

UI Design

Tuesday, October 16

Announcements

Thursday guest lecture: Dr. Carlos Jensen

Overview of the front-end

Interaction Design Concepts

Usability goals

Heuristic Evaluation

Design principles

Affordance

Visibility, Consistency, Feedback

Design guidelines

Nielsen's usability goals

1. Learnability
2. Efficiency
3. Memorability
4. Errors (safety)
5. Satisfaction

Class exercise

For each goal, write down one software application where:

The usability goal is **very** important

The usability goal is **not very** important

Learnability

Efficiency

Memorability

Errors (safety)

Satisfaction

Learnability

How easy a system is to **learn to use**

Can the user figure out the system by exploring?

How hard will it be to learn the whole set of functionality?

Learnability



Learnability

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The ultimate guide to human-centered design

Even the smartest among us can feel inept as we fail to figure out which light switch or oven burner to turn on, or whether to push, pull, or slide a door. The fault, argues this ingenious-even liberating-book, lies not in ourselves, but in product design that ignores the needs of users and the principles of cognitive psychology. The problems range from ambiguous and hidden controls to arbitrary relationships between

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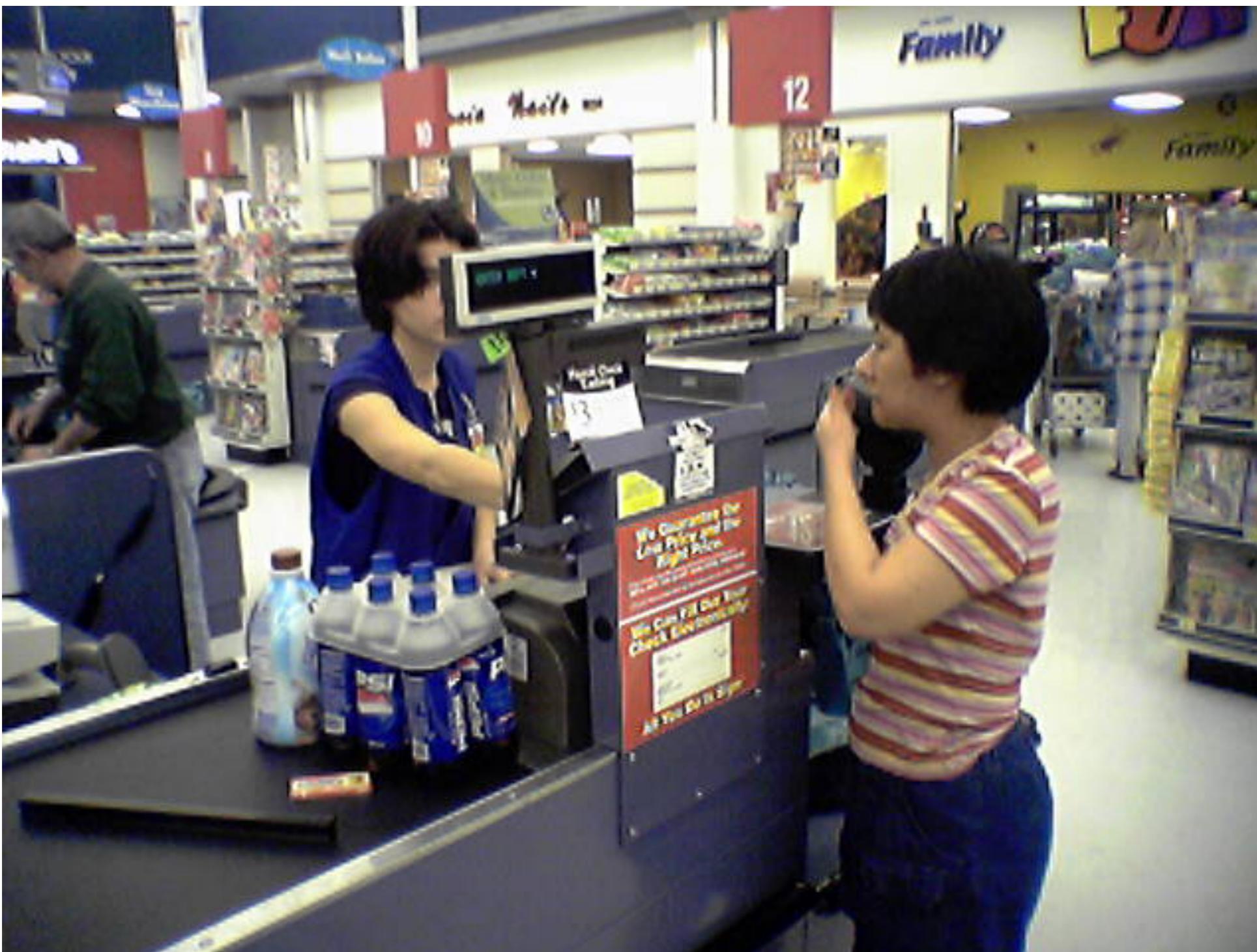
https://www.amazon.com/spark/ref=nav_upnav_merged_T1_Detail

Efficiency

The way a product supports users in carrying out their tasks

Once a user has learned the system can they sustain a high level of productivity?

Efficiency



Efficiency

Quantity: 1 ▾



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Memorability

How easy do you remember how to use a product,
after learning it?

What kind of interface support has been provided?

Especially important for interactive products that are used infrequently

Memorability

Added slides

```
commit 9ffafaa24d572df35409d8aae3e765d54bb66b39
Author: Caius Brindescu <caius.brindescu@gmail.com>
Date:   Wed Oct 3 16:00:12 2018 -0700
```

Fixed typo in sprint 1

```
commit 8b6aca59fb892503a167a604d5e1f10a2aea769e
Author: Caius Brindescu <caius.brindescu@gmail.com>
Date:   Wed Oct 3 07:56:58 2018 -0700
```

Fixed typos on slides

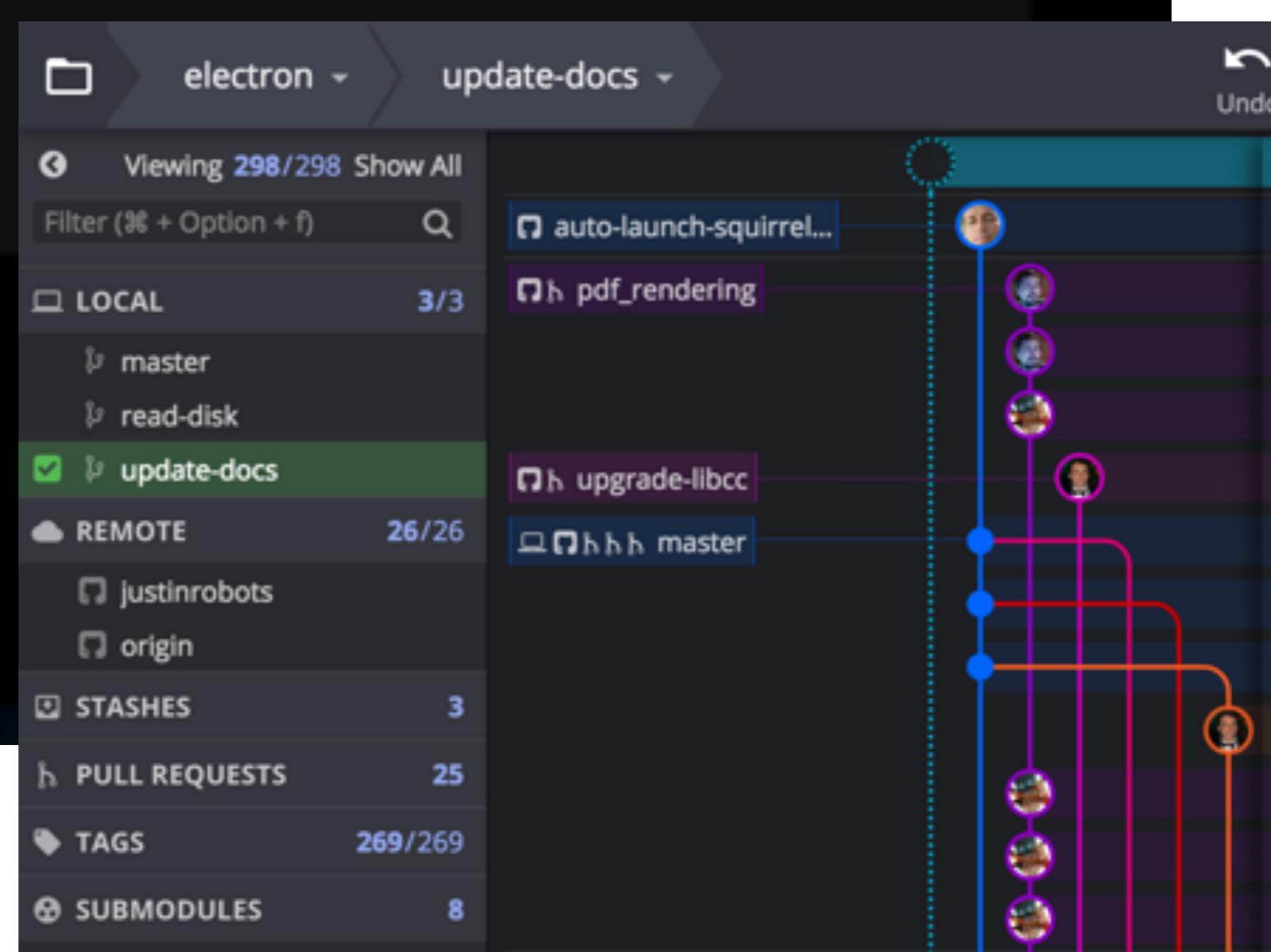
```
commit c3e960eba783f64704126d8bc66a3990ab85c372
Author: Caius Brindescu <caius.brindescu@gmail.com>
Date:   Tue Oct 2 12:34:54 2018 -0700
```

Added solid reading
Adso:website caius\$ git status

On branch sources

Your branch is up to date with 'origin/sources'.

```
nothing to commit, working tree clean
Adso:website caius$
```



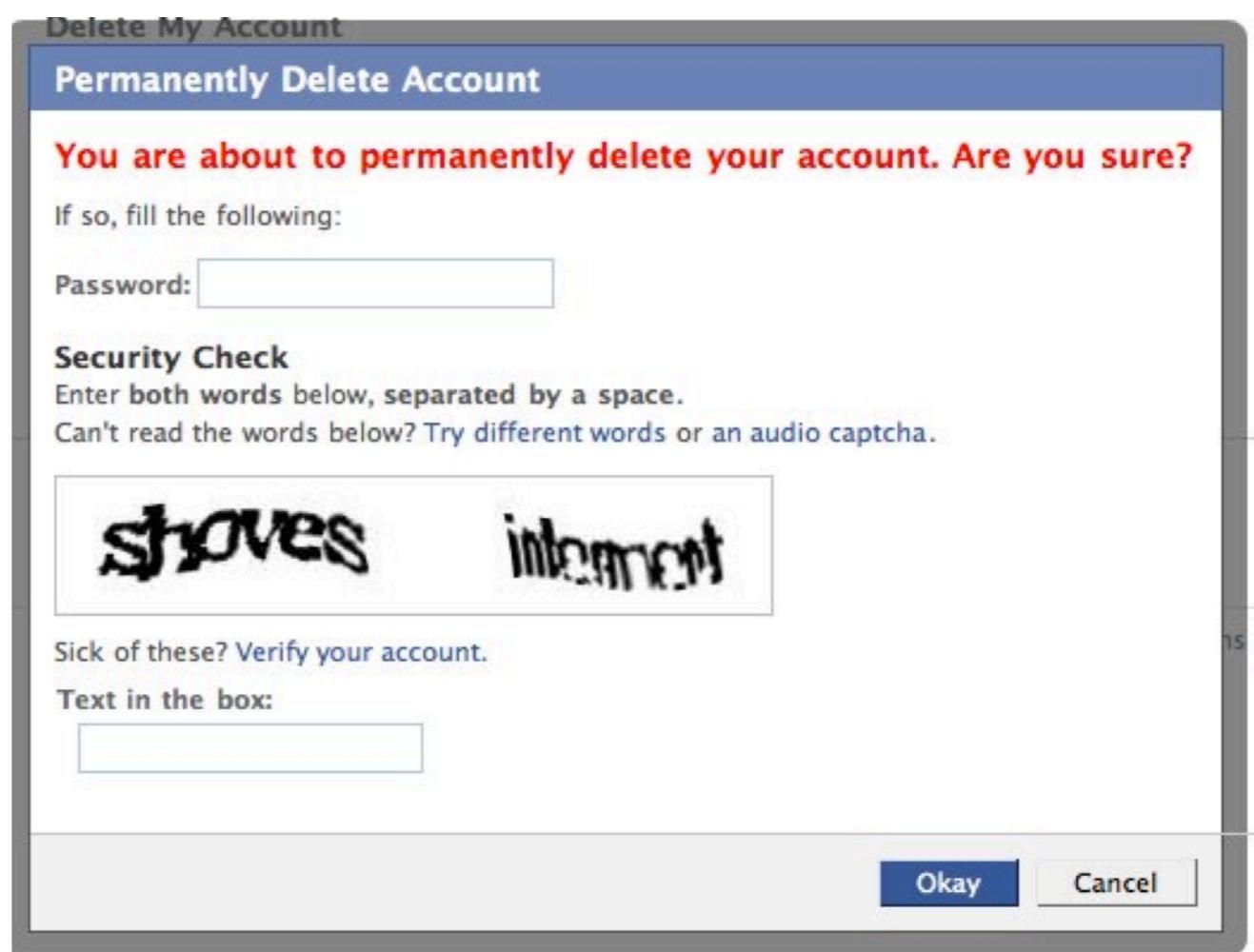
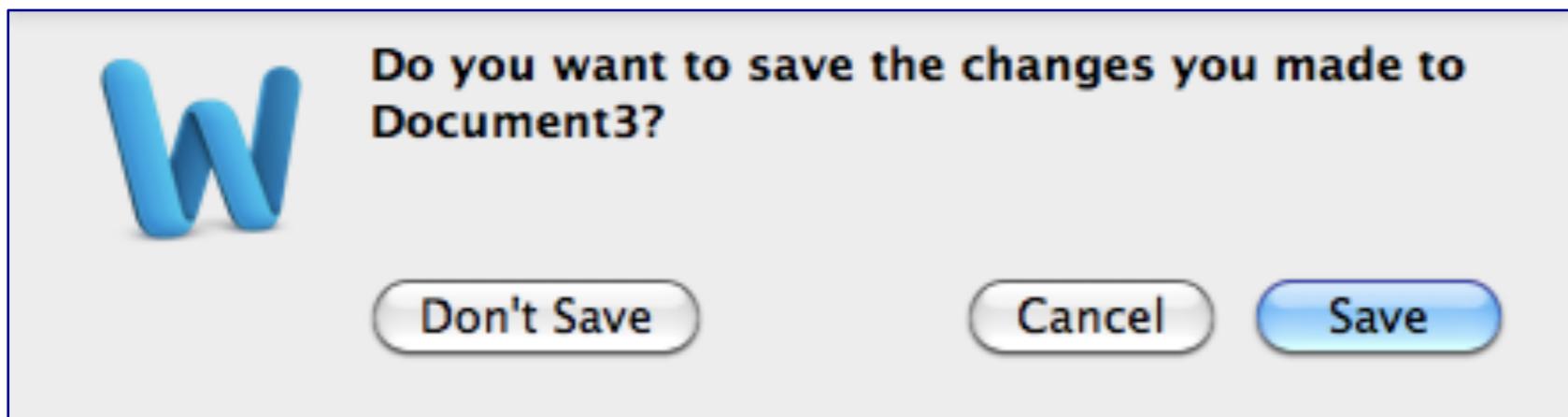
Errors (safety)

Protecting the user from dangerous conditions and undesirable situations, also from perceived fear

Question:

What is the range of errors possible

What measures to recover easily from them



Satisfaction

Subjective quality of how a system feels to a user

*What is the user's response after finishing their task/
interaction*

Satisfaction



FreeFoto.com

Satisfaction



Heuristic Evaluation

A simple and structured process for finding usability problems

3-5 evaluators

Can be performed on a working UI, or on sketches
(i.e. paper prototypes)

Short set of heuristics

The evaluator can keep all of them in their head

Heuristic Evaluation

1. **Visibility of system status.** Users should always be informed of system operations.
2. **Match between system and the real world.** Designers should endeavor to mirror the language and concepts users would find in the real world based on who their target users are.
3. **User control and freedom.** Offer users a digital space where backward steps are possible, including undoing and redoing actions.
4. **Consistency and standards.** Interface designers should ensure that both the graphic elements and terminology are maintained across similar platforms.

Heuristic Evaluation

5. **Error prevention.** Whenever possible, design systems so that potential errors are kept to a minimum.
6. **Recognition rather than recall.** Minimize cognitive load by maintaining task-relevant information within the display while users explore the interface.
7. **Flexibility and efficiency of use.** With increased use comes the demand for less interactions that allow faster navigation. This can be achieved by using abbreviations, function keys, hidden commands and macro facilities.

Heuristic Evaluation

8. **Aesthetic and minimalist design.** Keep clutter to a minimum. All unnecessary information competes for the user's limited attentional resources.
9. **Help users recognize, diagnose and recover from errors.** Designers should assume users are unable to understand technical terminology, therefore, error messages should almost always be expressed in plain language.
10. **Help and documentation.** When users require help, ensure it is easily located, specific to the task at hand and worded in a way that will guide them through the necessary steps towards a solution to the issue they are facing.

Shopping Cart Contents

Welcome, Ben Bitdiddle.



You have 2 item(s) in your shopping cart.

To remove an item, check "Remove" box & click "Recalculate".
Shipping Calculator below.

There is a problem with your order.

Product	Description	Quantity	Unit Price	Ext Price
323022	Pinnalce Clean Plus Version 4.0 Retail ***(Free 2nd Day)***	<input type="checkbox"/> 1	\$61.00	\$61.00
80098-21	Corsair VS1GBKIT400 1GB Kit DDR400 PC3200 Value Select Memory Retail (out of stock)	<input type="checkbox"/> 1	\$179.00	\$179.00

Subtotal: \$240.00

For more information about tax, please [click here](#).

[Recalculate](#) [Clear Cart](#)

Shipping Promotion details. Please read.

Check Out

Note: Discount will be applied during check out

Coupon Code: [Apply](#)

Ship to Zip Code: [Calculate Shipping Charge](#)

Have not made up your mind? Save all the items in your shopping cart!

Cart Title: [Save Shopping Cart](#)

Return to old shopping cart:

Cart Name: [Load Shopping Cart](#)

Visibility of system status

Match between system and the real world

User control and freedom

Consistency and standards

Error prevention

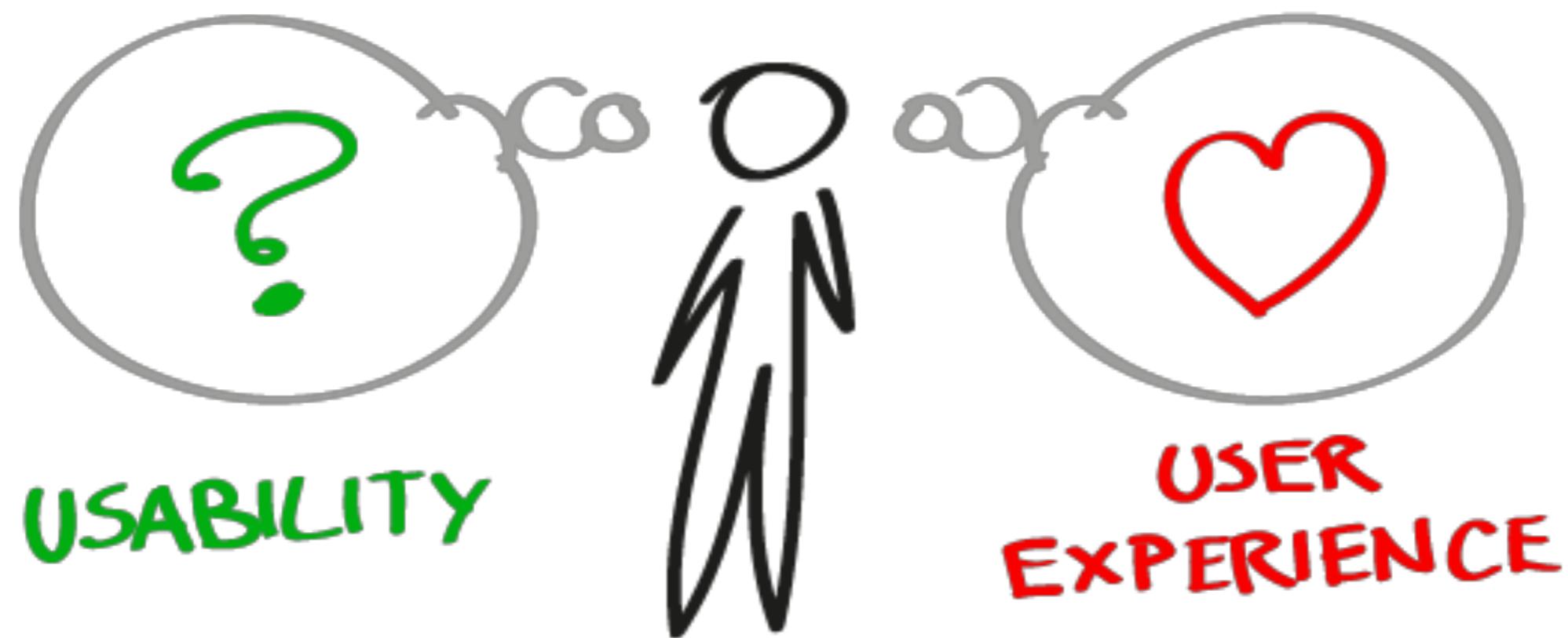
Recognition rather than recall

Flexibility and efficiency of use

Aesthetic and minimalist design

Help users recognize, diagnose and recover from errors

Help and documentation



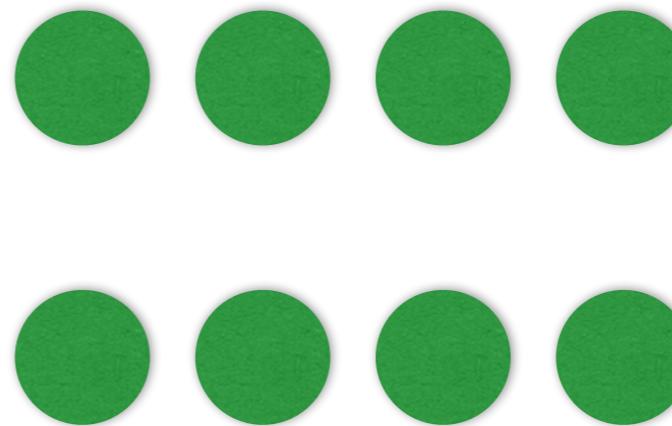
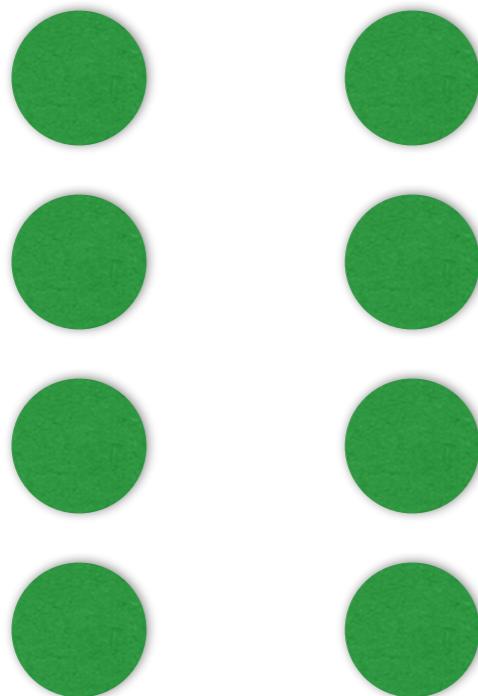
Gestalt principles

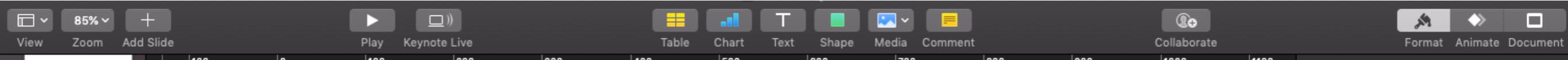
Gestalt = an organized whole that is perceived as more than the sum of its parts.

Our way of acquiring and maintaining **perceptions** in a chaotic world

Proximity

When items are close together, they are perceived as a group.





Show scroll bars: Automatically based on mouse or trackpad

When scrolling

Always

Click in the scroll bar to: Jump to the next page

Jump to the spot that's clicked

Continuation

Elements arranged in a line or a soft curve are perceived to be more related than those arranged randomly or in a harsh line.



「わたしの前に事務をやっていたのは、どんな人でした？」

「あなたと同じくらいの若い娘さんよ。その子のことはよく憶えているわ。消えちゃう前の

日の夜、偶然見かけたから。刺繡糸を買いに手芸店へ出掛けようとして、廊下で会ったの。

向こうは気づかなかつたみたい。夕暮れ時で薄暗かつたからね。うつむき加減で、でも深刻な感じじやなく、なんて言うか、ひそやかな感じだつた。その時の彼女の靴音が、とつても印象的だつたの。昔、電話の交換手だったから、音には敏感なのよ。これは簡単に聞き流すことのできない、何かの意味合いを含んだ音だと、直感したの。大きな音つていう意味じやないのよ。むしろつぶやくような、ささやくような音。他には何の物音もしないの。ただその靴音だけが、コツ、コツ、コツ、つて規則正しく、真っすぐに響いてた。人の靴音にこんなに引き付けられたことはなかつたわね」

彼女はこたつ掛けのパッチワークの縫い目を撫でていた。

「その次の日よ、消えちやつたのは」

「その人がどんな靴をはいてたか、憶えていらっしゃいますか？」

わたしはスープを飲むのを忘れ、スプーンを握つたまま尋ねた。

「それは憶えてないわ。暗かったから見えなかつたし、耳にばっかり神経がいつてたから」

「そうですか……」

わたしはスープ皿の中に視線を落とした。

This row is a lot easier to r

t h an th



Shorts
Surf & Swimwear
Accessories & Equipment

MEN'S RUNNING SHOES (125)

SORT BY: ▾

FILTERS

SHOE TYPE

 Cleats & Spikes

SURFACE

 Road Track Trail

NIKEiD

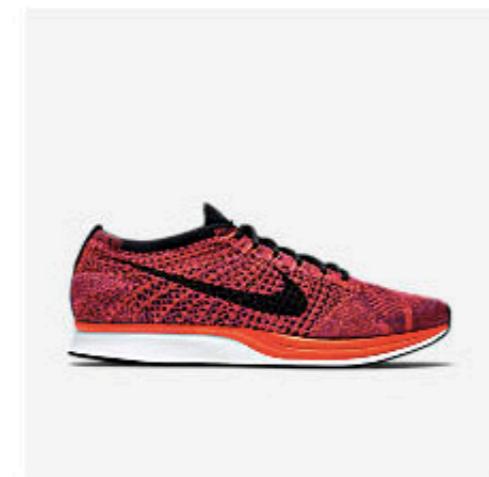
 Full Customization Personalization (Text Only)

BEST FOR

 Barefoot-like ride Neutral Ride Stability

+ More

COLLECTIONS

 Nike Zoom Nike Air Max

6 Colors

Nike Flyknit Racer
Unisex Running Shoe (Men's Sizing)
\$150

8 Colors

Nike LunarTempo 2
Men's Running Shoe
\$100

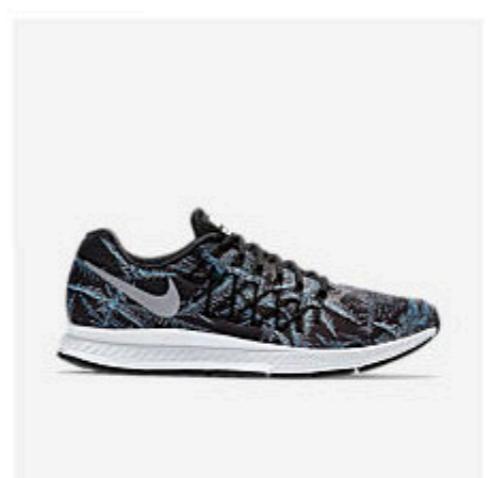
CUSTOMIZE IT

Nike LunarTempo 2 iD
Men's Running Shoe
\$150

6 Colors

Nike Flyknit Air Max
Men's Running Shoe
\$225

2 Colors

Nike Air Max 2016 Print
Men's Running Shoe
\$200

2 Colors

Nike Air Zoom Pegasus 32 Solstice
Men's Running Shoe
\$125

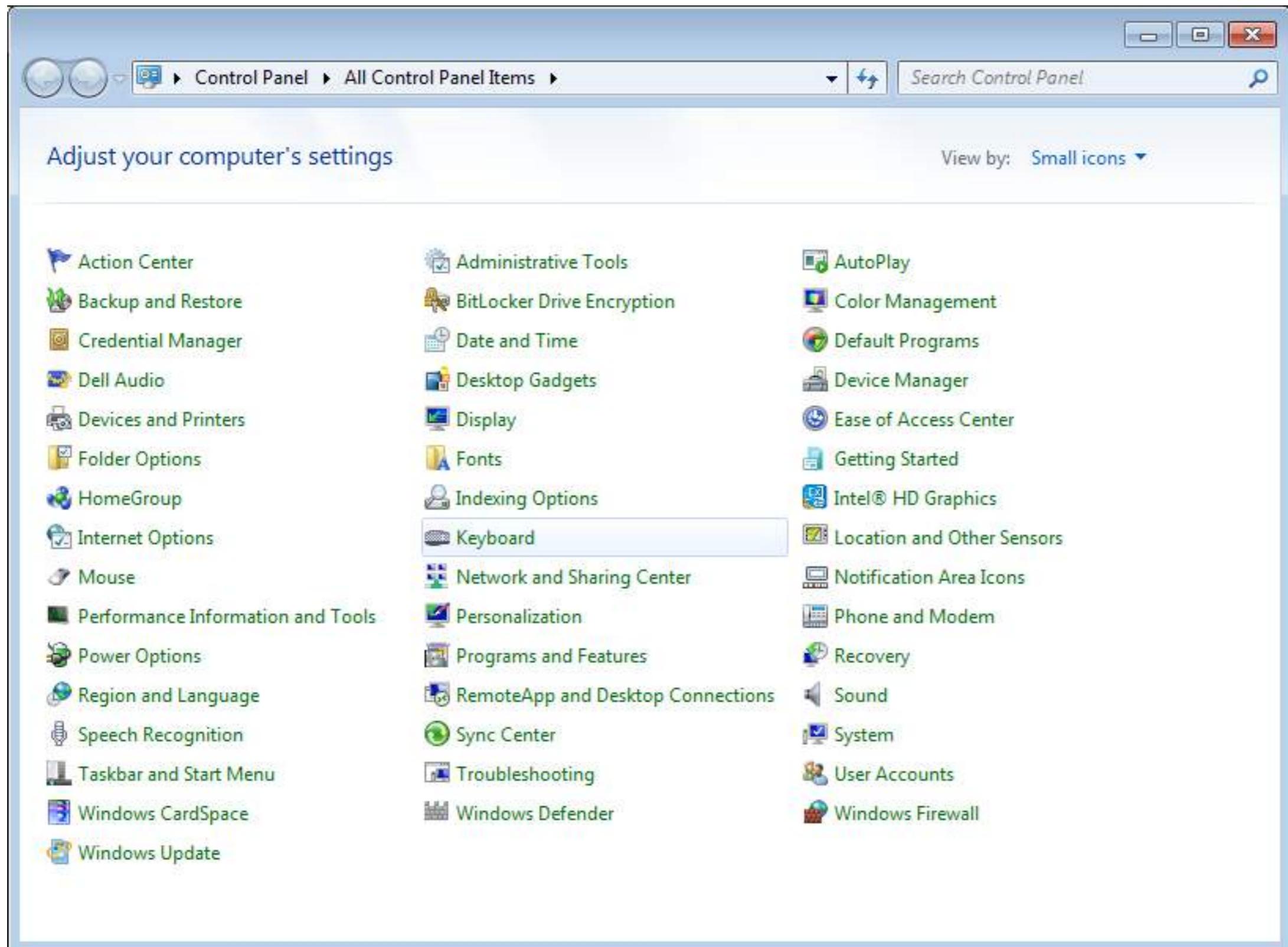
PERSONALIZE

3 Colors

Nike Free RN Distance
Men's Running Shoe
\$120

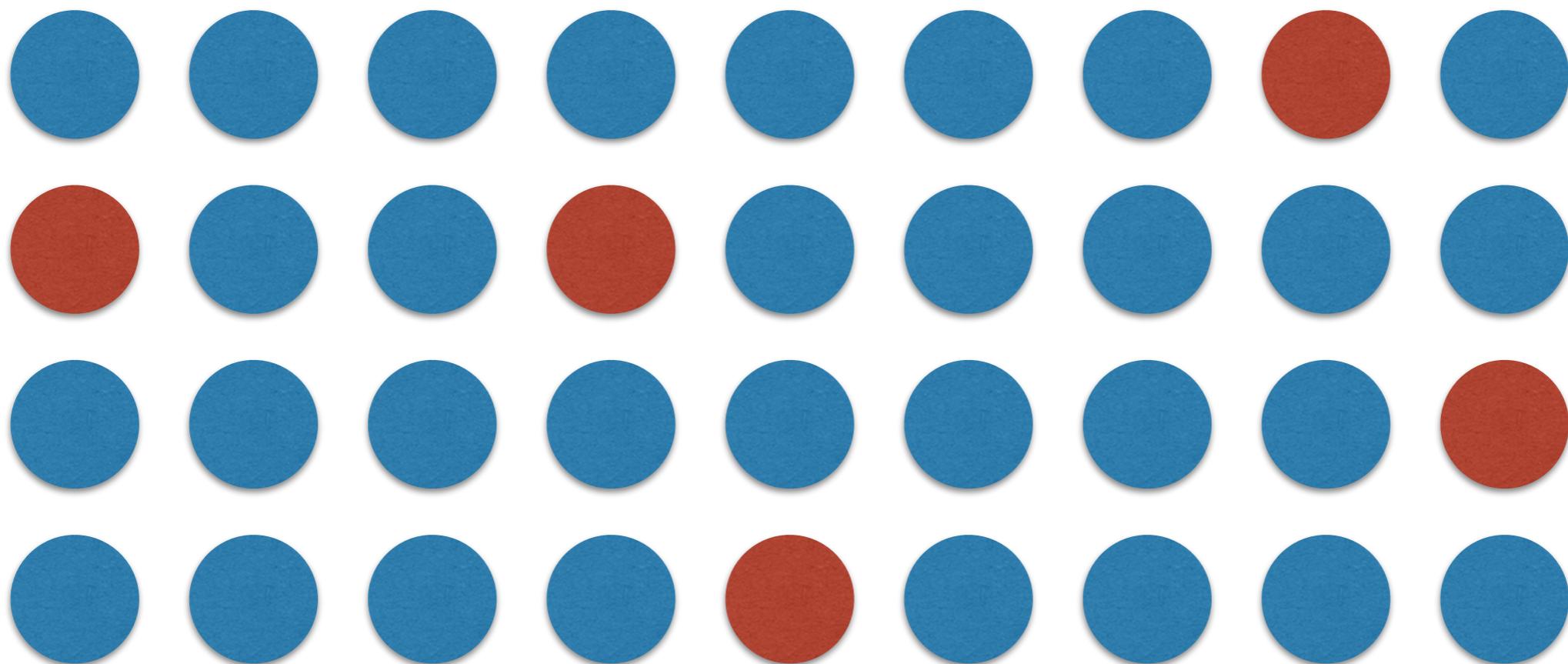
8 Colors

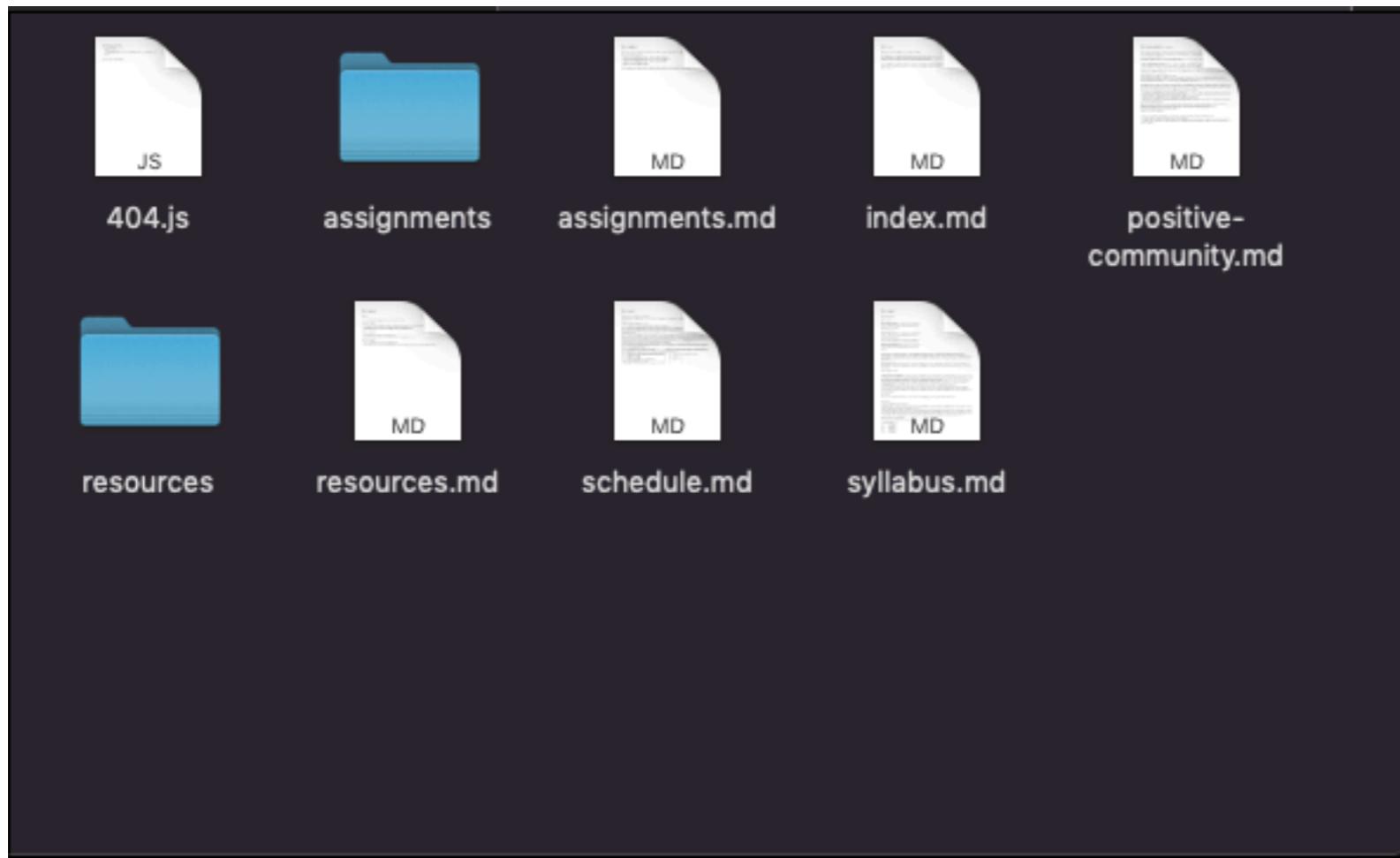
Nike Air Max 2016
Men's Running Shoe
\$190



Similarity

Similar elements are visually grouped, regardless of their proximity to each other





Closure



Closure

Your brain will fill in the missing parts of a design or image to create a whole.





Adobe



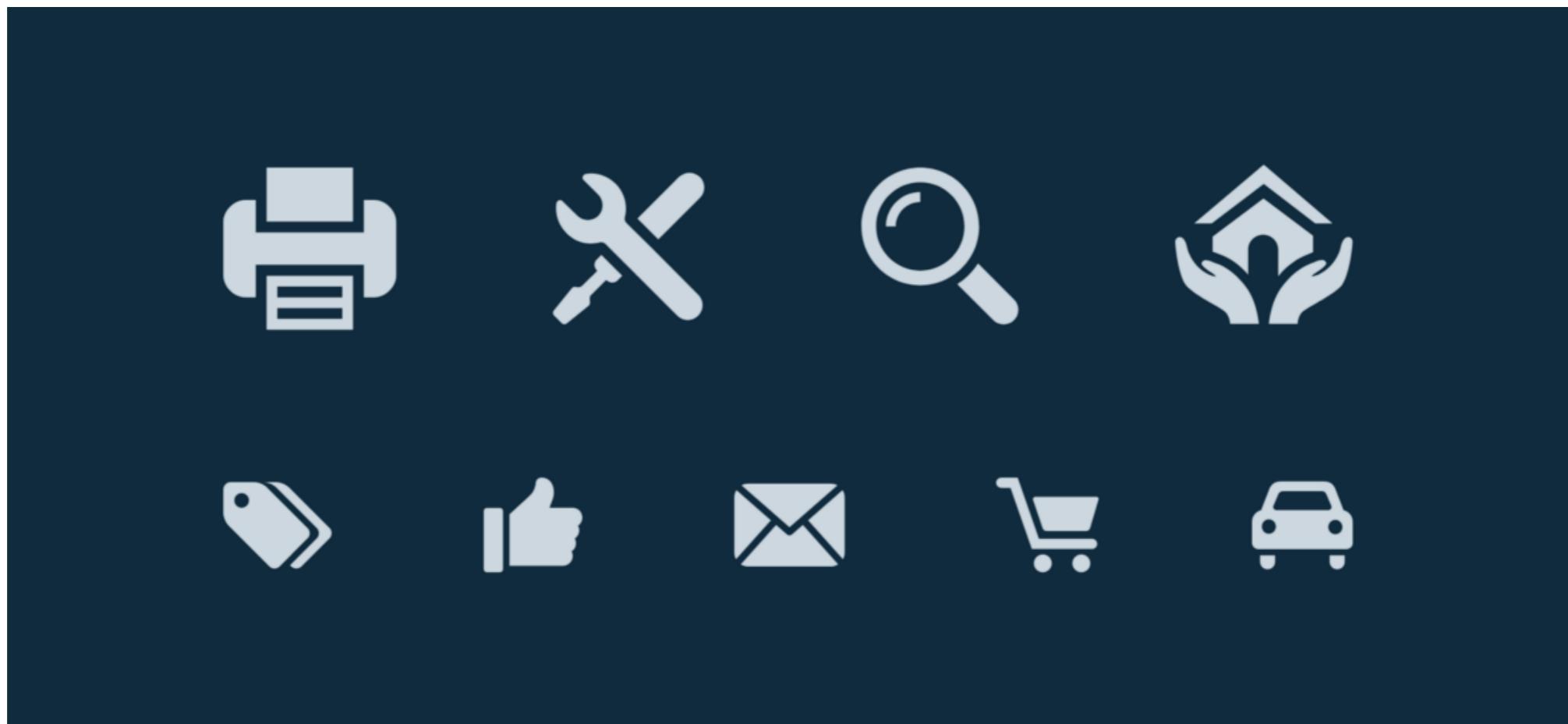


Figure and Ground

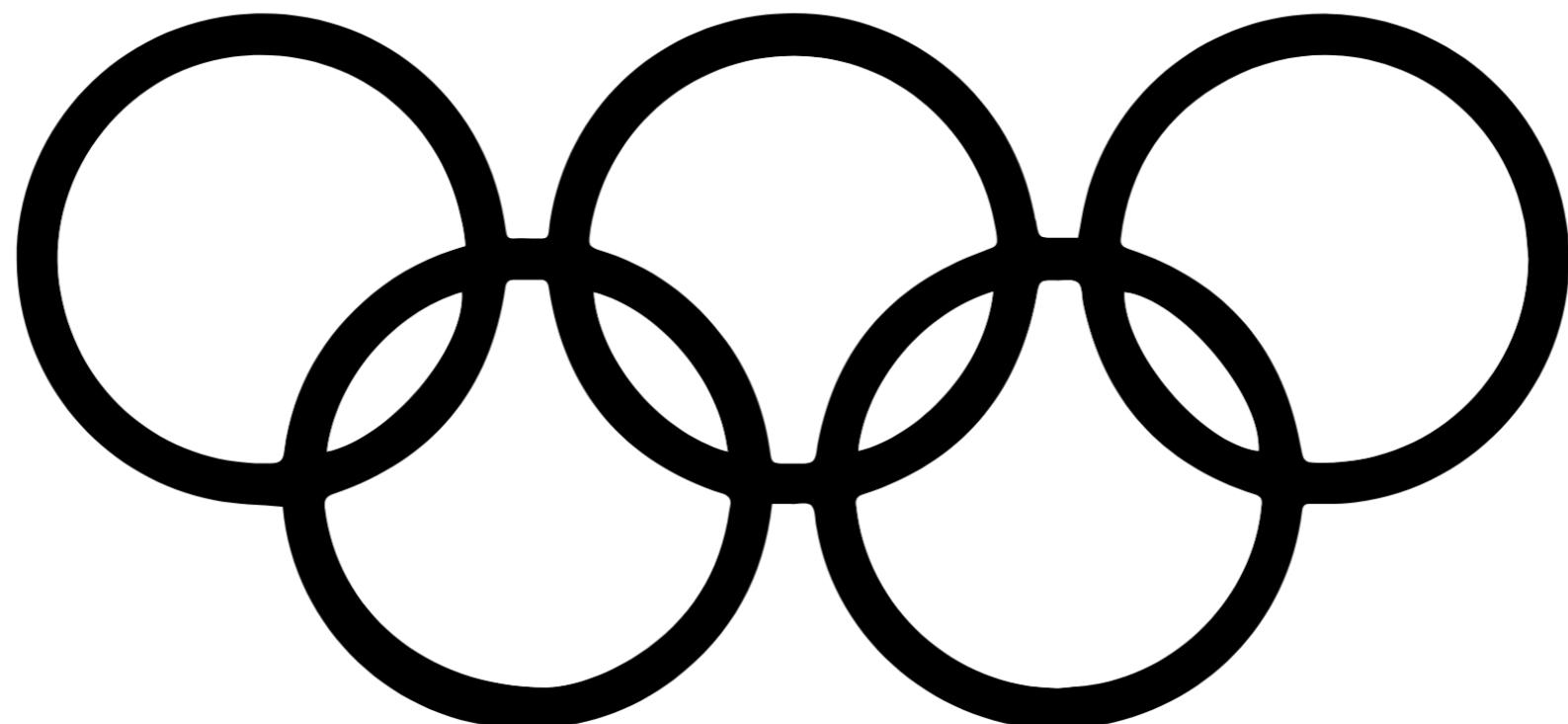
Your brain will distinguish between the objects it considers to be in the **foreground** of an image (the figure, or focal point) and the **background** (the area on which the figures rest).



Symmetry and Order

Your brain will perceive ambiguous shapes in as simple a manner as possible.

It also prefers to view images as symmetrical



{ } { } { }



Affordance

It should be obvious how a control is used



Affordances

The perceived and actual fundamental properties of the object that determine how it could possibly be used (Gibson 1977)

Some affordances are **obvious**, some **learned**

Have suggestions or clues about how to use these properties

Can be **dependent** on the

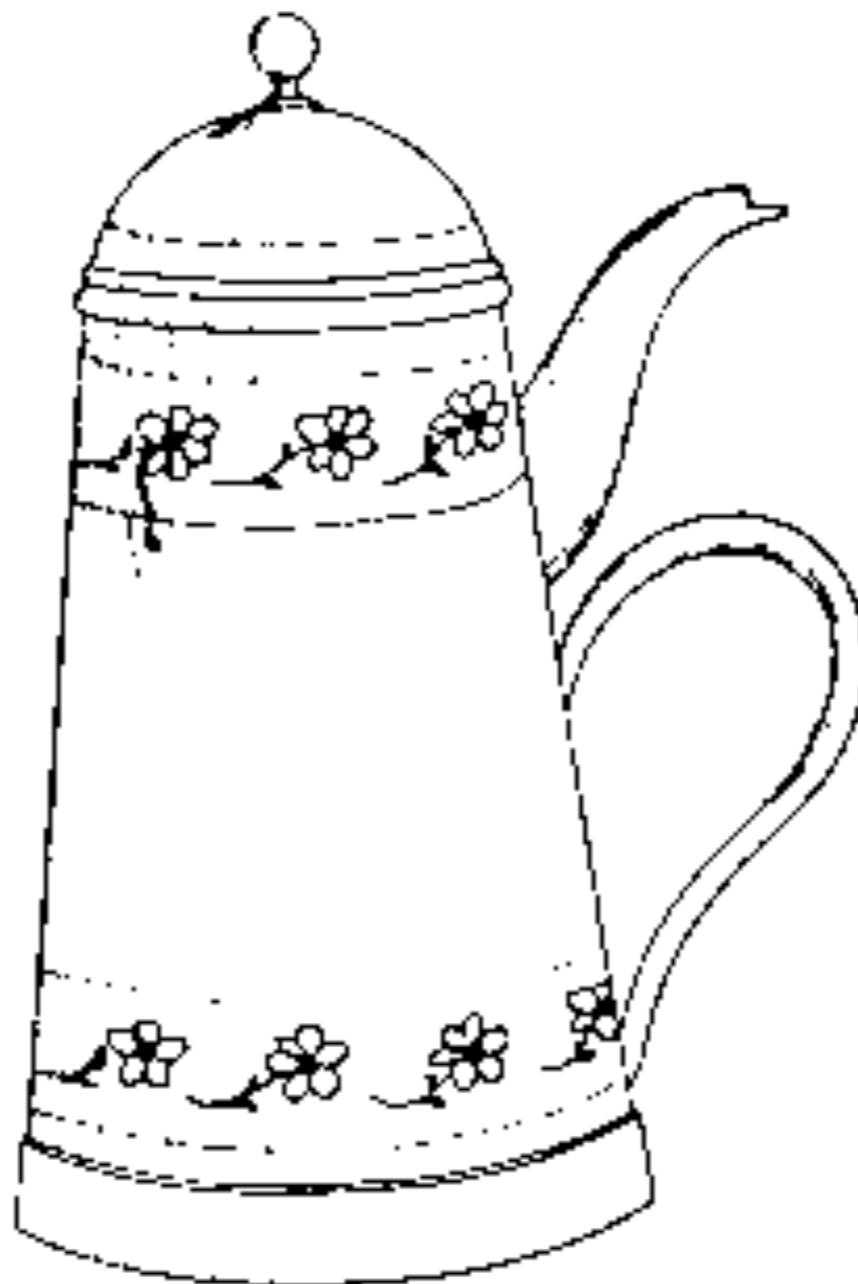
Experience

Knowledge

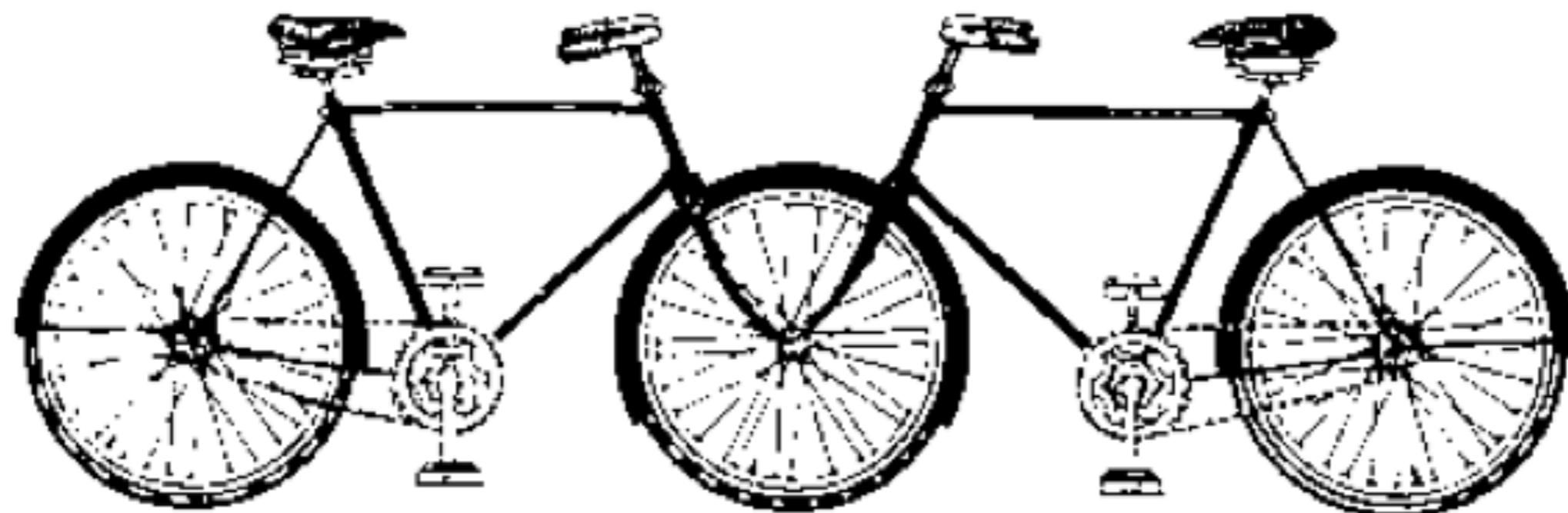
Culture of the actor

Can make an action easy or difficult

Affordances of a Teapot?



Affordance of a tricycle?

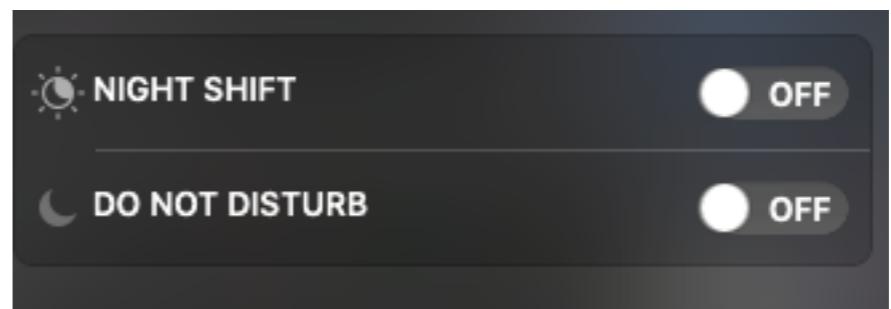
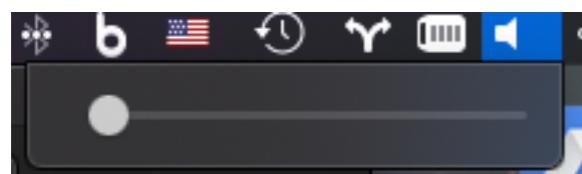


Affordances in Screen Based UI

Designer has control over perceived affordances

Graphical elements will afford only some kinds of actions

e.g. checkboxes and radioboxes



Mappings

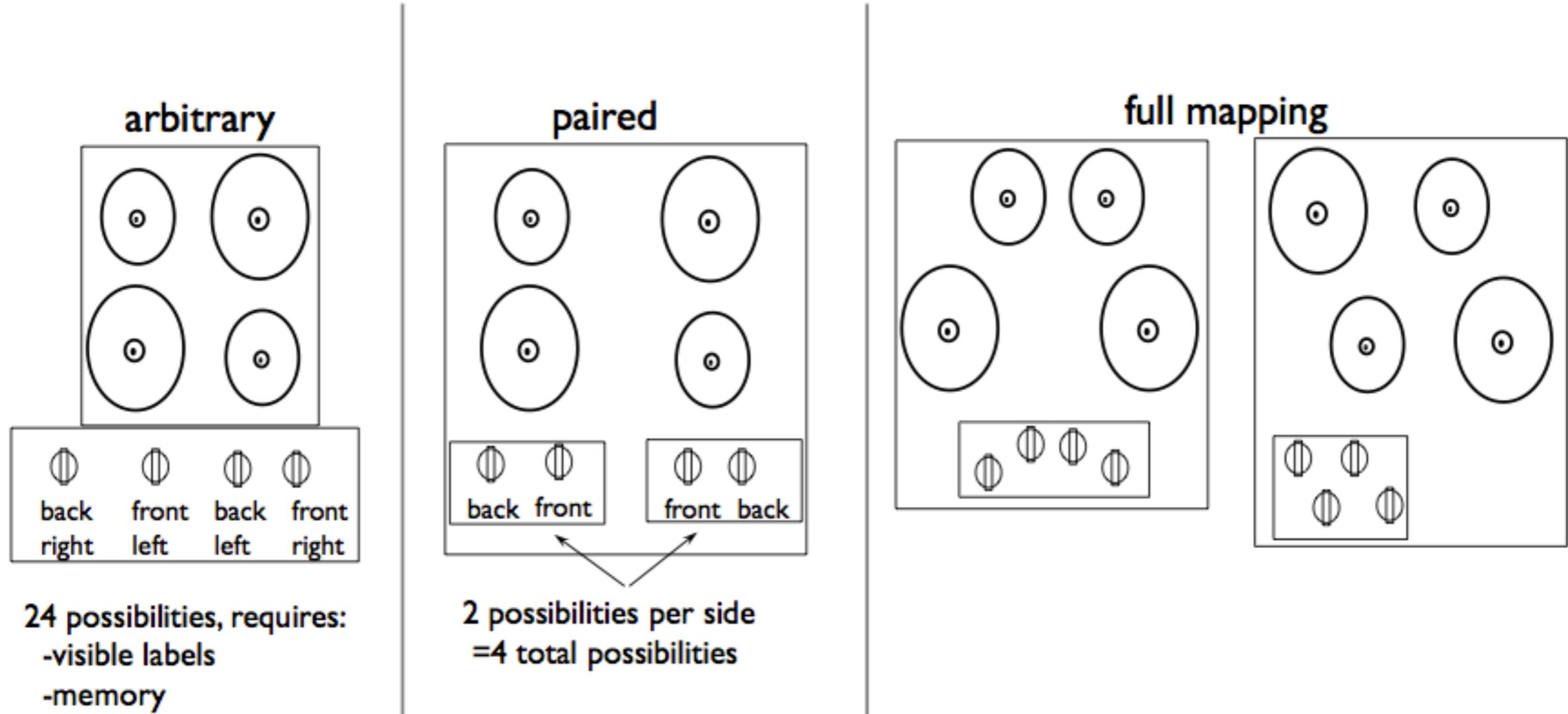
Natural mappings use constraints and correspondences in the physical world



For computer UI design:

Mapping between controls and their actions on the computer

Mapping controls to physical outcomes

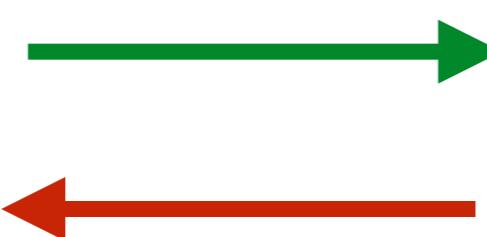
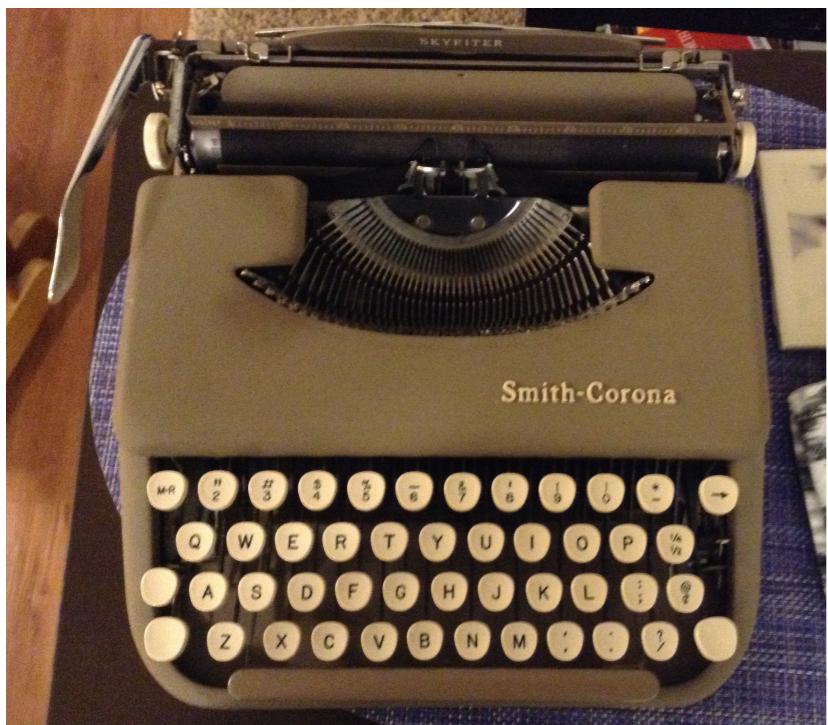


Transfer effects

People transfer expectations from known objects to similar new ones

Positive: previous experience applies to new situation

Negative: previous experience conflicts with new situation



Restricting interaction to reduce errors

The image shows two side-by-side screenshots illustrating user interface design for error reduction.

Left Screenshot (Document Edit Menu): A dark-themed Mac OS X-style menu bar is shown. The "Edit" menu is highlighted in blue. Other menu items include View, Insert, Format, Tools, and Tab. The "Edit" menu contains the following items:

- Can't Undo ⌘Z
- Repeat New Blank Document ⌘Y
- Cut ⌘X
- Copy ⌘C
- Paste ⌘V
- Paste Special... ⌘^⌘V
- Paste and Match Formatting ⌘⇧⌘V
- Clear ▶
- Select All ⌘A
- Find ▶
- Links...
- Start Dictation...
- Emoji & Symbols ⌘fn

Right Screenshot (Travel Booking Interface): A travel search interface for KAYAK. The top navigation bar includes links for HOTELS, FLIGHTS (highlighted in orange), CARS, and PACKAGES. Below the navigation, there are tabs for ROUND-TRIP, ONE-WAY, MULTI-CITY, and EXPLORE. The search fields show "Eugene (EUG)" as the departure city and "To where?" as the destination. The date selection shows "Depart - Return". The cabin class dropdown is set to "1 adult, Economy". A modal window on the right is titled "Cabin Class" and lists options: ECONOMY (selected), BUSINESS, PREMIUM ECONOMY, FIRST, and MULTIPLE. Another modal window at the bottom left offers "KAYAK Price Alerts" and "KAYAK Trips". On the far right, a "Travelers" section allows users to specify the number of adults (1), seniors, youth, children, seat infants, and lap infants.

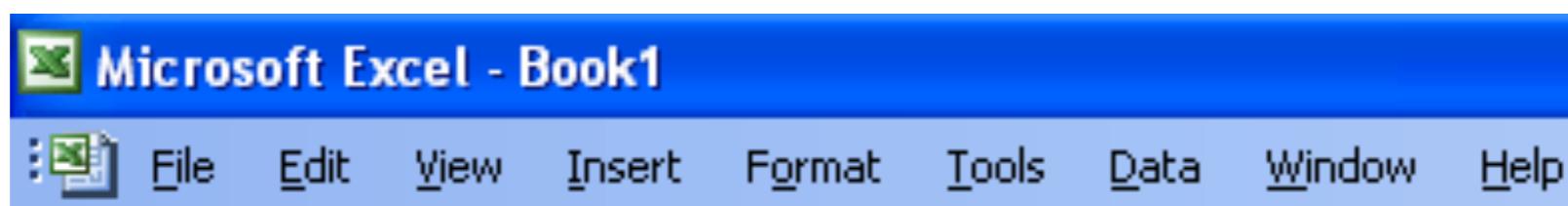
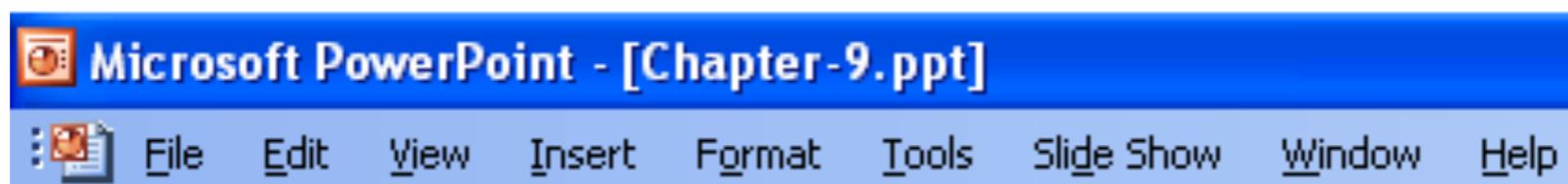
Visibility

Making it obvious which actions are available



Consistency

Uniformity in appearance, placement, terminology, and behavior

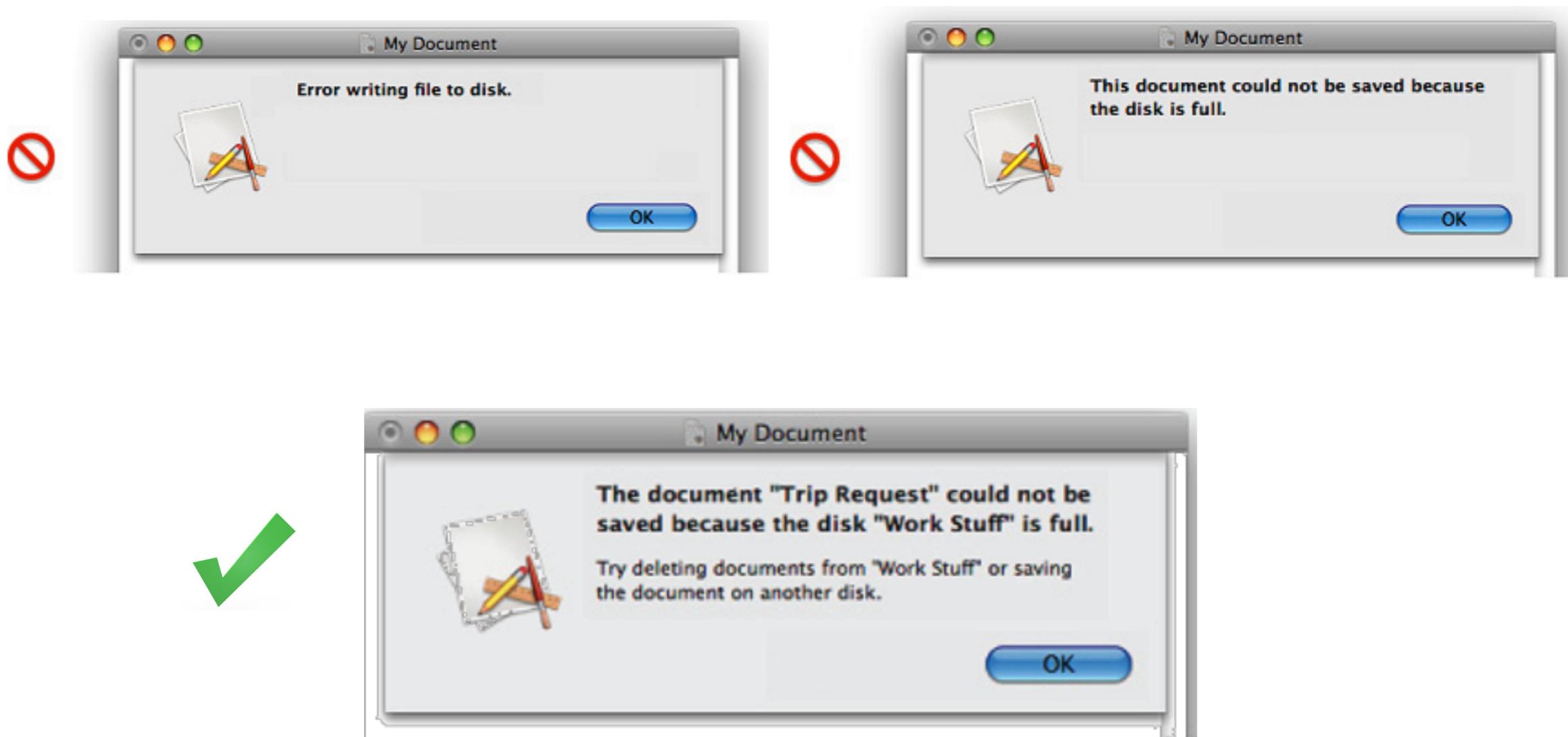


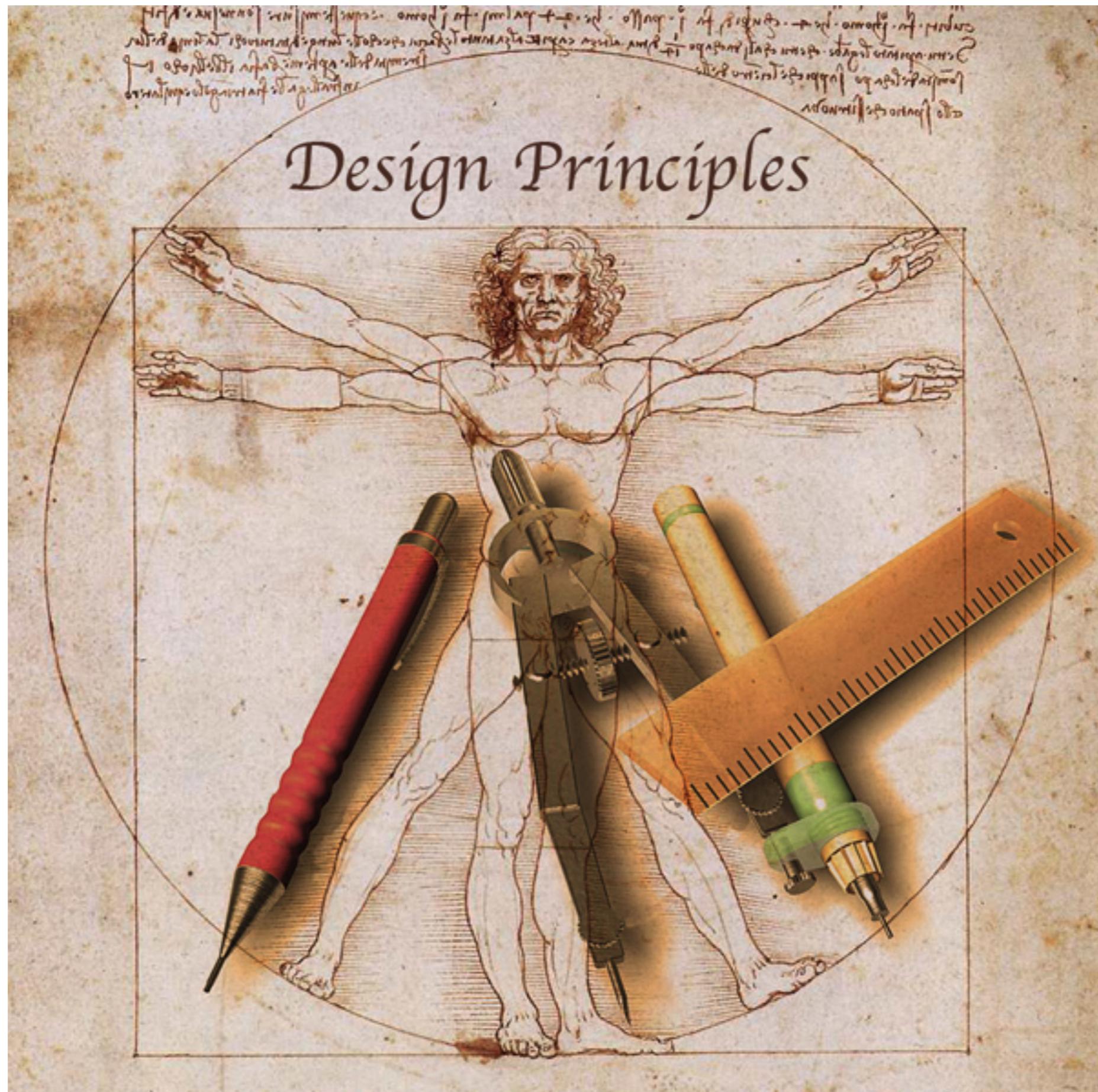
Feedback

Send information about what is happening back to the user



Feedback - from Bad to Better





Keep it simple



Google



Google Search

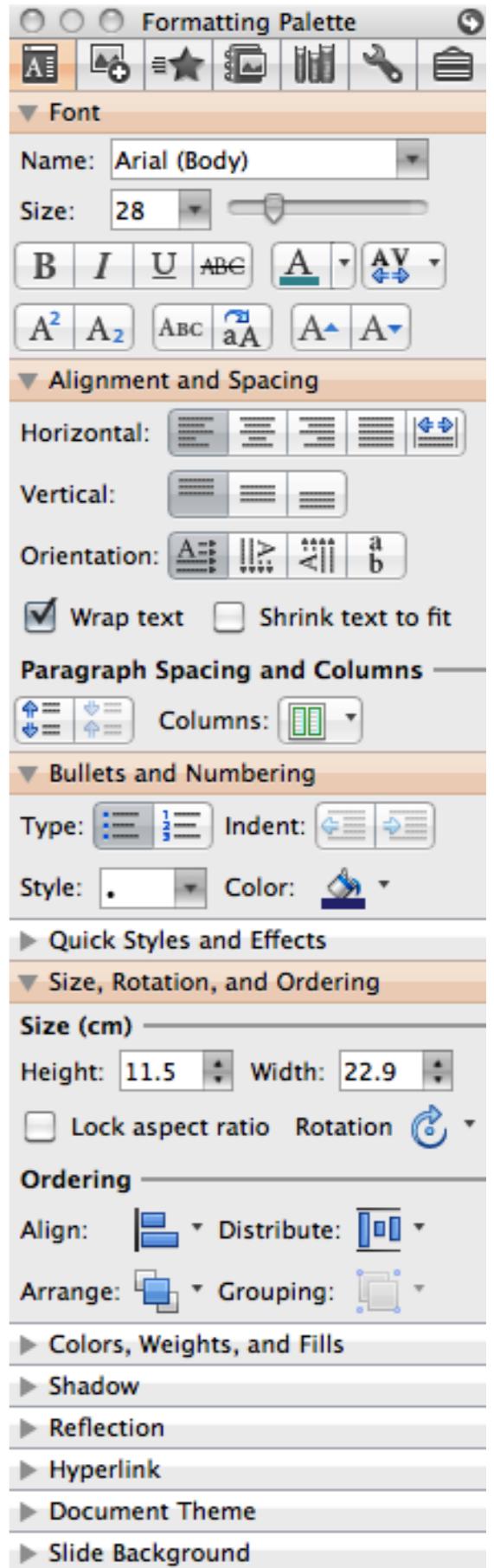
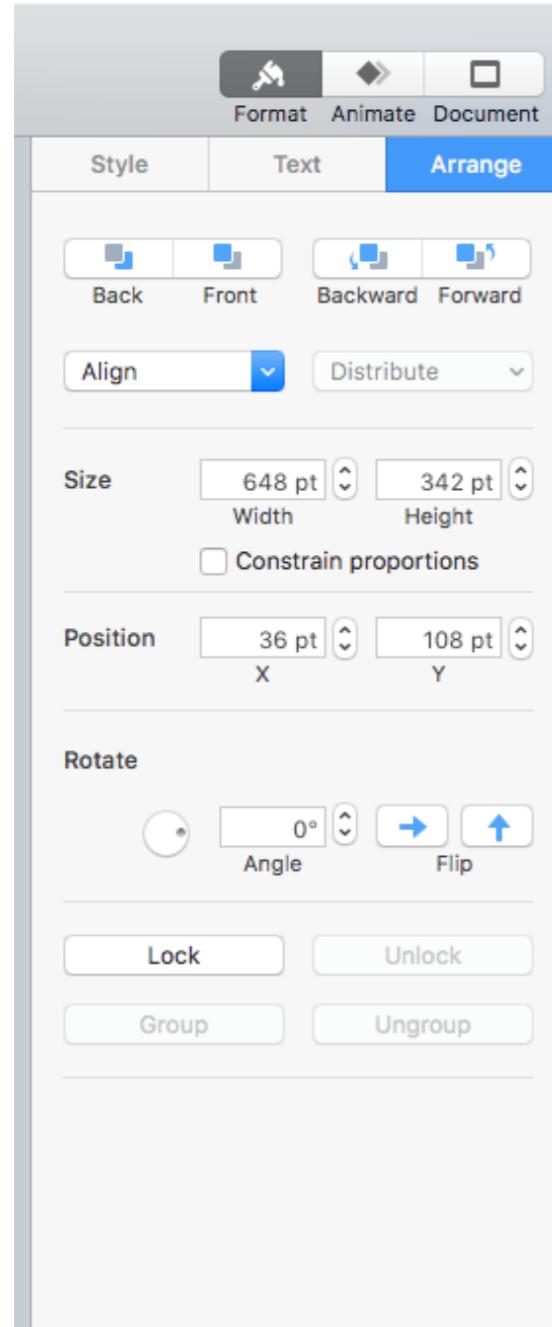
I'm Feeling Lucky



All in one doesn't work



Organize the UI in a meaningful way



Tolerance

Prevent user from making mistakes. Or allow for an easy recovery (undo).

Forward error recovery - system accepts the error and helps the user to accomplish their goal

Backward error recovery – undo the effects of the previous interaction

 Search Mail Search the Web

The conversation has been moved to the Trash. [Learn more](#) [Undo](#)

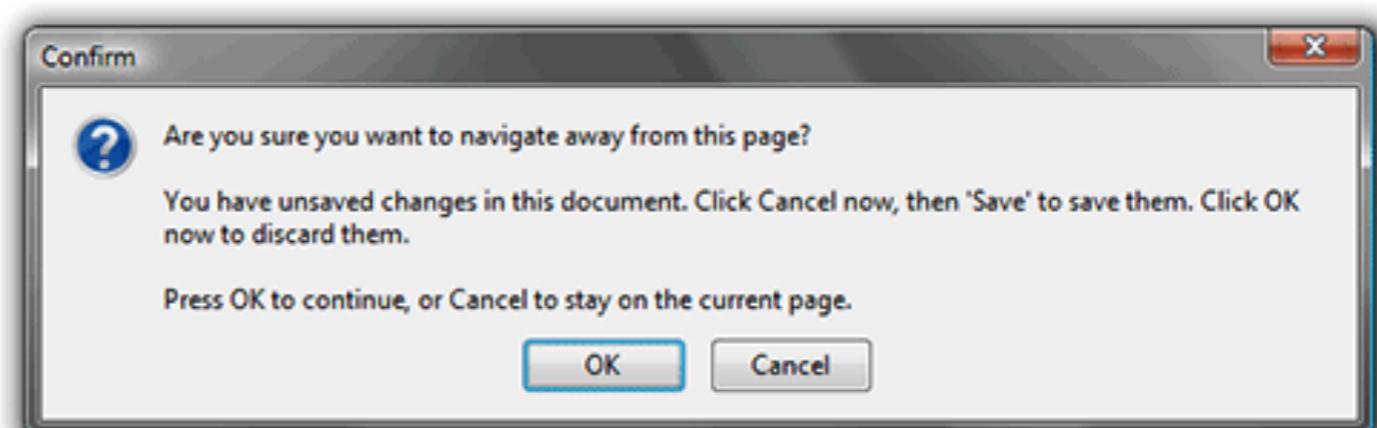
human coputer interaction

Search bar with microphone and magnifying glass icons.

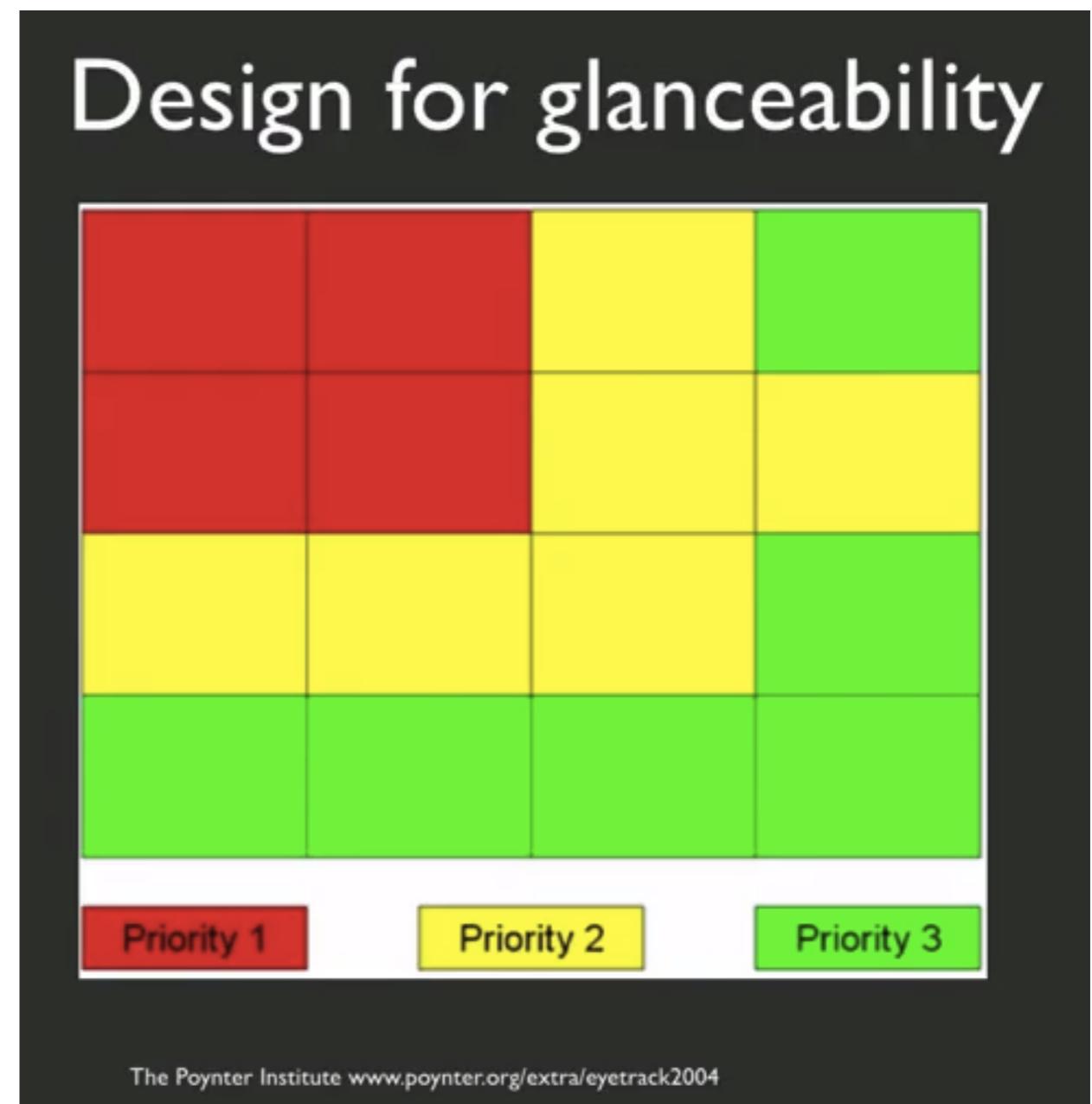
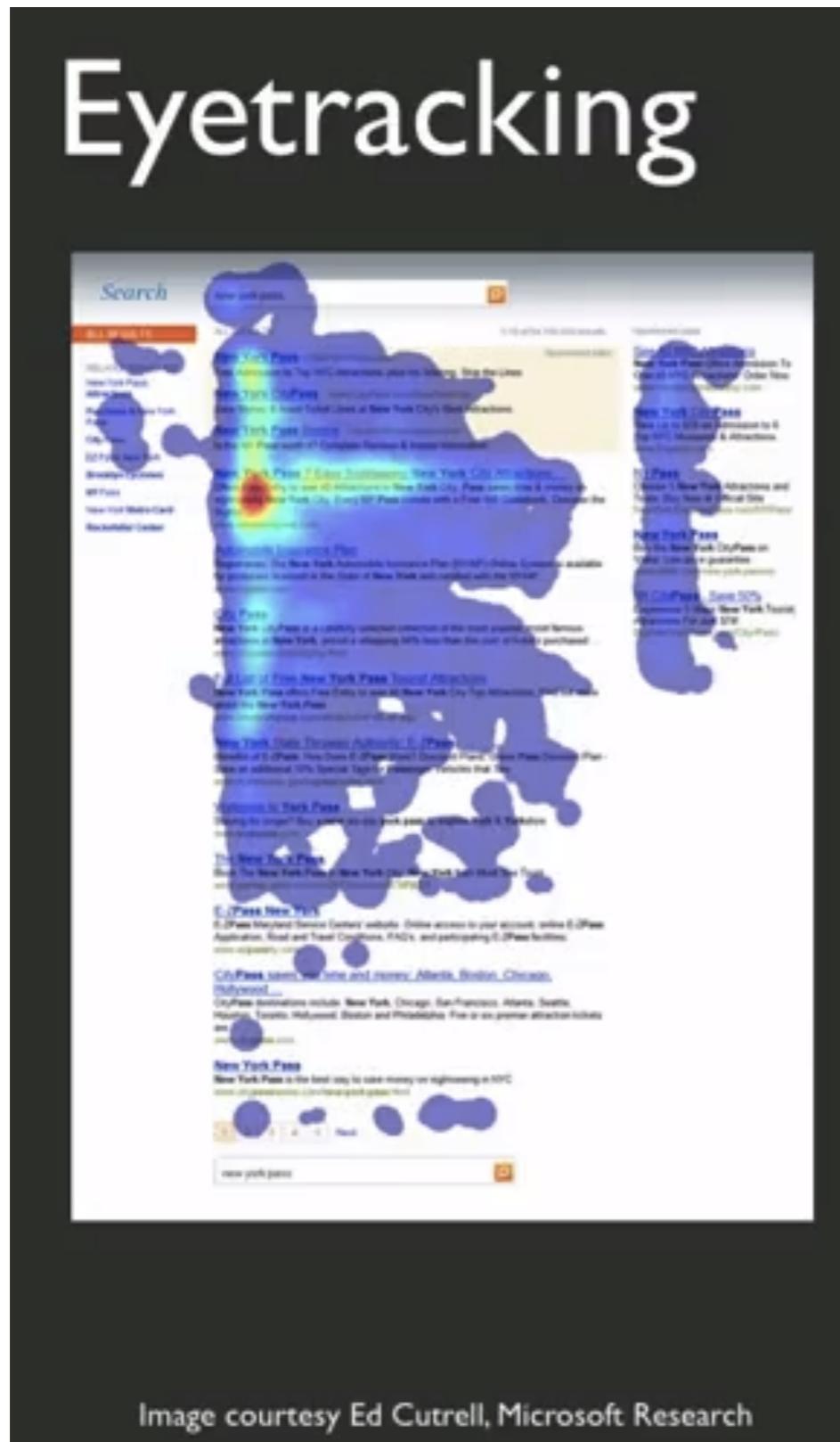
All News Books Images Videos More Settings Tools

About 66,000,000 results (0.49 seconds)

Showing results for **human computer** interaction
Search instead for [human coputer interaction](#)



Location on screen



The fold

SPECIAL COMMEMORATIVE SECTION

"All the News
That's Fit to Print"

LATE CITY EDITION
Weather: Hot, winds today; clear
tonight. Sunny, pleasant tomorrow.
Temp. range: today 84-94; Sunday
75-86. Temp. max. today yesterday
88. Complete U.S. report on p. 10.

VOL. CXVIII, No. 40,721 © 1969 The New York Times Company NEW YORK, MONDAY, JULY 21, 1969 10 CENTS

The New York Times

MEN WALK ON MOON

ASTRONAUTS LAND ON PLAIN; COLLECT ROCKS, PLANT FLAG

Voice From Moon:
'Eagle Has Landed'

EAGLE (the lunar module) Houston, Tranquility base here. The Eagle has landed.

HOUSTON: Eagle, Tranquility, we copy you on the ground. You've got a bunch of guys about to turn blue. We're breathing again. Thanks a lot.

TRANQUILITY BASE: Thank you.

HOUSTON: Tokyo looking good here.

TRANQUILITY BASE: A very smooth touchdown.

HOUSTON: Eagle, you are stay for TI. [The first step in the lunar operation] Over.

TRANQUILITY BASE: Roger. Stay for TI.

HOUSTON: Roger and we see you visiting the craters.

TRANQUILITY BASE: Roger.

COLUMBIA (the command and service module): How do you read me?

HOUSTON: Columbia, we have landed Tranquility base. Eagle is at Tranquility. I read you five by. Over.

COLUMBIA: Yes, I heard the whole thing.

HOUSTON: Well, it's a good show.

COLUMBIA: Fantastic.

TRANQUILITY BASE: I'll second that.

APOLLO CONTROL: The next major step-on may well be for the TI event. That is at 21 minutes 39 seconds after initiation of power descent.

COLUMBIA: Up intensity command reset to acquire on high gain.

Neil A. Armstrong moves away from the leg of the landing craft after taking the first step on the surface of the moon.

A Powdery Surface Is Closely Explored

By JOHN NOBLE WILFORD
Special to The New York Times

HOUSTON, Monday, July 21—Men have landed and walked on the moon.

Two Americans, astronauts of Apollo 11, steered their fragile four-legged lunar module safely and smoothly to the historic landing yesterday at 4:17:40 P.M., Eastern day-light time.

Neil A. Armstrong, the 38-year-old civilian commandet, radioed to earth and the mission control room here:

"Houston, Tranquility base here. The Eagle has landed."

The first men to reach the moon—Mr. Armstrong and his copilot, Col. Edwin E. Aldrin Jr. of the Air Force—brought their ship to rest on a level, rock-strewn plain near the southeastern slope of the arid Sea of Tranquility.

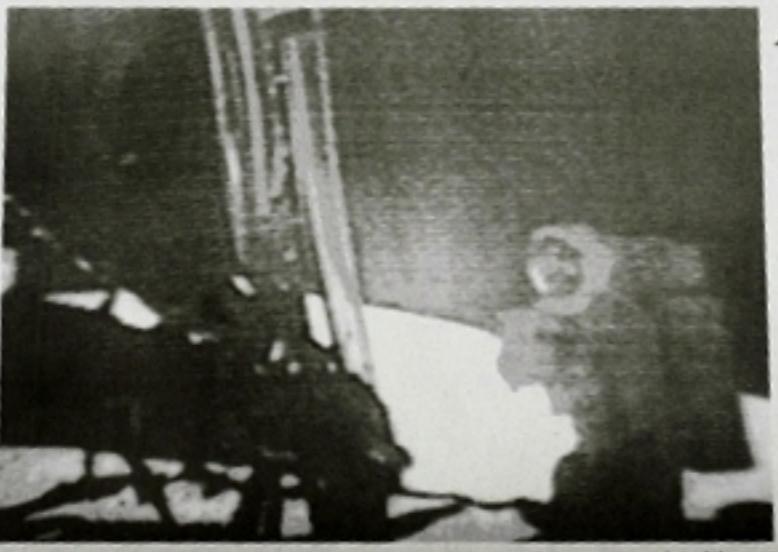
About six and a half hours later, Mr. Armstrong opened the landing craft's hatch, stepped slowly down the ladder and declared as he planted the first human footprint on the lunar crust:

"That's one small step for man, one giant leap for mankind."

His first step on the moon came at 10:56:20 P.M., as a television camera outside the craft transmitted his every move to an awed and excited audience of hundreds of millions of people on earth.

Tentative Steps Test Soil

Mr. Armstrong's initial steps were tentative tests of the lunar soil's firmness and of his ability to move about



The fold

For websites: what the users see without having to scroll

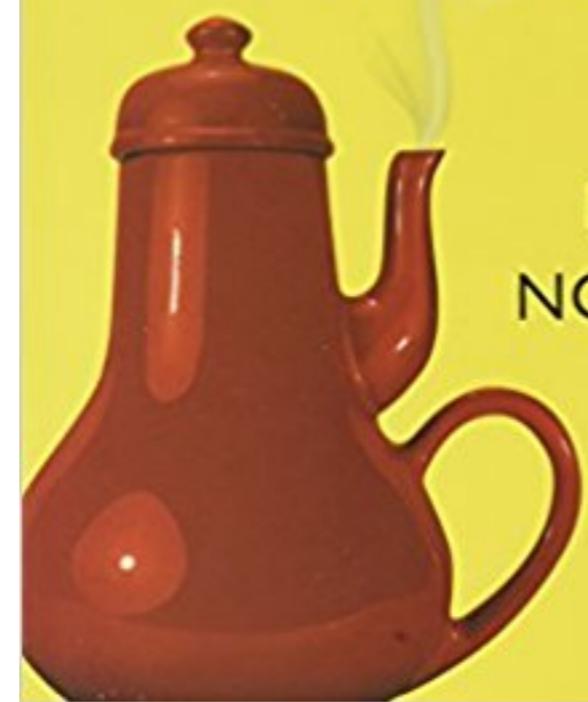
Varies a lot because of different device sizes

Beware of big banners or navigations bars

Beware of ad placement

REVISED & EXPANDED EDITION

*The DESIGN
of EVERYDAY
THINGS*



DON
NORMAN

Resources

Usability Goals: Nielson's 5 Goals

<https://www.nngroup.com/articles/usability-101-introduction-to-usability/>

Design principles: First Principles of Interactive Design
<http://www.asktog.com/basics/firstPrinciples.html>

Design Rules: 8 Golden Rules

<http://www.usask.ca/education/coursework/skaalid/theory/interface.htm>