

Design for Engineers

Tony Poor

MIT 6.470 — Palantir Technologies

What is design?

Design bridges the gap between
what a thing is and why it exists.

Sahil Lavingia

Designer at Pinterest, Gumroad

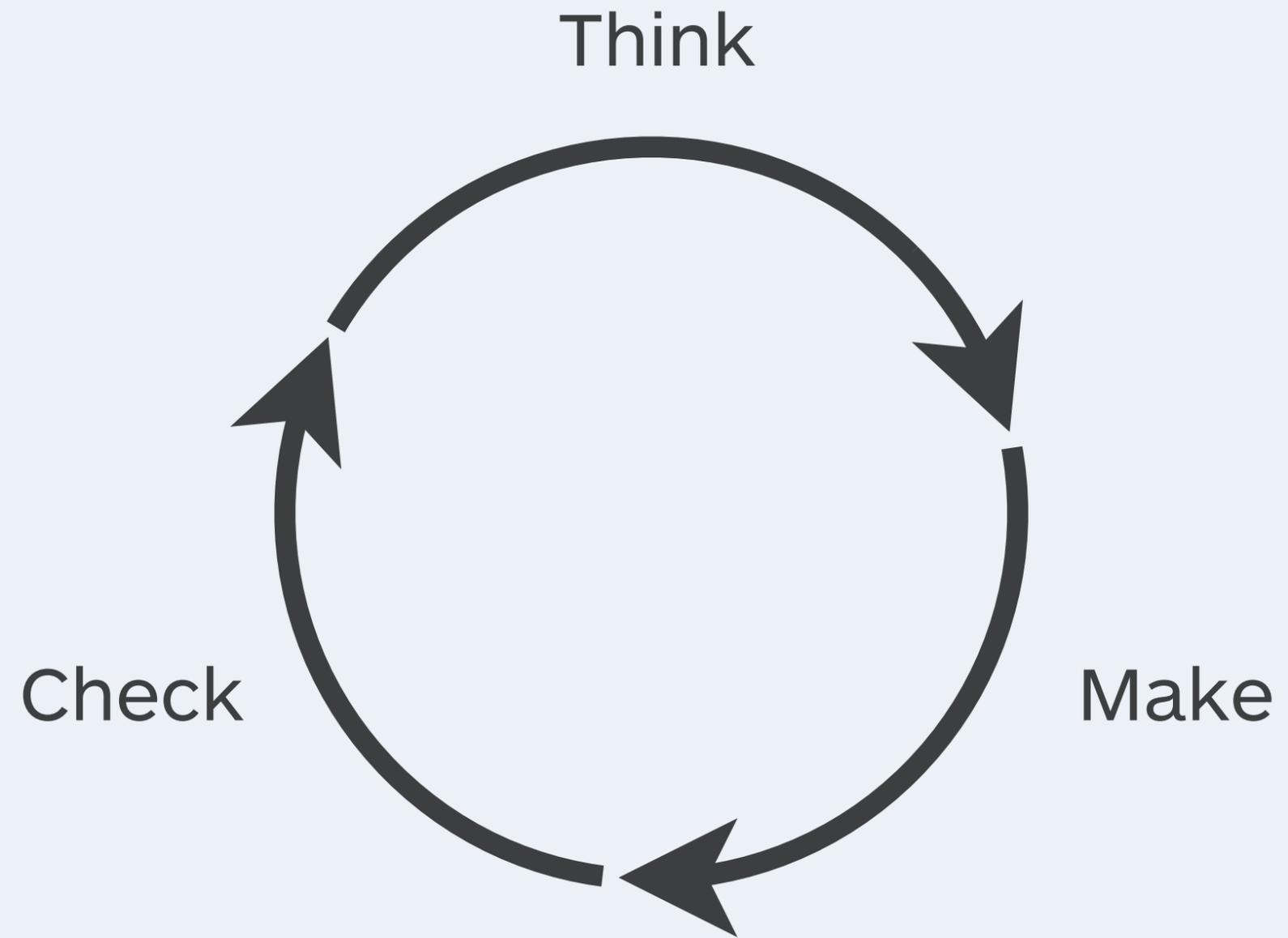
But I'm an engineer.

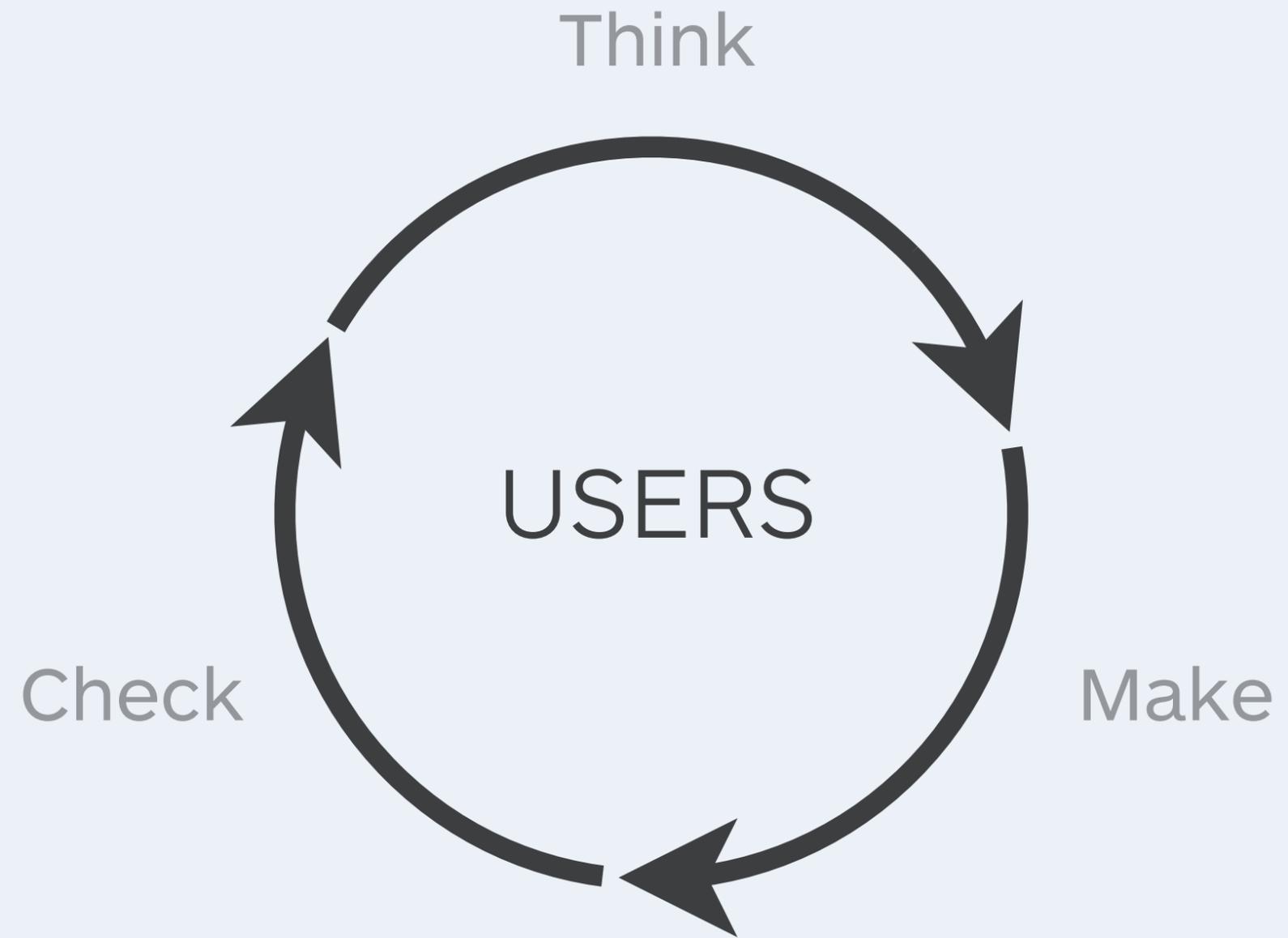
Our schedule for today...

- 1 **PROCESS**
- 2 **INTERACTION DESIGN**
- 3 **VISUAL DESIGN**

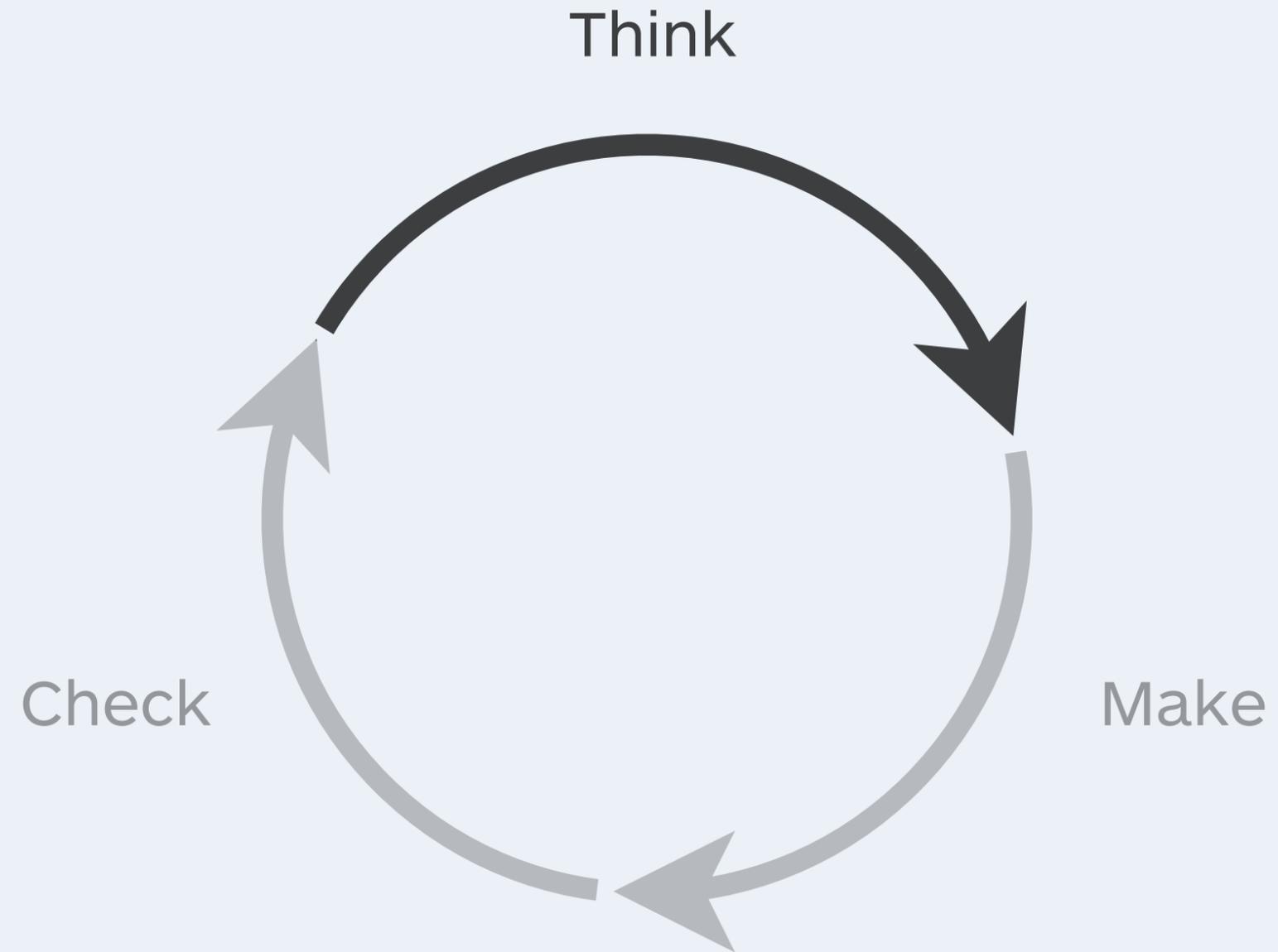
1

PROCESS

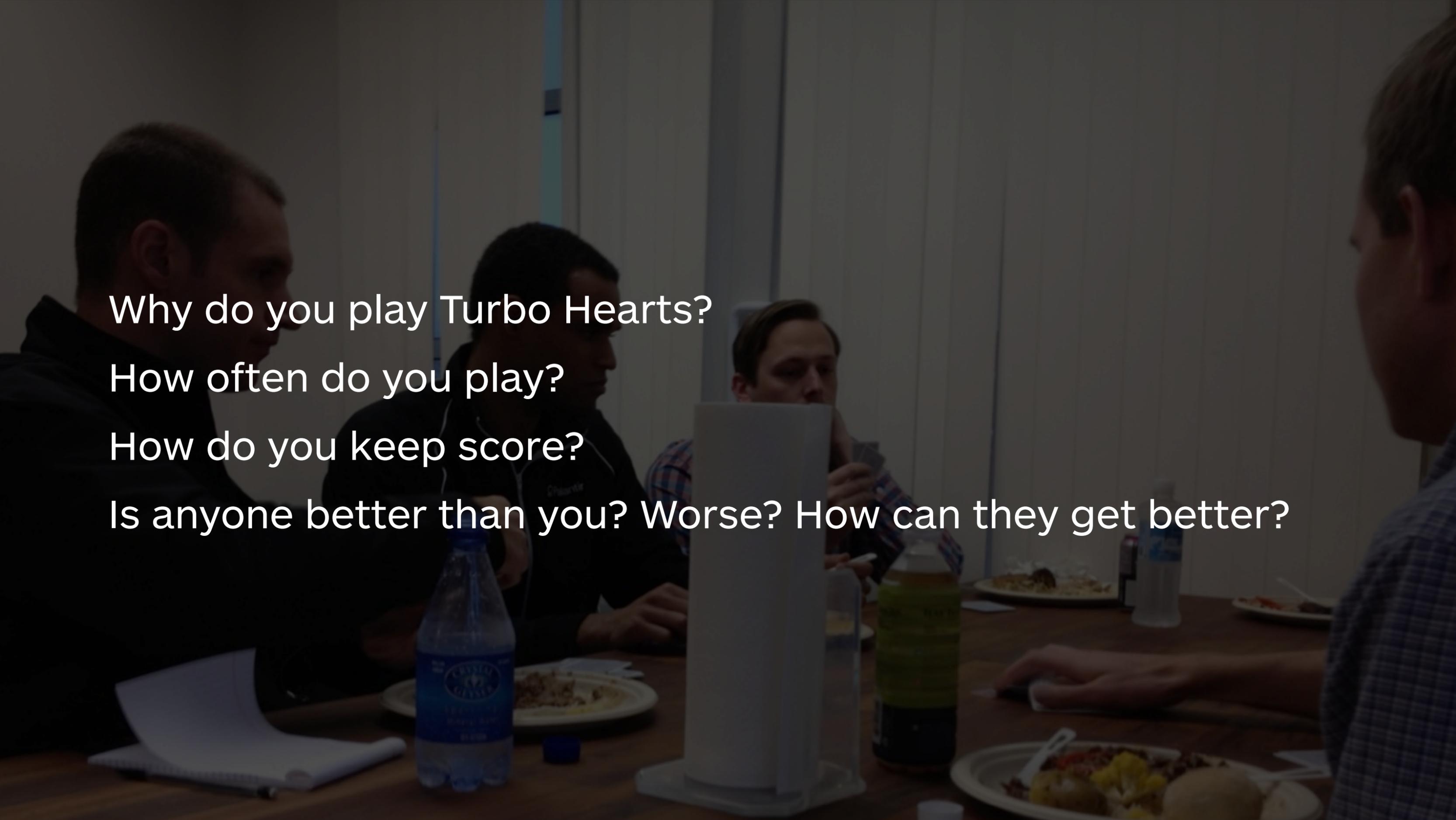




Who are you designing for? **Go talk to them.**





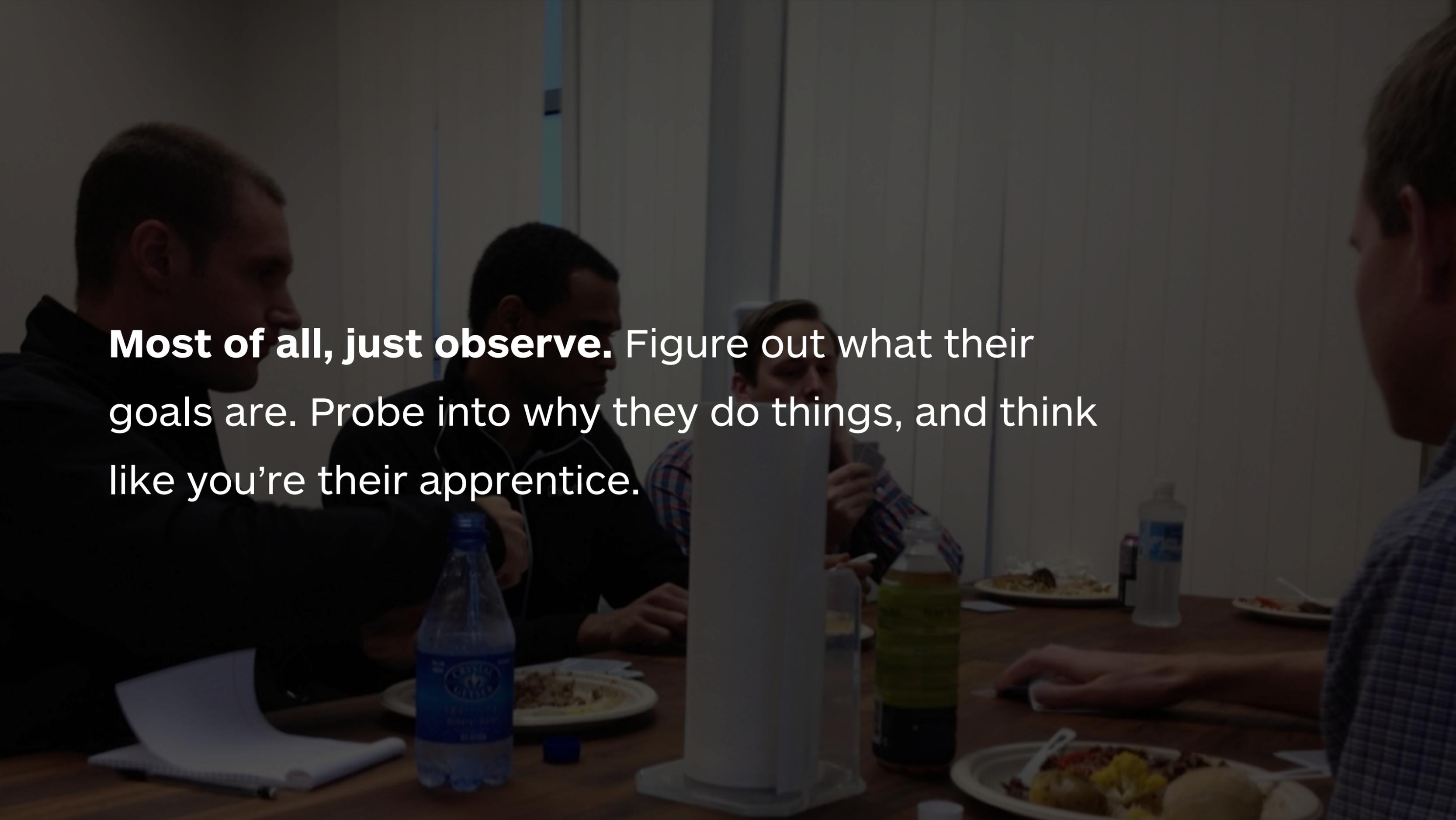


Why do you play Turbo Hearts?

How often do you play?

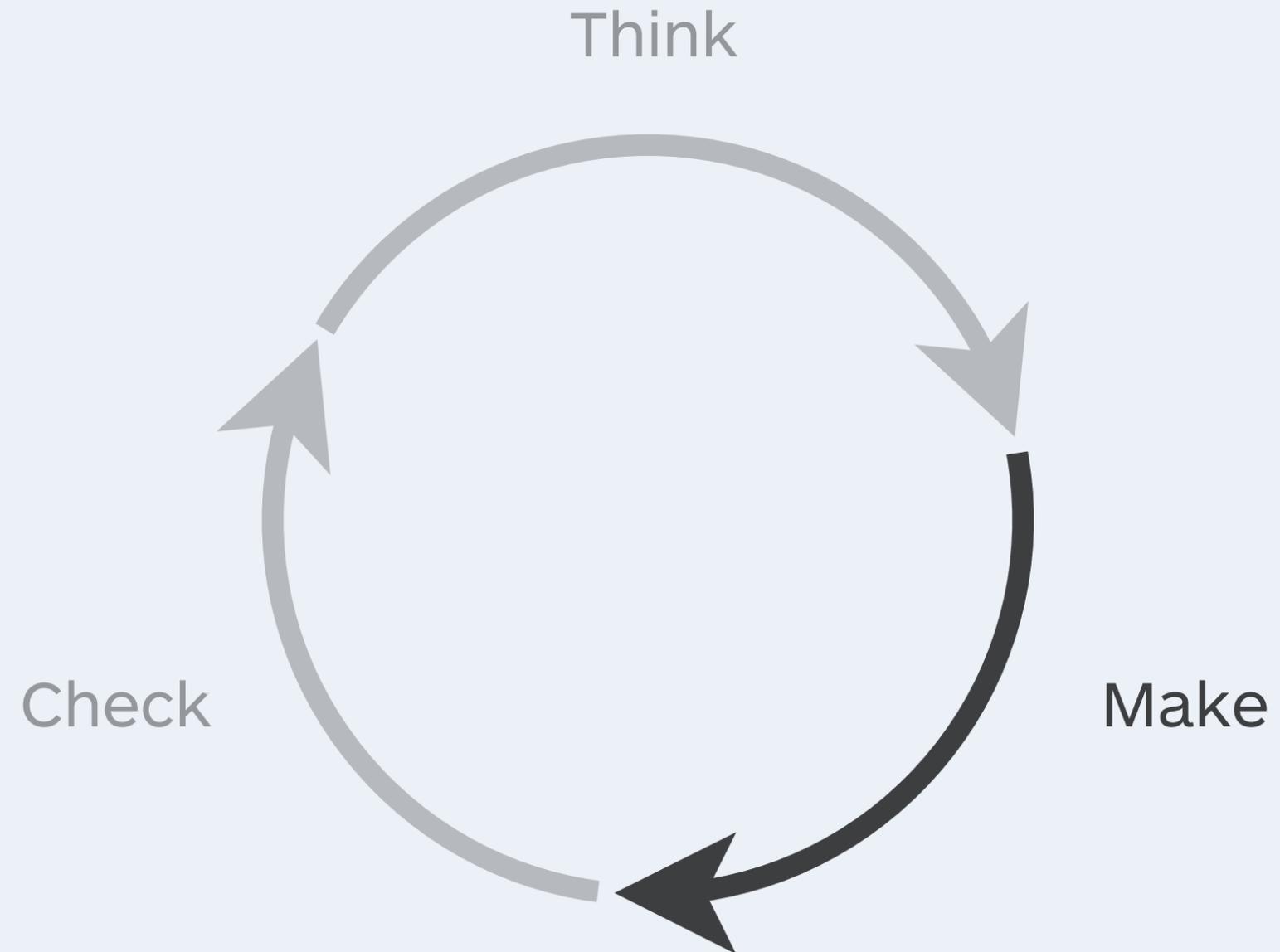
How do you keep score?

Is anyone better than you? Worse? How can they get better?

A group of people are seated around a table in what appears to be a meeting or workshop. The scene is dimly lit, with the primary light source coming from the left, casting soft shadows. In the foreground, a man in a dark jacket is seen in profile, looking towards the center. Behind him, another man in a dark jacket is also looking towards the center. Further back, a man in a plaid shirt is visible, looking down at something in his hands. On the right side of the frame, the back of a man's head and shoulder, wearing a blue and white checkered shirt, is visible. The table is set with several items: a blue water bottle, a white plate of food, a white napkin, and a white cylindrical object. The background consists of a plain, light-colored wall with vertical lines, possibly from a window blind or a wall panel.

Most of all, just observe. Figure out what their goals are. Probe into why they do things, and think like you're their apprentice.

Come up with divergent ideas to help your users achieve their goals. **Sketch.**



DID

-DX

TURBO (7) HEARTS SCORE TRACKER

username

password



Track your score, improve your game.

Start Tracking!

Recent Tips

Dan - don't deal with the Queen, it gives everyone too much information.

Register or log in to reply

View other player profiles. Search for friends who may have played your scores already

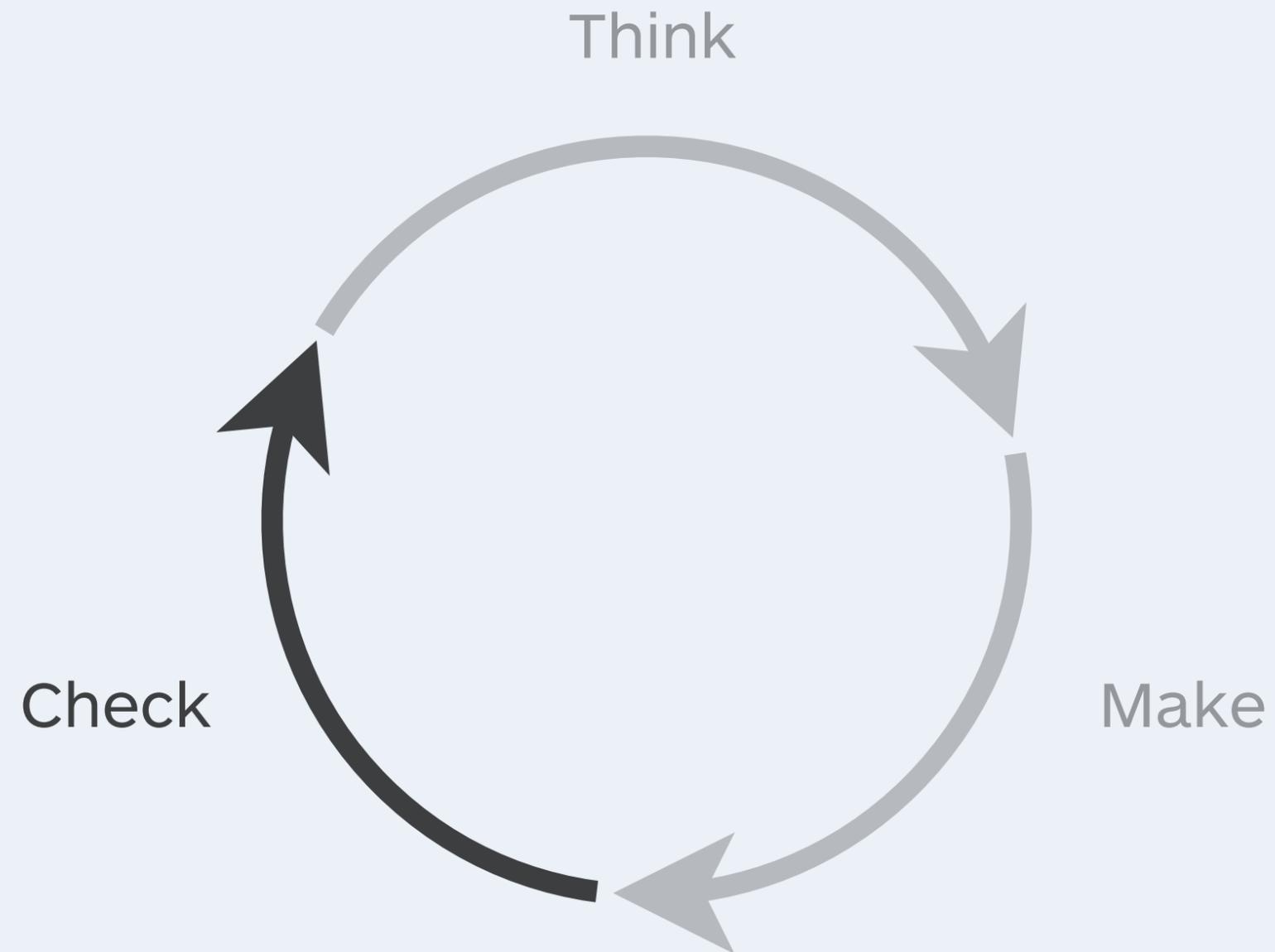
Todd to Allen - try to run more.
Allen - Any tips on how?
Dan - if you have more than 7 cards of a suit, you have a good chance of taking everything

Recent Games

12/21	<u>Dan</u> -5	<u>Todd</u> 12	<u>EA</u> 30	<u>G</u> 34
12/20	<u>Todd</u> 5	<u>Dan</u> 7	<u>Allen</u> 20	<u>EA</u> 25
12/17	<u>Q</u> 20	<u>Todd</u> 22	<u>Allen</u> 30	<u>EA</u> 64

Register or log in to reply

Show your ideas to your users. If you have a prototype (even just on paper), watch them use it.



DID

-DX

TURBO (7) HEARTS SCORE TRACKER

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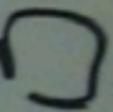
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12/17	<u>Q</u> 20	<u>Todd</u> 22	<u>Allen</u> 30	<u>EA</u> 64

Register or log in to reply

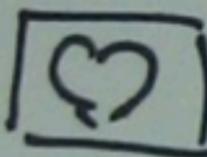
DDI



TURBO ♥ HEARTS SCORE TRACKER

Logged in as Jon Chu
Go to Dashboard

Log out



Jon Chu

edit profile

Recent Tips

Dan - don't lead with the Queen,
it gives everyone too much
information.

Recent Games

New game:

12/15	<u>Todd</u> : 17	<u>Allen</u> : 20	<u>Jon</u> : 22	<u>FA</u> : 35
12/10	<u>Dan</u> : 5	<u>Todd</u> : 22	<u>FA</u> : 23	<u>Jon</u> : 19

Post tip

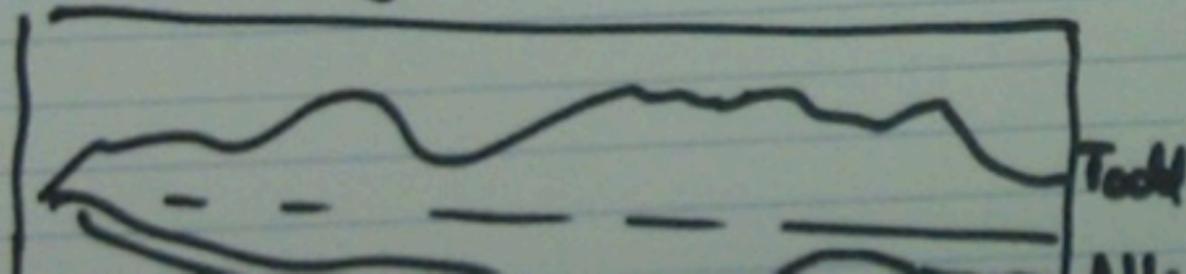
Post tip

Write a comment

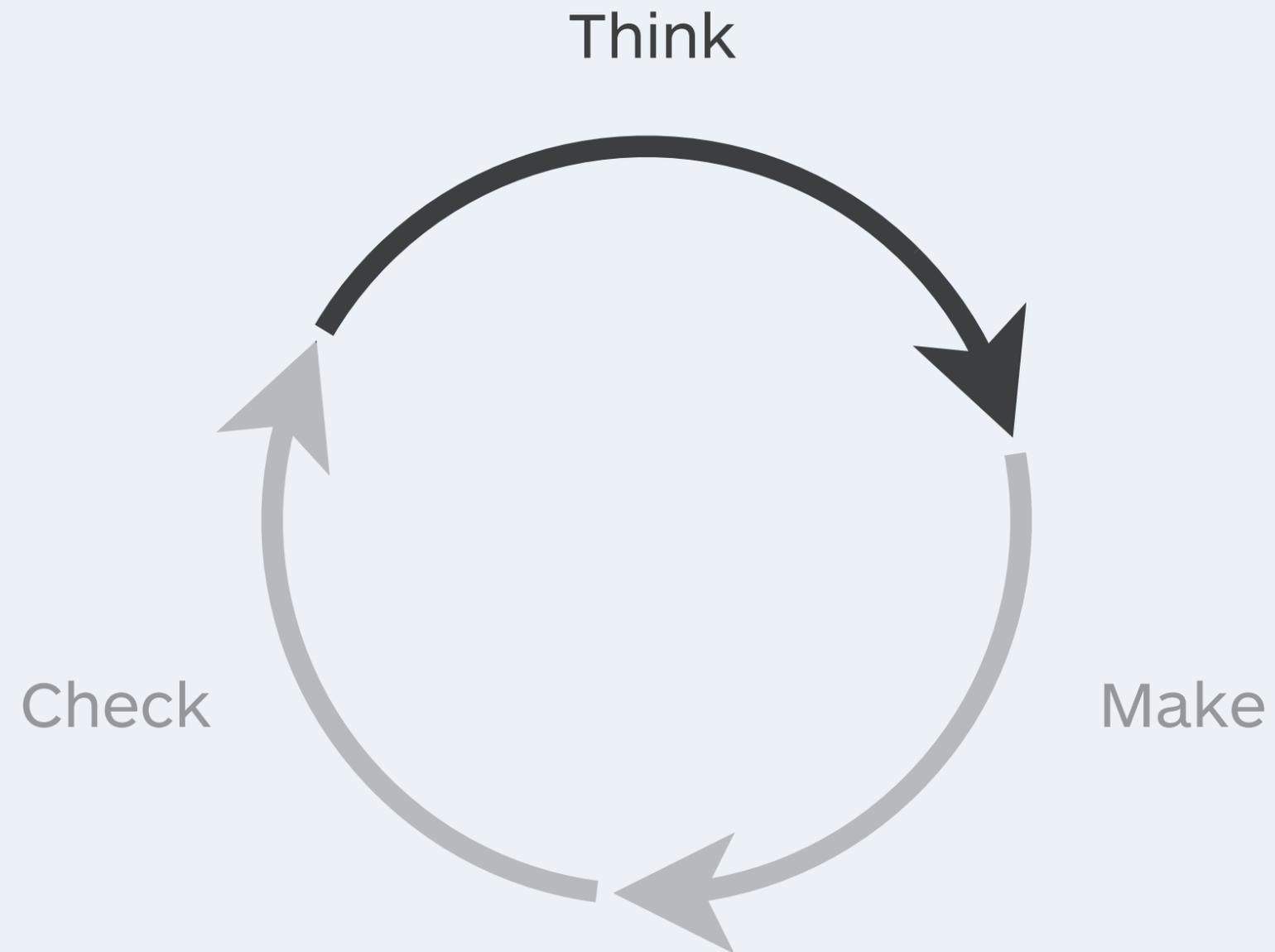
Write a tip

Leagues

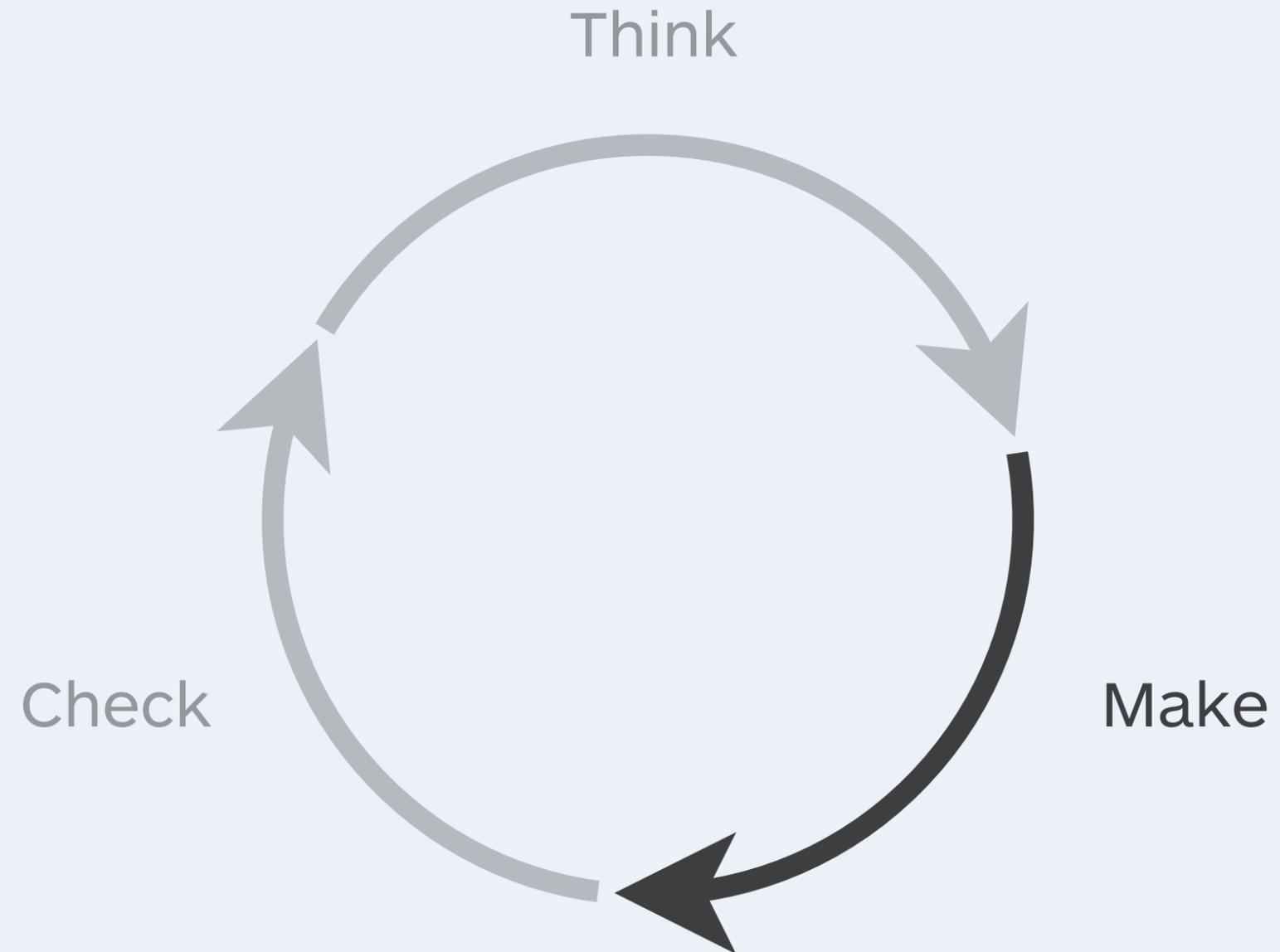
Default league add view



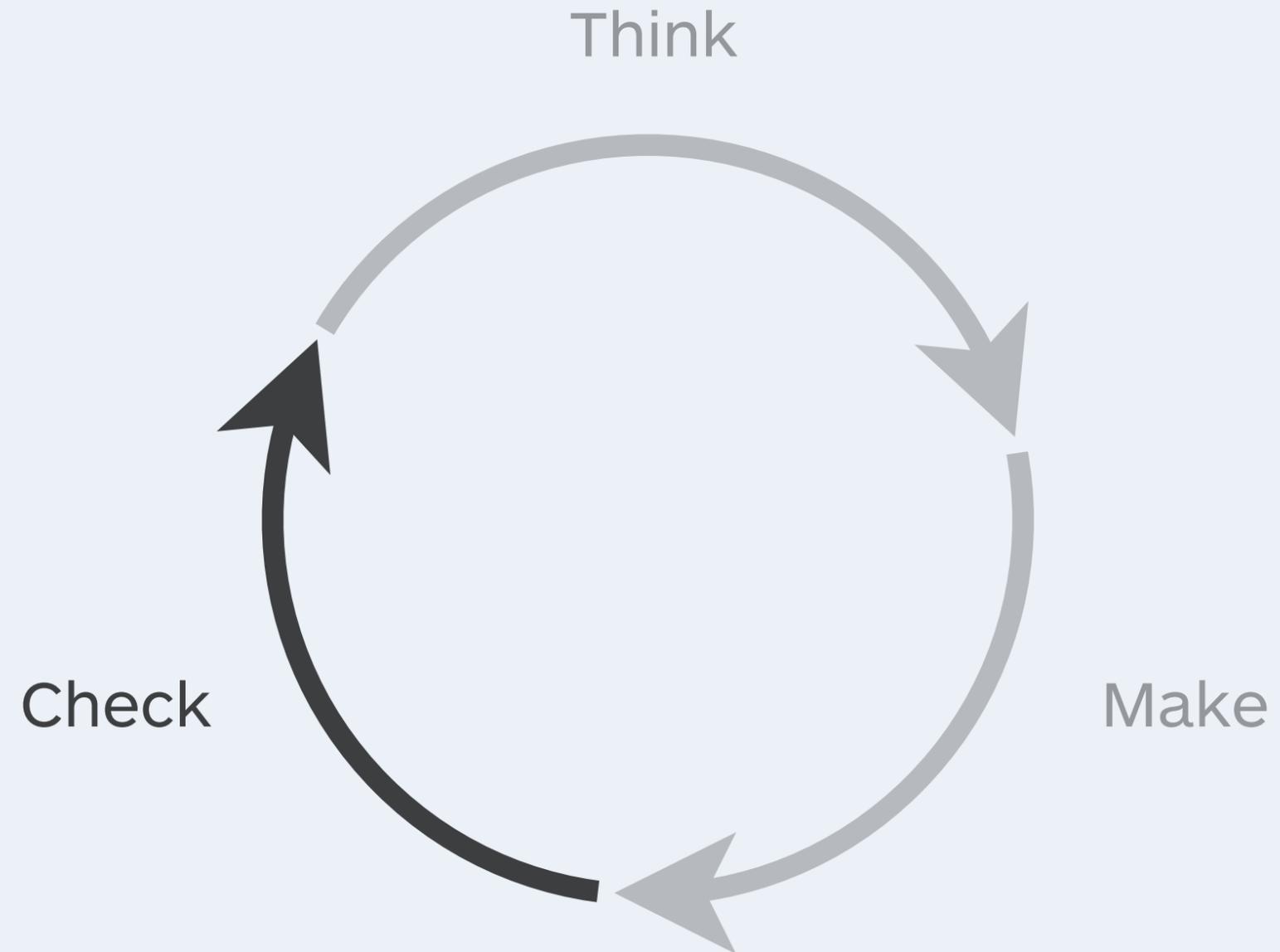
Were there any problems? Did we learn anything new about our users? What could we improve?



Iterate on your designs,
while increasing in fidelity...



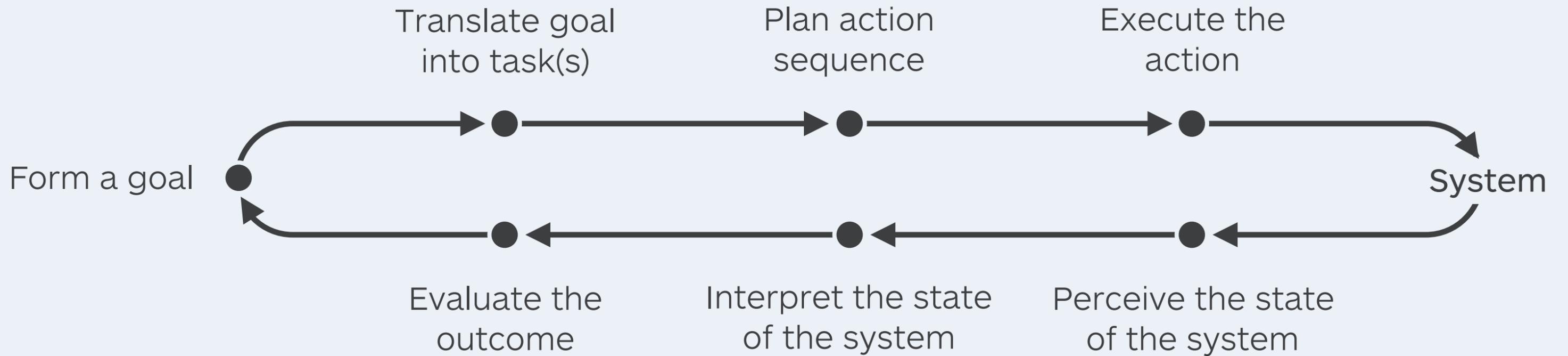
...and keep showing them to users, seeing how easy to use/valuable they are.



2

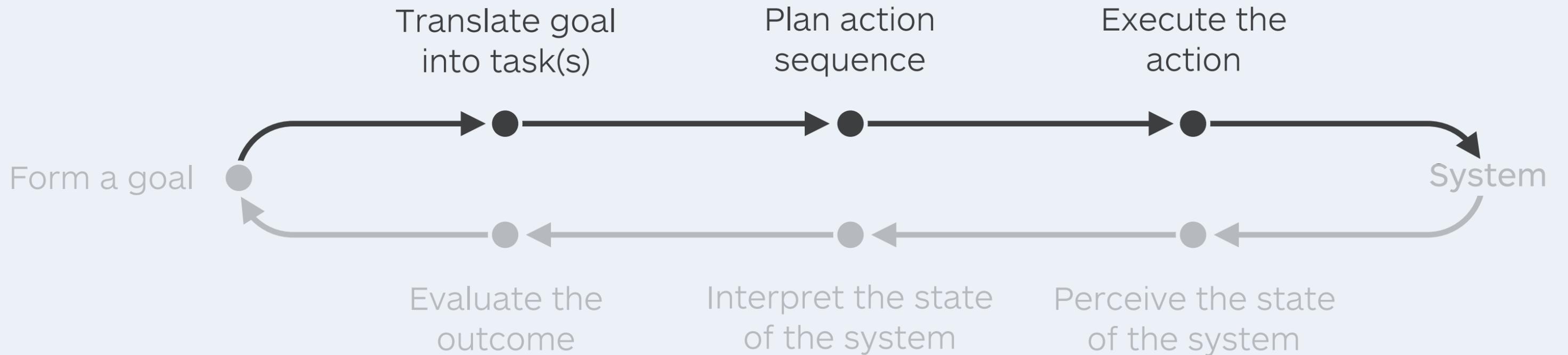
INTERACTION DESIGN

Seven Stages of Action

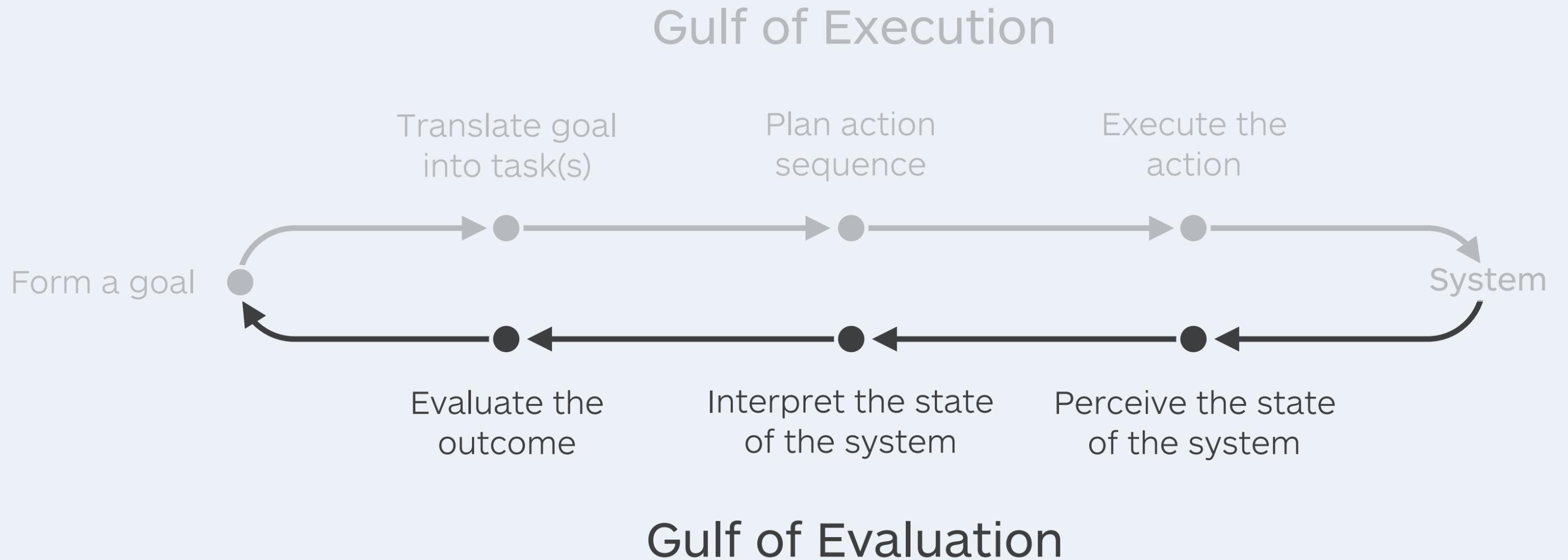


Seven Stages of Action

Gulf of Execution



Seven Stages of Action



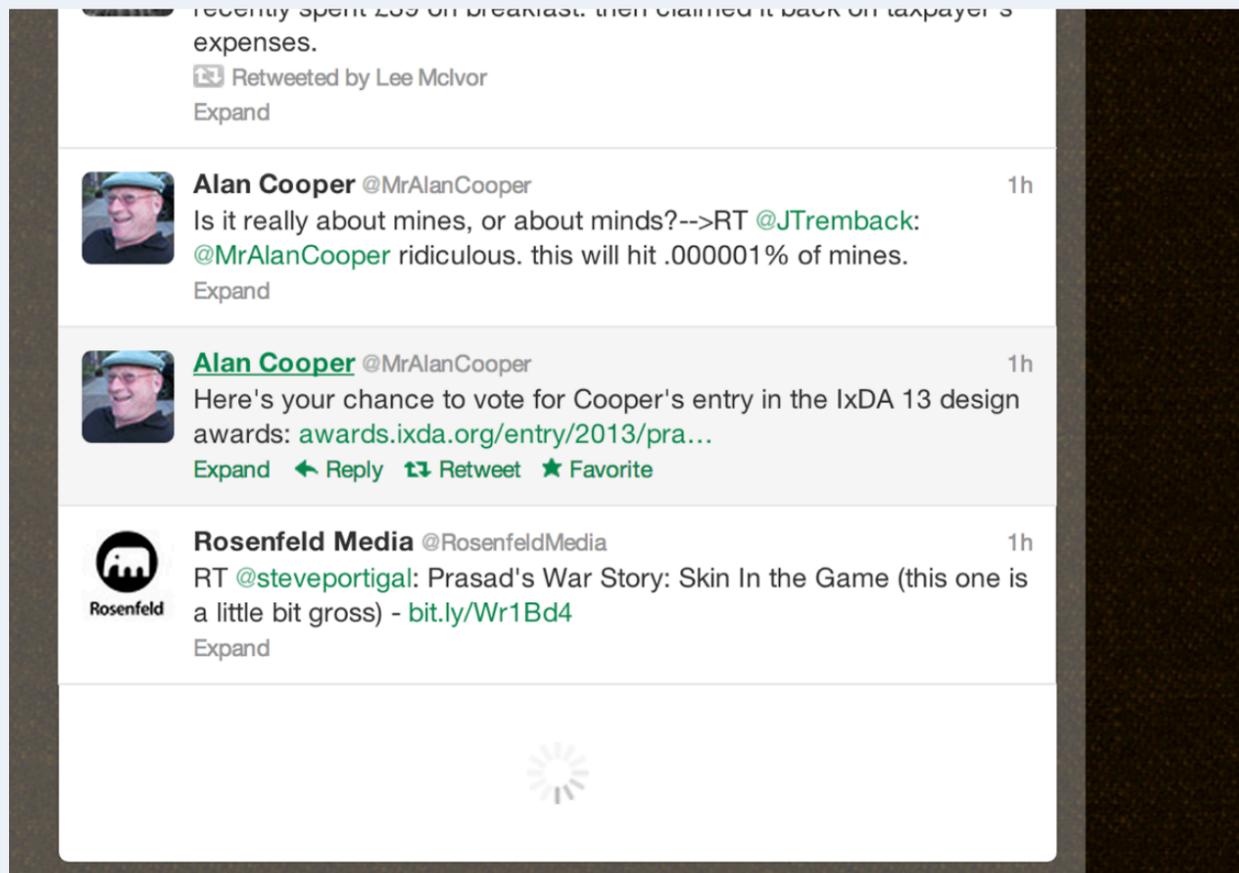
Interaction Design

Feedback

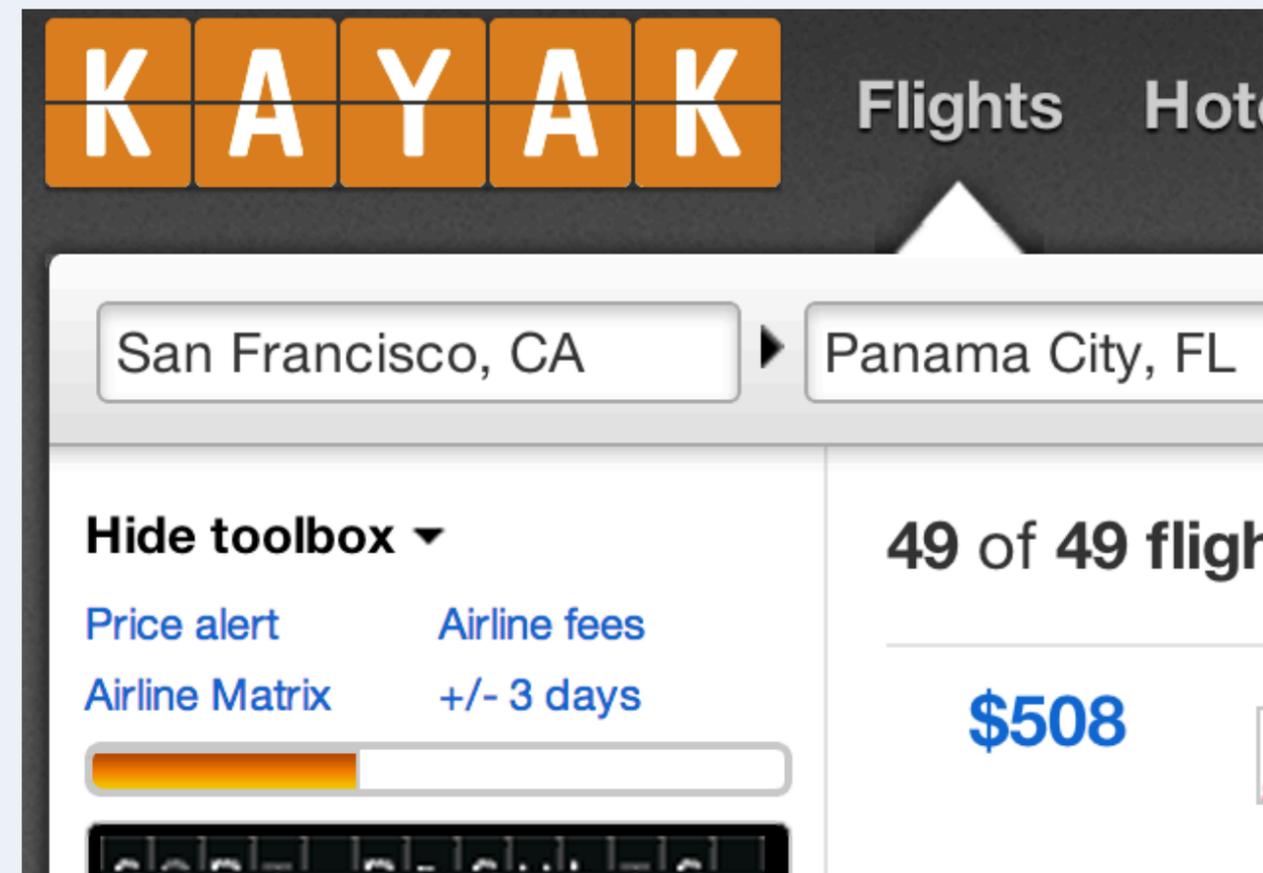
You can overcome the gulf of evaluation partially by giving feedback *quickly*.

Feedback

Activity Indicator



Progress Bar (>5 secs)



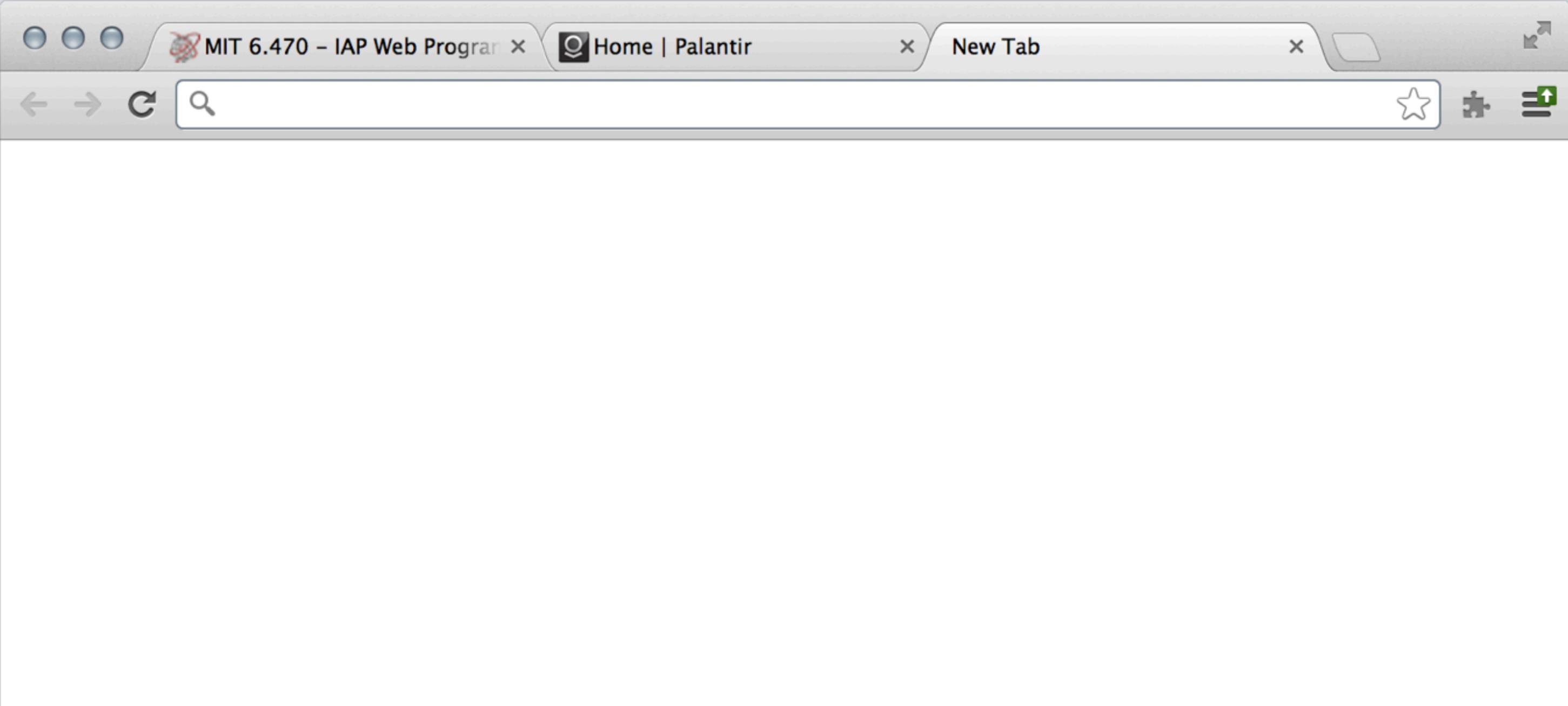
Interaction Design

Perceived Affordances

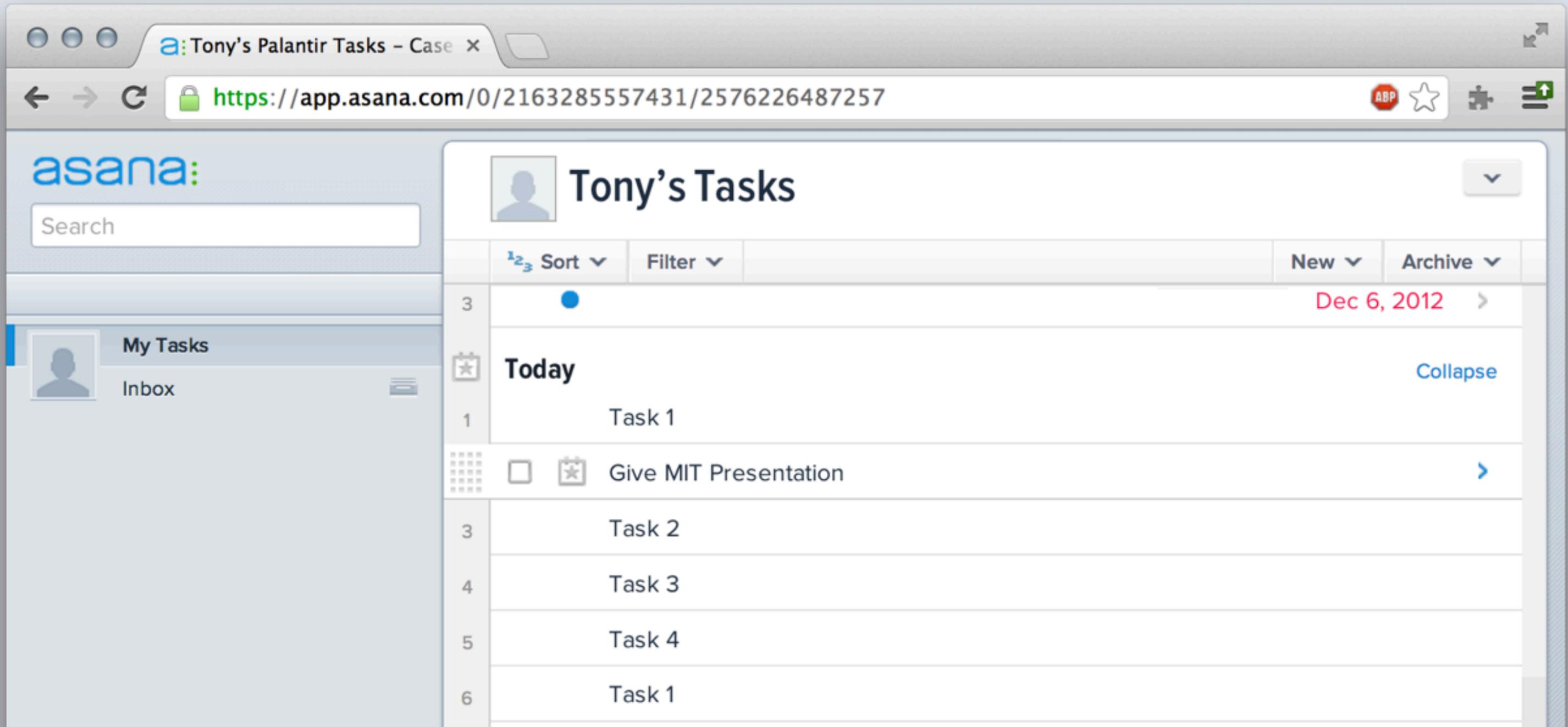
A cue baked into an object that signifies how it may be used.



Perceived Affordances



Perceived Affordances



Interaction Design

Proximity

Put controls next to the things that they modify.

Profile Picture
Cover Photo

About You

[Edit](#)

Living

[Edit](#)

Basic Info

[Edit](#)

Relationship

[Edit](#)



Mark Complete



Give MIT Presentation

add notes

Assignee **Tony Poor**

Today | Upcoming | Later

Projects [add to project](#)

[Subtasks](#) [Due Date](#) [Tags](#) [Attach a File](#)

Followers **Tony P**

[Unfollow](#)

Activity Feed

Tony Poor created task. 3:24pm

Tony Poor marked today. 3:24pm



Mark Complete



Give MIT Presentation

add notes

Assignee **Tony Poor**

Today | Upcoming | Later

Projects [add to project](#)

[Subtasks](#) [Due Date](#) [Tags](#) [Attach a File](#)

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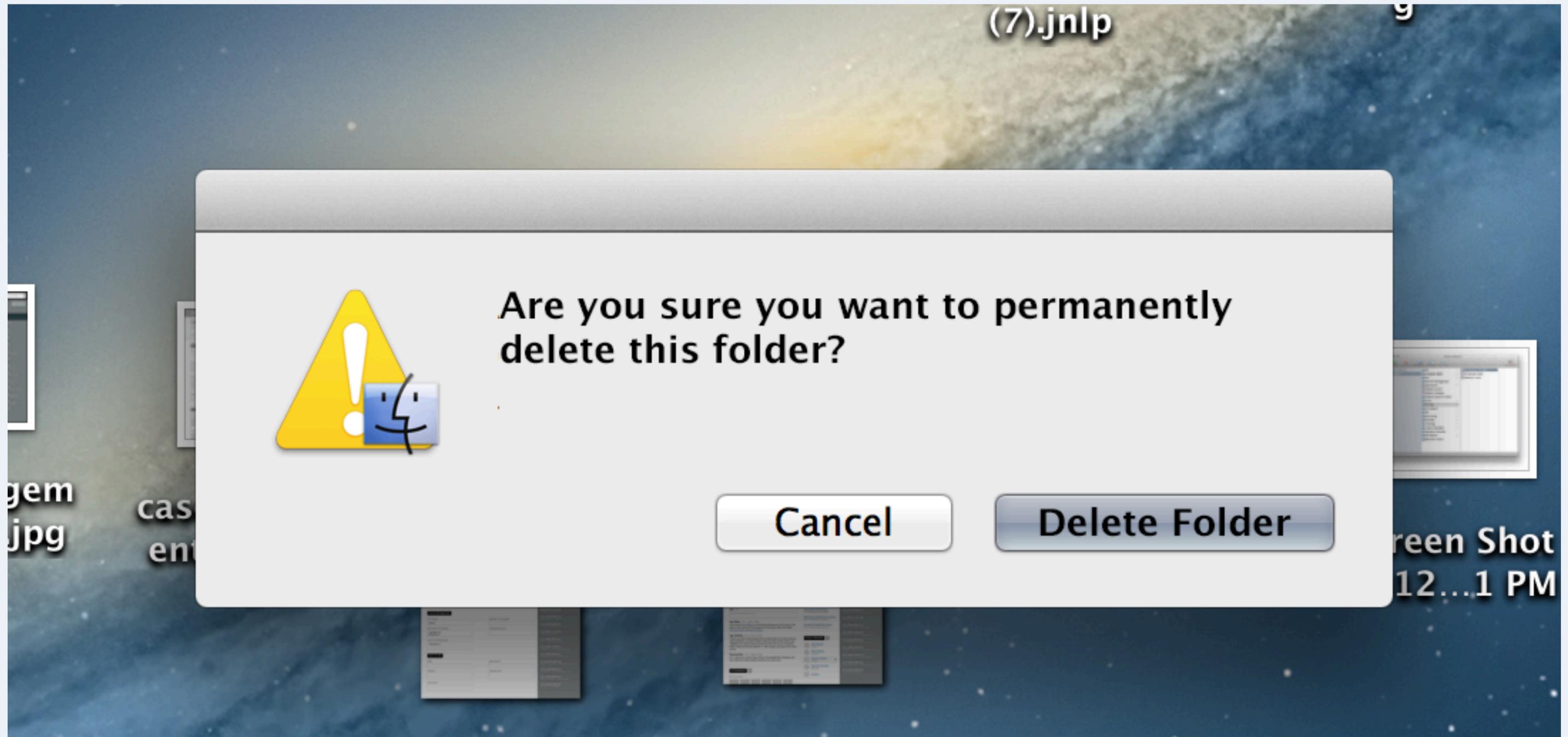
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Activity Feed

Tony Poor created task. 3:24pm

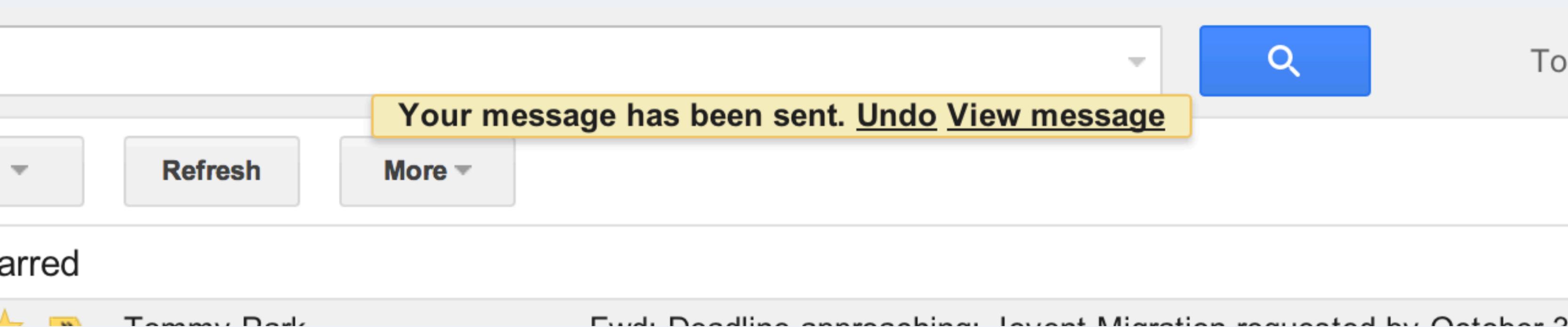
Tony Poor marked today. 3:24pm

Error Prevention



Error Prevention

So **do, don't ask** — just allow actions to be reversed.
Undo is **awesome**.

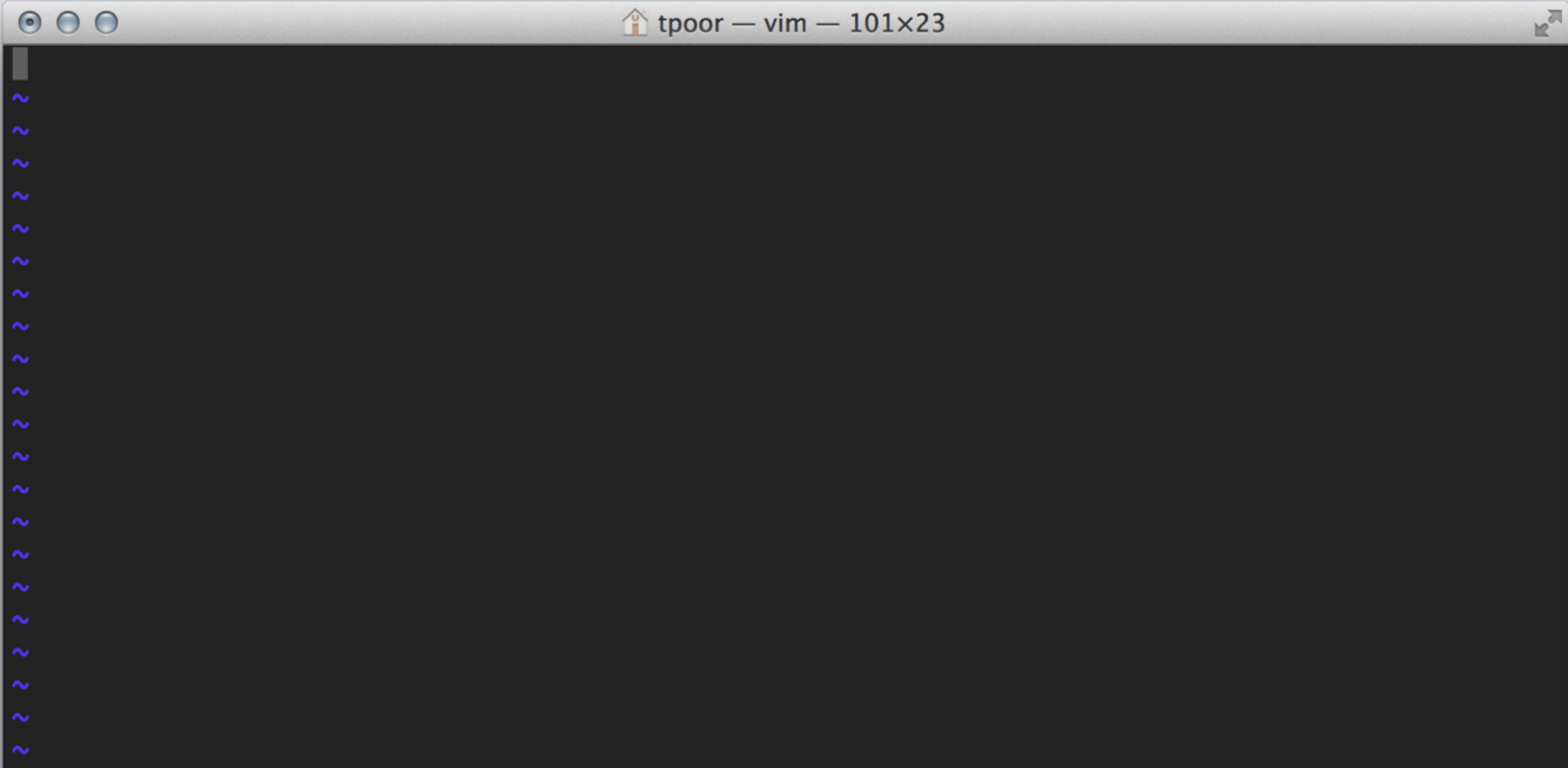


Modes

Mode errors can occur when the same action can have different results, depending on the state of the system.

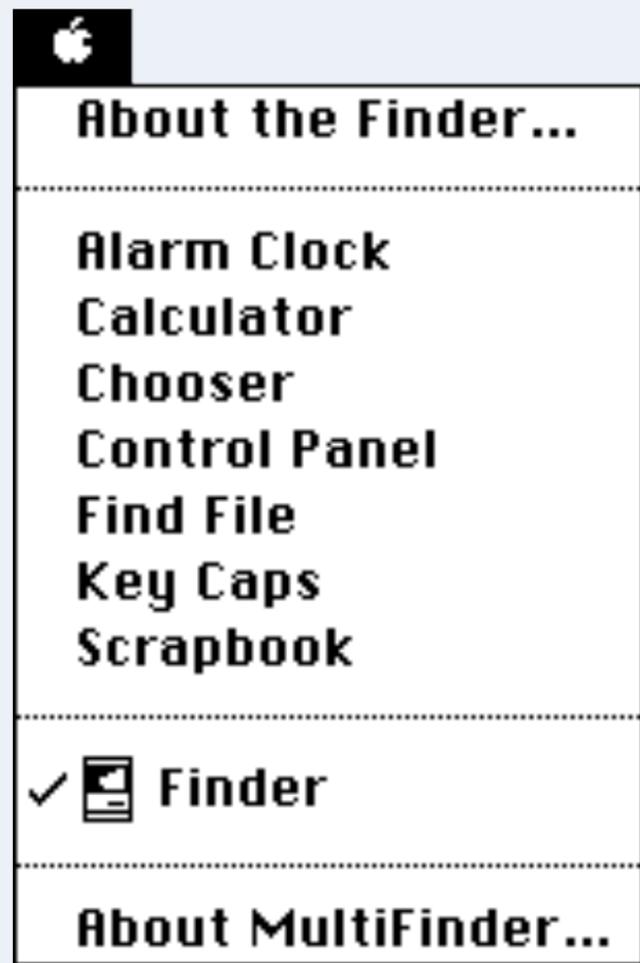
Interaction Design

Modes



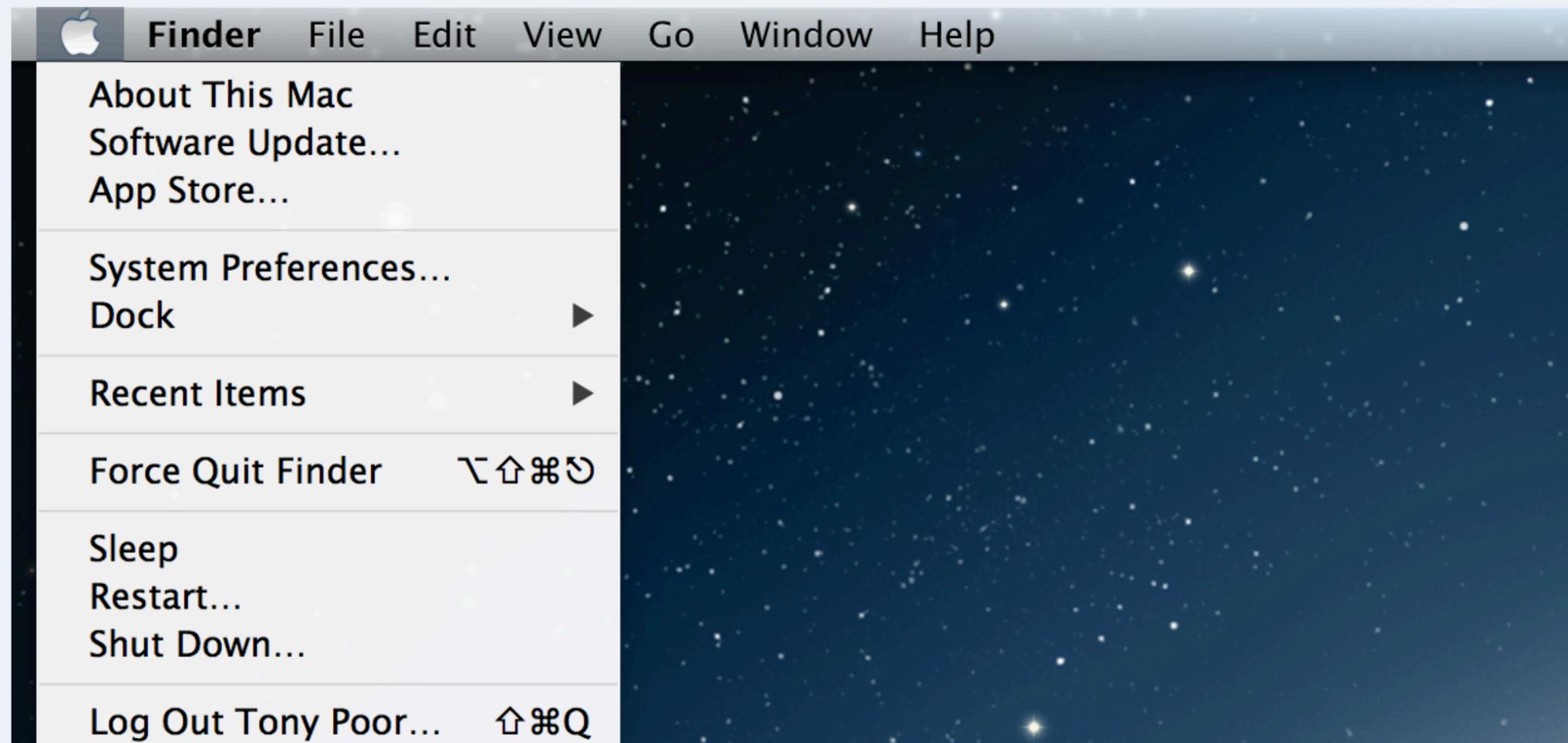
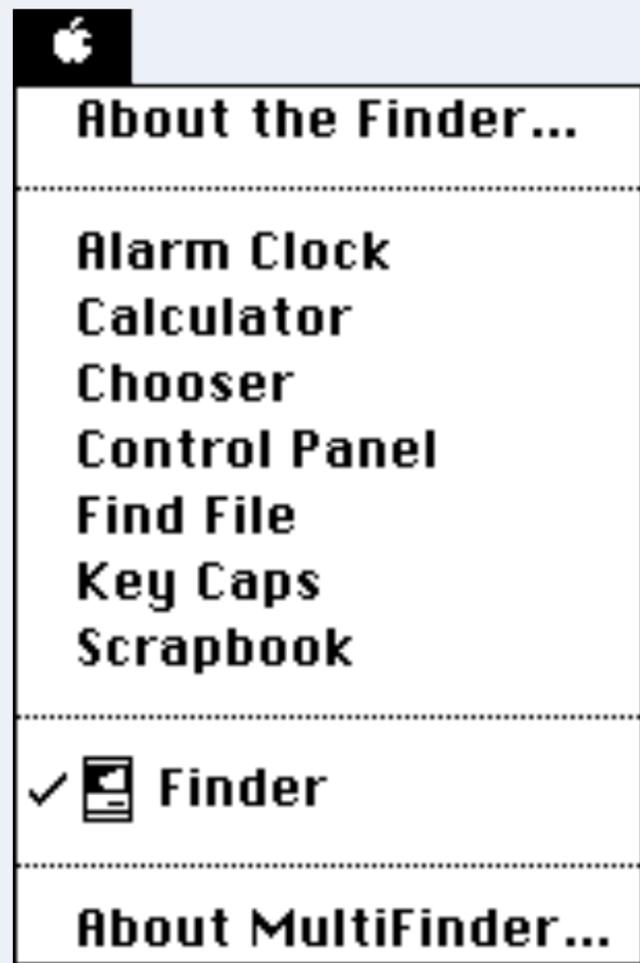
Modes

Quasimodes require the user to maintain some action.



Modes

Quasimodes require the user to maintain some action.



Modes

Some tips:

Try to avoid modality if you can.

Make mode state clear and visible.

Consider quasimodes.

Fitts's Law

$$T = a + b \log_2(1 + D/W)$$

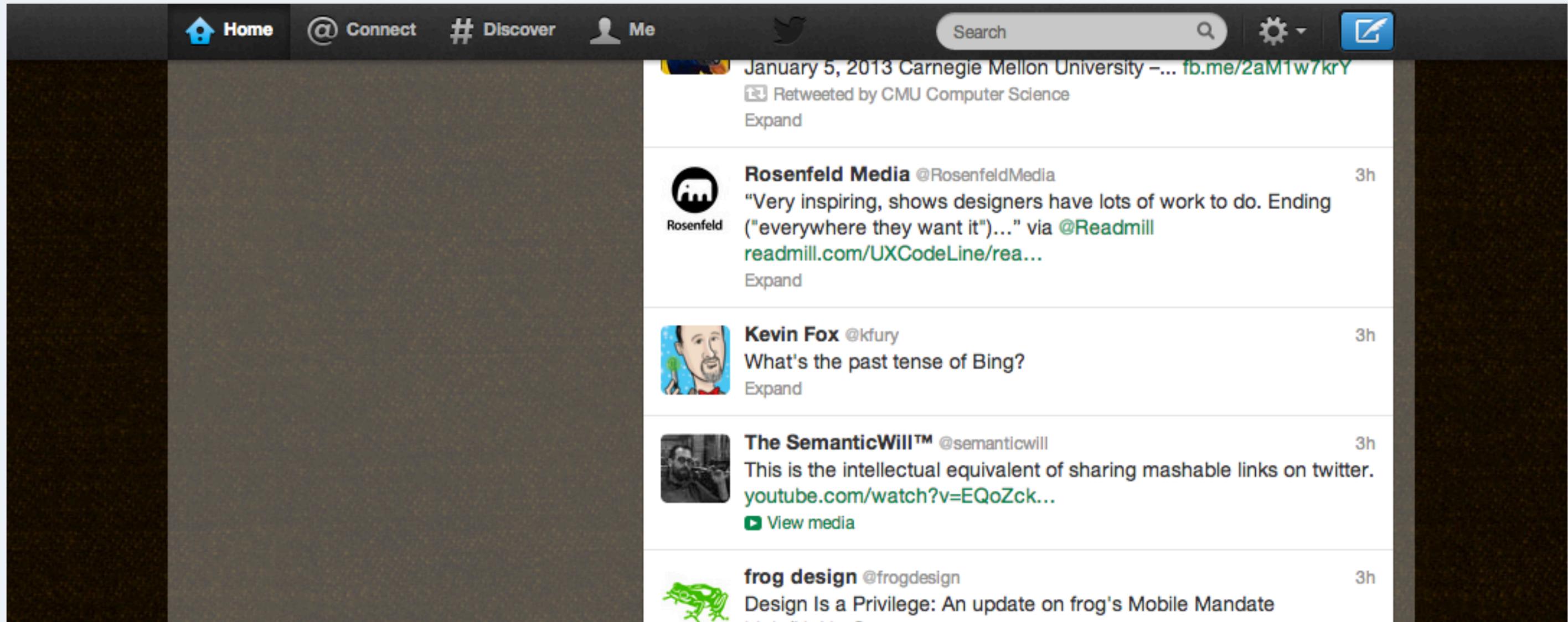
Time Constants Distance Target Width

The diagram shows the equation T = a + b log2(1 + D/W). Below the variables, there are labels and brackets: 'Time' is under 'T'; 'Constants' is under 'a + b' with a bracket; 'Distance' is under 'D'; and 'Target Width' is under 'W'. There are also vertical lines connecting 'T' to 'Time', 'D' to 'Distance', and 'W' to 'Target Width'.

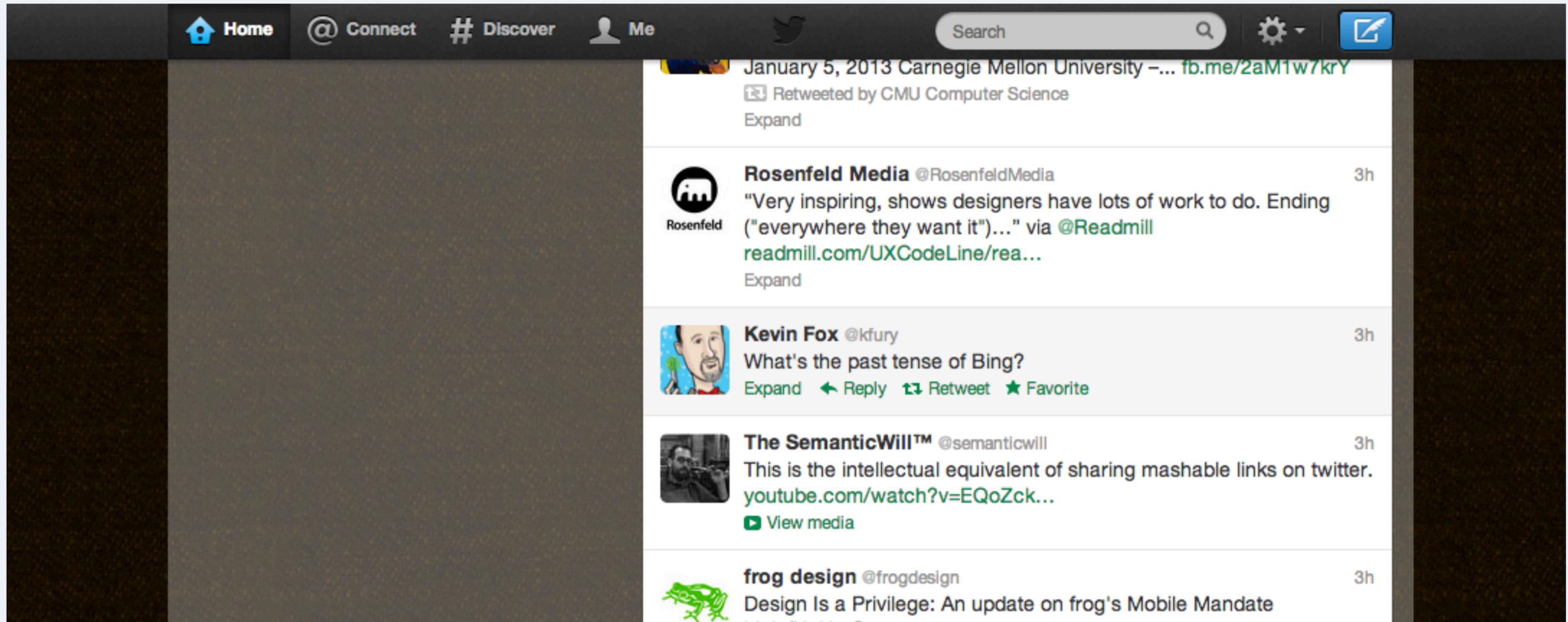
Make your targets bigger. (raise W)

Decrease distance to targets. (lower D)

Fitts's Law



Fitts's Law



display: block;

Hick's Law

$$T = a + b \log_2(n + 1)$$

Time Constants # of Options

The diagram shows the equation T = a + b log2(n + 1). Below the equation, there are three labels: 'Time' under 'T', 'Constants' under 'a + b', and '# of Options' under 'n + 1'. A vertical line connects 'T' to 'Time'. A horizontal bracket with a vertical line in the center connects 'a + b' to 'Constants'. A vertical line connects 'n + 1' to '# of Options'.

3

VISUAL DESIGN

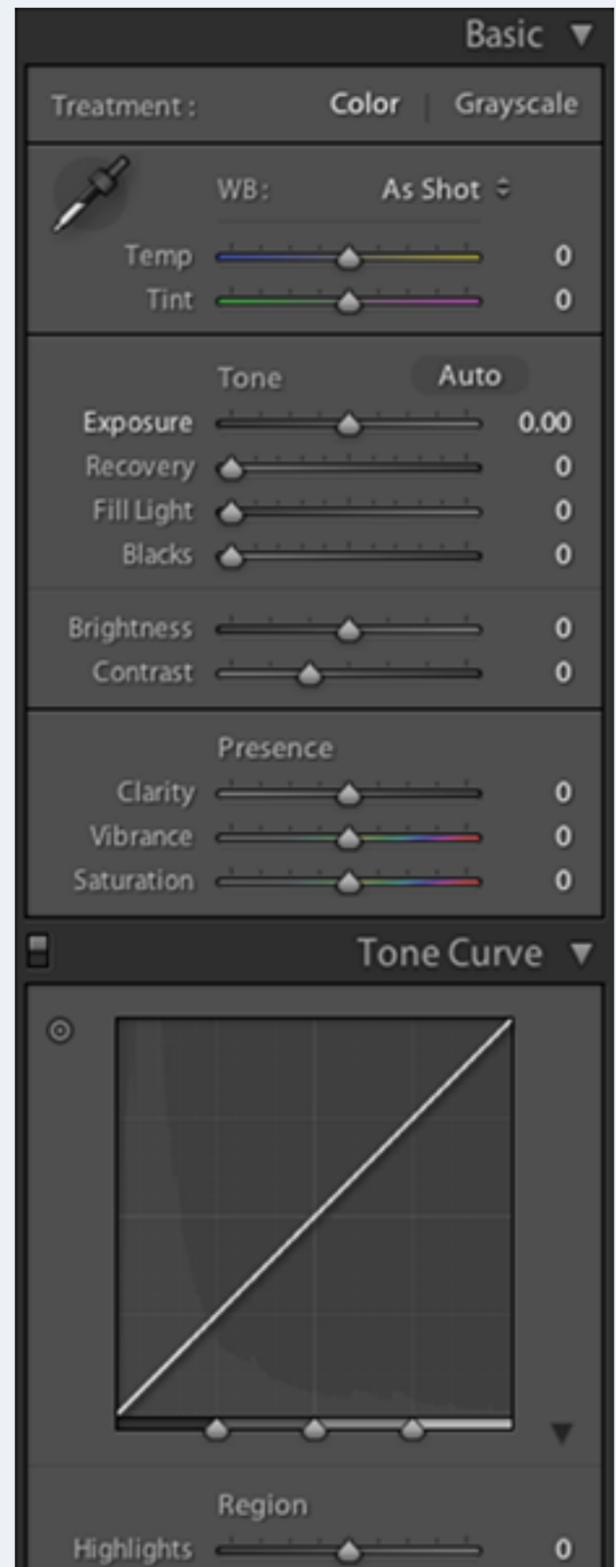
Visual Design

Grids

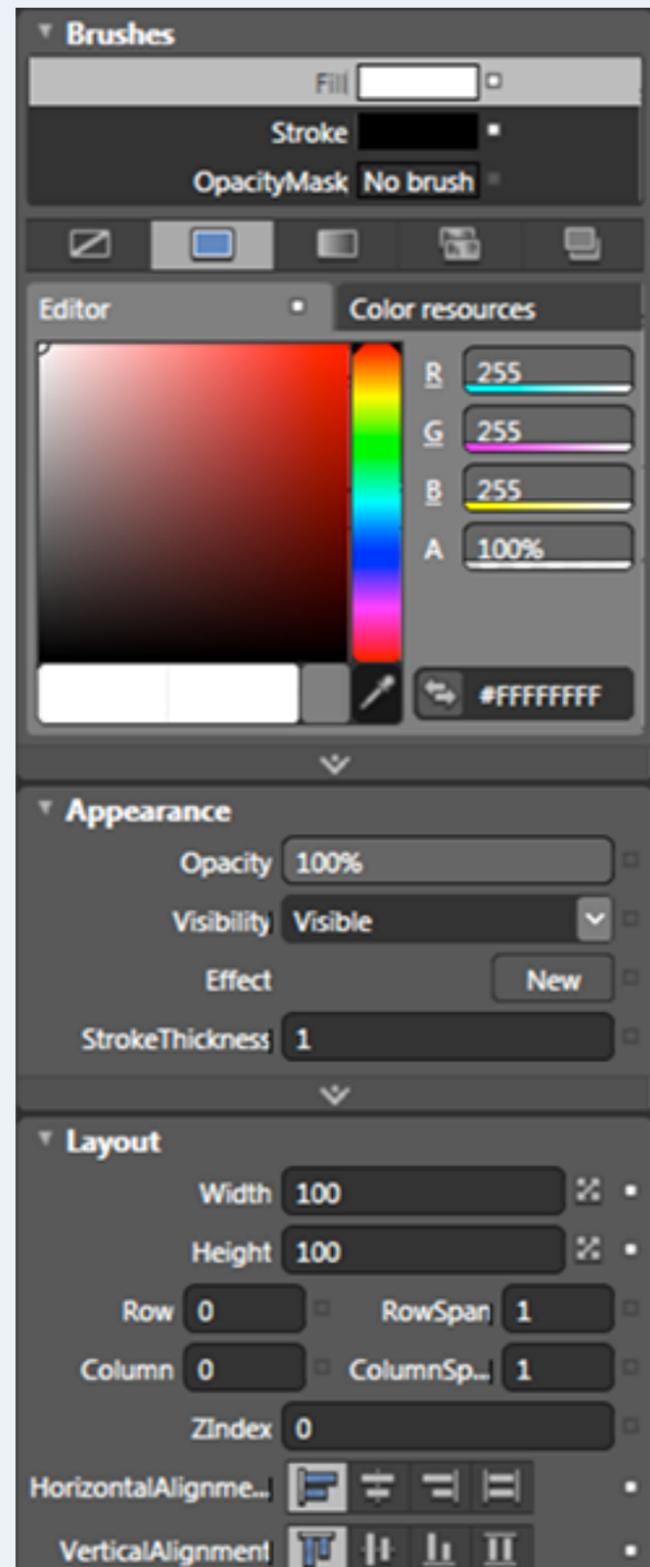
Line stuff up!

Which is harder to process?

Adobe Lightroom

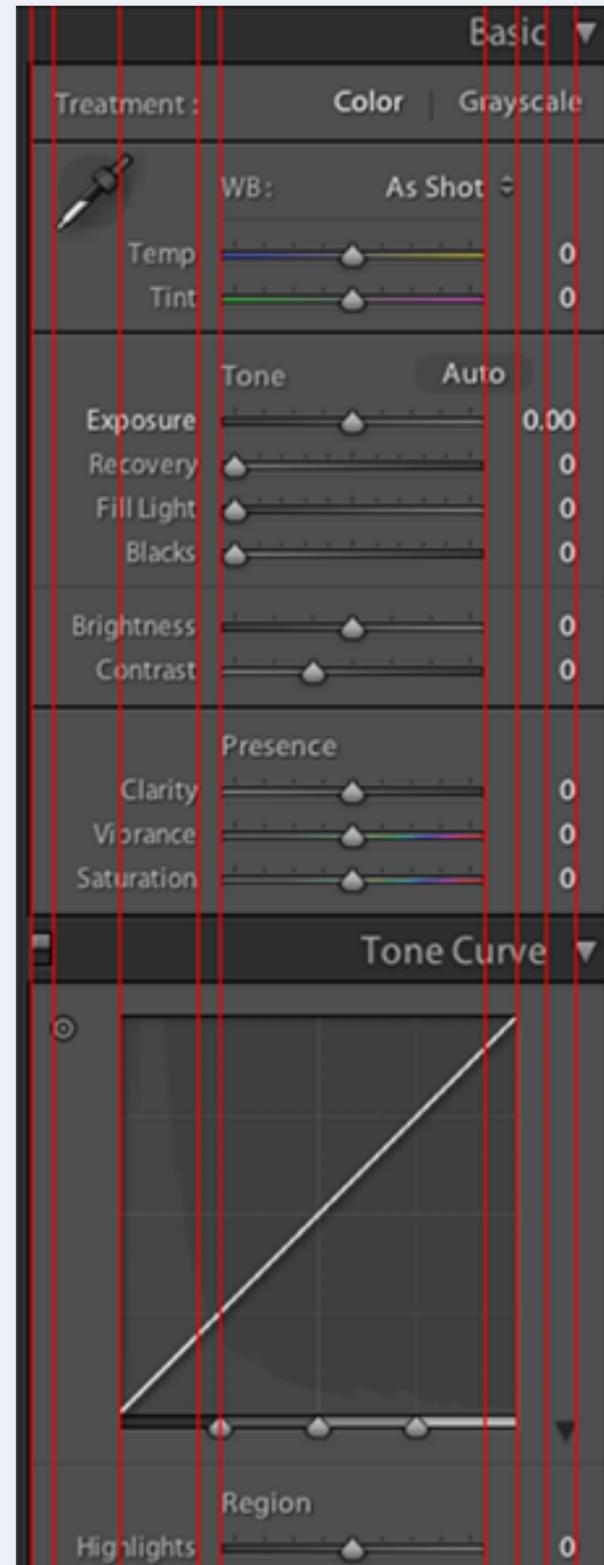


MS Expression Blend

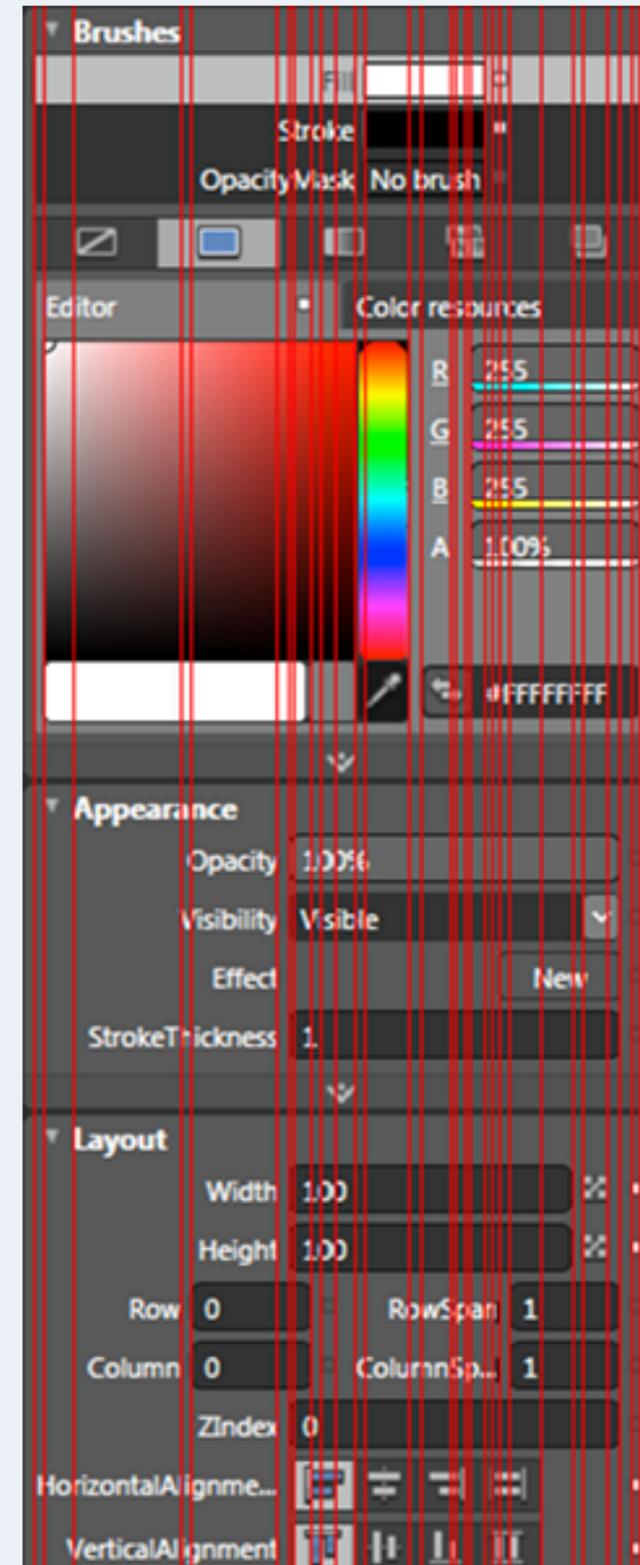


Which is harder to process?

Adobe Lightroom



MS Expression Blend



Subtraction

Version 7.1
Khoi Vinh's Web Site

Search via Google
 Search

Home	Categories	Archives	About	Previous	Next
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January 2013 1 posts	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			01	02	03	04	05
	06	07	08	09	10	11	12
	13	14	15	16	17	18	19
	20	21	22	23	24	25	26
	27	28	29	30	31		

Thu 03 Jan 2013

Melbhattan

★★★★

Happy new year everyone! Let's start things out Down Under, where friend and illustrator Oslo Davis, one of my favorite artists, has put together "**Melbhattan**," a wonderful, animated valentine to his native city of Melbourne. The artwork is distinctively his own, but the short film is "part homage, part pastiche of the opening sequence of Woody Allen's seminal 1979 film 'Manhattan,'" complete with a Gershwin-esque soundtrack. Here are a few select stills.



Ads by the Deck

Help Wanted



Subtraction  Version 7.1
 Khoi Vinh's Web Site

Search via Google

Home	Categories	Archives	About			Previous	Next
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January 2013 1 posts	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
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Thu 03 Jan 2013

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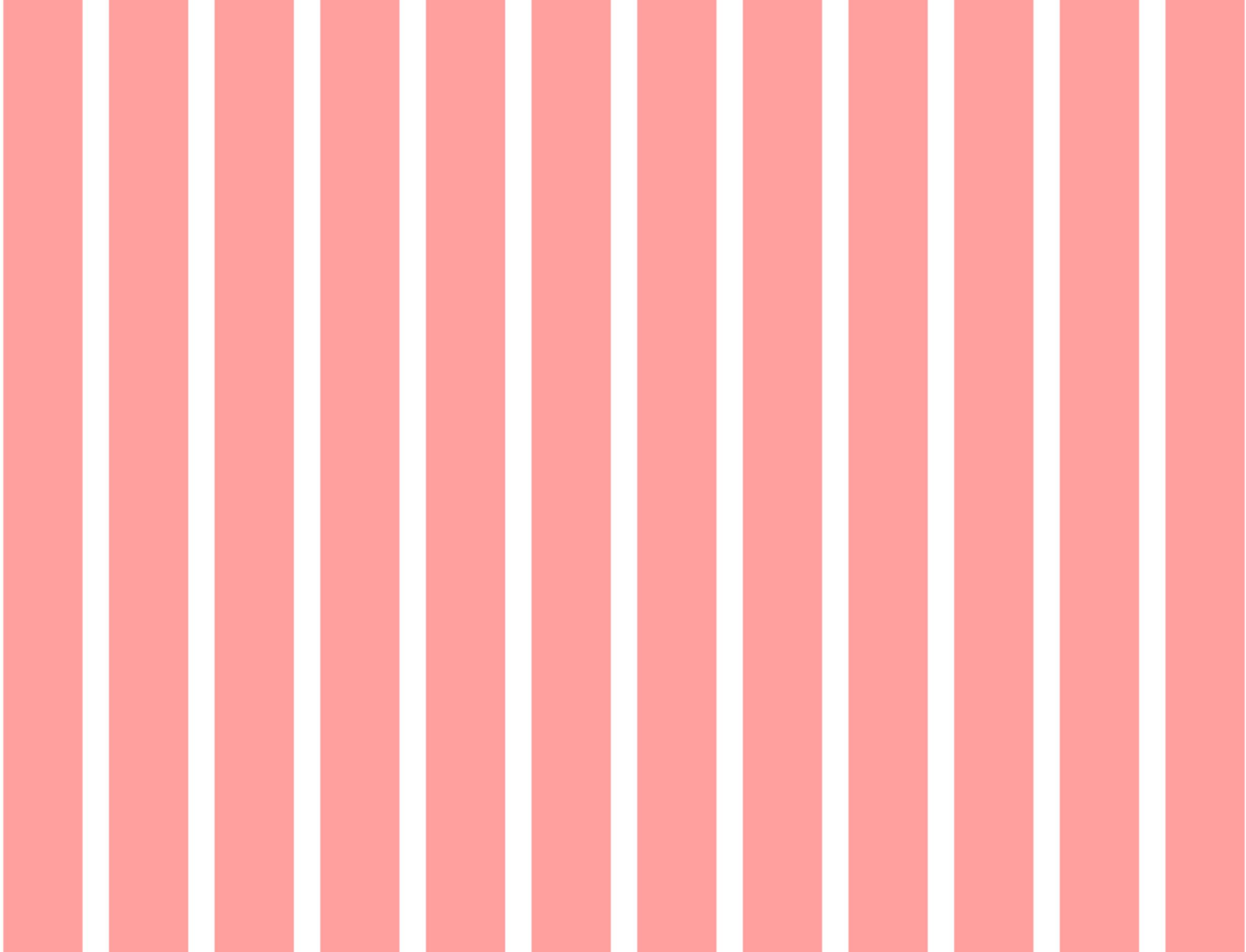
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Ads by the Deck

Help Wanted 

RED Interactive Agency



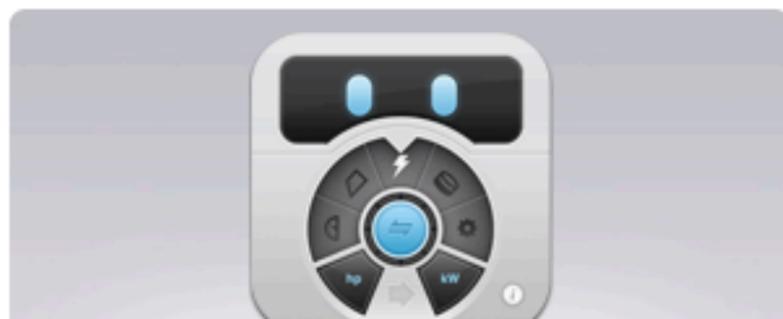


TWEETBOT FOR MAC

Now Available for Mac!

LEARN MORE

← iPhone **TWEETBOT** iPad →
A Twitter Client with Personality.



A Twitter Client with Personality.



WEIGHTBOT
Track your Weight.



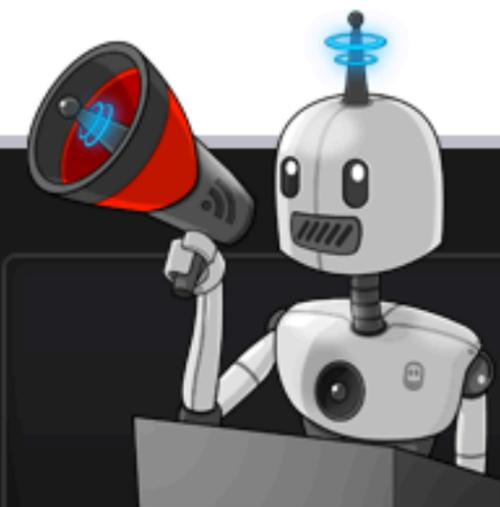
CALCBOT
Calculate Intelligently.



CONVERTBOT
Convert your Units.



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Having trouble with one of our robots? We are here to help.



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WANT THE LATEST TAPBOTS NEWS? JOIN OUR MAILING LIST!

SUBMIT

A Twitter Client with Personality.



WEIGHTBOT
Track your Weight.



CALCBOT
Calculate Intelligently.

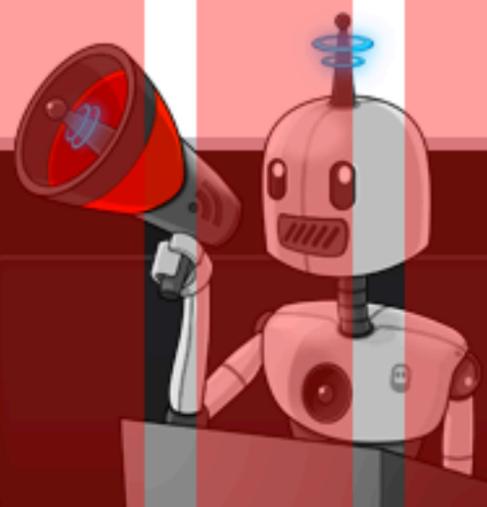


CONVERTBOT
Convert your Units.



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Learn more about Tapbots and the mad scientists behind these apps.



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GET HELP

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Too cool for RSS? Follow us on Twitter to get the latest.

WANT THE LATEST TAPBOTS NEWS? JOIN OUR MAILING LIST!

YOUR EMAIL HERE...

SUBMIT

Visual Design

Grids

Some CSS frameworks for grids (even responsive ones):

960 Grid System

<http://www.960.gs>

Zurb Foundation

<http://foundation.zurb.com/grid.php>

Visual Design

Typography

Choose a typeface that honors your content.

Best resource for web fonts: **Typekit** (typekit.com)
(Google Web Fonts is okay, but average quality is lower)

Try to limit to 1–2 typefaces, and if you don't know where to start, browse “**Recommended for Paragraphs**” on Typekit.

Visual Design

Typography

AaBbCcDd
EeFfGgHh

Freight Sans Pro Light *Light Italic* Book *Book Italic* Medium *Medium Italic*
Semibold Semibold Italic Bold Bold Italic Black Black Italic

Freight Text Pro Light *Light Italic* Book *Book Italic* Medium *Medium Italic*
Semibold Semibold Italic Bold Bold Italic Black Black Italic

One way to pair typefaces is to look for two that are similar structurally, but different in one or two major ways.

This article has some great tips:
<http://blog.typekit.com/2012/05/23/type-study-pairing-typefaces/>

Typography Tip #1

Keep line length manageable.

The house stood on a slight rise just on the edge of the village. It stood on its own and looked over a broad spread of West Country farmland. Not a remarkable house by any means—it was about thirty years old, squattish, squarish, made of brick, and had four windows set in the front of a size and proportion which more or less exactly failed to please the eye.



too long!

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A good rule of thumb: **45–75 characters.**
(66 is ideal.)

Typography Tip #2

Choose an appropriate line height (“leading”).

The house stood on a slight rise just on the edge of the village. It stood on its own and looked over a broad spread of West Country farmland. Not a remarkable house by any means—it was about thirty years old, squattish, squarish, made of brick, and had four windows set in the front of a size and proportion which more or less exactly failed to please the eye.

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line-height: 1.2 is the standard, but tweak if you need to.

Typography Tip #3

Use smart quotes!



“

‘

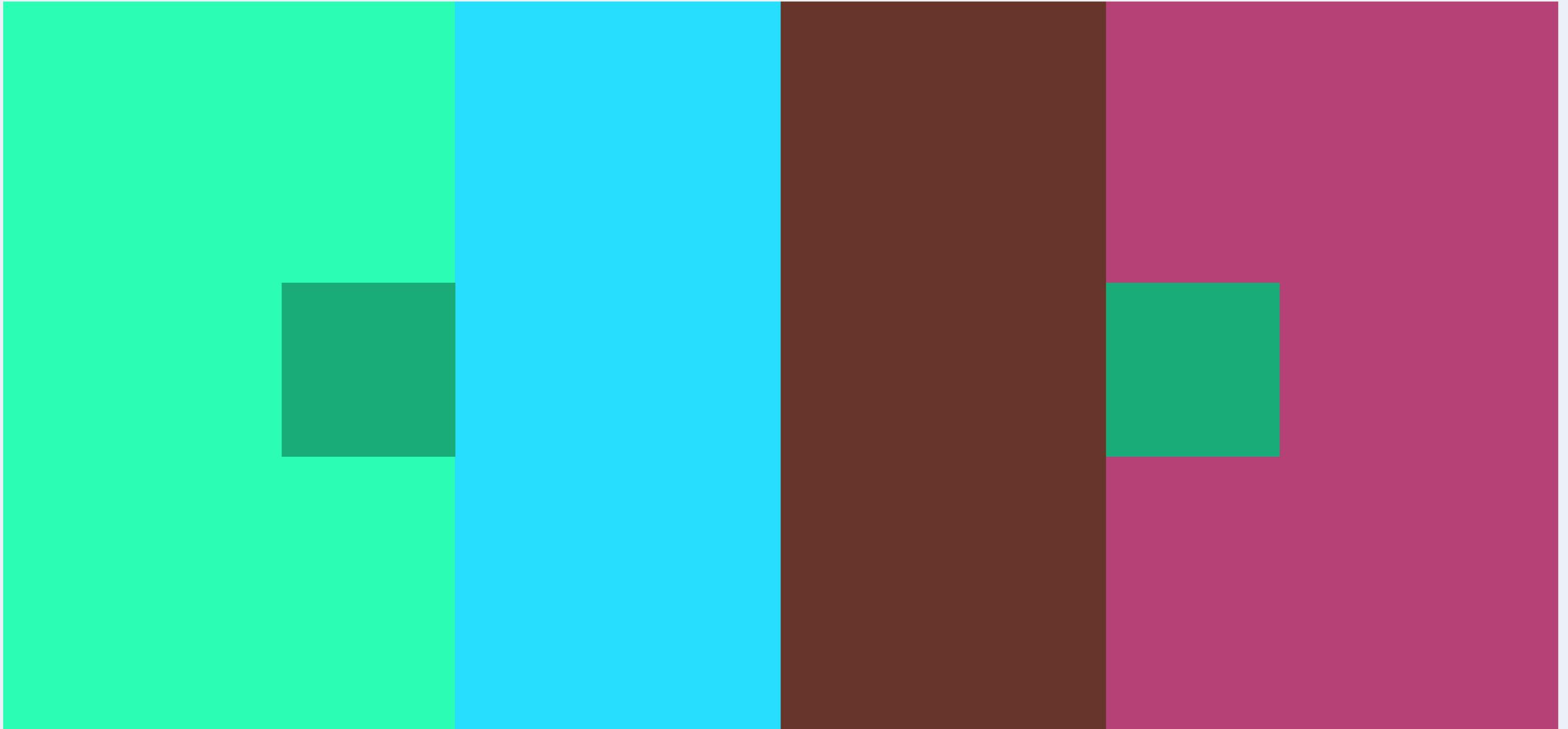
’

”

dumb quotes

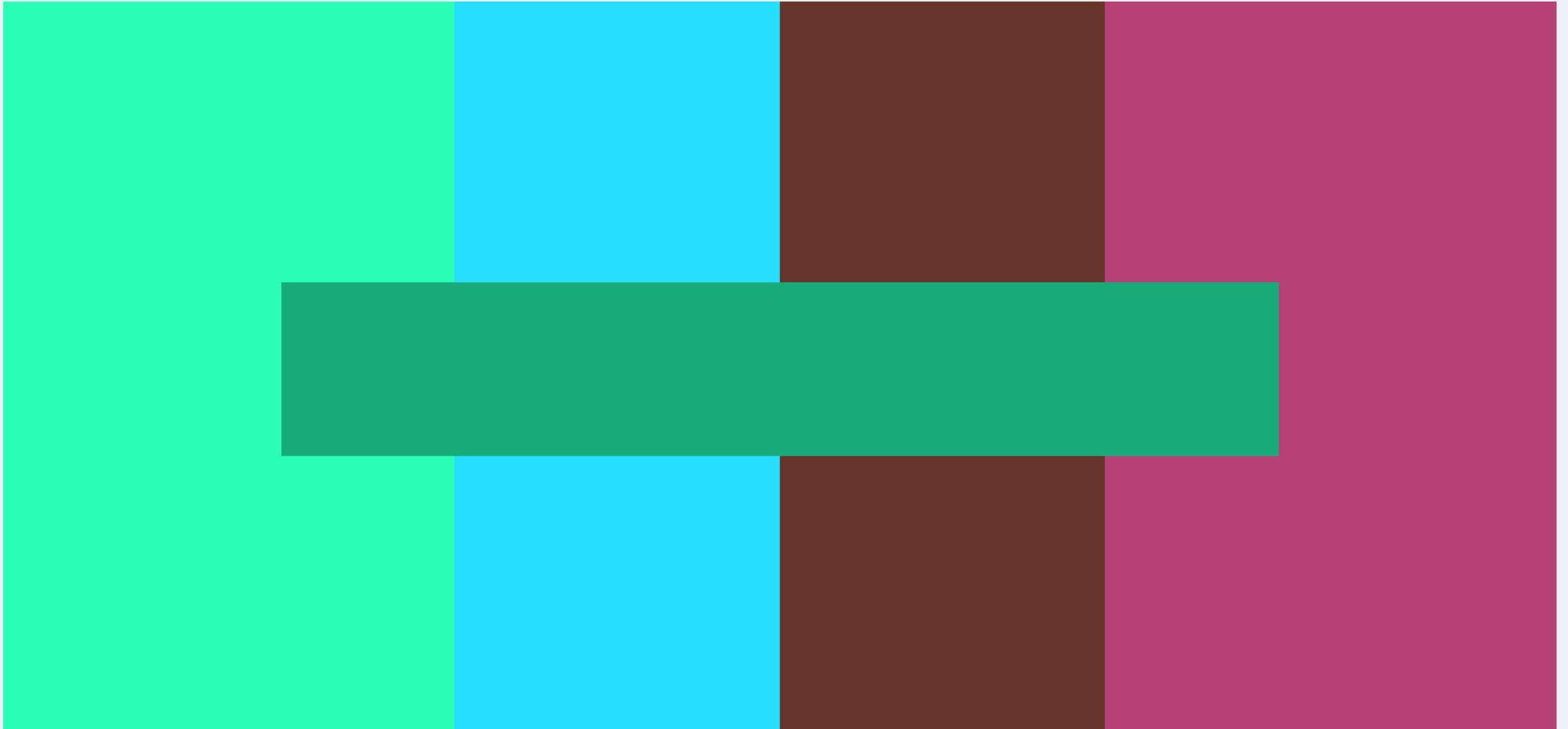
Visual Design

Color



Visual Design

Color



Visual Design

Color



Visual Design

Color

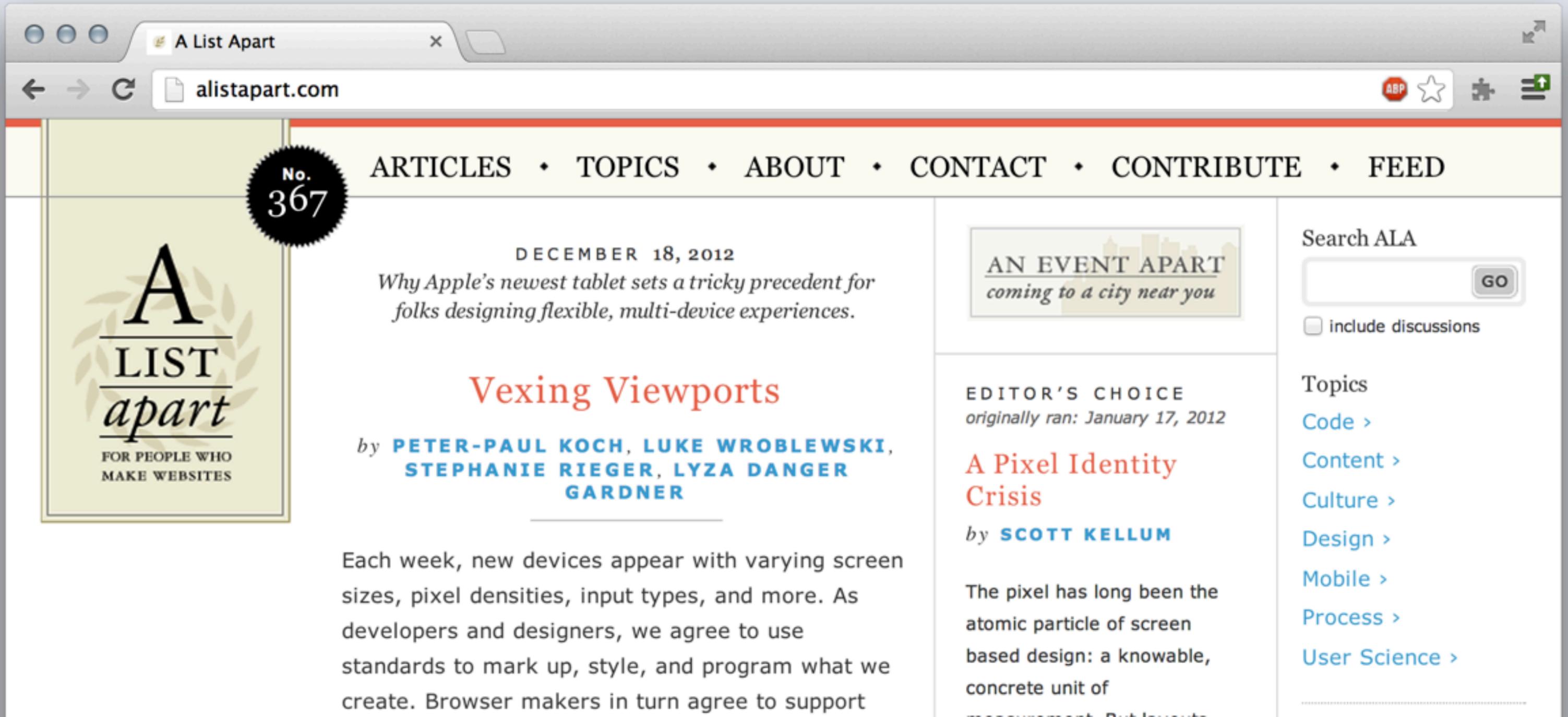
Color exploration resources:

Adobe Kuler
Colourlovers

kuler.adobe.com
colourlovers.com

Color Tip #1

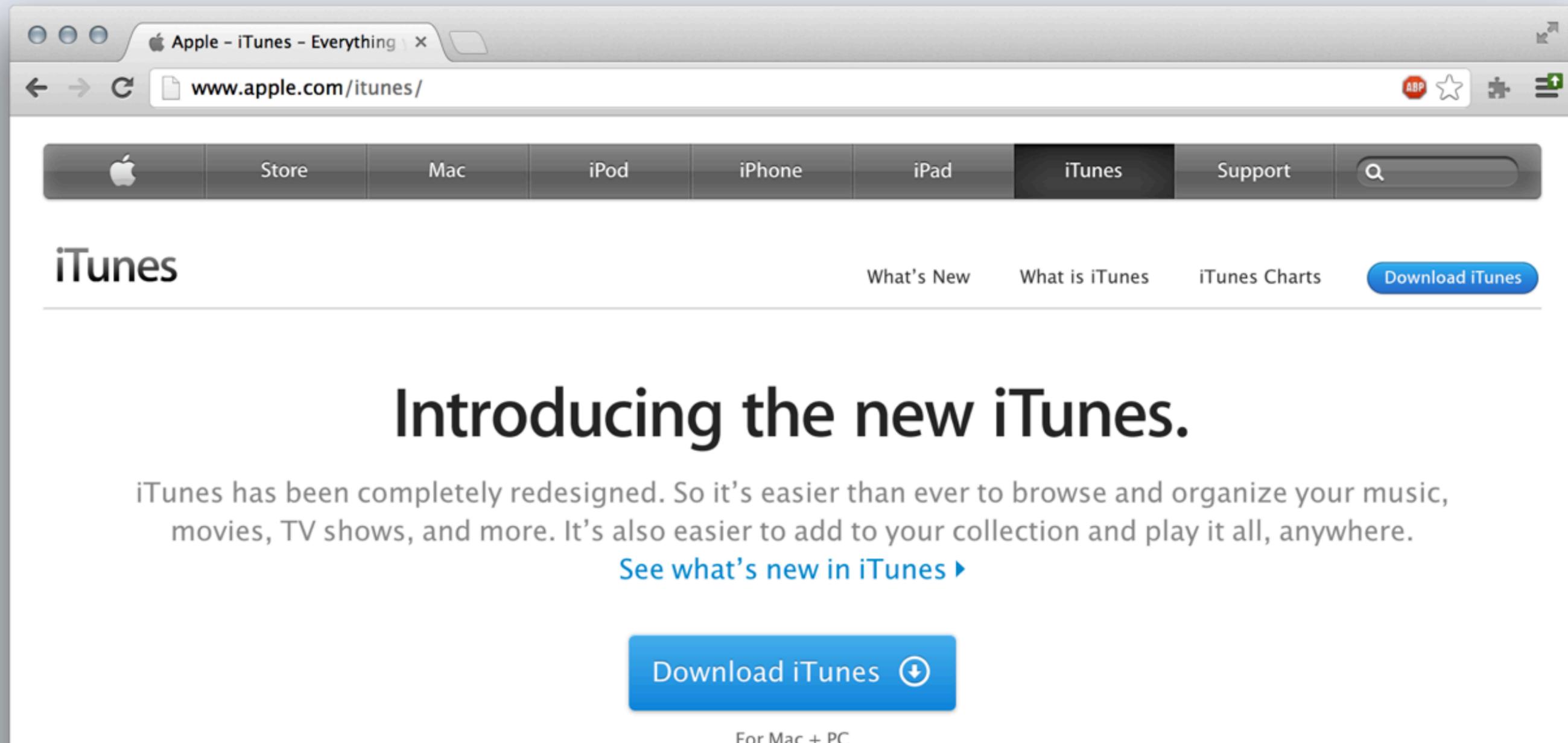
Limit your color palette.



The screenshot shows a web browser window with the URL `alistapart.com`. The page features a navigation bar with links: [ARTICLES](#) • [TOPICS](#) • [ABOUT](#) • [CONTACT](#) • [CONTRIBUTE](#) • [FEED](#). A badge on the left indicates 'No. 367'. The main content area displays the date 'DECEMBER 18, 2012' and the article title 'Vexing Viewports' by Peter-Paul Koch, Luke Wroblewski, Stephanie Rieger, Lyza Danger Gardner. The article text begins: 'Each week, new devices appear with varying screen sizes, pixel densities, input types, and more. As developers and designers, we agree to use standards to mark up, style, and program what we create. Browser makers in turn agree to support'. A sidebar on the right includes a search box for 'Search ALA', a 'GO' button, and a list of topics: [Code >](#), [Content >](#), [Culture >](#), [Design >](#), [Mobile >](#), [Process >](#), and [User Science >](#). There is also an 'EDITOR'S CHOICE' section for 'A Pixel Identity Crisis' by Scott Kellum.

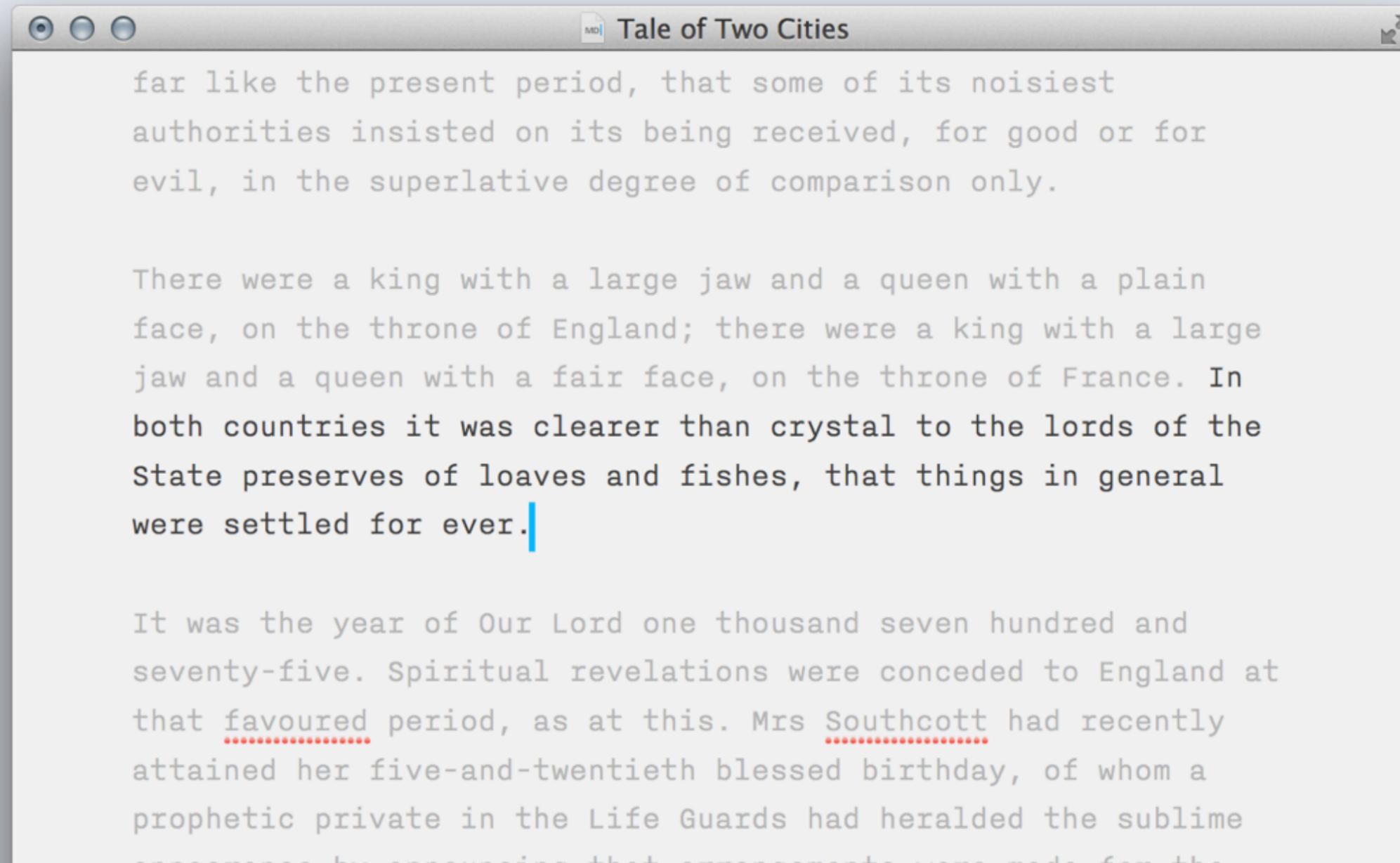
Color Tip #2

Use high contrast to draw attention and low contrast for less important elements.



Color Tip #2

Use high contrast to draw attention and low contrast for less important elements.



Color Tip #3

Try not to use pure black on pure white (or vice versa).

It was the best of times, it was the worst of times, it was the age of wisdom, it was the age of foolishness, it was the epoch of belief, it was the epoch of incredulity, it was the season of Light, it was the season of Darkness, it was the spring of hope, it was the winter of despair, we had everything before us, we had nothing before us, we were all going direct to Heaven, we were all going direct the other way—in short, the period was so far like the present period, that some of its noisiest authorities insisted on its being received, for good or for evil, in the superlative degree of comparison only.

Color Tip #3

Try not to use pure black on pure white (or vice versa).

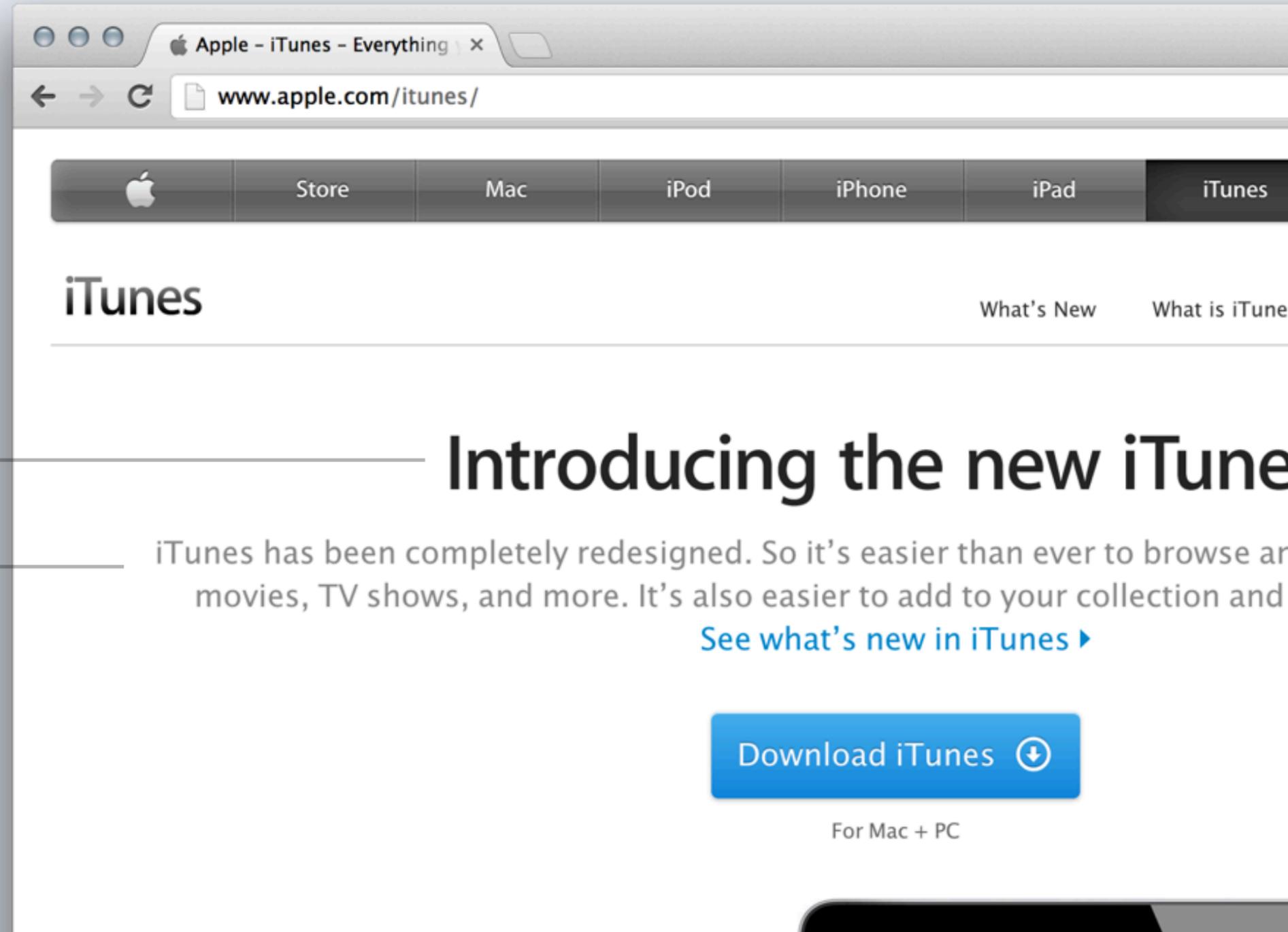
It was the best of times, it was the worst of times, it was the age of wisdom, it was the age of foolishness, it was the epoch of belief, it was the epoch of incredulity, it was the season of Light, it was the season of Darkness, it was the spring of hope, it was the winter of despair, we had everything before us, we had nothing before us, we were all going direct to Heaven, we were all going direct the other way—in short, the period was so far like the present period, that some of its noisiest authorities insisted on its being received, for good or for evil, in the superlative degree of comparison only.

Color Tip #3

Try not to use pure black on pure white (or vice versa).

#252525

#888888



Color Tip #4

Be aware of color blindness.

The screenshot shows the TurboHearts Tracker website interface. At the top, there is a navigation bar with the logo 'TURBO HEARTS TRACKER', a 'DASHBOARD' link, a 'LEAGUE' link, a profile picture, and a 'PROFILE' link. A 'Logout' button and a search bar are also present. The main content area starts with a 'WELCOME BACK, DAN' message and a link to 'View my profile'. Below this, a status message indicates the user is in 1st place with \$126. The 'RECENT GAMES' section features a table with columns for dates and player performance. The 'TOP PLAYERS' section lists the top three players with their current scores and bar charts. A line graph on the right shows the performance trends of the top players over time.

TURBO HEARTS TRACKER [DASHBOARD](#) [LEAGUE](#) [PROFILE](#) Logout

WELCOME BACK, DAN

[View my profile »](#)

You are currently in **1st place** with **\$126** in your league!

RECENT GAMES

[Add a Game](#)

Date	Player	Score	Points	Player	Score	Points	Player	Score	Points	Player	Score	Points
12/21	Dan Cervelli	+\$20	-5pts	Todd Weber	+\$5	2pts	Eric Anderson	+\$0	11pts	Eric Porter	-\$25	5pts
12/20	Todd Weber	+\$15	-8pts	Dan Cervelli	+\$5	-5pts	Eric Anderson	-\$5	6pts	Eric Porter	-\$15	5pts
12/10	Dan Cervelli	+\$20	-5pts	Todd Weber	+\$5	2pts	Eric Anderson	+\$0	11pts	Eric Porter	-\$25	5pts
12/9	Todd Weber	+\$15	-8pts	Eric Anderson	+\$5	-5pts	Dan Cervelli	-\$5	6pts	Eric Porter	-\$15	5pts
12/8	Dan Cervelli	+\$20	-5pts	Todd Weber	+\$5	2pts	Eric Anderson	+\$0	11pts	Eric Porter	-\$25	5pts

TOP PLAYERS

	DAN CERVELLI		\$126
	TODD WEBER		\$82
	ERIC ANDERSON		\$15

Color Tip #4

Be aware of color blindness.

TURBO HEARTS TRACKER | DASHBOARD | LEAGUE | PROFILE | Logout

WELCOME BACK, DAN

You are currently in **1st place** with **\$126** in your league!

RECENT GAMES

Date	Player 1	Score	Player 2	Score	Player 3	Score	Player 4	Score
12/21	Dan Cervelli	+\$20 -5pts	Todd Weber	+\$5 2pts	Eric Anderson	+\$0 11pts	Eric Porter	-\$25 5pts
12/20	Todd Weber	+\$15 -8pts	Dan Cervelli	+\$5 -5pts	Eric Anderson	-\$5 6pts	Eric Porter	-\$15 5pts
12/10	Dan Cervelli	+\$20 -5pts	Todd Weber	+\$5 2pts	Eric Anderson	+\$0 11pts	Eric Porter	-\$25 5pts
12/9	Todd Weber	+\$15 -8pts	Eric Anderson	+\$5 -5pts	Dan Cervelli	-\$5 6pts	Eric Porter	-\$15 5pts
12/8	Dan Cervelli	+\$20 -5pts	Todd Weber	+\$5 2pts	Eric Anderson	+\$0 11pts	Eric Porter	-\$25 5pts

TOP PLAYERS

Rank	Player	Score
1	DAN CERVELLI	\$126
2	TODD WEBER	\$82
3	ERIC ANDERSON	\$15

Close-up of game results table:

Player	Score	Points
Eric Porter	-\$25	5pts
Eric Porter	-\$15	5pts
Eric Porter	-\$25	5pts
Eric Porter	-\$15	5pts

Close-up of player performance bar charts:

- DAN CERVELLI: 10 green bars, 2 red bars
- TODD WEBER: 8 green bars, 2 red bars
- ERIC ANDERSON: 4 green bars, 4 red bars

Visual Design

Iconography

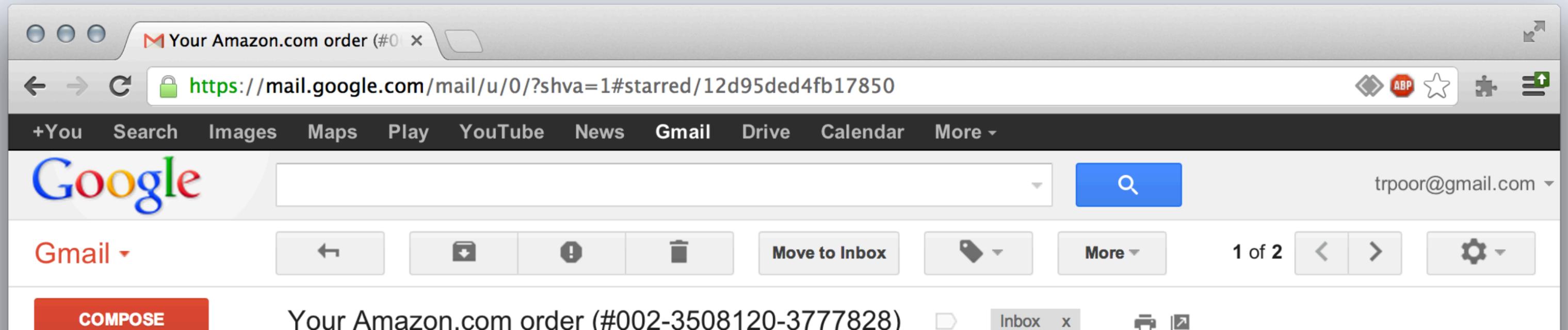
Icons can aid recognition vs. recall and make information more digestible.

Visual Design

Iconography

Icons can aid recognition vs. recall and make information more digestible.

...but avoid relying solely on them when you can.



www.glyphicons.com



...the more honest, truthful answer to
pretty much any question on web design
and usability [is] *it depends.*

Jeremy Keith

Author of HTML5 for Web Designers

Q&A

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