

# 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**

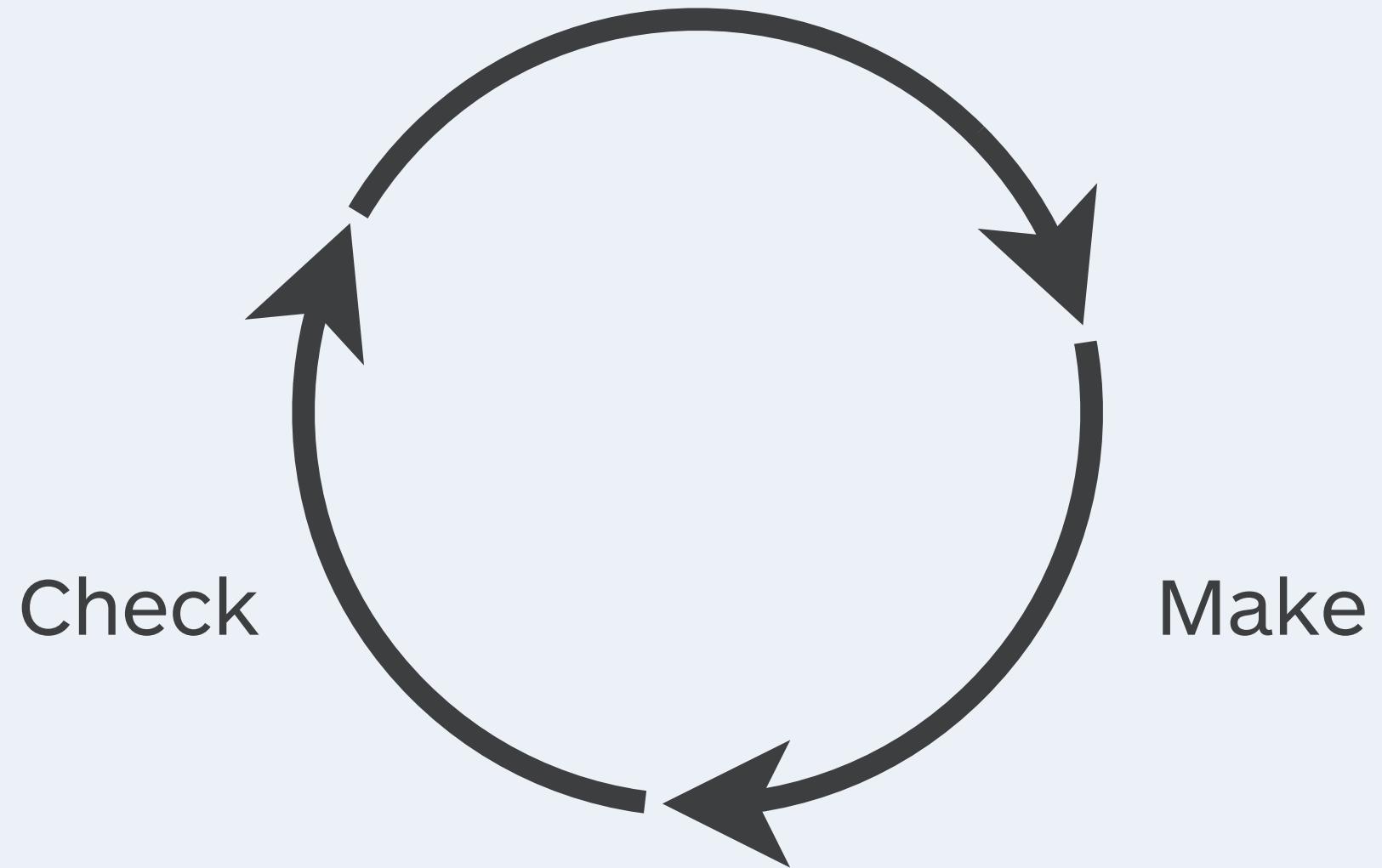
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1

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# PROCESS

Think

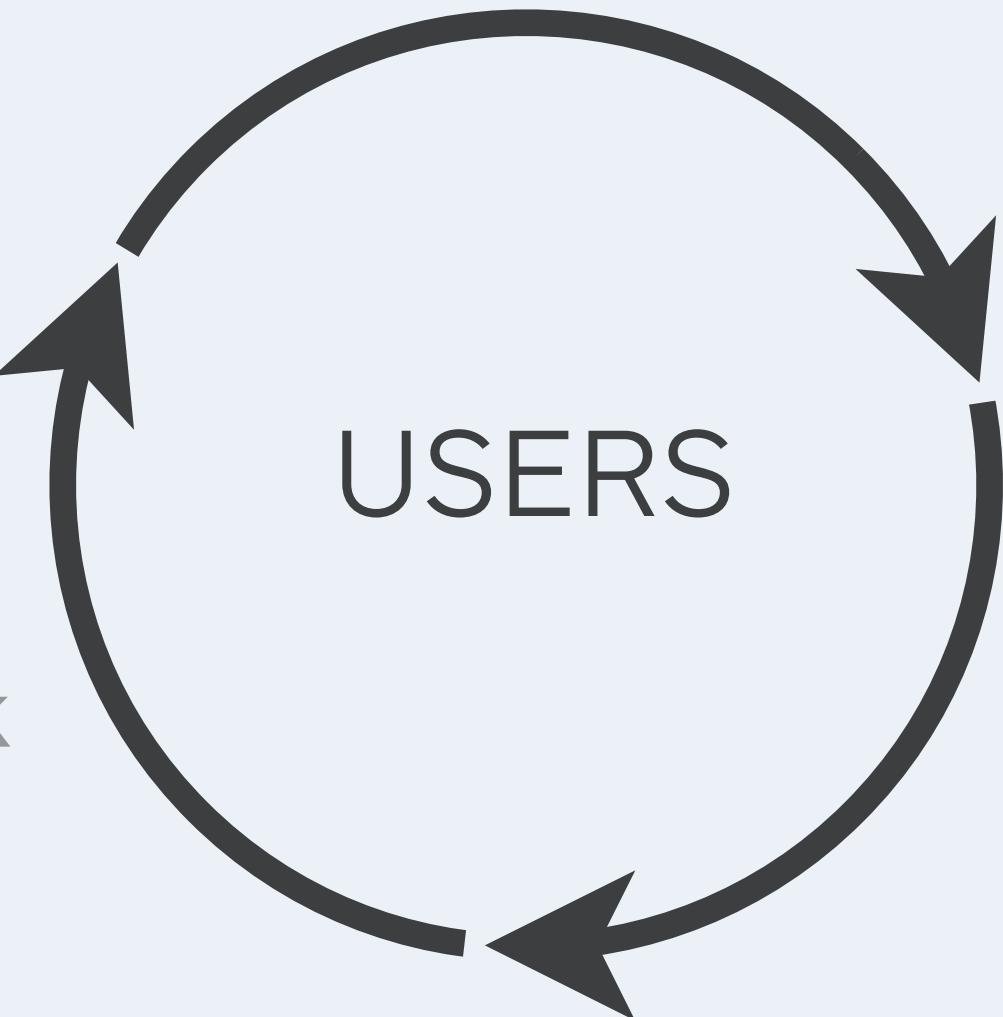


Think

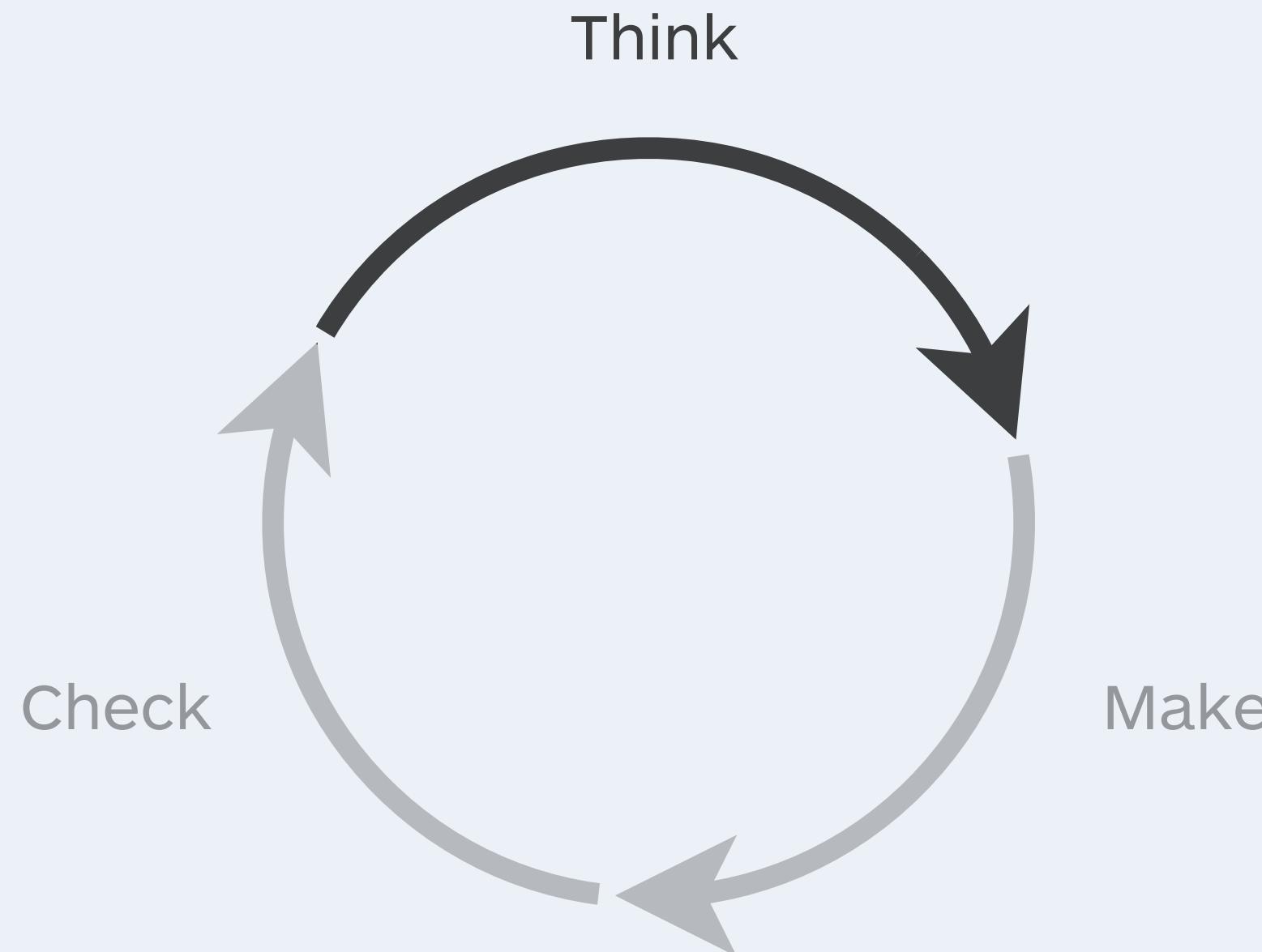
USERS

Check

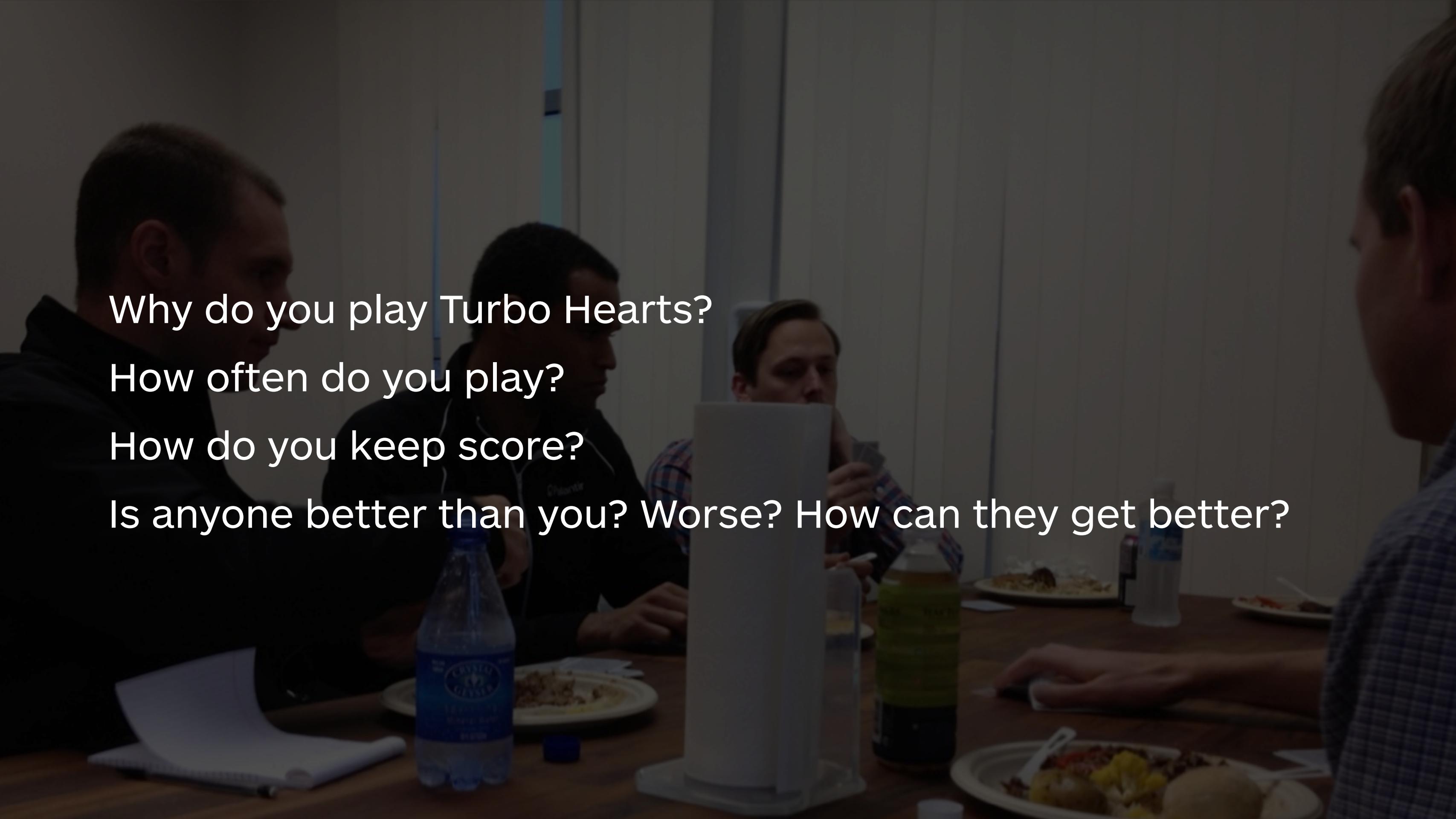
Make



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





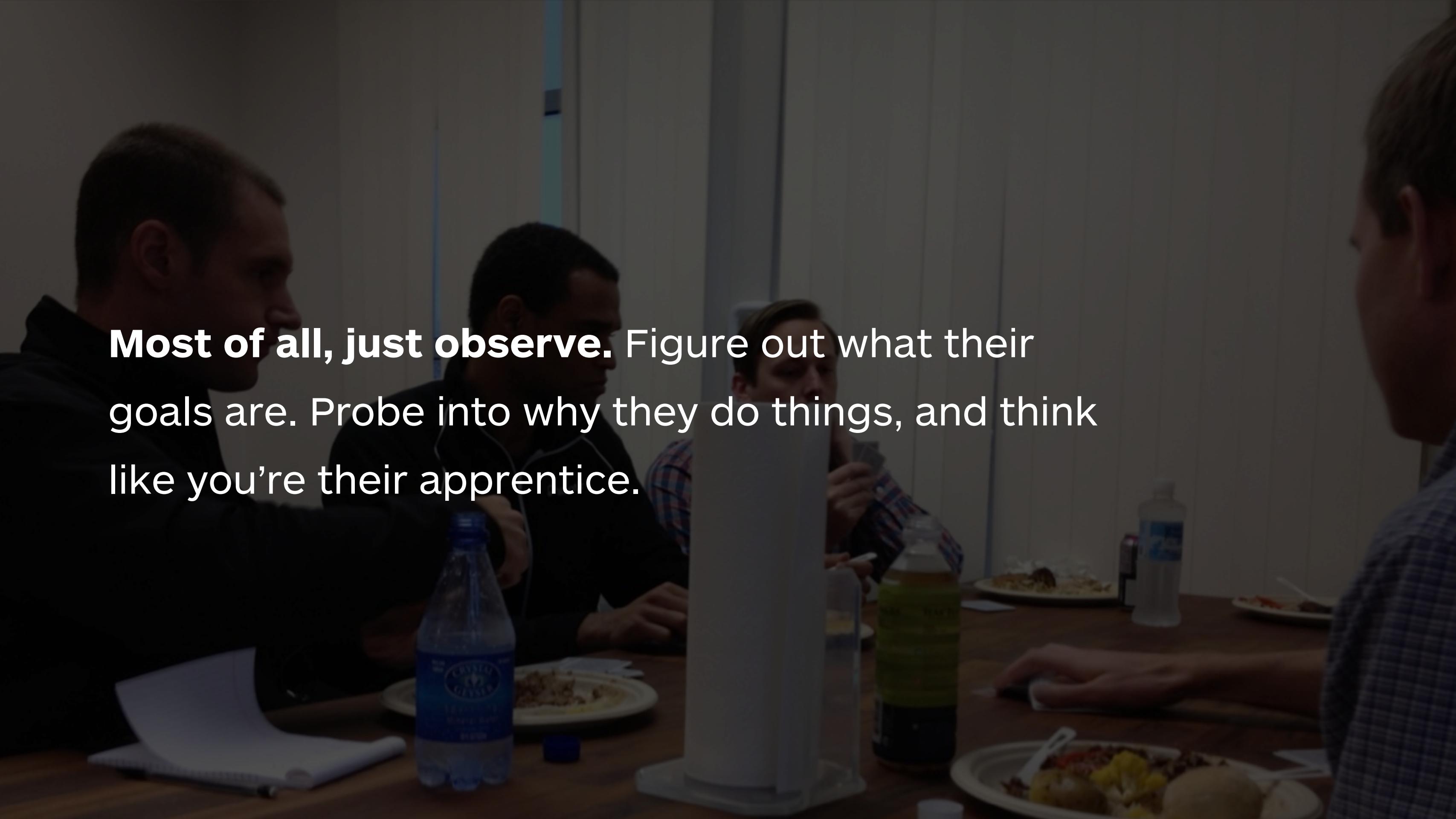
A photograph of four men sitting around a wooden table. They appear to be in a casual setting, possibly a break room or a restaurant. On the table, there are plates of food, glasses, and a bottle of water. One man in the center is holding up a large sheet of paper, likely a menu or a document, which is partially visible. The lighting is warm and the overall atmosphere is relaxed.

Why do you play Turbo Hearts?

How often do you play?

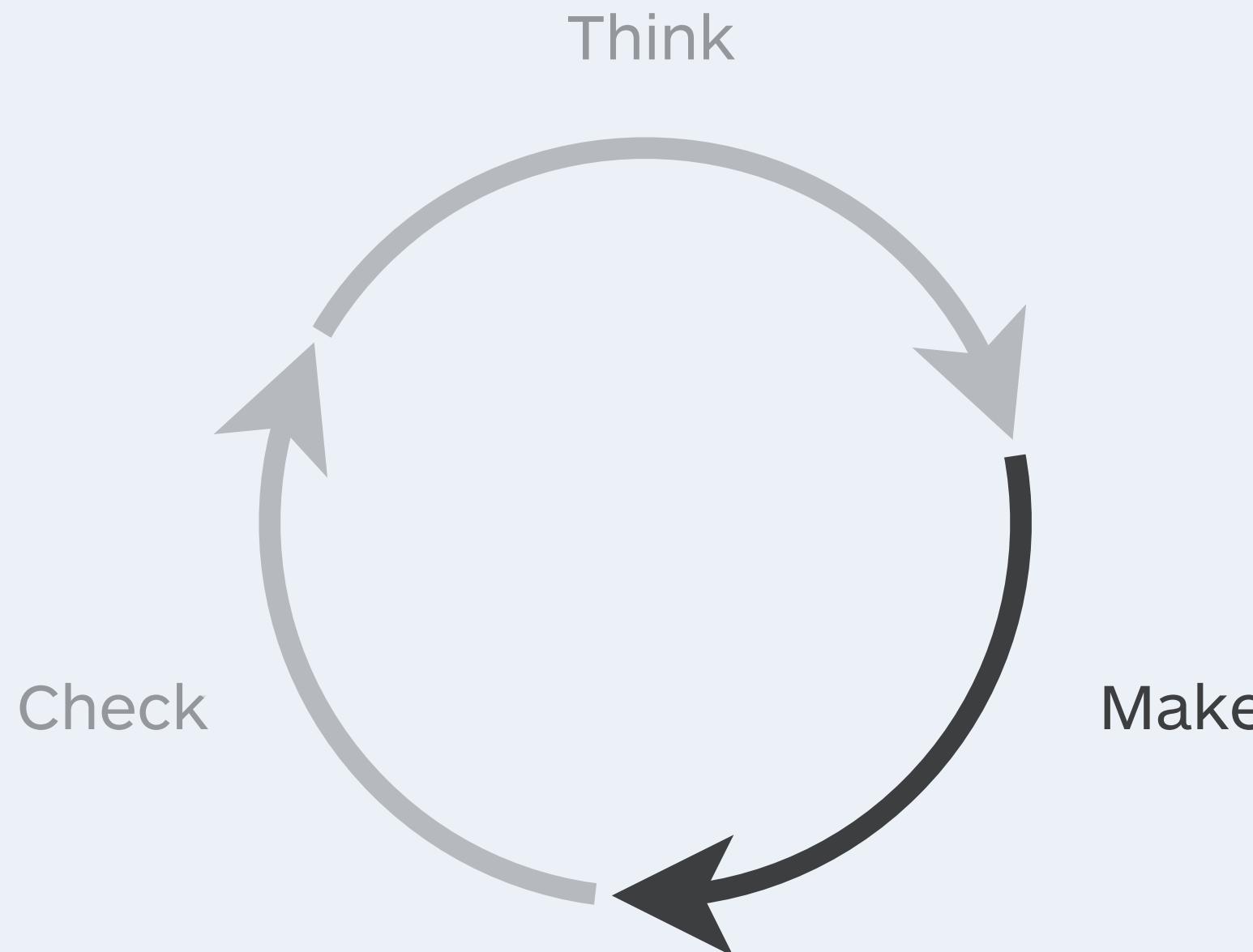
How do you keep score?

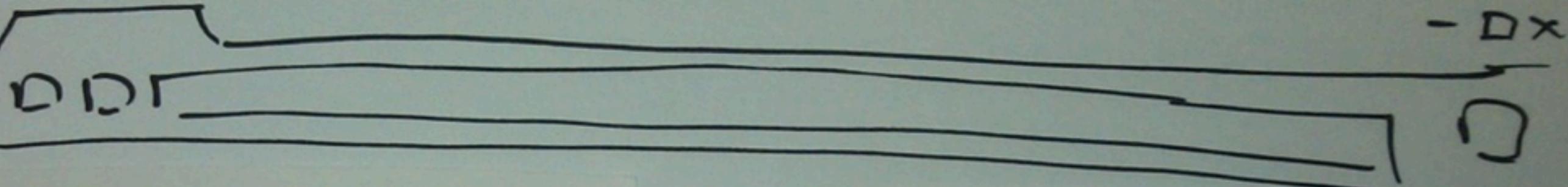
Is anyone better than you? Worse? How can they get better?

A photograph of a group of people sitting around a wooden dining table, engaged in a meal. There are several plates of food, glasses, and bottles on the table. The scene is set indoors with warm lighting.

**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.**





## TURBO HEARTS SCORE TRACKER

Track your score, improve  
your game.

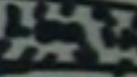
**Start Tracking!**

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

Search for a player

### Recent Games

12/21	<u>Dan</u> -5	<u>Todd</u> 12	<u>Allen</u> 30	<u>Tom</u> 34
12/20	<u>Todd</u> 5	<u>Dan</u> 7	<u>Tom</u> 20	<u>Allen</u> 25
12/17	<u>Tom</u> 20	<u>Todd</u> 22	<u>Allen</u> 30	<u>Tom</u> 24

username	password
<input type="text"/>	<input type="password"/> 

### Recent Tips

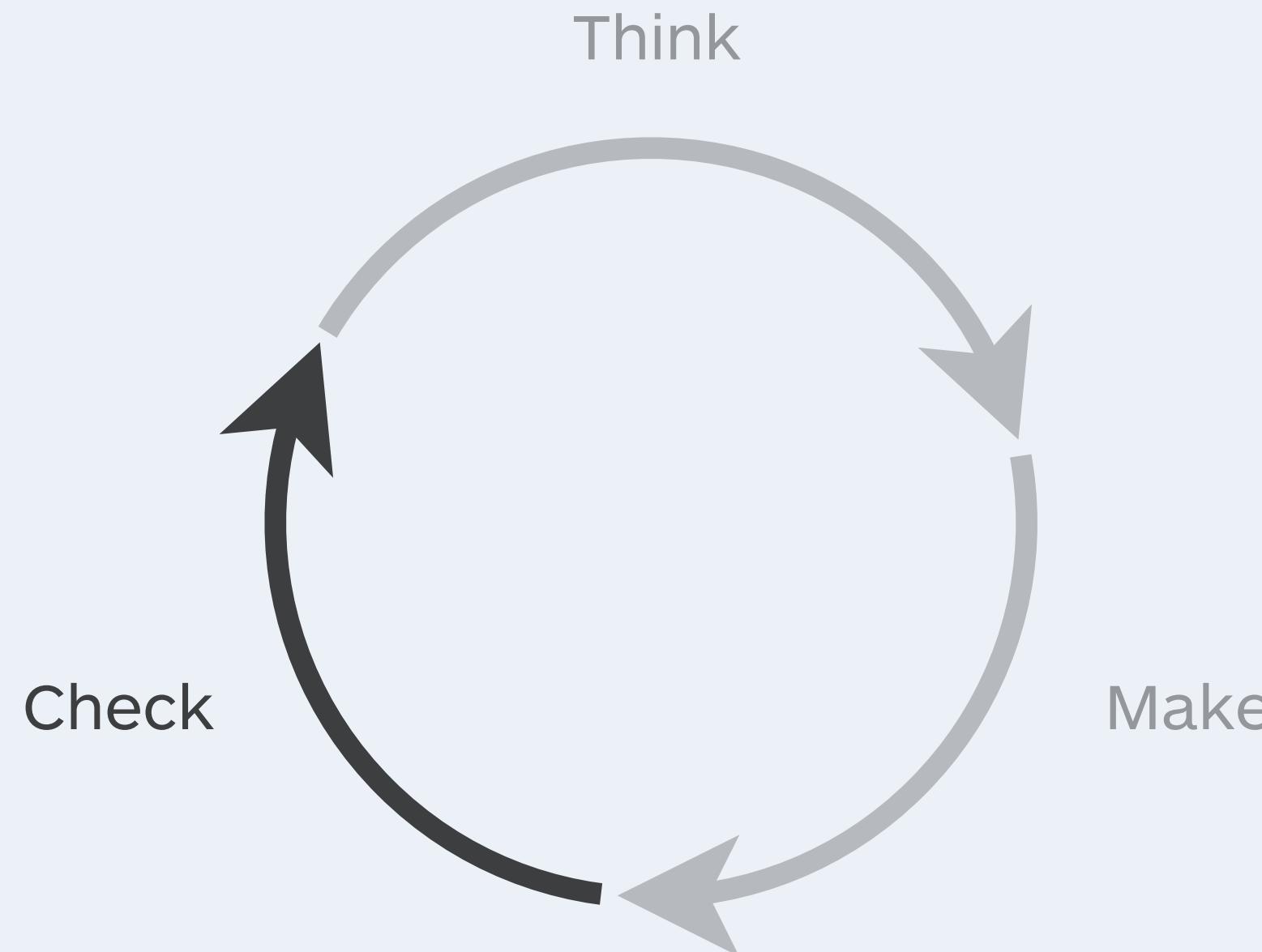
Dan - don't lead with the Qm,  
it gives everyone too much  
information.

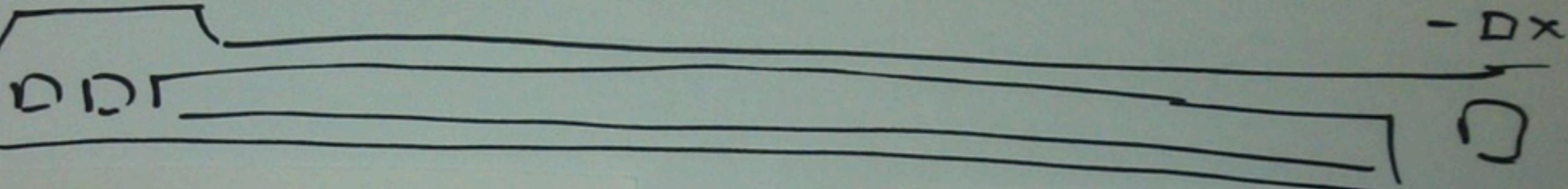
Register or Log In to reply

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

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.





## TURBO HEARTS SCORE TRACKER

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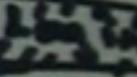
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<input type="text"/>	<input type="password"/> 

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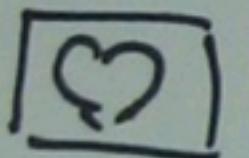
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# TURBO HEARTS SCORE TRACKER



Jon Chu

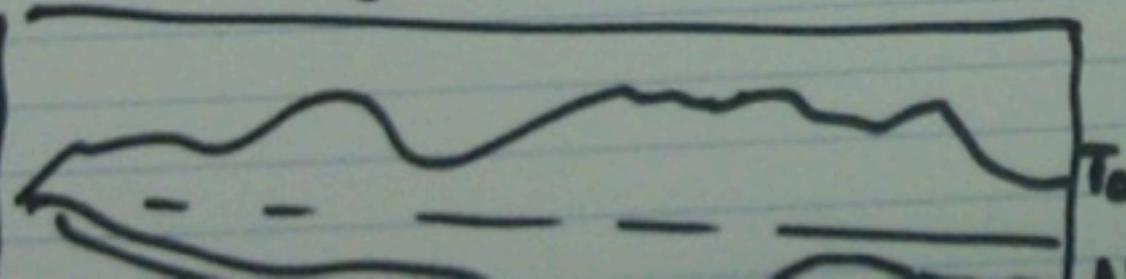
edit profile

## Recent Games

New game:	Player 1	Player 2	Player 3	Player 4
12/15	<u>Todd</u> : 17	<u>Allan</u> : 20	<u>Jon</u> : 22	<u>Erik</u> : 35
12/10	<u>Dan</u> : 5	<u>Todd</u> : 22	<u>EA</u> : 23	<u>Jon</u> : 20

## Leagues

Defective league only view



Logged in as Jon Chu  
Go to Dashboard

Log out

## Recent Tips

Dan - don't hang with the Qm, it gives everyone too much information.

Write a comment

Write a tip

DDT

## TURBO HEARTS SCORE TRACKER

Logged in as Jon Chu  
Go to Dashboard

Log out

Make sure they know you're testing the interface, not them.

Ask them to **think aloud** as they go.

"What do you expect to see when you click on that?"

"What do you see on this page?"

If they ask you a question, reverse it.

Dan - don't log with the Qn,  
it gives everyone too much  
information

Write a comment

Write a HP

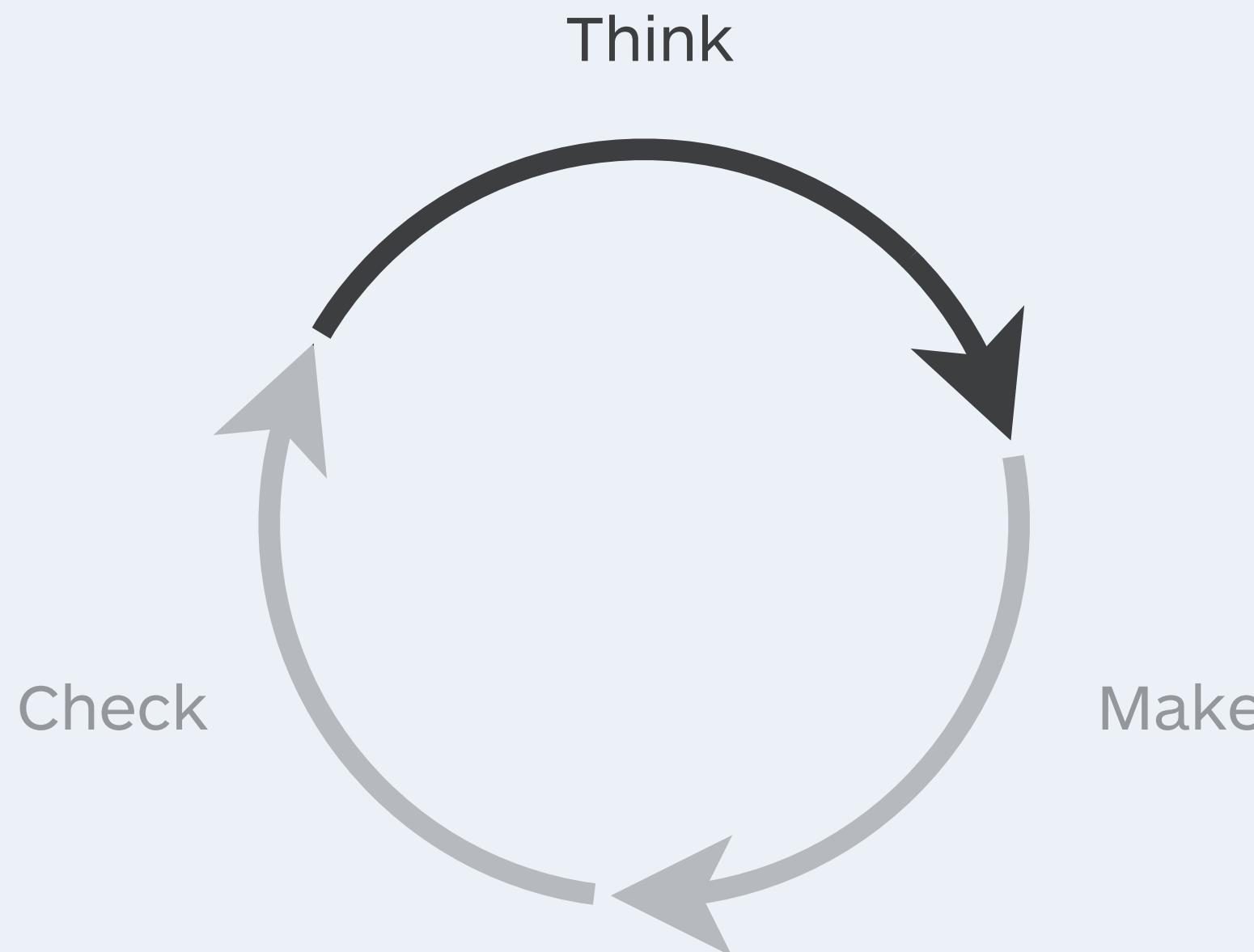
Leagues

Defunkt league only view

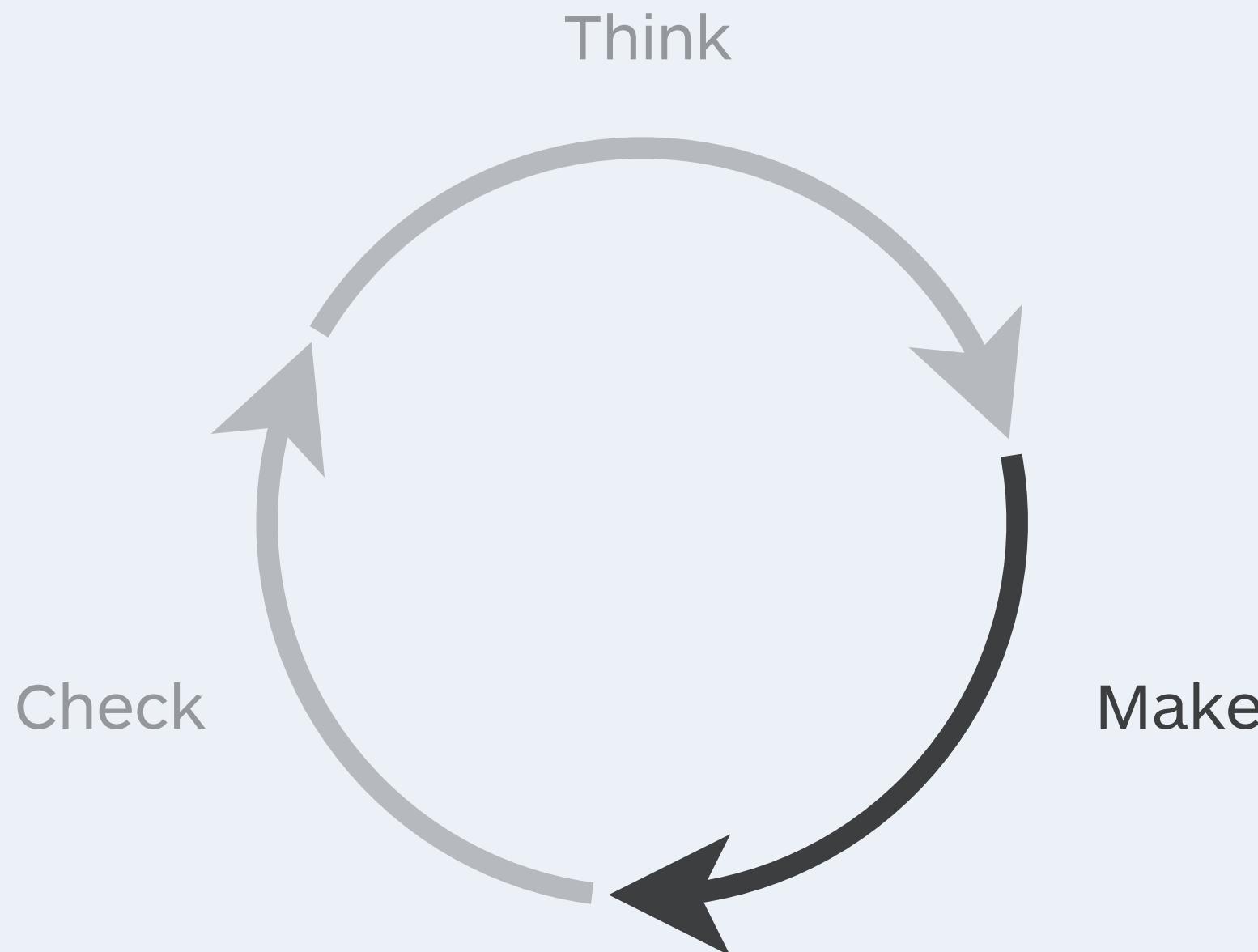
Todd

All

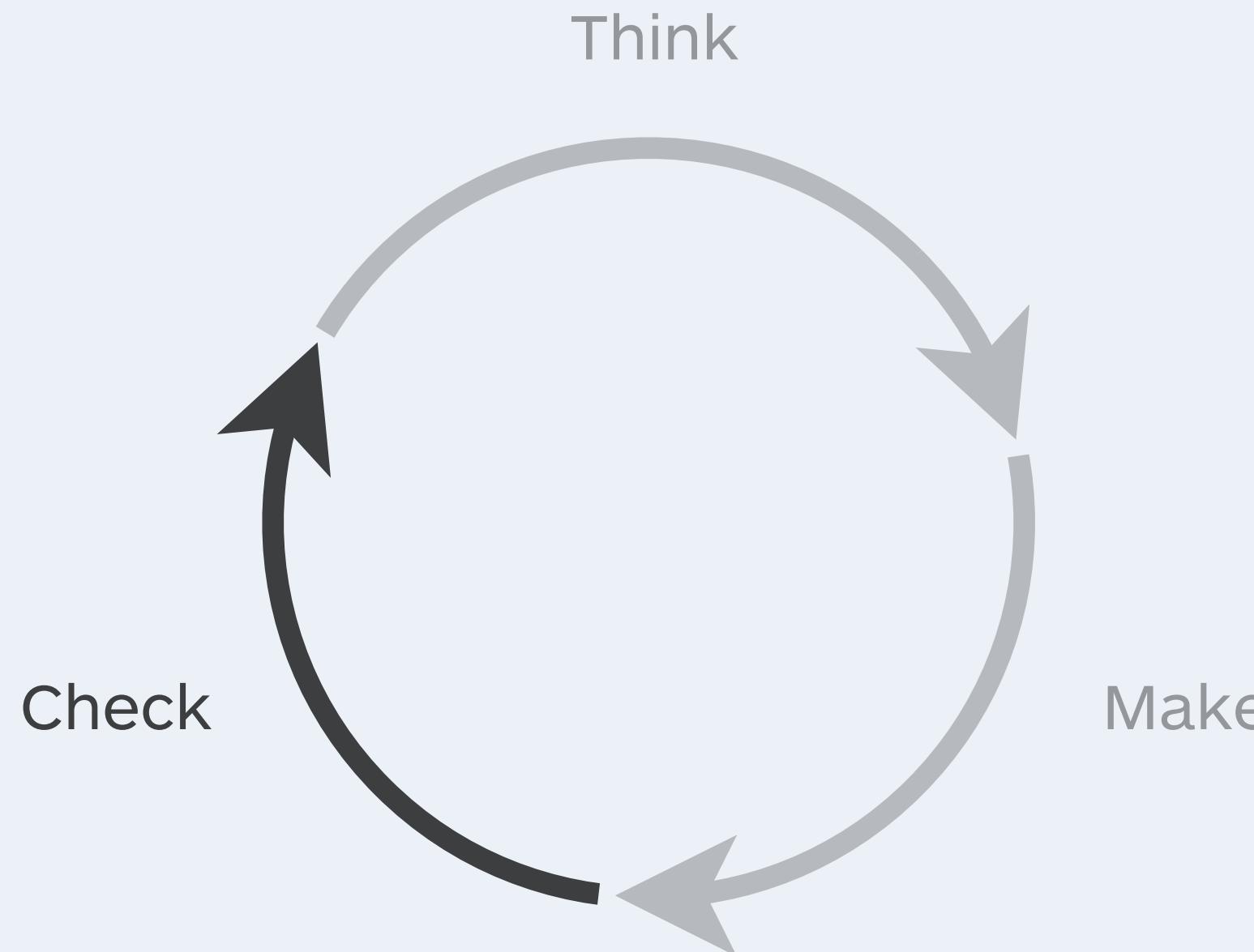
Were there any problems? Did we learn anything new about our users? What could we improve?



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



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



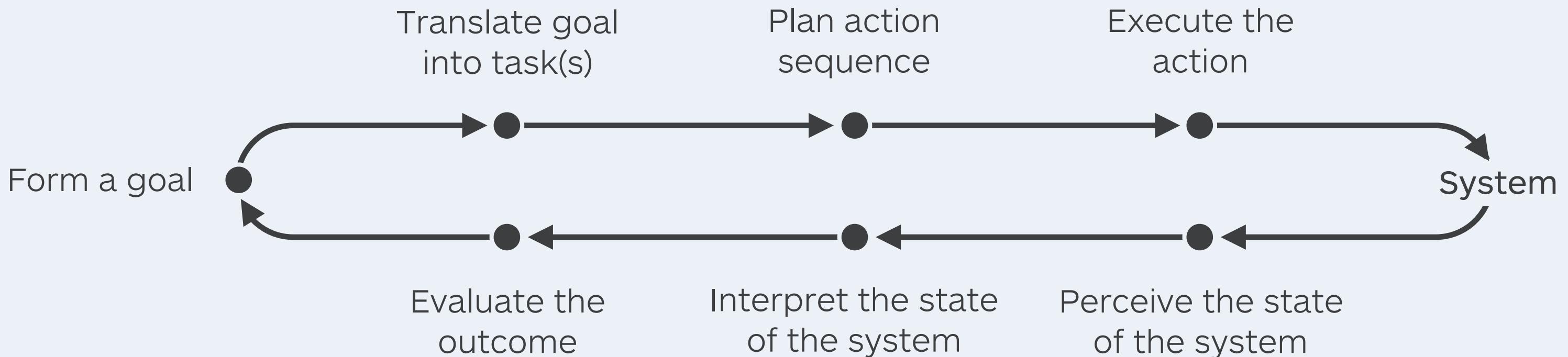
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2

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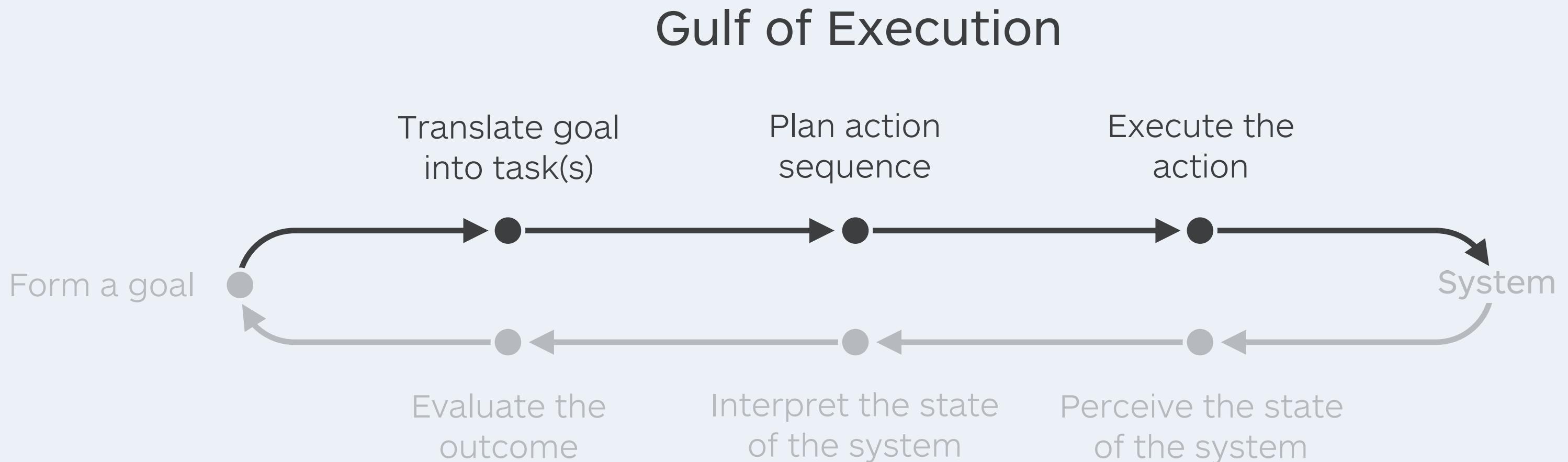
# INTERACTION DESIGN

# Seven Stages of Action

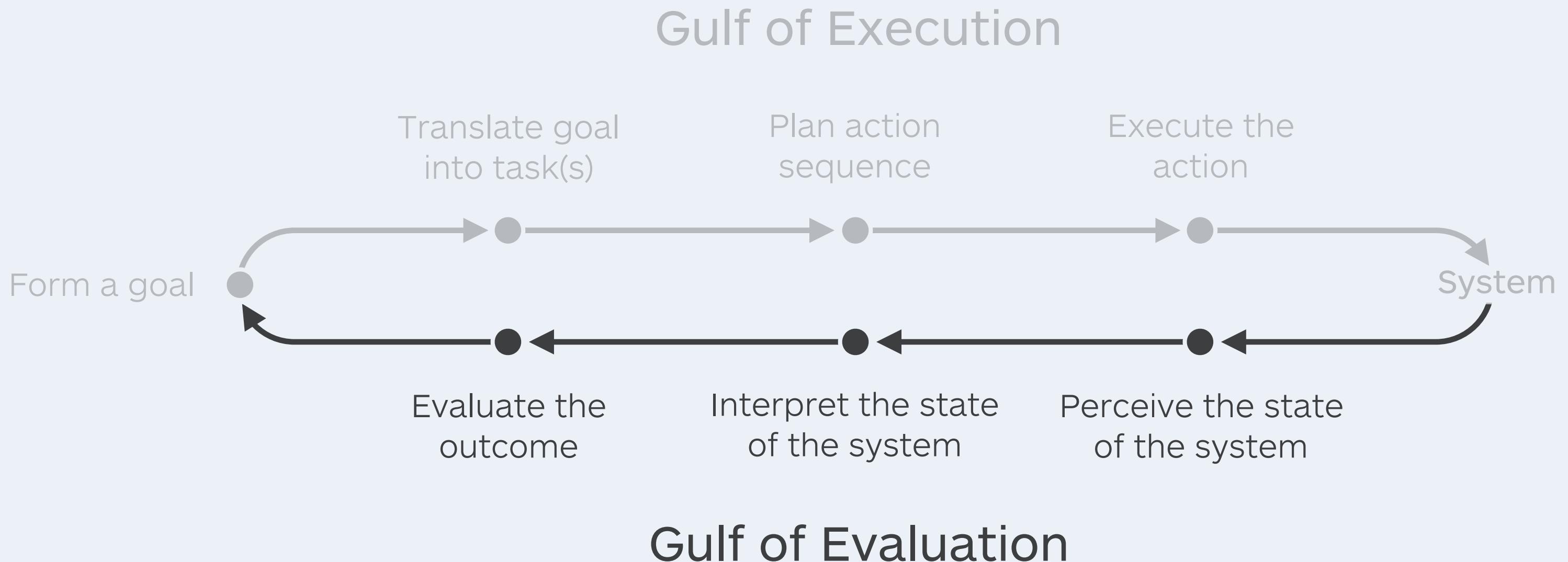


# *Interaction Design*

# Seven Stages of Action



# Seven Stages of Action



*Interaction Design*

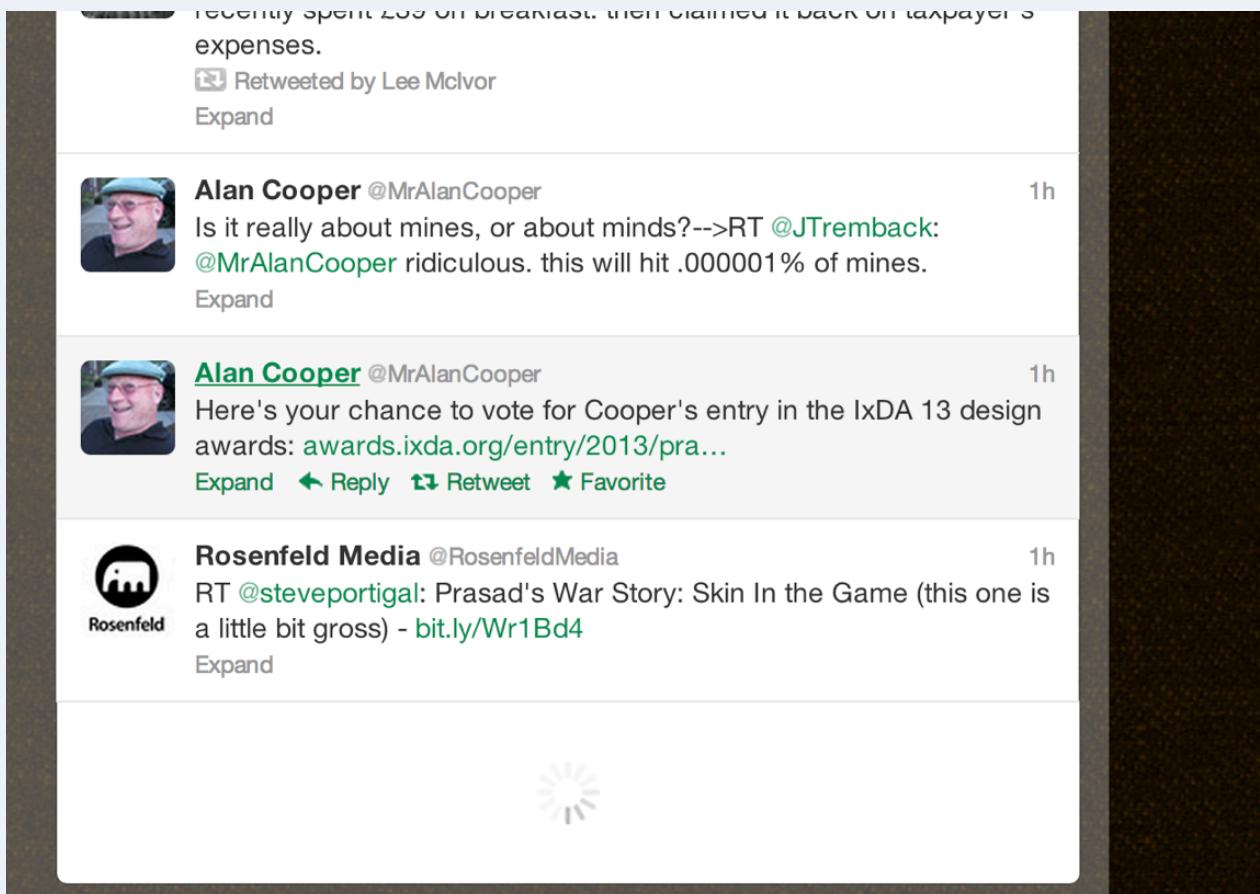
# Feedback

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

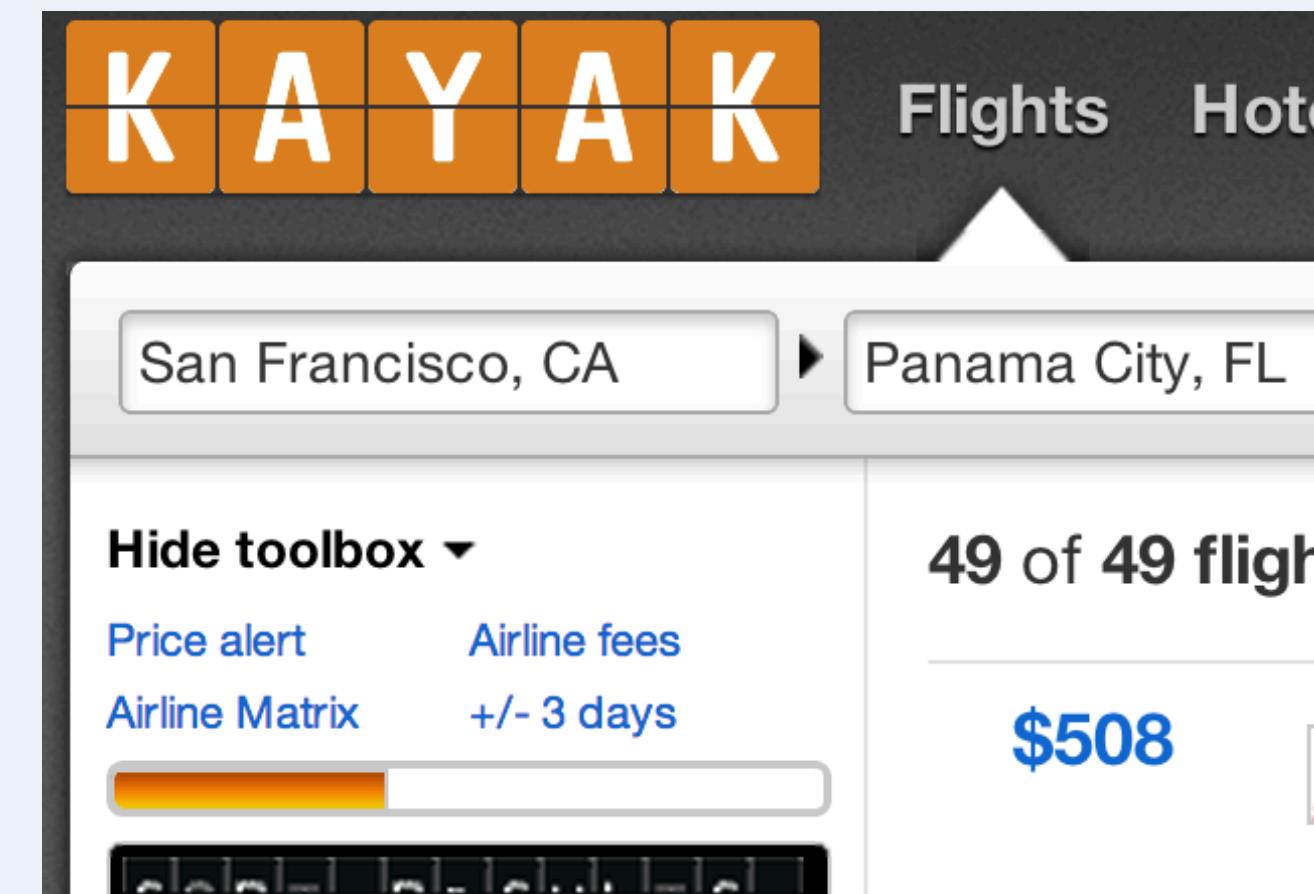
# Interaction Design

# Feedback

## Activity Indicator



## Progress Bar (>5 secs)



*Interaction Design*

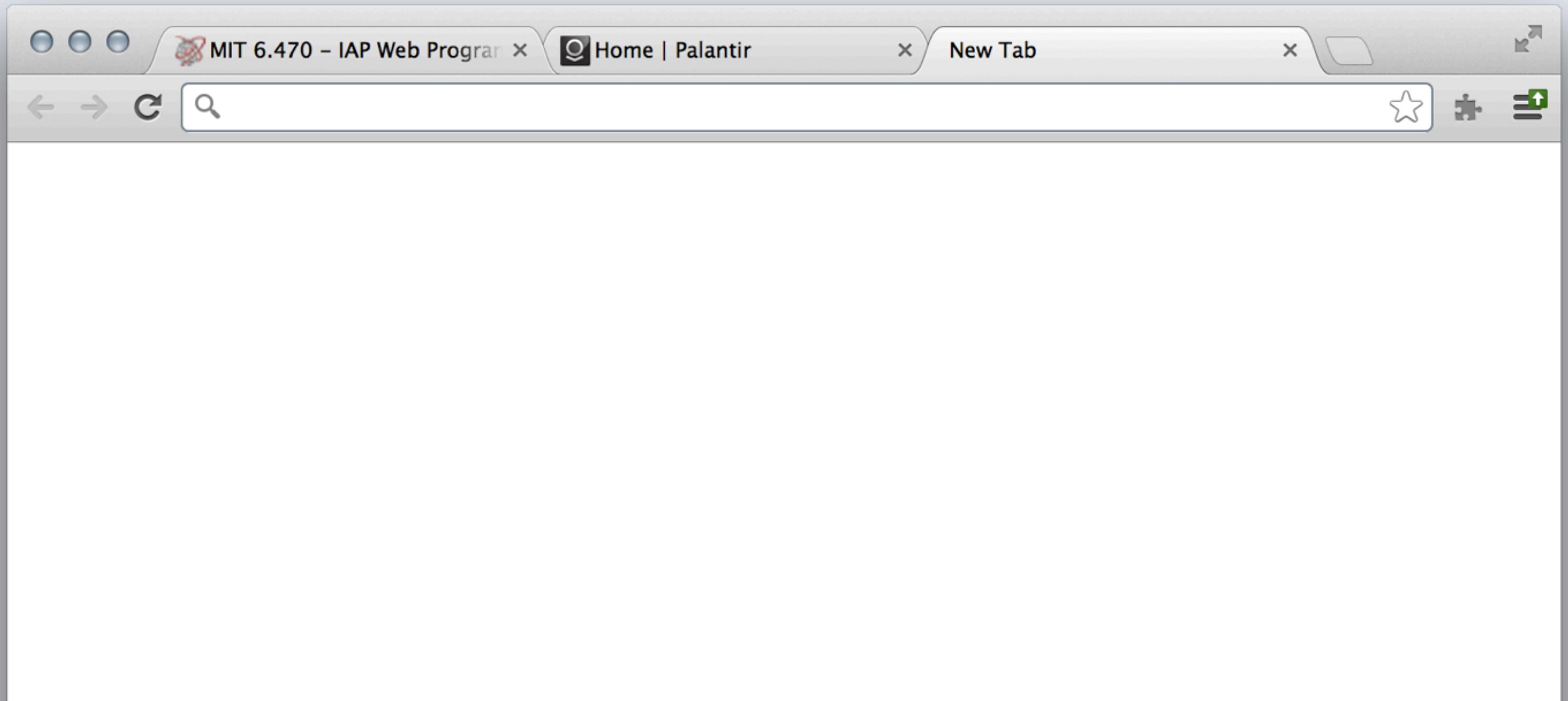
# Perceived Affordances

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



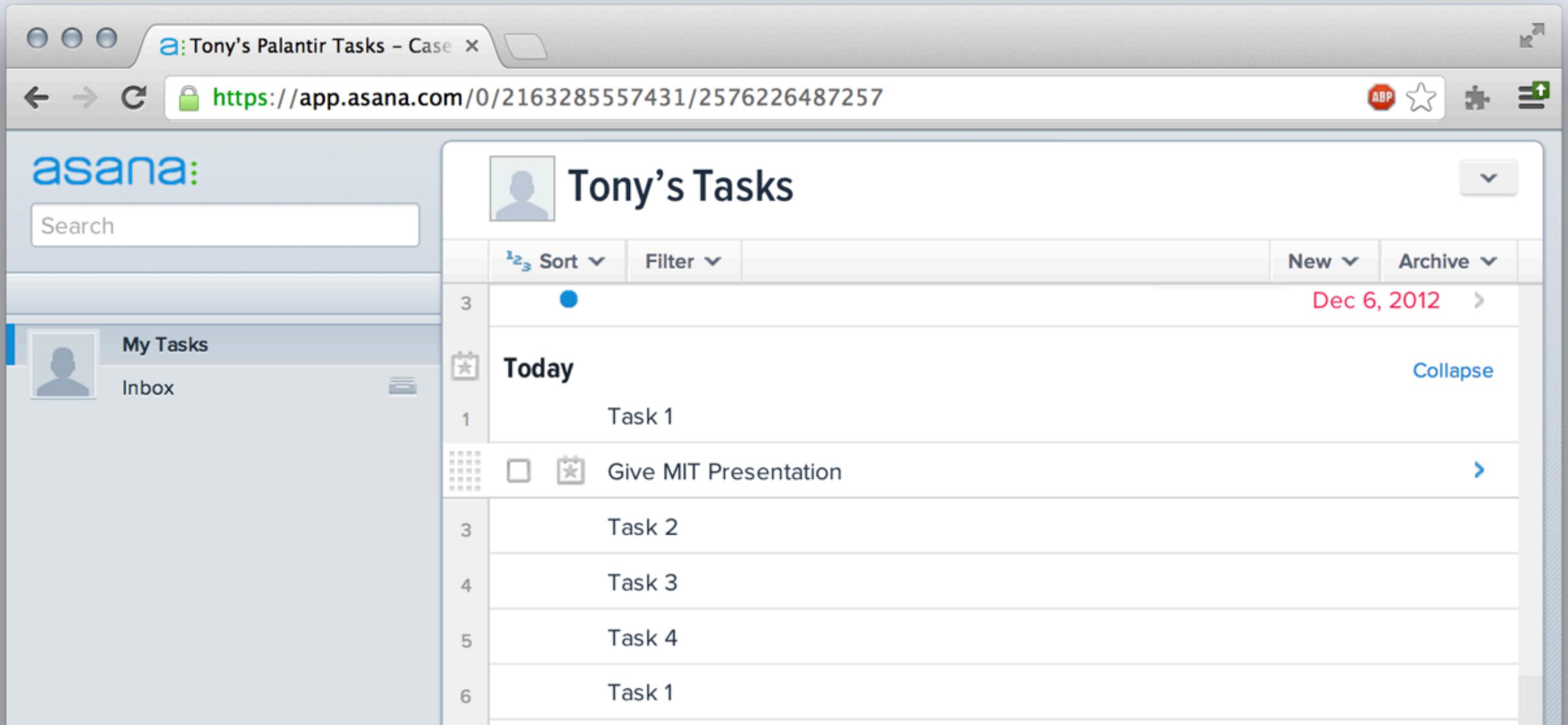
*Interaction Design*

# Perceived Affordances



*Interaction Design*

# Perceived Affordances



*Interaction Design*

# Proximity

Put controls next to the things that they modify.

Tony Poor

www.facebook.com/tony.poor/info

facebook Search for people, places and things

Tony Poor | Home | \*

About You

Living

Basic Info

Relationship

 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

Comment

 Mark Complete

## Give MIT Presentation

add notes

Assignee **Tony Poor** Today Upcoming Later

Projects add to project

 Subtasks Due Date Tags Attach a FileFollowers **Tony P**[Unfollow](#)

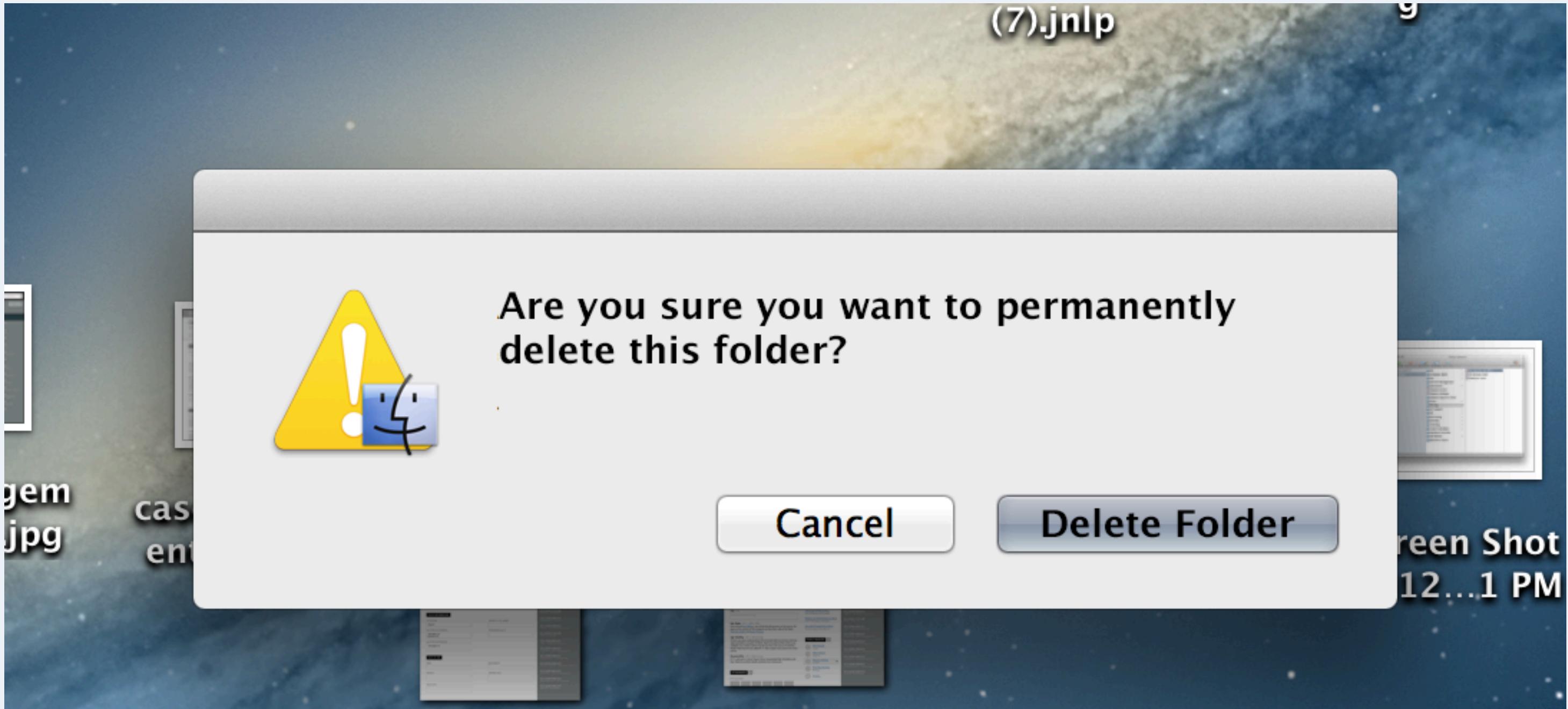
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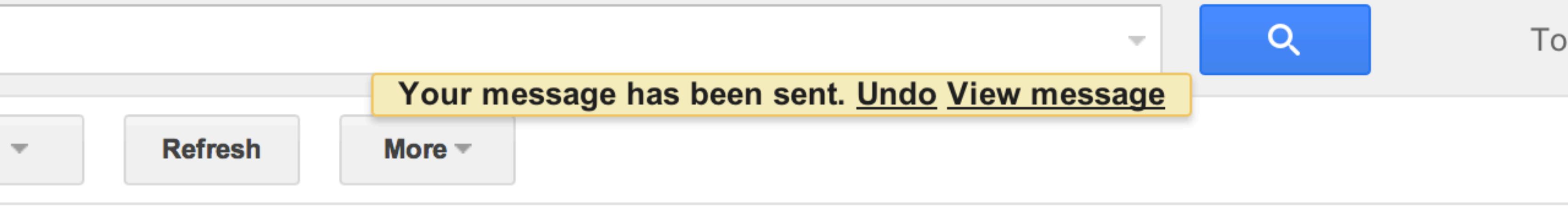
 Comment

# Error Prevention



# Error Prevention

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



arred

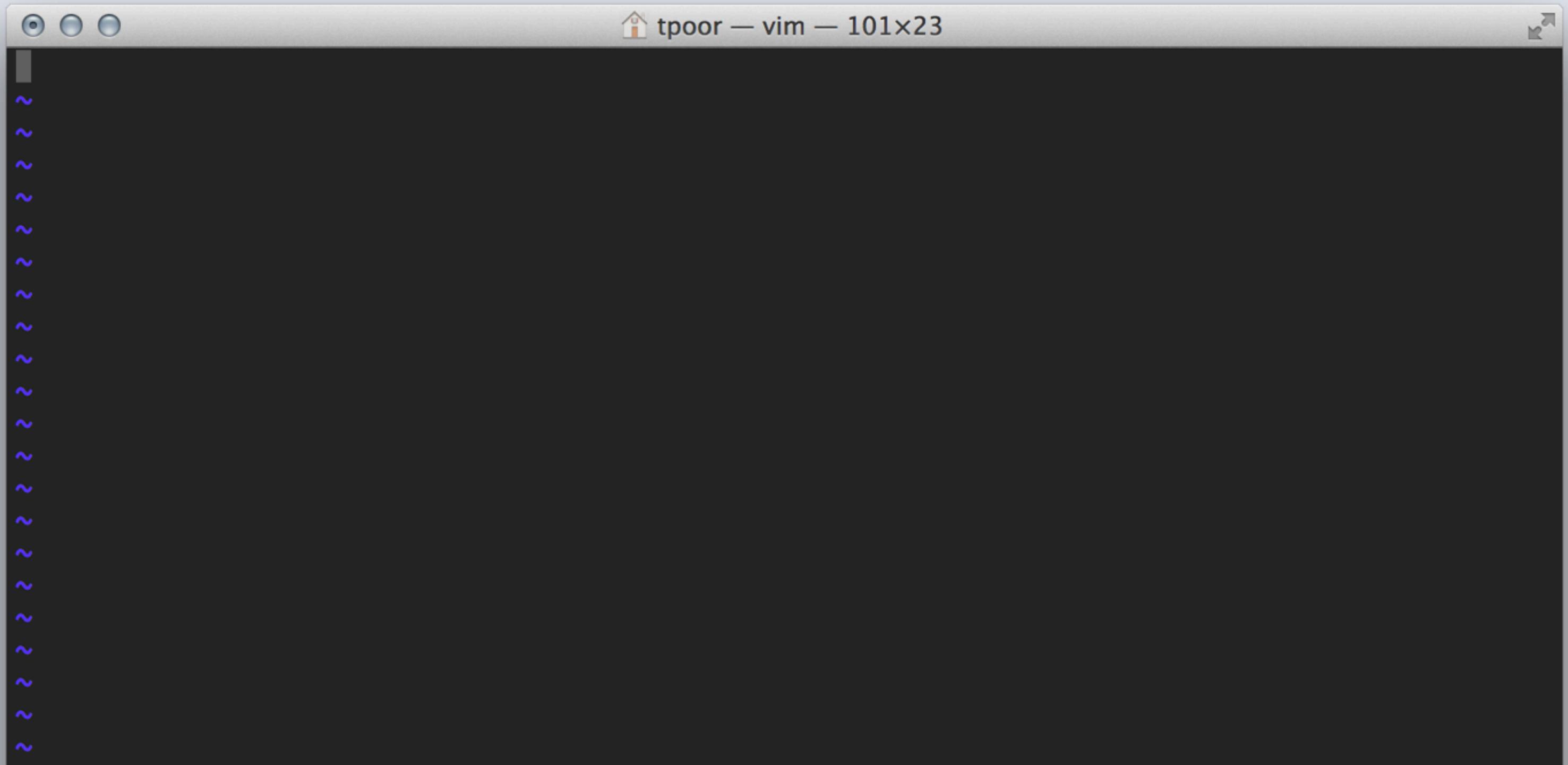


# Modes

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

*Interaction Design*

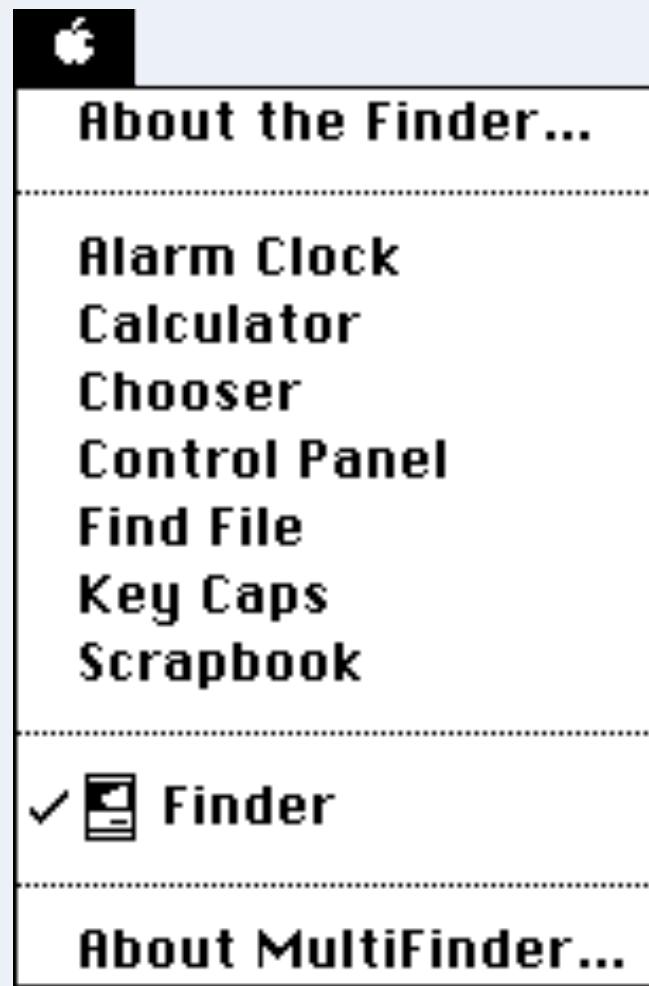
# Modes



*Interaction Design*

# Modes

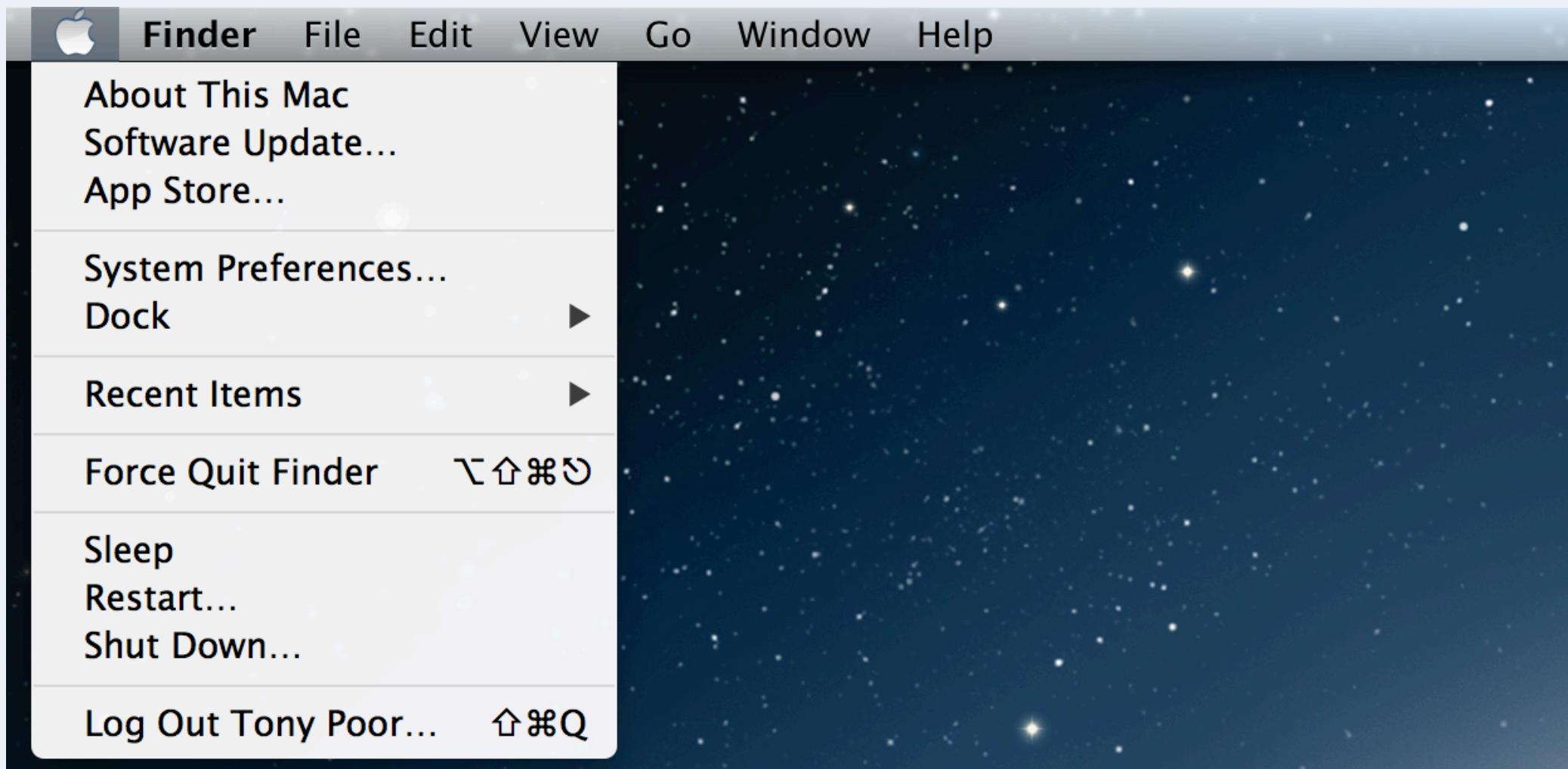
Quasimodes require the user to maintain some action.



## *Interaction Design*

# 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.

*Interaction Design*

# Fitts's Law

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

The diagram illustrates the components of the Fitts's Law equation. The term  $b \log_2$  is bracketed under the label "Constants", indicating that it is a constant factor. The term  $D/W$  is bracketed under the labels "Distance" and "Target Width", indicating that it is a ratio of distance to target width.

Make your targets bigger. (raise W)

Decrease distance to targets. (lower D)

*Interaction Design*

# Fitts's Law

January 5, 2013 Carnegie Mellon University -... [fb.me/2aM1w7krY](http://fb.me/2aM1w7krY)

Retweeted by CMU Computer Science

Expand

Rosenfeld Media @RosenfeldMedia 3h

"Very inspiring, shows designers have lots of work to do. Ending ("everywhere they want it")..." via @Readmill [readmill.com/UXCodeLine/rea...](http://readmill.com/UXCodeLine/rea...)

Expand

Kevin Fox @kfury 3h

What's the past tense of Bing?

Expand

The SemanticWill™ @semanticwill 3h

This is the intellectual equivalent of sharing mashable links on twitter. [youtube.com/watch?v=EQoZck...](http://youtube.com/watch?v=EQoZck...)

View media

frog design @frogdesign 3h

Design Is a Privilege: An update on frog's Mobile Mandate [bit.ly/13DfJL](http://bit.ly/13DfJL)

*Interaction Design*

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Expand

**Kevin Fox** @kfury 3h

What's the past tense of Bing?

Expand Reply Retweet Favorite

**The SemanticWill™** @semanticwill 3h

This is the intellectual equivalent of sharing mashable links on twitter. [youtube.com/watch?v=EQoZck...](http://youtube.com/watch?v=EQoZck...)

View media

**frog design** @frogdesign 3h

Design Is a Privilege: An update on frog's Mobile Mandate [bit.ly/13DfX](http://bit.ly/13DfX)

display: block;

*Interaction Design*

# Hick's Law

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

The diagram illustrates the components of the Hick's Law formula. It features a horizontal line with three vertical tick marks. The first tick mark is labeled "Time" below it. The second tick mark is positioned under a bracket that spans the first two terms of the equation, labeled "Constants" below it. The third tick mark is labeled "# of Options" below it.

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3

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# VISUAL DESIGN

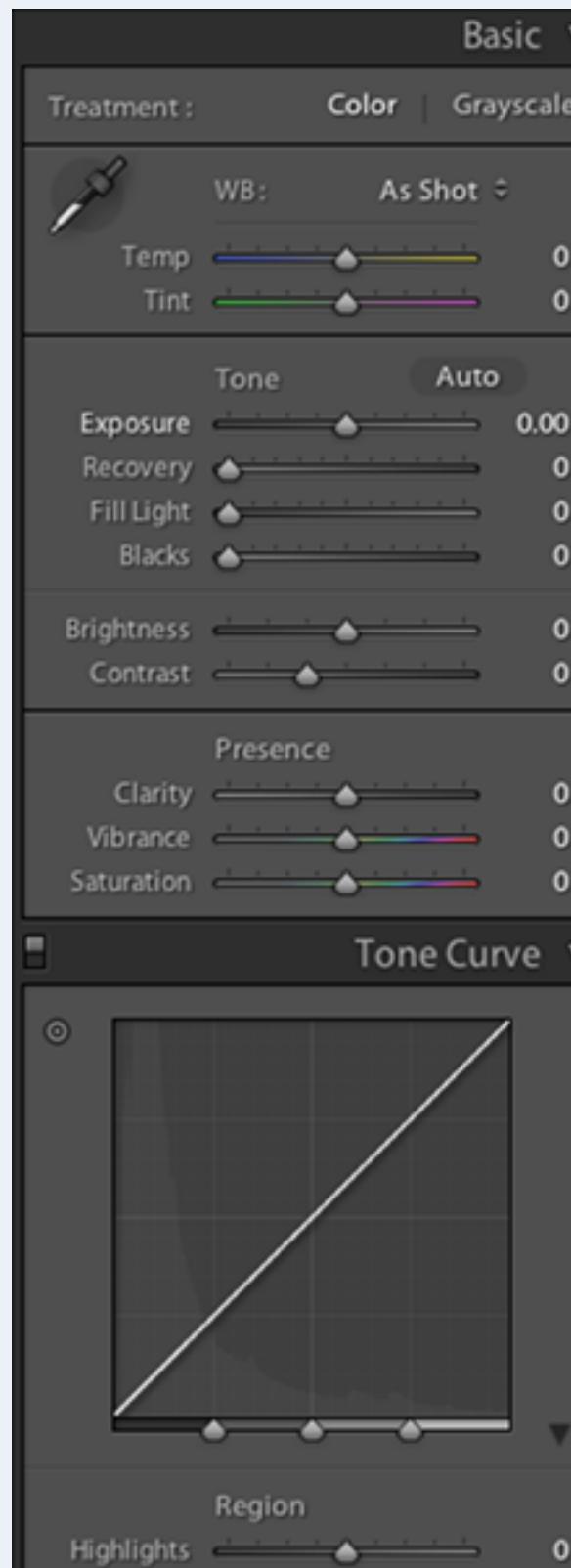
*Visual Design*

# Grids

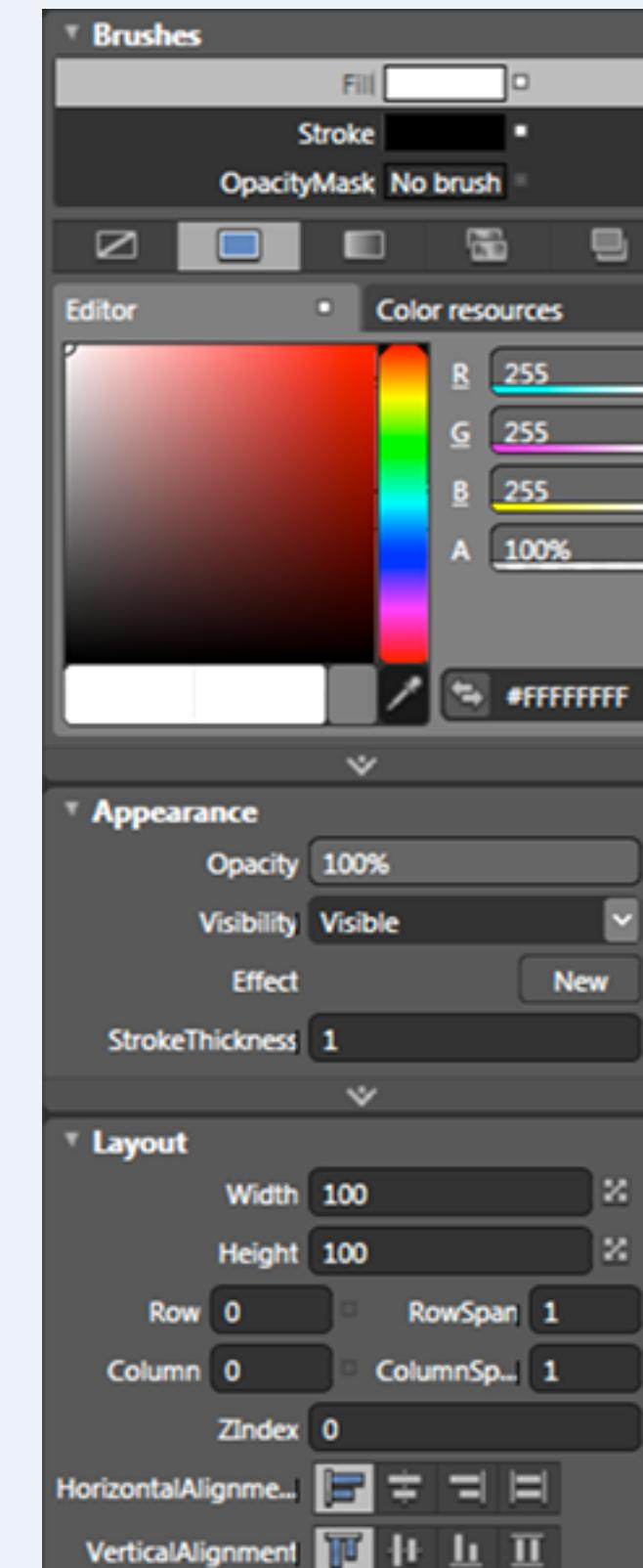
Line stuff up!

# Which is harder to process?

Adobe Lightroom

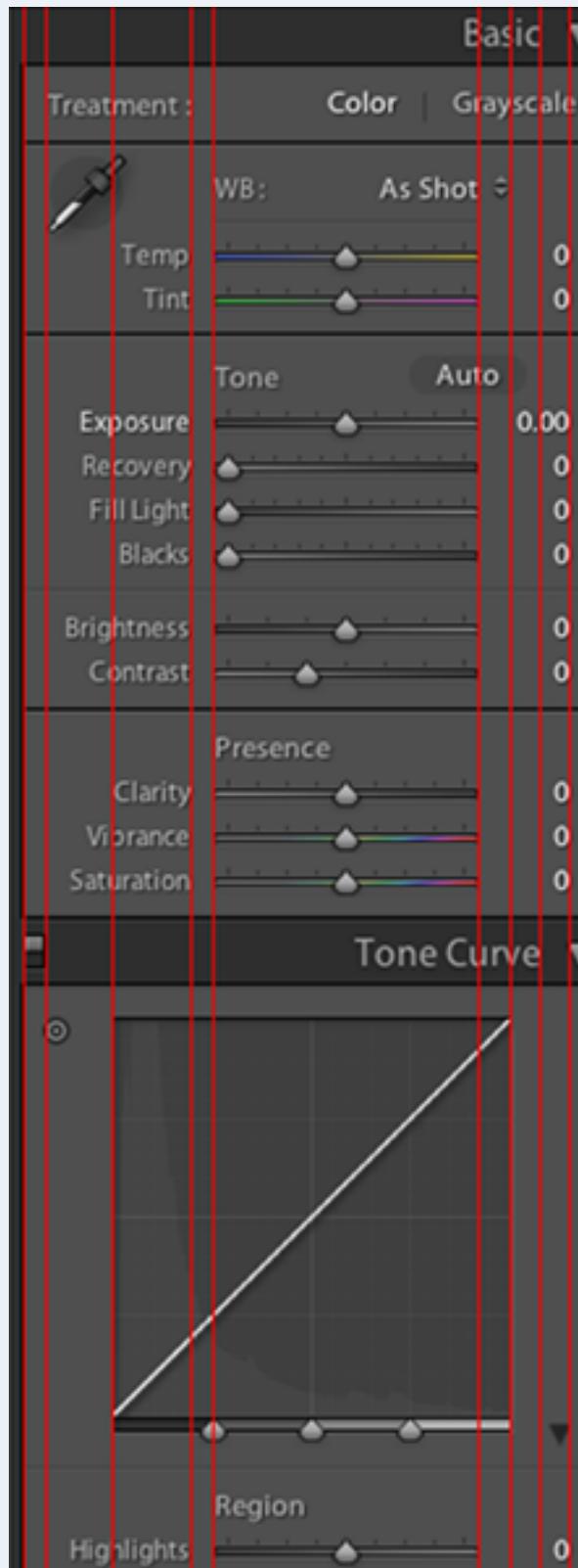


MS Expression Blend

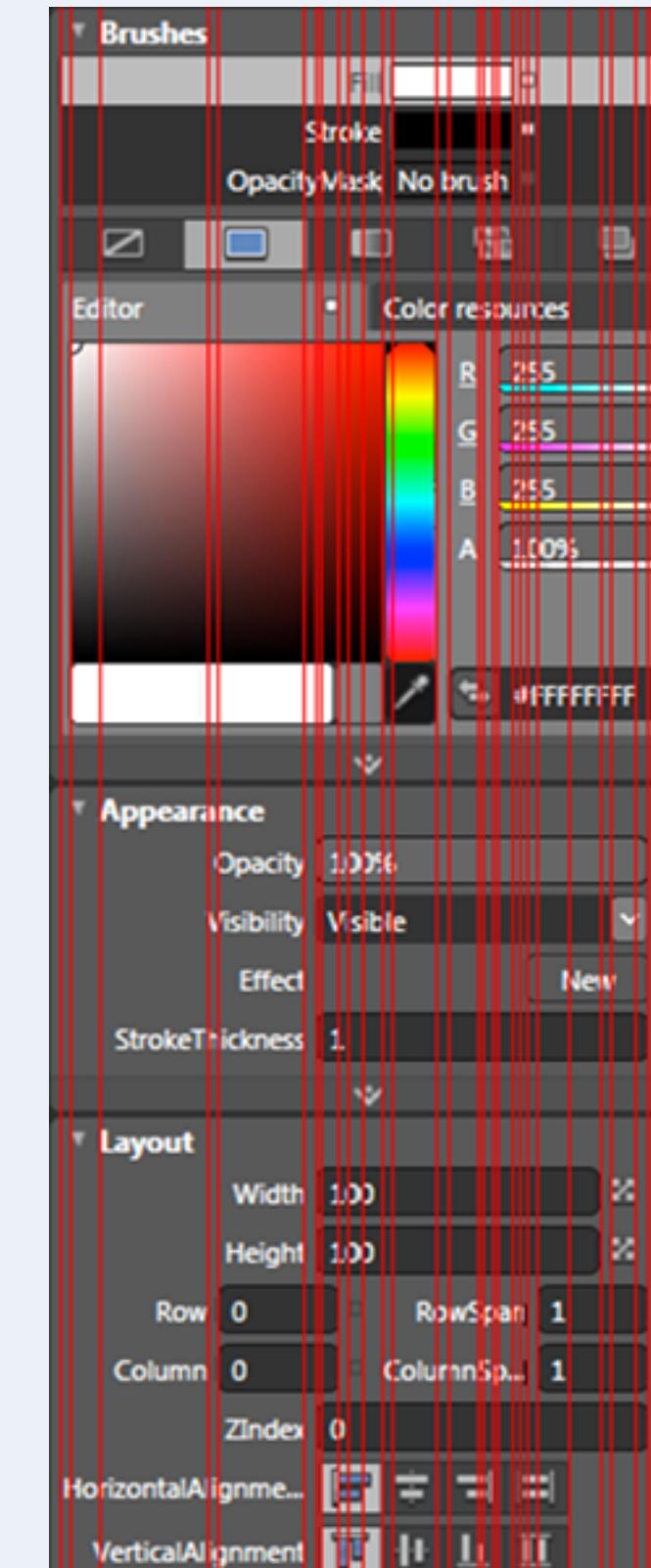


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Adobe Lightroom



MS Expression Blend



Subtraction.com: Jan 2013 A X

www.subtraction.com/2013/01

ABP ⭐ ⚗ ⌂

## Subtraction

Version 7.1  
Khoi Vinh's Web Site

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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		

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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

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Help Wanted

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PDF Interactive Agency



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## January 2013 1 posts

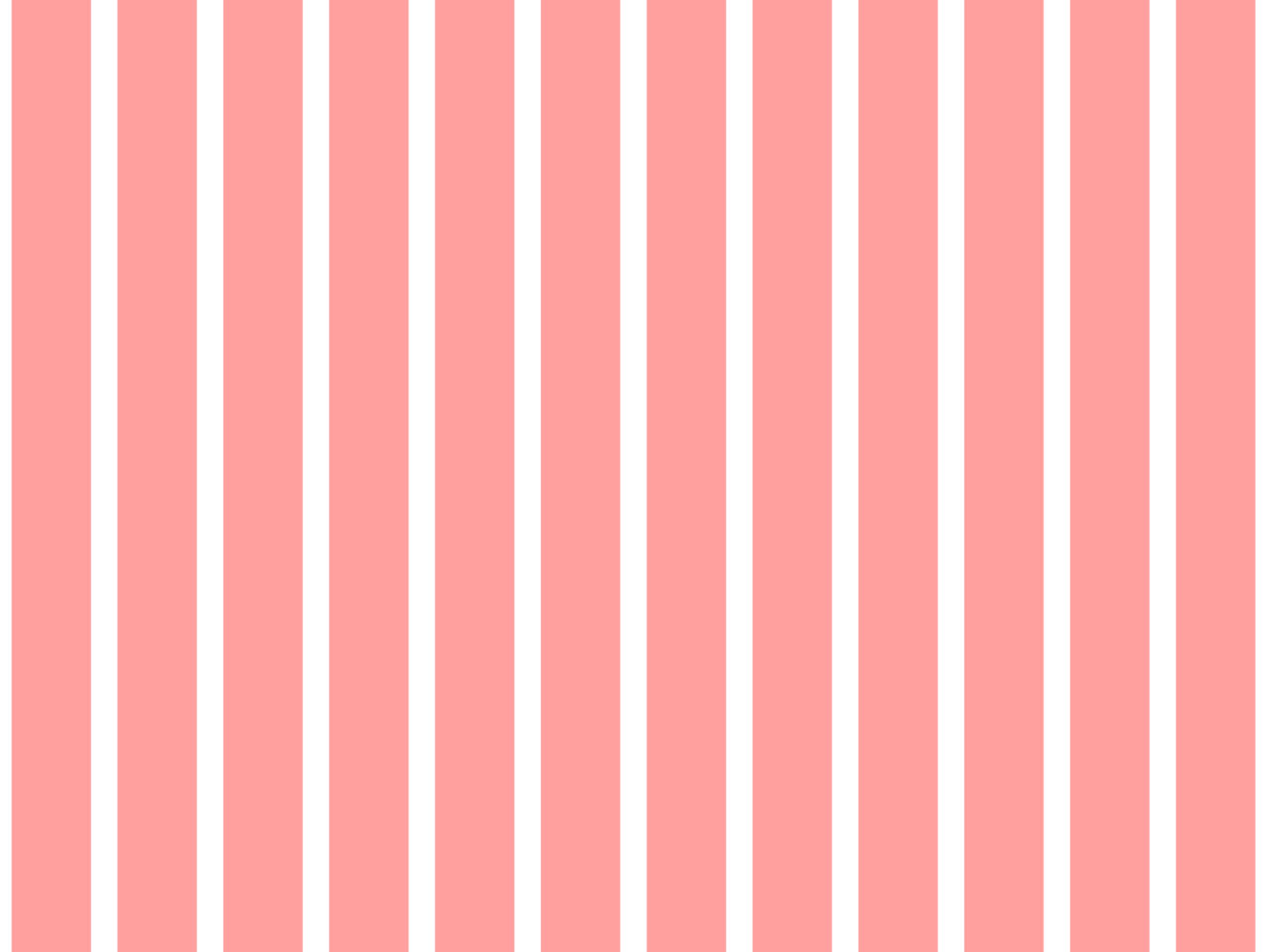
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
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**Ads by the Deck****Help Wanted**

PDR Interactive Agency



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



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YOUR EMAIL HERE...

SUBMIT

Tapbots — Robots for your iPhone

tapbots.com

A Twitter Client with Personality.



**WEIGHTBOT**  
Track your Weight.



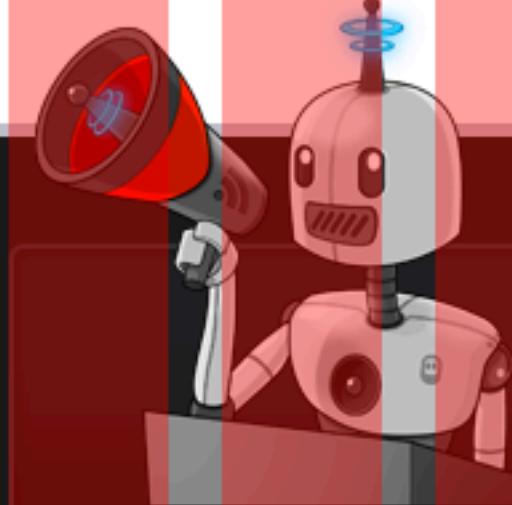
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WANT THE LATEST TAPBOTS NEWS? JOIN OUR MAILING LIST!

YOUR EMAIL HERE...

SUBMIT

*Visual Design*

# Grids

Some CSS frameworks for grids (even responsive ones):

960 Grid System  
Zurb Foundation

<http://www.960.gs>  
<http://foundation.zurb.com/grid.php>

*Visual Design*

# Typography

Choose a typeface that honors your content.

Best resource for web fonts: **Typekit** ([typekit.com](http://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!

*Typography Tip #1*

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

*Typography Tip #2*

## Choose an appropriate line height (“leading”).

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

*Typography Tip #3*

Use smart quotes!

“ “

‘ ’

，

， ’

&ldquo; &lsquo; &rsquo; &rdquo;

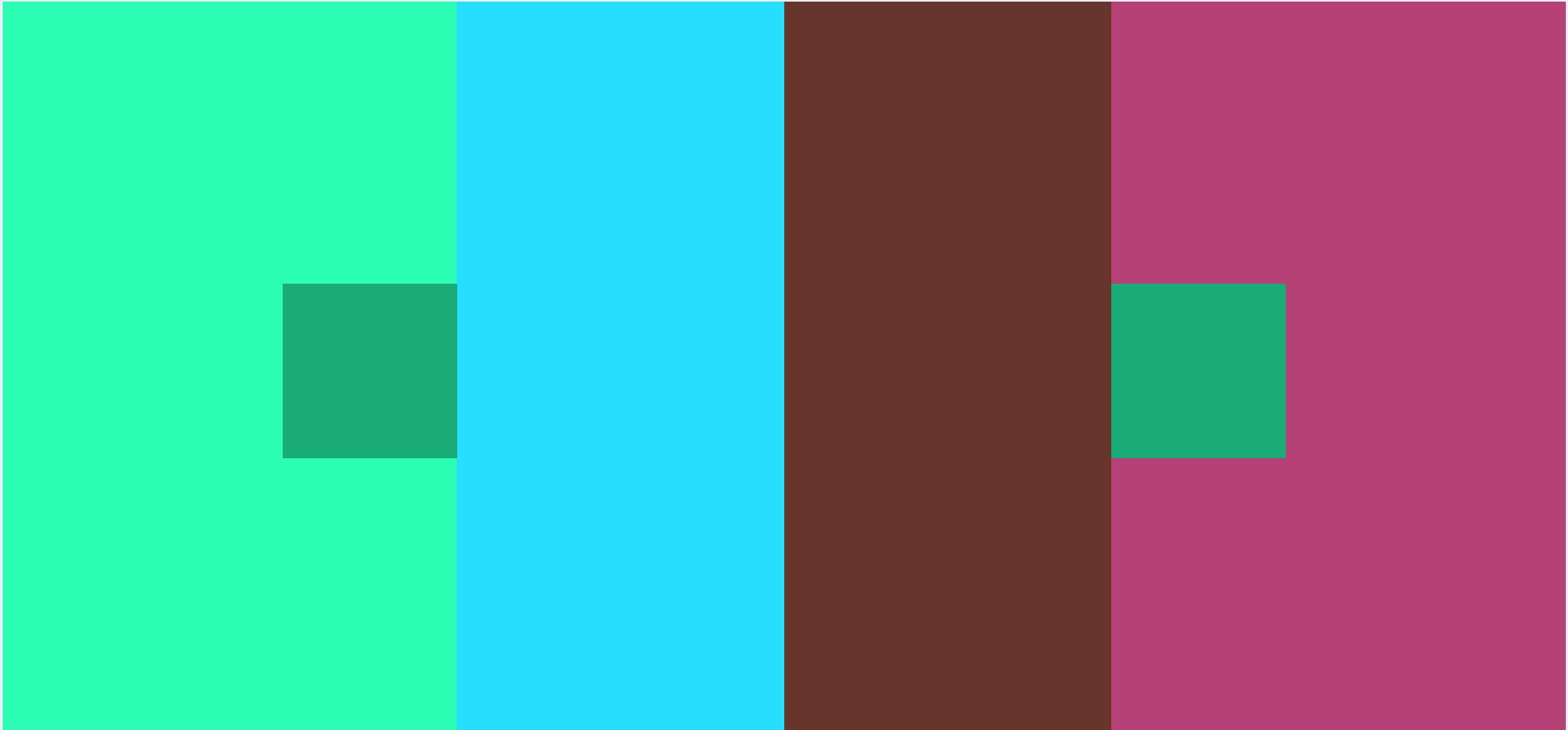
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dumb quotes

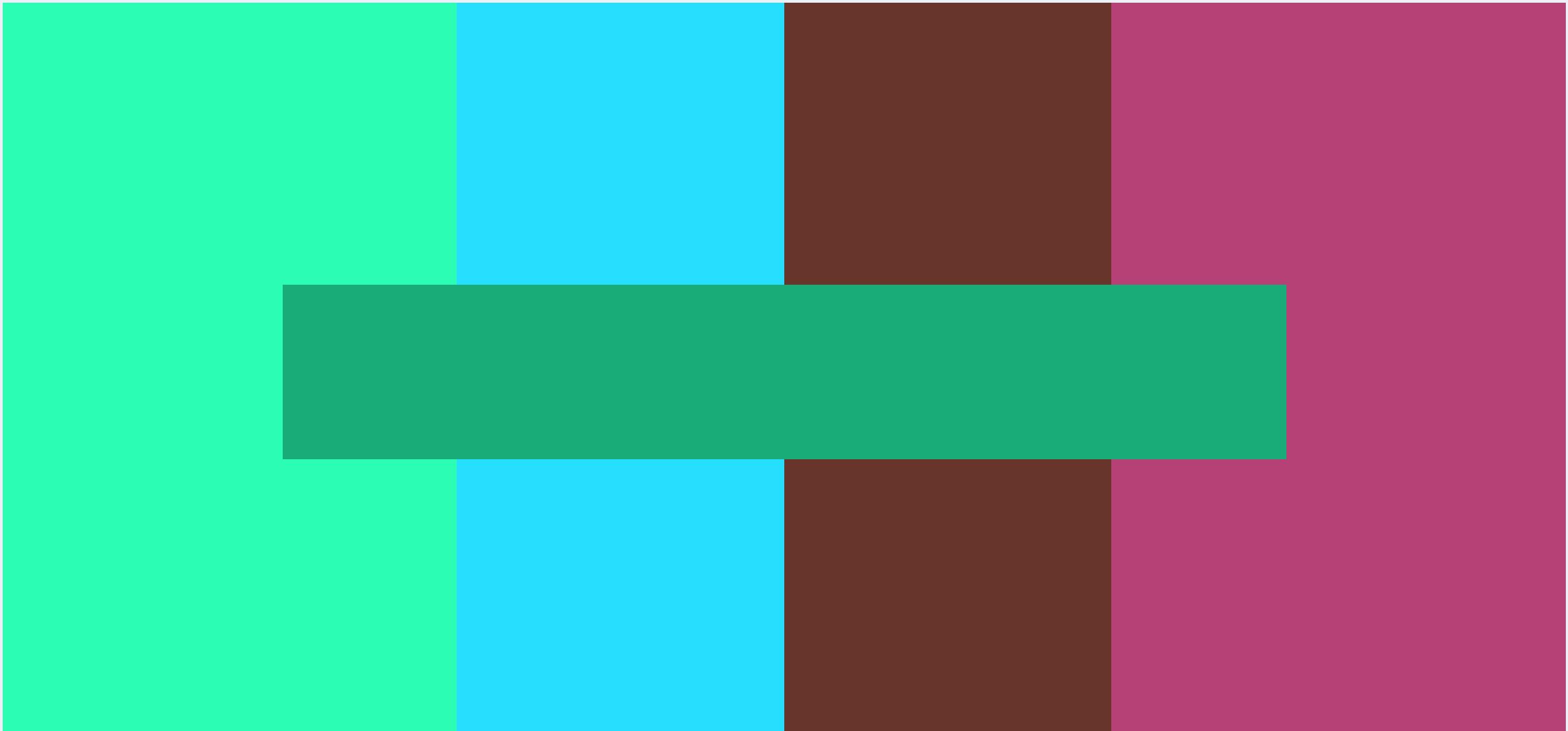
*Visual Design*

# Color



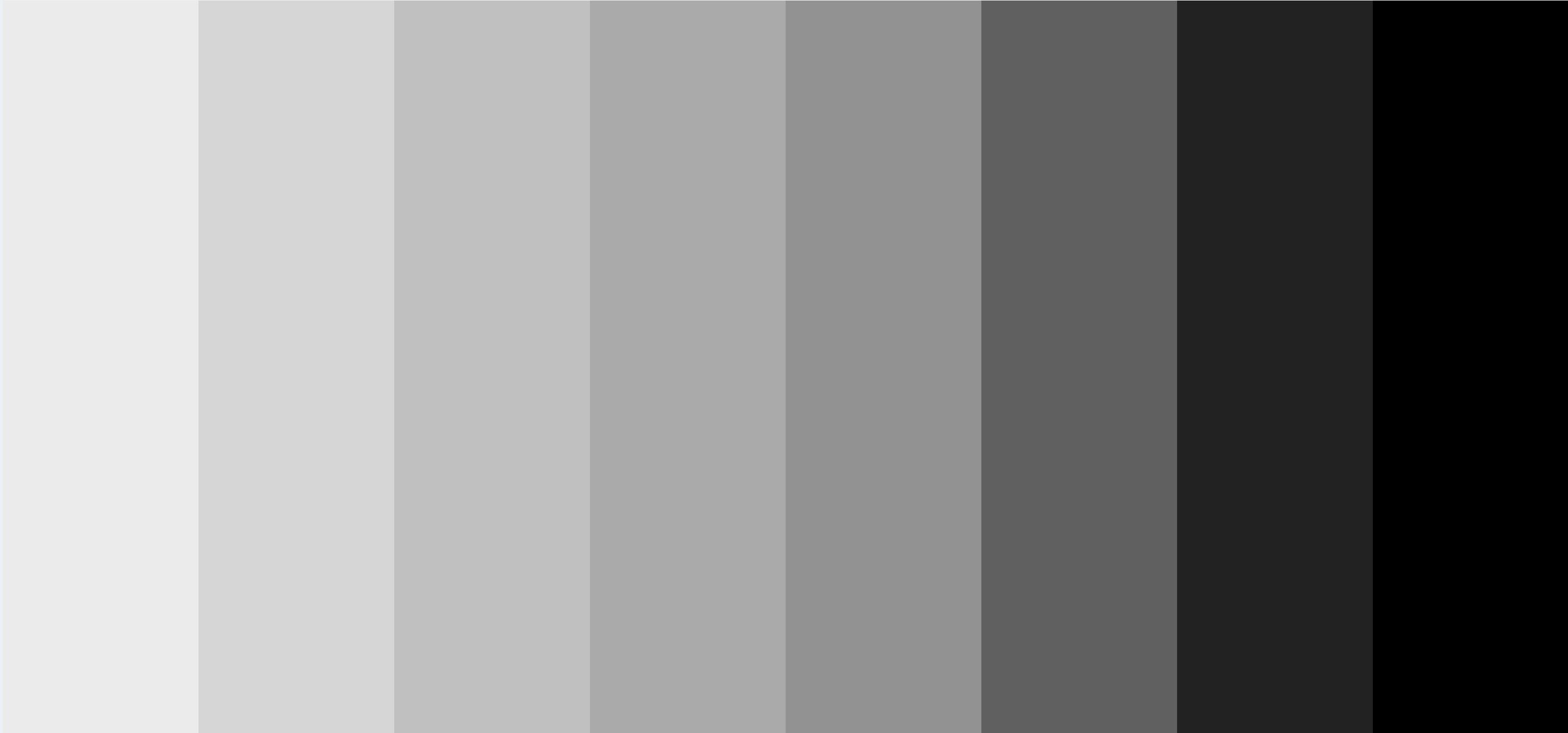
*Visual Design*

# Color



*Visual Design*

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*Visual Design*

# Color

Color exploration resources:

Adobe Kuler  
Colourlovers

[kuler.adobe.com](http://kuler.adobe.com)  
[colourlovers.com](http://colourlovers.com)

*Color Tip #1*

Limit your color palette.

The screenshot shows a web browser window displaying the homepage of A List Apart. The page features a light beige background with a thin red horizontal bar near the top. The header includes a navigation menu with links for ARTICLES, TOPICS, ABOUT, CONTACT, CONTRIBUTE, and FEED. To the left of the menu is a large, stylized logo for "A LIST apart" with a laurel wreath and the text "FOR PEOPLE WHO MAKE WEBSITES". A black circular badge with the number "367" is positioned above the logo. Below the header, there's a main article section with a date of DECEMBER 18, 2012, and a sub-headline: "Why Apple's newest tablet sets a tricky precedent for folks designing flexible, multi-device experiences." The main title of the article is "Vexing Viewports", written by PETER-PAUL KOCH, LUKE WROBLEWSKI, STEPHANIE RIEGER, LYZA DANGER GARDNER. A brief summary of the article follows. To the right of the main content, there are sidebar sections for "AN EVENT APART" (with a note about it coming to a city near you), "EDITOR'S CHOICE" (with a note about it originally ran on January 17, 2012), and "A Pixel Identity Crisis" by SCOTT KELLUM. A search bar and a sidebar with various topics like Topics, Code, Content, Culture, Design, Mobile, Process, and User Science are also visible.

A List Apart

alistapart.com

ARTICLES • TOPICS • ABOUT • CONTACT • CONTRIBUTE • FEED

No. 367

DECEMBER 18, 2012

*Why Apple's newest tablet sets a tricky precedent for folks designing flexible, multi-device experiences.*

## Vexing Viewports

by PETER-PAUL KOCH, LUKE WROBLEWSKI,  
STEPHANIE RIEGER, LYZA DANGER  
GARDNER

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

AN EVENT APART  
*coming to a city near you*

EDITOR'S CHOICE  
*originally ran: January 17, 2012*

### A Pixel Identity Crisis

by SCOTT KELLUM

The pixel has long been the atomic particle of screen based design: a knowable, concrete unit of measurement. But layouts

Search ALA

include discussions

Topics

Code >

Content >

Culture >

Design >

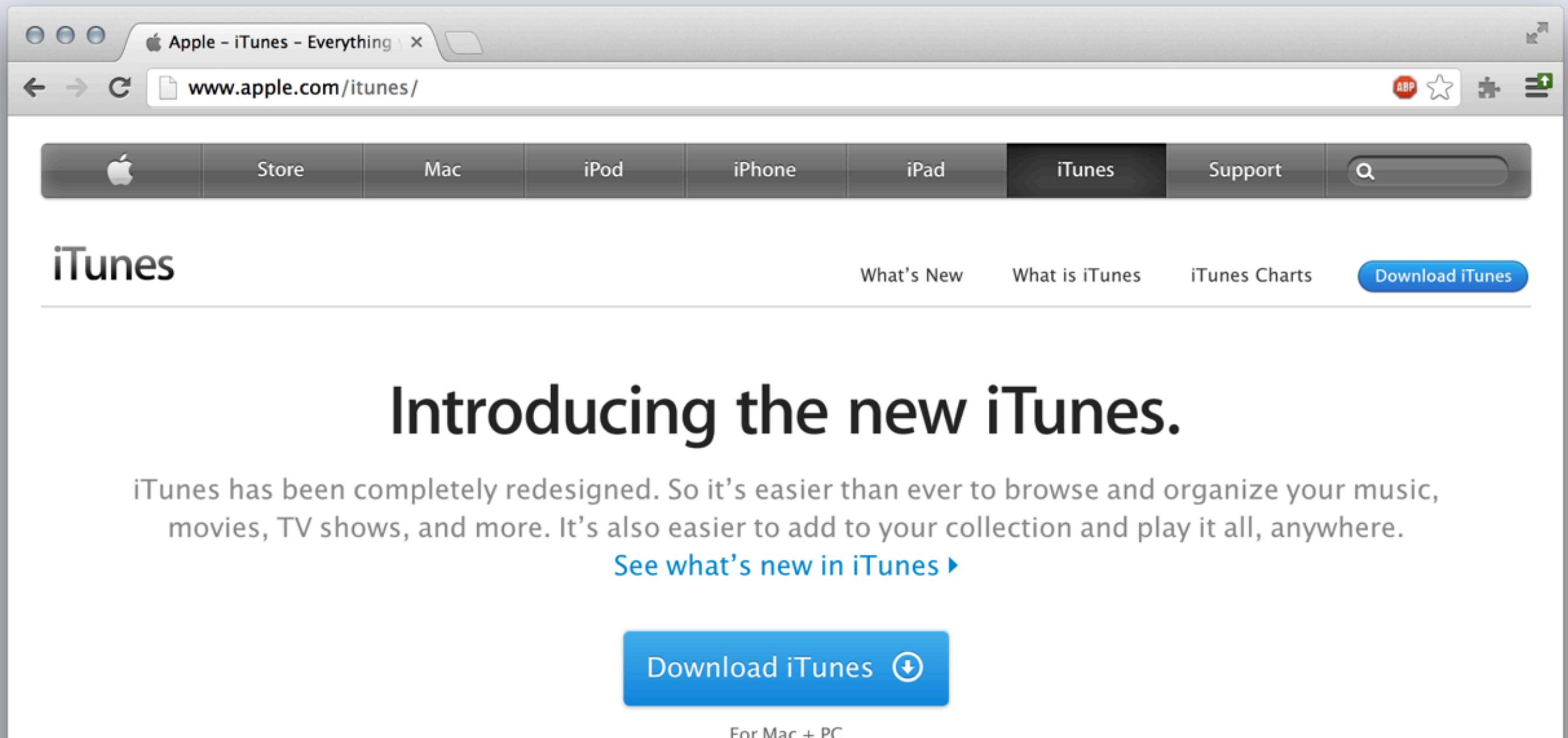
Mobile >

Process >

User Science >

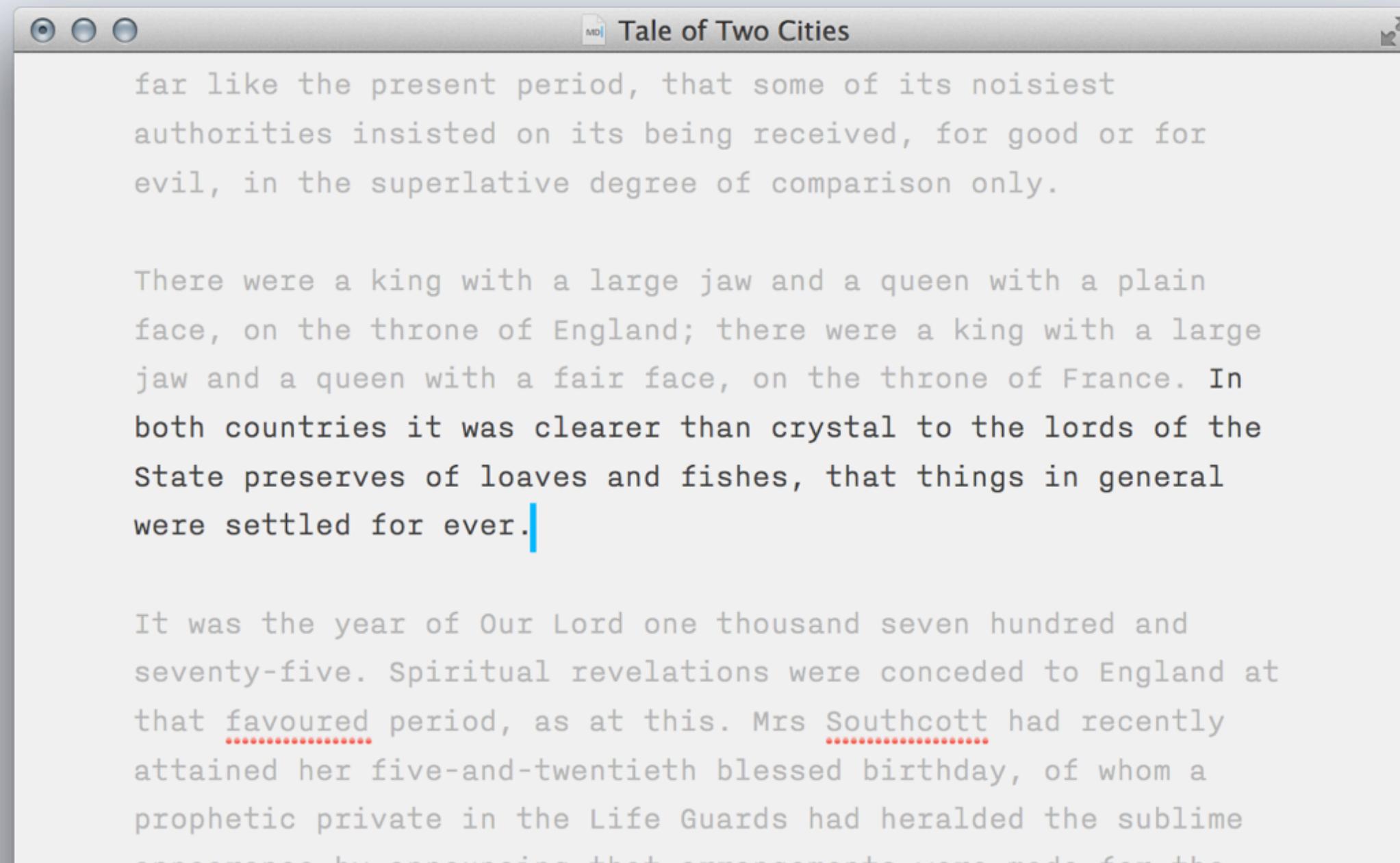
*Color Tip #2*

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).

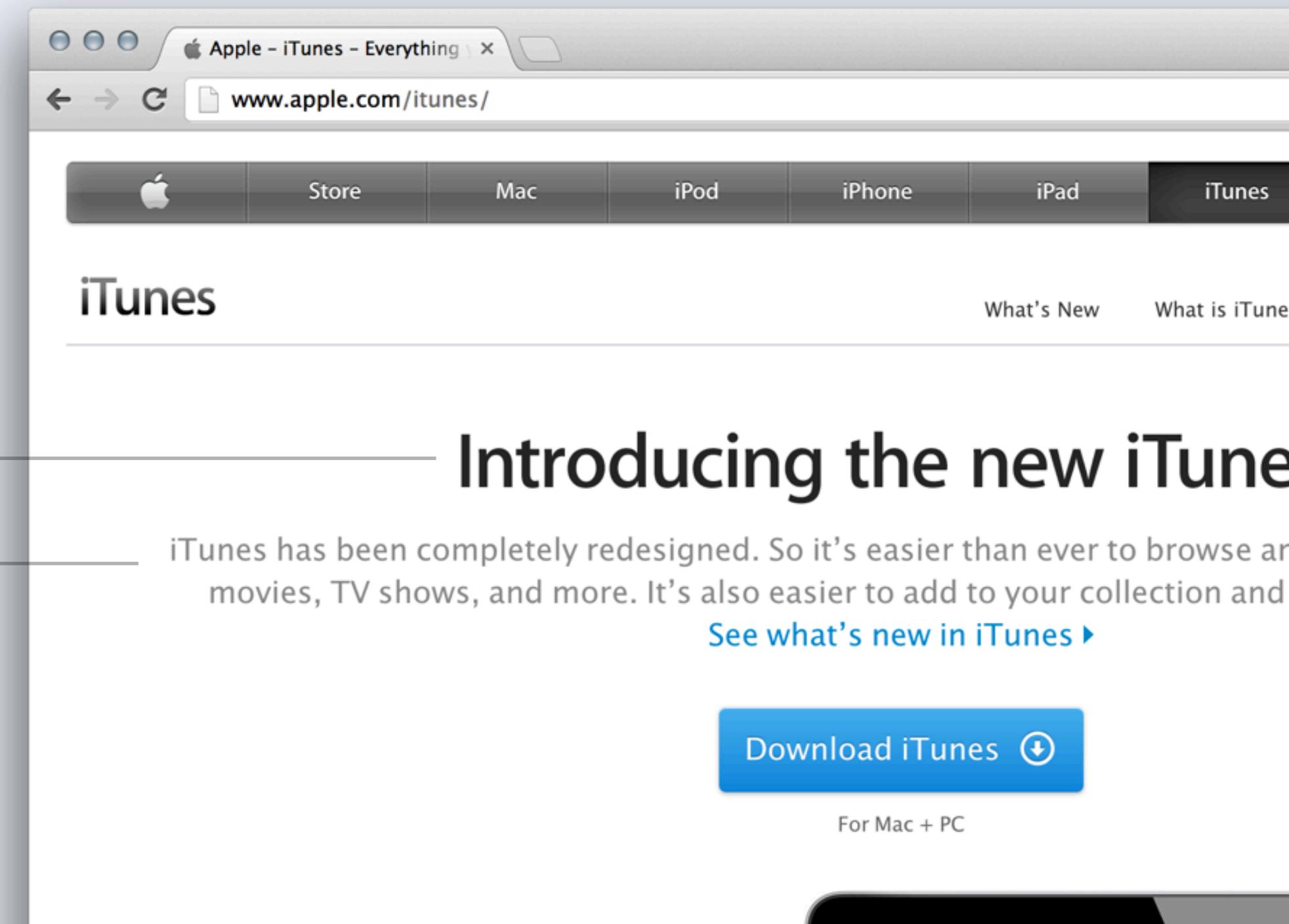
It was the best of times, it was the worst of times, it was the age of wisdom, it was the age of foolishness, it was the epoch of belief, it was the epoch of incredulity, it was the season of Light, it was the season of Darkness, it was the spring of hope, it was the winter of despair, we had everything 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.

**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

Date	Winner	Score	Change	Points	Winner	Score	Change	Points
12/21	Dan Cervelli	+\$20	-5pts		Todd Weber	+\$5	2pts	
12/20	Todd Weber	+\$15	-8pts		Dan Cervelli	+\$5	-5pts	
12/10	Dan Cervelli	+\$20	-5pts		Todd Weber	+\$5	2pts	
12/9	Todd Weber	+\$15	-8pts		Eric Anderson	+\$5	-5pts	
12/8	Dan Cervelli	+\$20	-5pts		Todd Weber	+\$5	2pts	

[Add a Game](#)

### Top Players

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



## Color Tip #4

Be aware of color blindness.

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**WELCOME BACK, DAN** [View my profile »](#)

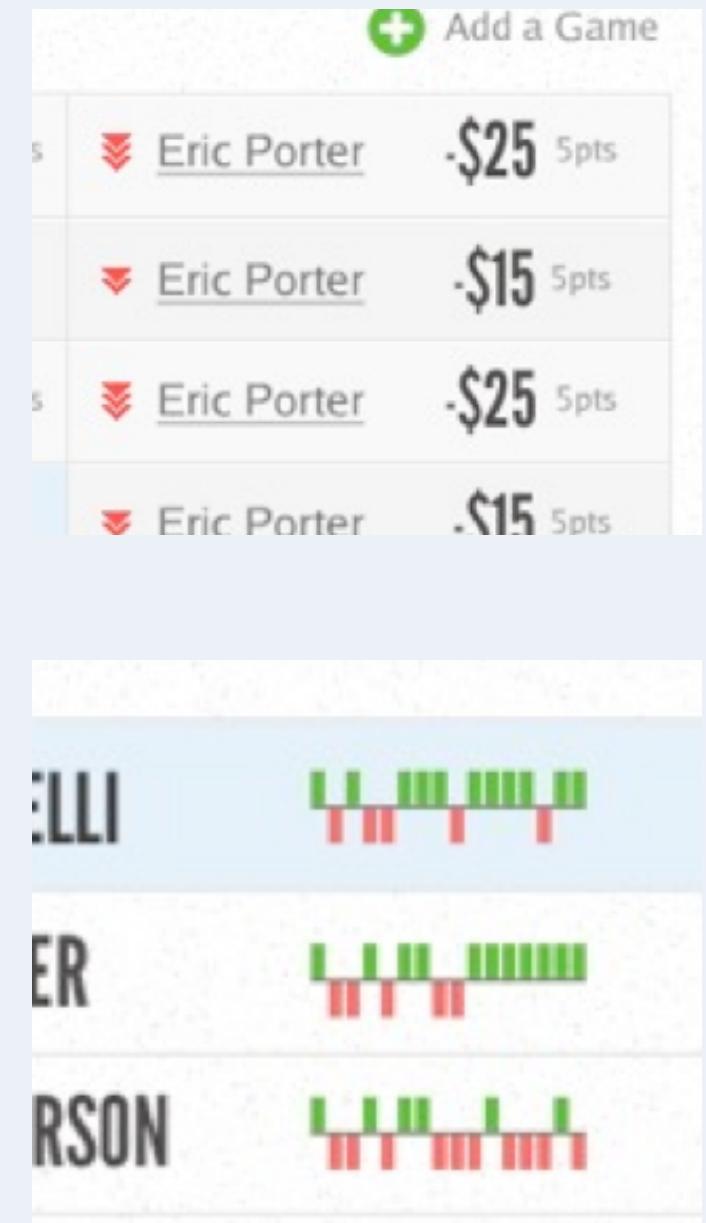
You are currently in **1st place** with **\$126** in your league!

**(1) RECENT GAMES**    **Add a Game**

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
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**TOP PLAYERS**

1	DAN CERVELLI		\$126
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*Visual Design*

# Iconography

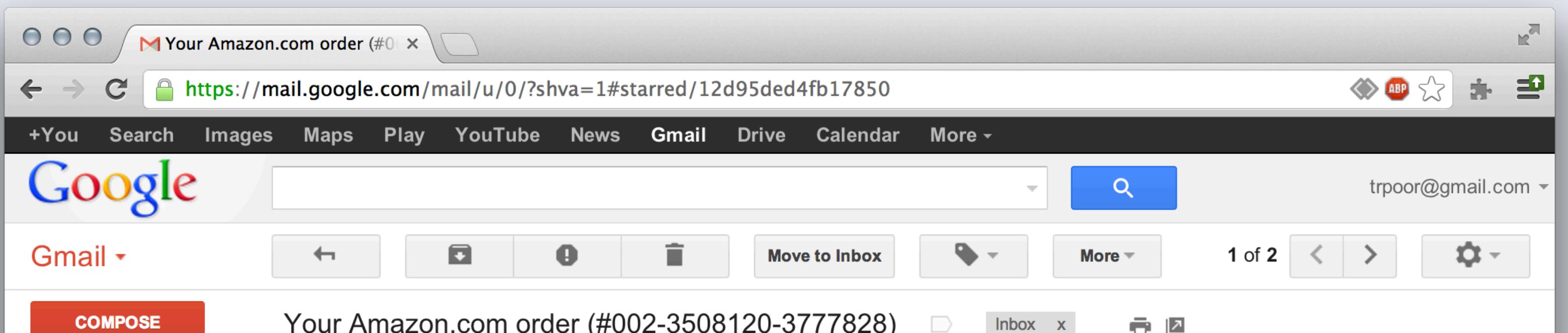
Icons can aid recognition vs. recall and make information more digestible.

*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](http://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

@tony poor • tpoor@palantir.com