

SWE 432 -Web Application Development

Fall 2021



George Mason
University

Dr. Kevin Moran

Week 13: Interaction Techniques & Visual Design





Administrivia

- HW Assignment 4 - Due Today!
- HW Assignment 5 - Out now, Due in 2 weeks (November 30th)!
- Reminder: Recorded Lecture for November 23rd (next week)



Quiz #7 Review

- What makes an interface usable?
- Identify one Heuristic violation ...
- What's the difference in when and how you might use a sketch, storyboard, or prototype in the design process?



HW Assignment #5

Overview

In this homework, you will conduct a think-aloud usability study to identify usability issues with existing web application(s) and then prototype the design of a new interface that addresses these issues.

Step 1: Develop user task

In this step, you will select a user task. You should follow the guidelines for choosing and communicating tasks given in the Week 12 Lecture. Your task may focus on a single web application (e.g., PatriotWeb) or may involve multiple applications. You should choose a task that is challenging for users. Write up a description of your task which you will give to participants. You should aim for a task that will take participants 10-15 minutes.



HW Assignment #5

Step 2: Conduct think-aloud usability evaluation

In this step, you will conduct a short think-aloud usability study with two participants. As users work, you should take notes, identifying and describing any critical incidents as they occur. You are free to recruit participants from any source you'd like, including friends, family, and other students in this class.



HW Assignment #5

Step 3: Identify usability issues and potential fixes

Based on the results from your two study sessions, in this step you will consolidate similar critical incidents that occurred (if any) and reflect on the underlying usability issue each embodies. For each critical incident that you identified, first reflect on if it is similar to any other critical incident. After identifying groups, reflect on what is the underlying potential cause? What caused the user to experience this critical incident? What change might help address this issue?



HW Assignment #5

Step 4: Storyboard a new user experience

Based on what you learned, you will now design a new and improved user experience that supports your user task. Your user experience might take the form of a new version of the web app(s) that the user was using or might consist of an entirely new web app. Your goal in building a storyboard is describe how users will use your web app. Your storyboard should consist of key steps, illustrating how a user will act in these steps to accomplish their task. The sketch does not need to be visually detailed: either a hand-drawn sketch or simple drawing program drawn sketch is fine.

As you are building your storyboard, you should design your user experience so that it follows the principles for designing usable interfaces discussed in lecture. In particular, you should identify at least 5 aspects of your user experience design and explain how each of these follows a 1) heuristic evaluation heuristic or 2) principle for building user interfaces described in the Week 11-14 Lectures. You may only use a single heuristic or principle once.

HW Assignment #5

Requirements

- **Step 1: Task design**
 - Follow guidelines given in Lecture 22 to ensure that the 1) goal is specific, 2) a scenario explains the background of what users will be doing, 3) end criterion for task is communicated, and 4) participants have a max time limit.
- **Step 2: Think-aloud usability evaluation**
 - Conduct a think-aloud usability evaluation in which 2 participants work for at least 10 minutes each.
 - Identify critical incidents that occurred.
- **Step 3: Usability issues**
 - Identify at least 3 separate usability issues that participants experienced, describing the symptoms that occurred as well as a possible underlying cause.
- **Step 4: New User experience storyboard**
 - Build a story board describing how users will work in your new web app.
 - Include at least 7 separate steps in the storyboard.
 - Annotate the storyboard with the action that the user or system takes to advance to the next step
 - Describe how the new design follows at least 5 separate heuristic evaluation heuristics or principles given in lecture, clearly identifying the heuristic or principle and briefly describing (in a few sentences) how the design follows the principle.



HW Assignment #5

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Class Overview

- **Part 1:** Interaction Techniques
 - Quick Lecture
 - Designing Alternative Interactions Activity
- **10 Minute Break**
- **Part 2:** Visual Design
 - Quick Lecture
 - Creating a Design Language (if we have time)

Interaction Design Overview





Identifying Actions

Goals → Action Sequence



Signifiers

Is this a button?

Or a link?

- Goals
 - Show which UI elements can be manipulated
 - Show how they can be manipulated
 - Help users get started
 - Guide data entry
 - Suggest default choices
 - Support error recovery

Hinting

- Indicate which UI elements can be interacted with
- Possible visual indicators
 - **Static hinting** - distinctive look & feel
 - **Dynamic hinting** - rollover highlights
 - **Response hinting** - change visual design with click
 - **Cursor hinting** - change cursor display

Course Project

Course Project

Project Overview

The major assignments in the course will be in the form of a project, and will be distributed over the course of the semester as "Project Checkpoints". You will first design and implement a simple UI in the form of a web app. Throughout the semester, you will perform peer evaluations, identifying usability issues with the UI of apps built by other students in the course. Based on the reported usability issues you receive, you will then iteratively redesign and improve the usability of your web app to address these issues. Full details for each Project Checkpoint can be found in the Project Checkpoint descriptions below; the due dates are summarized in the course schedule.

What to Build?

You are given the freedom to build any type of web application that you would like for the semester project. However, there are some general guidelines that are important to follow:

- *The project should be something the group can implement in two weeks.* Because much of this project will be focused on evaluating and refining the UI, the premise of the app should be simple. Some successful projects in the past have been as short as 500 lines of code.
- **It must be implemented as a web application and be usable by visiting a URL.** Projects can be implemented entirely client-side, or with some back-end technologies, but the back-end should be kept to a minimum.
- *We will primarily be evaluating your project based on the UI you create, not the elegance or sophistication of your implementation.* Thus, we expect that the best projects will be those that involve a significant amount of user facing interactions.

Table of contents

- Course Project
- Project Overview
- What to Build?
- Project Collaboration
- Project Checkpoint Schedule and Assignment Instructions

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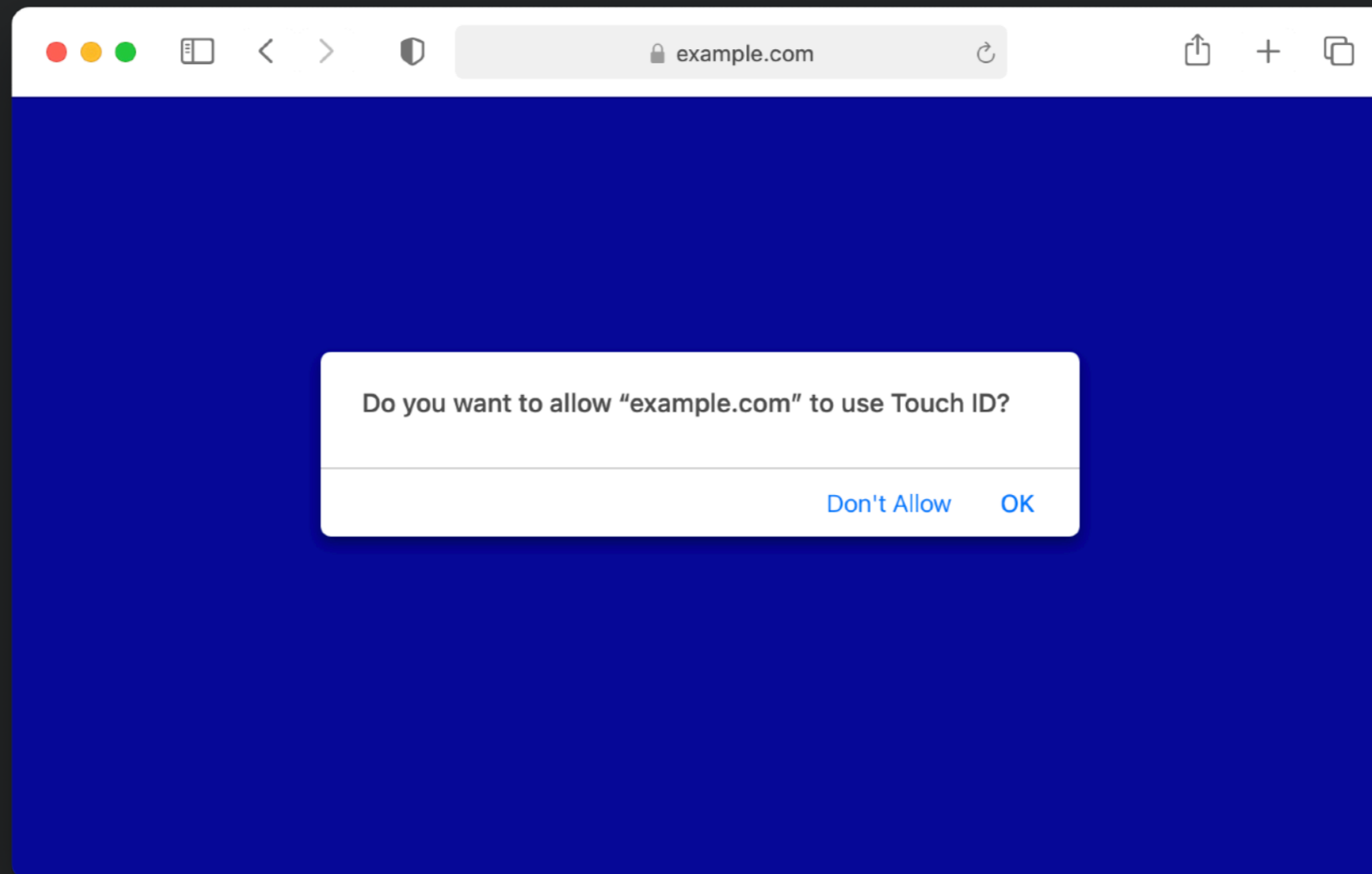
Help Users Predict Outcome of Actions

- What does this do?
- Should I click it?



Clarity of Wording (Bad Example)

- Design for clarity & precision





Clarity of Wording

- Choose words carefully
- Speak the user's language
- Avoid vague, ambiguous terms
- Be as specific as possible
- Clearly represent domain concepts



Likely & Useful Defaults

- Default text, if relevant (e.g., date)
- Default cursor position
- Avoid requirements to retype & re-enter data



Modes

- Vary the effect of a command based on state of system
- Examples
 - caps lock
 - insert / overwrite mode
 - vi / emacs command modes
 - keyboard entry used for controlling game and chatting



Challenges with Modes

- Modes create inconsistent mapping
 - E.g., control S sometimes saves, sometimes sends email
 - Especially dangerous for frequent interactions that become highly automatic System 1 actions
- Avoid when possible
- Clearly distinguish if necessary
 - Make clear to user which mode they are in and how to change



Command Interactions

- How can a user invoke a command?
- Common examples
 - Menus
 - Buttons
 - Toolbar
 - Dialog box
 - Keyboard shortcut
 - Gesture
- What are some advantages and disadvantages of each approach?

Physical Actions

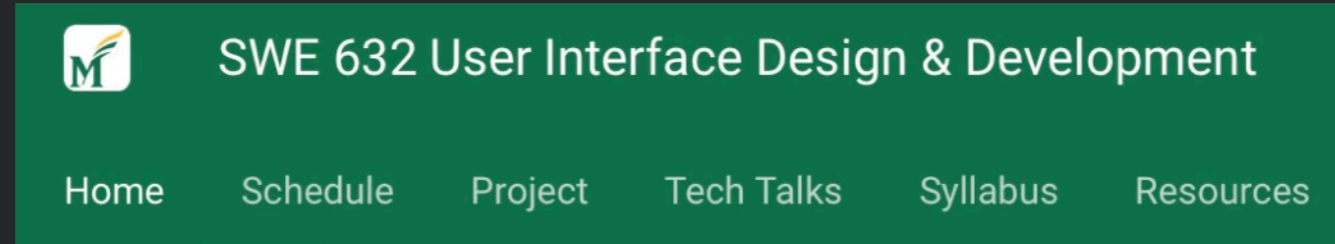




Avoid Physical Awkwardness

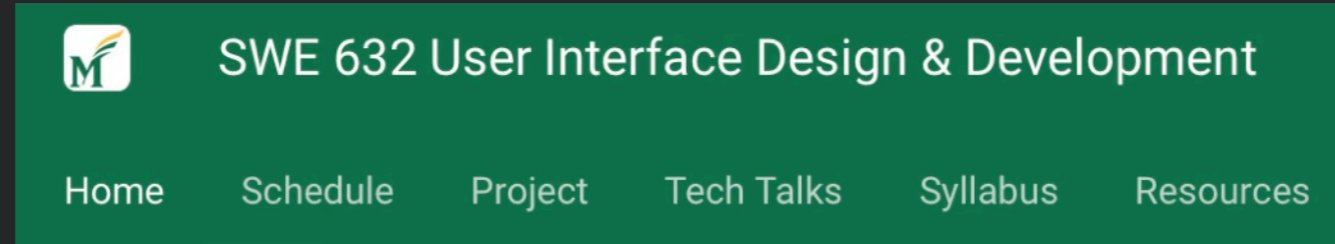
- Switching between input devices takes time
- Avoid forcing user to constantly switch between input devices (e.g., keyboard & mouse)
 - e.g., Effective tab order between fields
- Avoid awkward keyboard combinations

Moving the Mouse



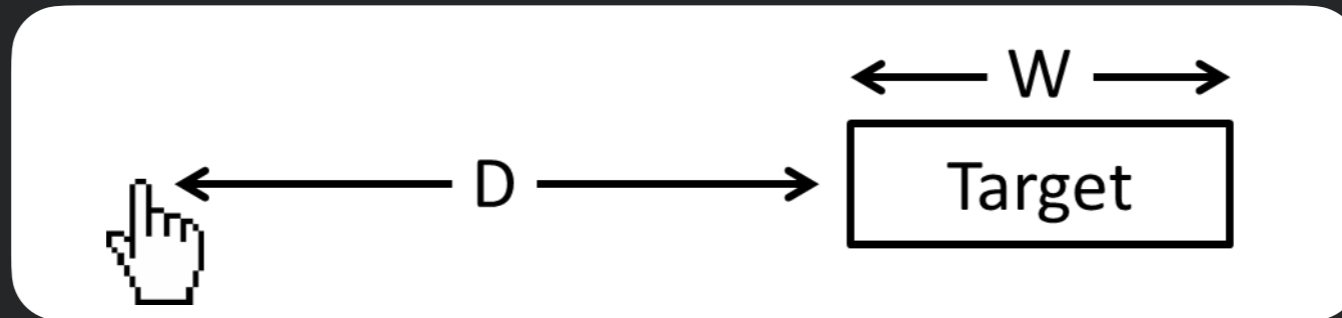
- After a user has (1) realized that a region is interactable, (2) decided that it will cause the desired action to be invoked
- How long does it take for a user to move the cursor to click on it?
- What factors might influence this time?

Moving the Mouse

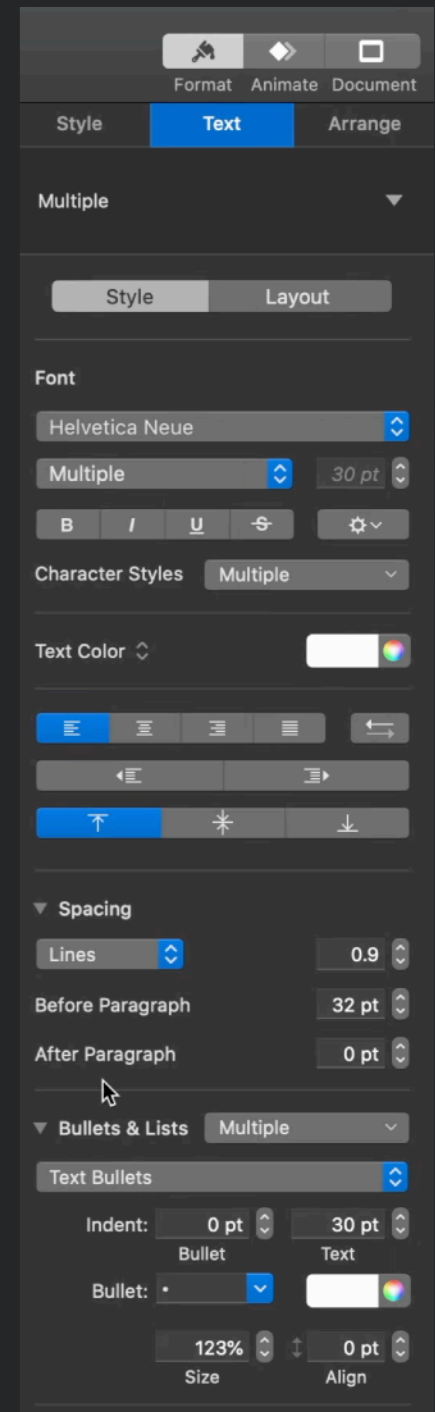


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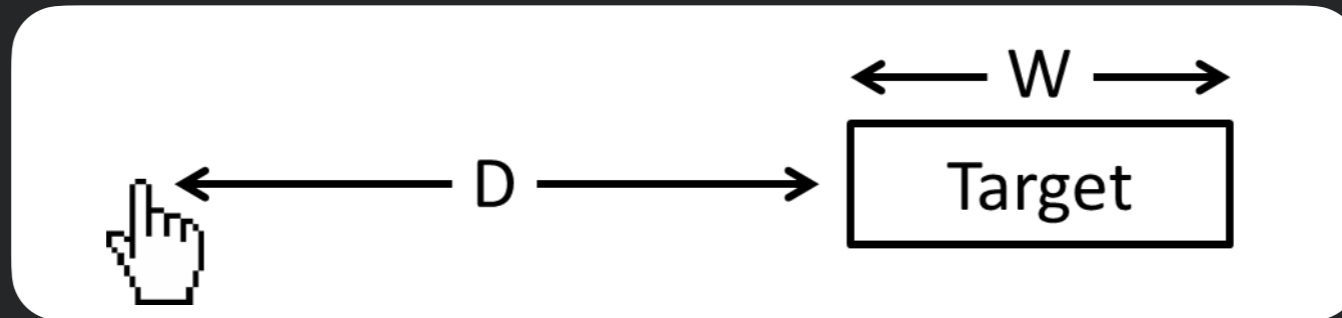
Fitt's Law



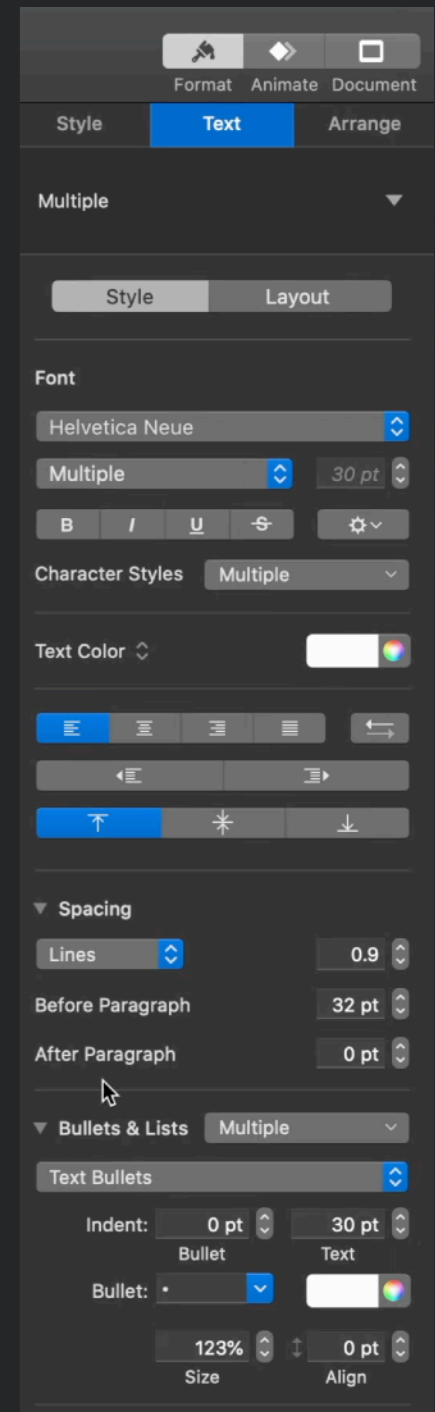
- Time required to move to a target ***decreases*** with target ***size*** & ***increases*** with ***distance*** to the target
- Movements typical consist of
 - one large quick movement to target (***ballistic*** movement)
 - fine-adjustment movement (***homing*** movements)
- Homing movements generally responsible for most of movement time & errors
- Applies to rapid pointing movements, not slow continuous movements



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Design Implications of Fitt's Law

- **Constraining** movement to one dimension dramatically increases speed of actions
 - e.g., scroll bars are 1D

The screenshot shows a presentation application window. The title bar includes 'View', 'Zoom 87%', 'Add Slide', 'Play in Window', and 'Play'. The left sidebar contains a list of 10 slides:

1. SWC 612 - Design & Development of User Interfaces
2. SWC 612 - Design & Development of User Interfaces
3. Administration
 - Make a Date Grades Returned
 - Review calendar
 - Project Checkpoint 4 due today
 - Project Checkpoint 5 due now, due 02/27/20 before 11:59pm
 - Discussion Question 9 - Posted after class
 - Midterm Course Evaluation - Post to Piazza now
4. Midterm Exam Grade Breakdown
 - Bar chart showing grade distribution
5. Midterm Exam Feedback
 - Opportunity to resubmit your exam with corrected answers
 - Points resubmission dependent on grade
 - You must re-take all parts, depending on grade
 - 60% and above can get 20% back
 - 40% and above can get 10% back
 - Over 20% of students 20% and above
6. Project Checkpoint 5: Design Review 2
7. Midterm Course Evaluation
 - Conduct anonymous survey
 - Opportunity to tell me:
 - The aspects of the course that you like most
 - The aspects of the course that you like least
 - Additional suggestions
 - Points to Pass or check, completed optional
8. Class Overview
 - Overview of the course Design, Interaction Design, Usability
 - Learning Objectives: Design, Interaction Design, Usability
 - Midterm Exam: Overview, Design, Usability
 - Final Exam: Overview, Design, Usability
 - Final Project: Overview, Design, Usability
 - Final Paper: Overview, Design, Usability
 - Final Presentation: Overview, Design, Usability
9. Interaction Design Overview
10. Identifying Actions
 - Goal → Action Sequence

The main content area shows the title 'Design Implications of Fitt's Law' and the start of a list:

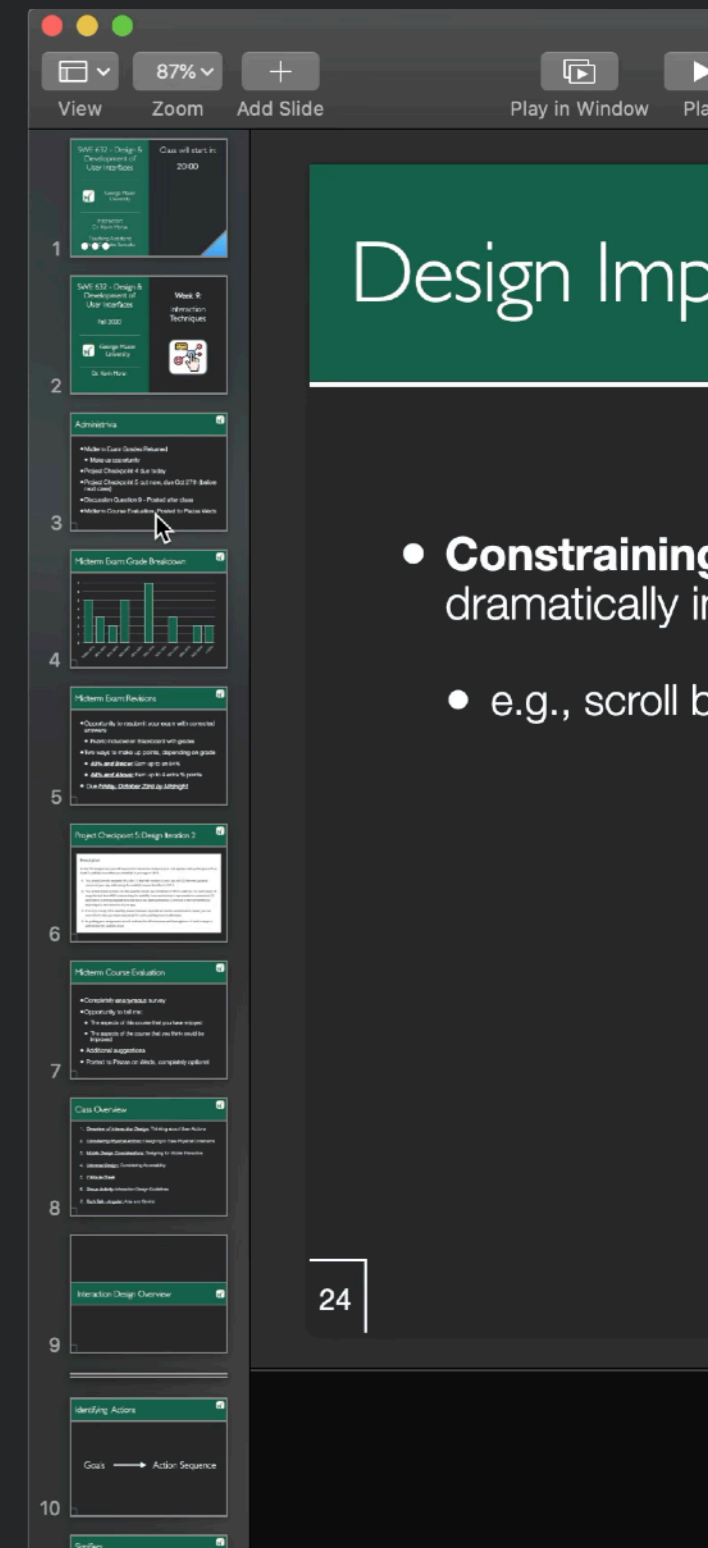
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The slide number '24' is visible in the bottom right corner of the presentation window.



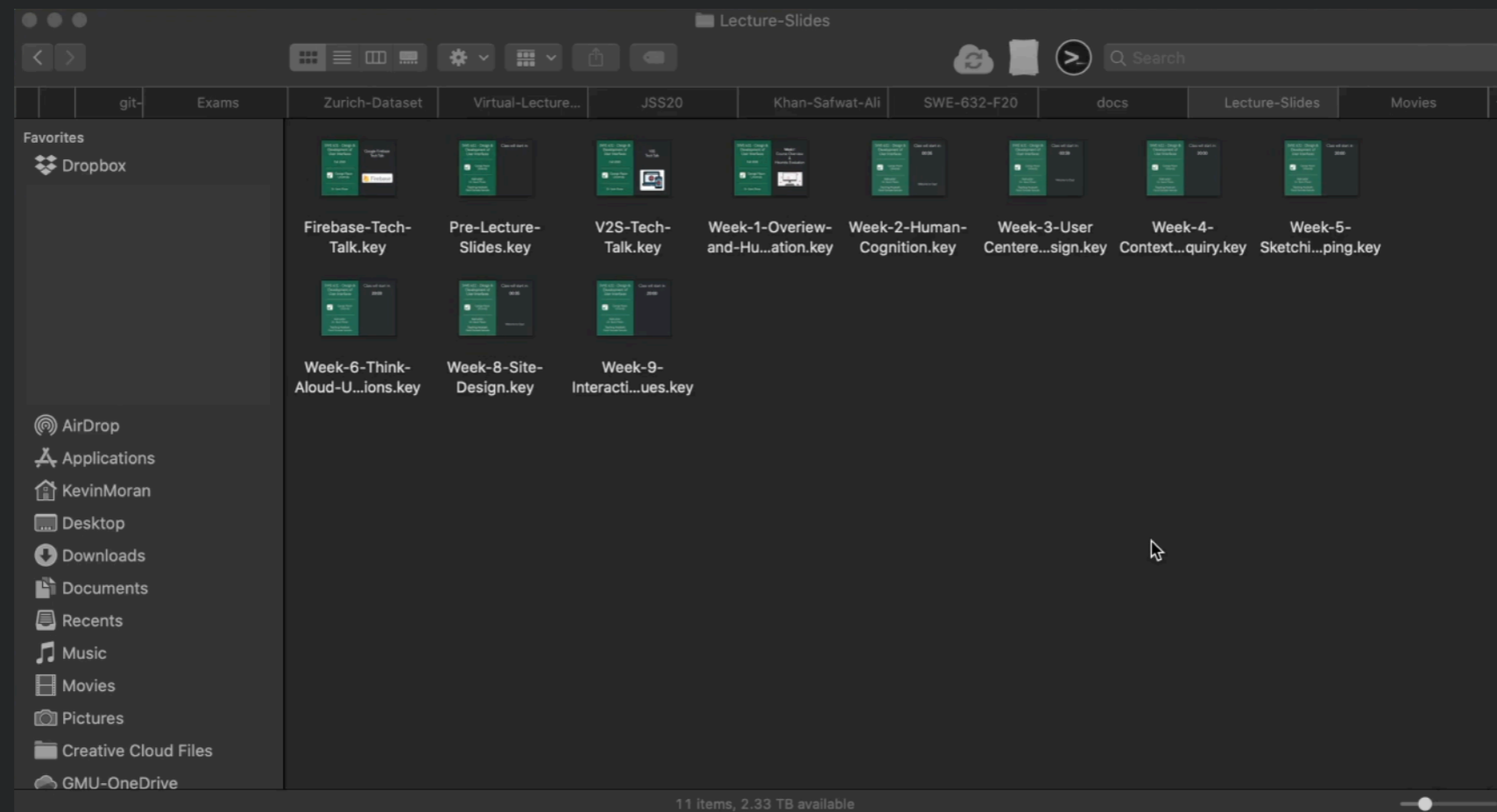
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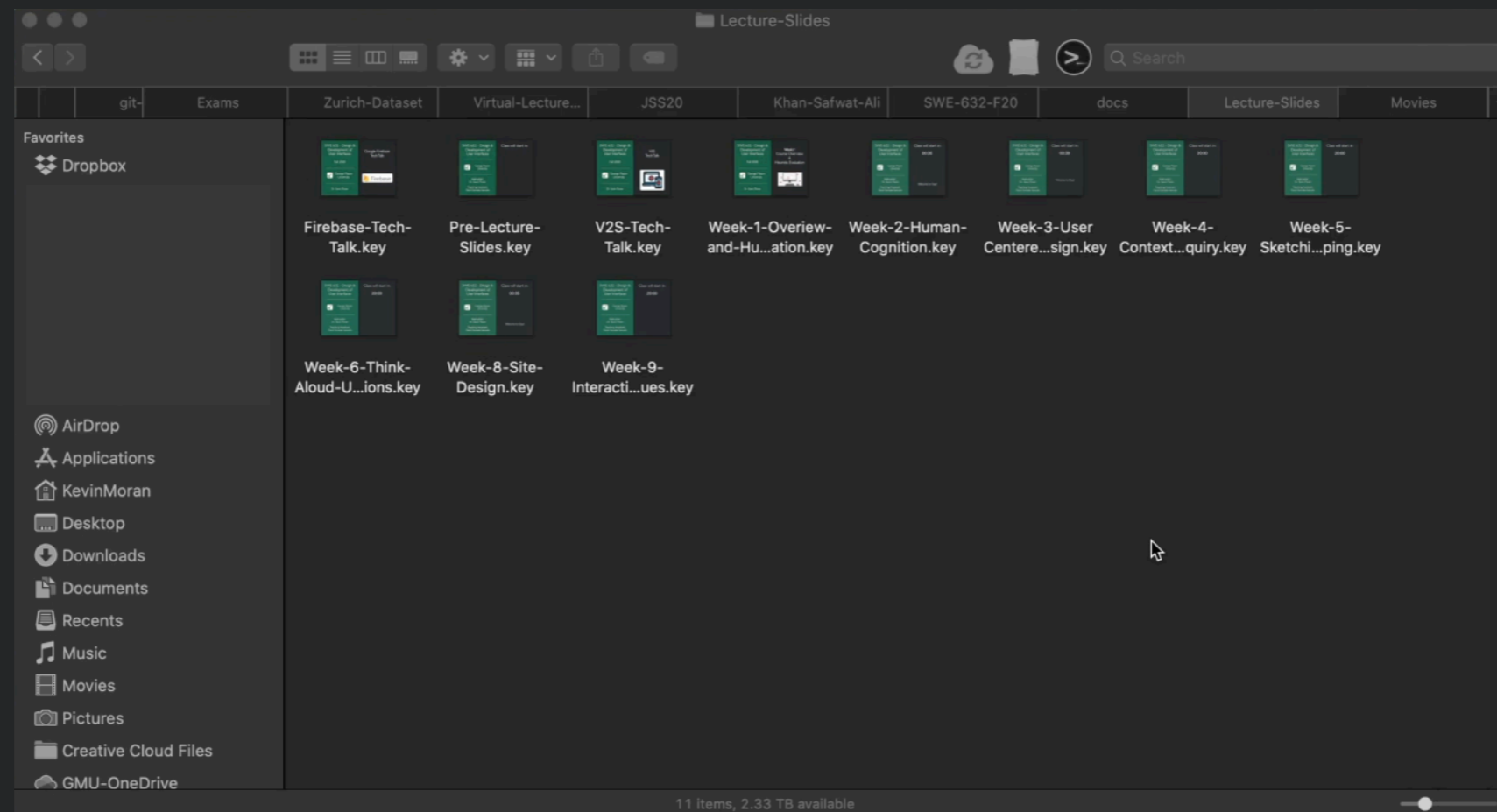
Design implications of Fitt's law

- Making controls ***larger*** reduces time to invoke actions
- Locating controls closer to user ***cursor*** reduces time
 - e.g., context menus



Design implications of Fitt's law

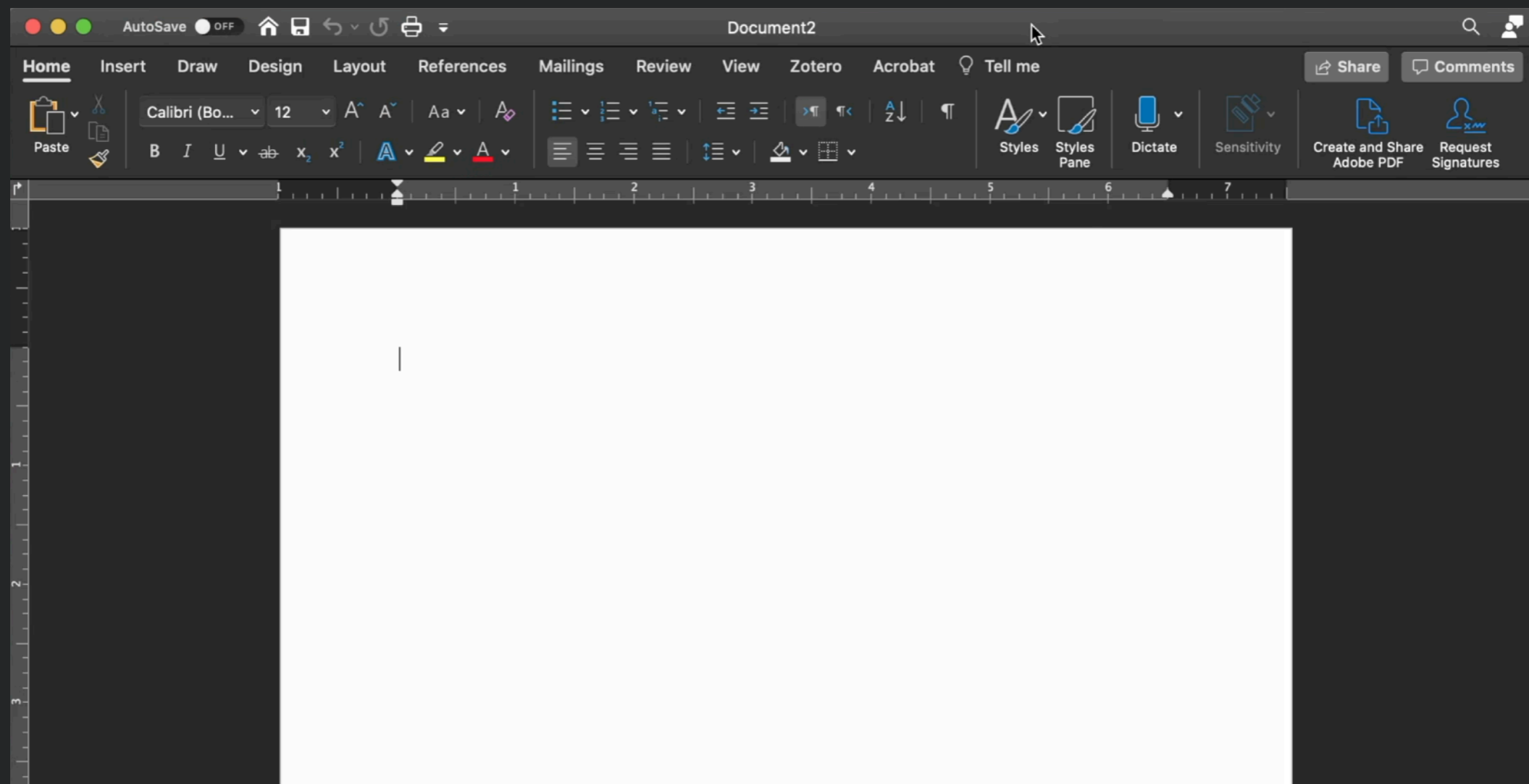
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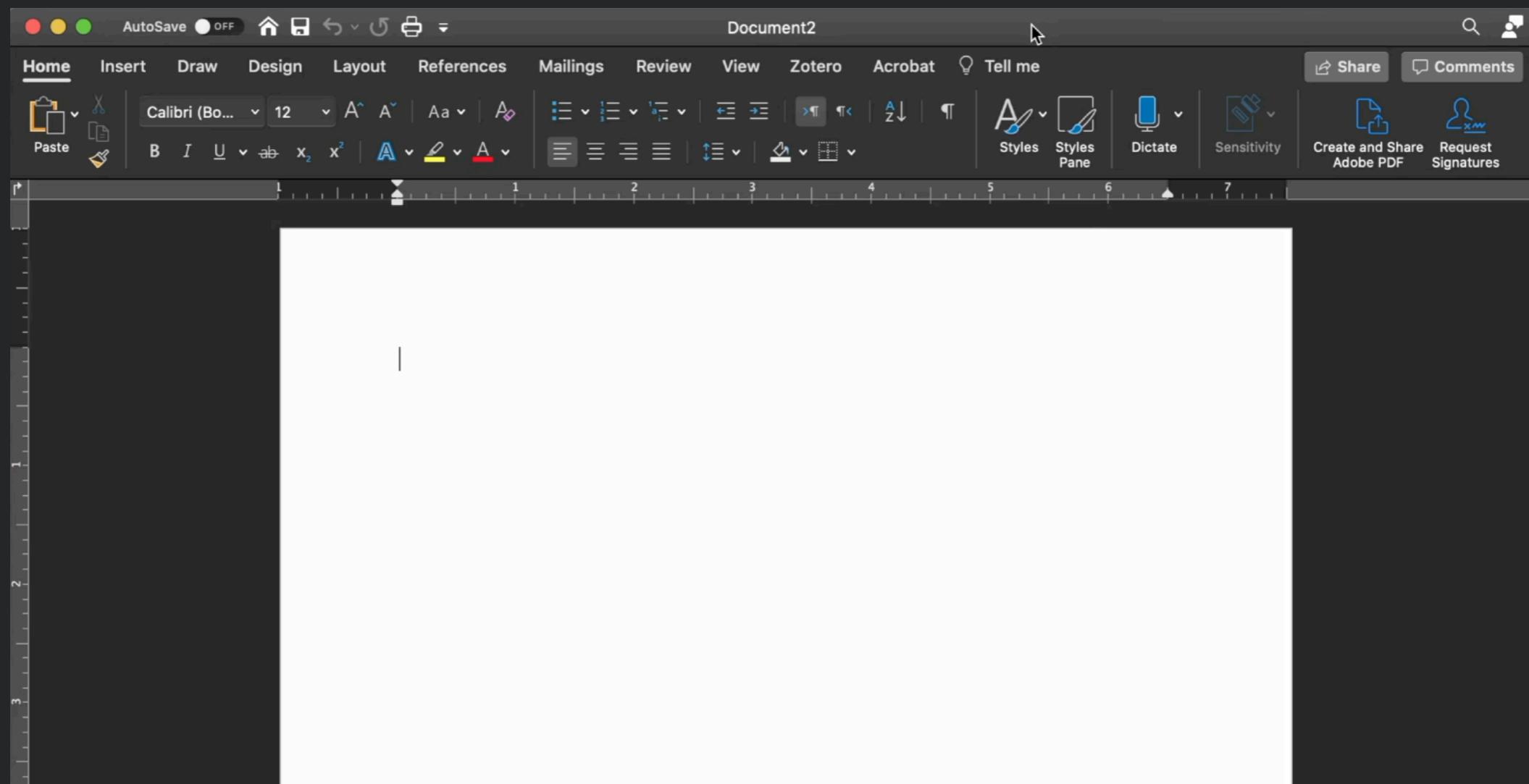
- Positioning button or control along edge of screen acts as barrier to movement, substantially reducing homing time & errors





Design Implications of Fitt's Law

- Positioning button or control along edge of screen acts as barrier to movement, substantially reducing homing time & errors



Mobile Design



Responsive Design

- Mobile devices often have smaller form factor than desktop / laptop OS
- Can design a separate UI
- Or may build a ***fluid*** UI that rescales for different display sizes



Responsive Design

- Mobile devices often have smaller form factor than desktop / laptop OS
- Can design a separate UI
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Where's the Cursor?

- No cursor on many mobile devices
- Cannot use dynamic hinting to determine which elements can be interacted with
 - May require more use of static hinting
- Fitt's law still applies
 - Fingers are less sensitive, hard to select small buttons, occlude elements

Alternative Inputs

- Modern mobile devices often have a wide range of sensors which can be used for input
 - Camera
 - Microphone
 - Accelerometer
 - Three-axis gyro
 - GPS
 - Barometer
 - Proximity sensor
 - Ambient light sensor
- Enables new interaction techniques

Augmented Reality

- Overlaying generated content on top of view of the real world



Augmented Reality

- Overlaying generated content on top of view of the real world





Alternative Inputs + Augmented Reality





Alternative Inputs + Augmented Reality



Universal Design





A Personal Subject for Me...



A Personal Subject for Me...





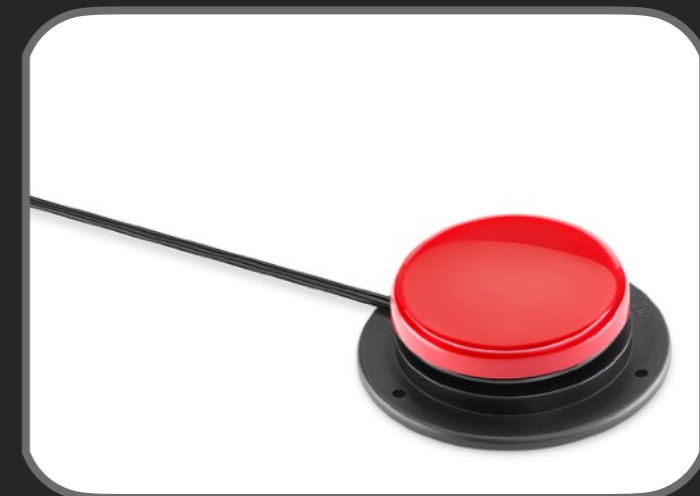
A Personal Subject for Me...



A Personal Subject for Me...



+





Supporting Users with Disabilities

- **Perception** - visual & auditory impairments
 - Blindness or visual impairments
 - Color blindness
 - Deafness & hearing limitations
- **Motion** - muscle control impairments
 - Difficulties with fine muscle control
 - Weakness & fatigue
- **Cognition** - difficulties with mental processes
 - Difficulties remembering
 - Difficulties with conceptualizing, planning, sequencing actions



Blindness and Visual Impairments

- Users use screenreader to listen to screen elements
- Reads all of the text on the page
 - Through practice, learn to listen to text at 400+ words per minute
- Important to have *alt-text*
 - Images should have labels that explain them
- Important to have *hierarchy*
 - Rather than visually skimming page, skims page by listening to section heads to determine which level to navigate to next



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Motion Impairments

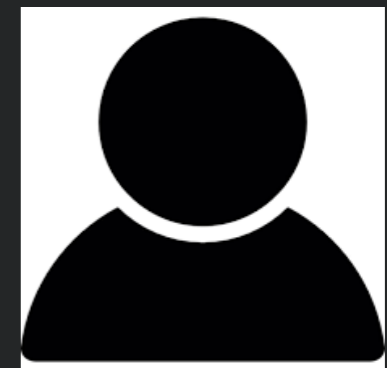


Motion Impairments



Universal Design

- How can users with physical disabilities be supported in user interactions?
- Good: *assistive design* - offering equivalent actions for disabled users that cannot take normal actions
- Better: *universal design* - designing interactions so broadest set of users across age, ability, status in life can use normal actions



Example - Curb cut

- Initially designed for **accessibility** - support for disabled & wheel chairs
- But potentially benefits **all users** of public spaces - people w/ suitcases, hand carts, roller blades, bikes, ...



7 Principles of Universal Design

- **Equitable use:** The design is useful and marketable to people with diverse abilities
- **Flexibility in use:** The design accommodates a wide range of individual preferences and abilities
- **Simple and intuitive:** Use of the design is easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level
- **Perceptible information:** The design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities
- **Tolerance for error:** The design minimizes hazards and the adverse consequences of accidental or unintended actions
- **Low physical effort:** The design can be used efficiently and comfortably and with a minimum of fatigue
- **Size and space for approach and use:** Appropriate size and space is provided for approach, reach, manipulation, and use regardless of user's body size, posture, or mobility



Big Topic - Further Reading

Jeff Bigham's Course at CMU: <http://www.accessibilitycourse.com>

Amy Ko's Book Chapter on Accessibility:
<https://faculty.washington.edu/ajko/books/user-interface-software-and-technology/#/accessibility#ref-islam10>

In-Class Activity





In-Class Activity: Interaction Design Guidelines

- Envision a fictional app (e.g., a mobile AR tour-guide app for visiting Antarctica)
 - Build a list of alternative interaction techniques for your category
 - Identify examples from desktop / web / mobile apps
 - Describe pros and cons of each for your design context
 - Describe how you will support mobile and universal design
- **(1) Navigating lists of items**
 - Examples: grids, lists, pages of results, infinite scrolling, filtering
 - **(2) Invoking commands on content**
 - Examples: toolbar, floating toolbar, cards, context menu, sidebar pane
 - **(3) Invoking top level commands**
 - Examples: drawers, toolbar, menus, dialog
 - **(4) Entering formatted text**
 - Examples: toolbar commands, Markdown, HTML
 - **(5) Panning and zooming**
 - Example: zoom slider, scrollbars, pinch to zoom, drag to pan
 - **(6) Accelerometer-based control**
 - Examples: shake to undo, rotate to pan, roll / pitch / yaw game control
 - **(7) Chat bots**

SWE 432 - Web Application Development



George Mason
University

Instructor:
Dr. Kevin Moran

Teaching Assistant:
David Gonzalez Samudio

Class will start in:
10:00

SWE 432 - Web Application Development



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10:00

Overview of Visual Design





Elements of Visual Design

label

label

label

label

label

label

label

label

label

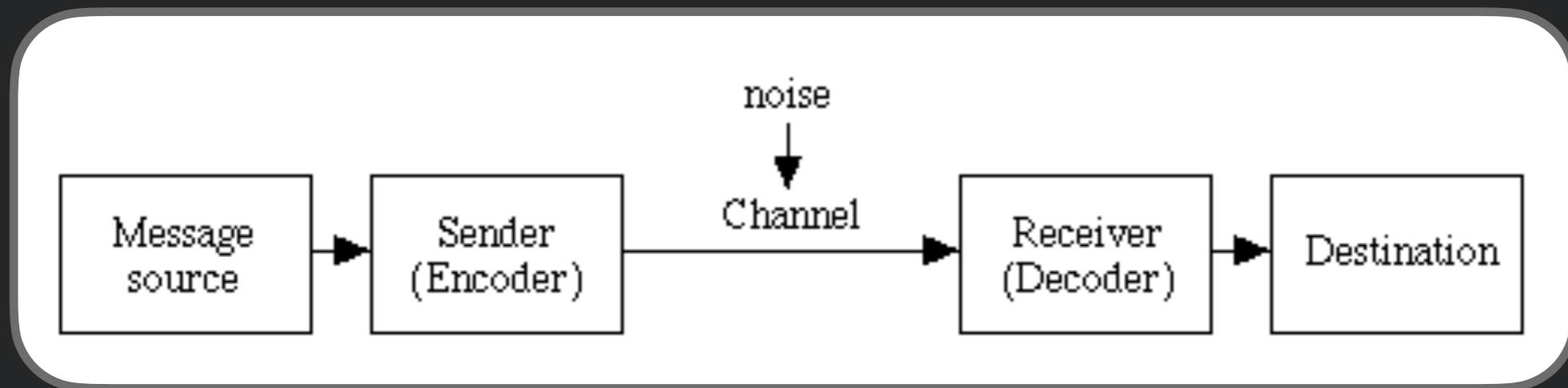


Visual Design

- 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



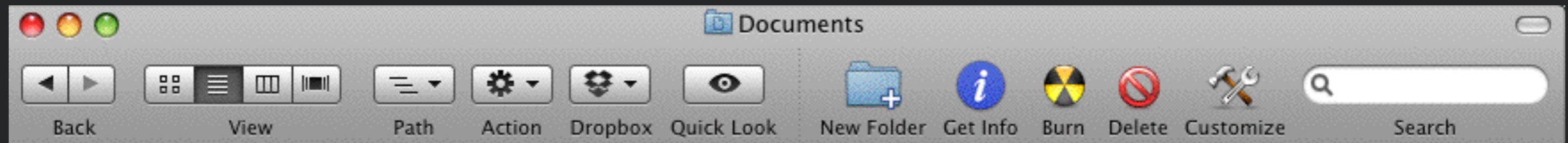
Marc Berthier. Tykho Radio. 1997. Synthetic rubber and other materials, 5 1/2 x 5 1/2 x 1 5/8" (14 x 14 x 4.1 cm). Manufactured by Lexon, France. The Museum of Modern Art, New York. Gift of the manufacturer.

Reducing a Design to its Essence

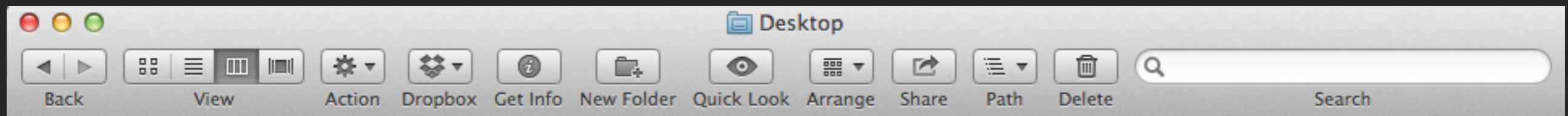


- Make design simple, bold, and direct by removing inessential details & elements
 - Even essential elements may be suggested
1. *Determine essential qualities & information to be conveyed*
 2. *Critically examine each element & ask how design would suffer without it.*
 3. *Try removing elements. What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

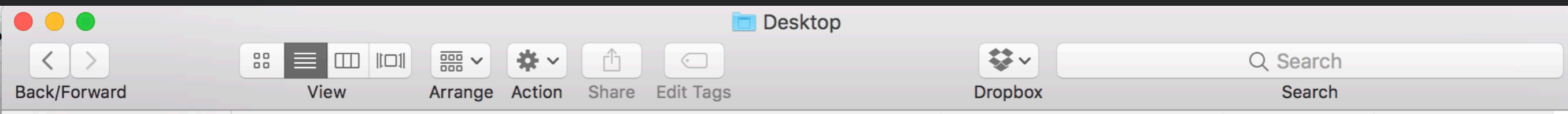
Trade-offs in Simplicity



OSX c.2010



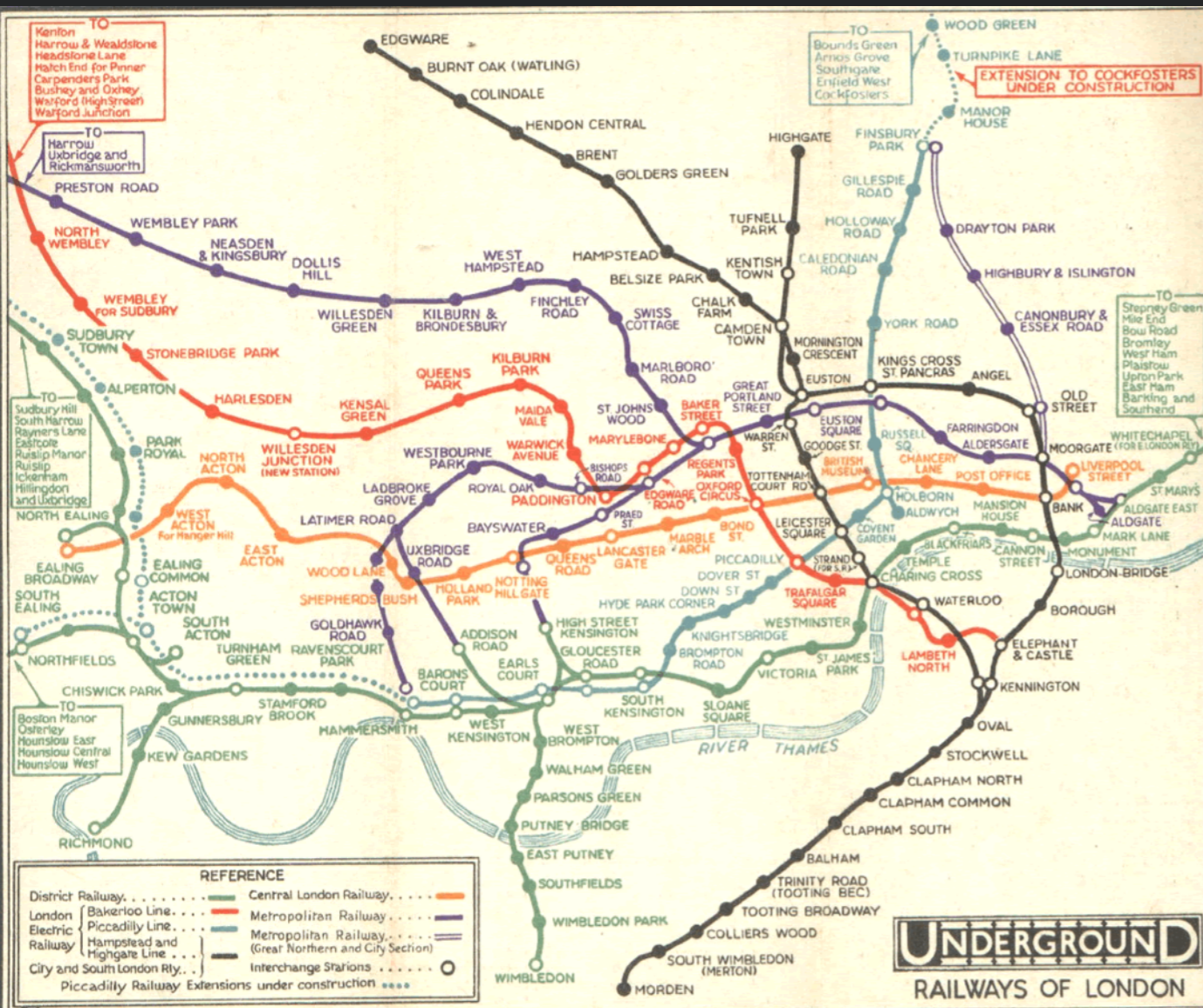
OSX c.2011



OSX c.2016



Guidelines for Visual Design



Reduction in new map: relative distances don't matter

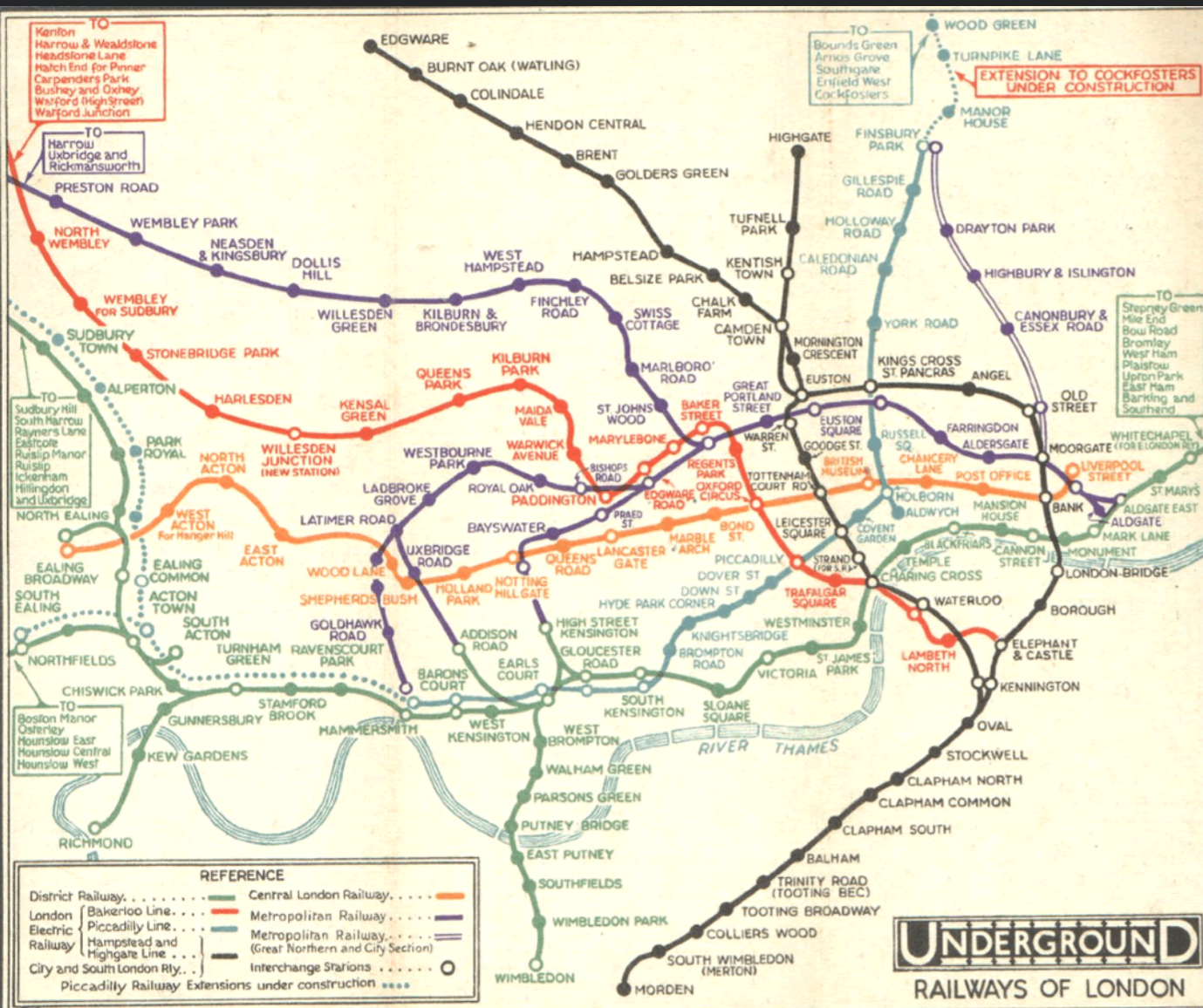


Regularizing the Elements of a Design

- 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



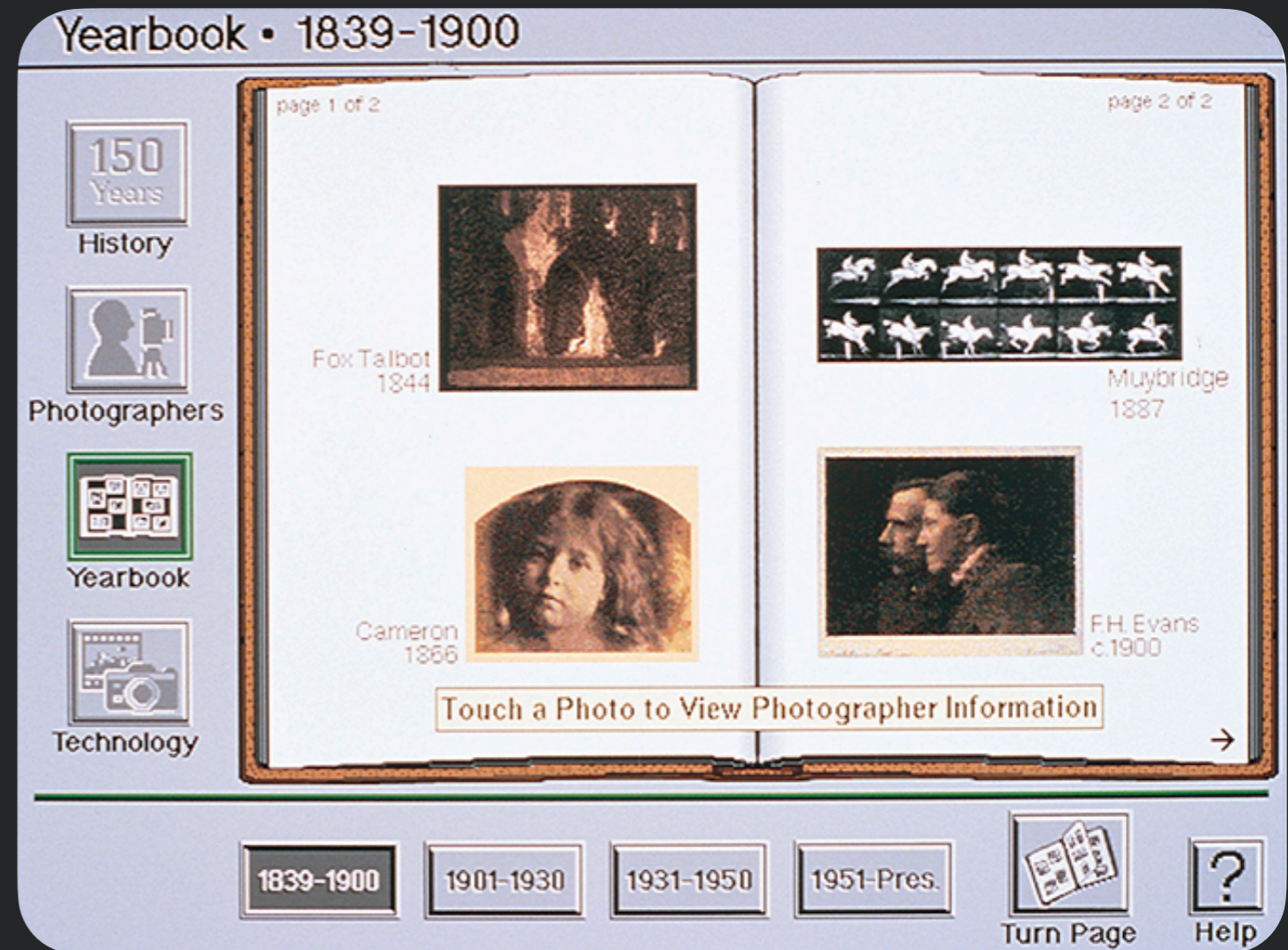
Guidelines for Visual Design



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 <ul style="list-style-type: none"> SWE 432 	8 Noon	9	10
11	12 <ul style="list-style-type: none"> Office Hours 	13 10:30 AM	14	15	16	17

Scale, Contrast, & Proportion



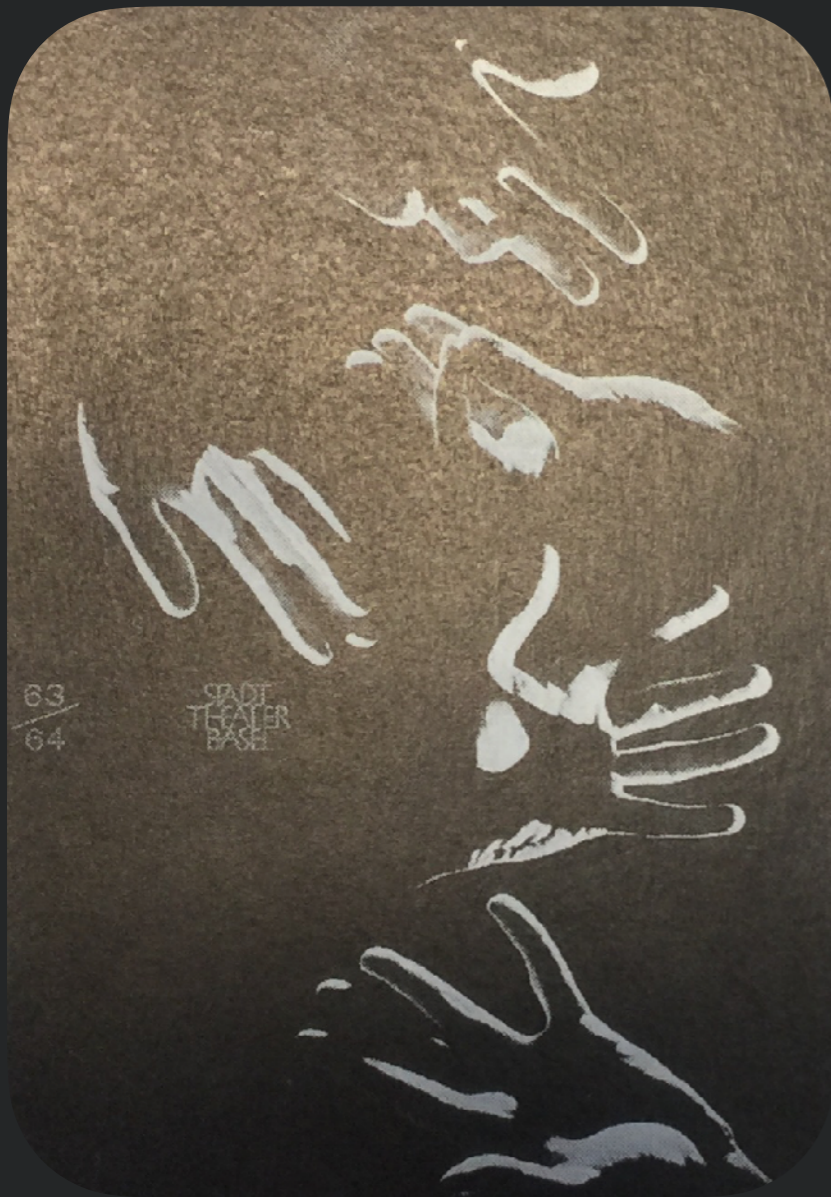


Scale, Contrast, & Proportion

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

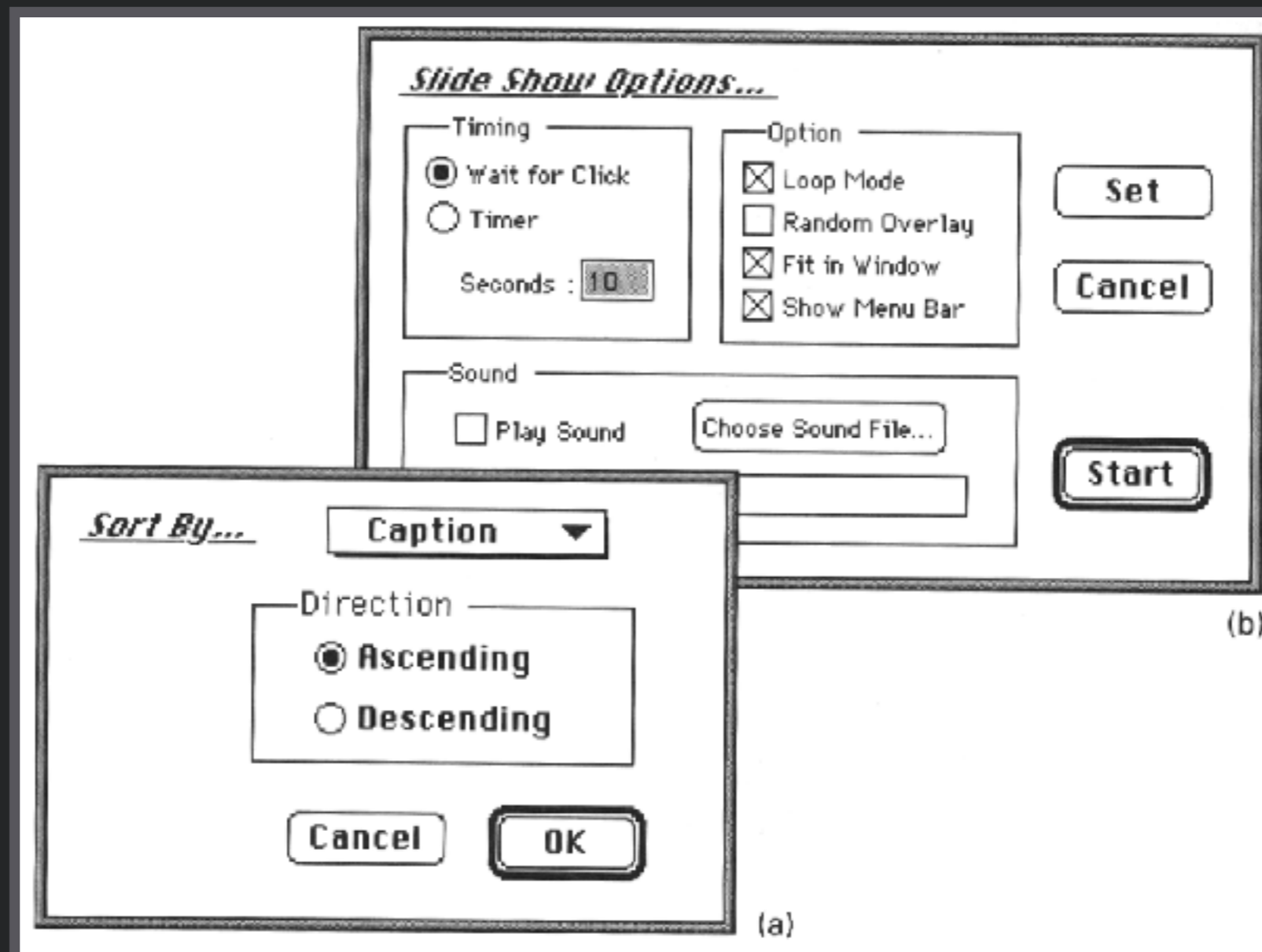


Principles

- **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

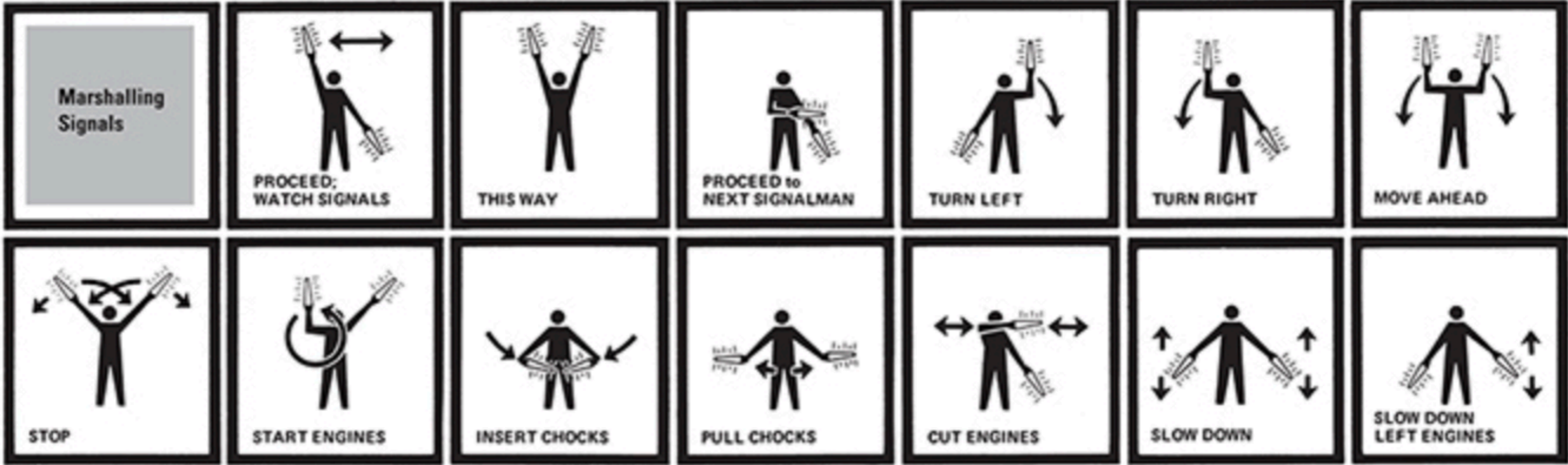
- Contrasting color, value, texture can segregate information into separate layers
- Supports overlapping information in displays, allowing selective processing of specific sets of elements
- Allows different layers to be read and interpreted separately





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



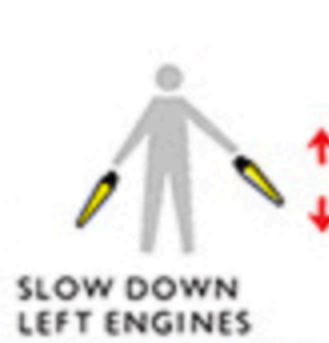
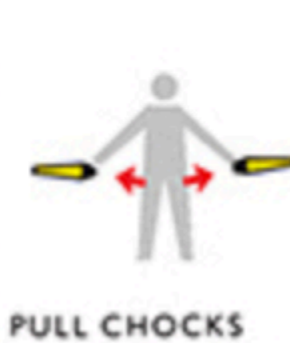
Layers



Marshalling Signals



MARSHALLING SIGNALS



Organization & Structure



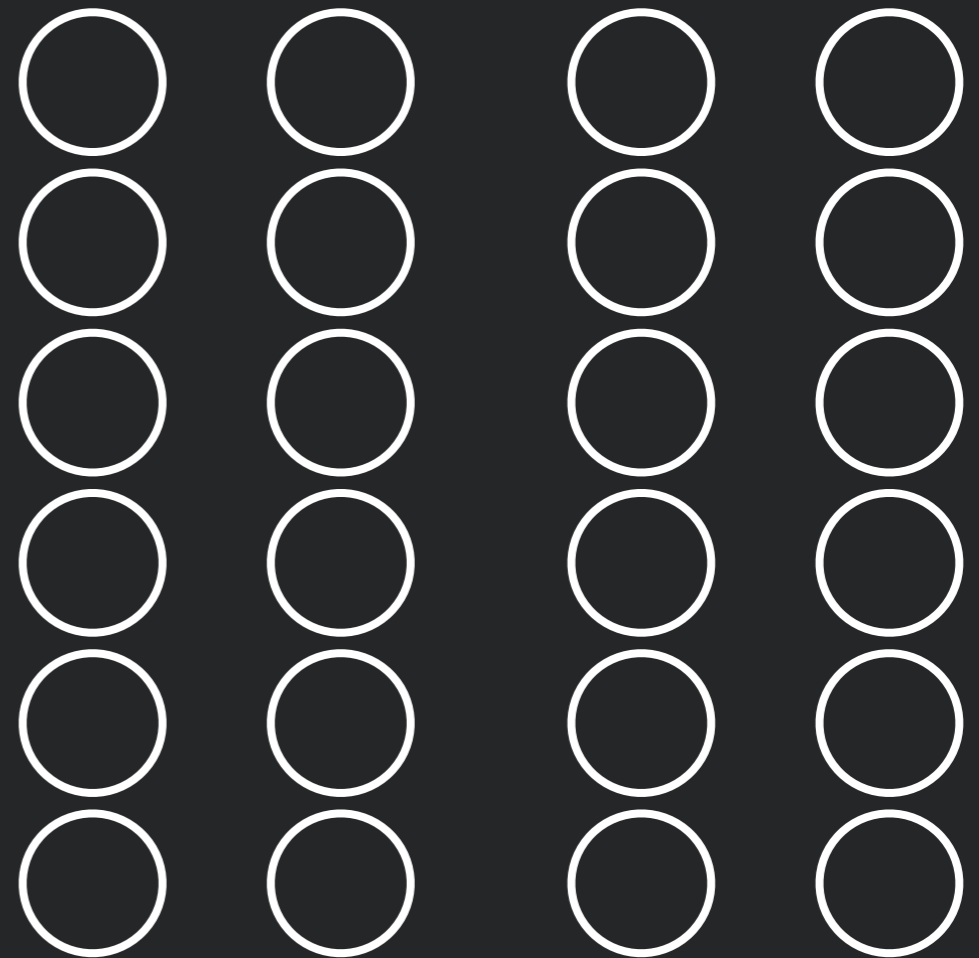
Organization & Structure

- 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

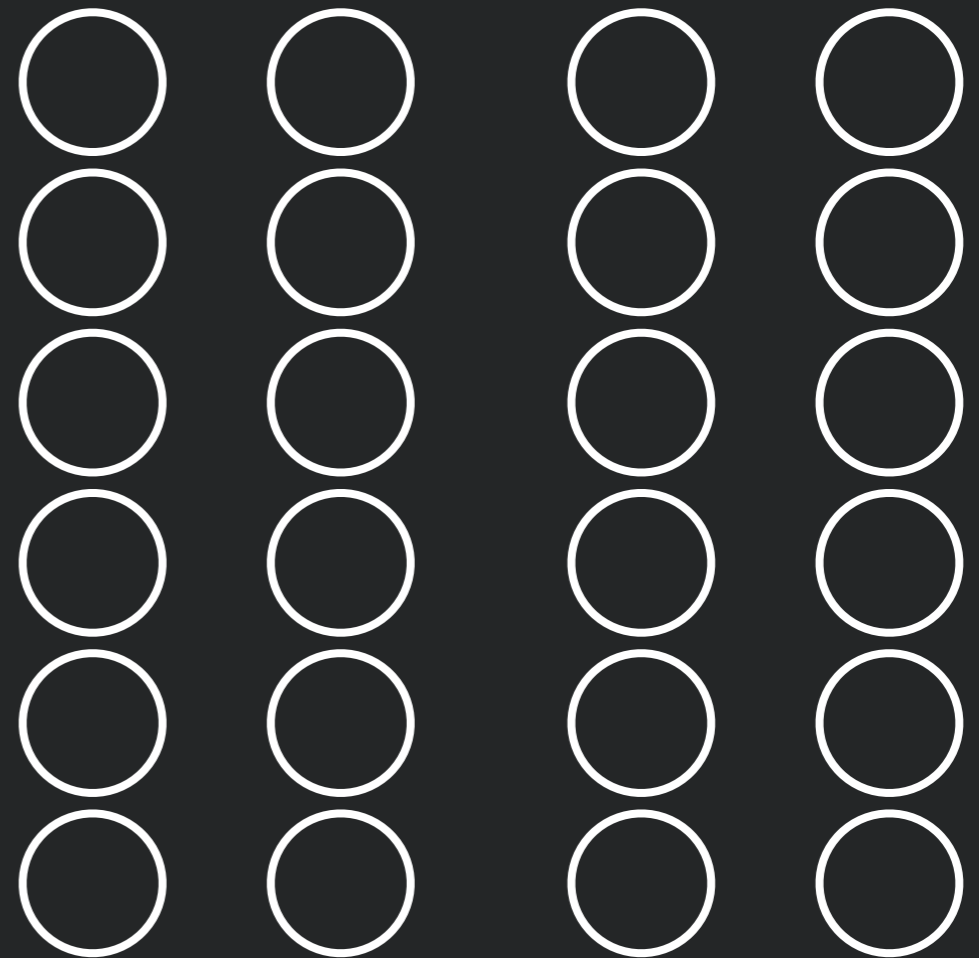
- Elements associated most strongly w/ nearby elements



Gestalt Principle - Proximity

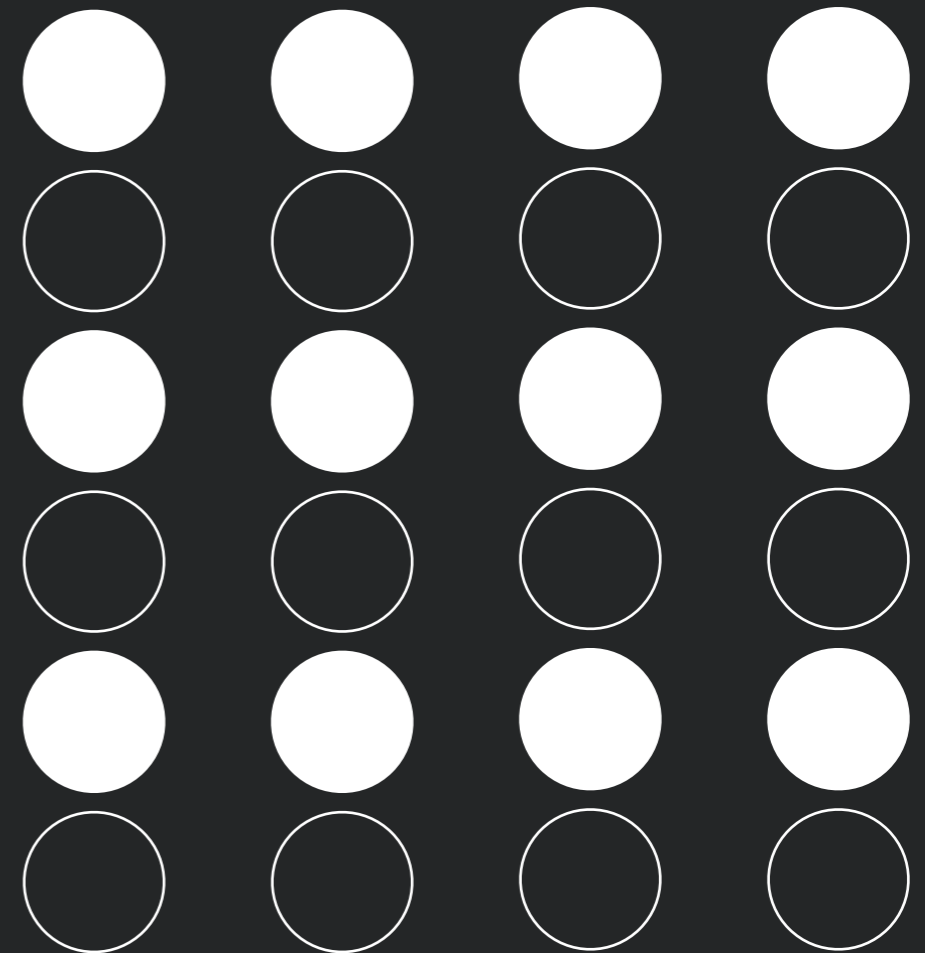
- Elements associated most strongly w/ nearby elements

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



Gestalt Principle - Similarity

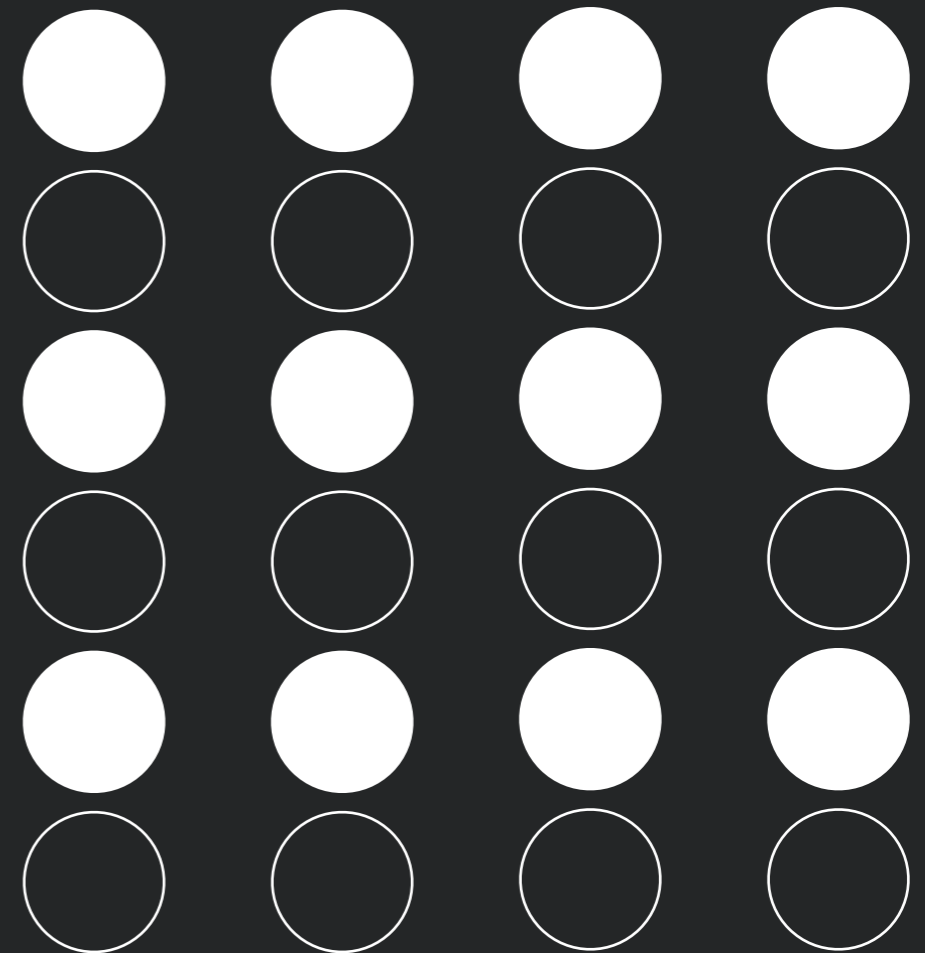
- Elements associated more strongly when share common visual attributes than when they differ



Gestalt Principle - Similarity

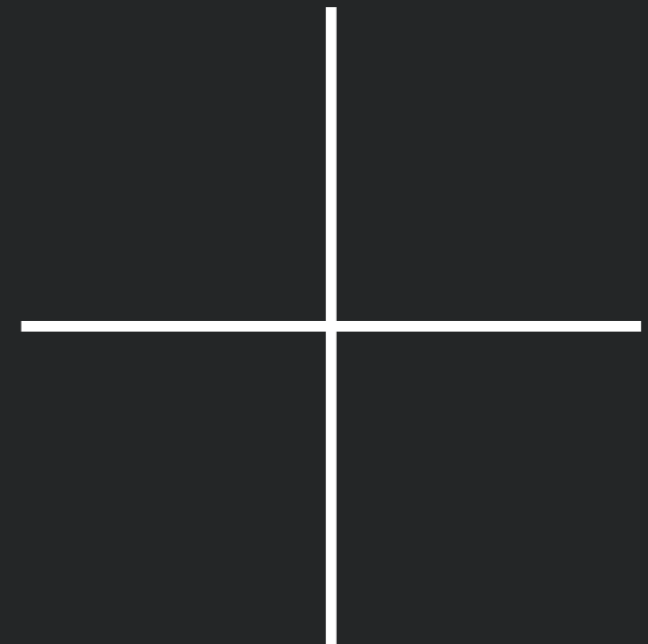
- Elements associated more strongly when share common visual attributes than when they differ

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



Gestalt Principle - Continuity

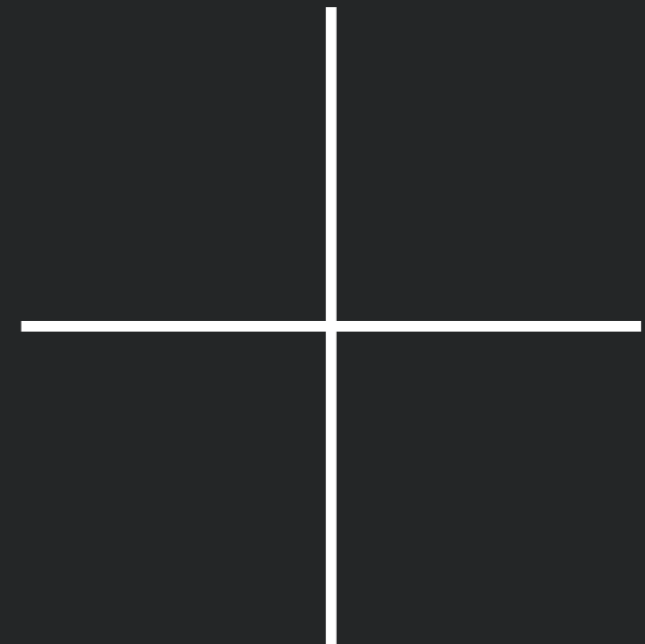
- Preference for *simplest* physical explanation of complex figure



Gestalt Principle - Continuity

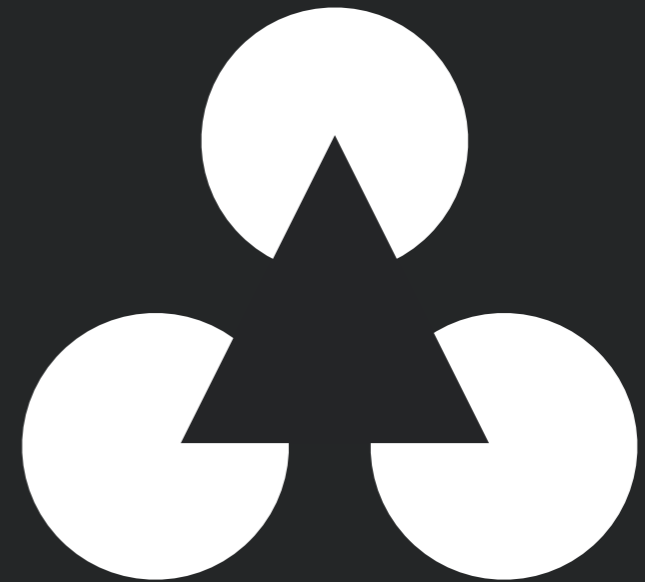
- Preference for *simplest* physical explanation of complex figure

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



Gestalt Principle - Closure

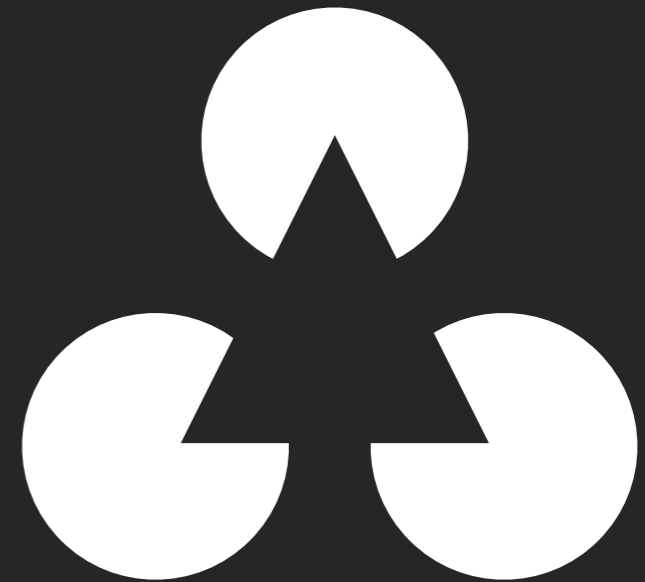
- Preference to interpret figures as complete, even when missing information



Gestalt Principle - Closure

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

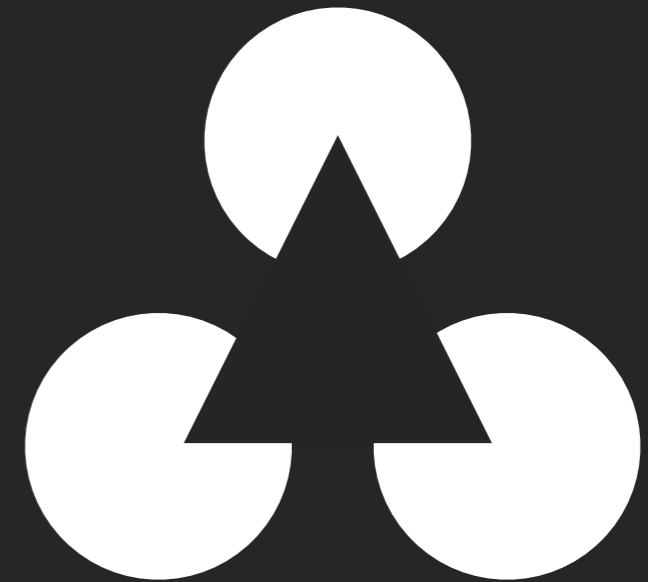
Parsed as triangle superimposed on 3 complete circles, even though none of these is actually present



Gestalt Principle - Closure

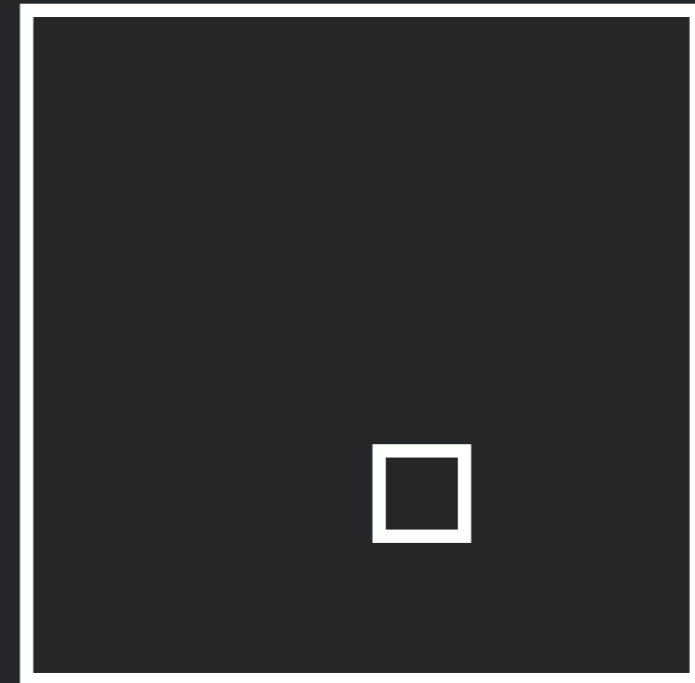
- Preference to interpret figures as complete, even when missing information

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



Gestalt Principle - Area

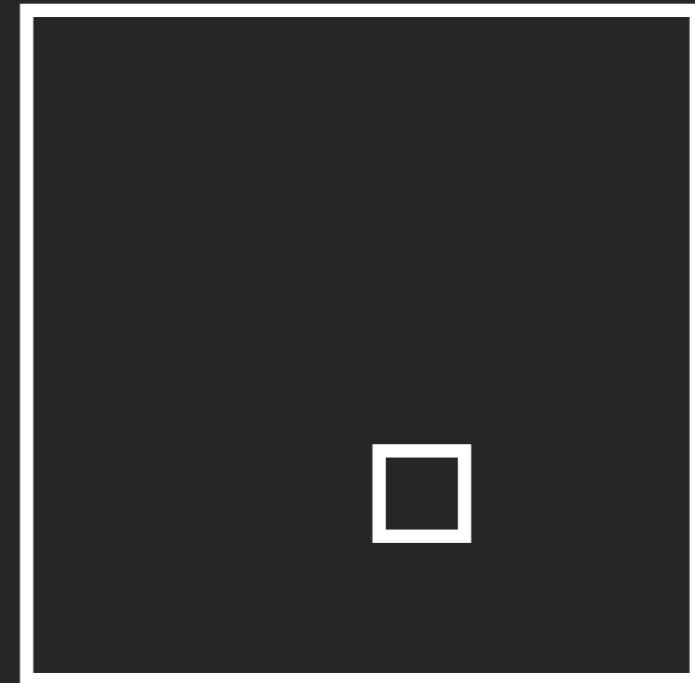
- Preference to interpret smaller overlapping elements as figure, larger as ground



Gestalt Principle - Area

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

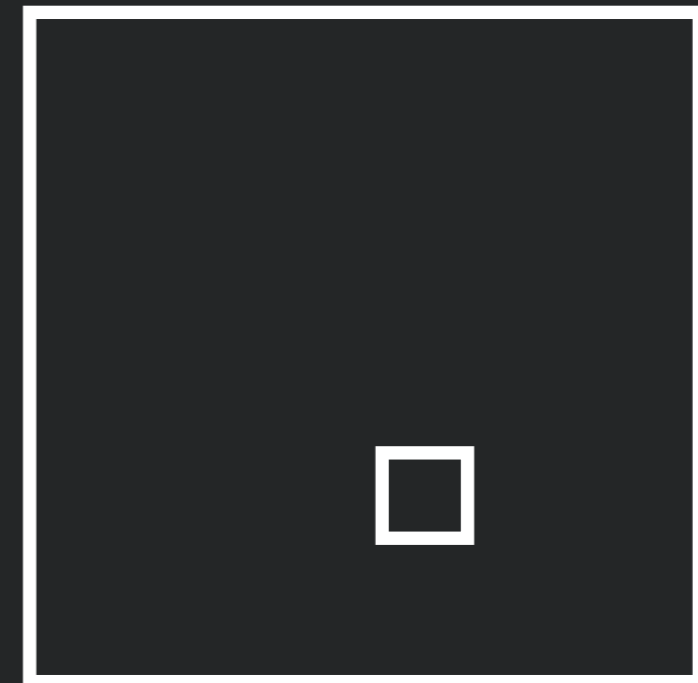
Small rectangle parsed as small rectangle
on top of larger, rather than hole



Gestalt Principle - Area

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

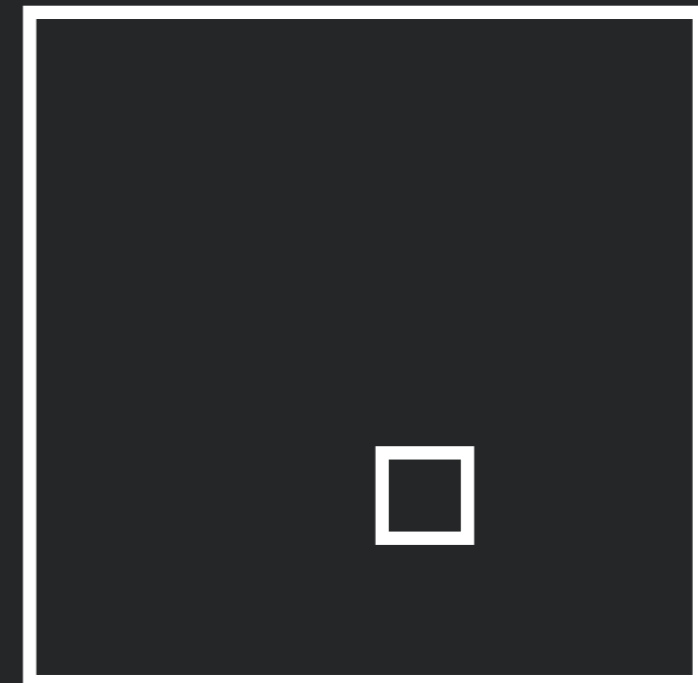
Small rectangle parsed as small rectangle on top of larger, rather than hole



Gestalt Principle - Area

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

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

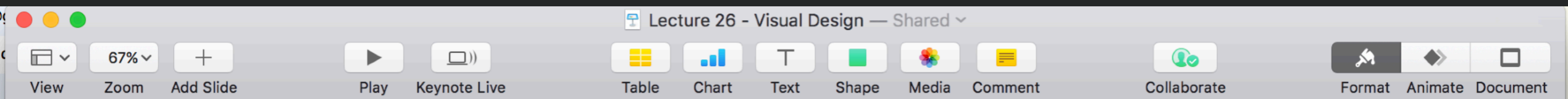
Parsed as two overlapping objects rather than 3 separate shapes



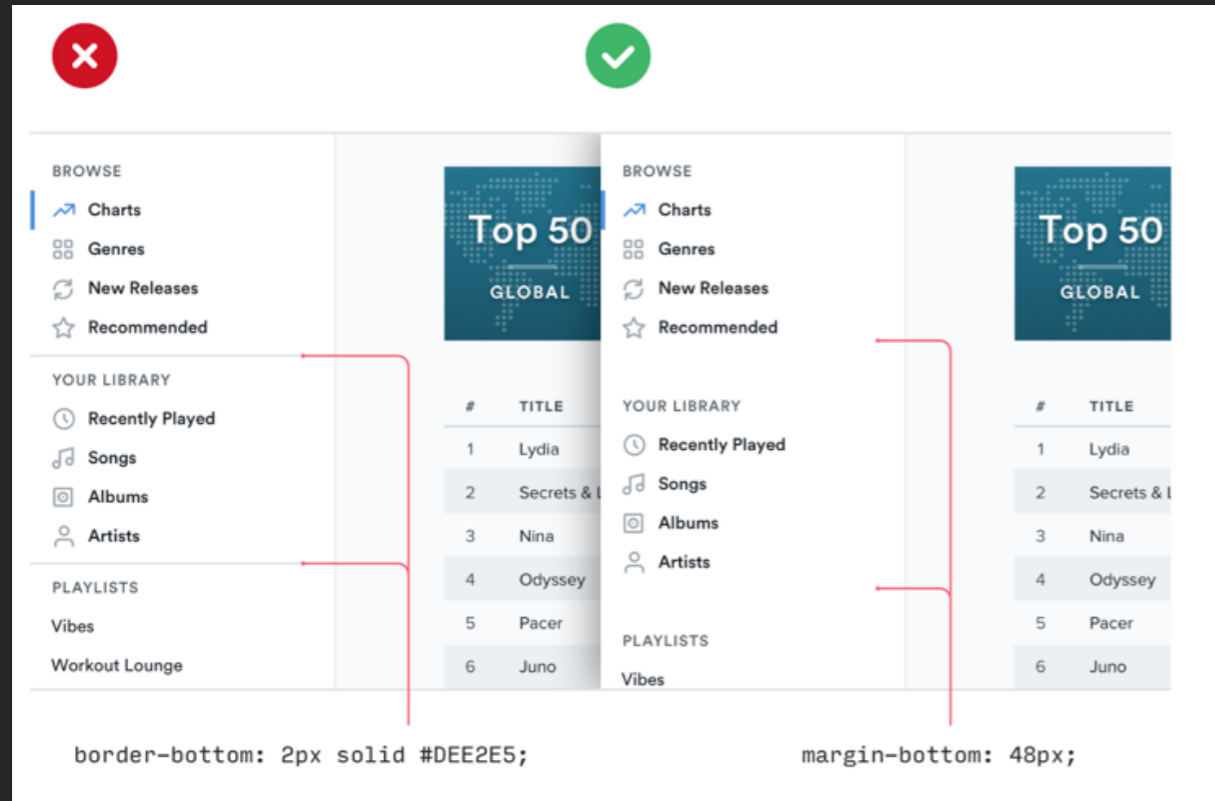
Grouping



- 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

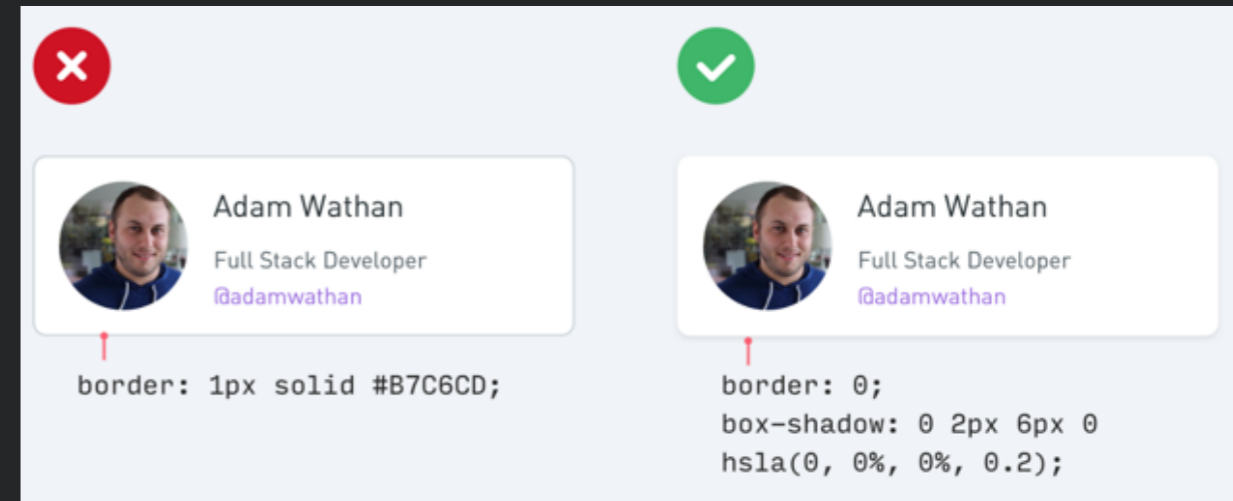


Use Fewer Borders

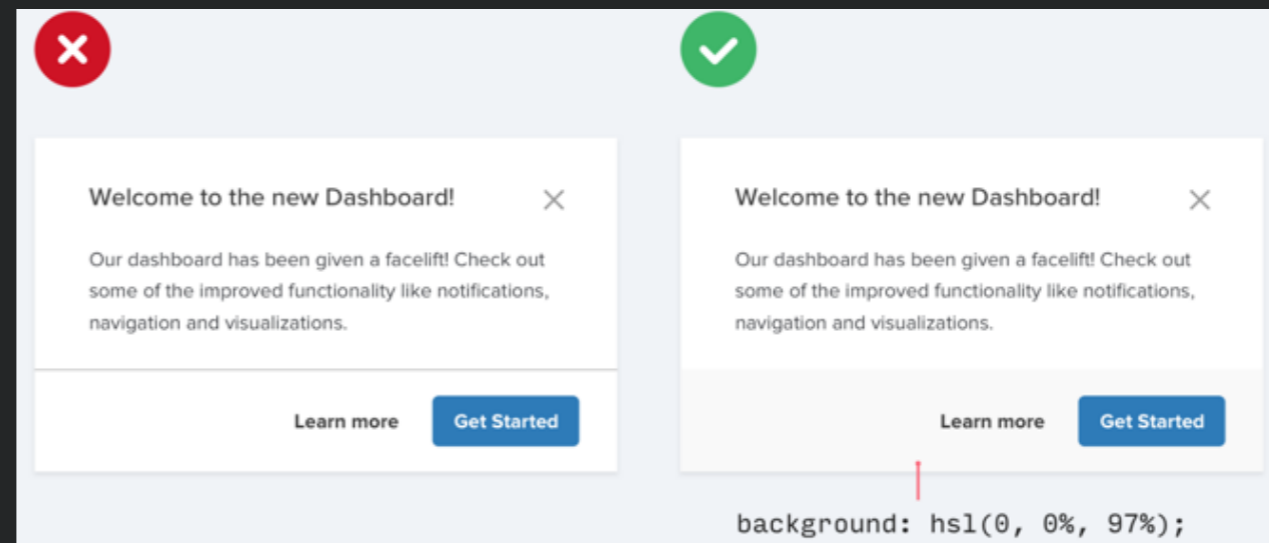


negative space

<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.**

Hierarchy

Order groups based on perceptual prominence corresponding to intended reading sequence

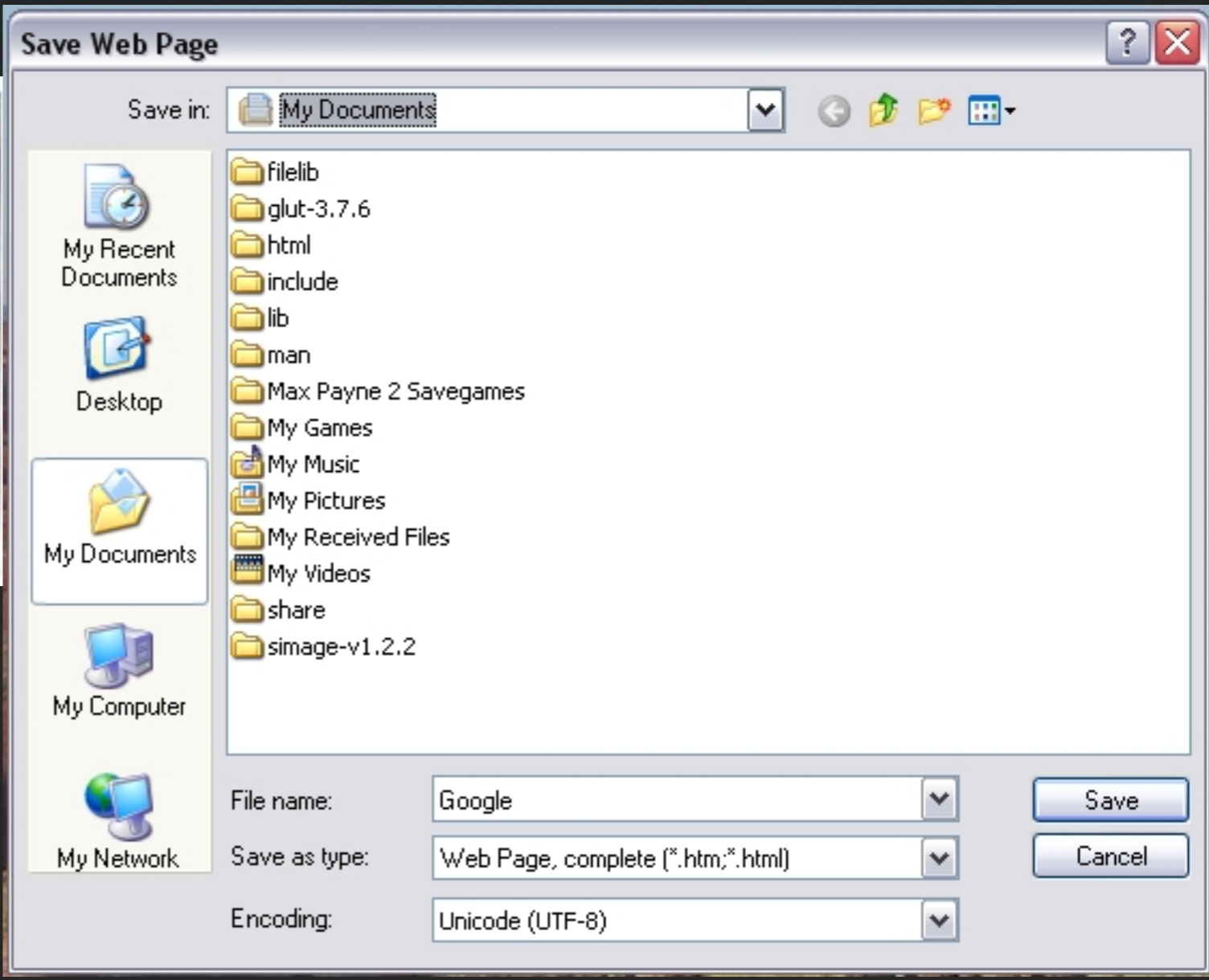
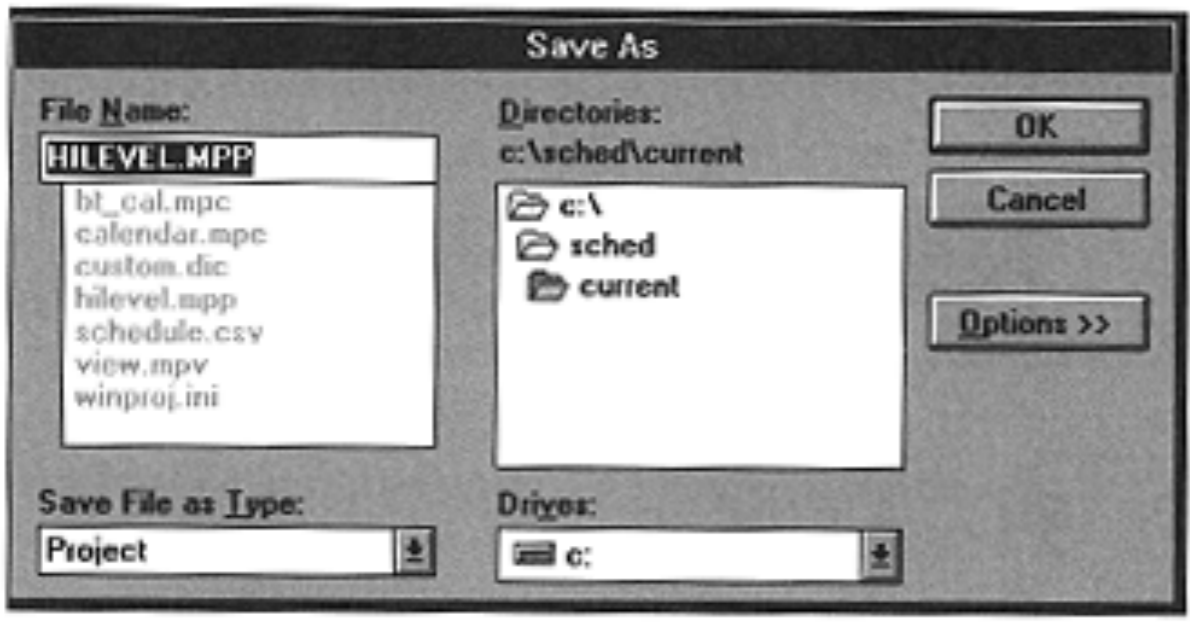
Can help solve “skimming” problems

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!





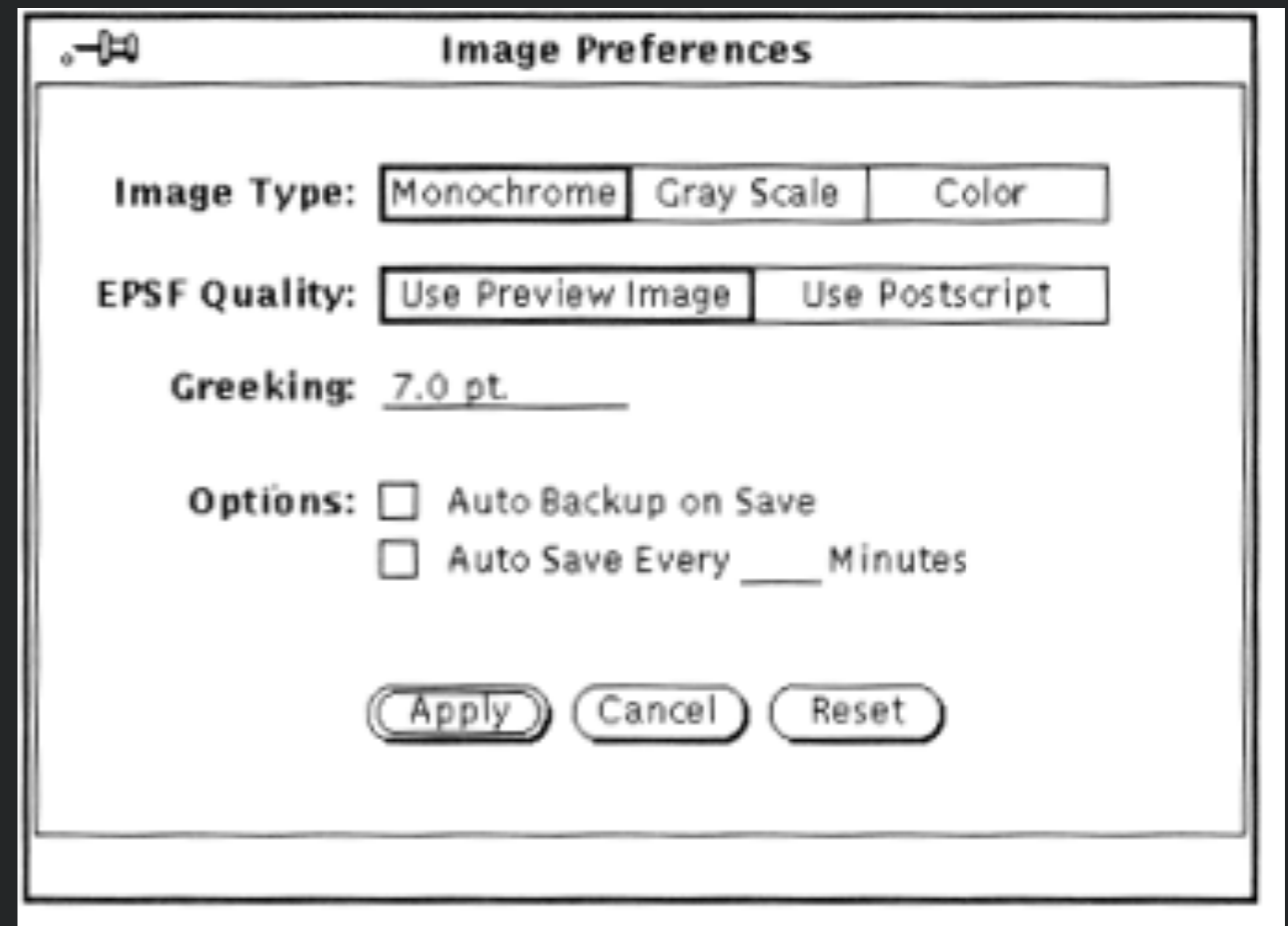
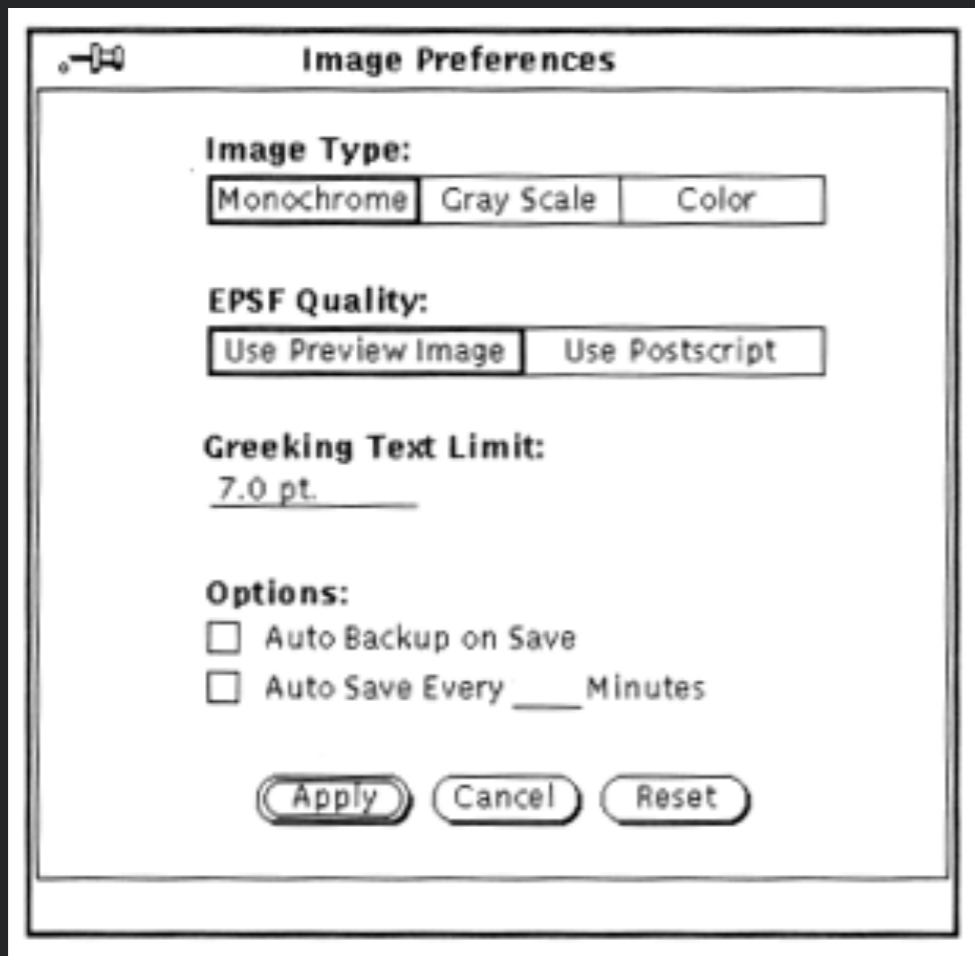
Use Negative Space

- 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

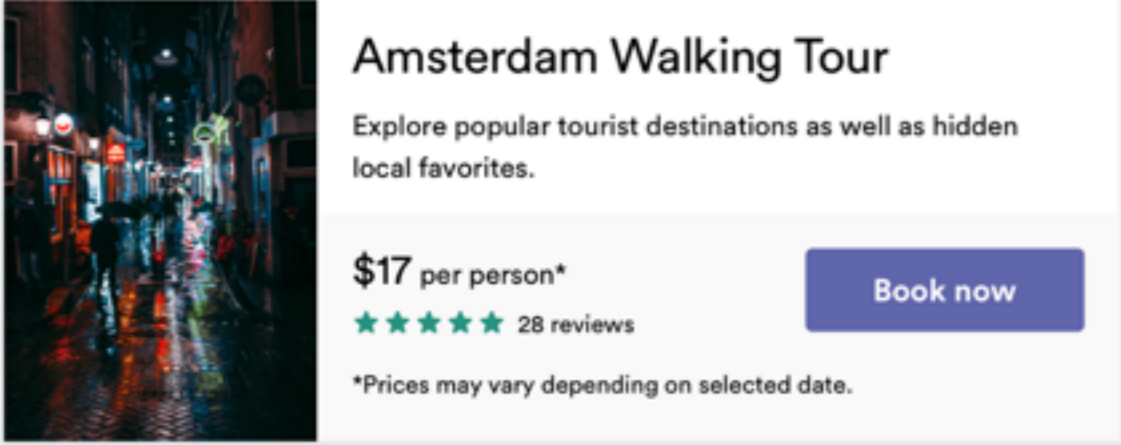
- Directs ***attention*** to critical regions of display
 1. Review design, prioritizing groups
 2. Add extra ***space*** to ensure spatial separation & emphasis, particularly for important elements





Creating Hierarchy: Color and Weight Instead of Size

✗



Amsterdam Walking Tour
Explore popular tourist destinations as well as hidden local favorites.

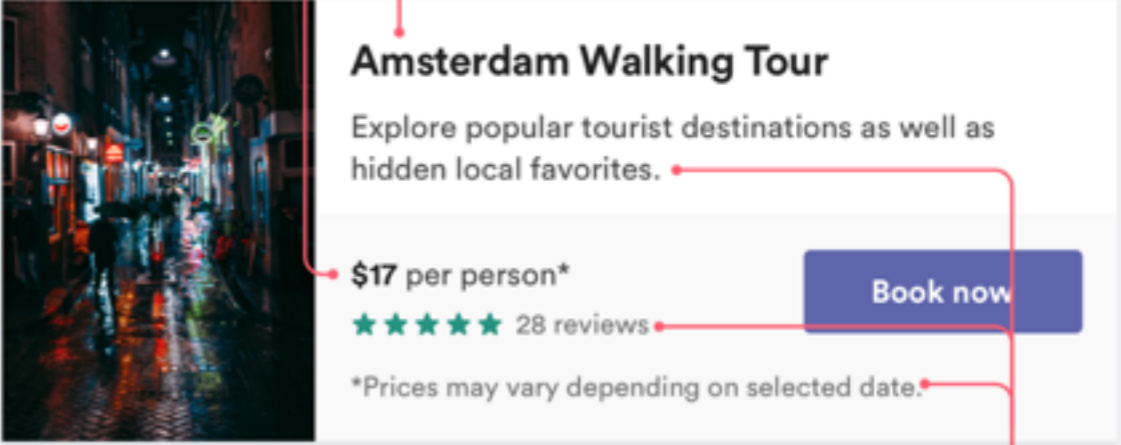
\$17 per person*
★★★★★ 28 reviews

*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

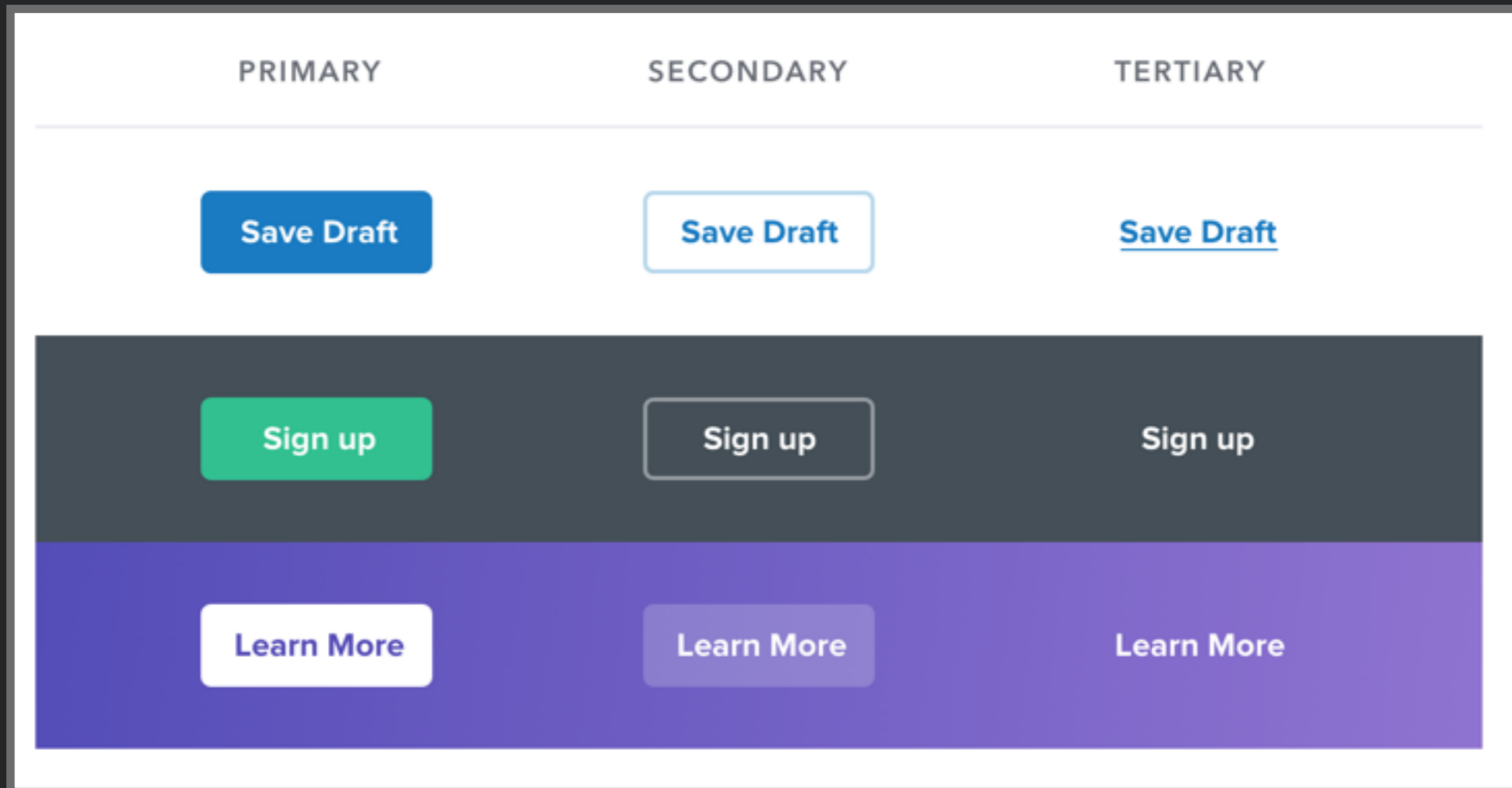
*Prices may vary depending on selected date.

Book now

Lighter not smaller



Signal Importance of Action



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

Images & Icons





Images & Icons

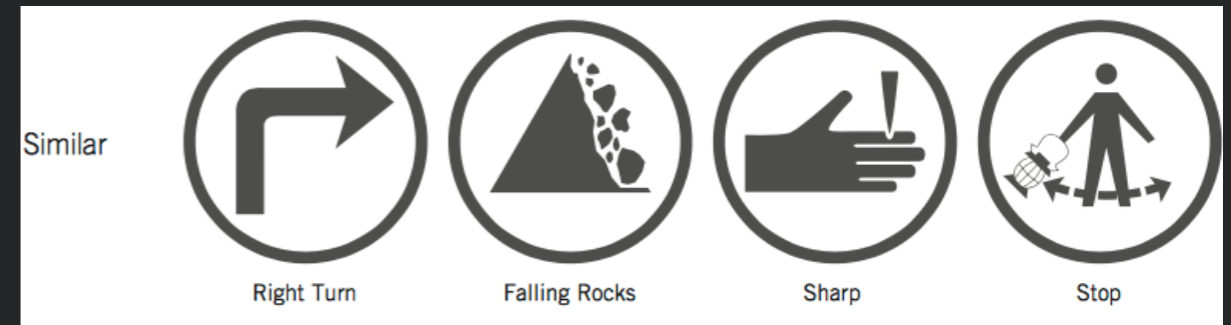
- Benefits
 - Identification - images are easy to recognize
 - Expression - breadth of artistic expression that can make design more engaging & enjoyable



Types of Iconic Representation

Types of Iconic Representation

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



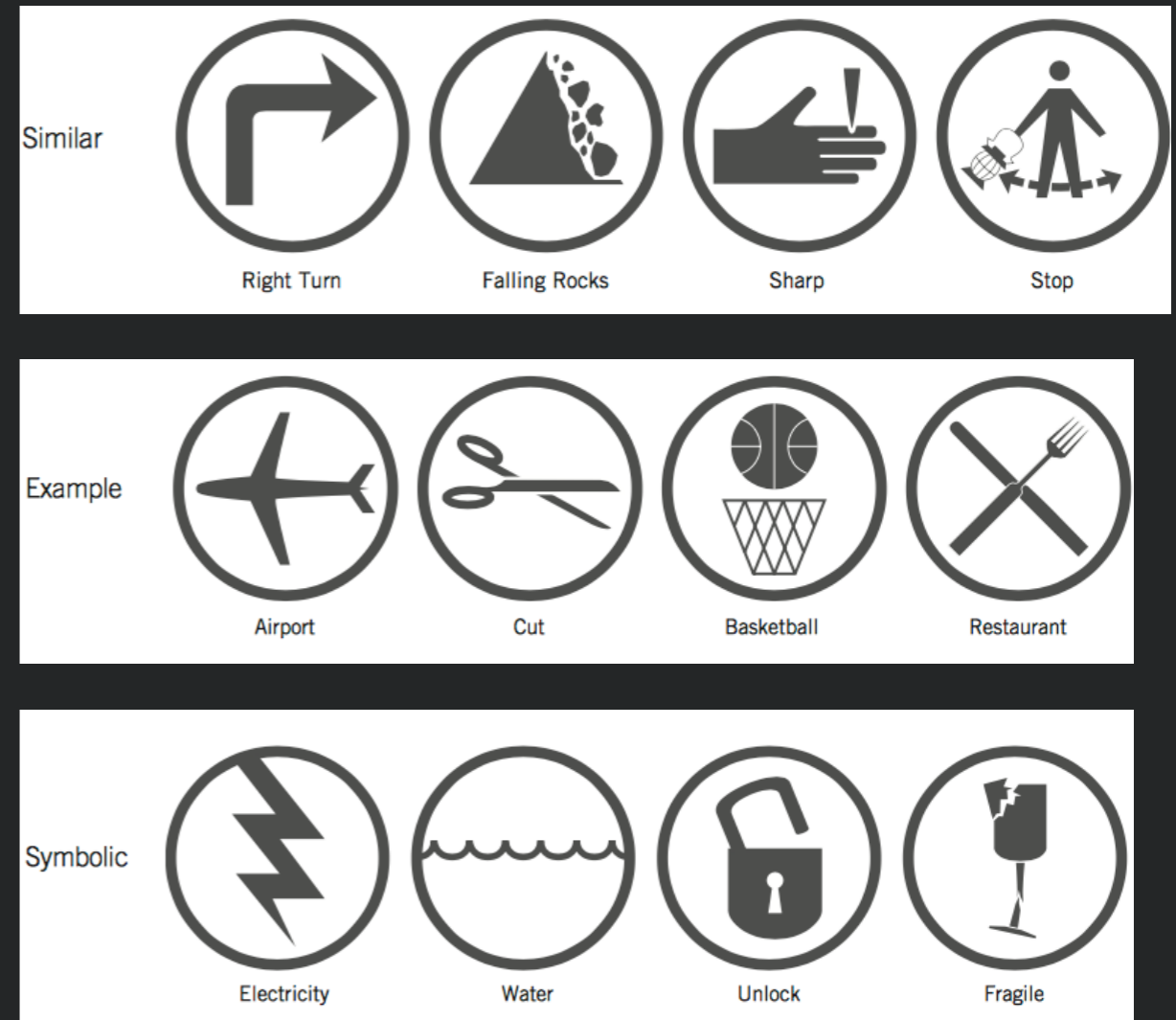
Types of Iconic Representation

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



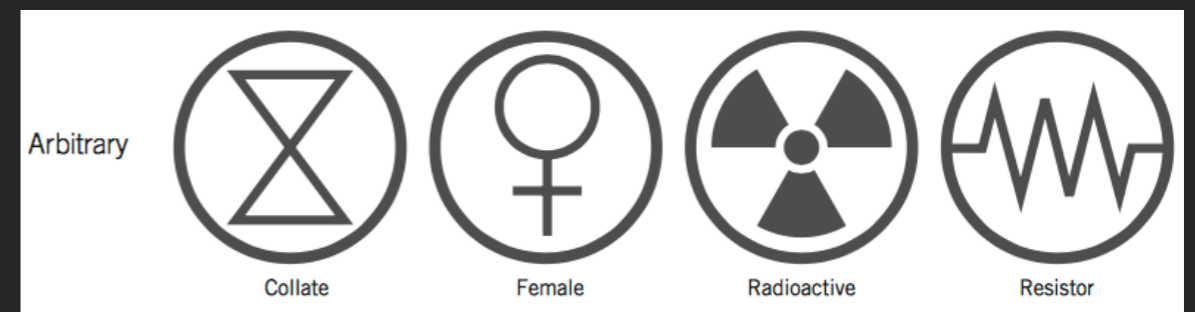
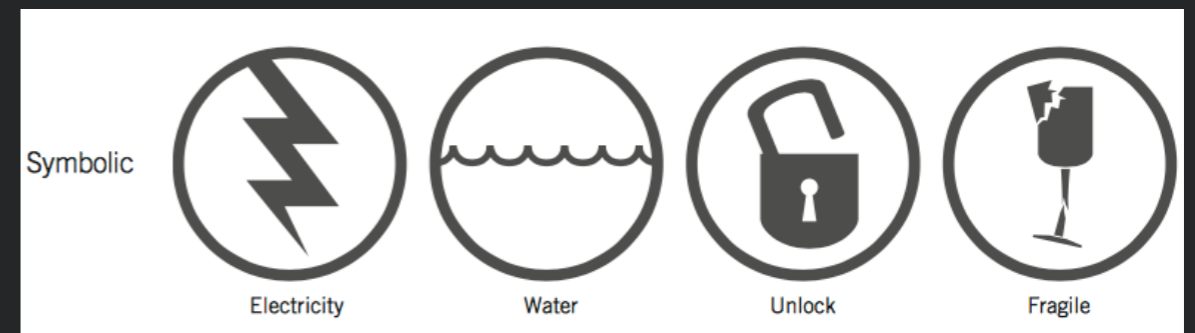
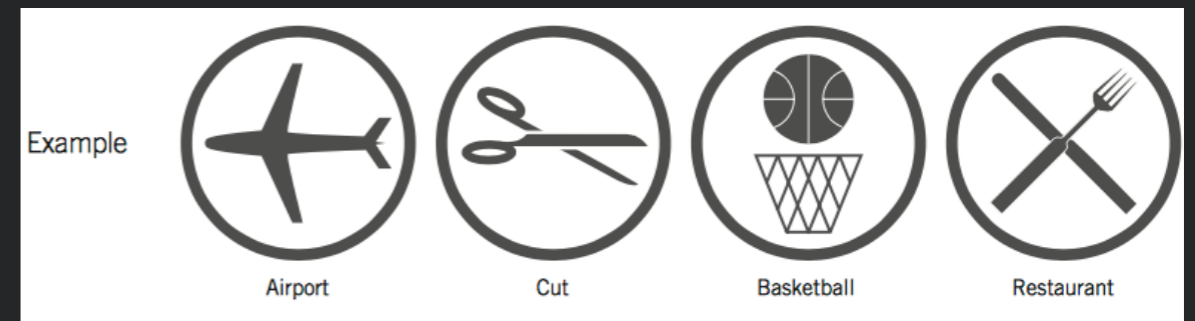
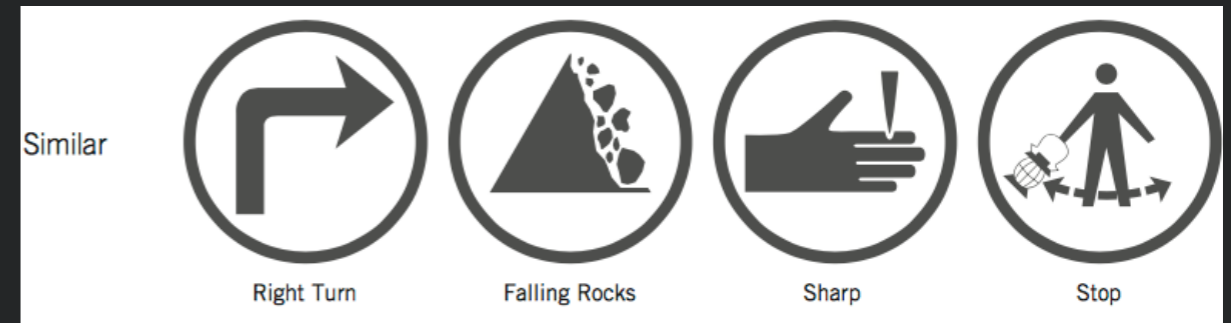
Types of Iconic Representation

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



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*

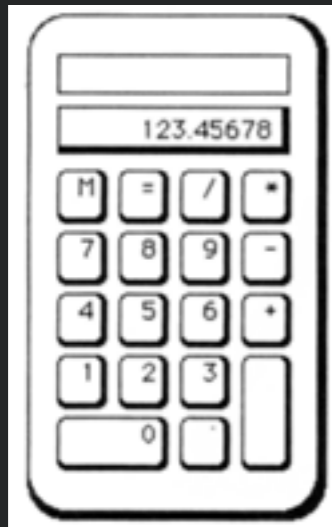


Use of Abstraction

- 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

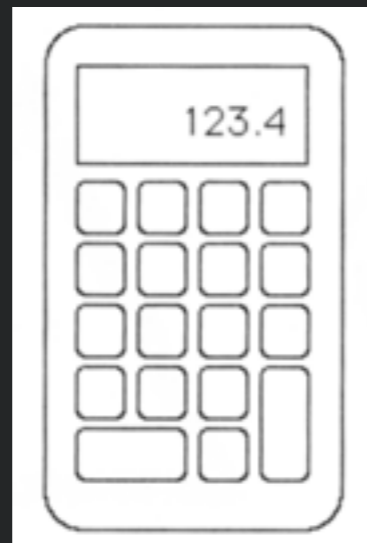
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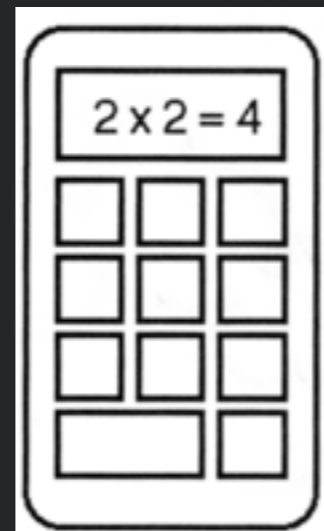
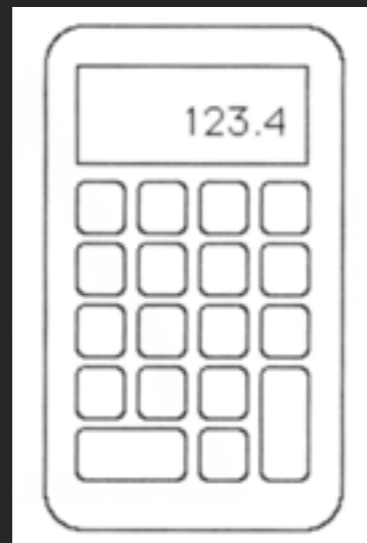
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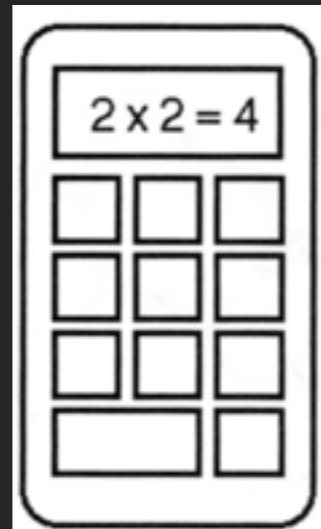
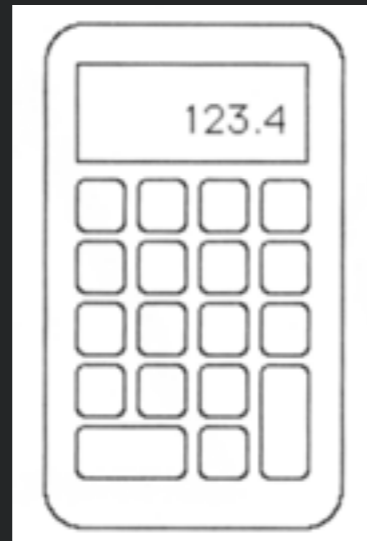
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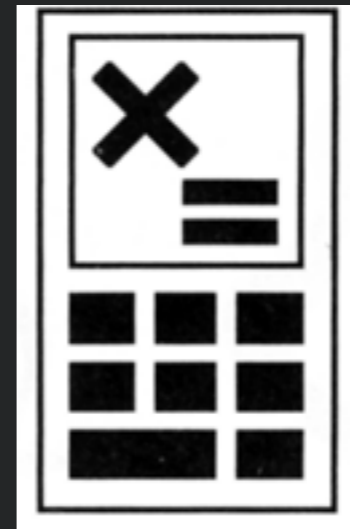
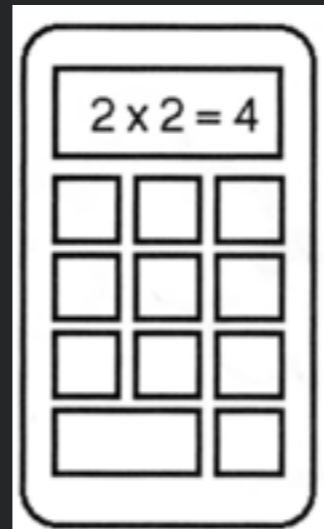
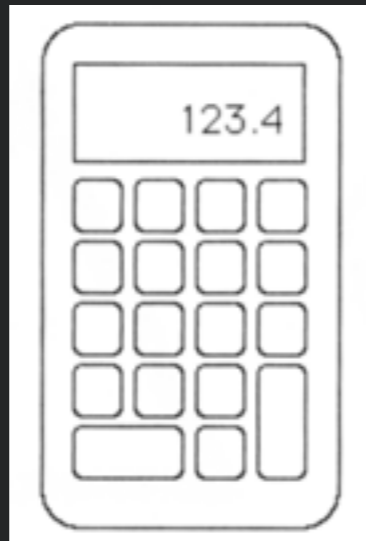
Use of Abstraction

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Use of Abstraction

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- Makes icon more generic, more canonical, less complex





Principles of Icon Design

Principles of Icon Design



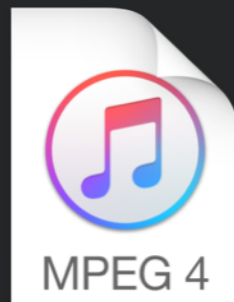
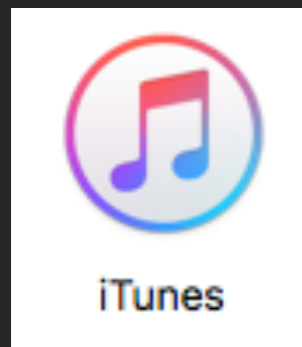
- Immediacy - can be perceived effortlessly & involuntarily by being **bold**, clear, balanced

Principles of Icon Design



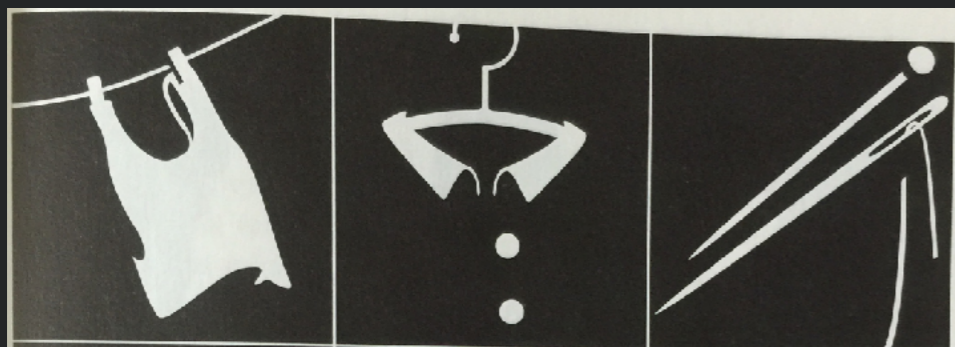
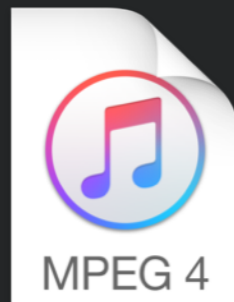
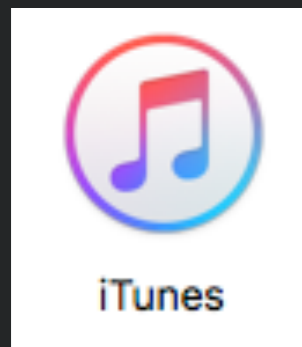
- Immediacy - can be perceived effortlessly & involuntarily by being **bold**, clear, balanced
- Generality - represents a **class** of items, rather than an individual element, by removing details that may vary

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

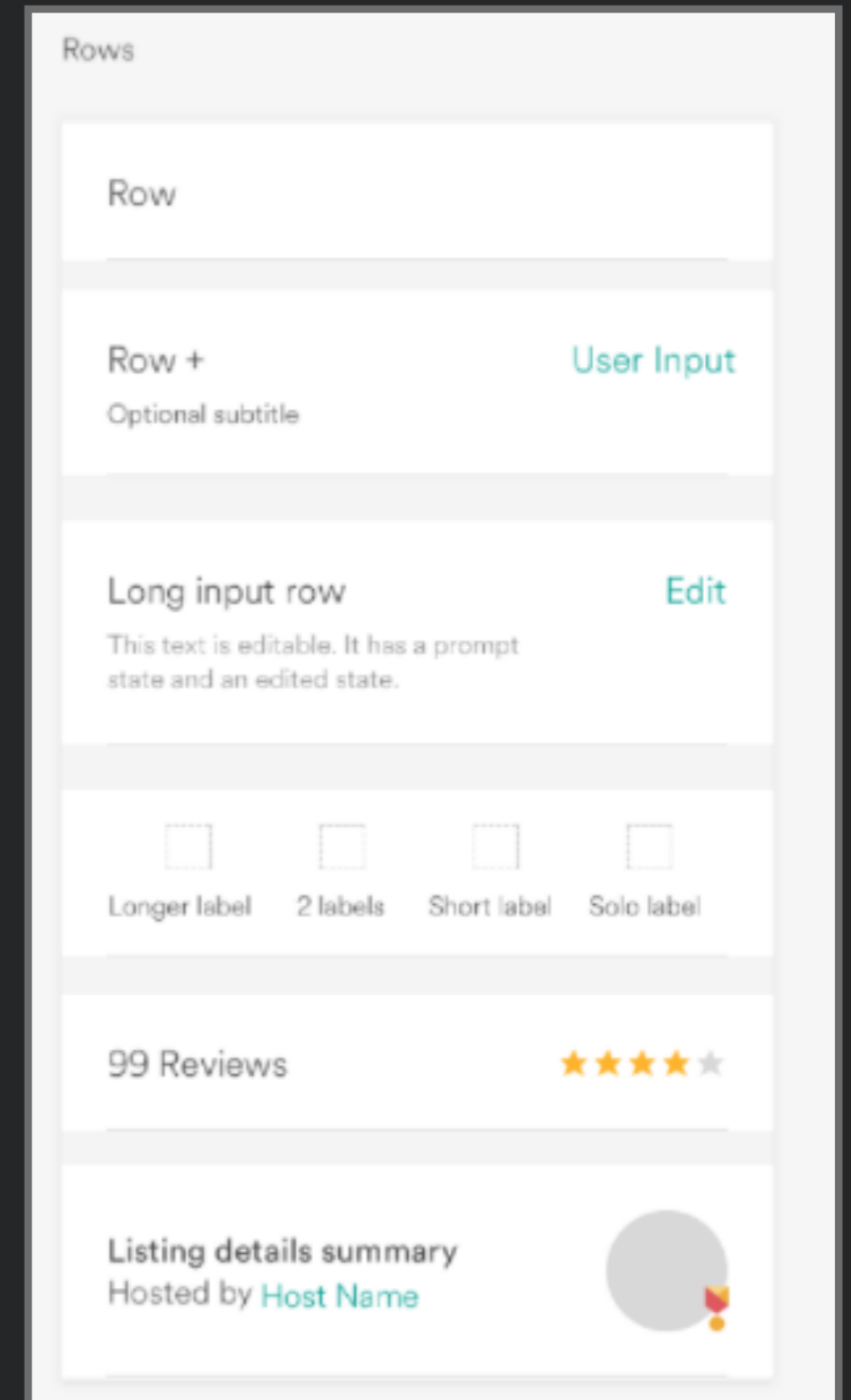


Design Languages



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](#)

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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

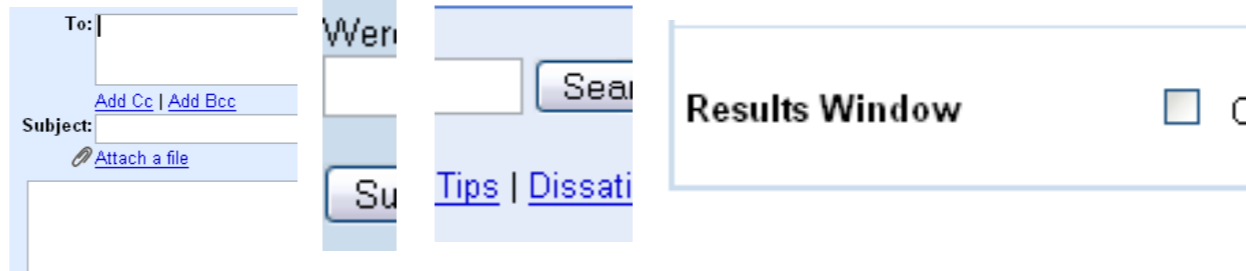
[Invite 7 frie](#) [New Featu](#) **New!** Never lose ai **act now**

Example: Syntax, Google 2004

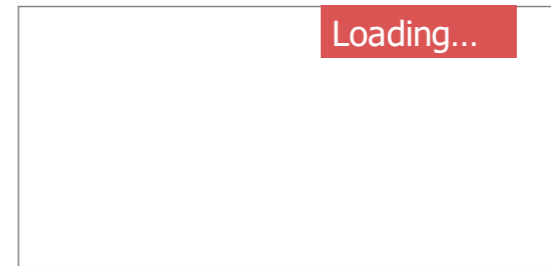
task

Find results

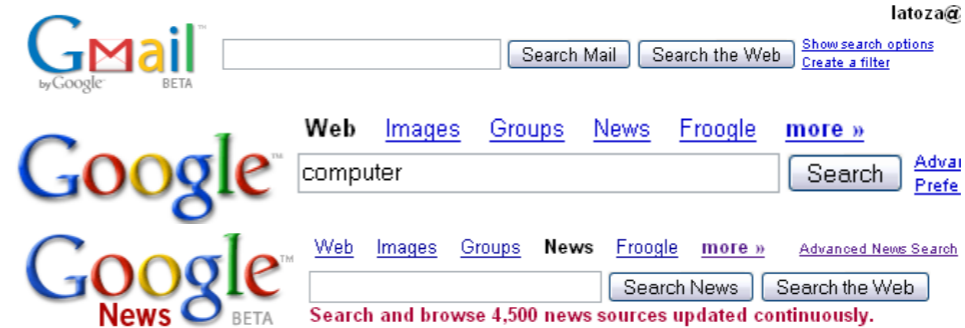
with **all** of the words
with the **exact phra**
with **at least one** of
without the words



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



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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 PDW 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 ...
Fresno turns on the heat at the Chili Cook-off The Carnegie Pulse
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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



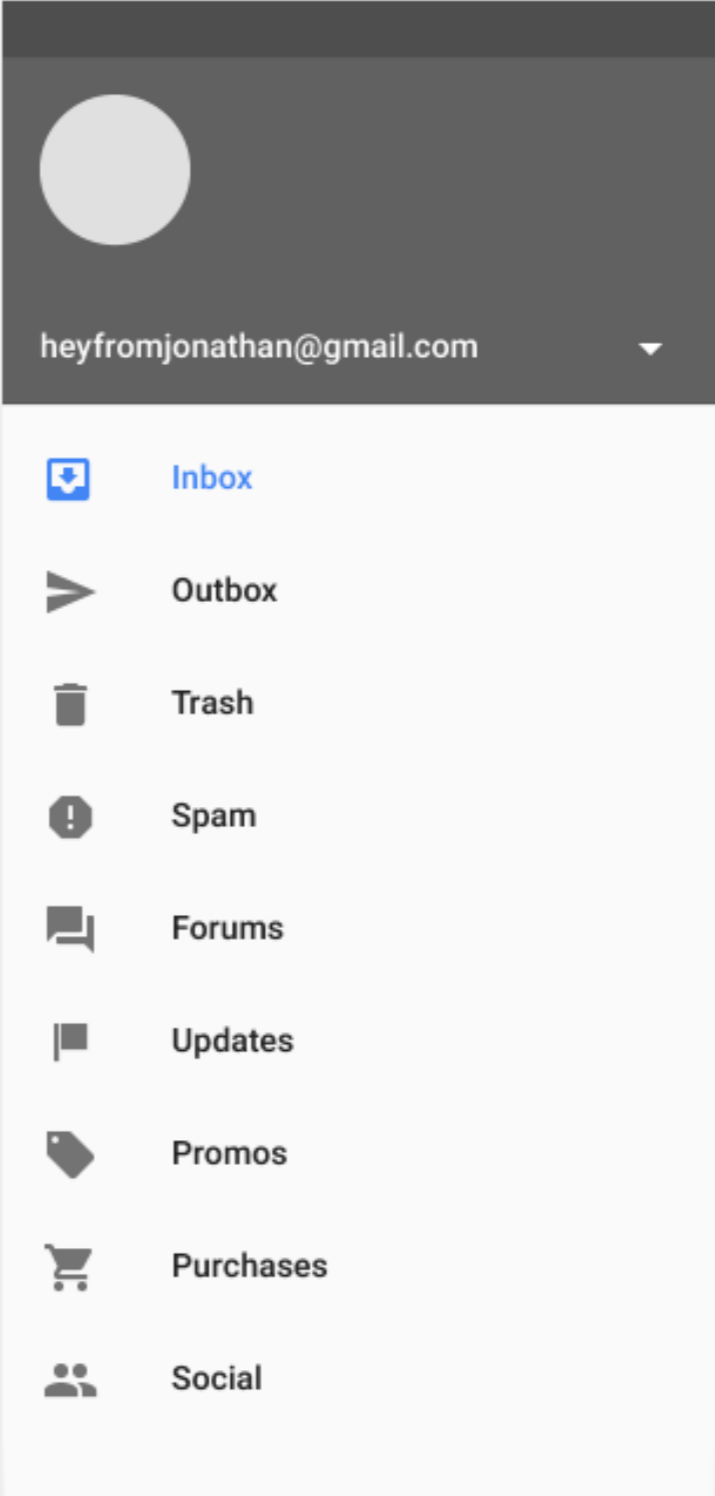
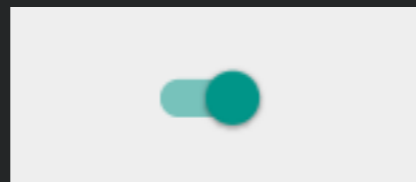
Top 10 Australian beaches

Number 10
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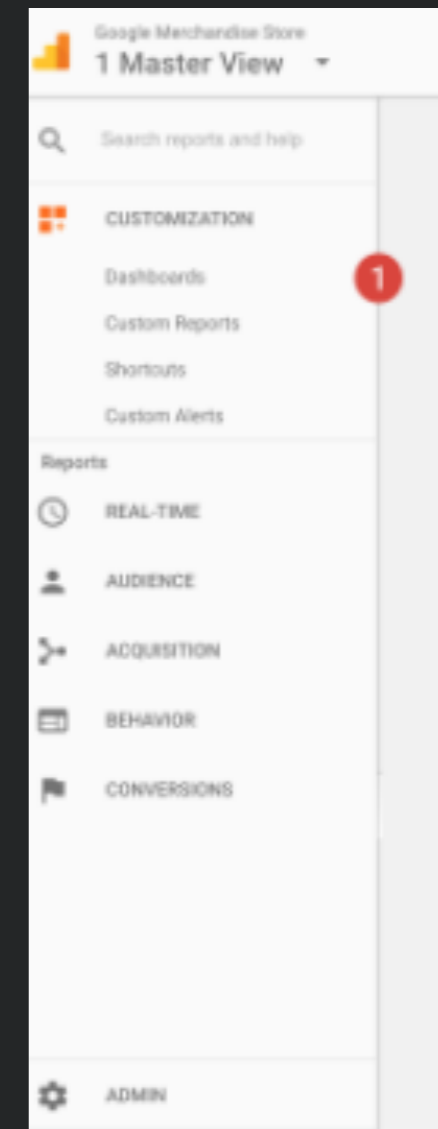
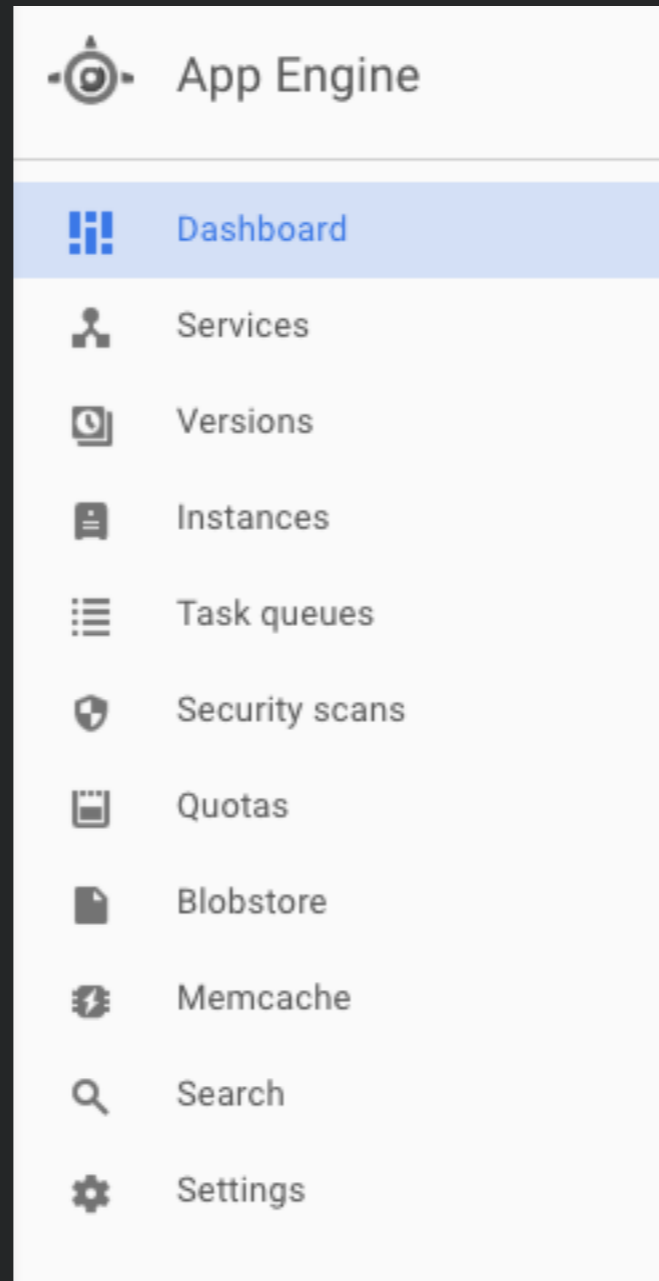
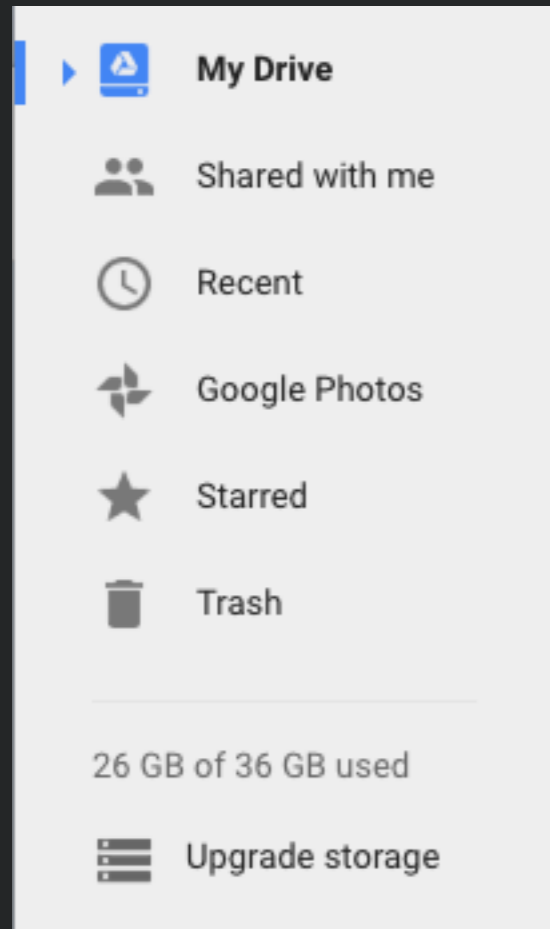


heyfromjonathan@gmail.com

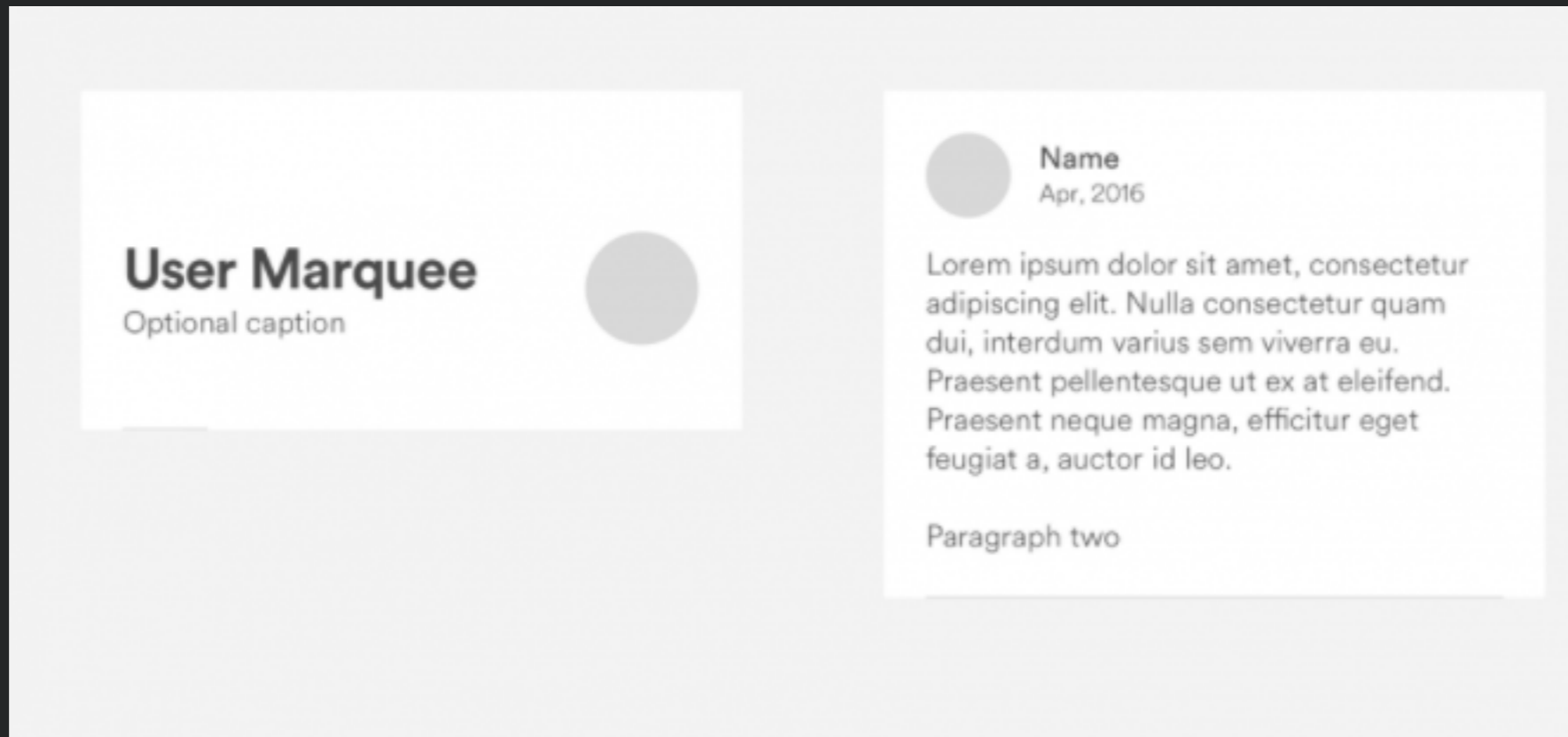
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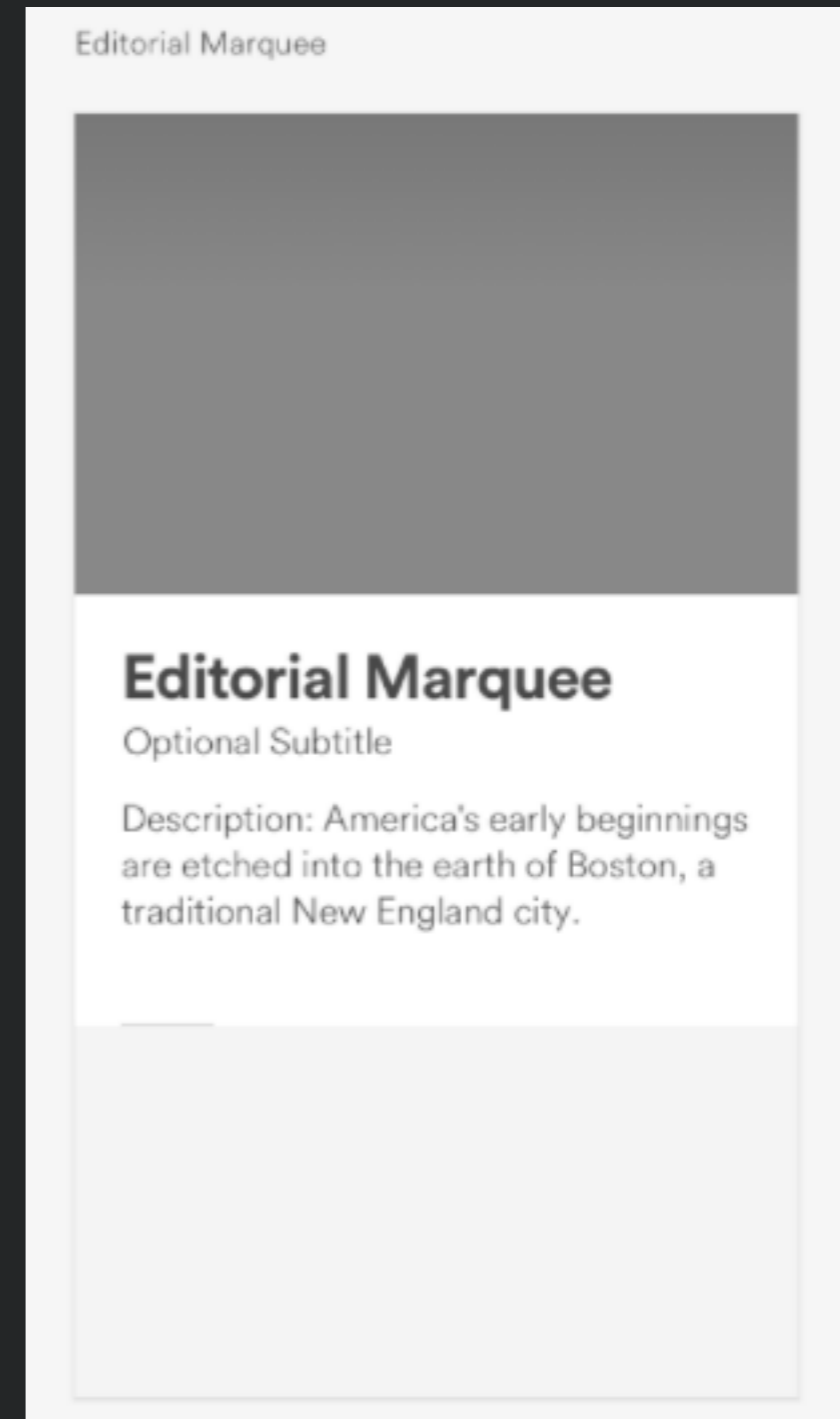
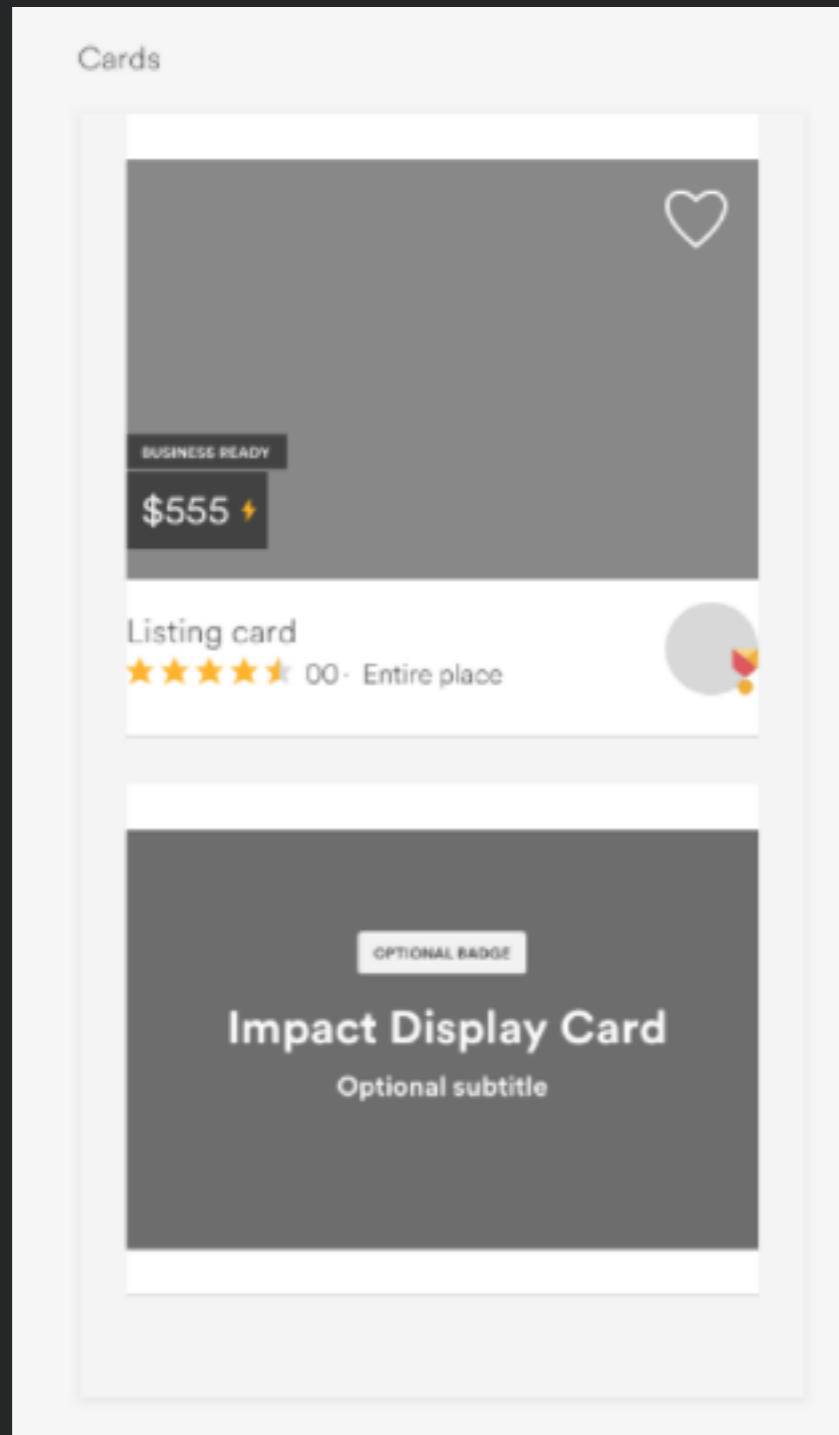
Examples: Google 2016



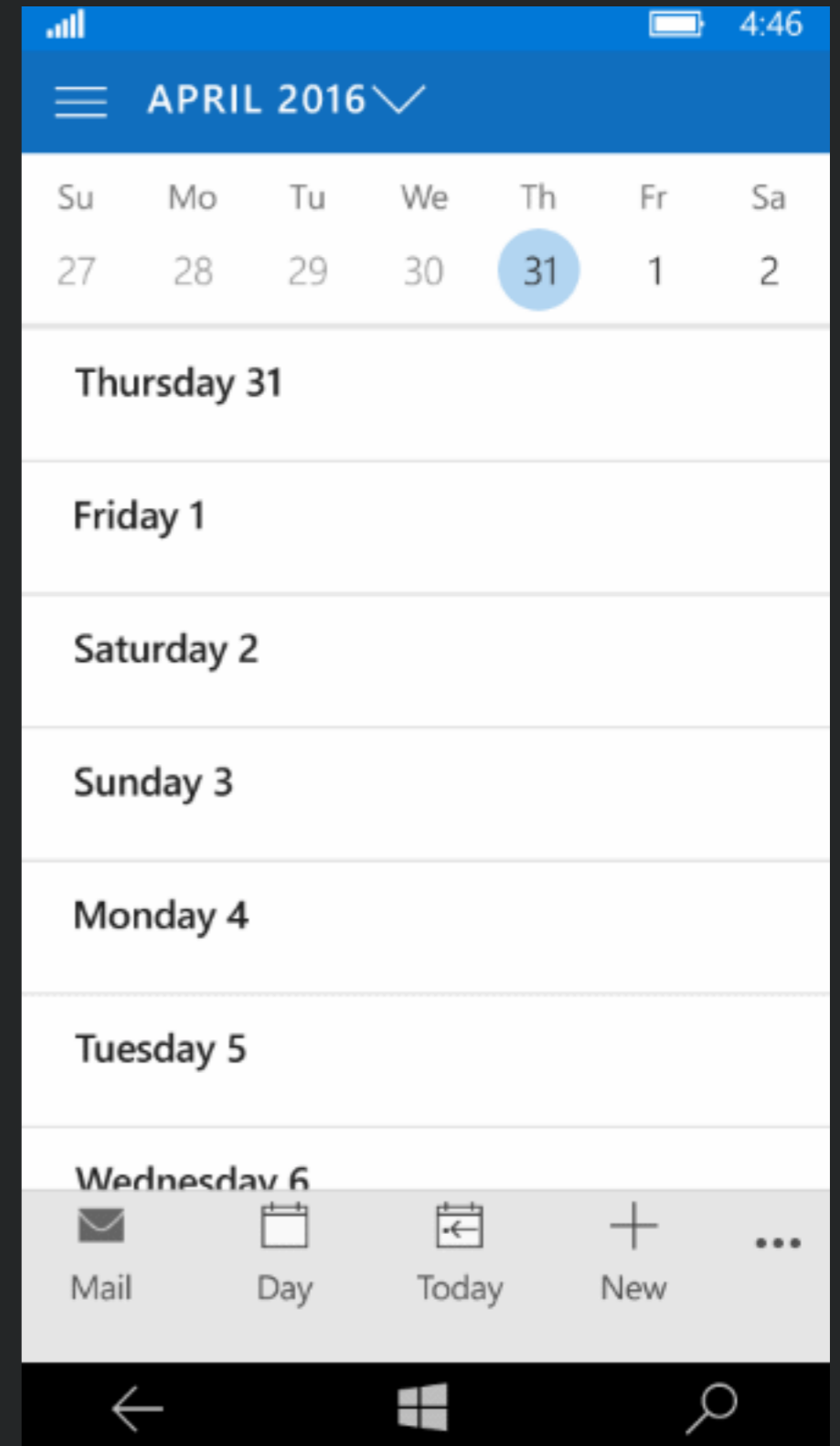
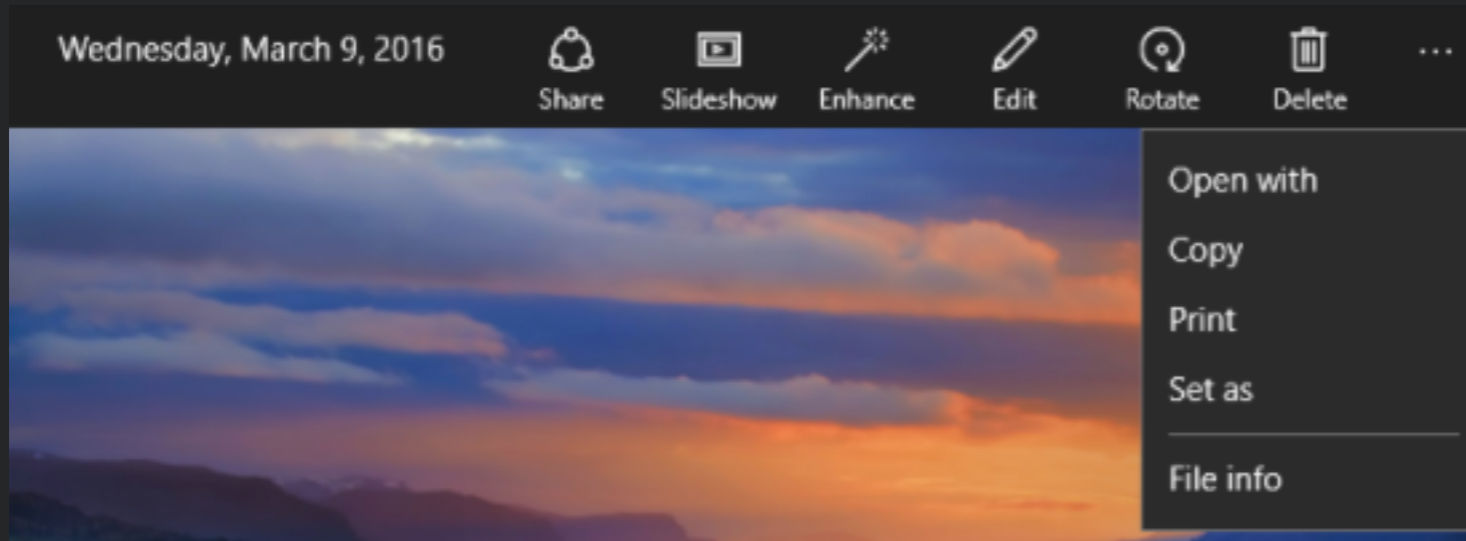
Examples: AirBnb



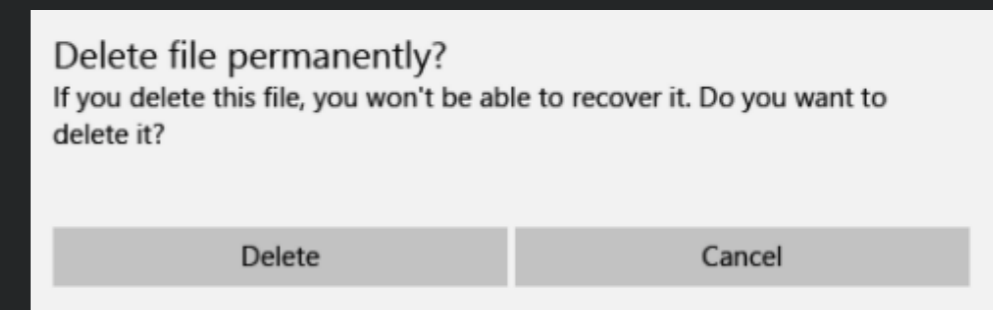
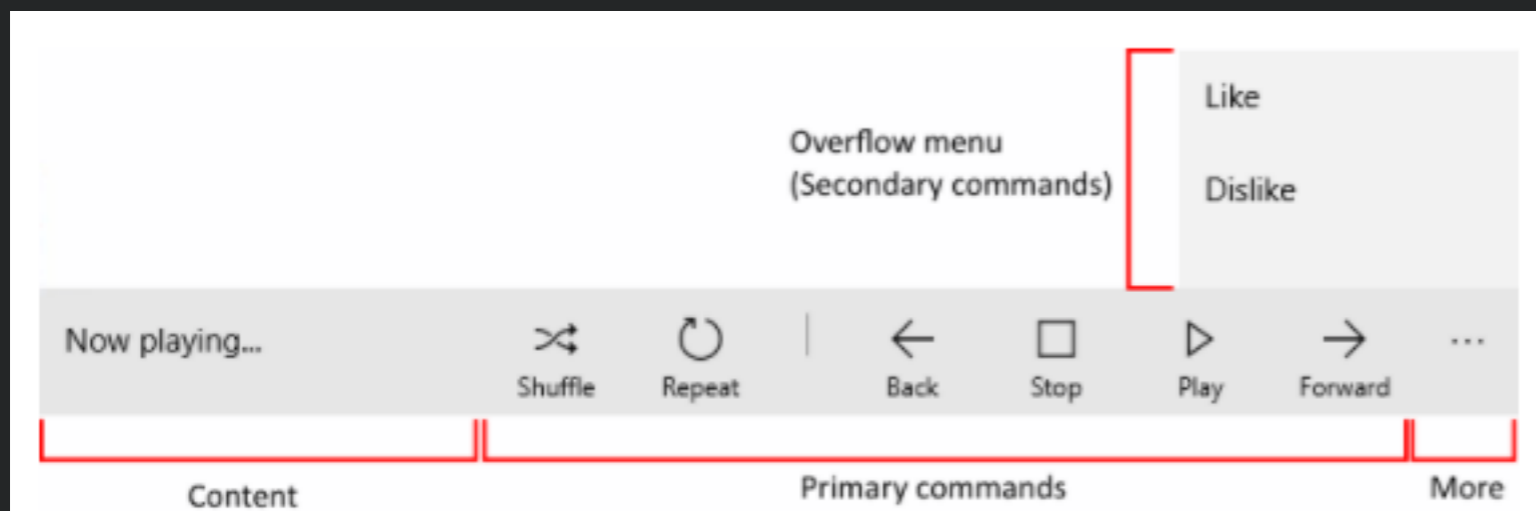
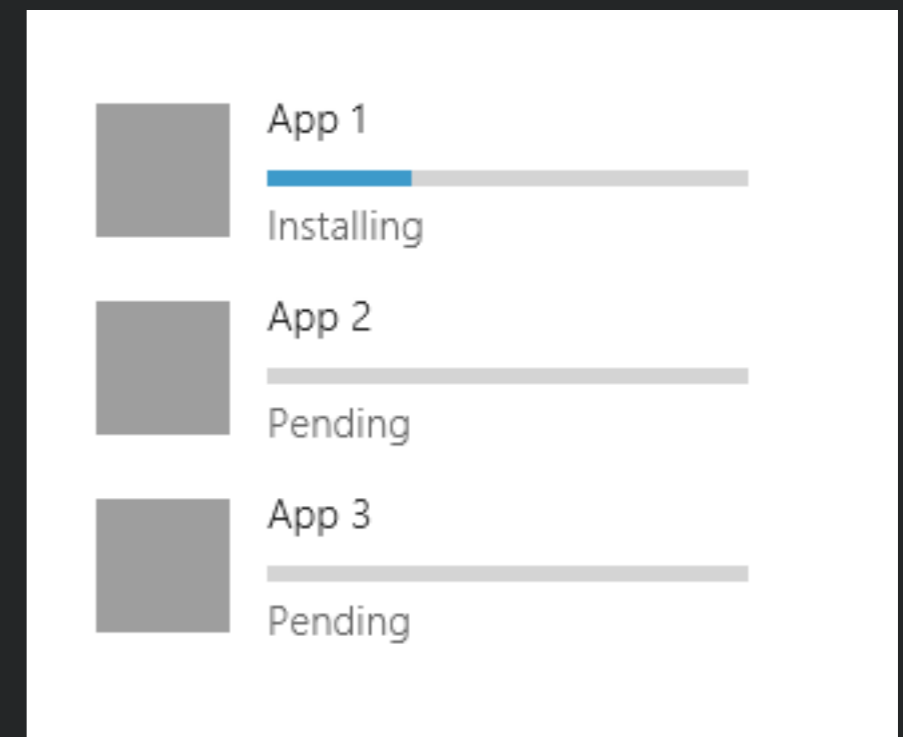
Examples: AirBnb



Examples: Microsoft

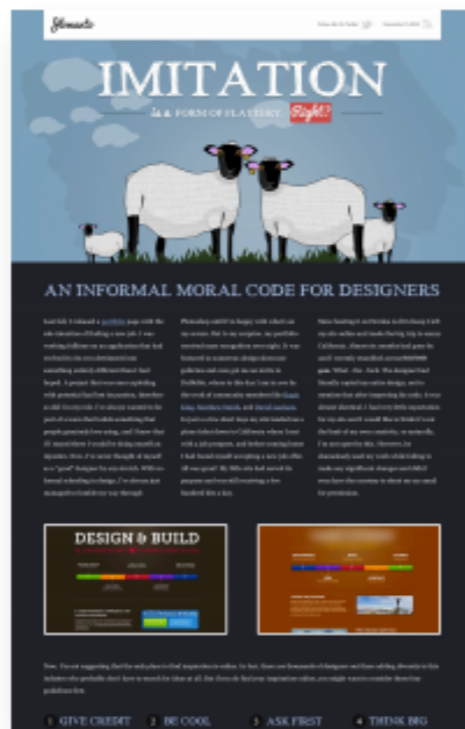
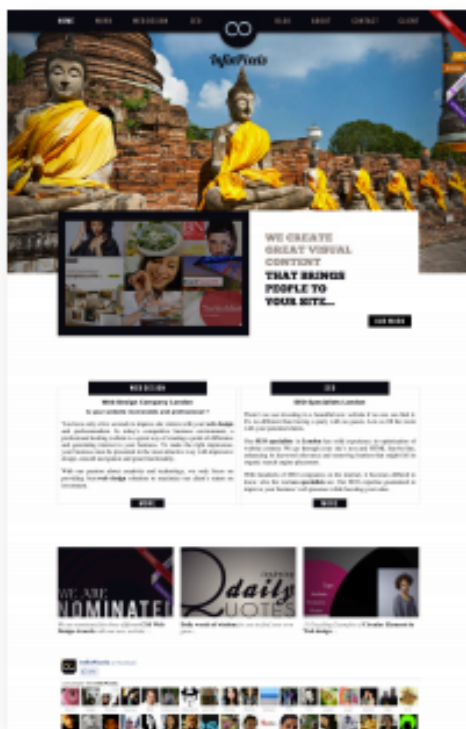
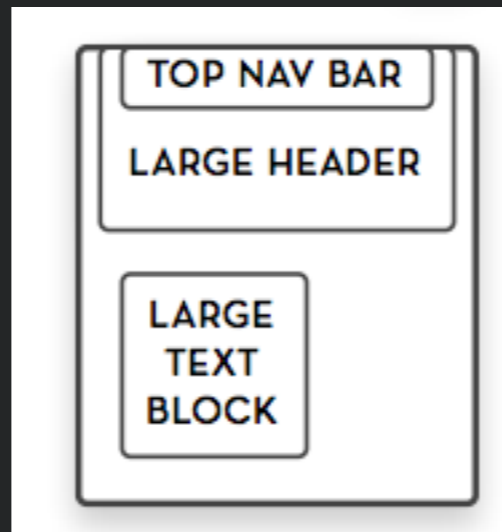


Examples: Microsoft





Example: Header with text blocks layout

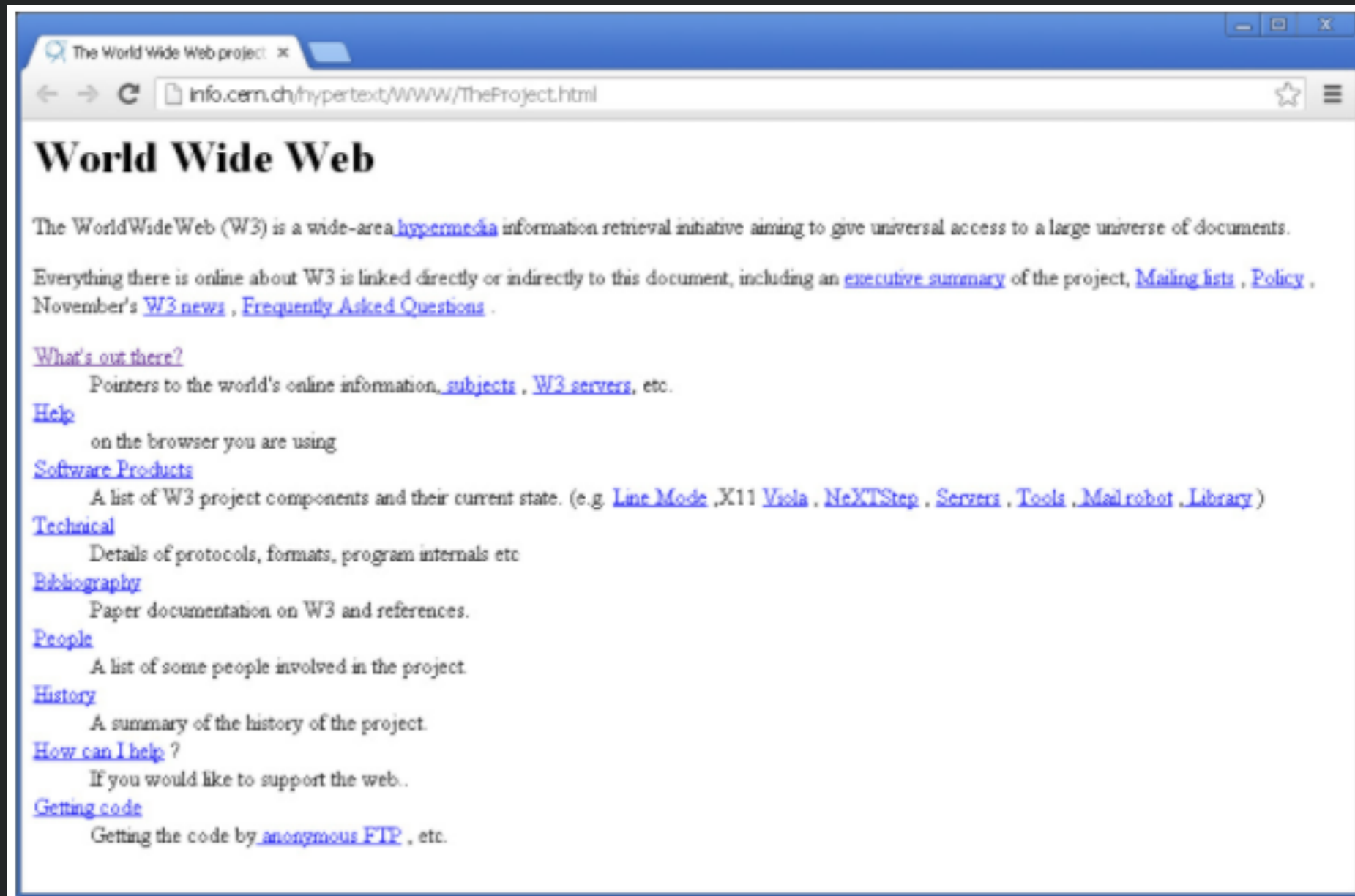


<http://ranjithakumar.net/resources/webzeitgeist.pdf>

Position Encodes Meaning and Function



Web Design Languages Over Time



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

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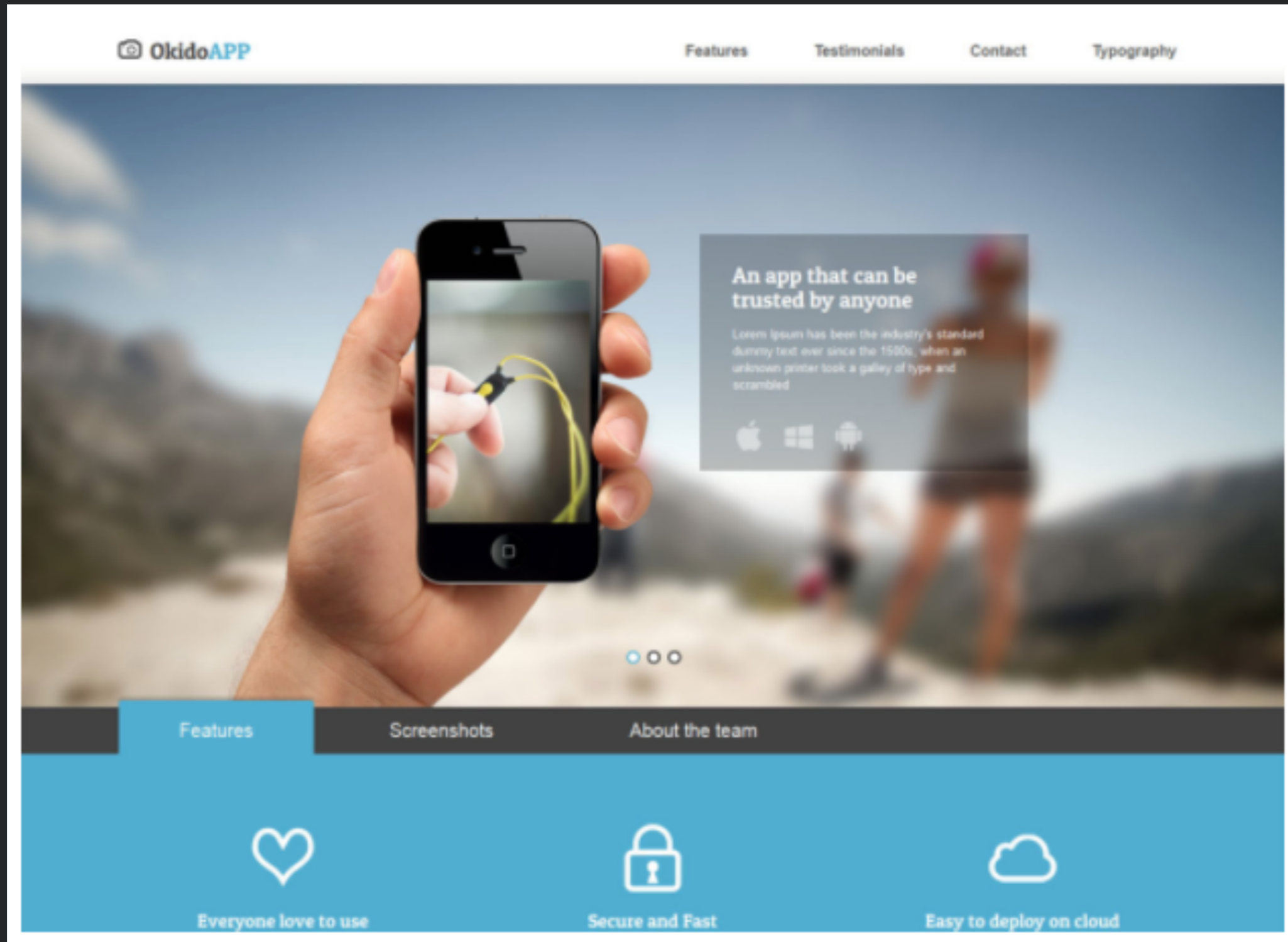
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Web Design Languages Over Time

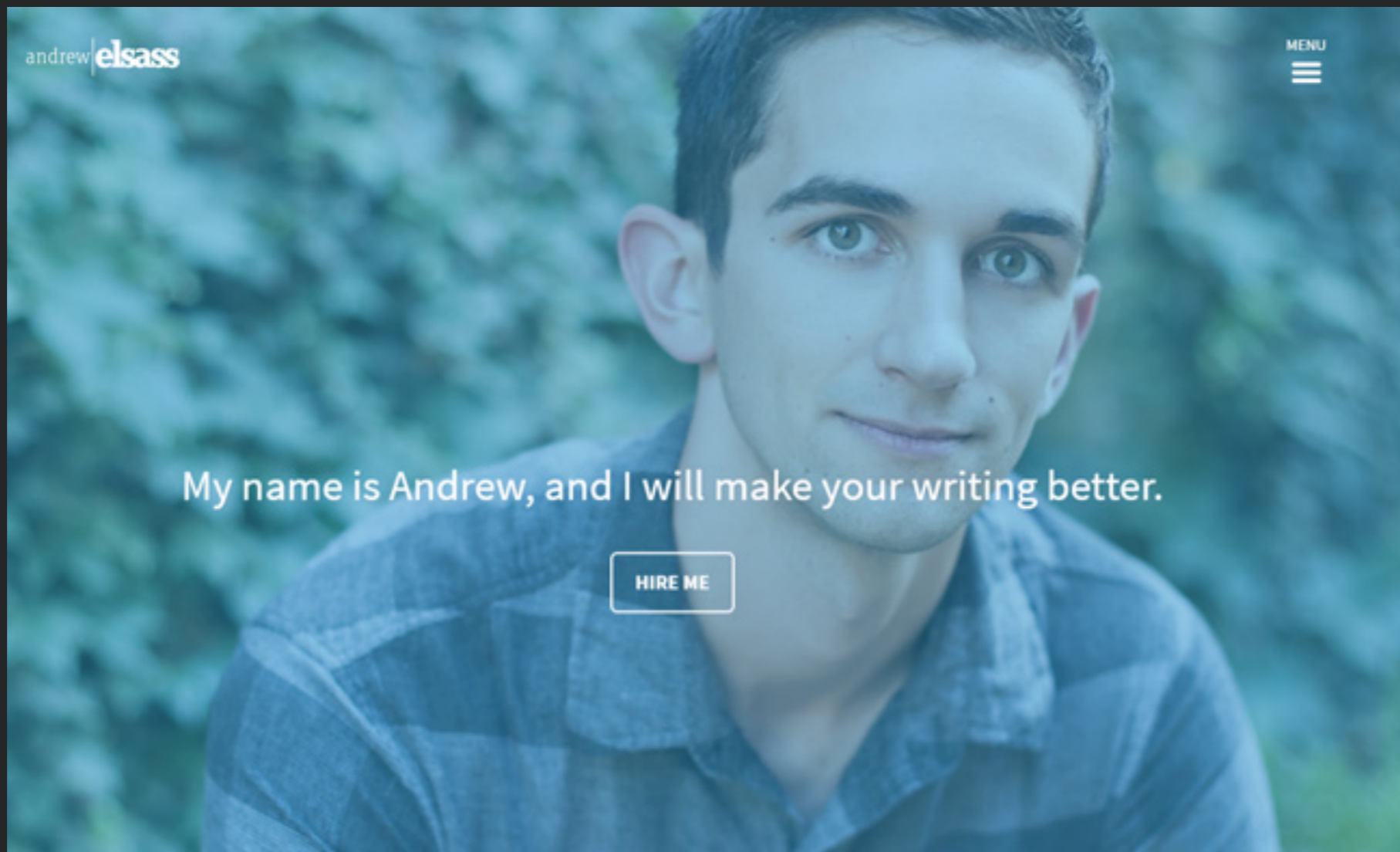


Web Design Languages Over Time



Common Visual Idioms, Circa 2016

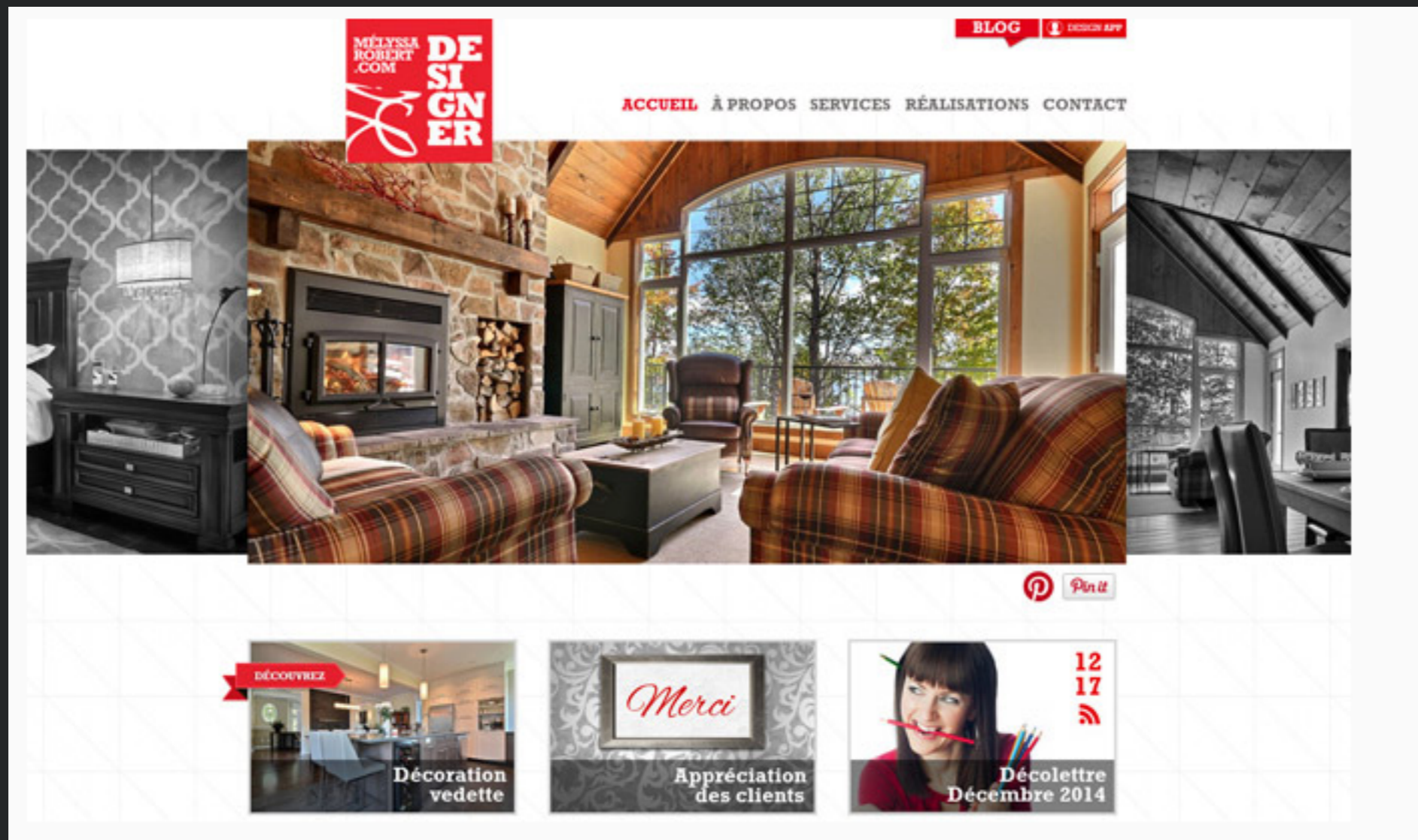
- Hero images: large attractive header image



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Common visual idioms, circa 2016

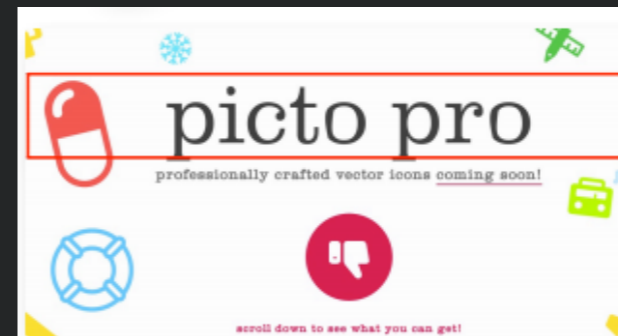
- Rotating image galleries (carousels)



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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