
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Web Design Languages Over Time

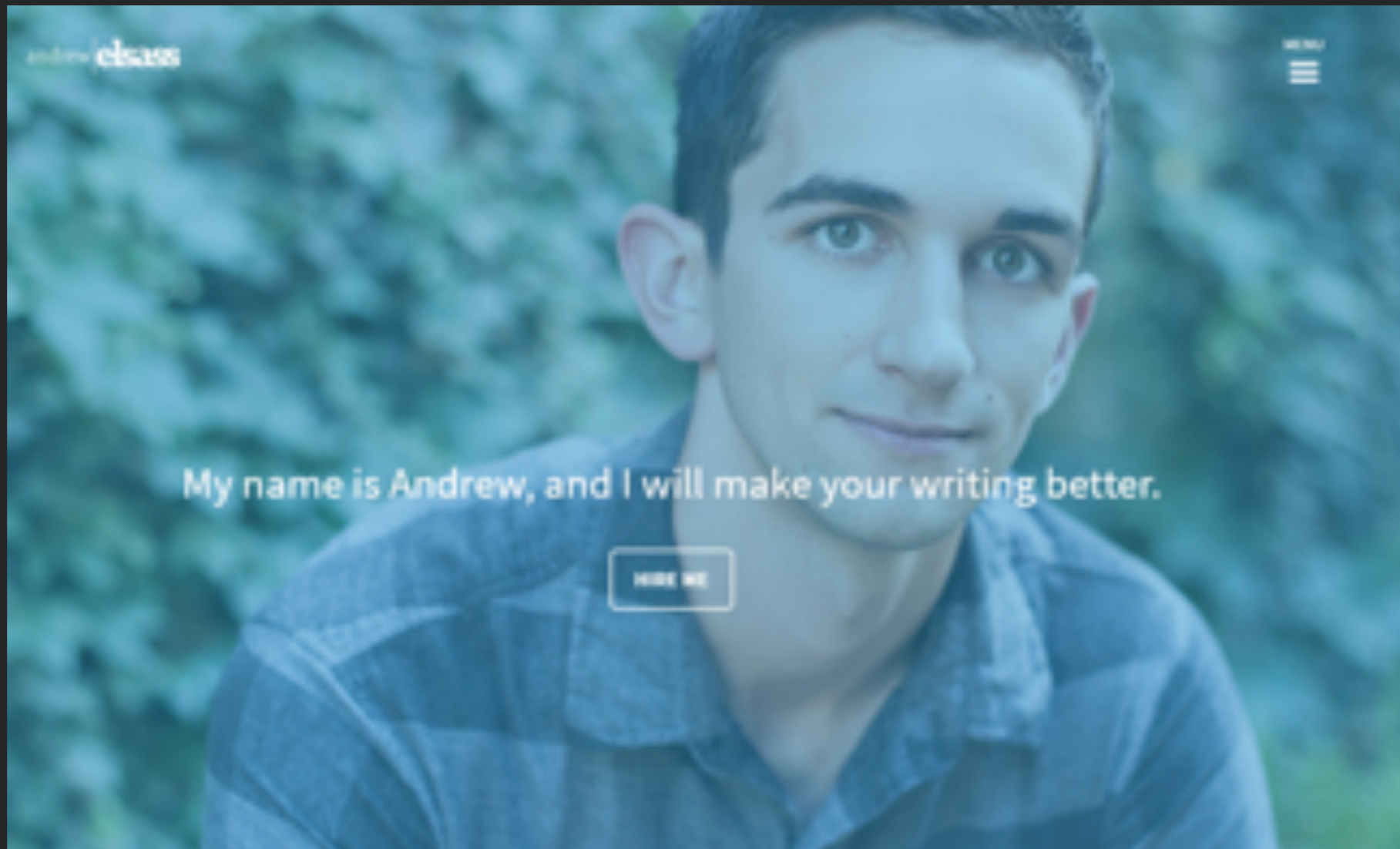


Web Design Languages Over Time



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

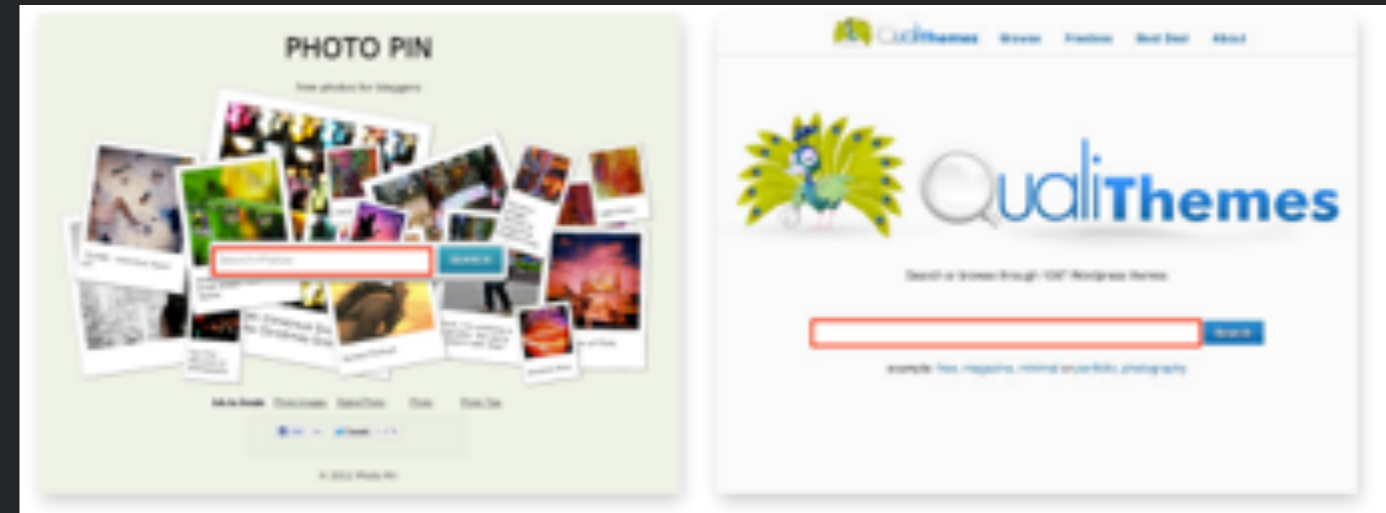
- Rotating image galleries (carousels)



<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

7 Minute Break



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 632 course