

Welcome & Recap

Course Schedule

Day One: EXPLORE		Day Two: EXPLAIN	
8:00–8:30	Breakfast	8:00–8:30	Breakfast
8:30–9:30	Welcome & Introduction <ul style="list-style-type: none"> ▪ What? Why? Who? How? ▪ Design Sprint: Overview & Team Formation 	8:30–8:45	Welcome & Review
9:30–10:00	Map - Charts <ul style="list-style-type: none"> ▪ What's The Question? Who Is the Audience? 	8:45–10:00	Map - Story <ul style="list-style-type: none"> ▪ Data Stories ▪ What Is The Message? ▪ Design Sprint: Messages
10:00–10:15	Break	10:00–10:15	Break
10:15–12:00	Map - Charts (cont.) <ul style="list-style-type: none"> ▪ Design Sprint: Map ▪ What is the data? ▪ Tableau: Introduction & Data ▪ Effective Visualizations ▪ Graphical Integrity & Keep it Simple 	10:15–12:00	Sketch - Story <ul style="list-style-type: none"> ▪ Dashboards ▪ Design Sprint: Tableau Dashboards ▪ Storyboards ▪ Design Sprint: Storyboard Sketching
12:00–1:00	Lunch (Group Photo After Lunch)	12:00–1:00	Lunch
1:00–2:00	Sketch - Charts <ul style="list-style-type: none"> ▪ Sketching ▪ Choose the Right Chart 	1:00–2:00	Decide & Prototype - Story <ul style="list-style-type: none"> ▪ Design Sprint: Tableau Storyline ▪ Perception: Contrast, Color, C.R.A.P. ▪ Design Sprint: Dashboard Iteration
2:00–2:10	Break	2:00–2:10	Break
2:10–2:30	Sketch - Charts (cont.) <ul style="list-style-type: none"> ▪ Design Sprint: Sketch 	2:10–3:00	Test - Story <ul style="list-style-type: none"> ▪ Evaluation Methods ▪ Think-Aloud Studies ▪ Design Sprint: Test
2:30–2:45	Decide - Charts <ul style="list-style-type: none"> ▪ Design Sprint: Decide 	3:00–3:10	Break
2:45–3:15	Prototype - Charts <ul style="list-style-type: none"> ▪ Tableau Prototype 	3:10–4:00	Show & Tell <ul style="list-style-type: none"> ▪ Design Sprint: Iteration ▪ Show & Tell Presentations
3:15–3:30	Break	4:00–4:30	Program Wrap-Up (Evaluation, Certificates)
3:30–4:00	Prototype - Charts (cont.) <ul style="list-style-type: none"> ▪ Tableau Prototype 		
4:00–4:15	Day 1 Wrap-Up		
4:15–5:00	Reception		

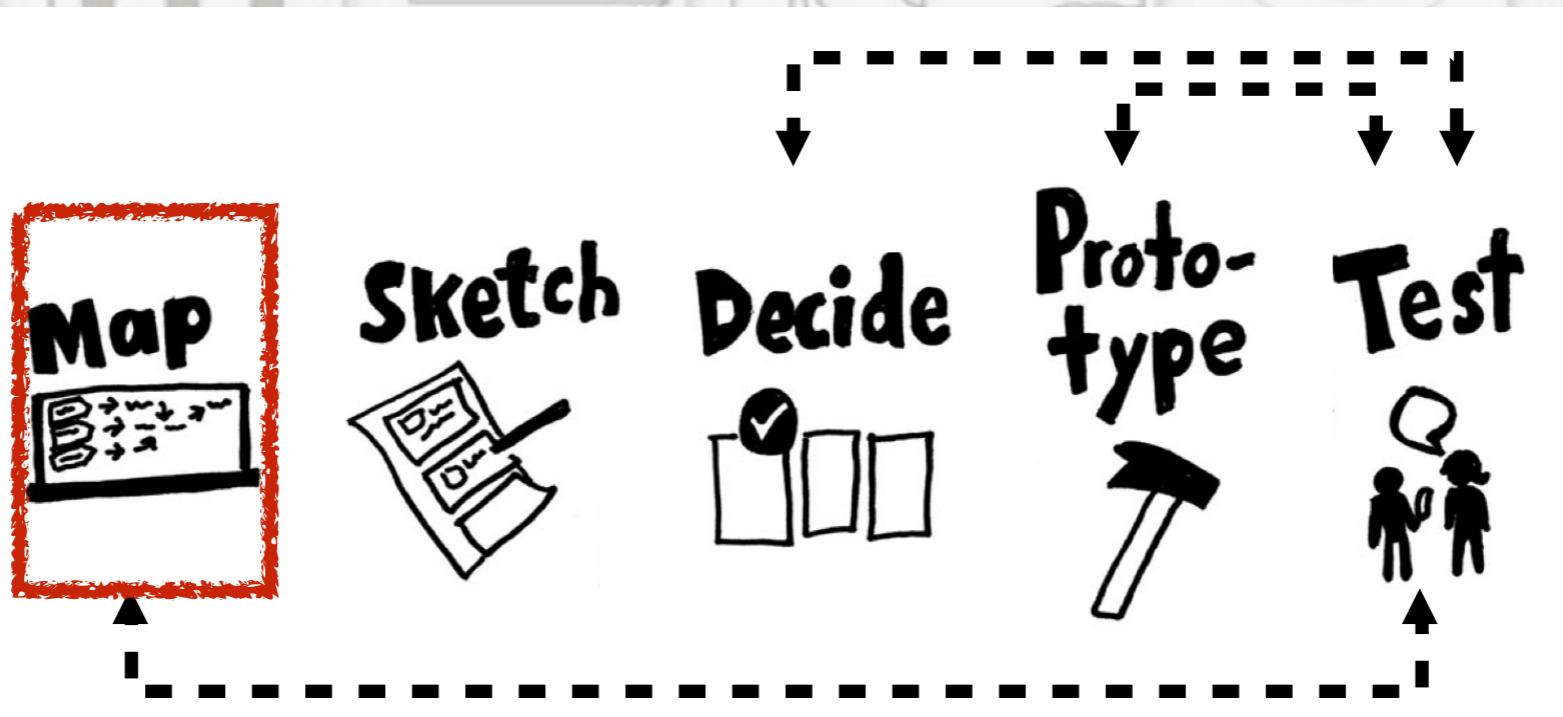
Activity

- What were the main takeaways from day 1 for you?
- Time: 5 min



Map - Story

- Data Stories
- What is the message?
- Map - Story



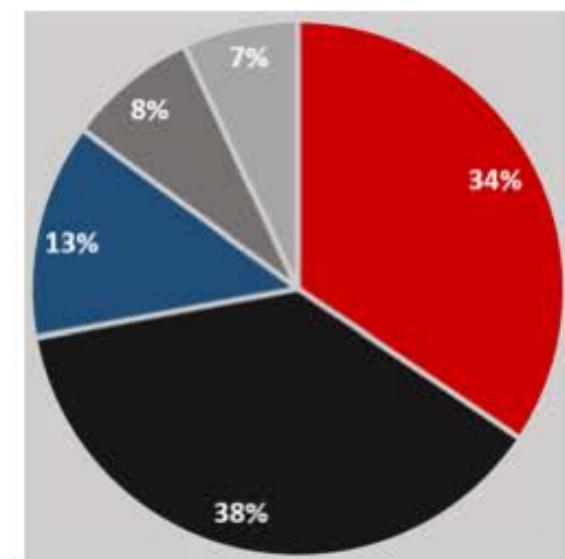
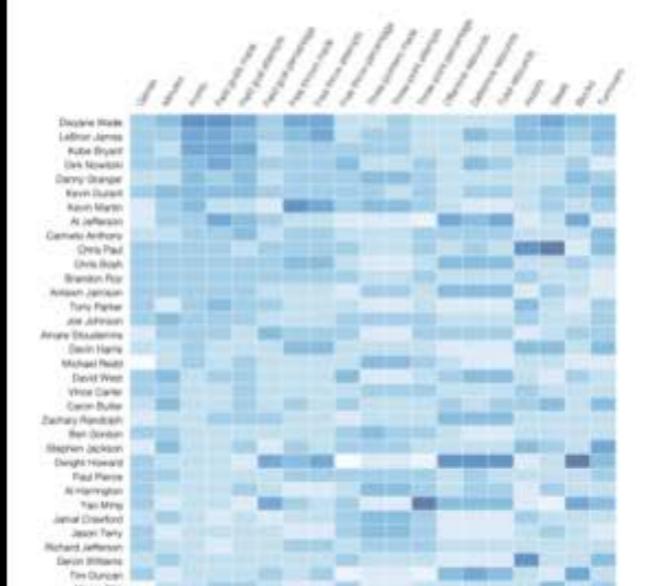
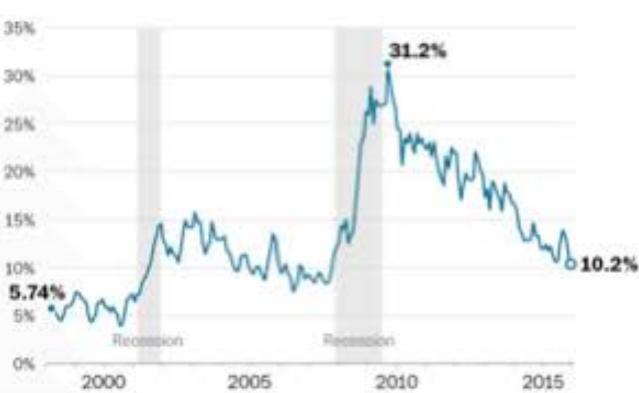
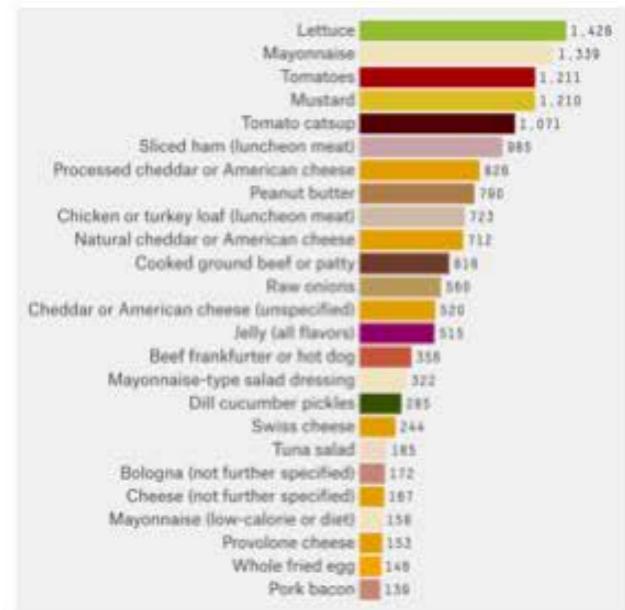
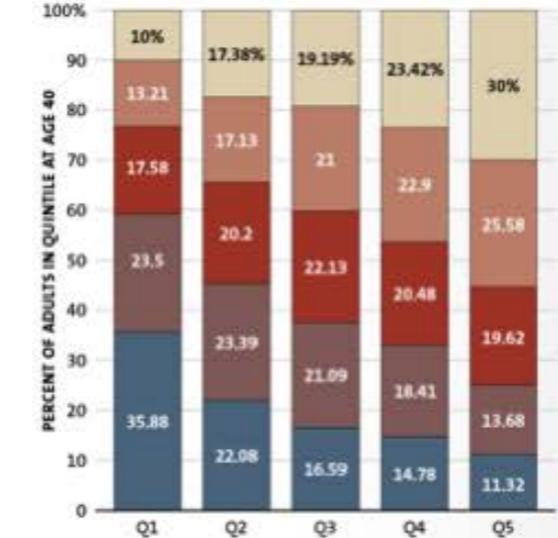
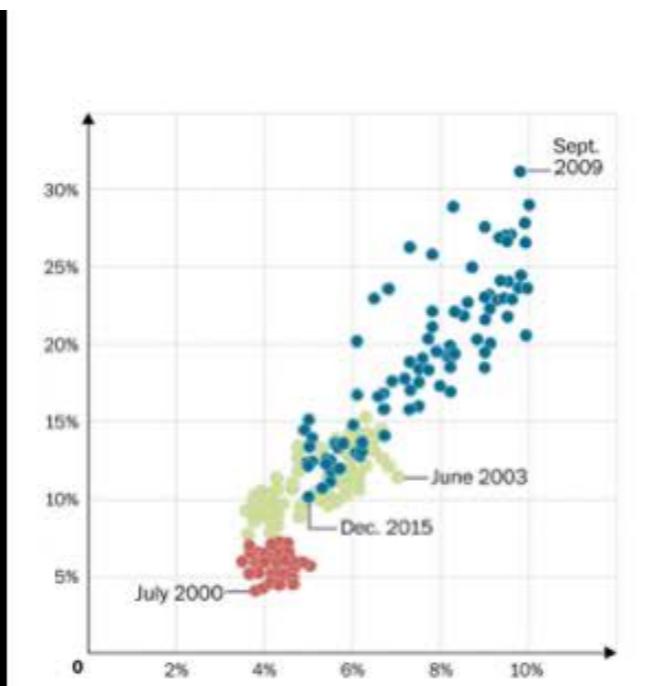
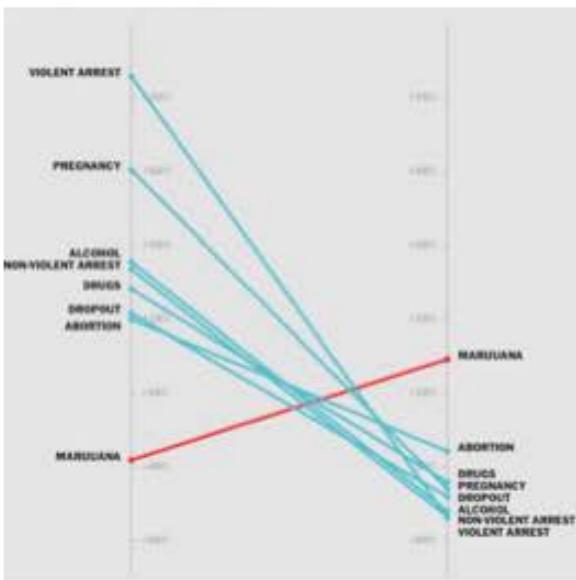
Data Stories

Stories

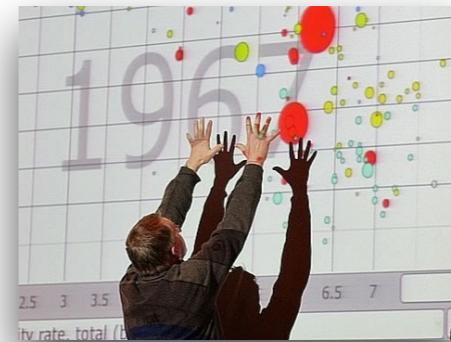
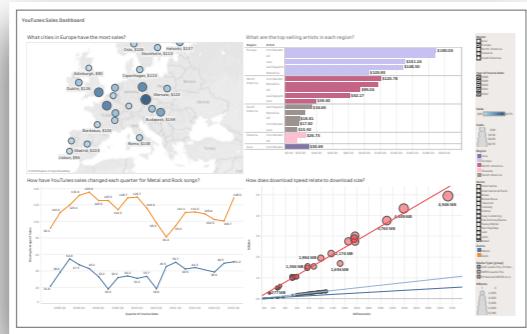
The most memorable delivery tool for information



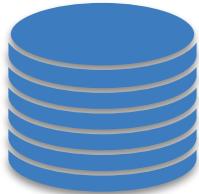
Not Stories



Explore and Explain



Data



Visuals



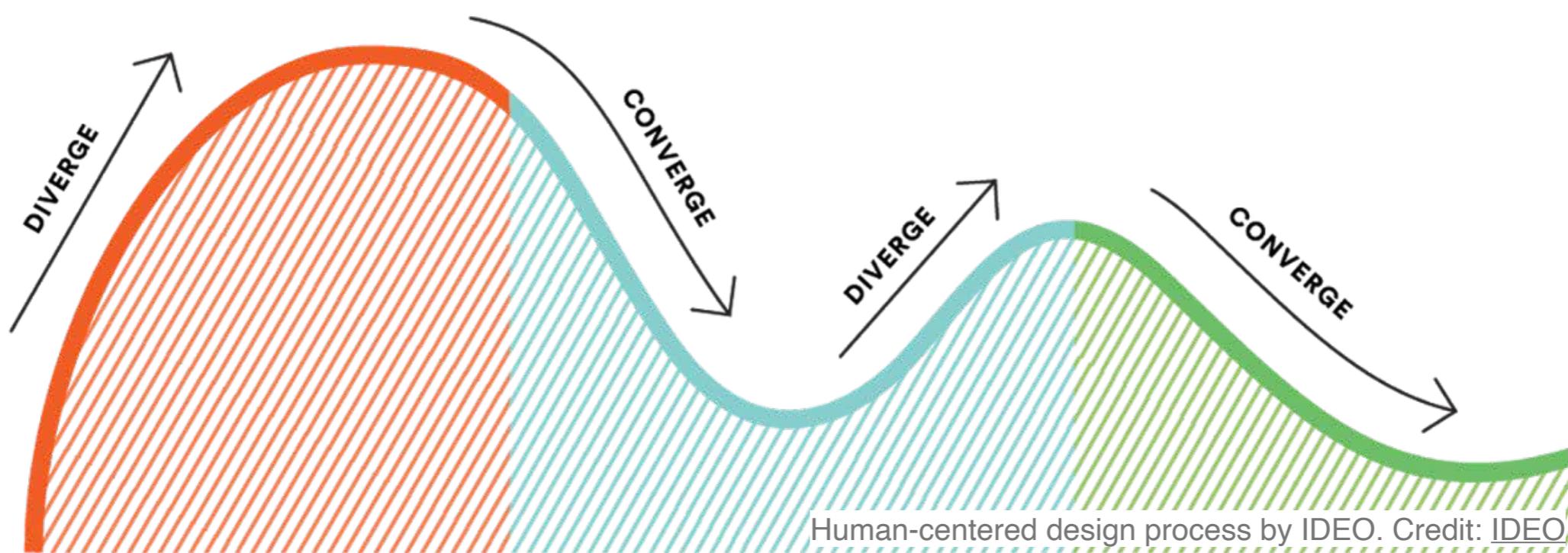
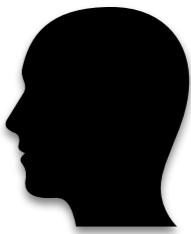
Insight



Narrative

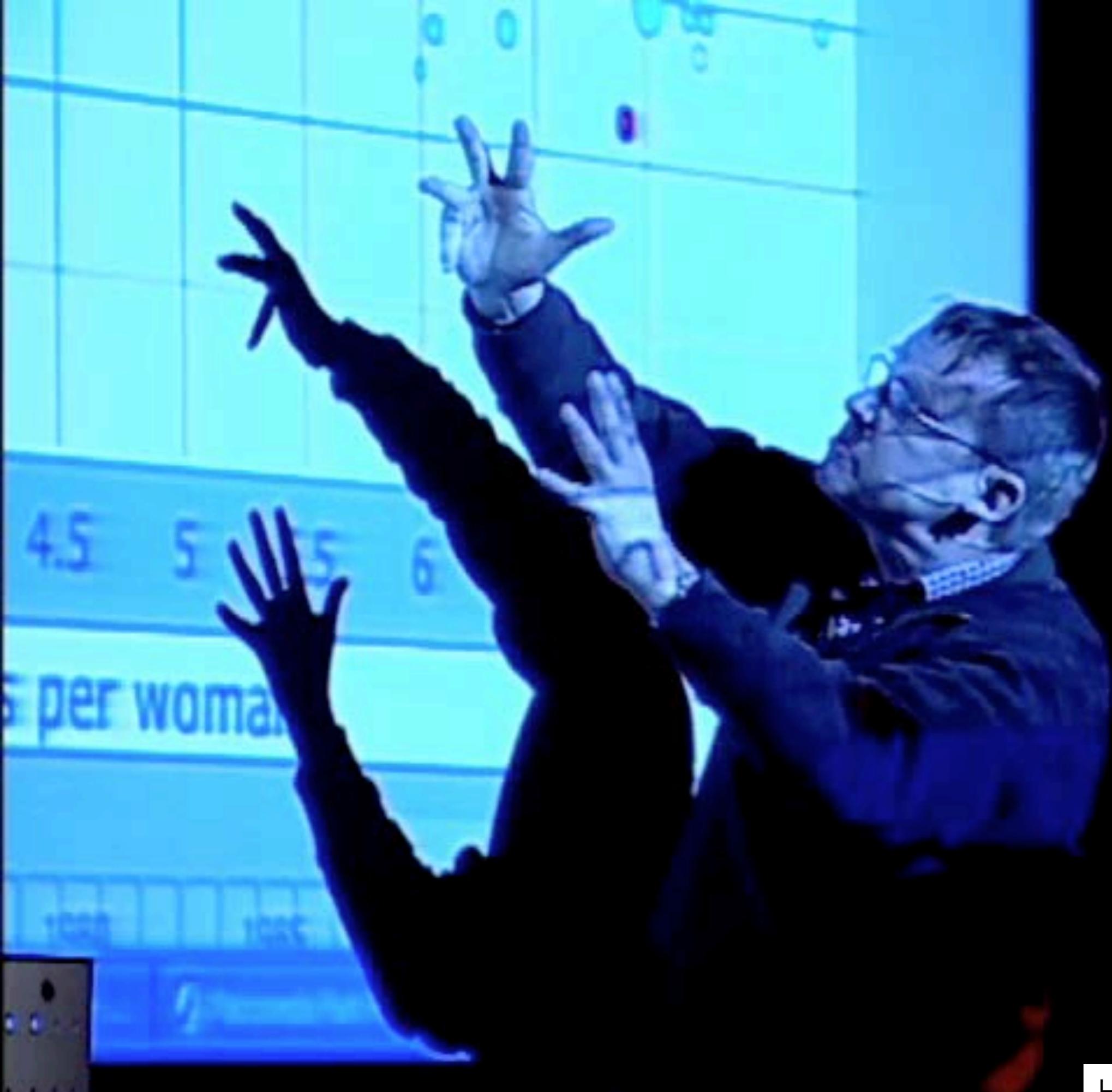


Audience

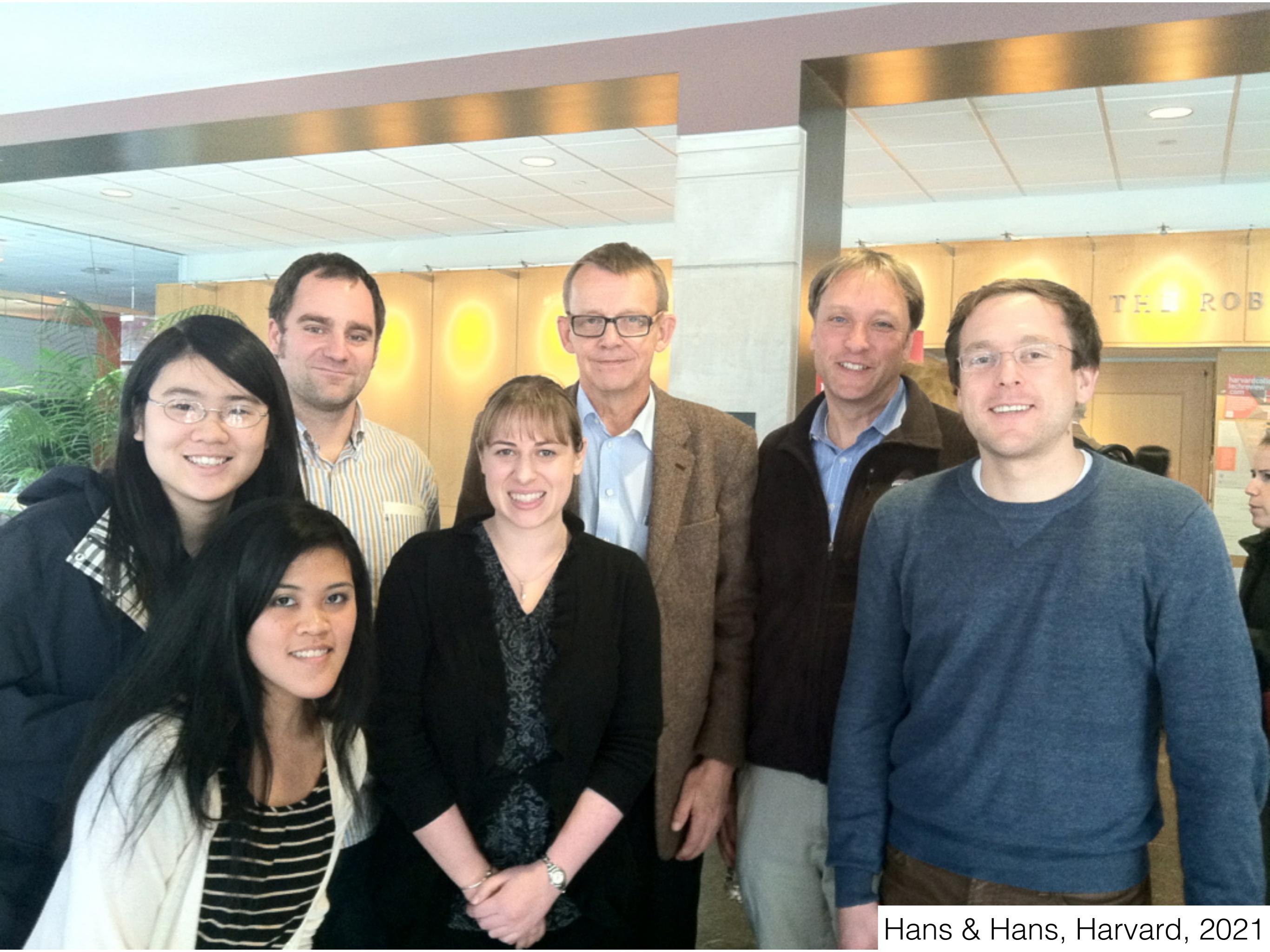


Human-centered design process by IDEO. Credit: IDEO

Brent Dykes



Hans Rosling, TED 2006



Hans & Hans, Harvard, 2021

Activity 5.3

Look at the following data story. What are the elements of a good data story?

5 mins



[bit.ly/techgen-story](https://www.washingtonpost.com/graphics/2017/03/01/what-tech-world-did-you-grow-up-in/)



WHAT 'TECH
WORLD' DID YOU
GROW UP IN?

bit.ly/techgenstory

Data Story Elements

Data stories use **data** as a fact-based foundation.

A **message** that is the central insight, idea, or main point.

An **explanatory focus** to help the audience interpret the data by drilling into aspects such as the *how* and *why*.

A **linear sequence** in which supporting facts build on each other until the conclusion is reached.

Contextual details and dramatic elements—setting, plot, characters—for the audience to properly grasp your insights.

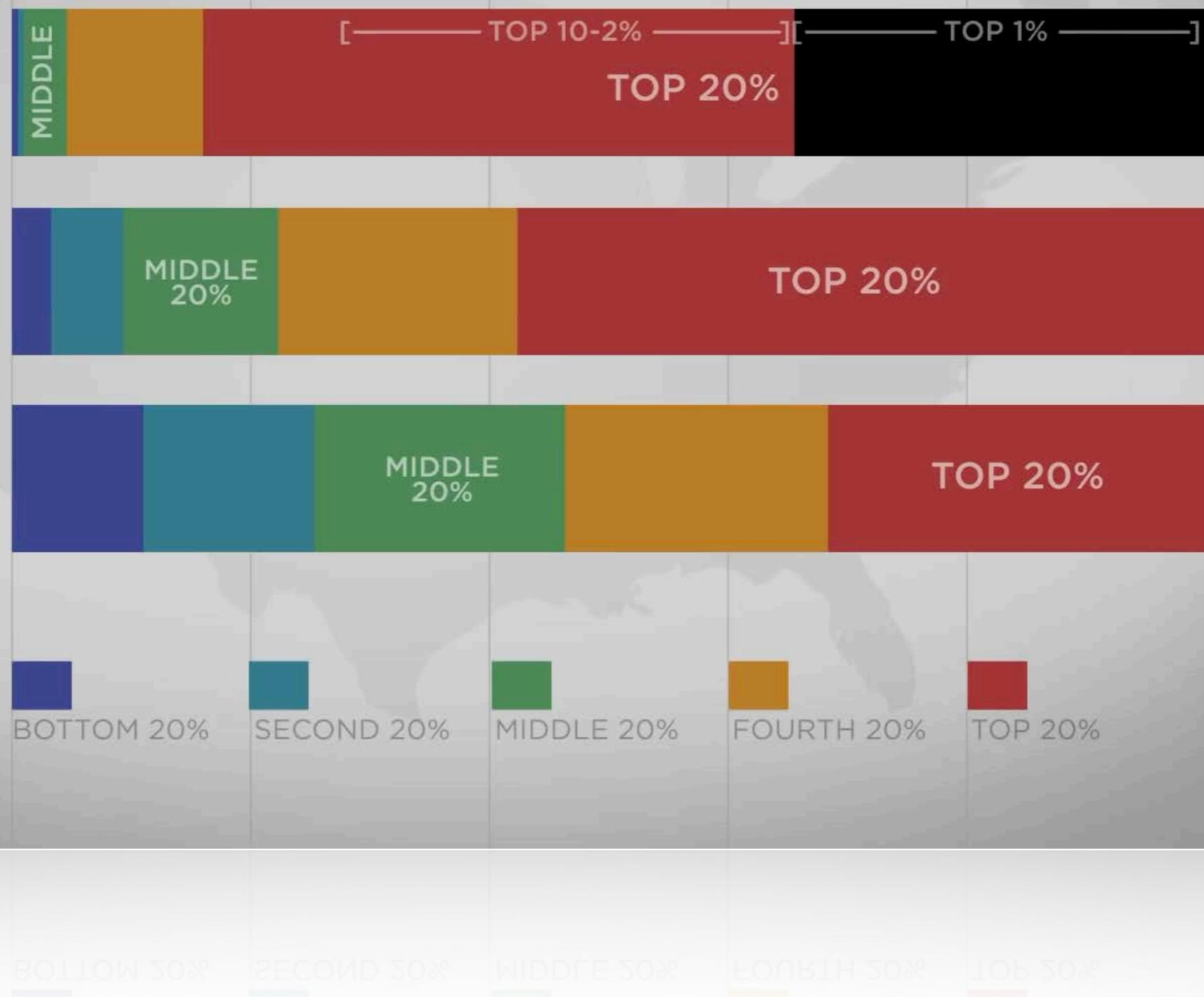
Visualizations that anchor the story and that are supported by words and numbers.

WEALTH INEQUALITY IN AMERICA

ACTUAL
Distribution of
Wealth in the U.S.

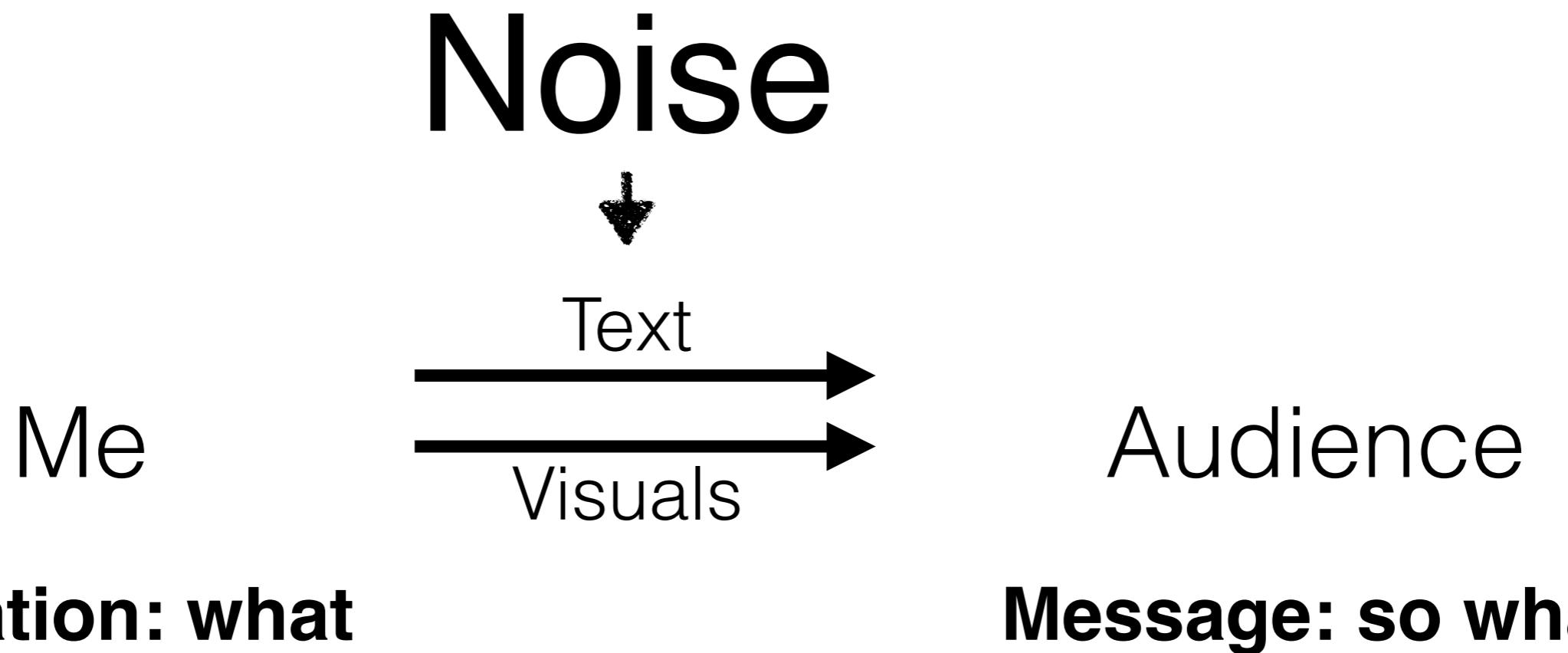
What Americans
THINK
The Distribution Is

Distribution
92% Choose as
IDEAL



What is the message?

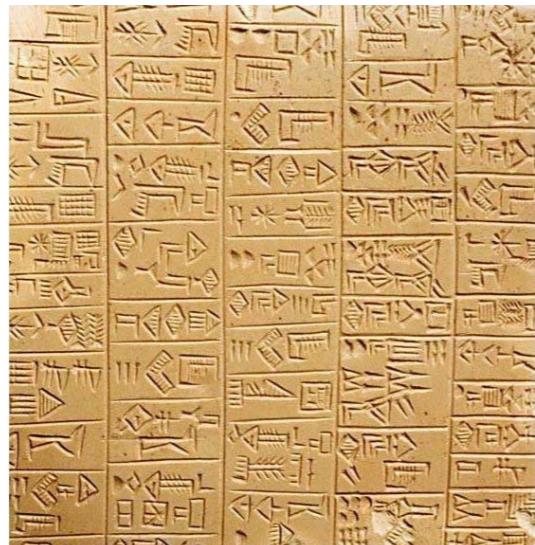
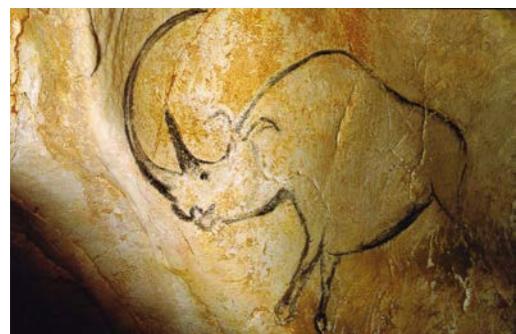
Communication



Effective
Redundancy

Redundant Encoding

- Text: rational, abstract, processed sequentially, slow, learned
- Visual: intuitive, concrete, processed in parallel, fast, innate



,	Ѡ	T	P	ABCDEF
B	Ѽ	Y	S	GHIJKLM
G	Ѽ	K	Q	NOPQRS
D	Ѽ	L	R	TUVWXYZ
H	Ѽ	M	Š	
W	Ѽ	N	X	
Z	Ѽ	S	T	
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Ѡ	Ѽ			

Abstraction

What is the message?

Customer Service Complaints: Volume & Response Time

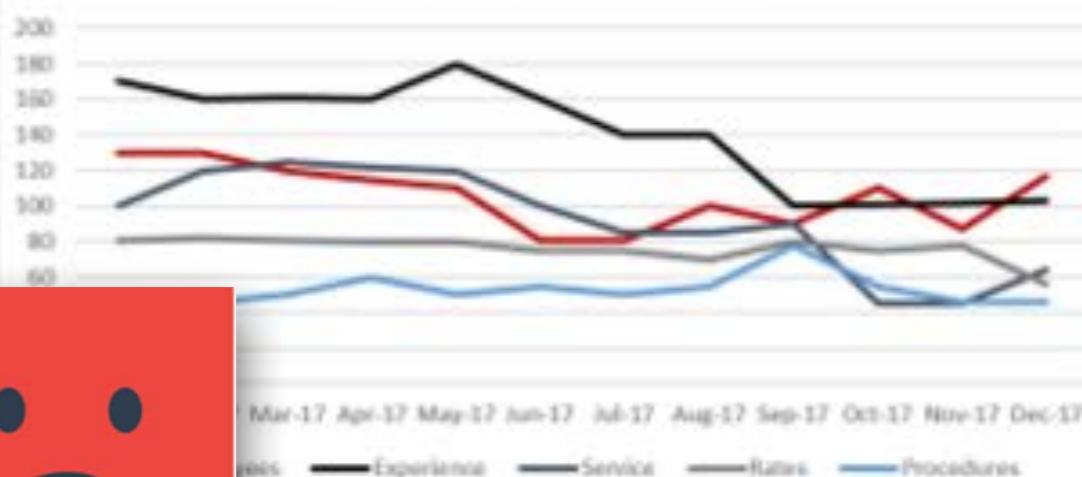
December complaints are up from November but remain down from YTD averages

Historical Complaint Summary

Total Volume of Customer Service Complaints



Top Complaint Categories



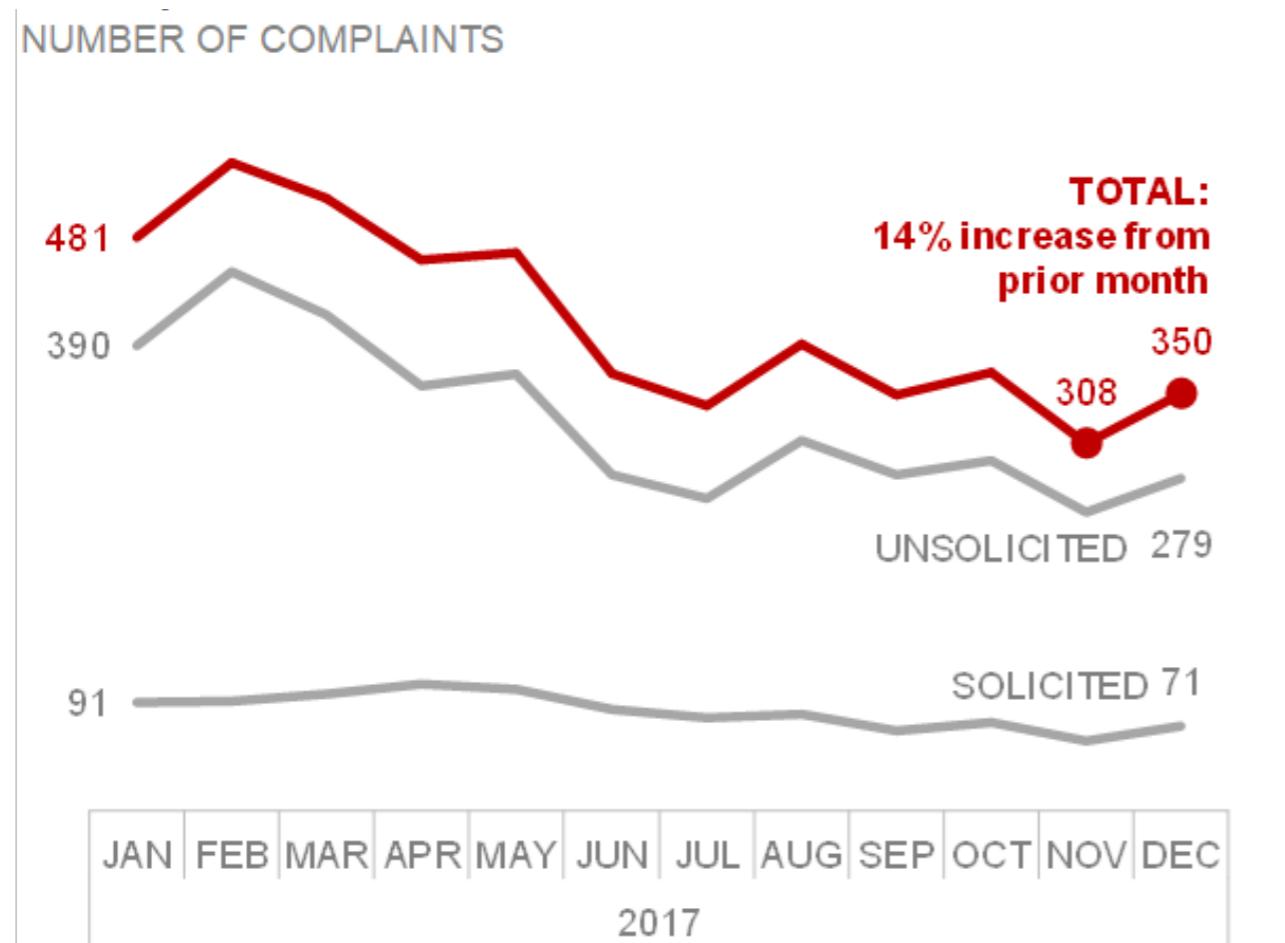
Commentary

- Complaints were up 14% vs the prior month. The change in complaint volume falls within normal month to month variance. From a complaints per business day perspective, December's results were at 16.5 which compares favorably to the YTD average of 17.9 and is higher than September's YTD low of 15.
- Employee related complaints increased to 117 from 87 in November, but remain somewhat consistent with YTD levels. The top root cause reasons are employee related (Carelessness - 18; Lack of training - 17).
- We will monitor trends on these root cause areas and address in action plans with the individual departments.
- Categories including Procedures, Rate and Client Experience remain consistent.



Customer Service Complaints

Total Number of Complaints



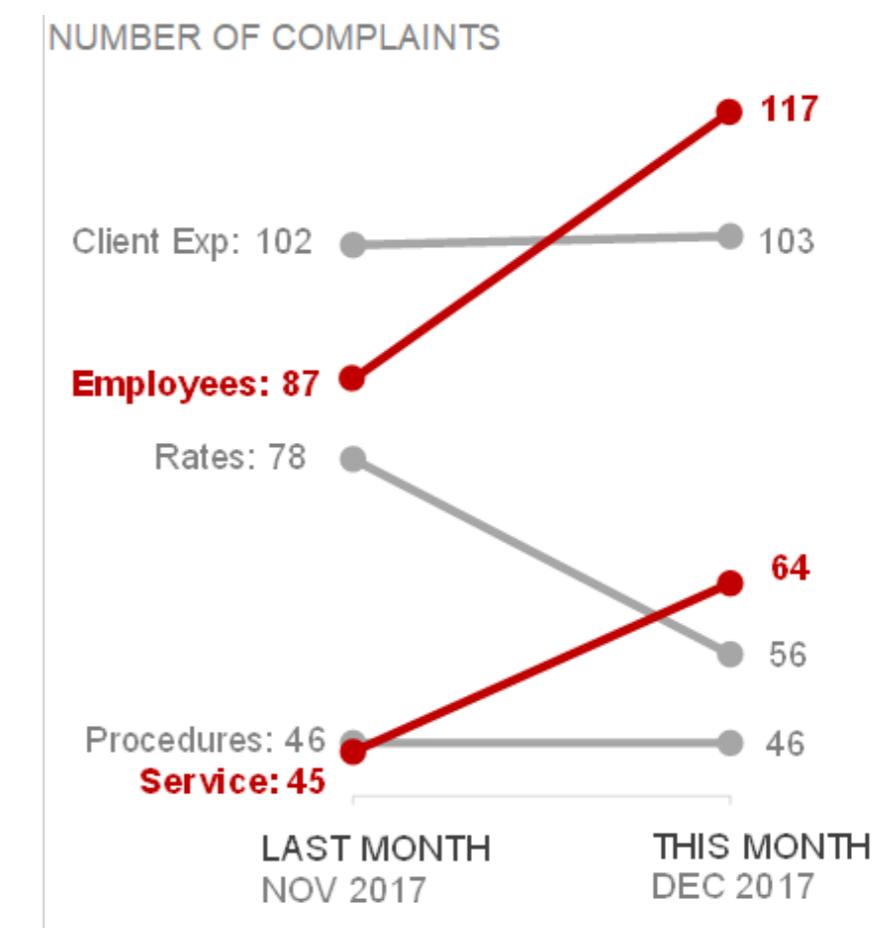
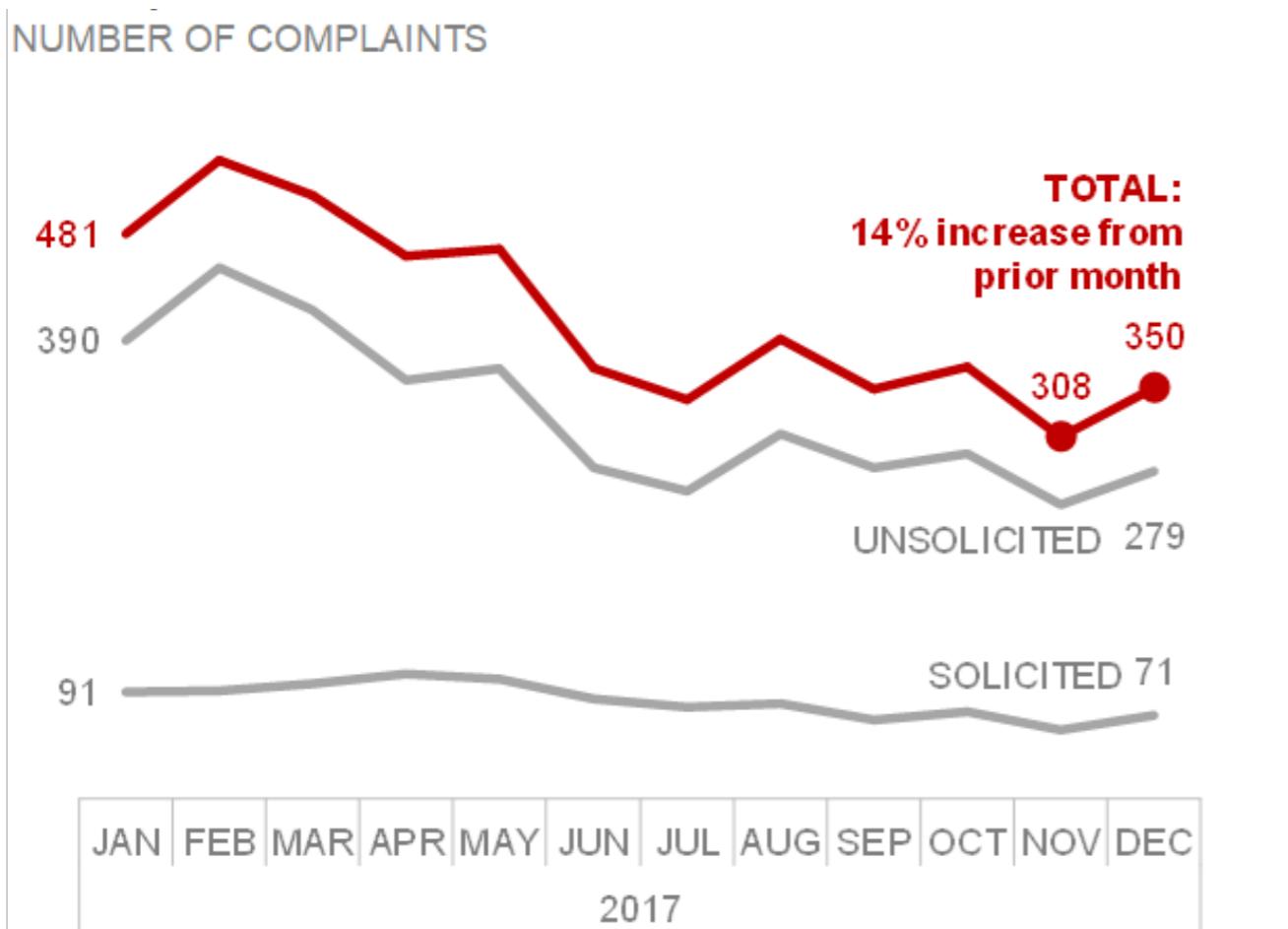
Complaints by Category



Customer Service Complaints

Complaints are **increasing**

Especially about
employees and **services**

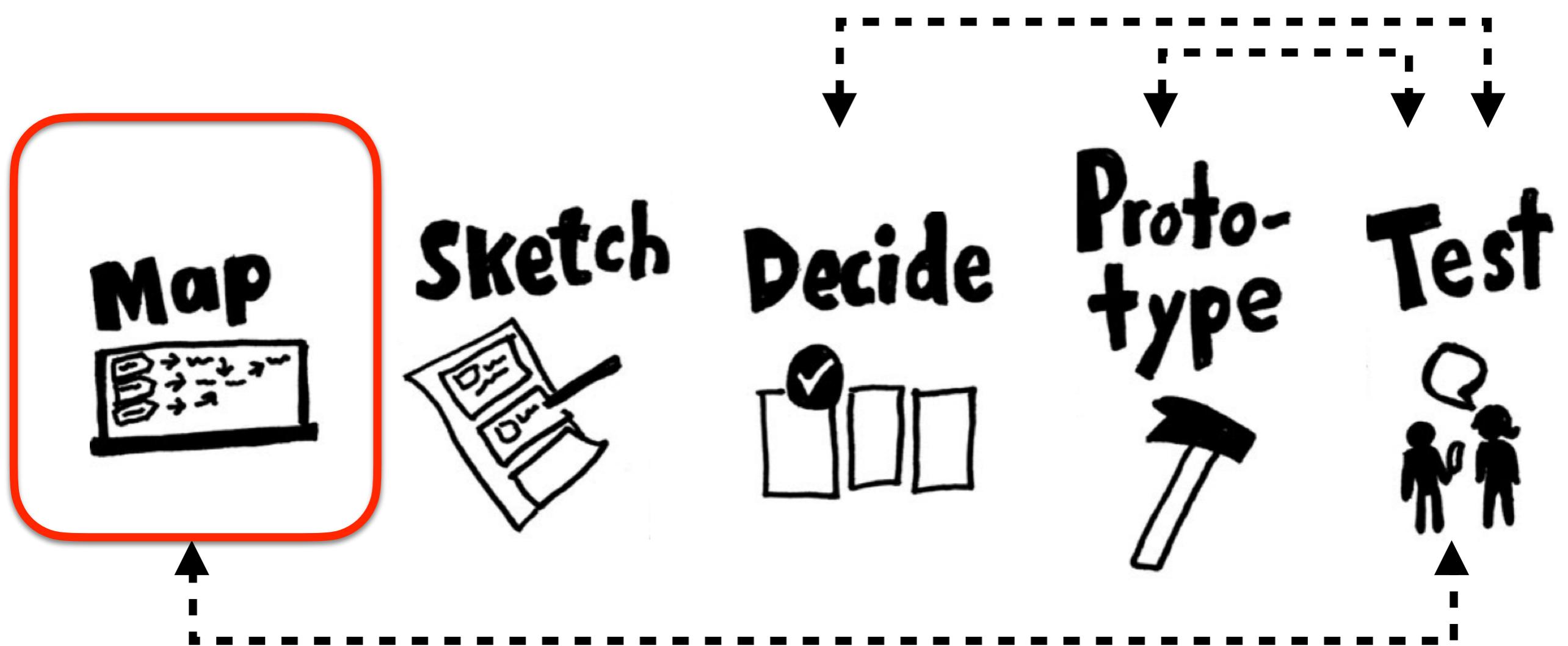


Effective redundancy & messaging

Coffee Break



Map - Story



Activity

Finish your Tableau visualizations.

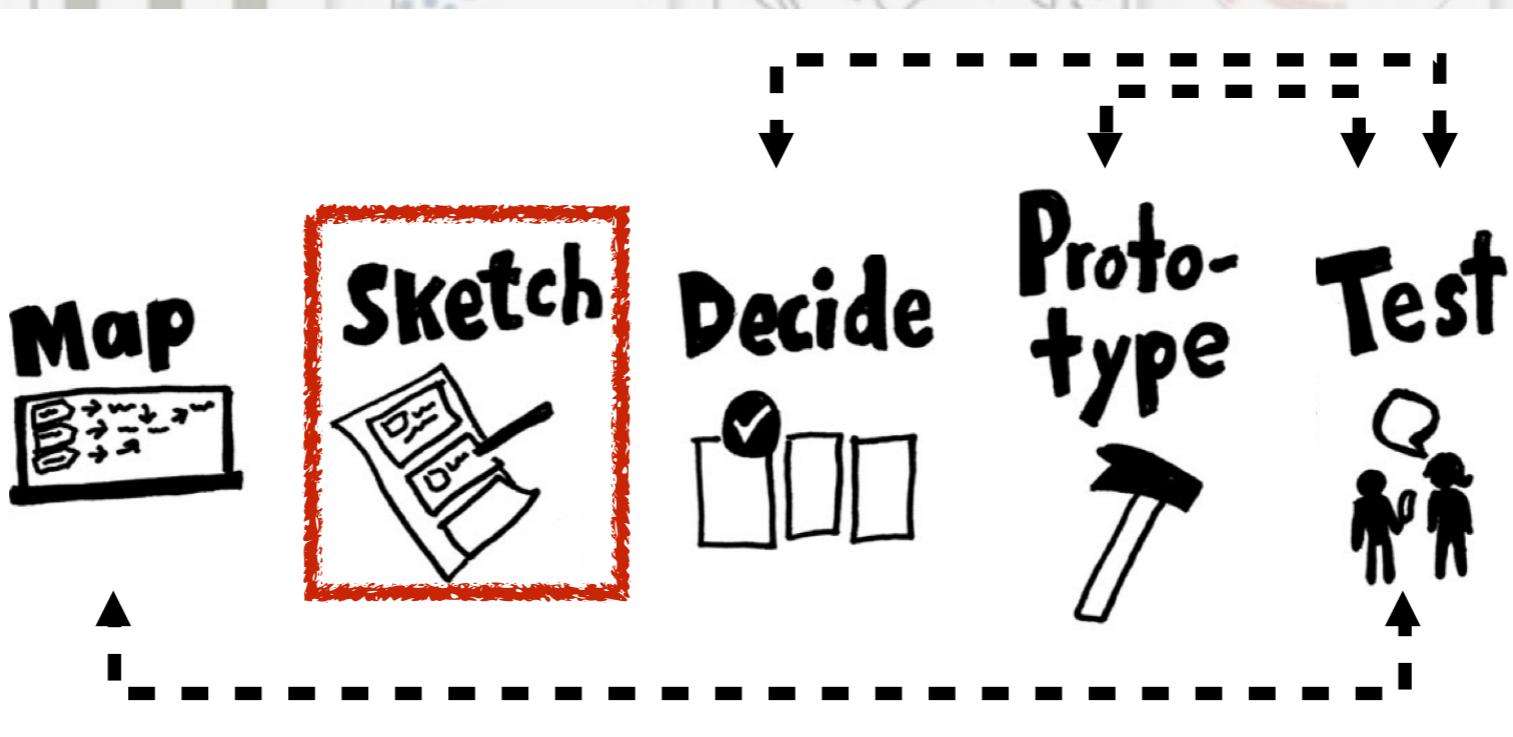
Discuss appropriate messages for each of them and put the messages in the titles.

20 mins



Sketch - Story

- Dashboards
- Tableau Dashboards
- Storyboards



Dashboards

755



Steroids or Not, the Pursuit Is On

Barry Bonds is taking aim at the career home run record. He needs only six more to tie Babe Ruth and 47 to equal Hank Aaron.

Lines are cumulative home runs.

Hank Aaron
755 homers
23 seasons



Babe Ruth
714 homers
22 seasons



Barry Bonds
708 homers
20 seasons

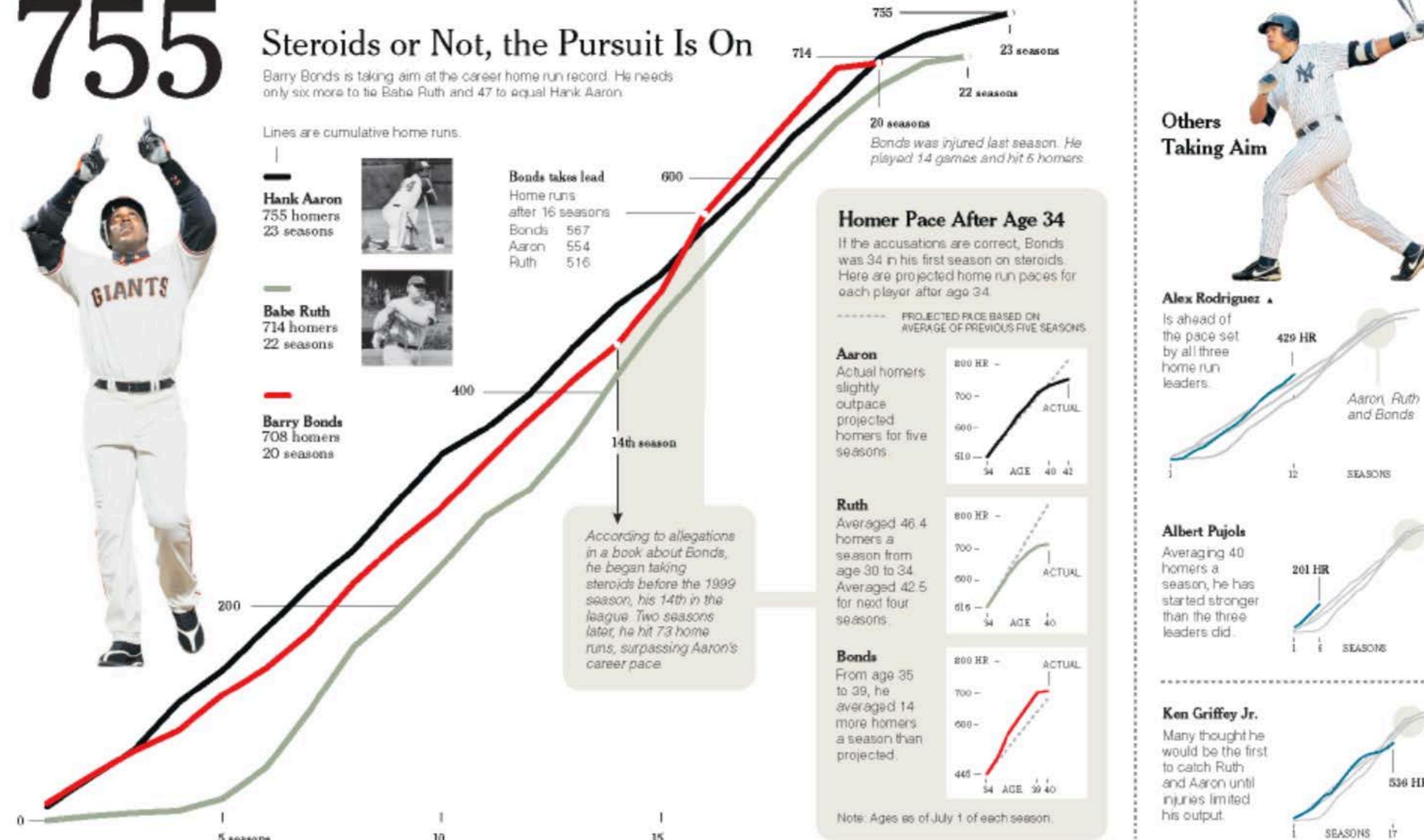
Bonds takes lead
Home runs
after 16 seasons
Bonds 567
Aaron 554
Ruth 516

600

400

14th season

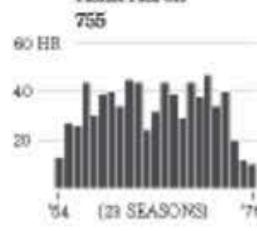
According to allegations in a book about Bonds, he began taking steroids before the 1999 season, his 14th in the league. Two seasons later, he hit 73 home runs, surpassing Aaron's career pace.



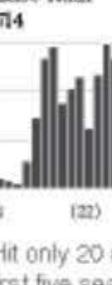
Differing Paths to the Top of the Charts

The top seven players on the career home run list, along with a look at Griffey (12th), Rodriguez (37th) and Pujols (tied 257th).

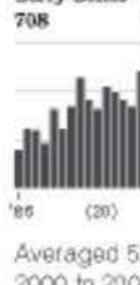
Hank Aaron



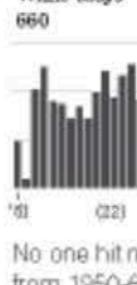
Babe Ruth



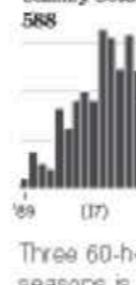
Barry Bonds



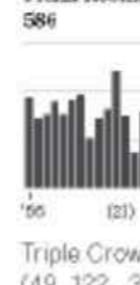
Willie Mays



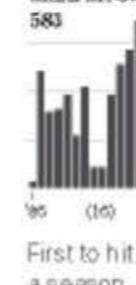
Sammy Sosa



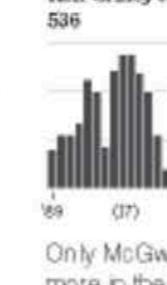
Frank Robinson



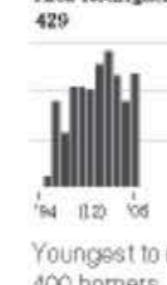
Mark McGwire



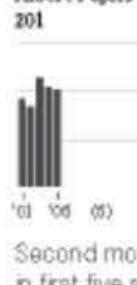
Ken Griffey Jr.



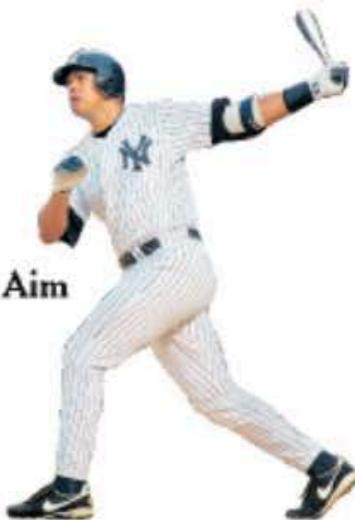
Alex Rodriguez



Albert Pujols

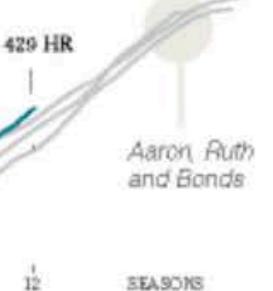


Others Taking Aim



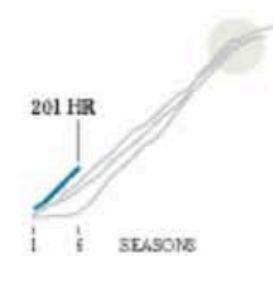
Alex Rodriguez

Is ahead of the pace set by all three home run leaders.



Albert Pujols

Averaging 40 homers a season, he has started stronger than the three leaders did.



Ken Griffey Jr.

Many thought he would be the first to catch Ruth and Aaron until injuries limited his output.



755

Steroids or Not, the Pursuit Is On

Every home run ever hit in Major League history includes only 10 more to tie Babe Ruth and 47 to exceed him. Aaron's 755th came in his 23rd season.

Aaron's 755th came in his 23rd season.

Hank Aaron
755 home runs
23 seasons



Babe Ruth
714 home runs
22 seasons



Barry Bonds
708 home runs
20 seasons



BEGINNING

After hitting his 200th home run at age 34, Aaron's home run pace was about 10 per year. But Bonds' home run rate increased to 12 per year after age 34, while Ruth's rate declined to 10 per year after age 34.



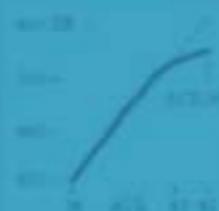
20 seasons
Aaron has 40 more home runs than Ruth and Bonds have in their 20 seasons.

Homer Pace After Age 34

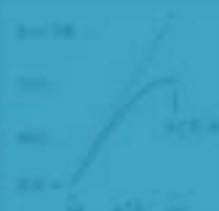
If the accusations are correct, Bonds' pace after age 34 is the best, followed by Ruth and then Aaron.

Home runs per season
Home runs per career season

Aaron
Averaged 10.4 home runs a season from 1960 to 1974.
Then 10.2 home runs a season until 1983.



Ruth
Averaged 10.4 home runs a season from 1920 to 1934.
Averaged 10.2 home runs a season from 1935 to 1948.

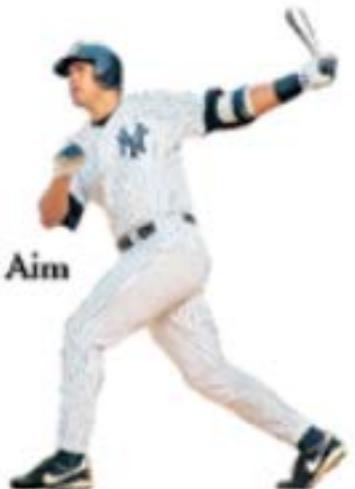


Bonds
Averaged 12.0 home runs a season from 1990 to 1999.
Then 10.0 home runs a season until 2007.



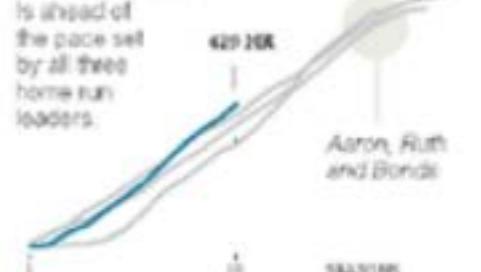
Home runs in 19 days 17 days in seasons

Others Taking Aim



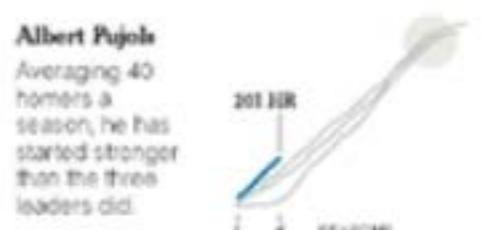
Alex Rodriguez

Is ahead of the pace set by all three home run leaders.



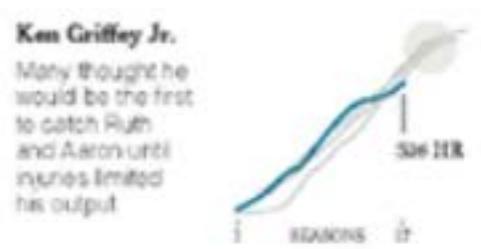
Albert Pujols

Averaging 40 home runs a season, he has started stronger than the three leaders did.



Ken Griffey Jr.

Many thought he would be the first to catch Ruth and Aaron until injuries limited his output.



Differing Paths to the Top of the Charts

The top seven players on the career home run list, along with a look at Griffey (129), Rodriguez (378) and Pujols (led 257).

Hank Aaron



16 times hit 30 or more (M.L. most)

Babe Ruth



Hit only 20 over first five seasons.

Barry Bonds



Averaged 52 from 2000 to 2004.

Willie Mays



No one hit more than 52 from 1950-69.

Sunny Sosa



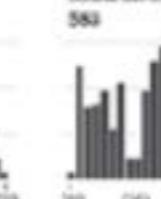
Three 60-homer seasons is record.

Frank Robinson



Triple Crown in '66 (49, 122, .316). First to hit 70 in a season.

Mark McGwire



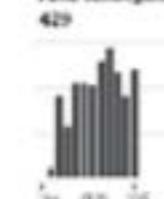
Only McGwire had more in the '90s. Youngest to reach 400 homers.

Ken Griffey Jr.



Youngest to reach 400 homers.

Alex Rodriguez



Second most ever in first five seasons.

Source: Elias Sports Bureau. Illustrations by Joe Wizel. Photos: Getty Images (Aaron, Bonds, Ruth); AP (McGwire, Griffey Jr., Rodriguez); Getty Images (Pujols)

755

Steroids or Not, the Pursuit Is On

Every home run swing was at the power home run record mark—over 10 more to go. 2006: Ruth and 47 to break Hank Aaron.

From a 2005 AP photo by David J. Phillip

Hank Aaron
755 home runs
23 seasons



Babe Ruth
714 home runs
23 seasons



Berry Bonds
708 home runs
23 seasons

BEGINNING

According to statistics in a book about steroids, the Bonds curve follows history from 1920 until the mid-1950s. The Ruth curve passes through the 1950s, while the Aaron curve passes through the 1960s.



23 seasons
Aaron was youngest person to exceed 700 career home runs.

Homer Pace After Age 34

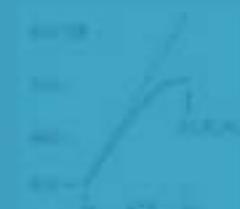
If the generation who entered baseball in 1948 had the same pace per season, here are projected home run paths for each player after age 34:

2006 & 2007 projections are based on 2005 home run rates.

Aaron
Total home runs:
818
Averaged:
32.875
Home runs for last 10 years:
162



Ruth
Averaged 1.614
Fathers 4
Neighbors 10
1947-50 to 54
Age aged 1.614
for next 10 years:



Bonds
Total age 34:
708
Averaged 5.4
Home runs:
162 last 10
years:



Home runs by all players taken together:

Others Taking Aim

Alex Rodriguez
429 home runs
2006 total
by all players
Home runs:

MIDDLE

Albert Pujols
Averaging 43
home runs
so much he has
started changing
from the three
batters out.

Ken Griffey Jr.
Home run record
should be the first
to surpass 400,
but it's likely to
remain limited
in output.

Alex Rodriguez
429 home runs
2006 total
by all players
Home runs:

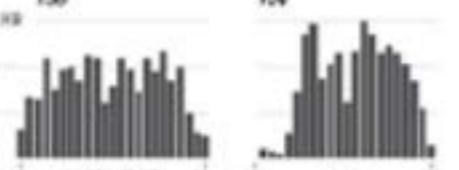
Albert Pujols
261 home runs
2006 total
by all players
Home runs:

Differing Paths to the Top of the Charts

The top seven players on the career home run list, along with a look at Griffey (129), Rodriguez (378) and Pujols (led 257H).

Hank Aaron

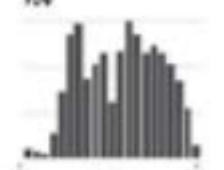
755



15 times hit 30 or
more (M.L. most).

Babe Ruth

714



Hit only 20 over
first five seasons.

Berry Bonds

708



Averaged 52 from
2000 to 2004.

Willie Mays

660



No one hit more
than 150 from
1950-69.

Sunny Sosa

588



Three 60-home run
seasons is record.

Frank Robinson

588



Triple Crown in '66
(49, 122, .318).
First to hit 70 in a
season.

Mark McGwire

583



Only McGwire had
more in the 90's.
Youngest to reach
400 home runs.

Ken Griffey Jr.

536



Youngest to reach
400 home runs.

Alex Rodriguez

429



Second most ever
in first five seasons.

Illustration by Jon Waidl/Orion for The New York Times

755

Steroids or Not, the Pursuit Is On

Babe Ruth is closing in on the career home run record. Four years, 600+ HR more to tie Babe Ruth and 40 to exceed him in April.

1 year to exceed Babe Ruth

Hank Aaron
755 home runs
203 seasons



Babe Ruth
714 home runs
222 seasons



BARRY BONDS
708 home runs
203 seasons

BEGINNING

1981 season

According to assumptions in a 2006 study from the College of Charleston, without Barry's steroid use, Bonds' total HR total would be 590, 100 fewer than he actually had. And the difference grows, as his career continues.



2014 season
Bonds was indicted on charges that he used performance-enhancing drugs.

Homer Pace After Age 34

If the acceleration rate remains constant, Bonds will add 20 HR per 100 seasons to his total home run count after age 34.

Actual career: 1994-2005
Seasons: 114, home runs: 714

Aaron
Actual career:
1957-74
16 seasons
Projected:
Players 30+ Total
Home Runs



Ruth
Actual career:
1919-34
16 seasons
Projected:
Players 30+ Total
Home Runs



Bonds
Actual career:
1987-2005
18 seasons
Projected:
Players 30+ Total
Home Runs



From: tiny.cc/meyarw (July 1, 2007) (2007)

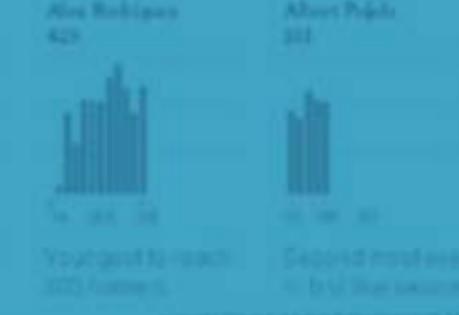
Others Taking Aim

Alex Rodriguez
71 seasons
1994-2013
16 seasons
Home runs: 429

MIDDLE

Albert Pujols
16 seasons
2001-10
16 seasons
Home runs: 511

Ken Griffey Jr.
16 seasons
1990-2001
16 seasons
Home runs: 500



Differing Paths to the Top of the Charts

The top seven players on this career home run list, along with a look at Griffey (128), Pujols (142), and Pineda (129).



END

755

Headline

Steroids or Not, the Pursuit Is On

Barry Bonds is taking aim at the career home run record. He needs only six more to tie Babe Ruth and 47 to equal Hank Aaron.

Lines are cumulative home runs.

Hank Aaron
755 homers
23 seasons



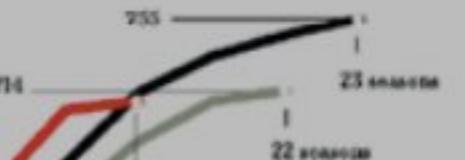
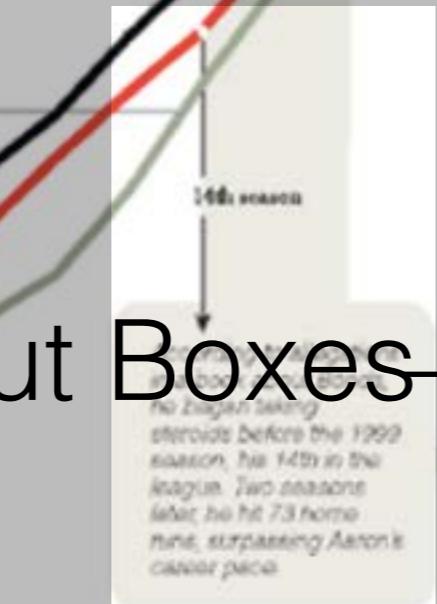
Babe Ruth
714 homers
22 seasons



Barry Bonds
708 homers
20 seasons



Bonds takes lead
Home runs
after 15 seasons
Bonds 587
Aaron 554
Ruth 516

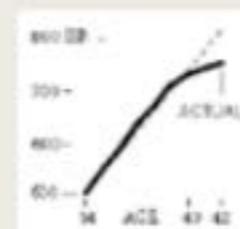


Homer Pace After Age 34

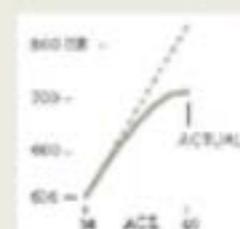
If the accusations are correct, Bonds was 34 in his first season on steroids. Here are projected home run paces for each player after age 34.

PROJECTED PACE BASED ON
AVGAGE OF PREVIOUS FIVE SEASONS

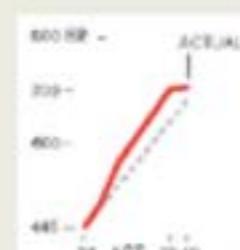
Aaron
Actual homers
slightly
outpace
projected
homers for five
seasons.



Ruth
Averaged 46.4
homers a
season from
age 30 to 34.
Averaged 42.5
for next four
seasons.



Bonds
From age 35
to 39, he
averaged 14
more homers
a season than
projected.



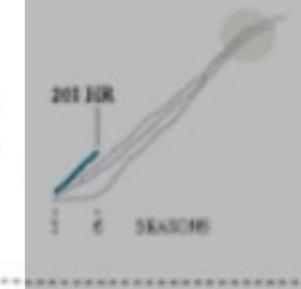
Note: Ages as of July 1 of each season.

Others Taking Aim

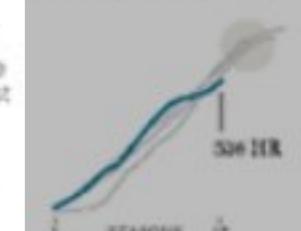
Alex Rodriguez
Is ahead of
the pace set
by all three
former leaders.



Albert Pujols
Averaging 40
homers a
season, he has
started stronger
than the three
leaders did.



Ken Griffey Jr.
Many thought he
would be the first
to catch Ruth
and Aaron until
injuries limited
his output.



Differing Paths to the Top of the Charts

The top seven players on the career home run list, along with a look at Griffey (12th), Rodriguez (37th) and Pujols (56th).

Hank Aaron
755



Babe Ruth
714



Barry Bonds
708



Willie Mays
660



Stanley Sosa
588



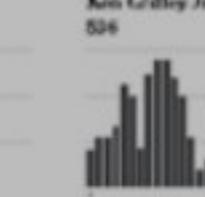
Frank Robinson
584



Mark McGwire
583



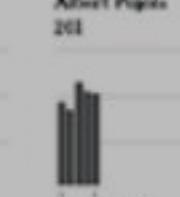
Ken Griffey Jr.
536



Alex Rodriguez
429



Albert Pujols
261



15 times hit 30 or
more (M.L. min.)

Hit only 20 over
first five seasons.

Averaged 52 from
2000 to 2004.

No one hit more
from 1950-69.

Three 60-homer
seasons is record.

Triple Crown in '66
(49, 122, .316)

First to hit 70 in
a season.

Only McGwire had
more in the 90's.

Youngest to reach
400 homers.

Second most ever
in first five seasons.

America's Finest News Organization

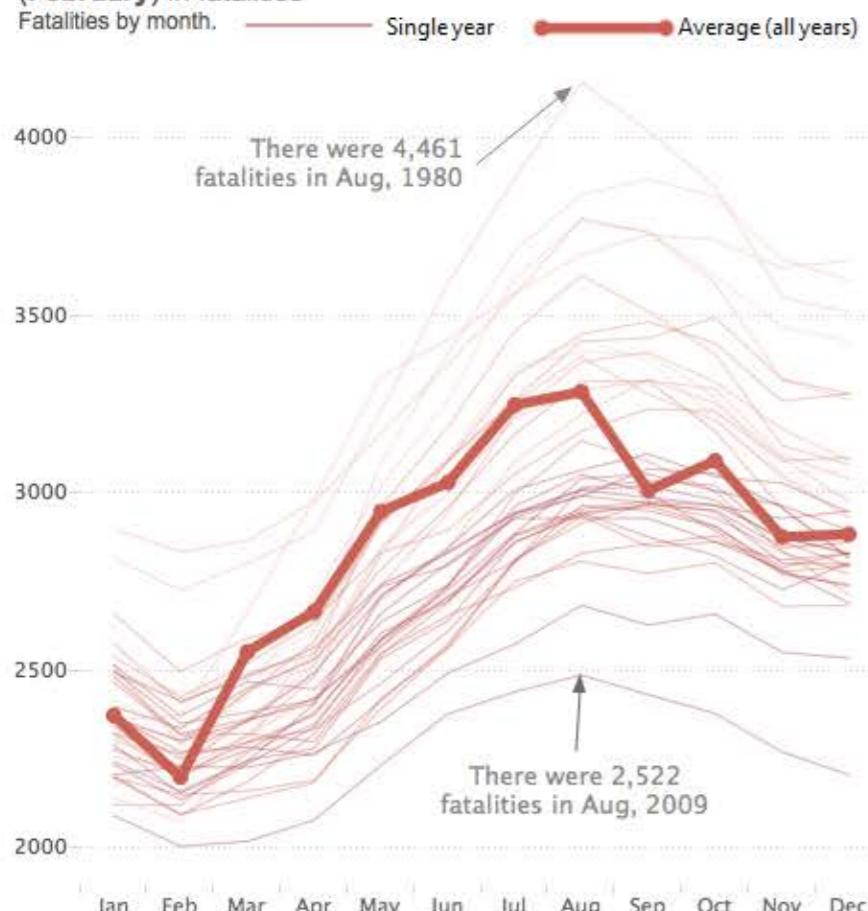
Dashboard Design

Fewer people are dying on US roads, but seasonal trends persist.

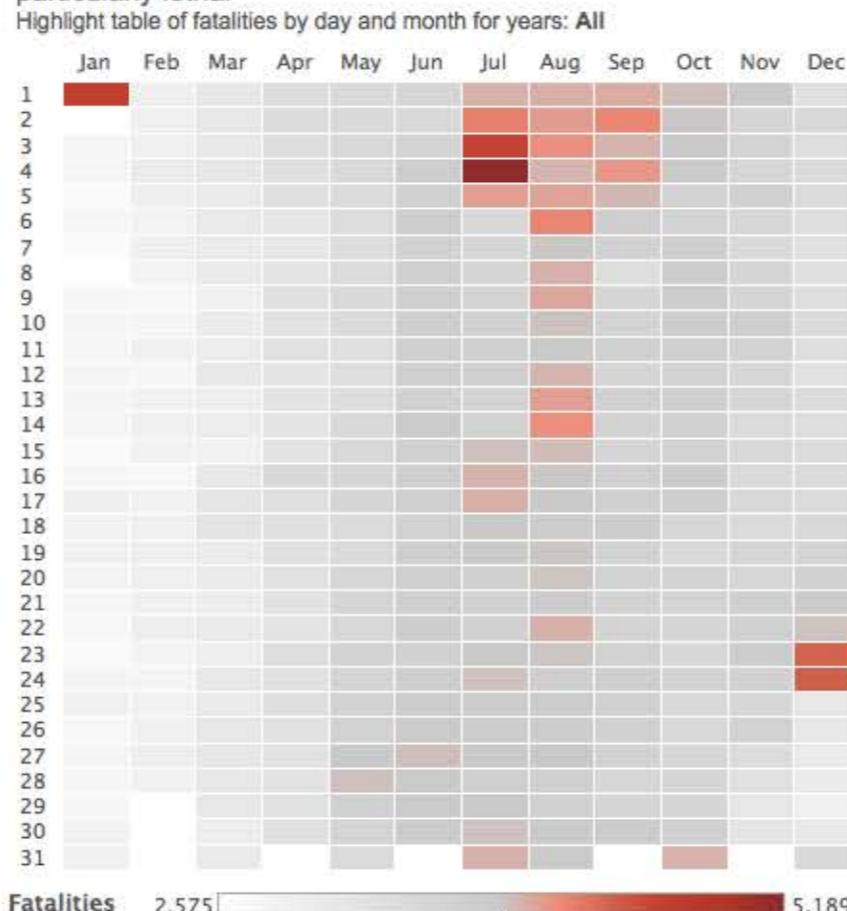
There have been 1,263,670 road fatalities in the US between 1979 and 2011. This dashboard explores the seasonality in the data.

Data from the National Highway Traffic Safety Administration:
<http://www-nrd.nhtsa.dot.gov/Cats/Index.aspx>

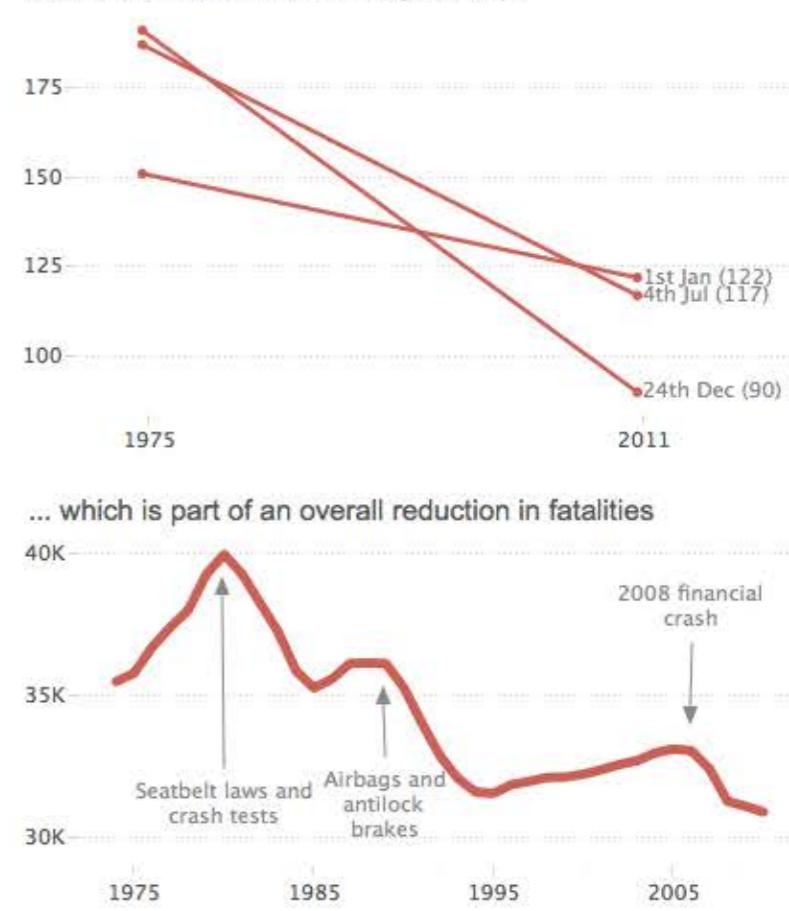
1. Every year sees the same peaks (**August**) and troughs (**February**) in fatalities



2. Three holidays (**New Year, July 4th, Christmas**) are particularly lethal

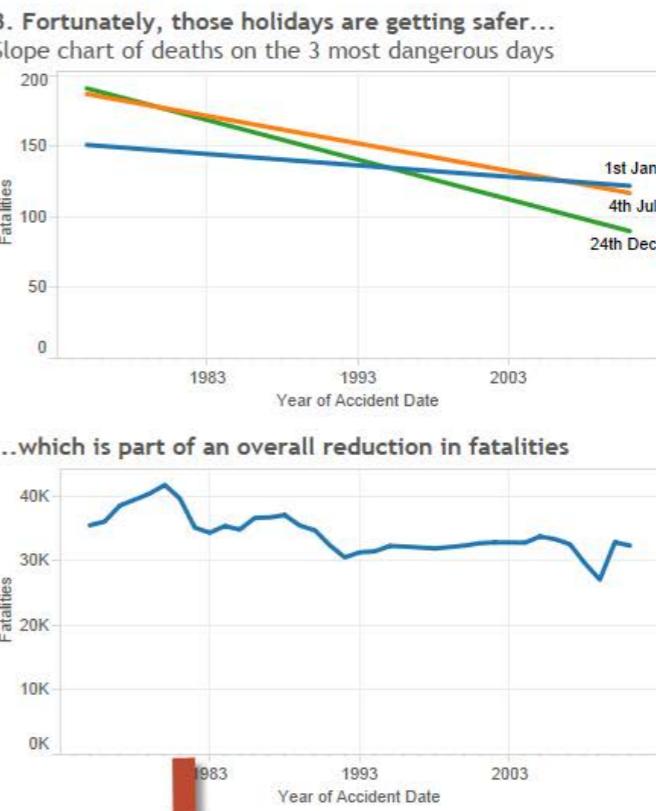
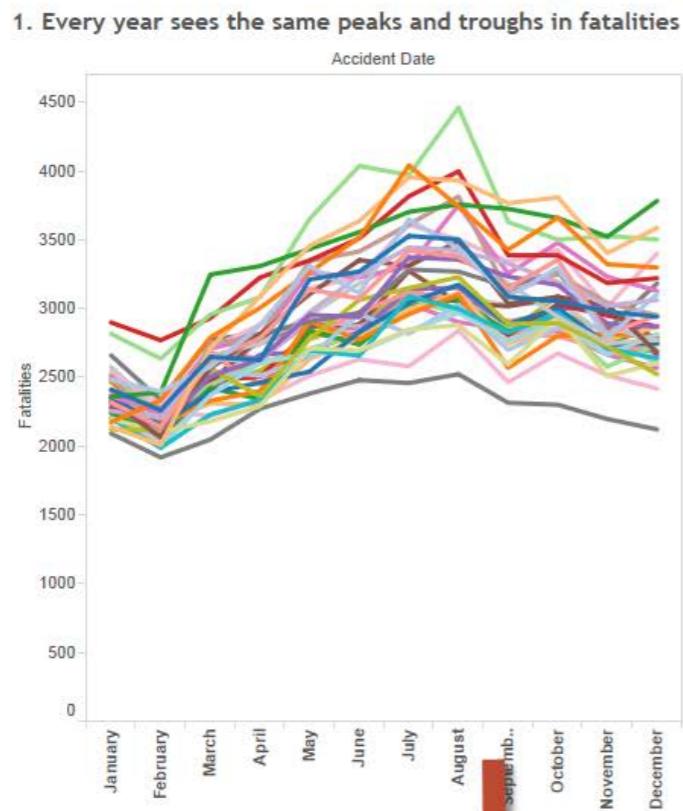


3. Fortunately, those holidays are getting safer...



Fewer people are dying on US roads, but seasonal trends

There have been 1,236,670 road fatalities in the US between 1979 and 2011. This dashboard explores the seasonality in the data.



Fewer people are dying on US roads, but seasonal trends persist.

There have been 1,263,670 road fatalities in the US between 1979 and 2011. This dashboard explores the seasonality in the data.

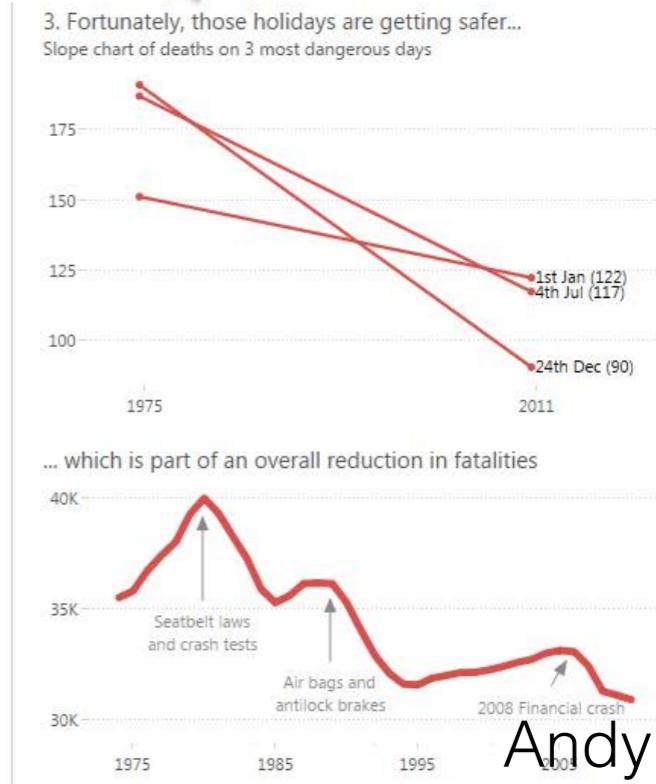
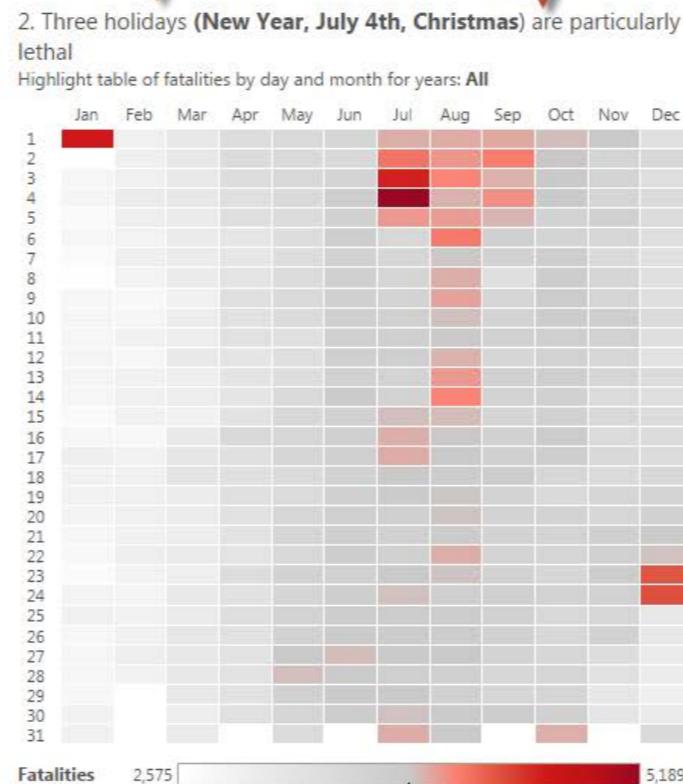
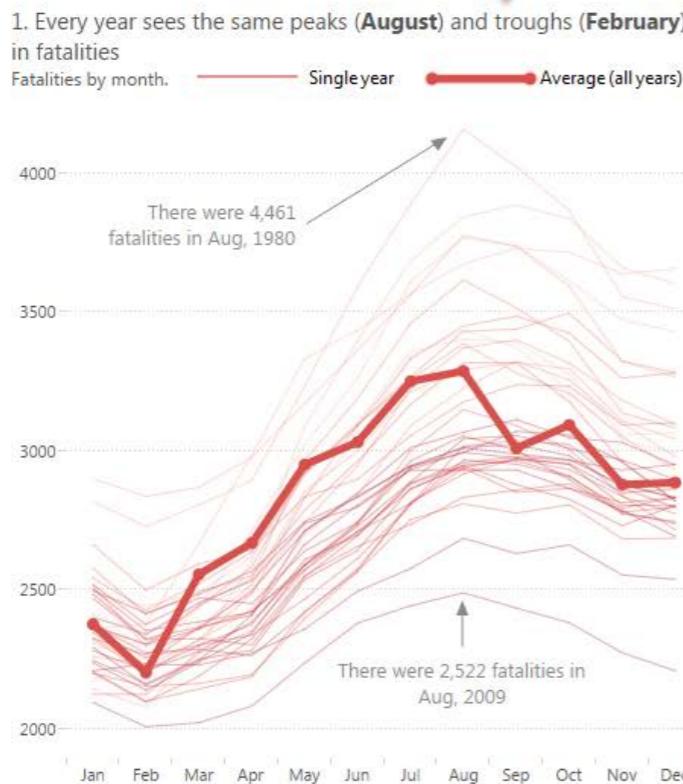


Tableau Public Gallery

tableau public

GALLERY

AUTHORS

BLOG

RESOURCES

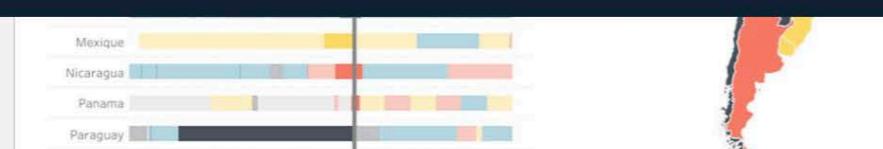
ACTIVITY

SIGN IN

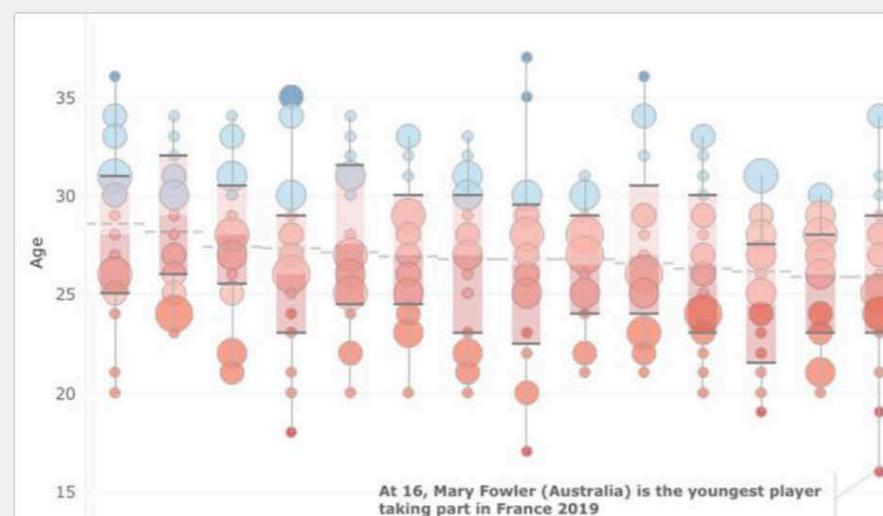


Viz of the Day

Featured



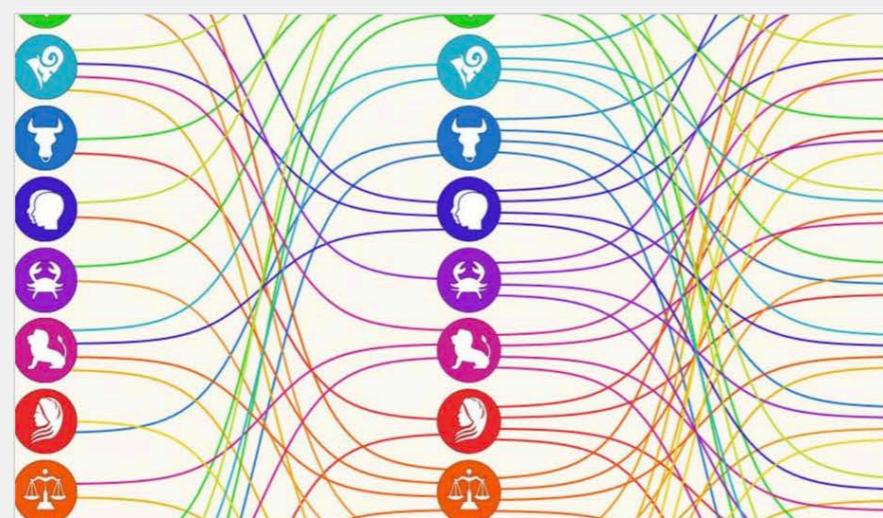
June 10, 2019



Who is playing in the 2019 FIFA Women's World Cup?

James Smith used data provided by #SportsVizSunday to analyze the 24 squads competing for the 2019 Women's World Cup in France. Which team will be victorious?

June 7, 2019



Find your Zodiac Match

In this colorful visualization, Jennifer Dawes takes a look at the zodiac signs (inspired by Kevin Flerlage). Which signs are you most compatible with? Explore the visualization to find out.

June 6, 2019

Tableau Zen Masters



Judit Bekker



Wendy Shijia



Jeffrey Shaffer



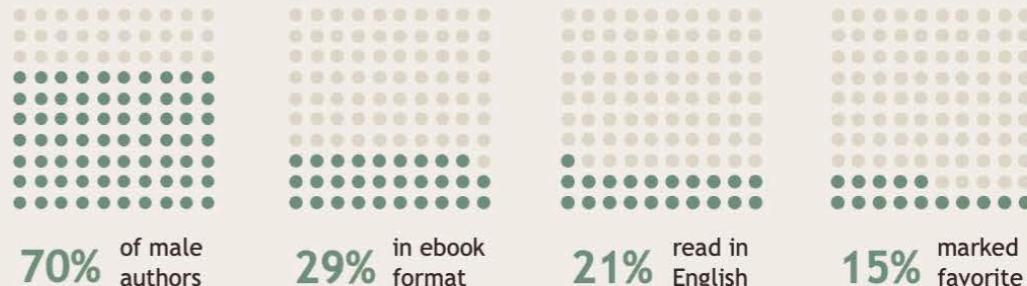
Andy Cotgreave



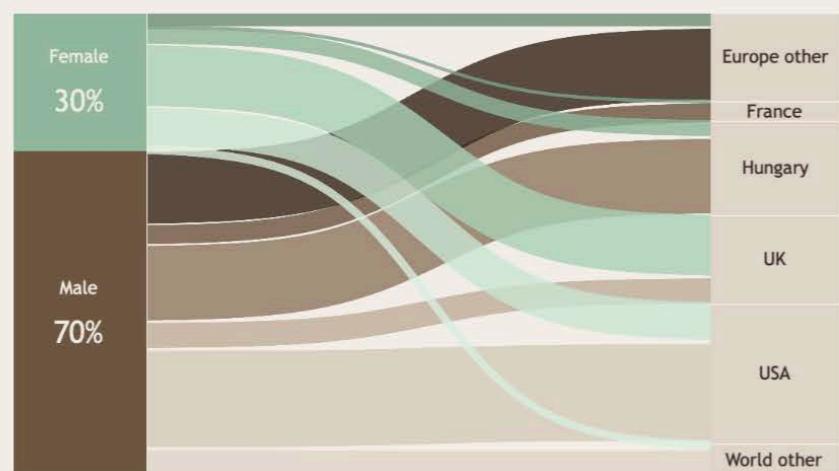
Chantilly Jaggernaut

BOOKS I'VE READ IN THE PAST 10 YEARS

In the past 10 years I have read **278 books** that add up to **97,483 pages** from 171 different authors across the globe. 218 of them were written in my native language (Hungarian), 59 I have read in English and only 1 in Russian. From all these books I marked **42 favourite** and gave an average 4.28 star rating (out of 5) versus 4.34 of the reading community.



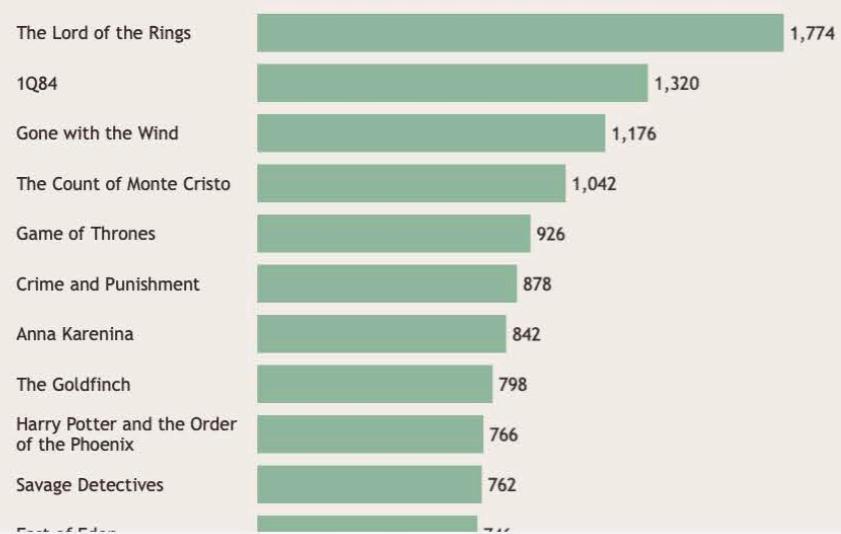
BOOKS BY AUTHOR AND COUNTRY GROUP



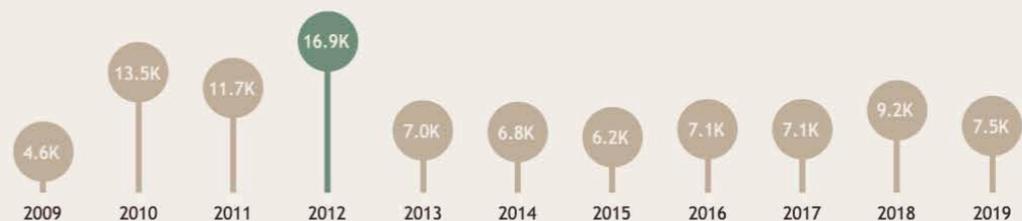
AUTHORS BY BIRTHPLACE



20 LONGEST BOOKS READ



NUMBER OF PAGES READ BY YEAR



TOP 15 AUTHORS BY NUMBER OF BOOKS

- Favourites are marked green -



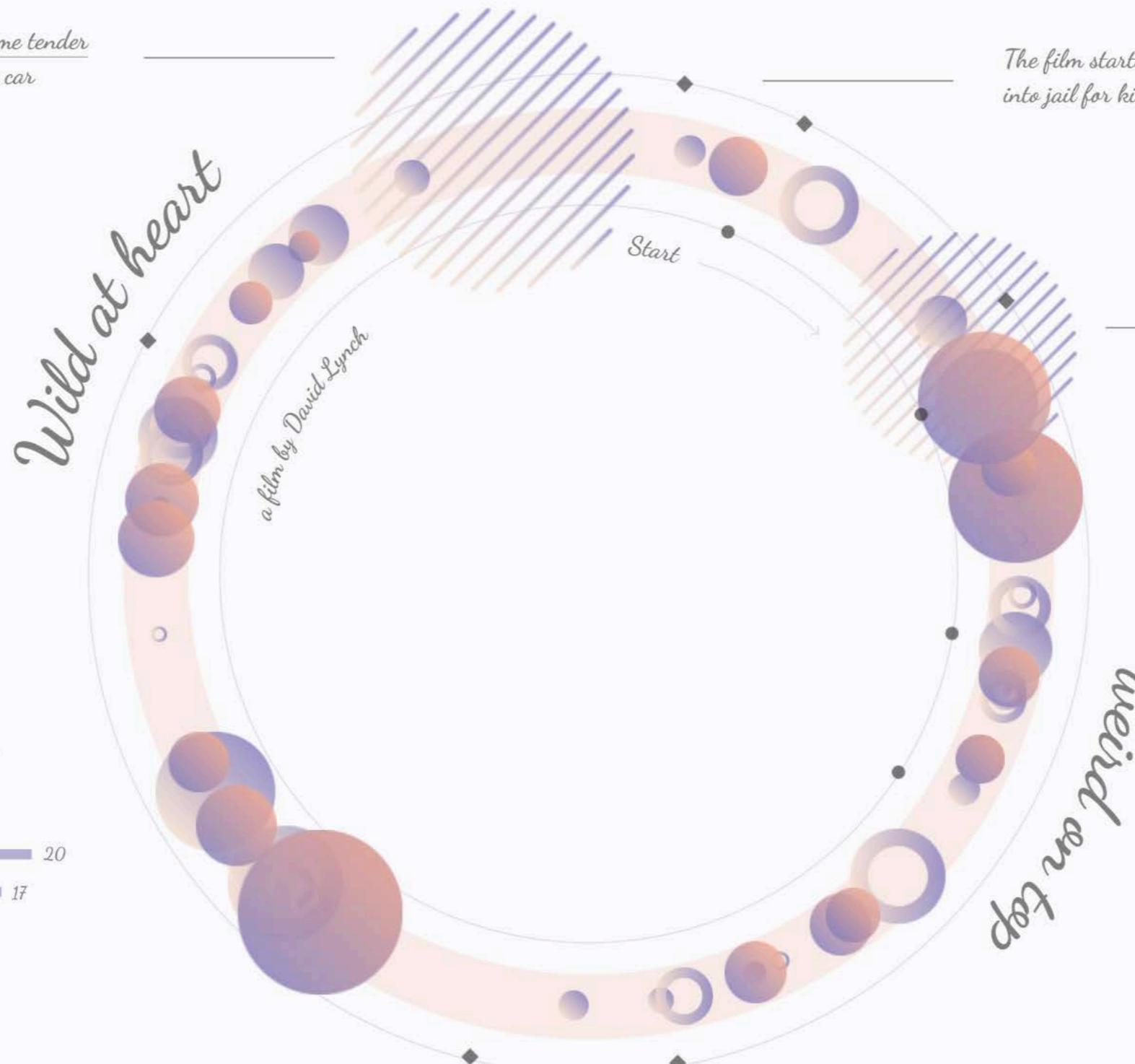
*Sailor singing Love me tender
to Lula on top of the car*

*The film starts with Sailor getting
into jail for killing Bobby Ray Lemon*

*Well, you ain't let me down
yet, Sail'. That's more than
I can say for the rest of
the world.*

Who's smoking?

Sailor	20
Lula	17
Johnnie	8
Others	3
Perdita	3
Bobby	2
Juana	1
Marcello	1



- Sail', how come you didn't
sing me Love me tender?
You told me that was your
favorite love song.
- I told you I'd only sing
Love me tender to my wife.

- I'd go to the far end of the
world for you baby.
- Rockin' good news.

How to read?

- Sailor singing
 - Lula smoking
 - Sailor smoking
 - Others smoking
 - Sex
 - ◆ Violence
- Duration
(singing and smoking)

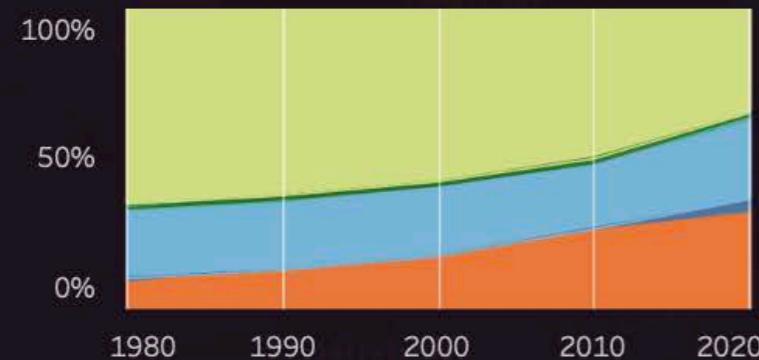
Data & design: Judit Bekker

Land use in Shanghai, 2020

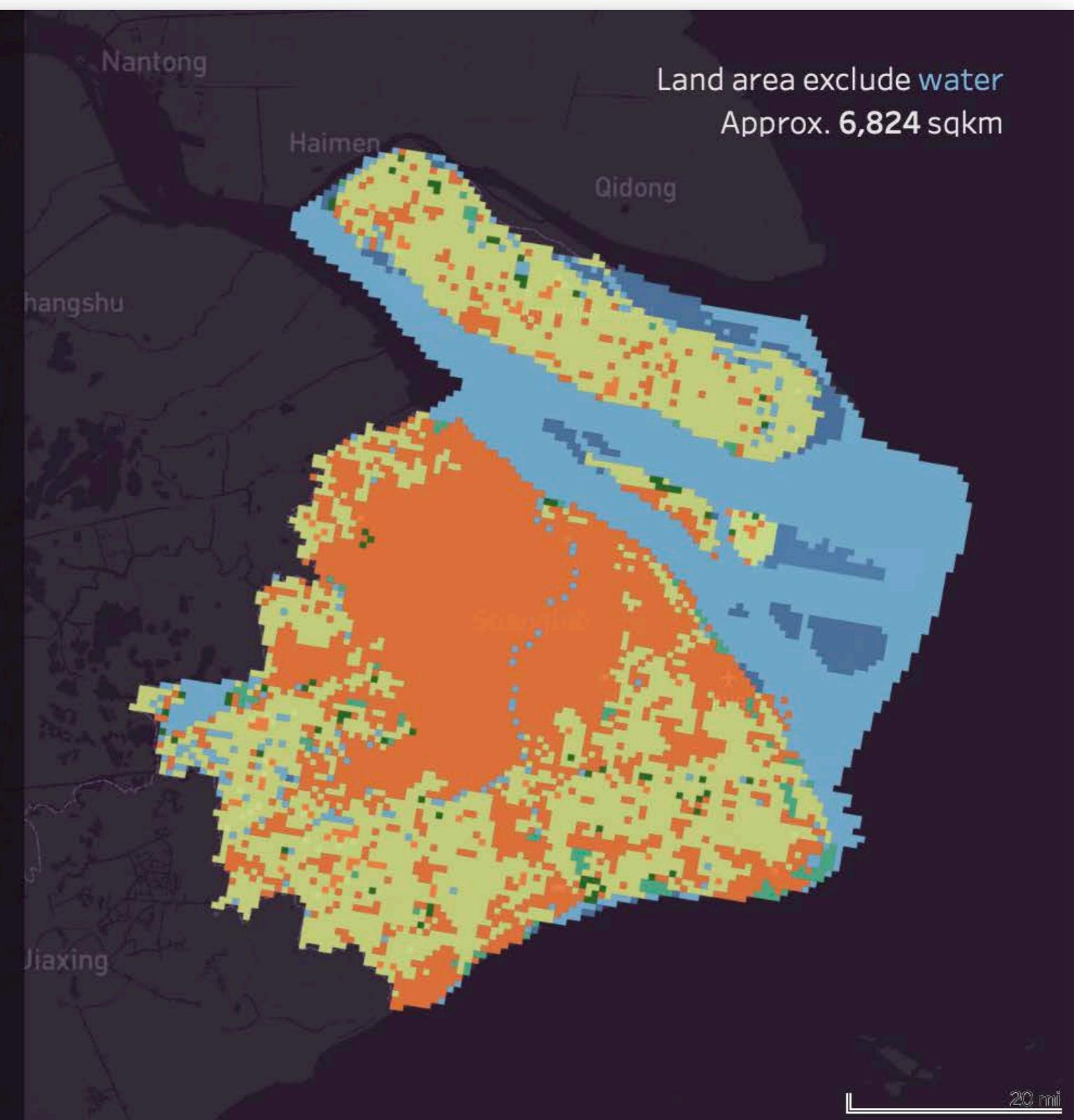
Slide to other years



Percentage of total area by type of land use



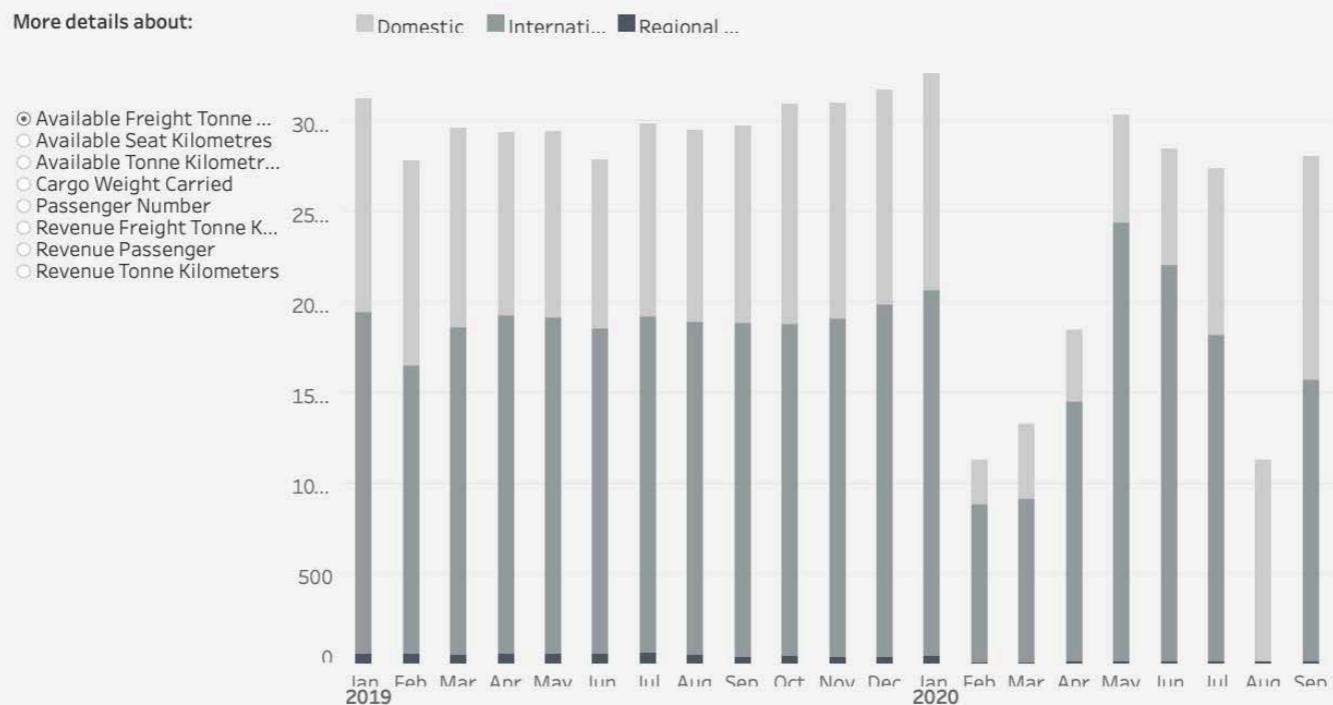
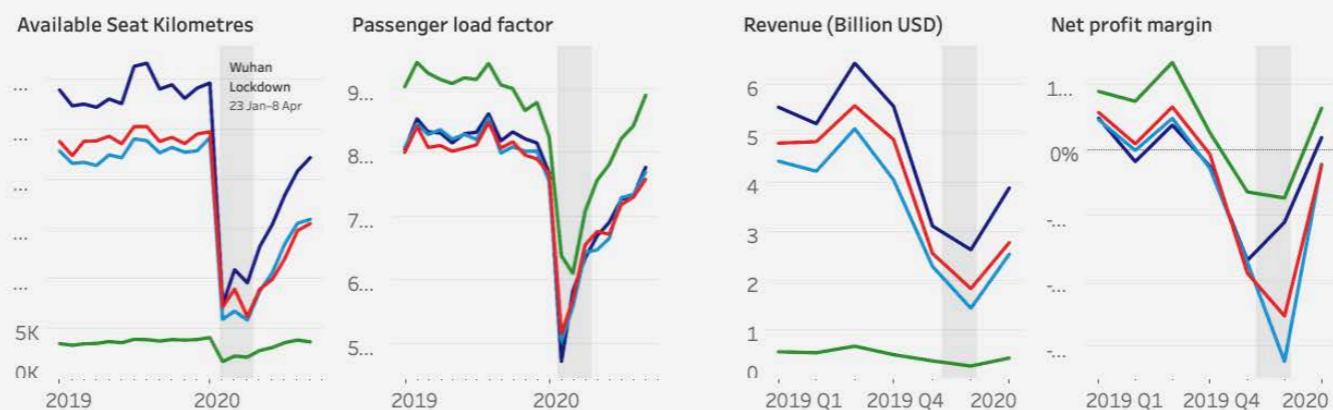
Data source: 1-km Landsat TM/EMT grid from
www.resdc.cn
Made with ❤️ and QGIS, Tableau, Mapbox



Slowly Recovering

Comparing the impact of the pandemic on **four** Chinese airlines

Air China, China Eastern Airlines, China Southern Airlines are the top3 full service airlines in China, while Spring Airlines is the top low-cost carrier.



Data sources

Airline info:
<https://www.planespotters.net/airline>
Financial reports: <http://f10.eastmoney.com/>
Air China: http://www.airchina.com.cn/cn/investor_relations/

China Eastern Airlines:

http://www.airchina.com.cn/cn/investor_relations/
China Southern Airlines:
<https://www.csair.com/cn/about/investor/>
Spring Airlines: <https://www.ch.com/invester/>

Wendy Shijia | @ShijiaWendy | 30 Oct, 2020

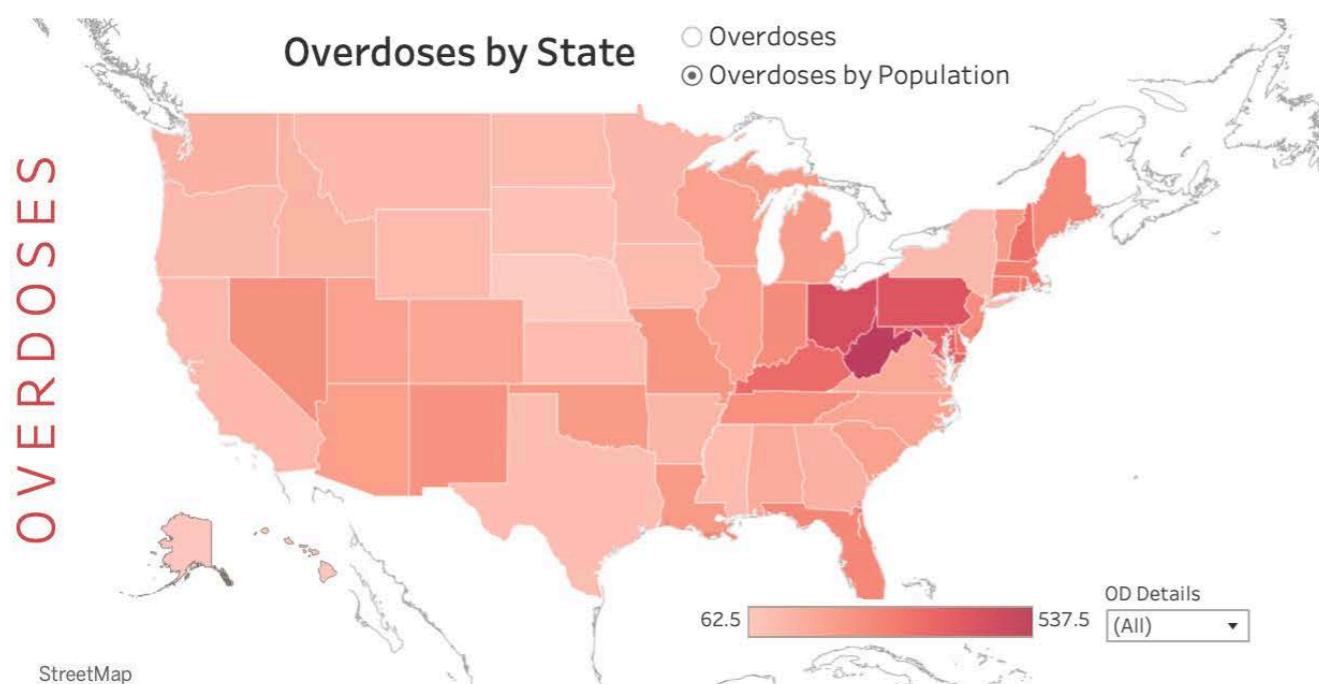
Wendy Shijia

THE OPIOID CRISIS



#####

A story of drug overdoses and/or over-prescription?



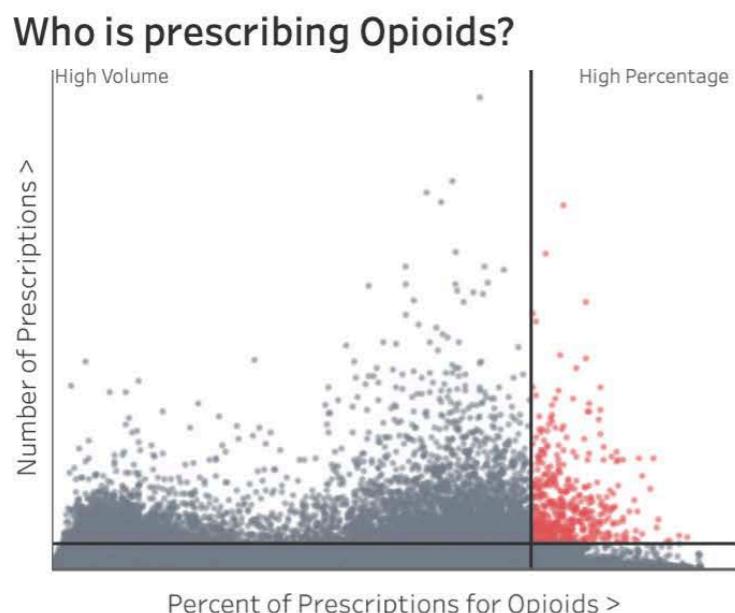
Overdose Totals

Opioids | All Other Drugs

- Sort by Number
- Sort by Percent Change

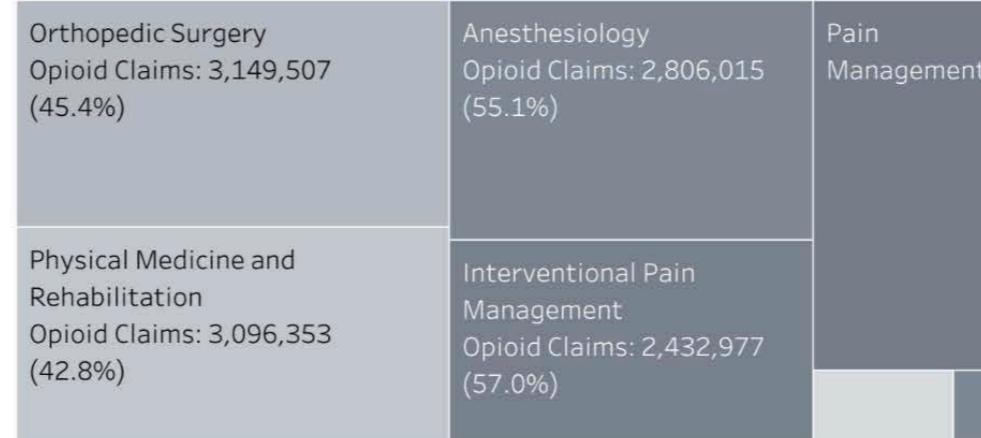
	2015	2016	2017
Number of Drug Overdose Deaths	48,877	56,236	65,813
Opioids	9,458	11,436	12,787
Synthetic Opioids	2,343	4,296	7,036
Natural & Semi-Synthetic Opioids	4,303	4,736	4,468
Heroin	3,148	4,041	4,201
Cocaine	1,564	2,197	3,034
Psychostimulants	1,292	1,656	2,186
Percent with drugs specified	1,654	1,653	1,659
Methadone	1,152	1,133	1,069

PRESCRIBPTIONS



Which specialties prescribe the most?

State: All



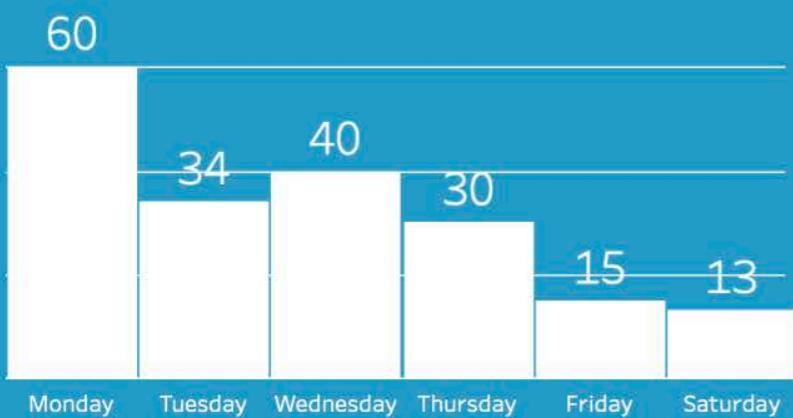
Medicaid Spending by State



Sources/Credits

CINCINNATI TABLEAU USER GROUP SURVEY

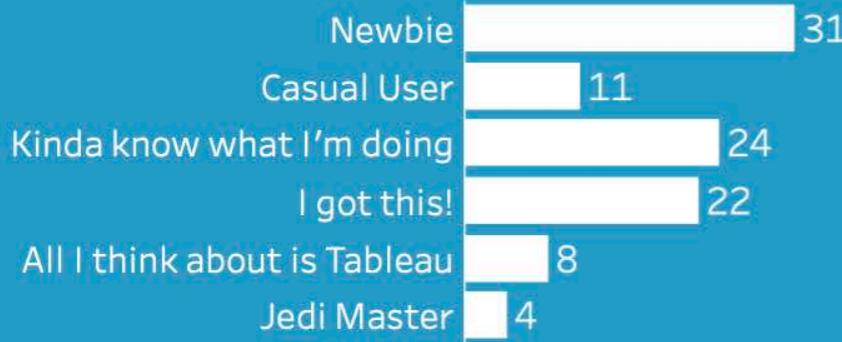
Day of Week



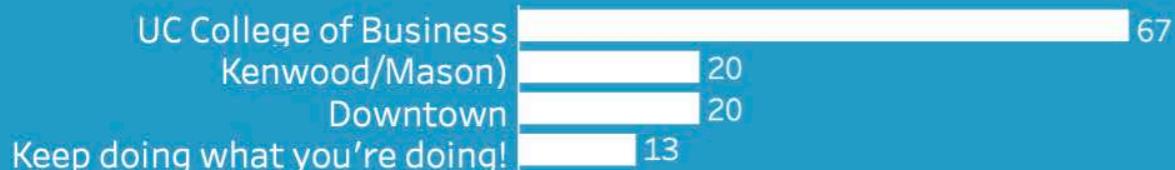
Time of Day



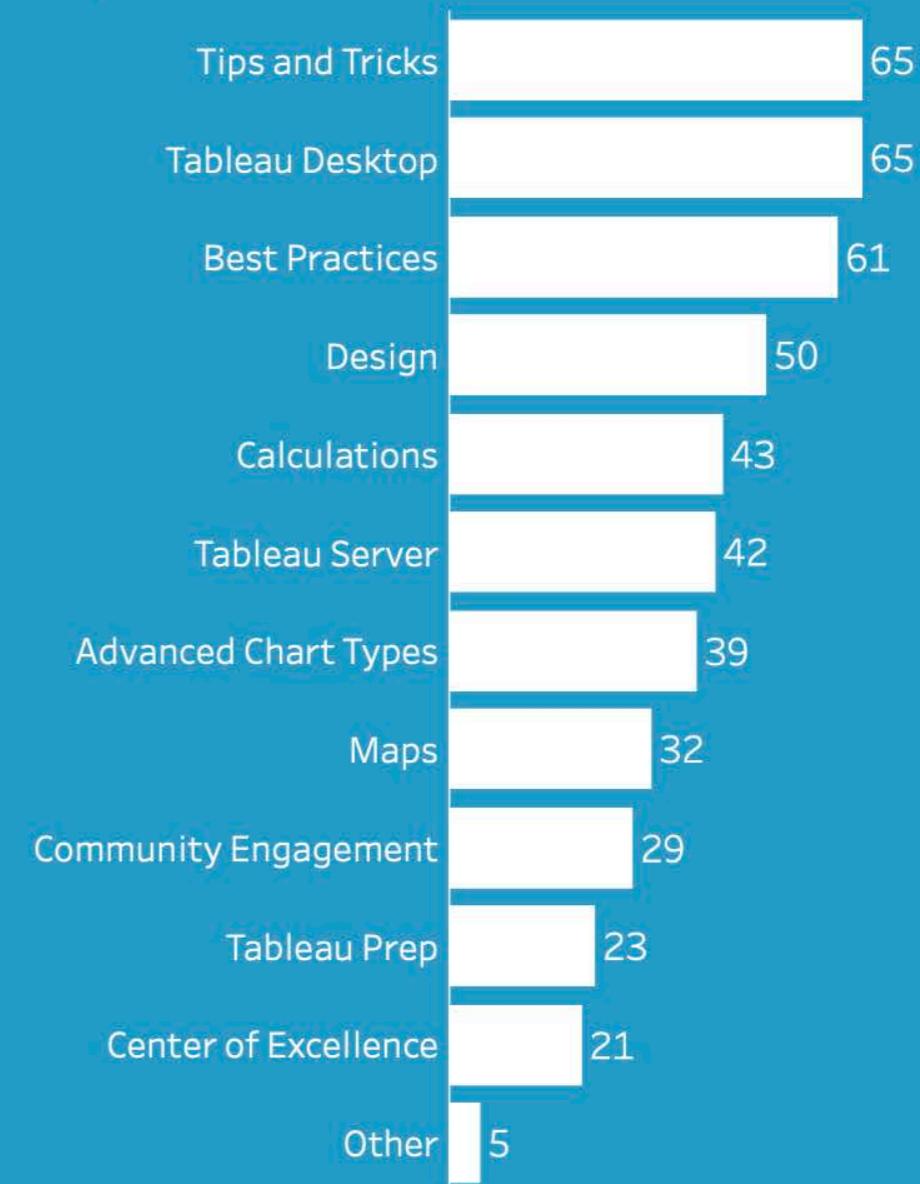
Experience



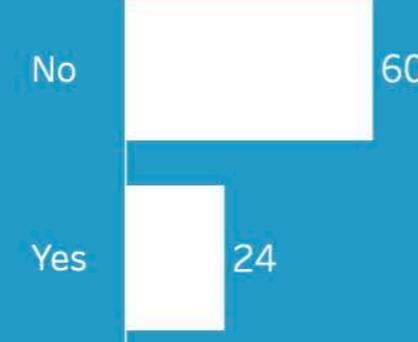
Location



Topics



Student



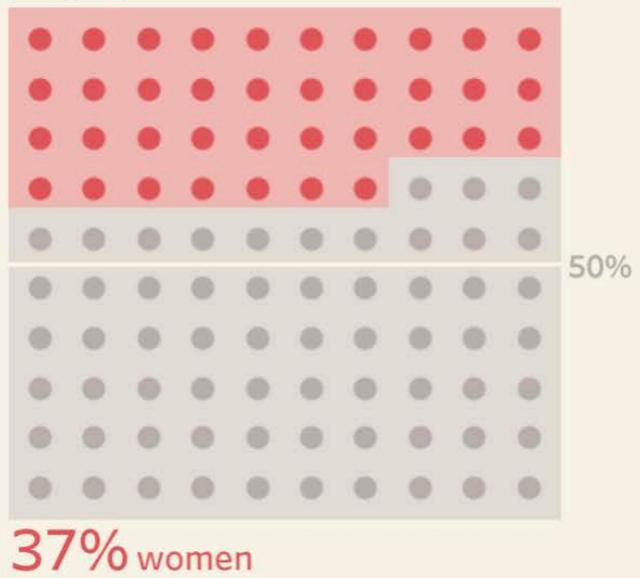
Created by Jeffrey A. Shaffer | Survey of Cincinnati Tableau User Group on 1/13/2020

Andy Cotgreave

Women in American Orchestras



all players *hover*

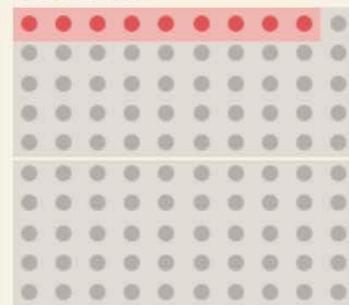


Visualization created by Jeffrey A. Shaffer

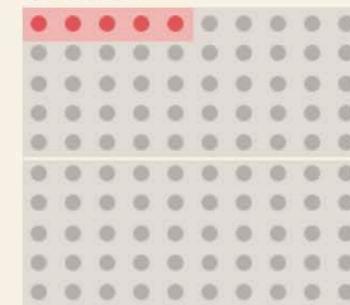
1,833 musicians from the top 20 orchestras in the United States (based on salary)

Inspiration: "Graphing Gender in America's Top Orchestras" by Suby Raman

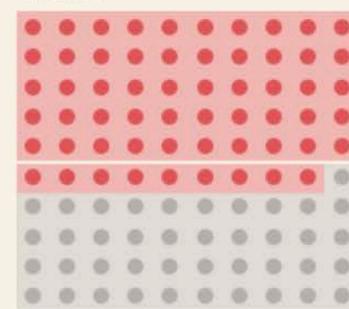
conductor



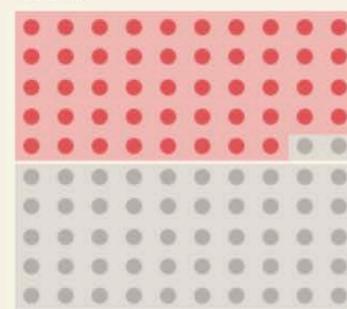
director



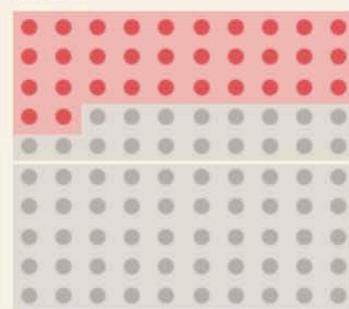
violin



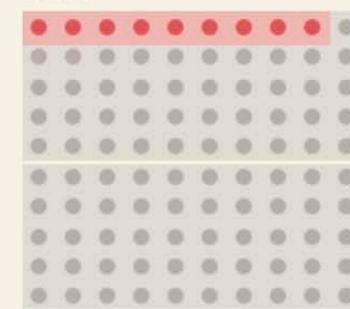
viola



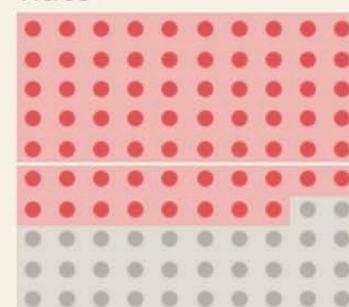
cello



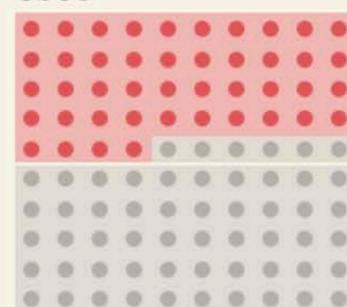
bass



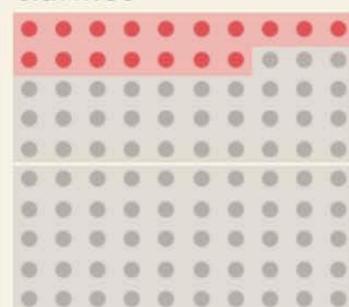
flute



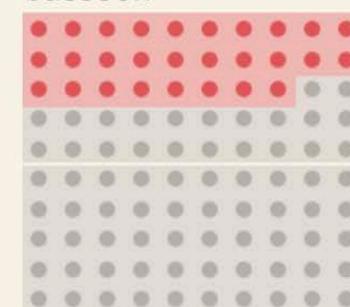
oboe



clarinet



bassoon



CORONAVIRUS COVID-19 CASES



Total Confirmed

528,959

Confirmed Cases in TOP 30 Co...

83,758	US
81,234	China
80,589	Italy
57,786	Spain
43,938	Germany
29,551	France
29,406	Iran
11,812	United Kingdom
11,811	Switzerland
9,240	Korea, South
7,468	Netherlands
6,909	Austria
6,235	Belgium
4,029	Canada
3,629	Turkey
3,544	Portugal
3,369	Norway
2,985	Brazil
2,840	Sweden
2,810	Australia
2,693	Israel
2,031	Malaysia
2,023	Denmark
1,925	Czechia
1,819	Ireland
1,453	Luxembourg
1,403	Ecuador
1,385	Japan
1,306	Chile
1,221	Poland

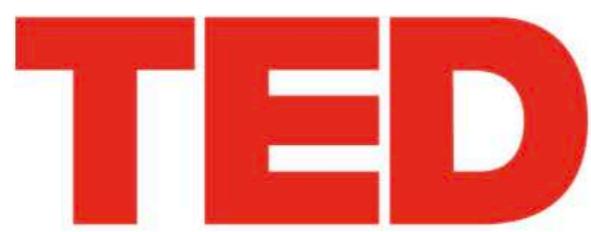
Total Deaths

23,952

Total Deaths in TOP 30 Countri...

8,215	Italy
4,365	Spain
3,274	China
2,234	Iran
1,698	France
1,208	US
580	United Kingdom
435	Netherlands
267	Germany
220	Belgium
191	Switzerland
131	Korea, South
78	Indonesia
77	Brazil
77	Sweden
75	Turkey
60	Portugal
49	Austria
47	Japan
45	Philippines
41	Denmark
37	Canada
36	Iraq
34	Ecuador
26	Greece
25	Algeria
24	Egypt
23	Malaysia
23	Romania
21	San Marino





A Visual Exploration of TED Talks

Information on all audio-video recordings of TED Talks uploaded to the official TED.com website through September 21st,

Data Source: <https://www.kaggle.com/rounakbanik/ted-talks> | Viz Inspiration: <http://thedataface.com/2018/02/education/explore-ted->

Designed By: Chantilly Jaggernauth



1 Explore the Top 5 Most Viewed Talks

Do schools kill creativity?	47.2M views
Your body language may shape who you are	43.2M
How great leaders inspire action	34.3M
The power of vulnerability	31.2M
10 things you didn't know about orgasm	22.3M

2 Select a Scatterplot View*

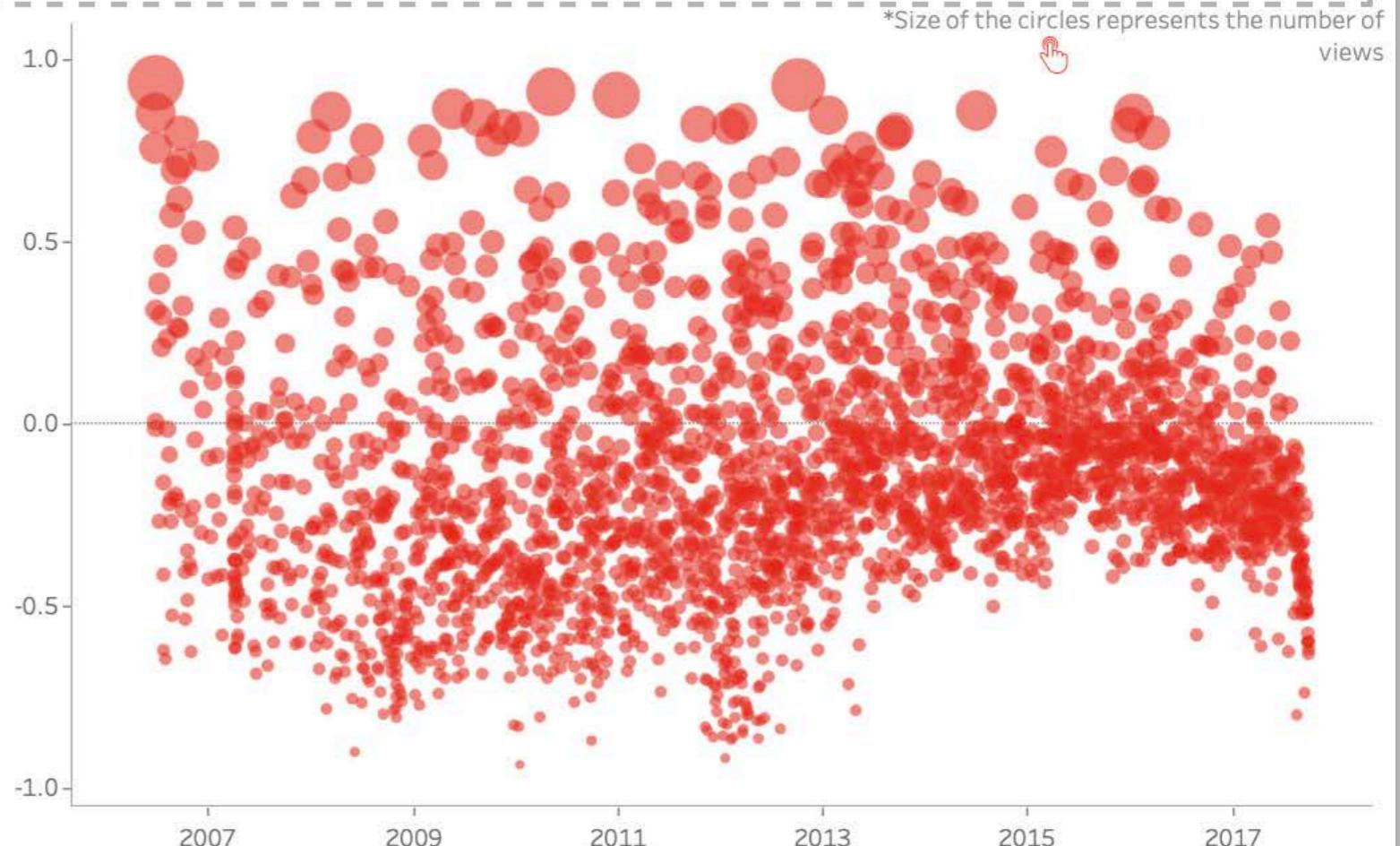
Normalized

3 Highlight & Watch a Particular Talk

Highlight Title

Highlight Main Speaker

Highlight Tags

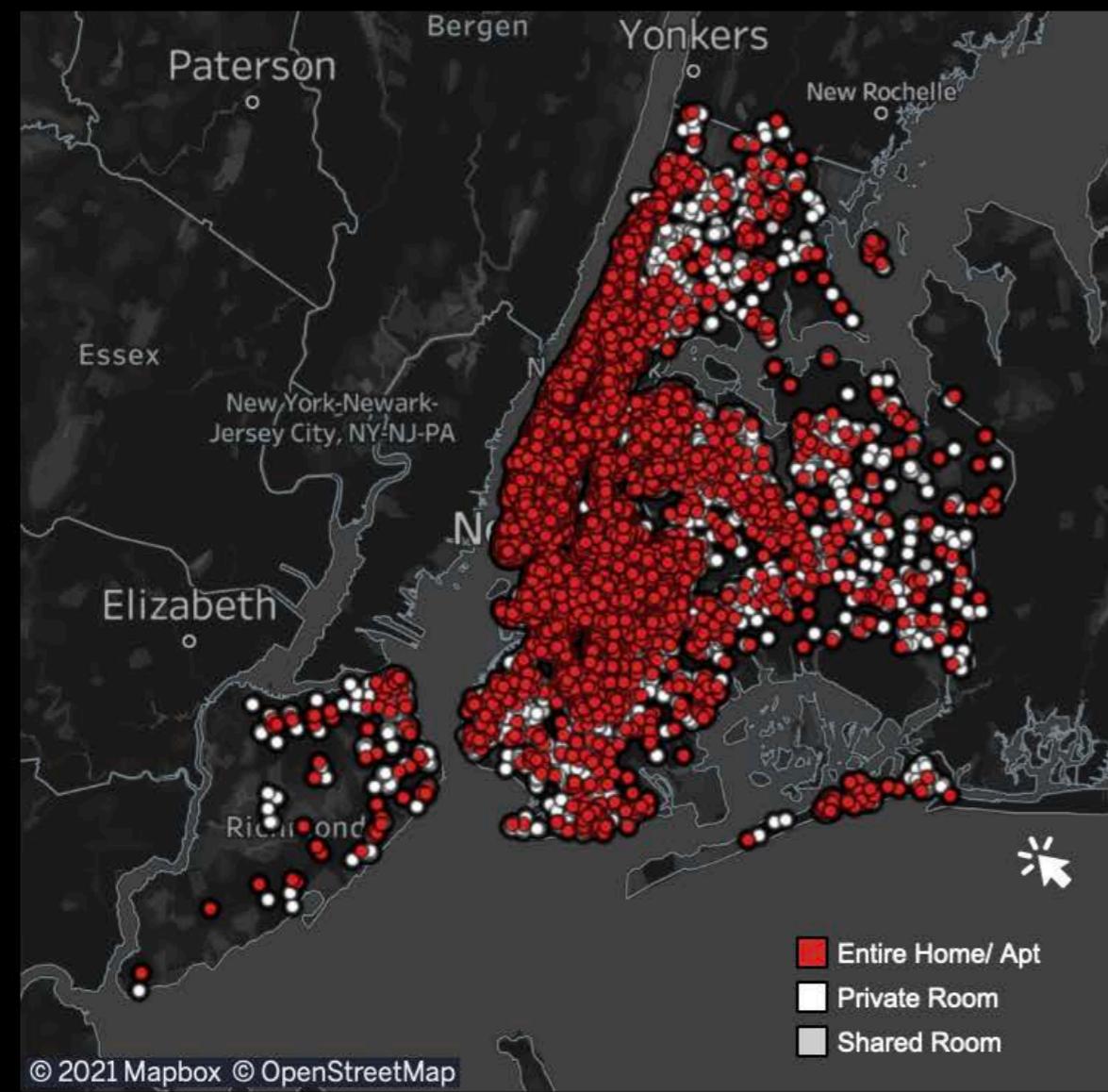


*Normalization is used to adjust values on different scales to a common scale. In this particular case, the number of views is adjusted to have a value between -1 and 1. 0 represents the mean, 1 represents the most viewed and -1 presents the least viewed.

Airbnb - New York

36,608

out of 36,608 total listings



Location *i*



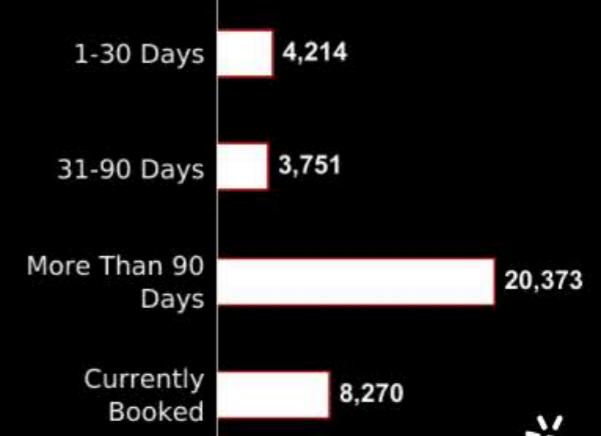
Rental Type *i*



Minimum Cost *i*



Availability *i*

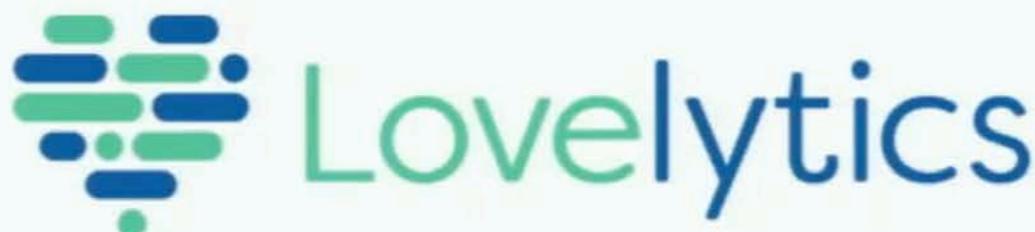


Chantilly Jaggernaut

Watch: Zen Master: Design Secrets for a Non-Designer

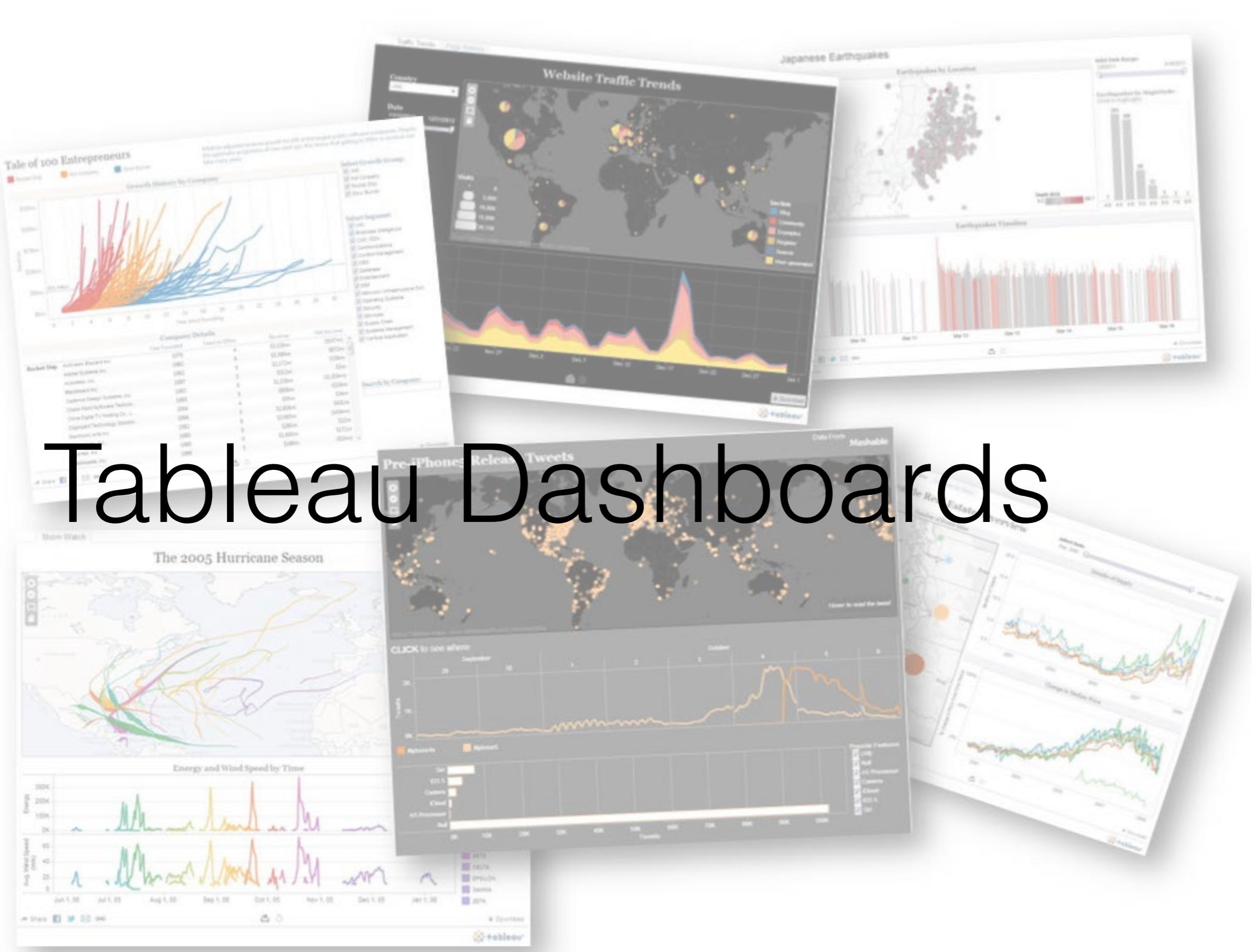


TABLEAU
CONFERENCE



ZEN MASTER

Tableau Dashboards



Activity

As a team, create a dashboard. Sketch a dashboard layout first.

Do you have a call to action? Add a title and captions that support your data story.

20 mins

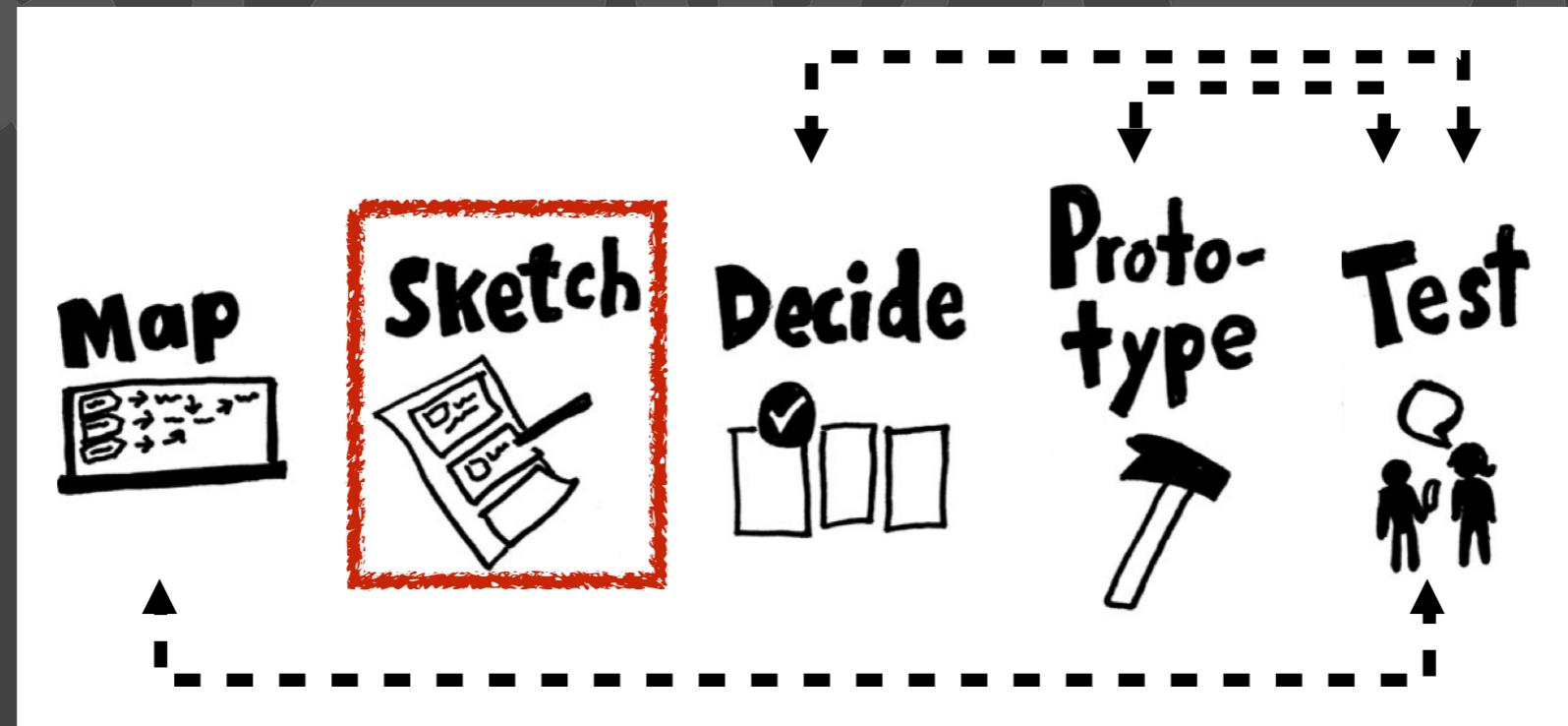


Tableau Dashboard

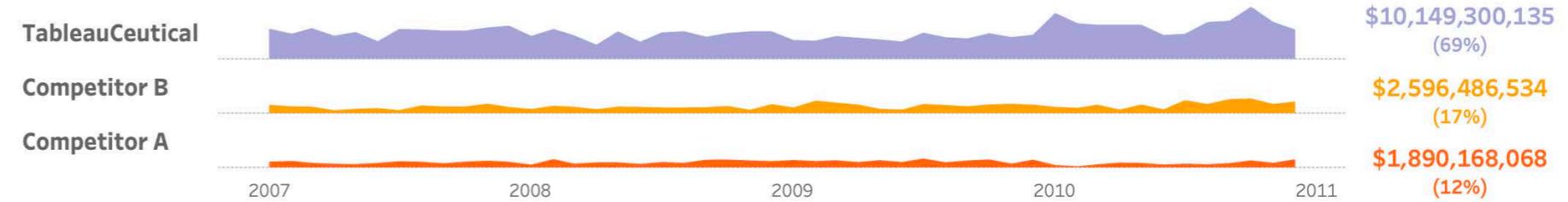
Super Drugs Executive Exploration Dashboard

I'm interactive! Click to explore.

Top 5 Performers (by Sales)

1	Tony Sayre	\$119,110,492
2	Brad Thomas	\$113,132,540
3	Adam Hart	\$106,590,921
4	Bill Donatelli	\$102,831,690
5	Darren Budd	\$100,959,450

Top 3 Suppliers (by Sales)

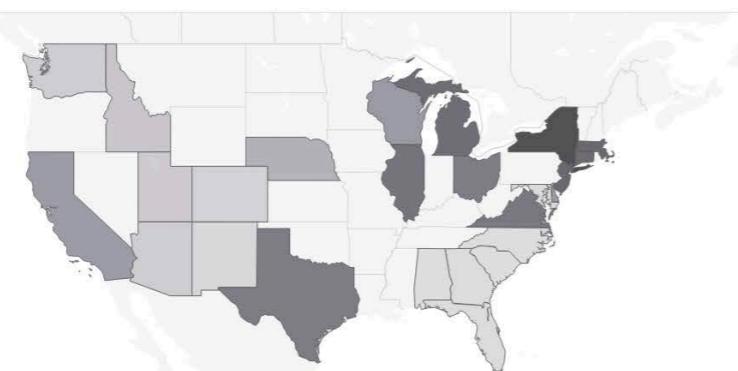


State Sales Map

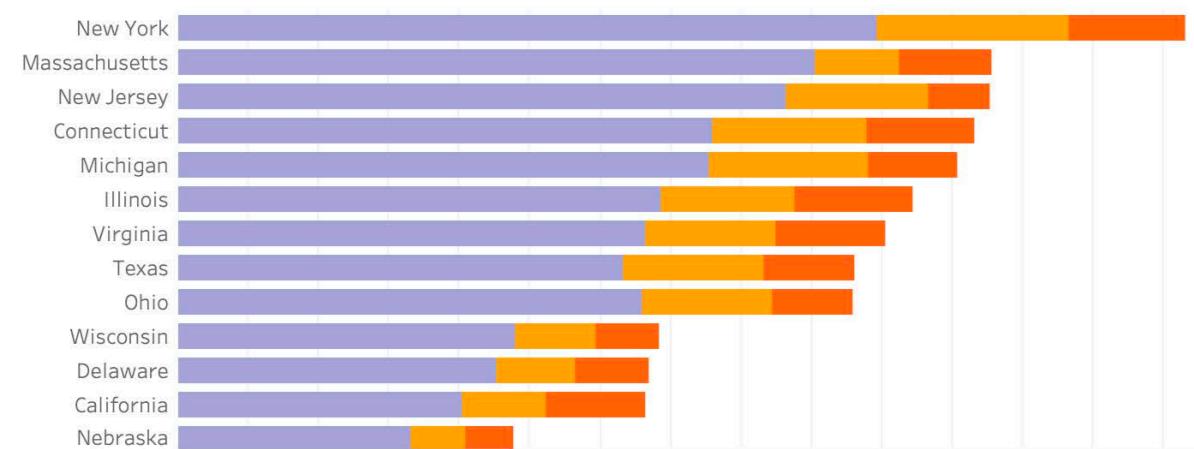
State or Pharmacy Region State
State (All) (All)

Sales

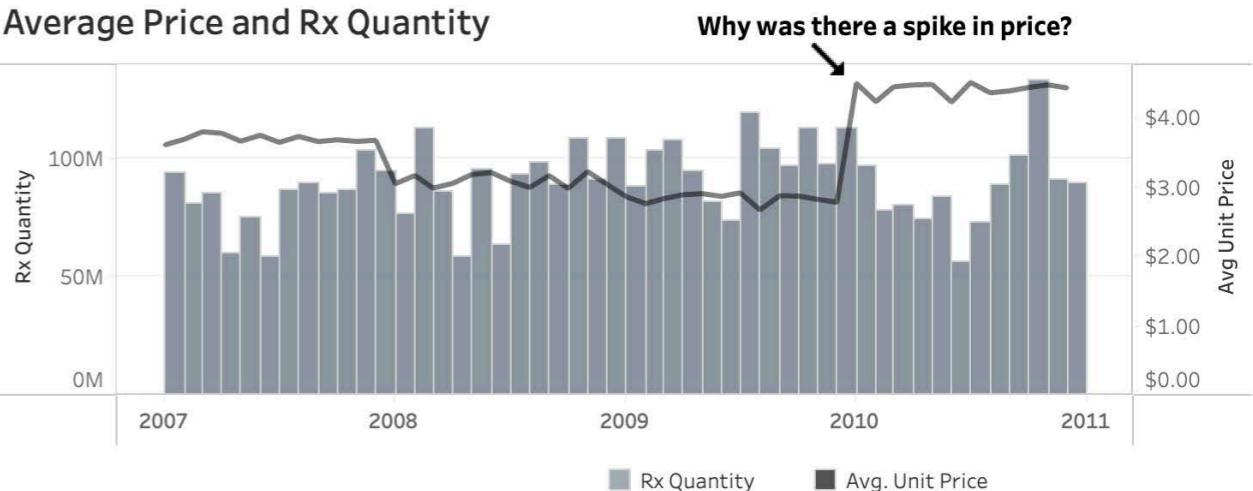
\$14,635,954,736 \$



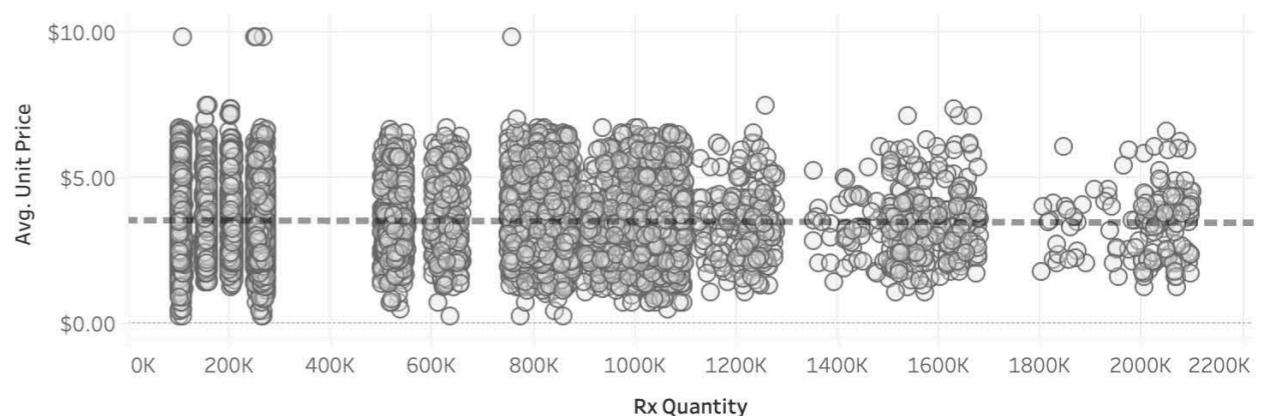
Sales by State Bar Chart



Average Price and Rx Quantity



Average Price and Quantity Correlation: -0.01419



Storyboards

Storyboards



Storyboard: A linear sequence of illustrations that visualize a story.

Scene I

First pig
building
straw house.



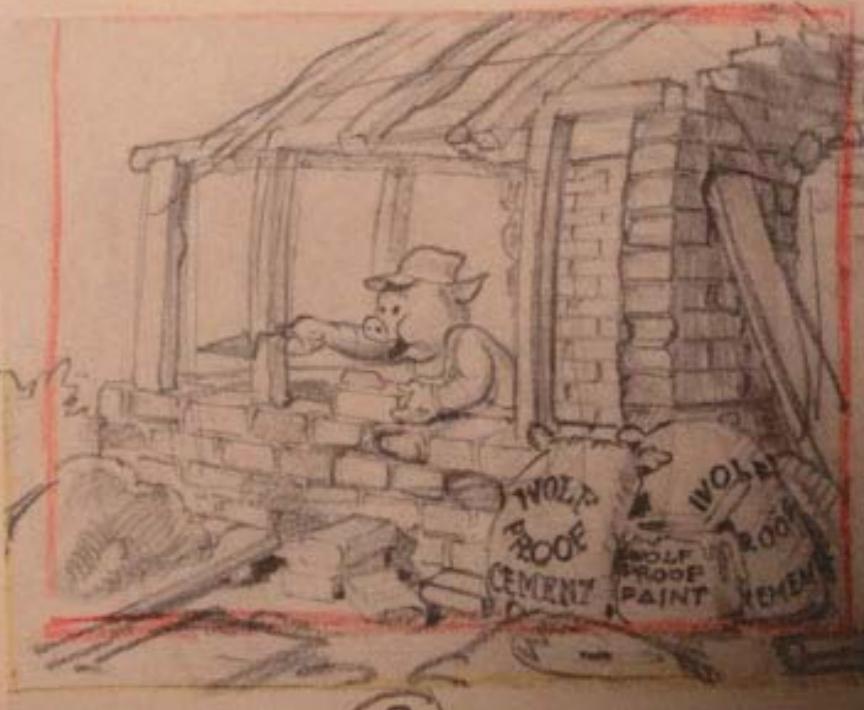
Scene II

Second pig
building
house of sticks



Scene III

Third pig
building
house of brick



Each frame is substantial.
Leaving it out alters the story.





Pixar, 'A Bugs Life'

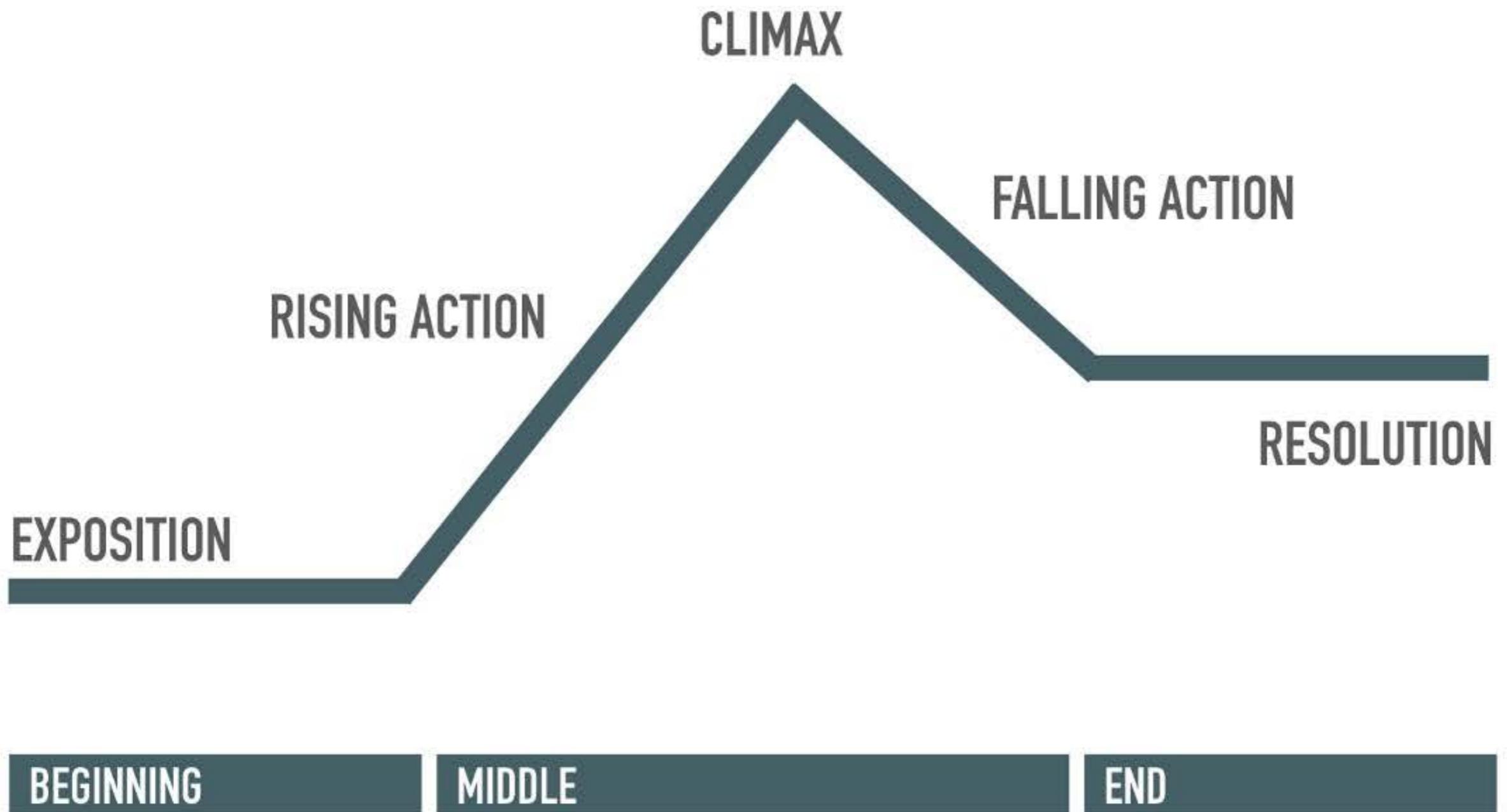
“



The purpose of a story is to get someone to say "**a-ha**" and to see something the way you do. Begin there and work backwards.

– Seth Godin

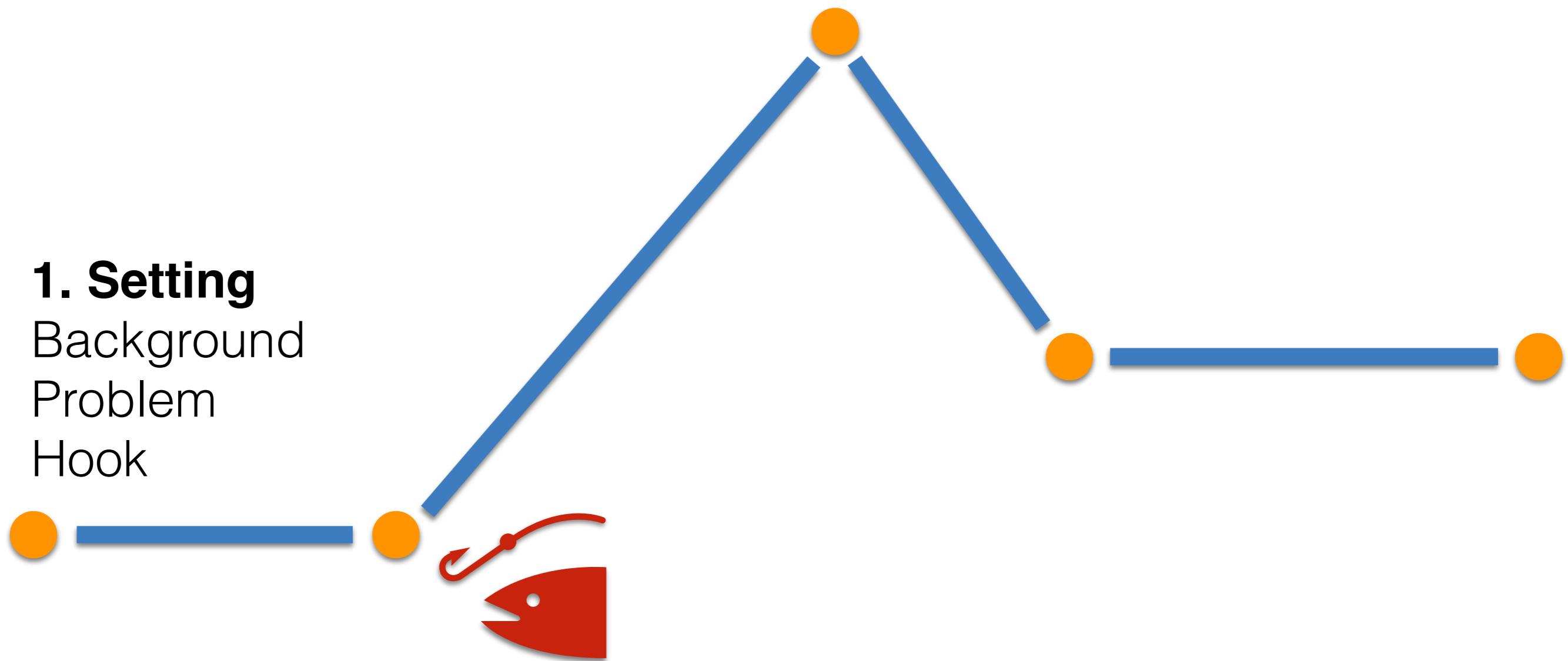
Gustav Freytag's Story Arc



Data Storytelling Arc

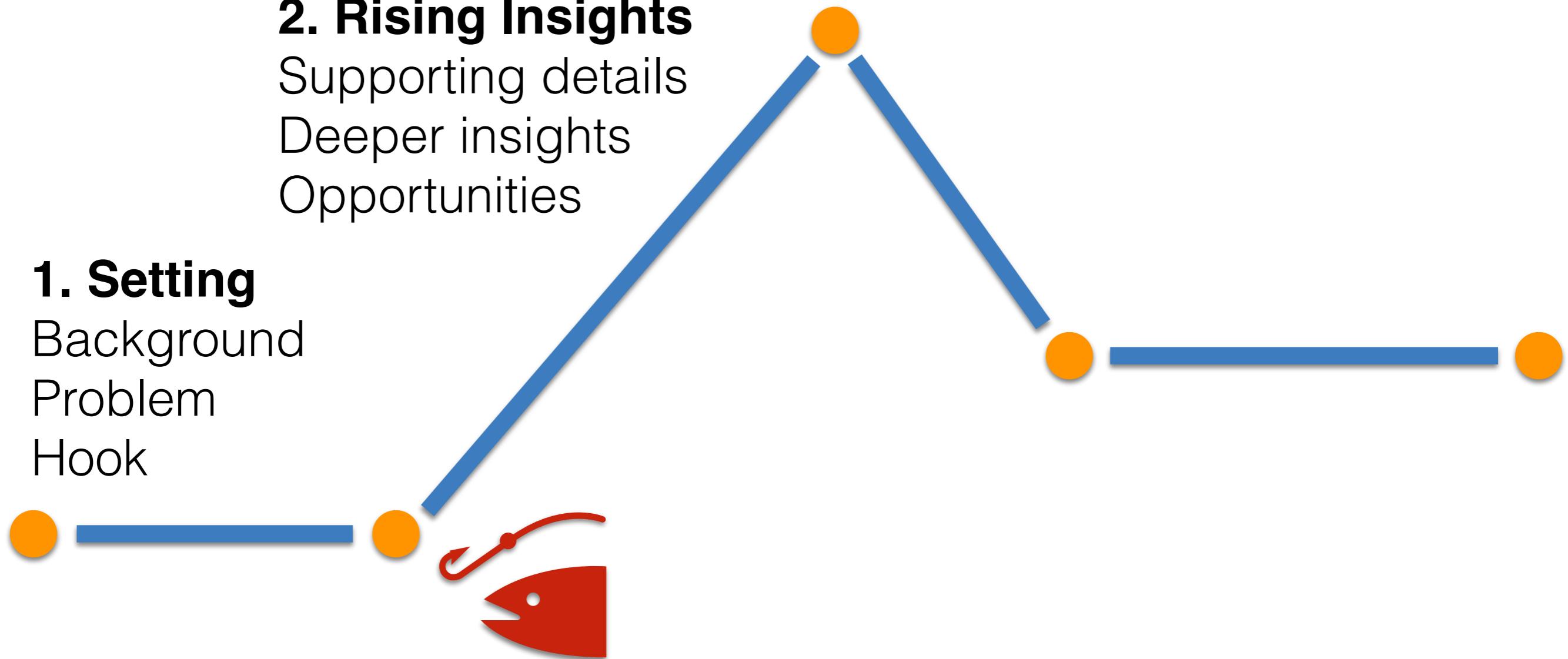
1. Setting

Background
Problem
Hook



Data Storytelling Arc

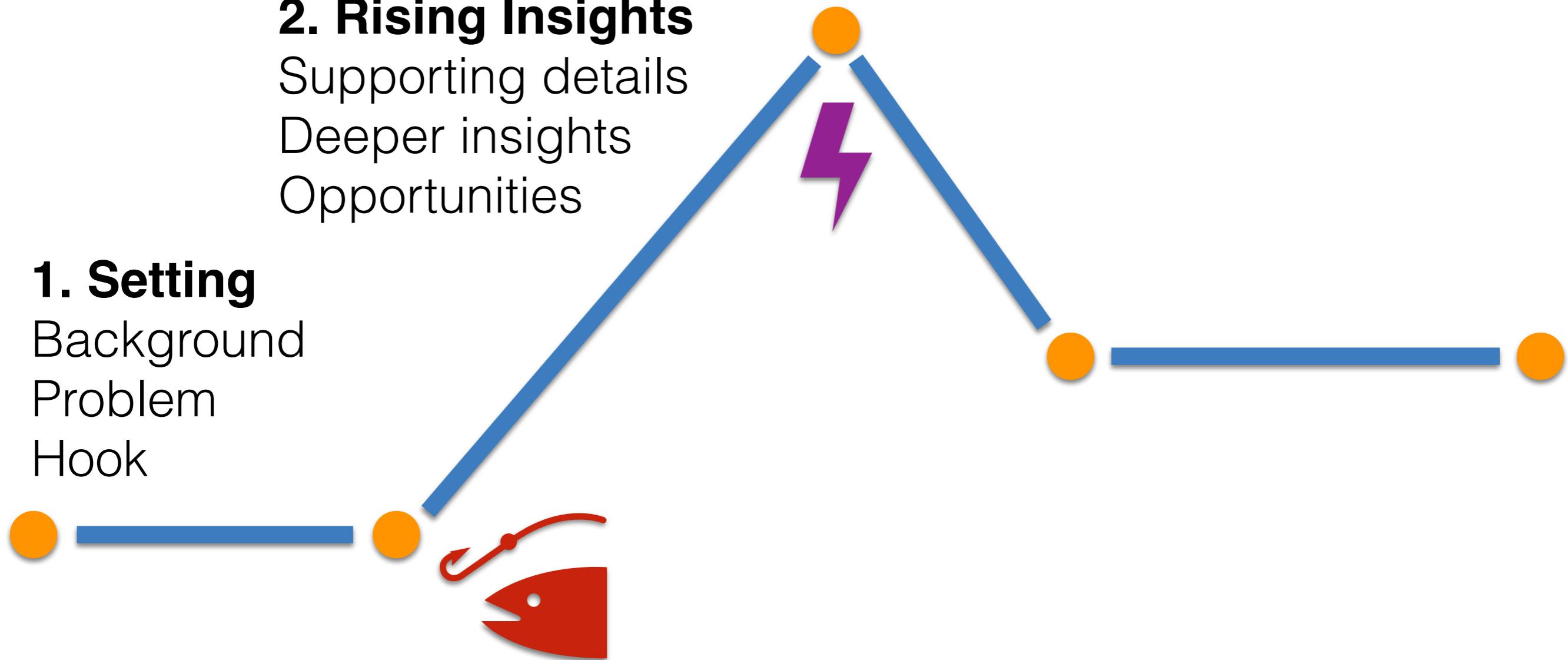
- 1. Setting**
- Background
 - Problem
 - Hook
- 2. Rising Insights**
- Supporting details
 - Deeper insights
 - Opportunities



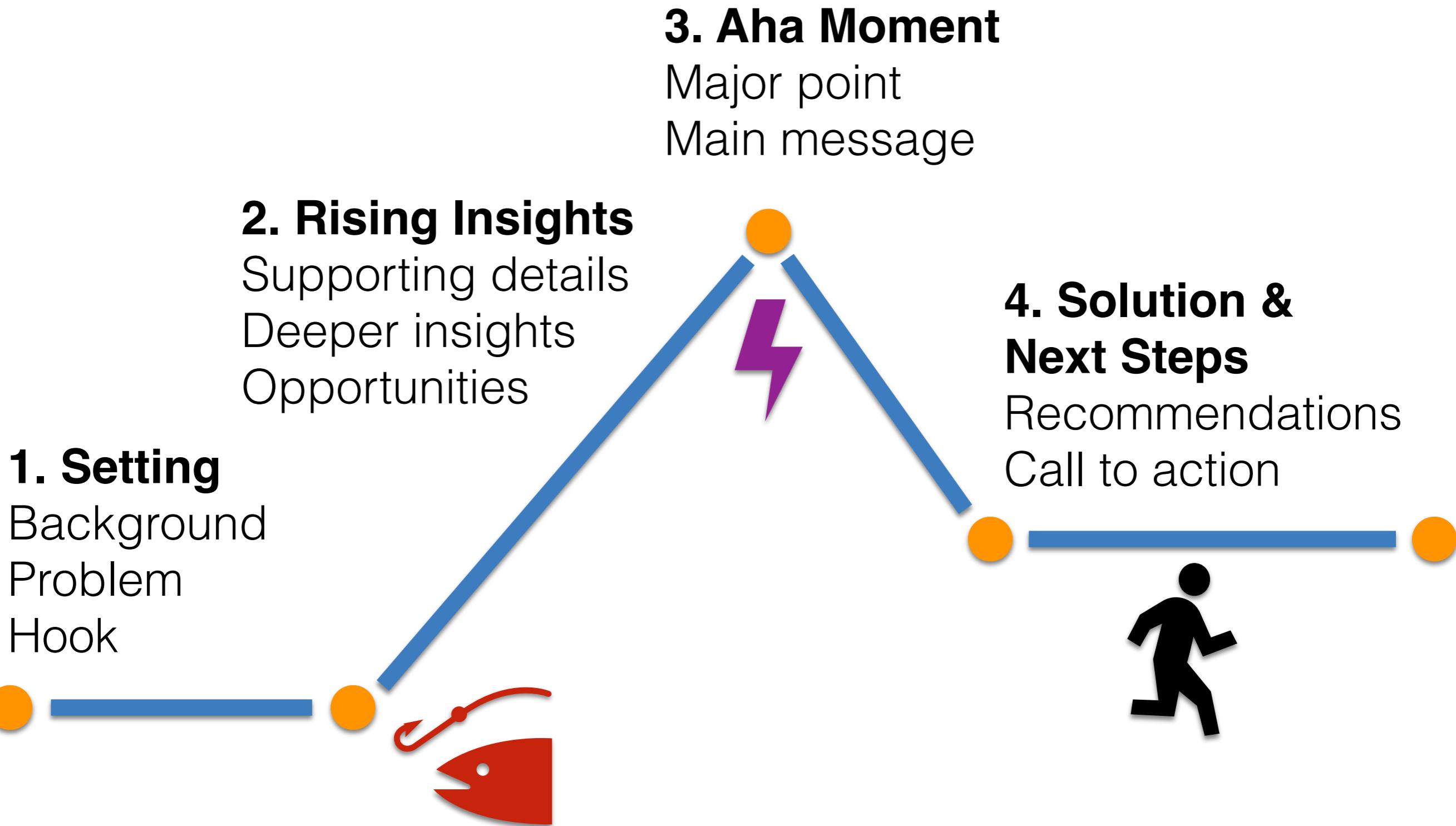
Data Storytelling Arc

- 1. Setting**
Background
Problem
Hook
- 2. Rising Insights**
Supporting details
Deeper insights
Opportunities

- 3. Aha Moment**
Major point
Main message



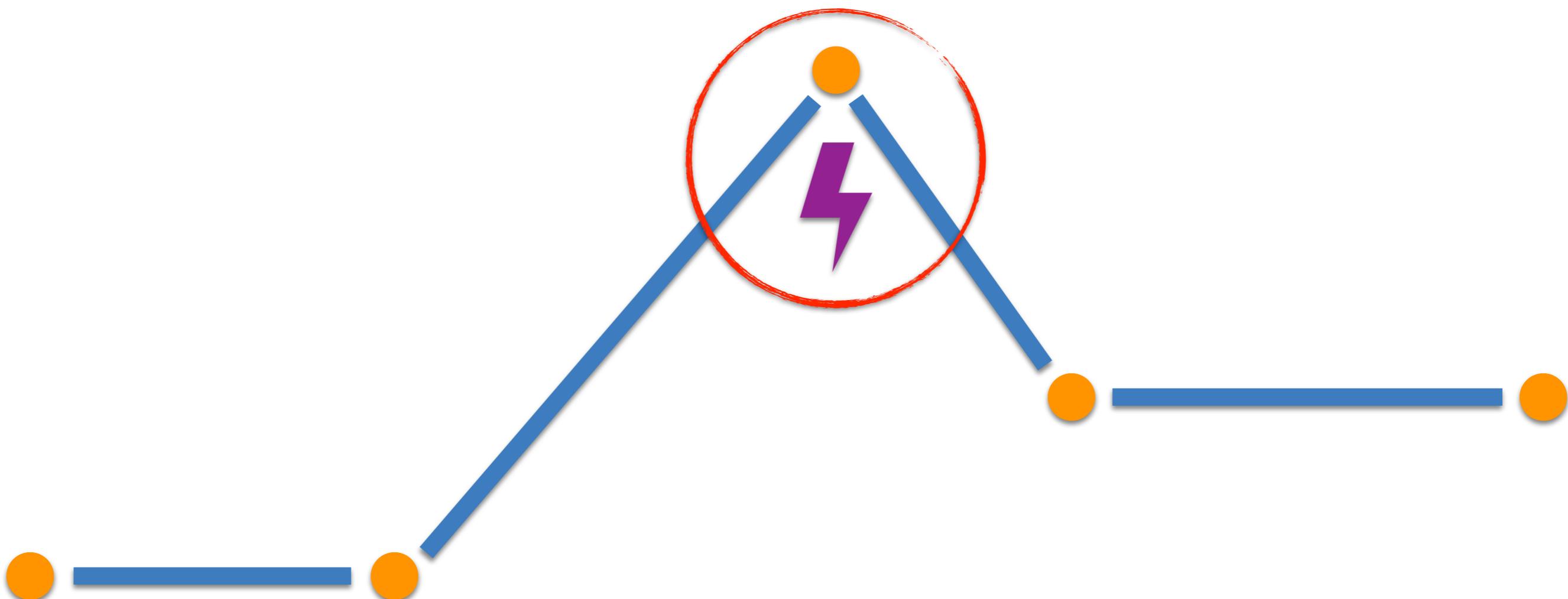
Data Storytelling Arc



Storyboarding Data Stories

1. What is your Aha Moment?

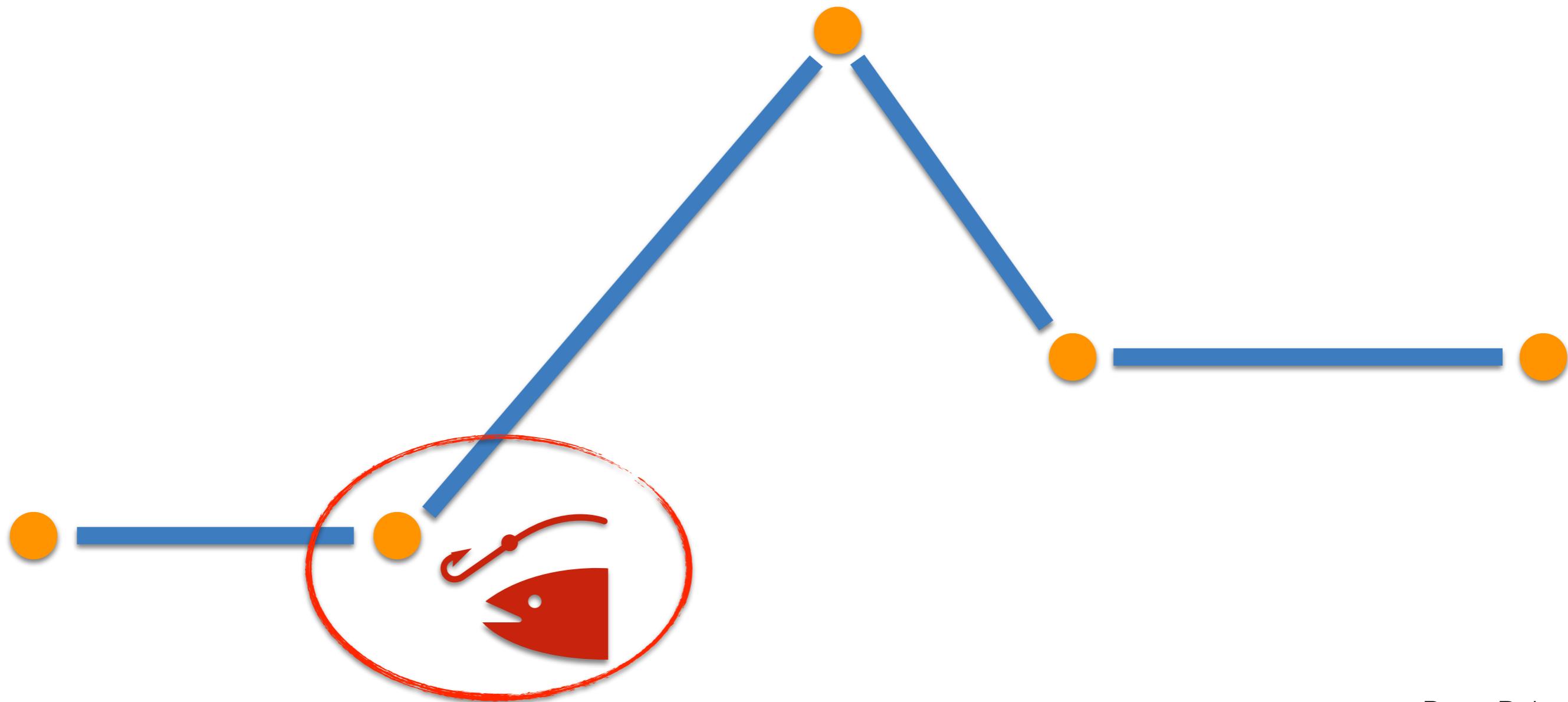
Articulate your major point and main message in a single sentence.



Storyboarding Data Stories

2. Where does your story begin?

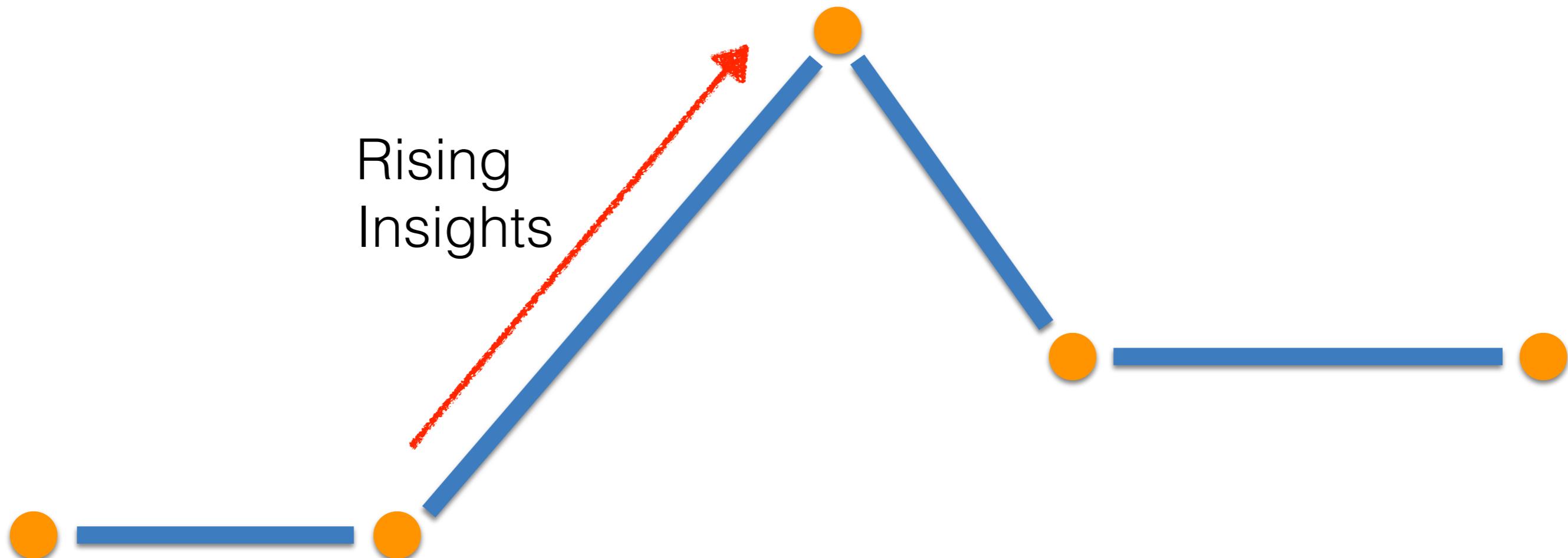
What initially caught your attention during your analysis? Your hook could be your first substantial insight.



Storyboarding Data Stories

3. Select your rising insights

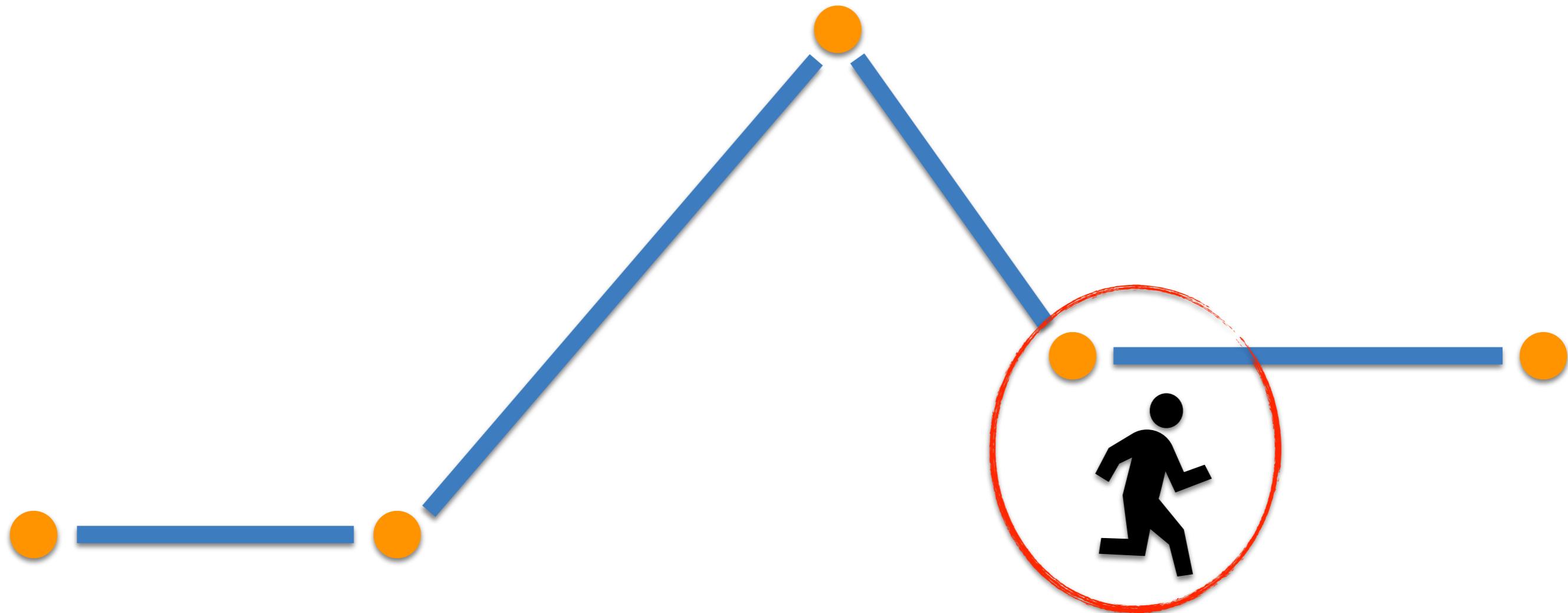
Sequence your story points in a logical manner that mirrors the path your audience's curiosity would follow.



Storyboarding Data Stories

4. Empower your audience to act

Provide guidance on how your audience can move forward with your idea or insight.



Activity

As a team, create a story board using sticky notes and your posters. Make sure your story supports your call to action. Add a story title and captions for each story panel.

20 mins

Brooke Lark, Unsplash



Lunch Break

Decide & Prototype - Story

- Tableau Storyline
- Perception - Contrast, Color, C.R.A.P

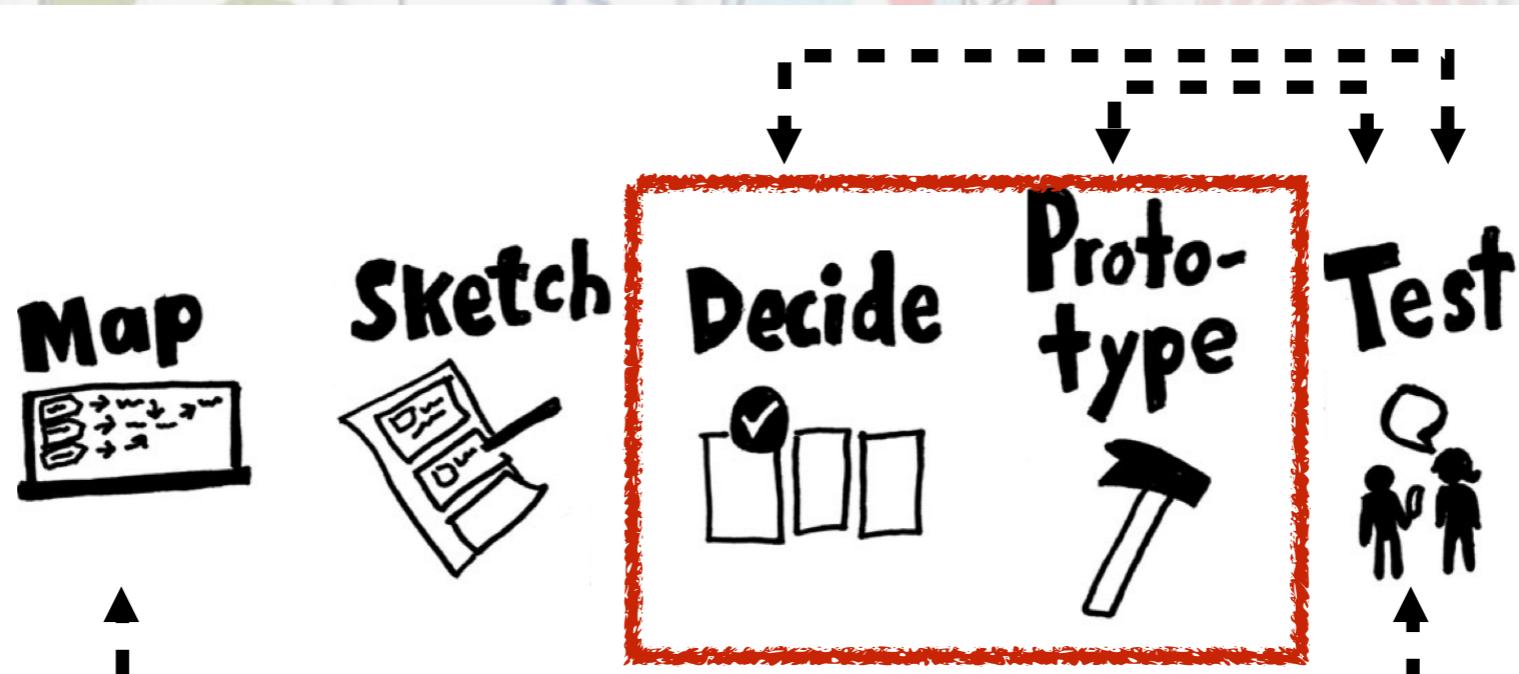
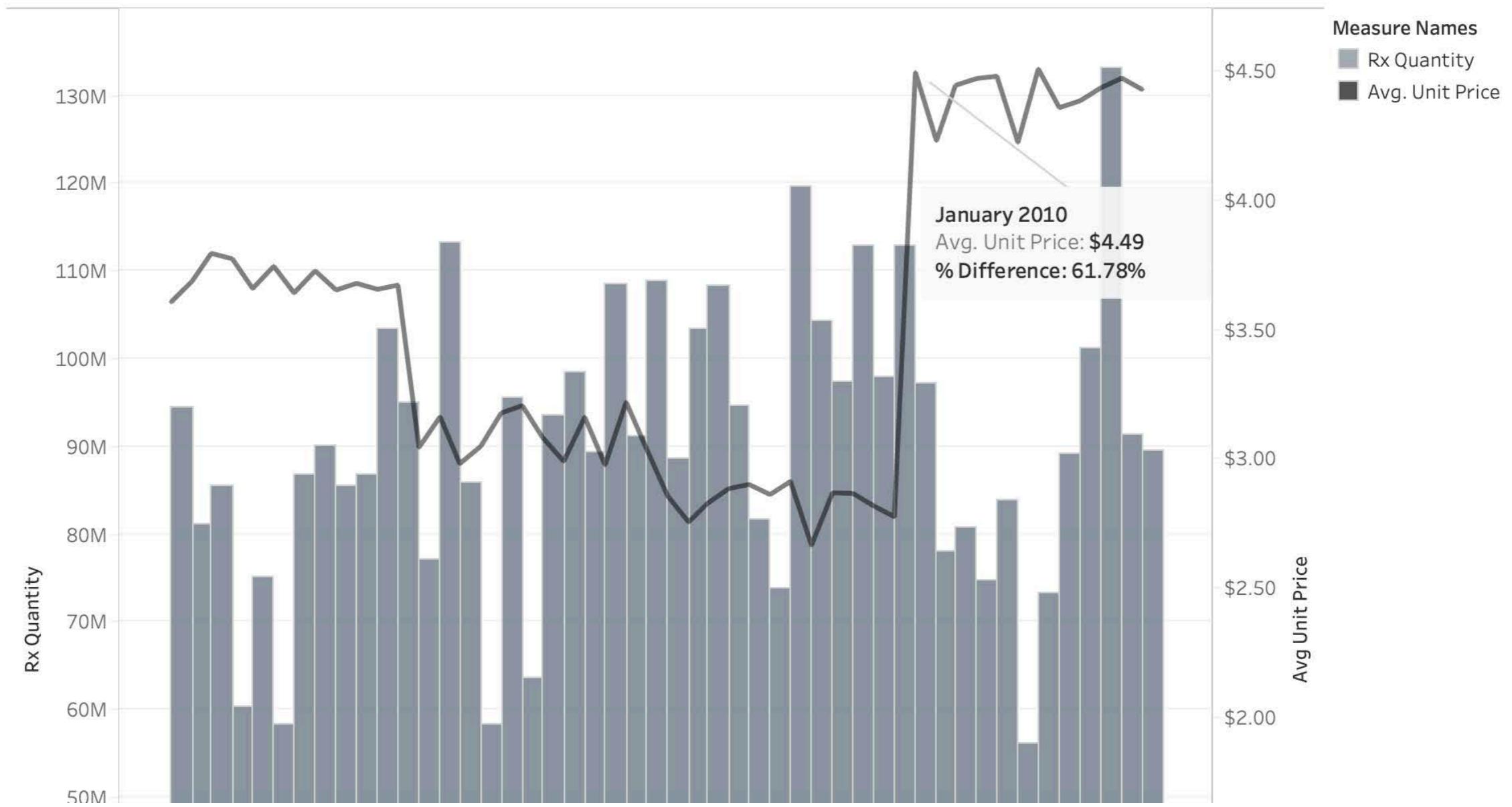


Tableau Storyline

Tableau Storyline

Why was there a spike in price?

< In Jan 2010, the Industry saw a 62% increase in price.
Competitors A&B saw a significant drop in quantity.
This drop was historic for A and drove up all industry prices.
The first two months in 2010 were the worst in A's history. >



Activity

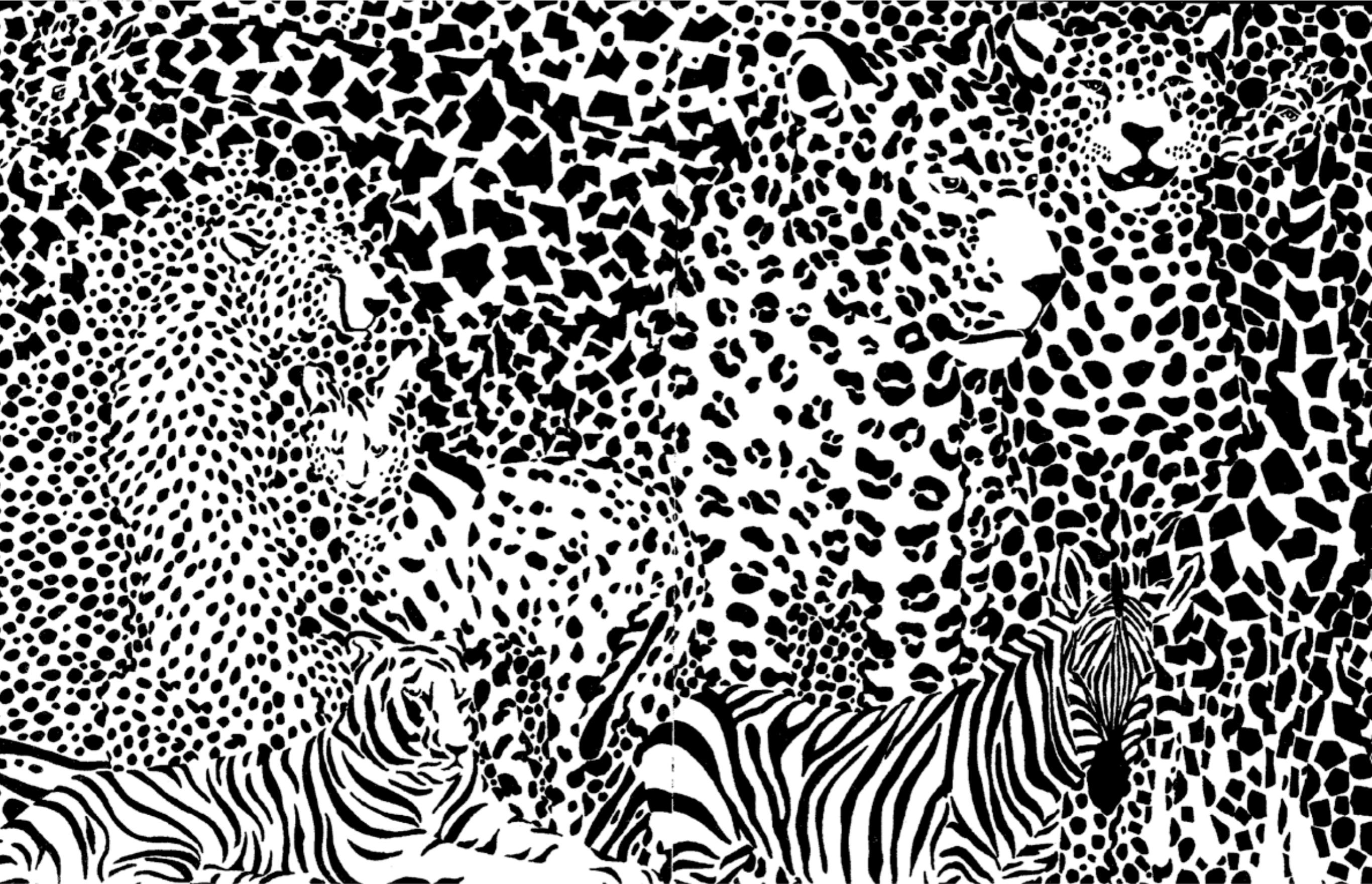
As a team, decide on your main message and takeaways and create a Tableau storyline.

Add titles and captions to each storyline panel.

20 mins

Perception

- Contrast
- Color
- C.R.A.P.



"Ranger Rick", ca. 1980s
Courtesy of Terry Yoo / Ross Whitacker



You see with your mind!



VS.



#TheDress



Kim Kardashian West



Following

What color is that dress? I see white & gold.
Kanye sees black & blue, who is color
blind?



RETWEETS 3,996 FAVORITES 6,562



8:41 PM - 26 Feb 2015



+21



Mindy Kaling



Follow

IT'S A BLUE AND BLACK DRESS! ARE YOU
F***ING KIDDING ME

RETWEETS 9,924 LIKES 17,998



8:43 PM - 26 Feb 2015



B.J. Novak @bjnovak · 26 Feb 2015

white and gold



2.9K

5.6K

...



Mindy Kaling @mindykaling · 26 Feb 2015

"@bjnovak: white and gold". ARE YOU INSANE



Taylor Swift
@taylorswift13

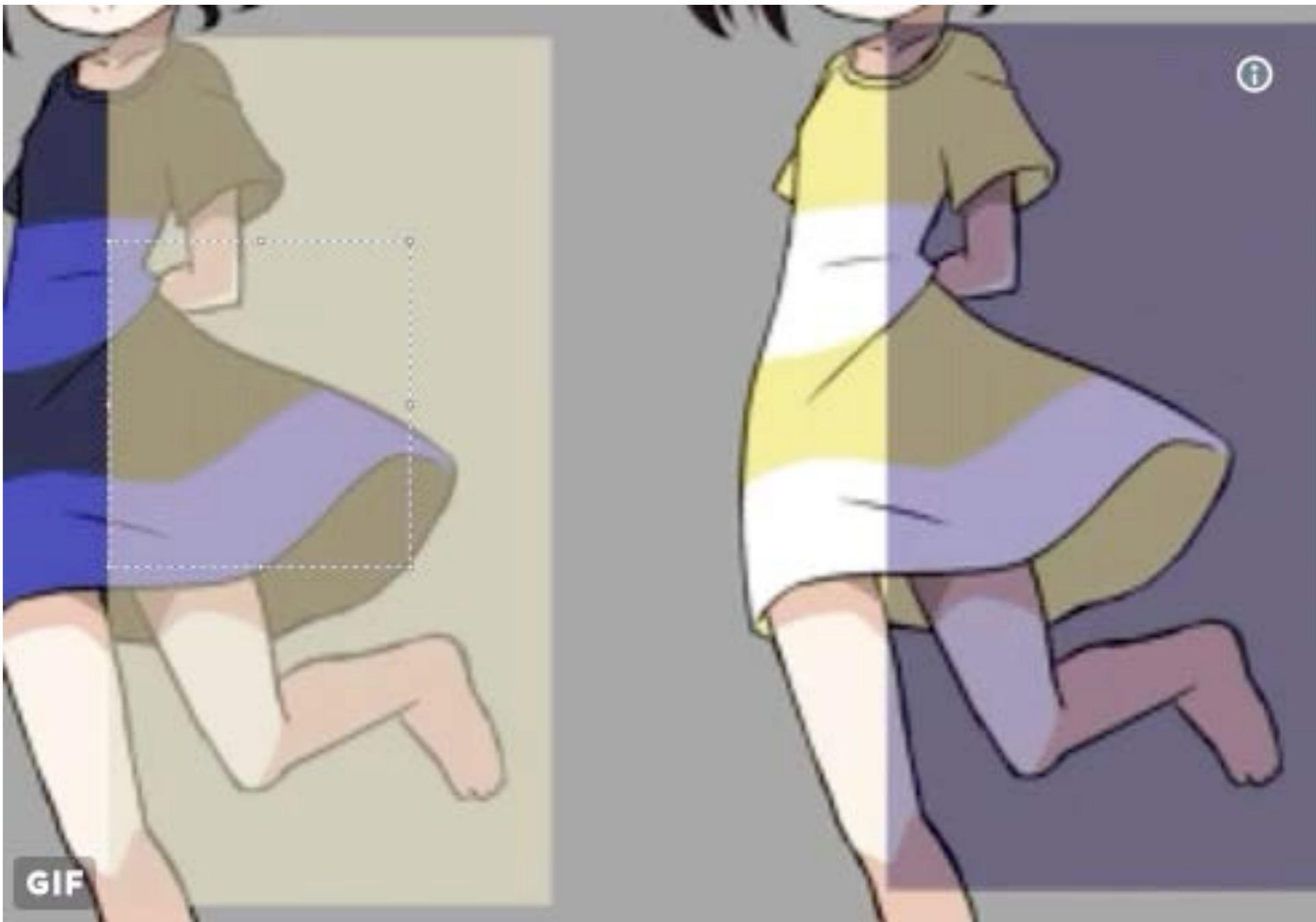


Follow

I don't understand this odd dress debate
and I feel like it's a trick somehow.
I'm confused and scared.
PS it's OBVIOUSLY BLUE AND BLACK



Outdoor vs. Indoor Prior



Contrast

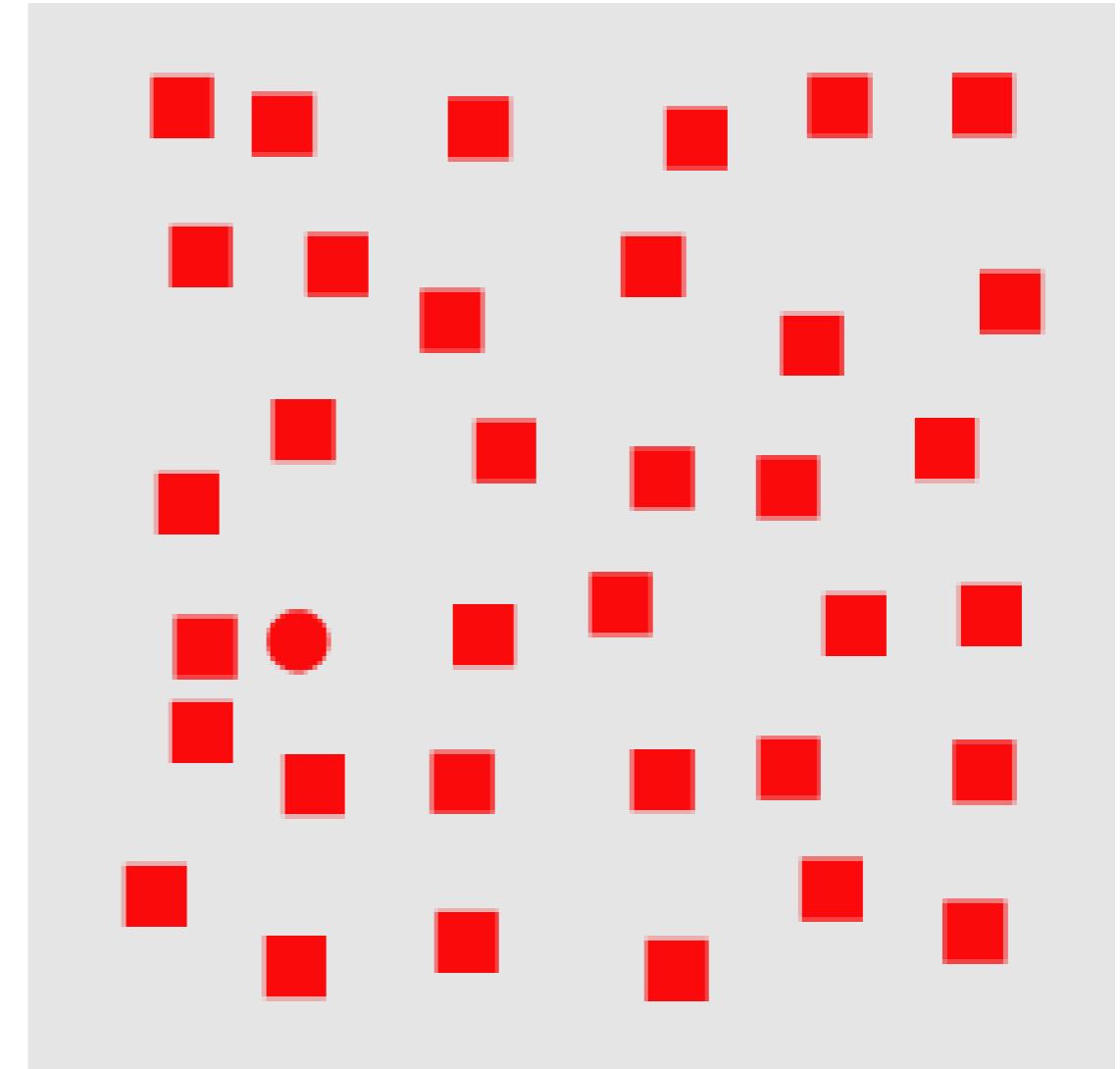
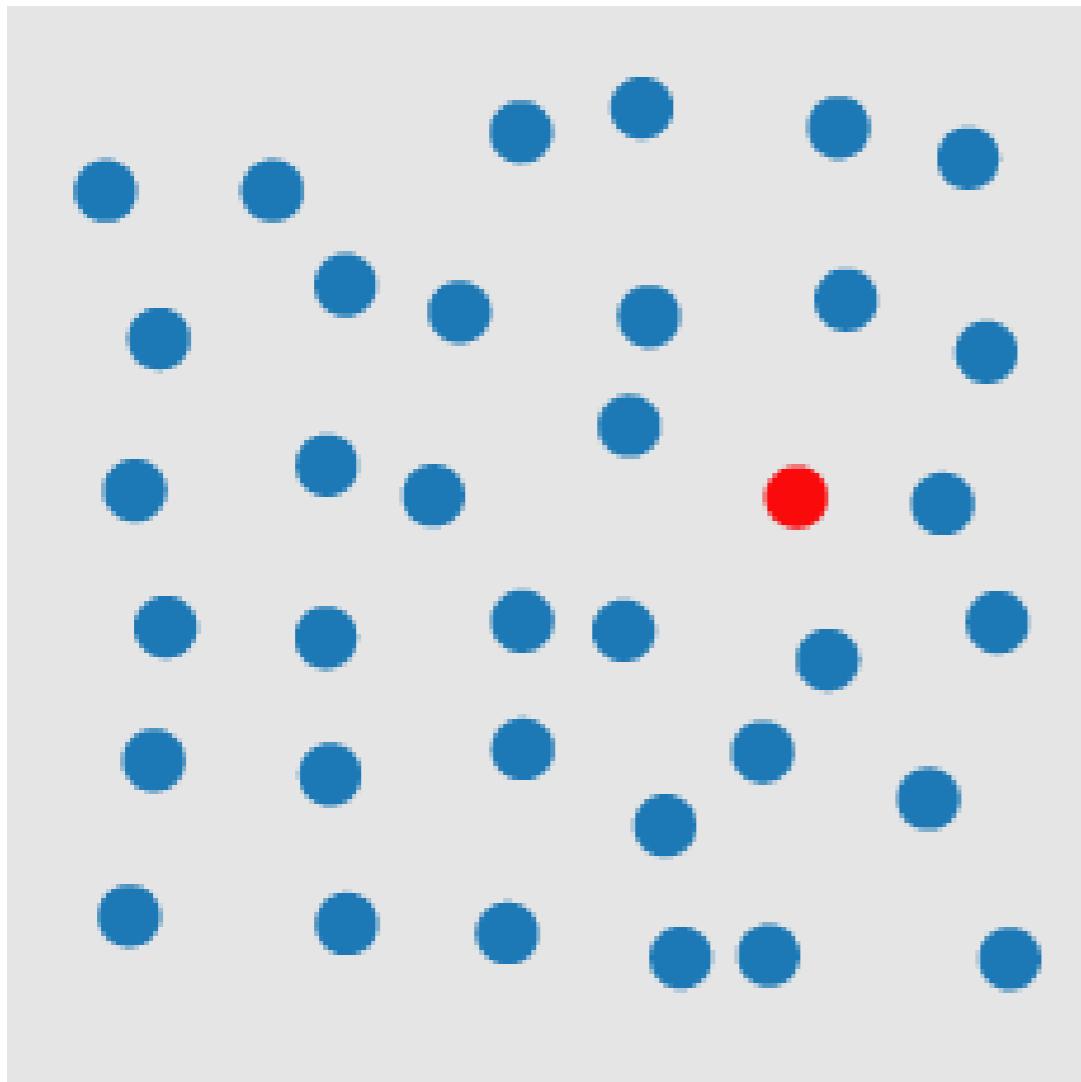
How many Vs?

MTHIVLWYADCEQGHKILKMTWYN
ARDCAIREQGHHLVKMFPSTWYARN
GFPSSVCEILQGKMFPSNDRCEQDIFP
SGHLMFHKMVPSTWYACEQTWRN

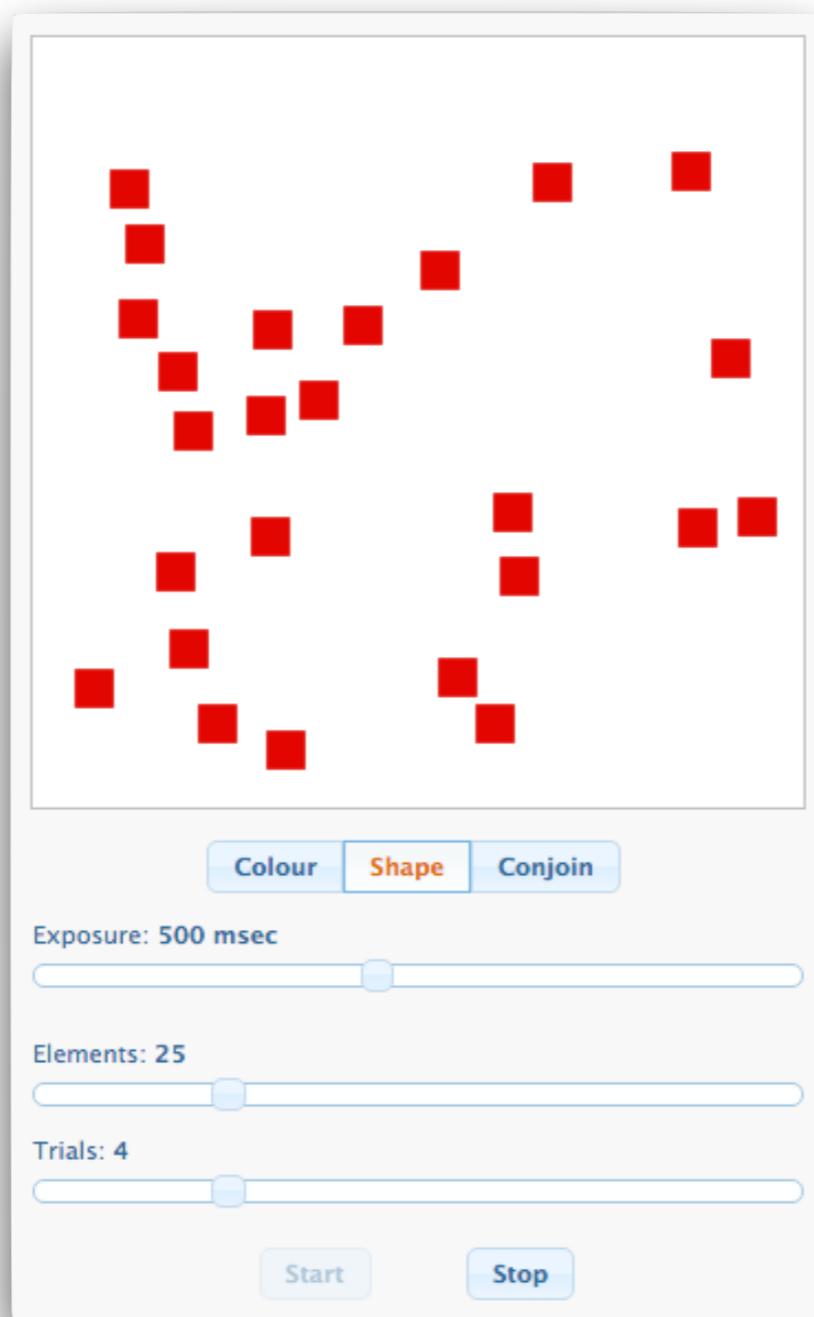
How many Vs?

MTHIVLWYADCEQGHKILKMTWYN
ARDCAIREQGHLVKMFPSTWYARN
GFPSVCEILQGKMFPSNDRCEQDIFP
SGHLMFHKMVPSTWYACEQTWRN

Pre-Attentive Processing

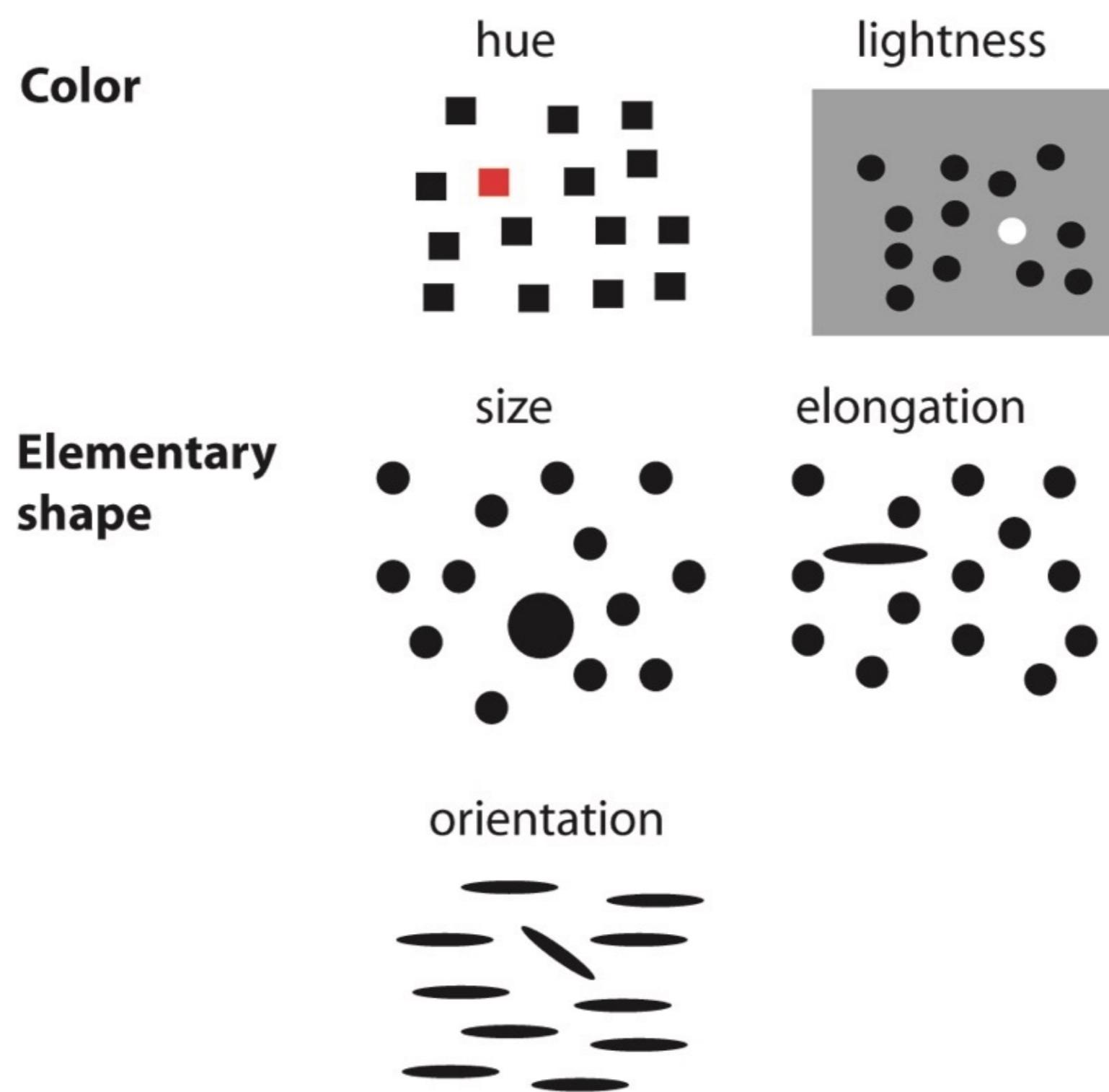


Things That Pop

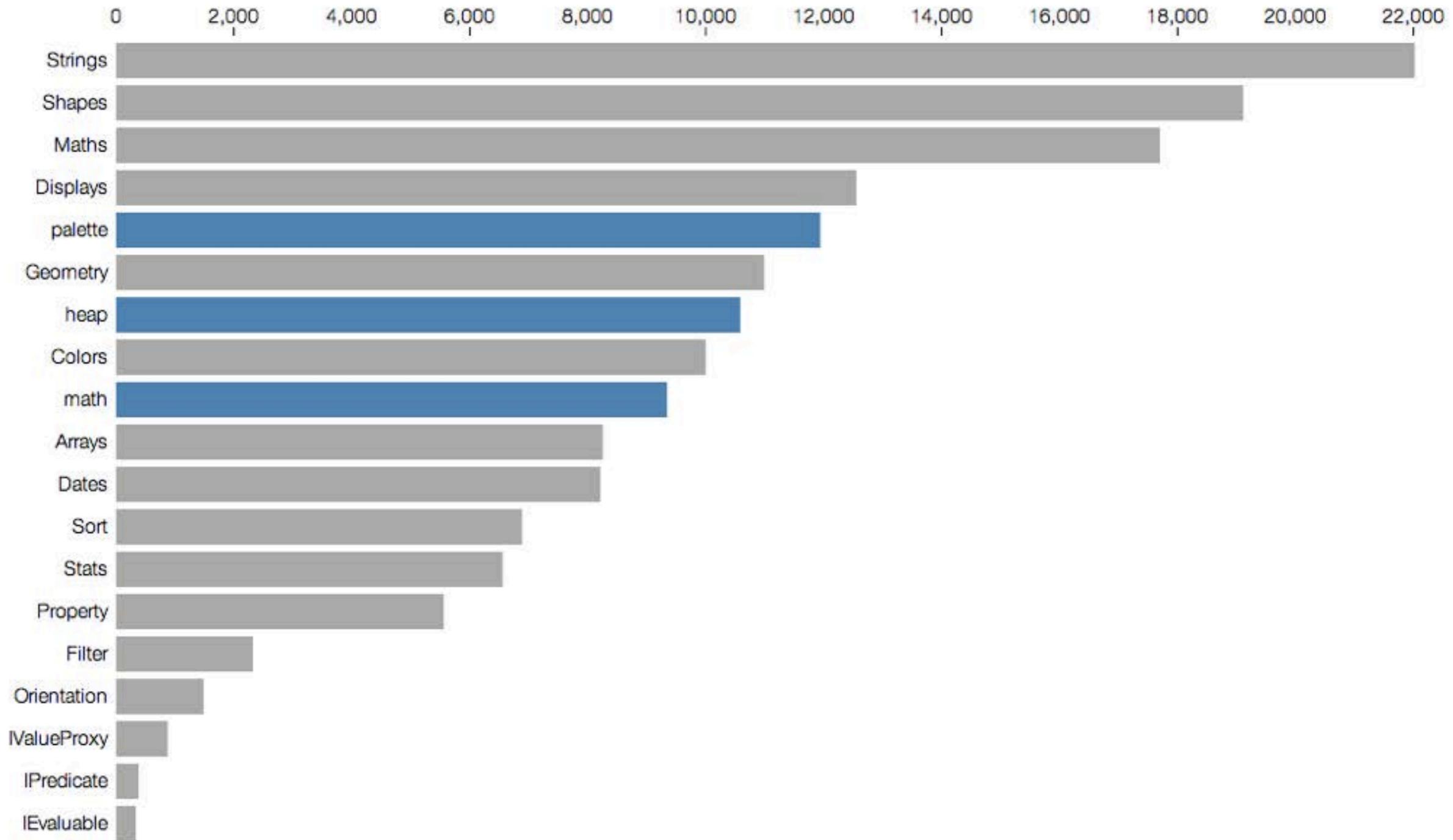


Christopher Healey, NC State University

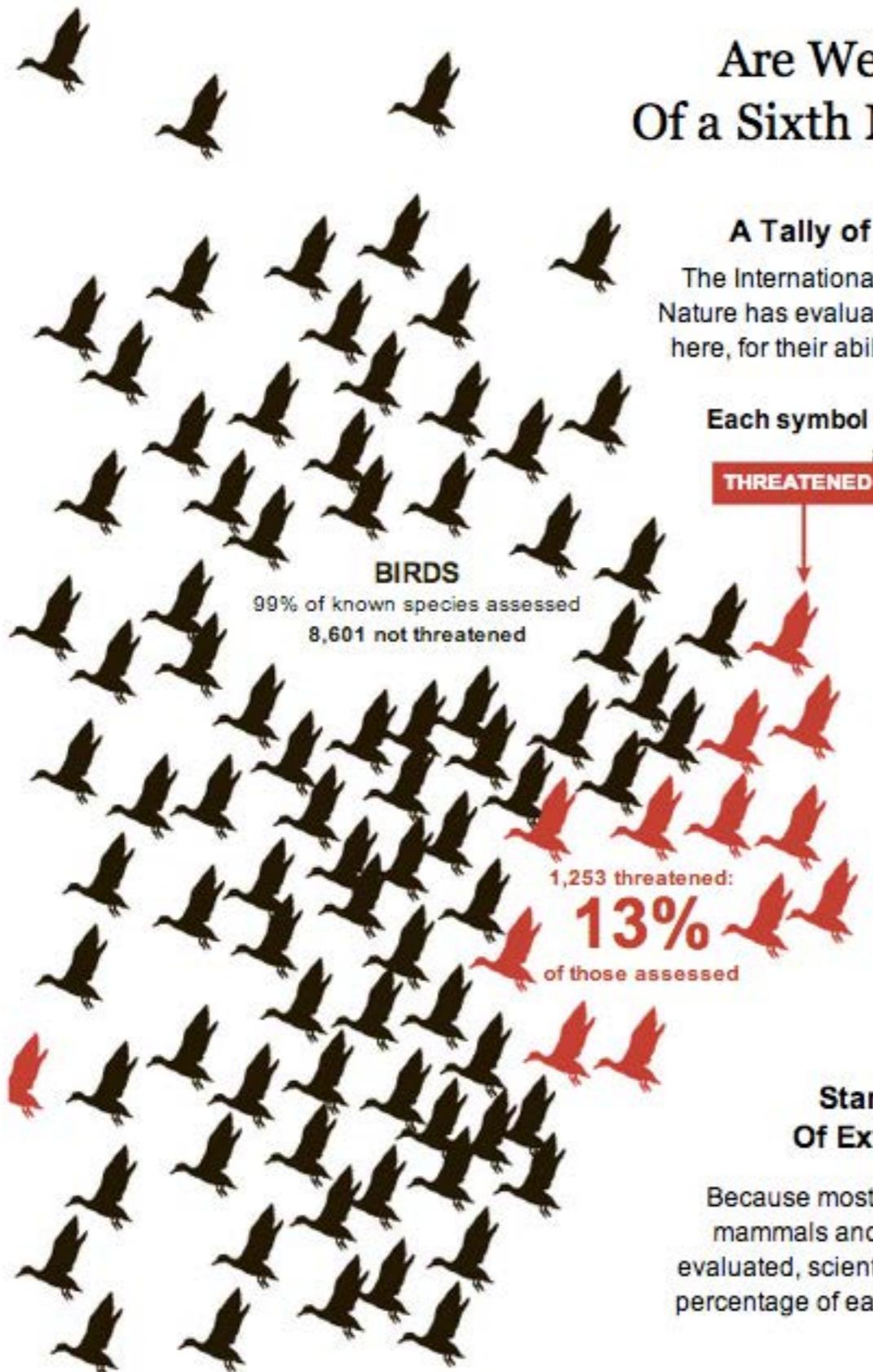
Pre-Attentive Channels



Contrast



Are We in the Midst Of a Sixth Mass Extinction?



A Tally of Life Under Threat

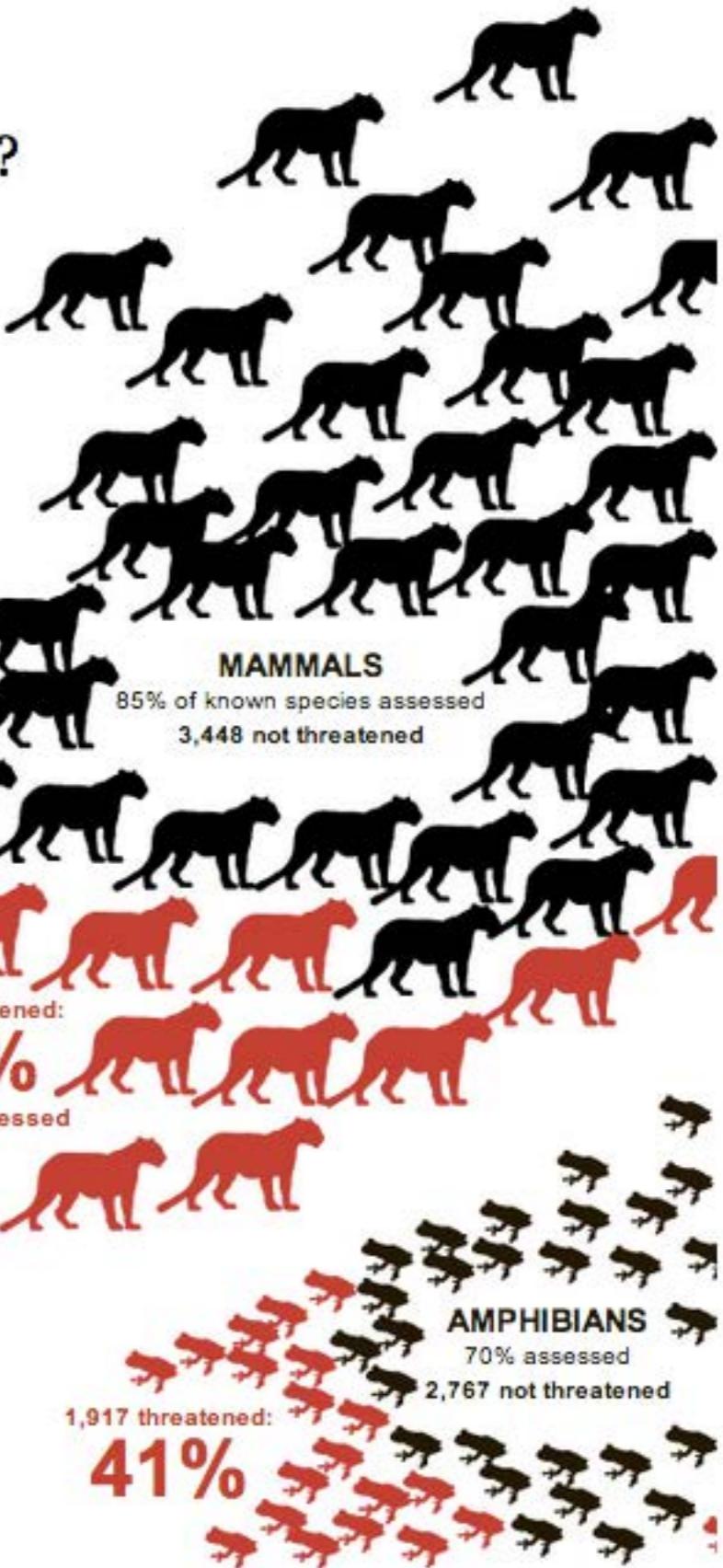
The International Union for Conservation of Nature has evaluated 52,205 species, depicted here, for their ability to survive. [Related Article »](#)

Each symbol represents 100 species assessed:

THREATENED



NOT THREATENED

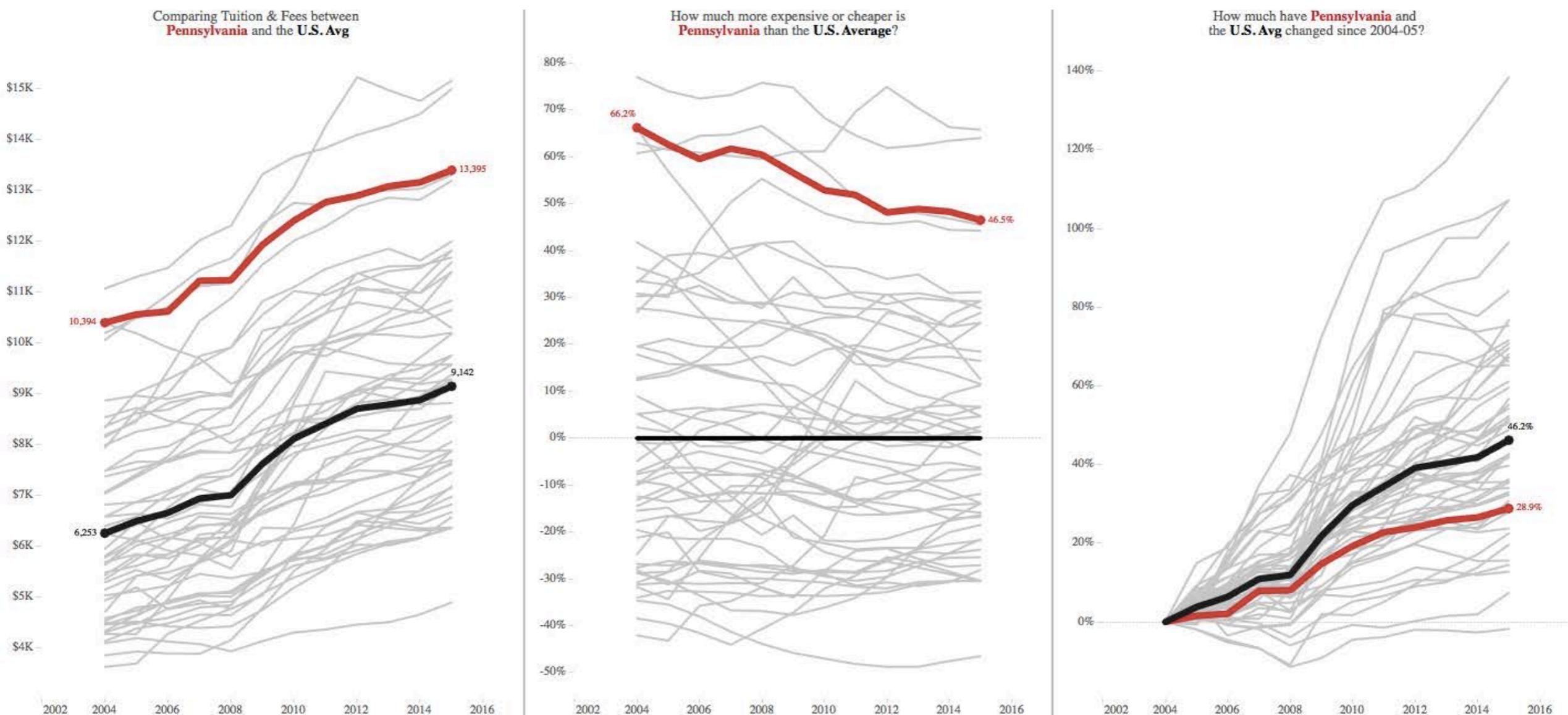
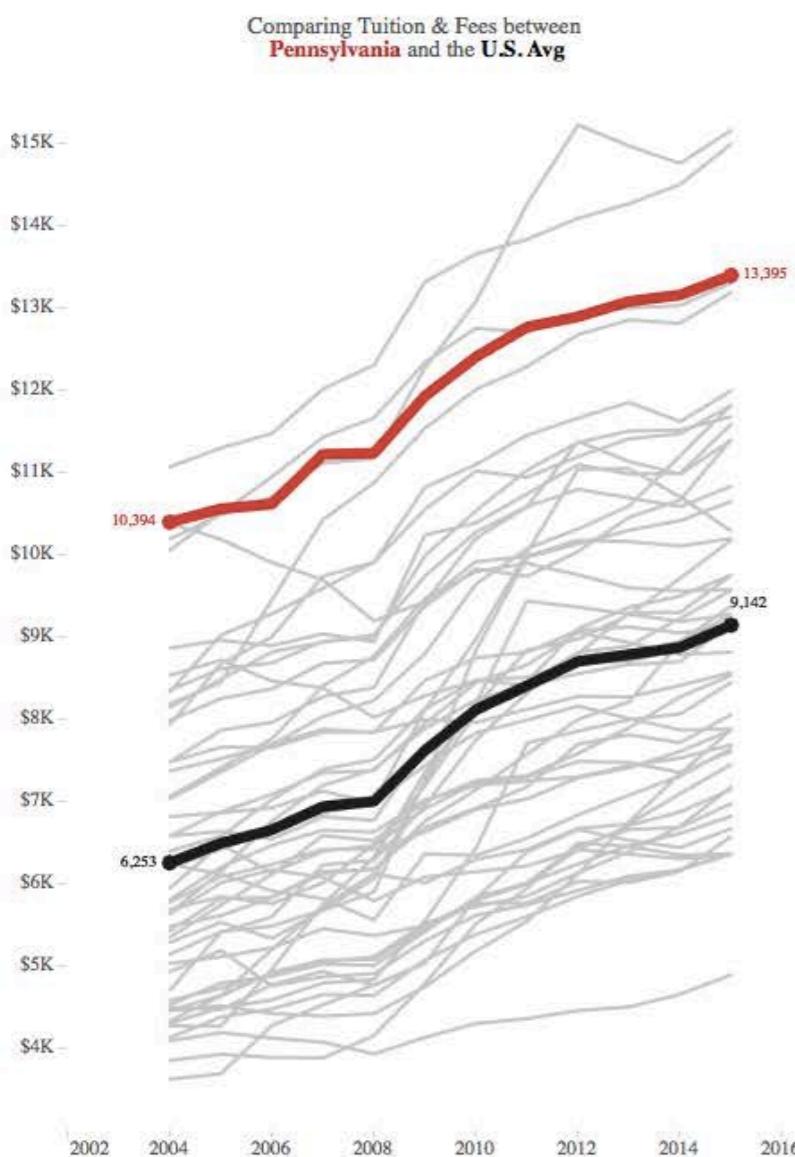


Stark Indicators Of Extinction Risks

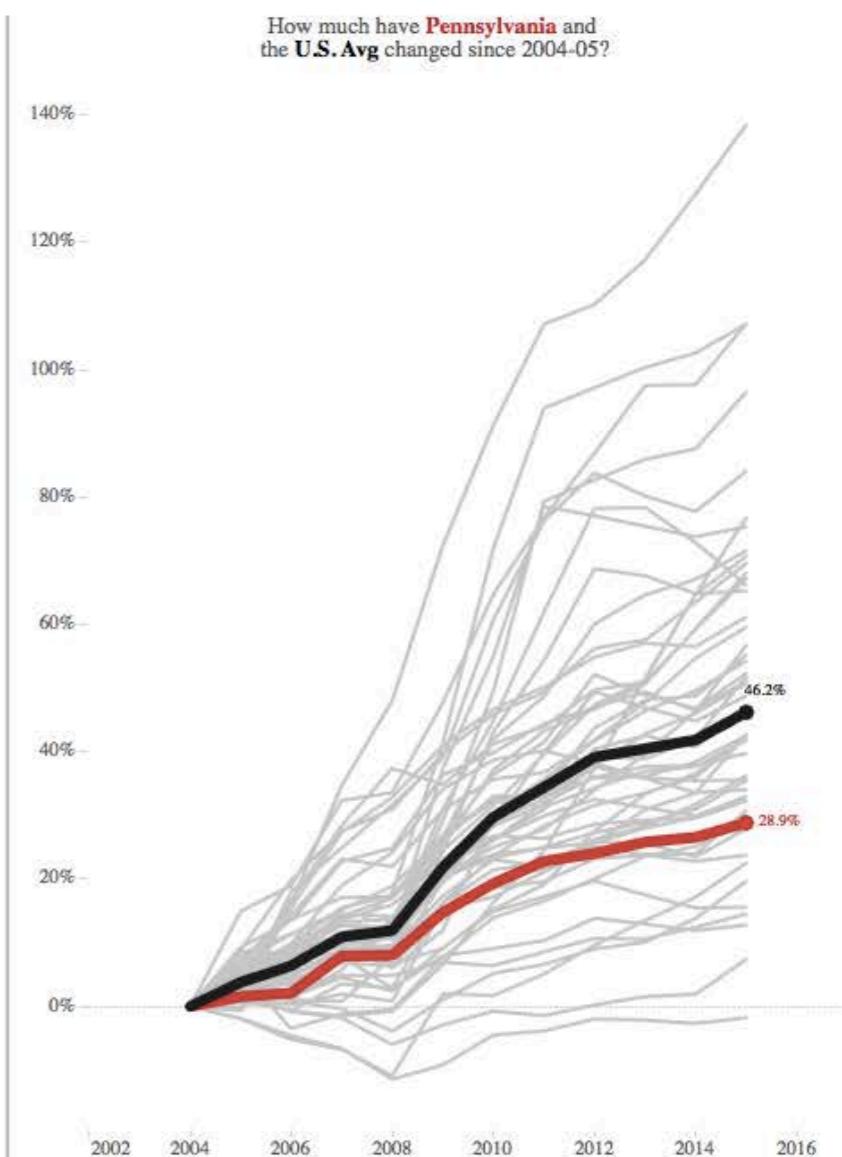
Because most **known species** of birds, mammals and amphibians have been evaluated, scientists are confident about the percentage of each group that is threatened.

Contrast and Layering

The Rising Cost of Tuition in the United States



Choose a State
Pennsylvania



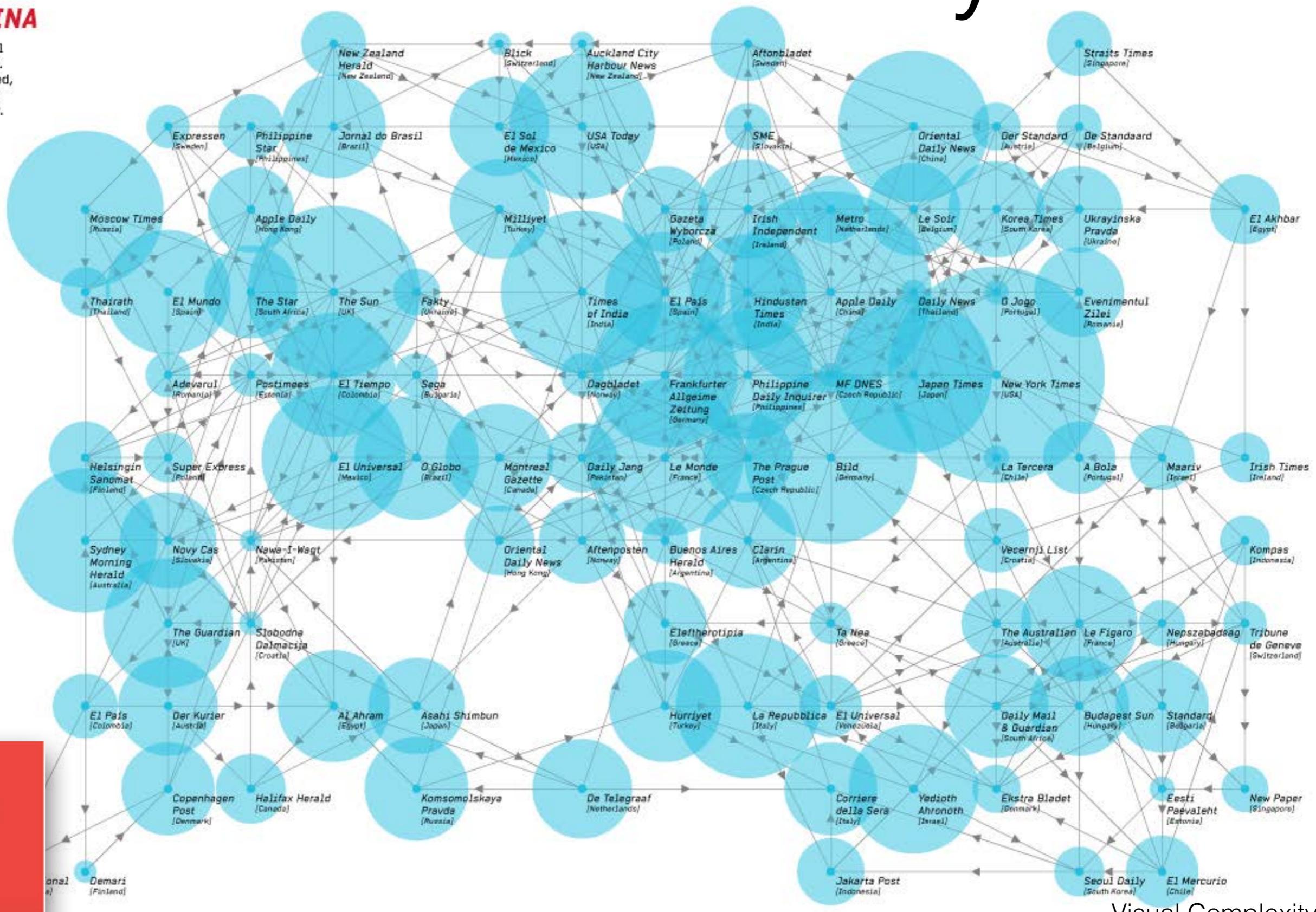
A. Kriebel

<http://www.vizwiz.com/2016/05/makeover-monday-rising-cost-of-tuition.html>

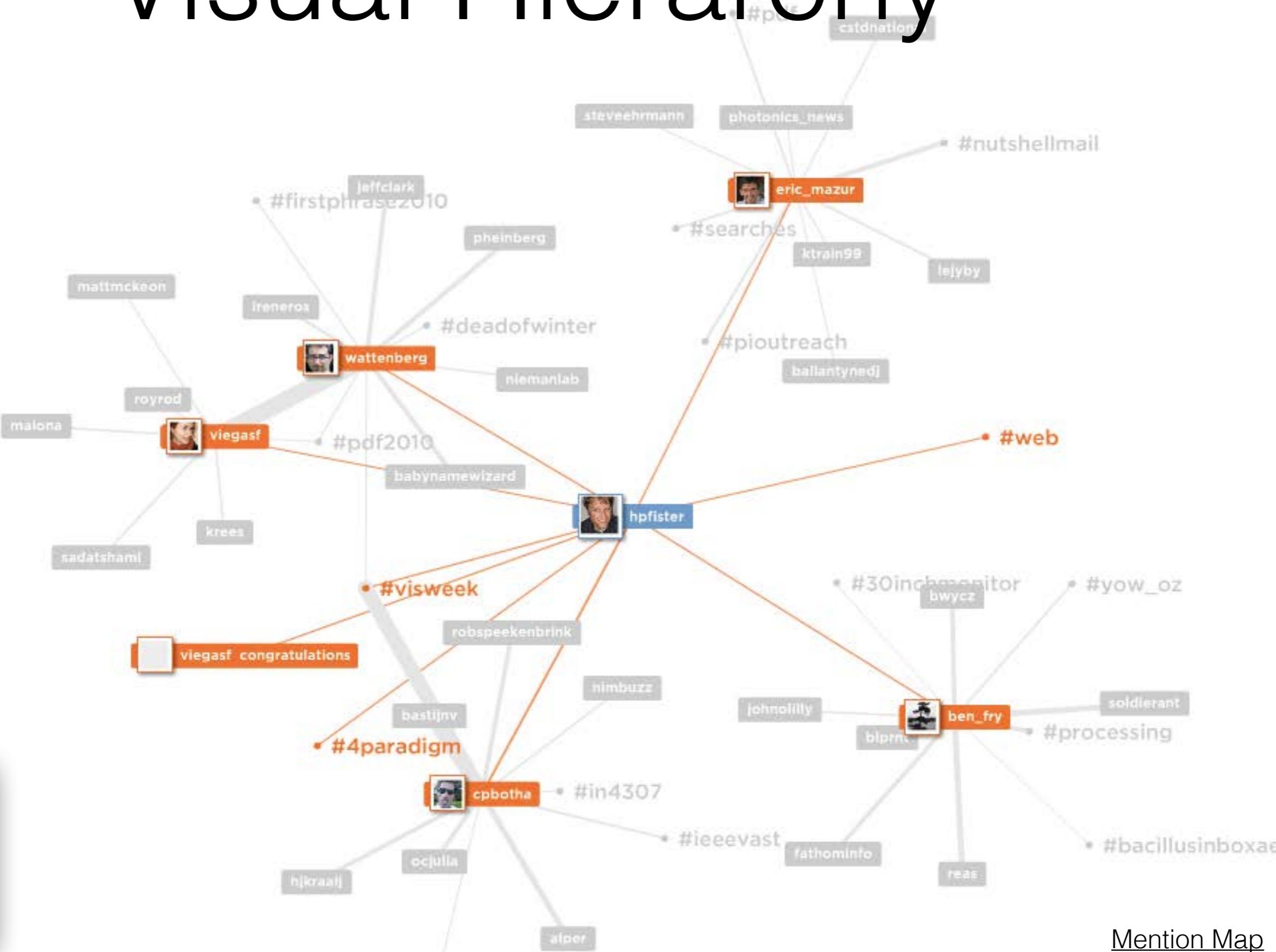
Visual Hierarchy

+SUMEDICINA

The Sumedicina scandal spread around the world. Everywhere rumors arised, which were passed from newspaper to newspaper.



Visual Hierarchy



Where the Power Is Out and Returning Across the Northeast

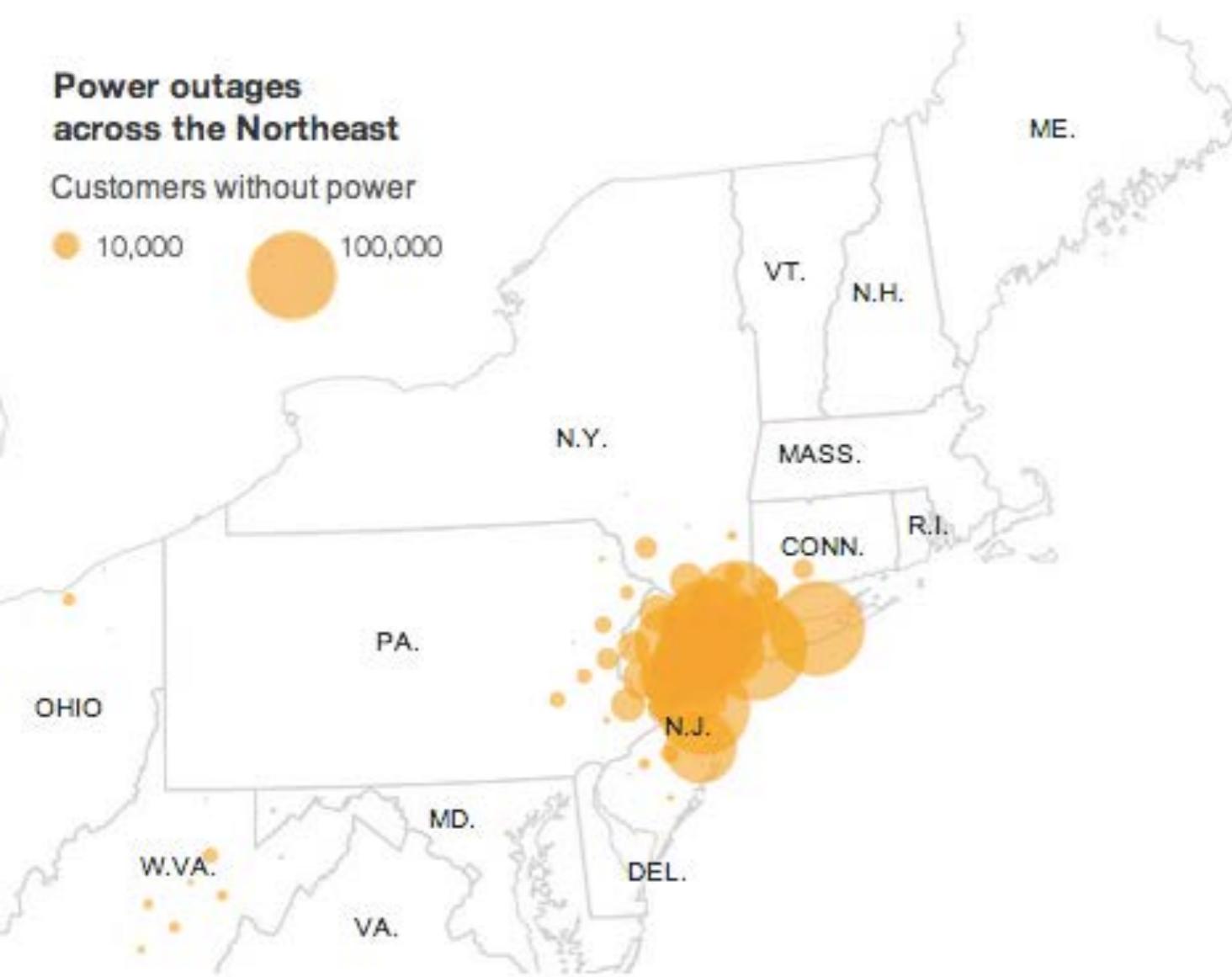
Updated Sunday, November 4 at 8:00 PM

Hurricane Sandy felled trees, downed power lines and flooded substations. The storm led to power failures in at least 17 states. Here's the restoration status in areas with significant power failures.

Power outages across the Northeast

Customers without power

● 10,000



TRI-STATE AREA

PSE&G

501,074 customers affected



Jersey Central Power & Light

405,816 customers affected



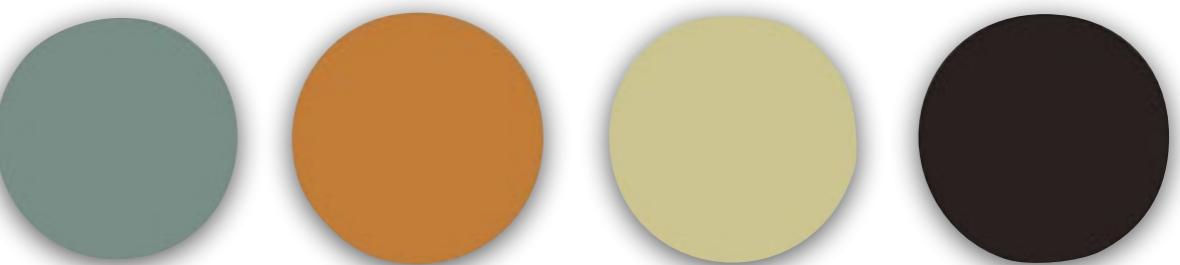
Long Island Power Authority

281,900 customers affected





Color



Describing Color

Hue



Luminance



Saturation



Categorical 33 Colors!

UNITED

STATES

FREQUENCY

ALLOCATIONS

THE RADIO SPECTRUM

RADIO SERVICES COLOR LEGEND

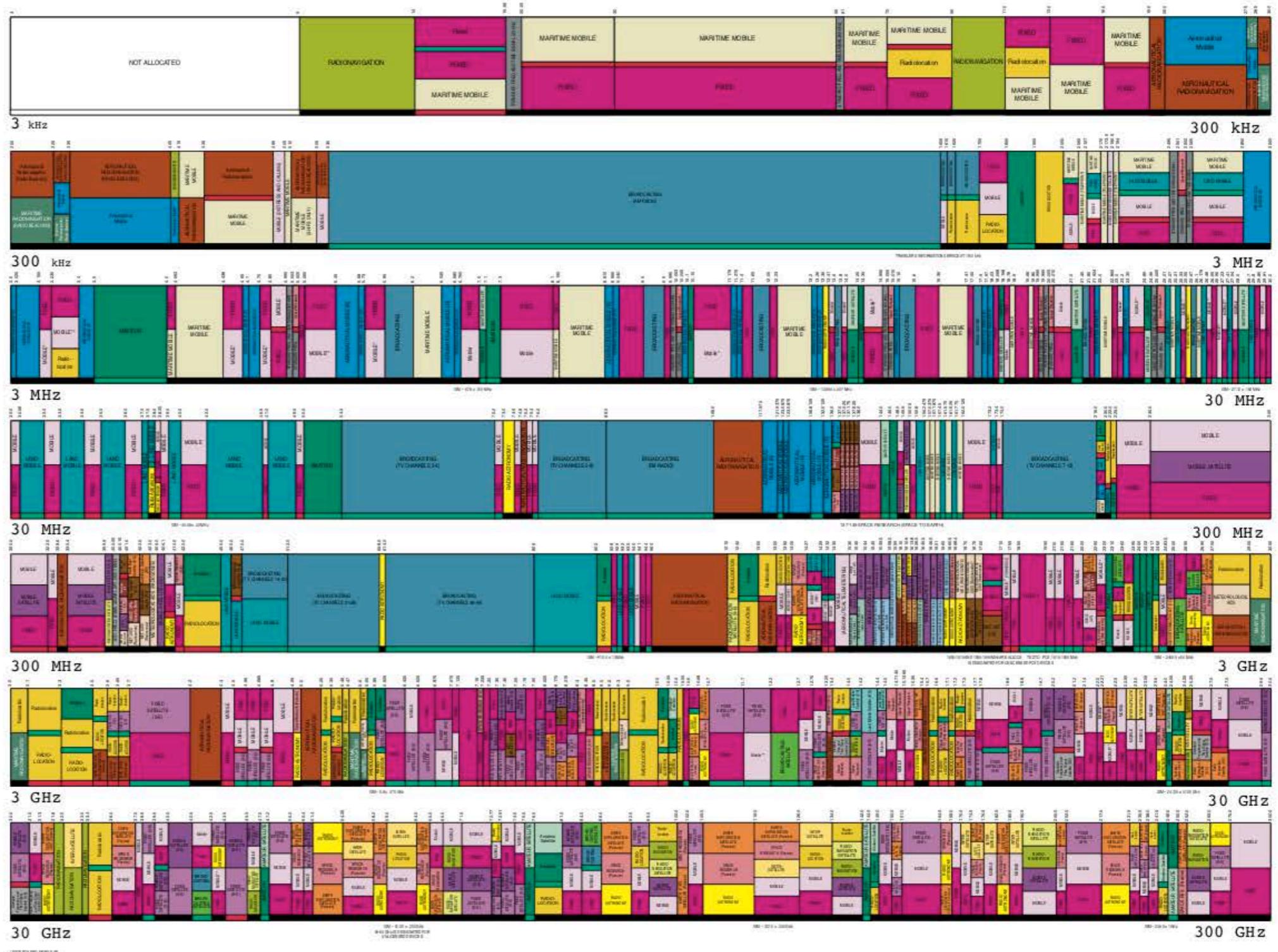
AERONAUTICAL MOBILE	INTERSATELLITE	RADIOTRONIC
AERONAUTICAL MOBILE SATELLITE	LAND MOBILE	RADIODETERMINATION
AERONAUTICAL NAVIGATION	LAND MOBILE SATELLITE	RADIOLOCATION
AMATEUR	MARITIME MOBILE	RADIOLOCATION SATELLITE
AMATEUR SATELLITE	MARITIME MOBILE SATELLITE	RADIO NAVIGATION
BROADCASTING	MARITIME NAVIGATION	RADIO NAVIGATION SATELLITE
BROADCASTING SATELLITE	METEOROLOGICAL	SPACE OPERATION
EARTH EXPLORATION SATELLITE	METEOROLOGICAL SATELLITE	SPACE RESEARCH
FIXED	MOBILE	STANDARD FREQUENCY AND TIME SIGNAL
FIXED SATELLITE	MOBILE SATELLITE	STANDARD FREQUENCY AND TIME SIGNAL SATELLITE

ACTIVITY CODE

GOVERNMENT EXCLUSIVE	GOVERNMENT NON-GOVERNMENT SHARED
NON-GOVERNMENT EXCLUSIVE	

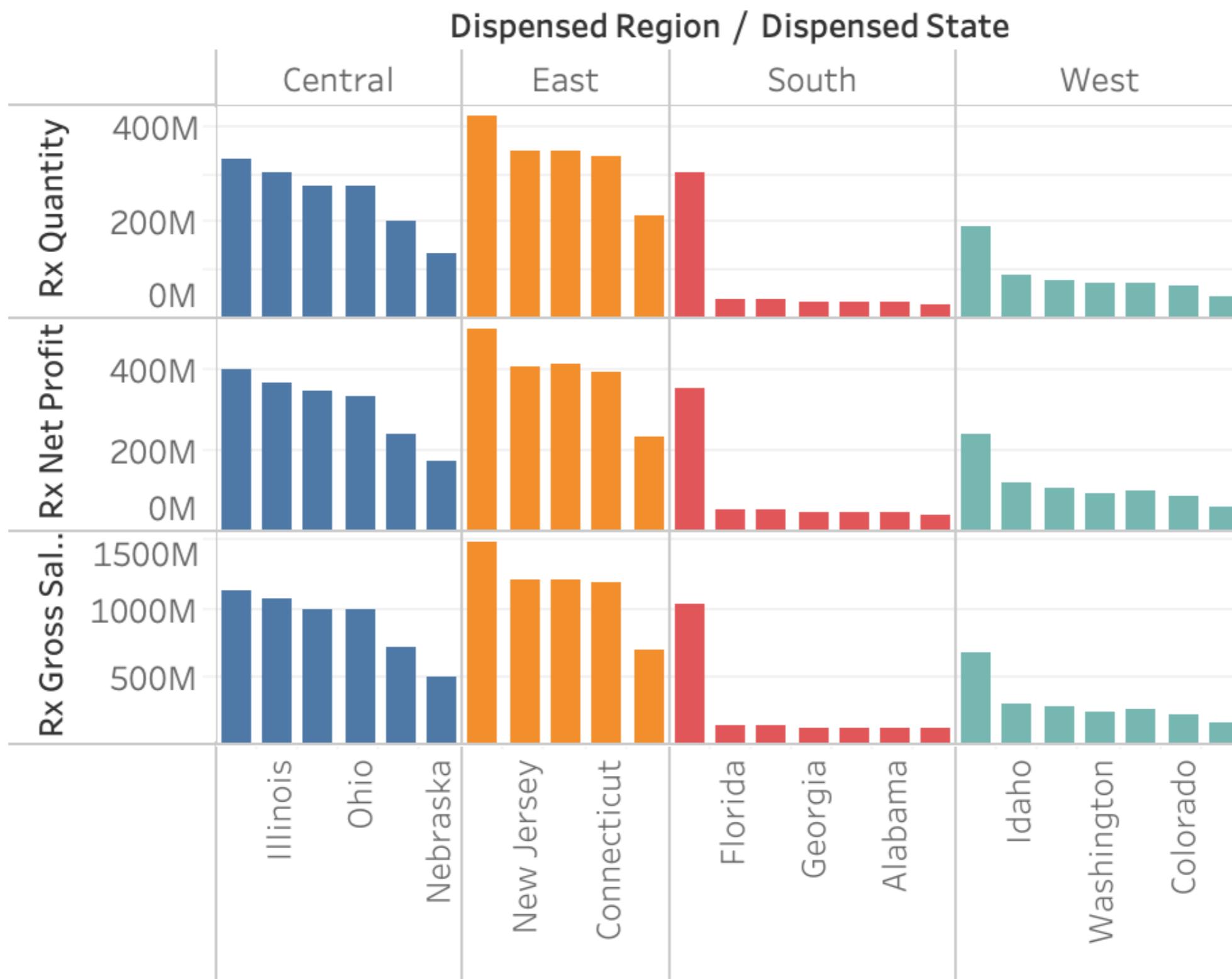
ALLOCATION USAGE DESIGNATION

SERVICE	EXAMPLE	DESCRIPTION
Primary	FIXED	Capital Letters
Secondary	Mobile	1st Capital Letter followed by lowercase letters
Permitted	BROADCASTING	Capital Letters between colons delineated



Categorical Color

Use no more than 8-10 colors at once.



Ordinal - Sequential

Mainly vary luminance and saturation.

L only



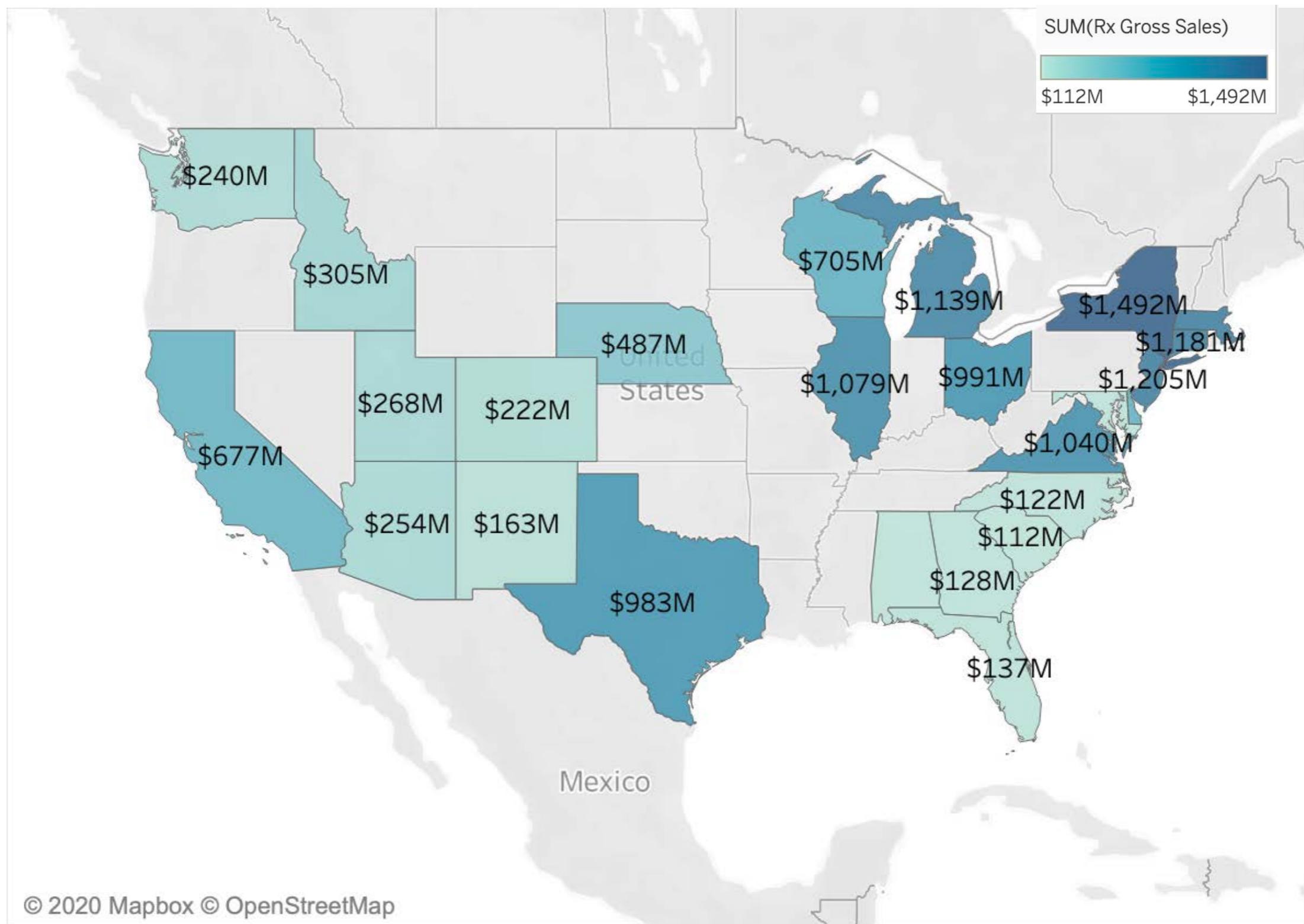
L and S



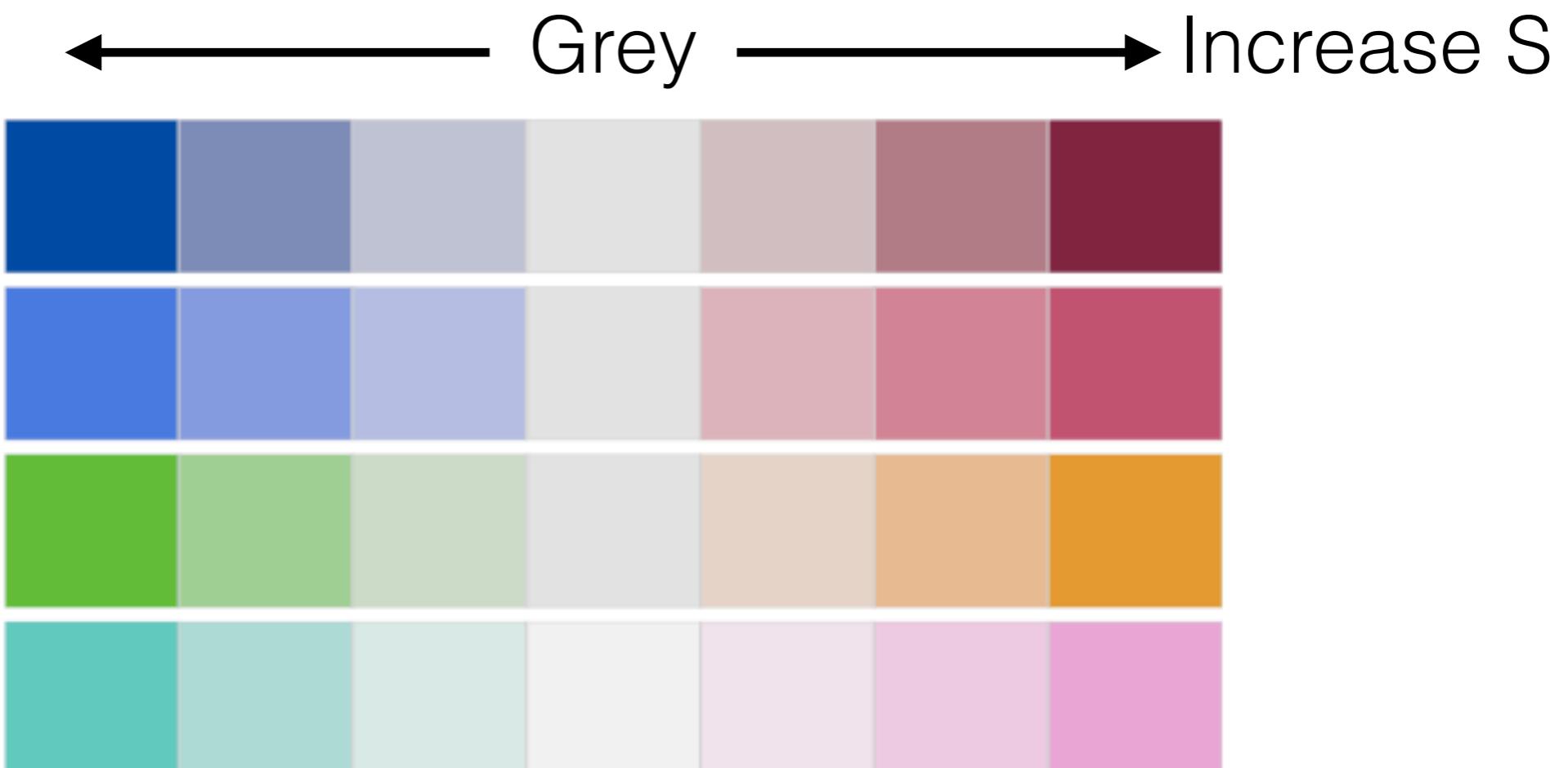
L, S, and H



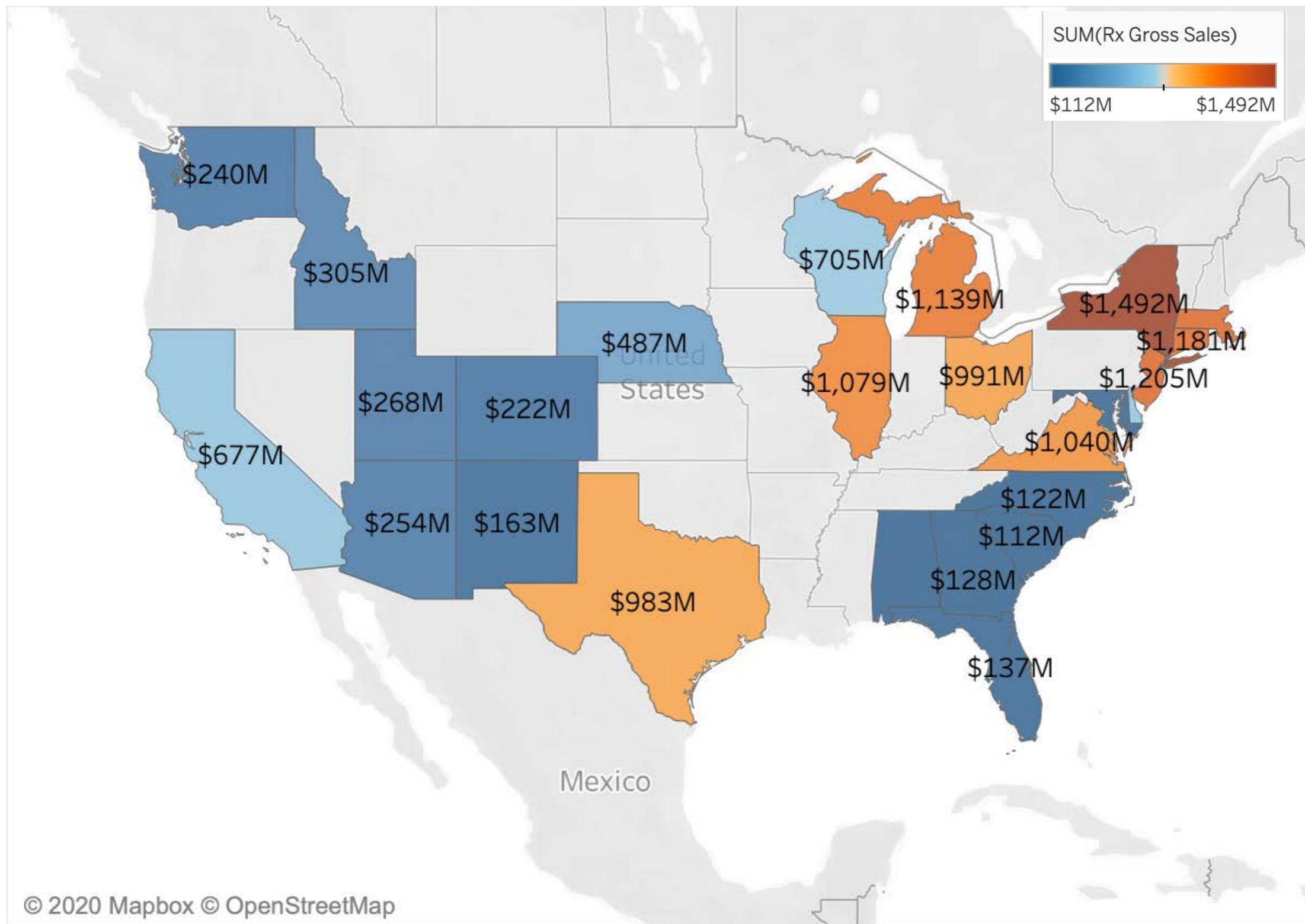
Ordinal - Sequential



Ordinal - Diverging

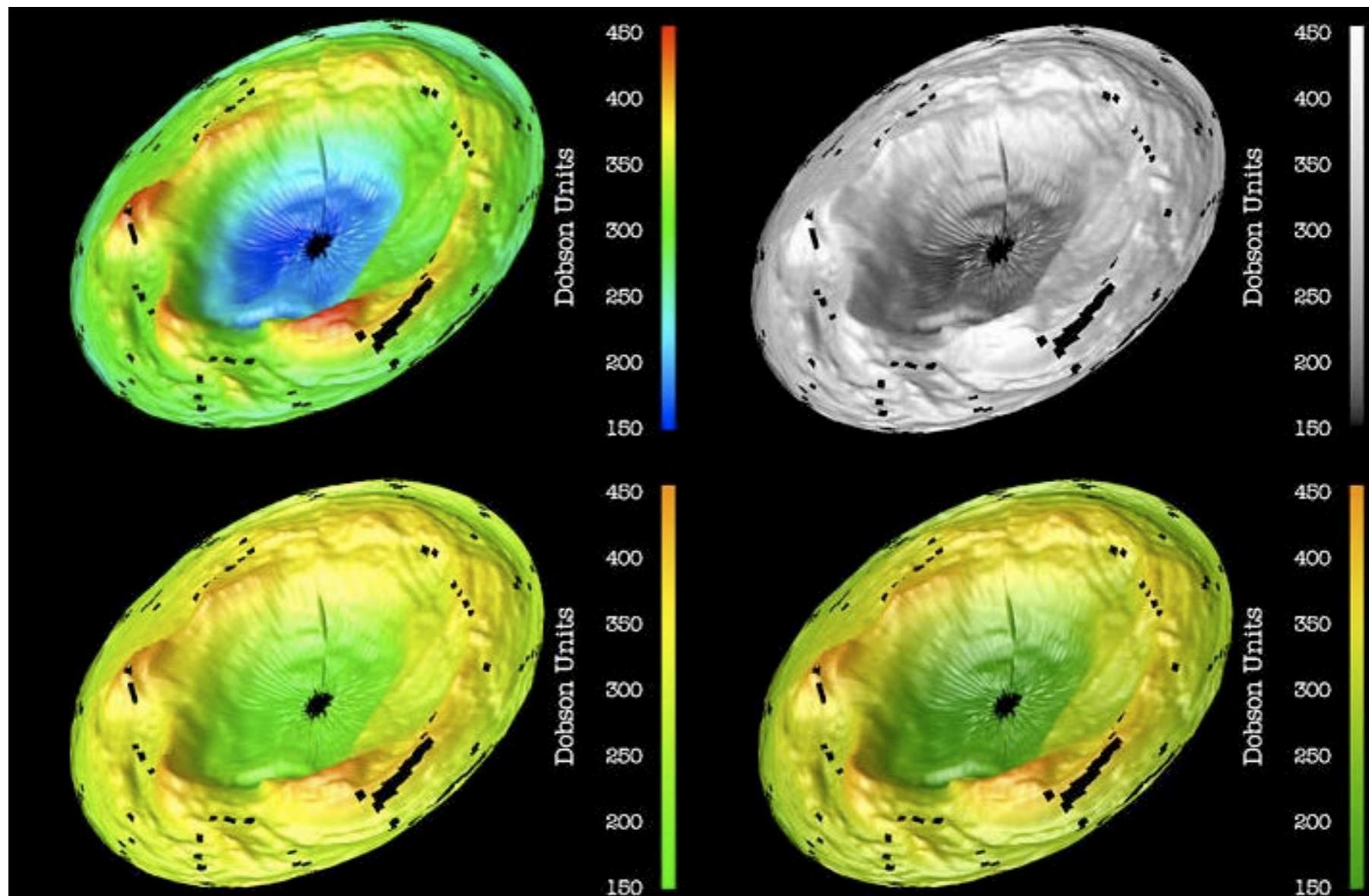


Ordinal - Diverging



Quantitative - Continuous

Hue

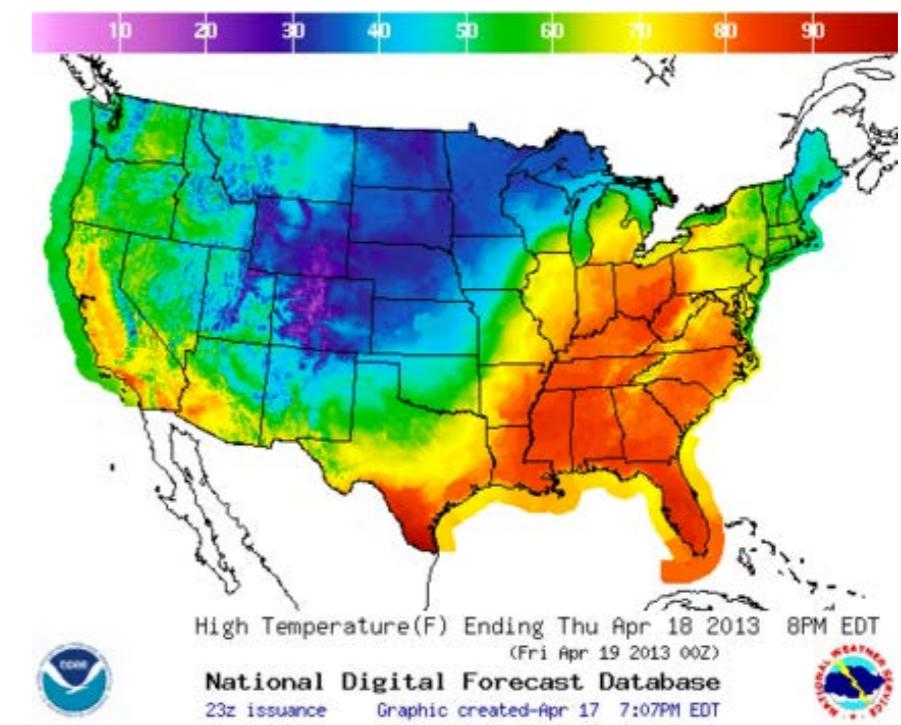
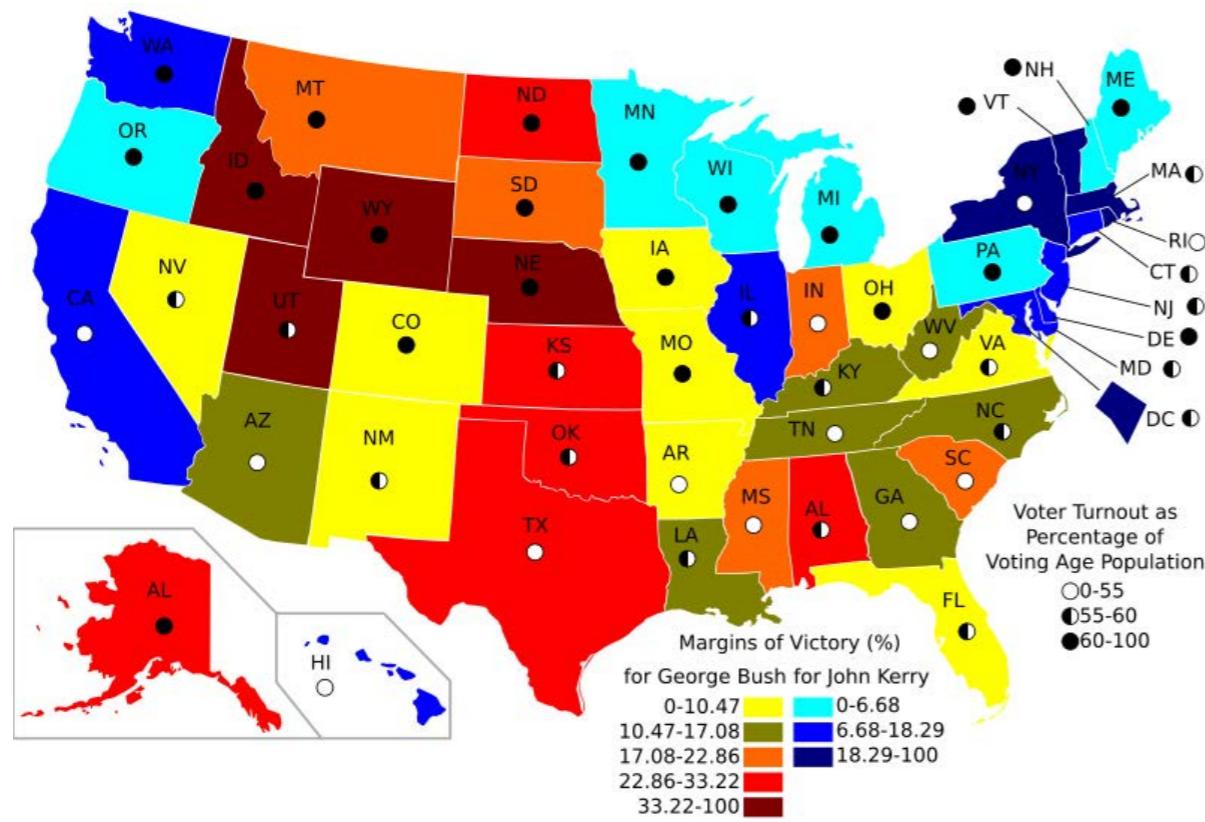
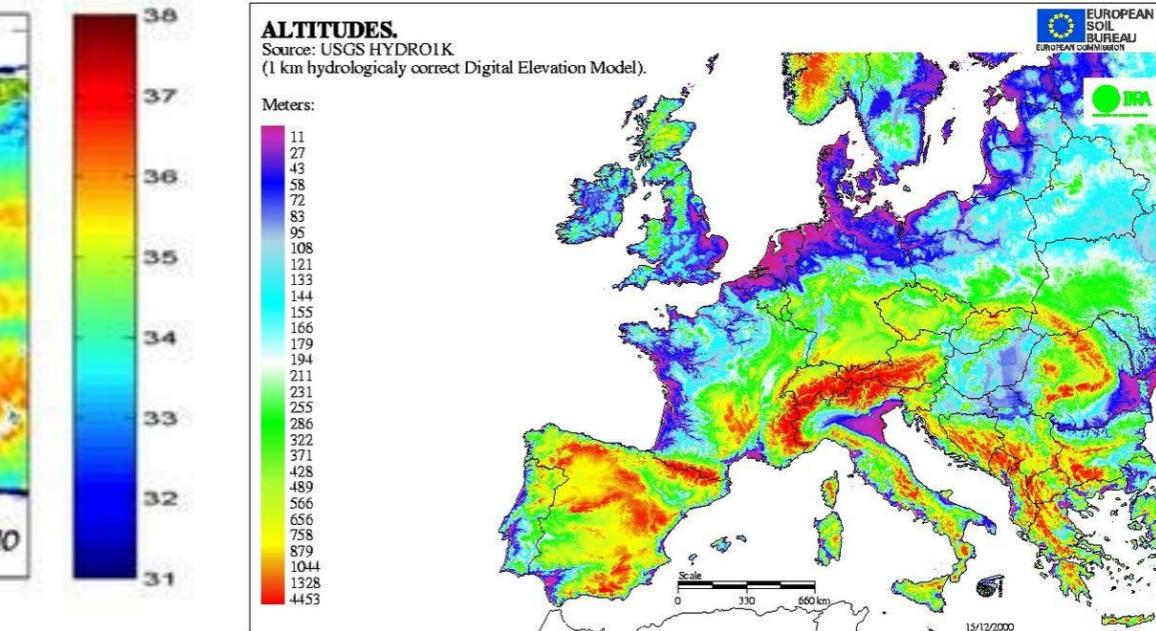
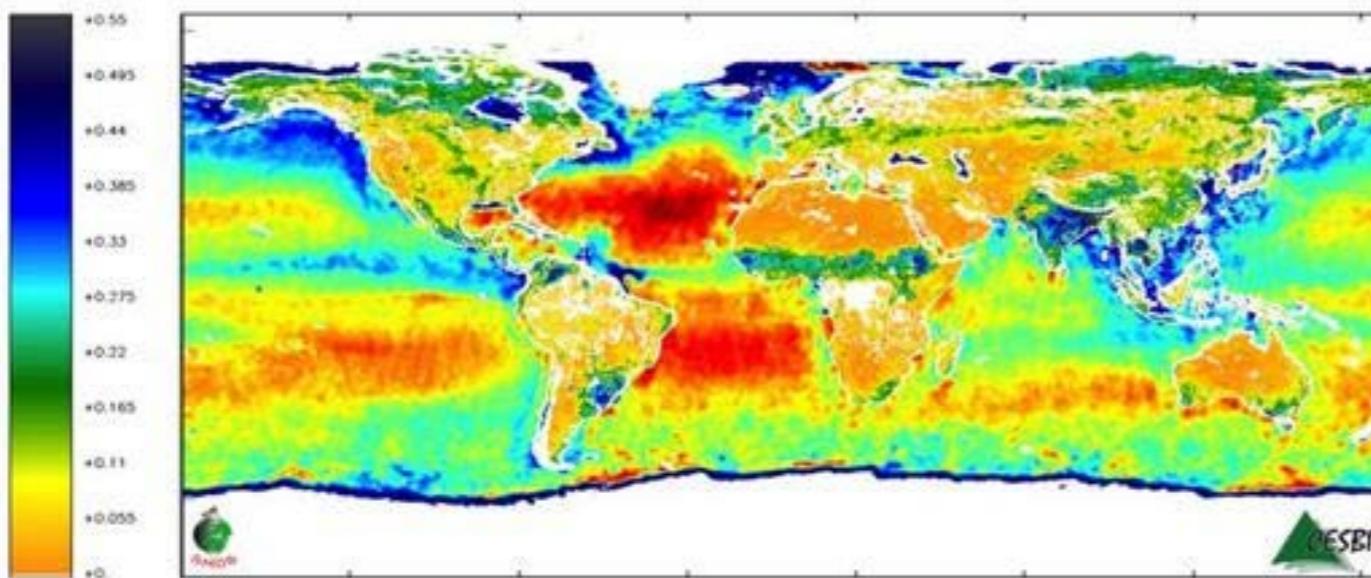


Luminance

Hue &
Saturation

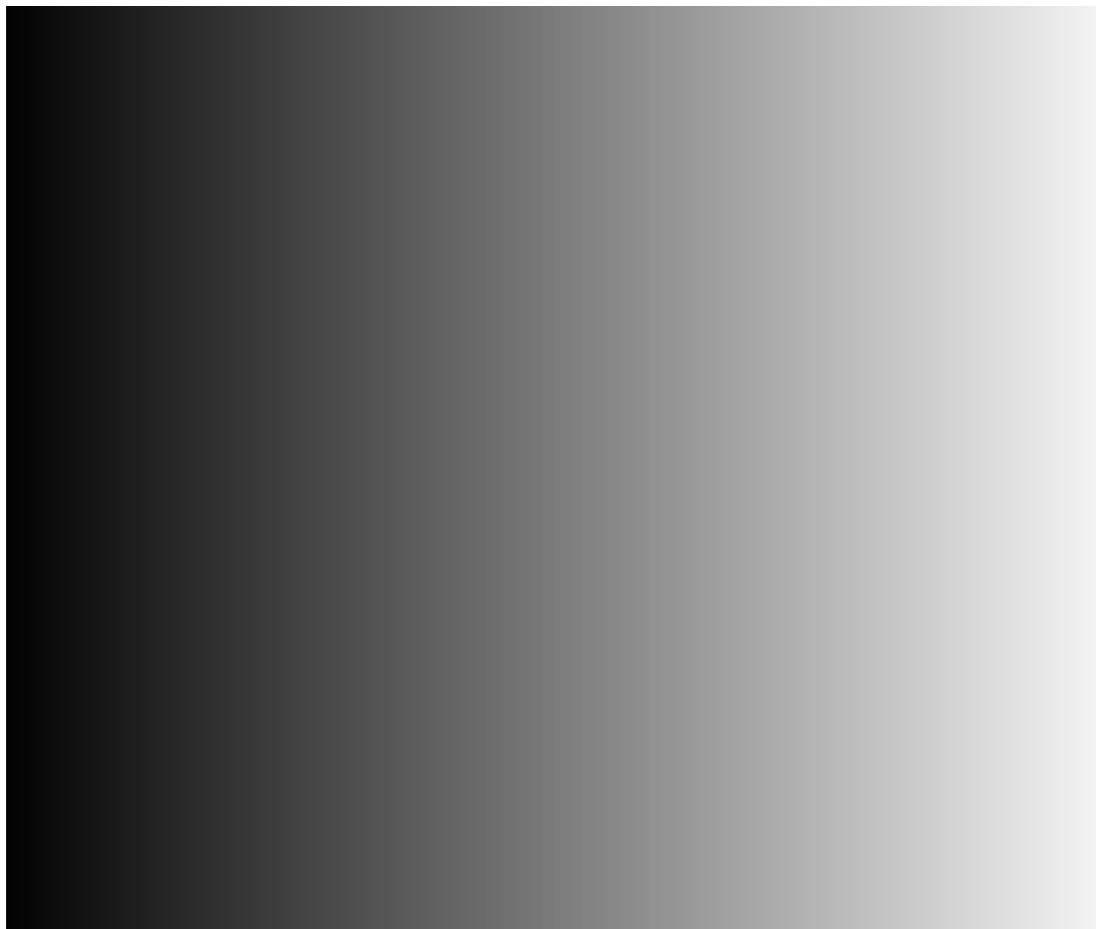
Hue &
Luminance

Rainbow Color Map



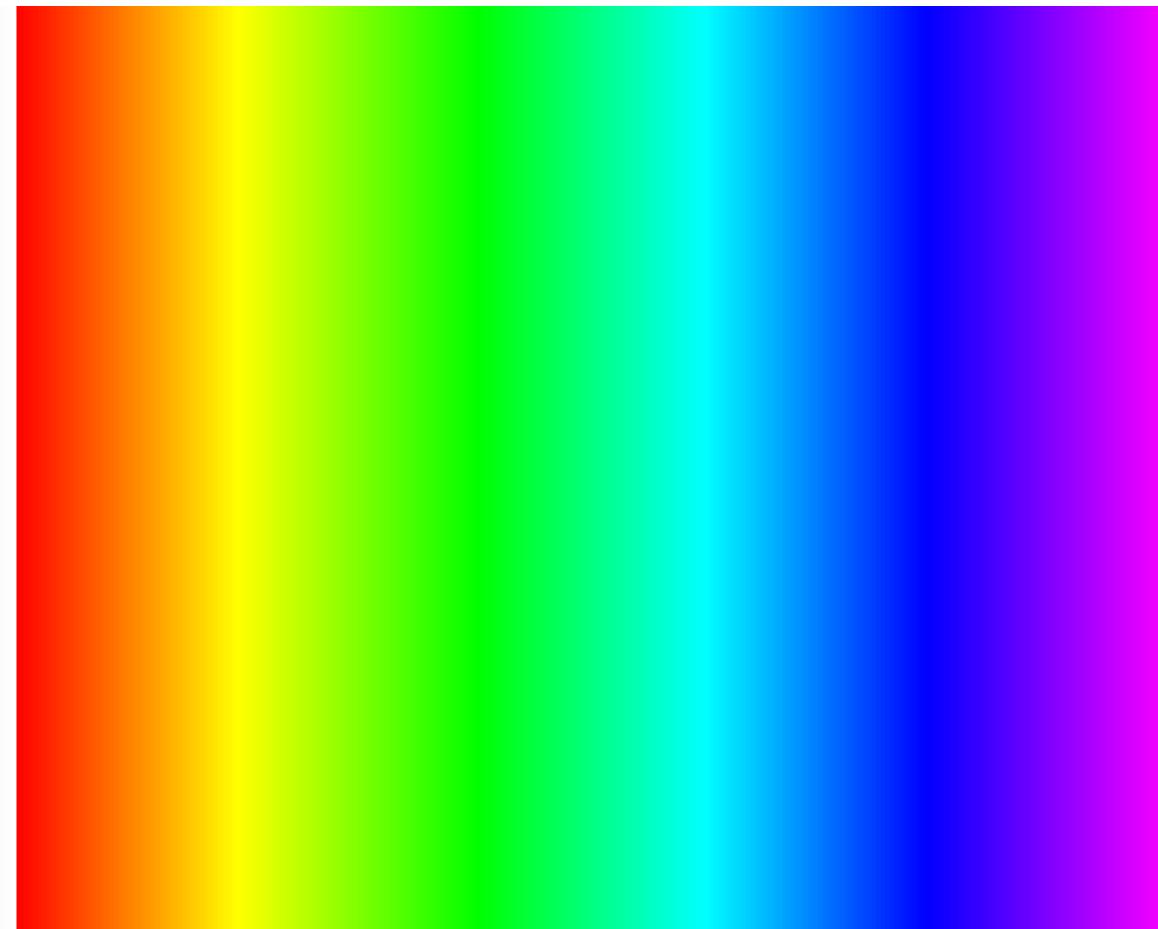
Perceptual Uniformity

Luminance Gradient



Perceptually
Uniform

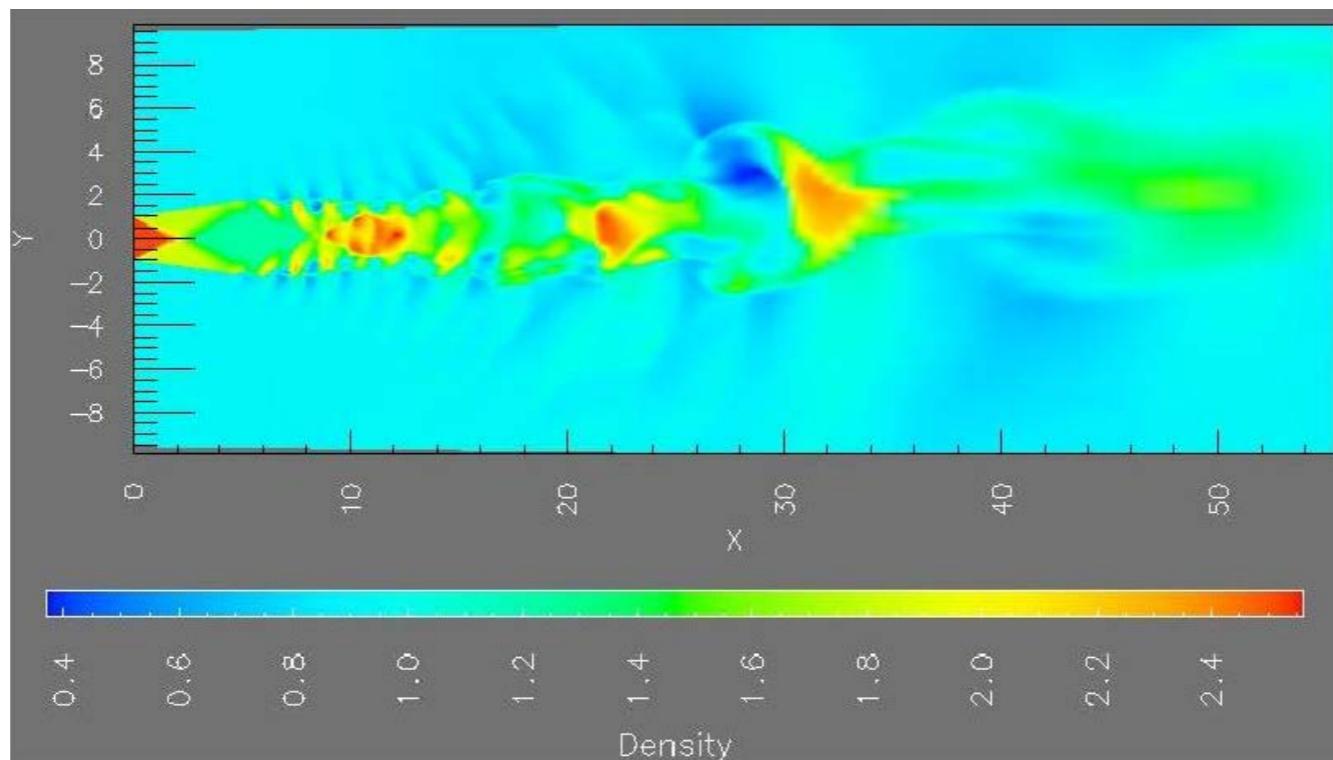
Rainbow Color Map



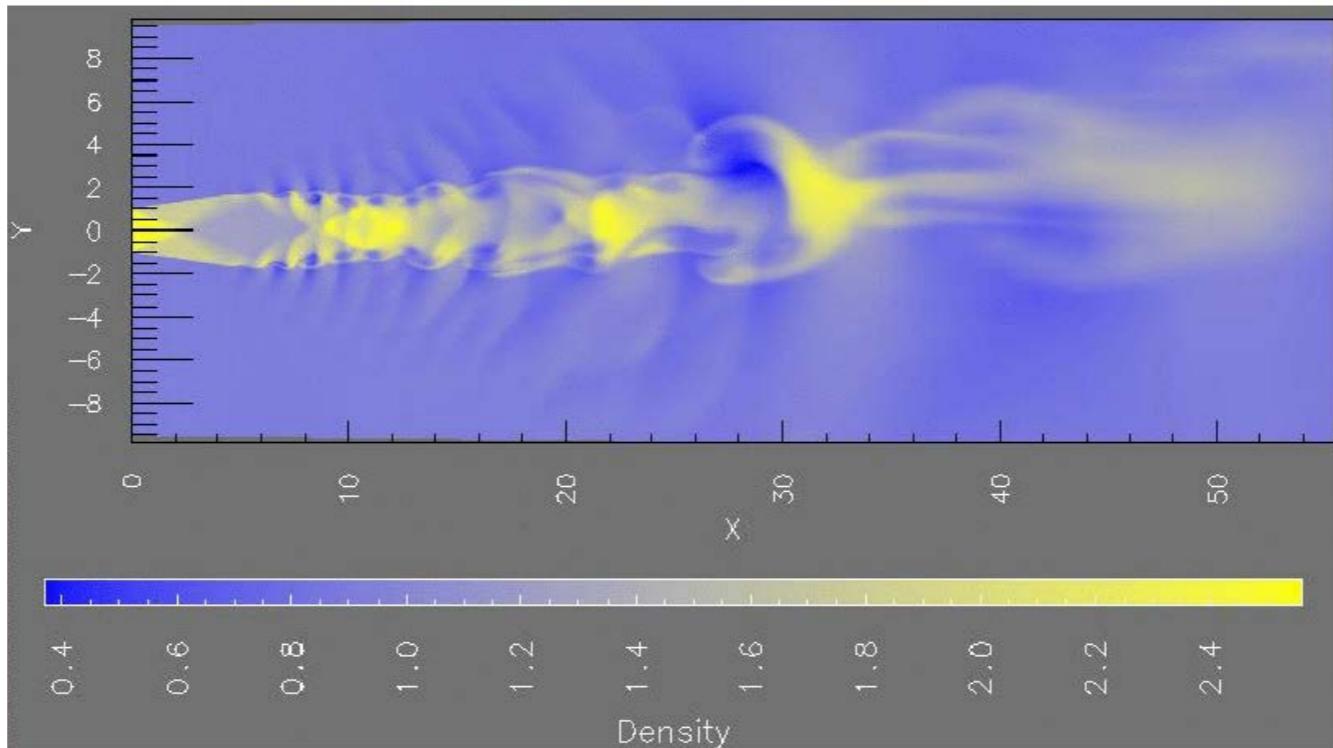
Perceptually
Non-Uniform

Perceptual Uniformity

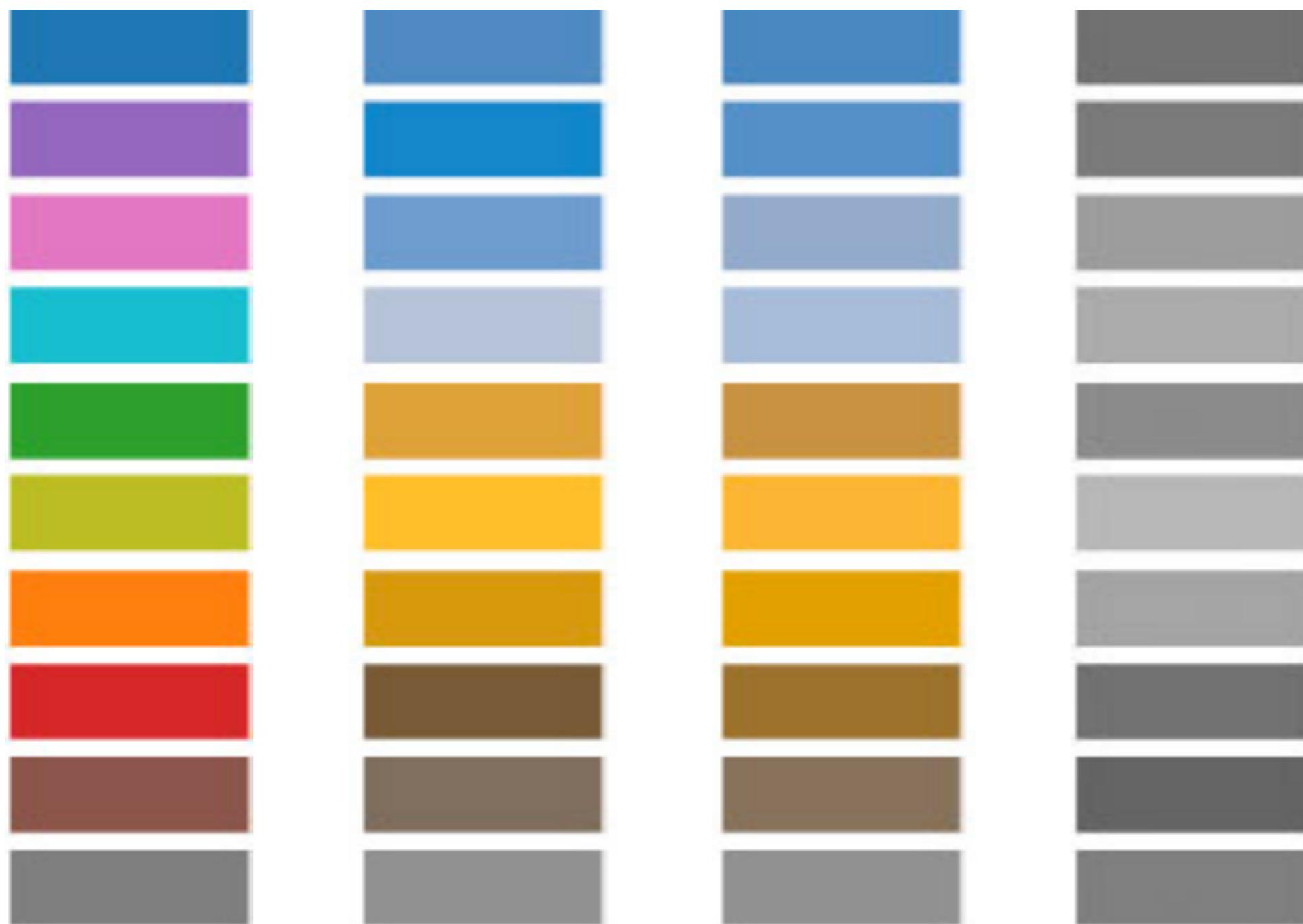
Rainbow



Perceptually
Uniform



Color Blindness



Normal

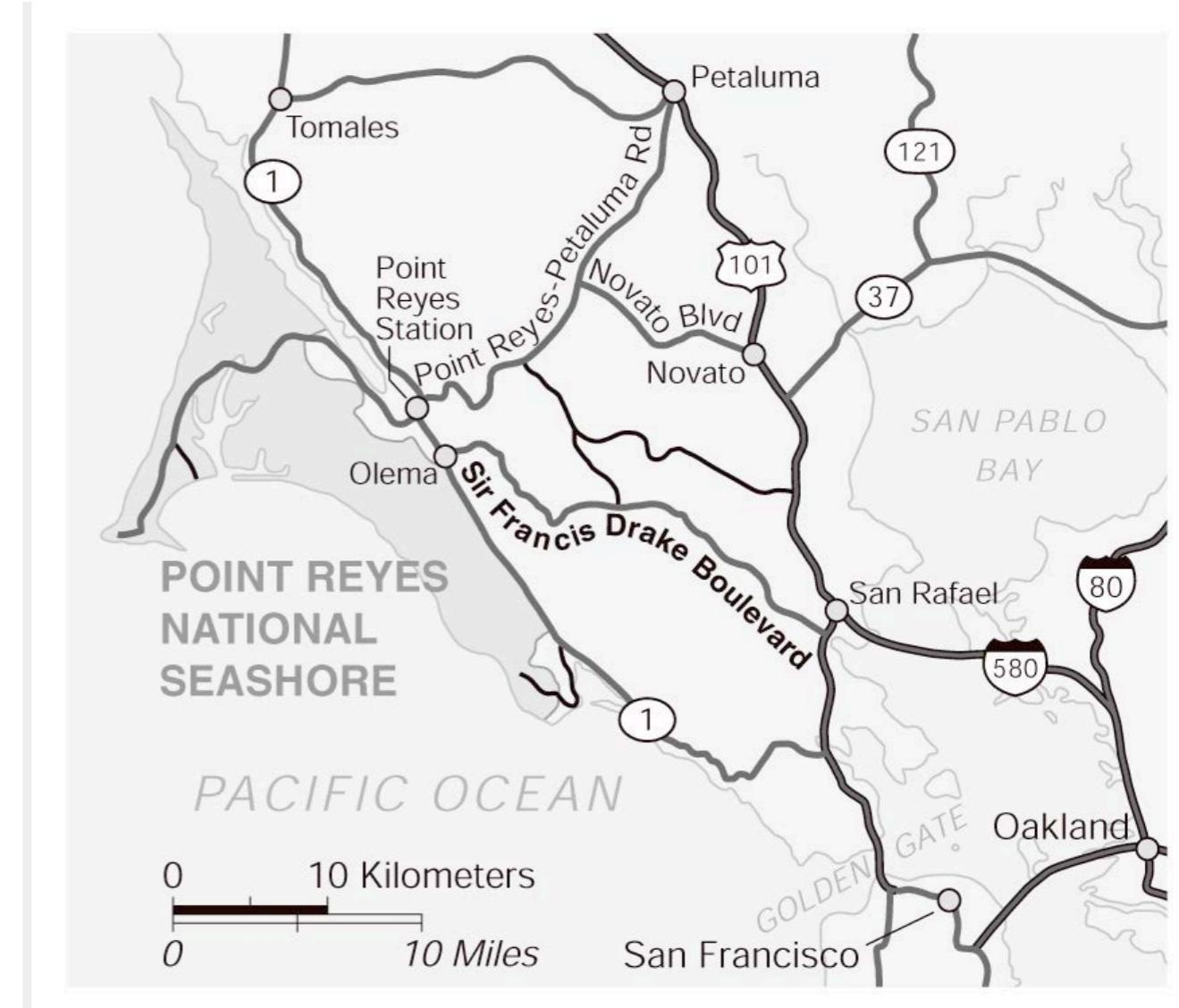
Protanope

Deutanope

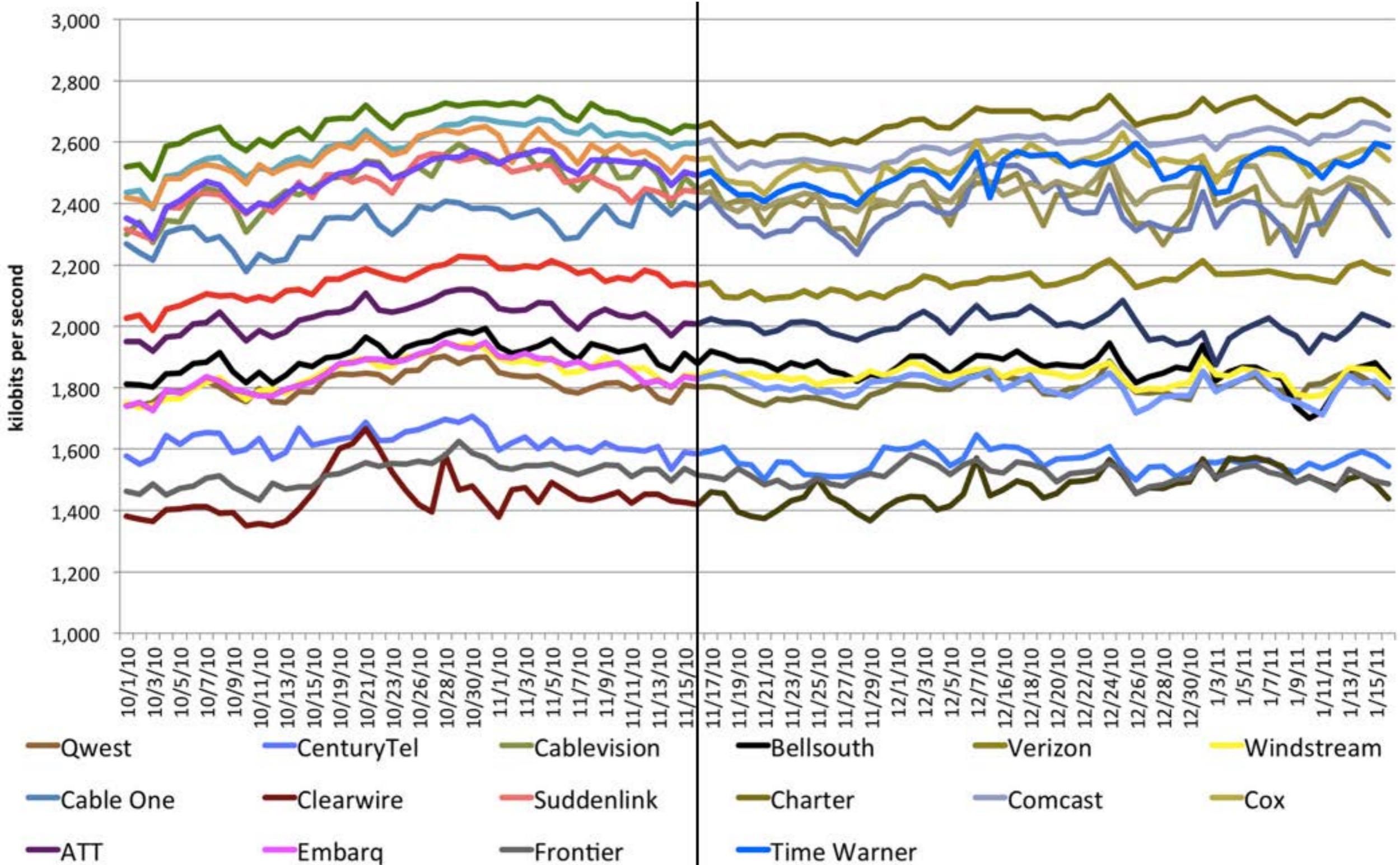
Luminance

“Get It Right in Black and White”

M. Stone



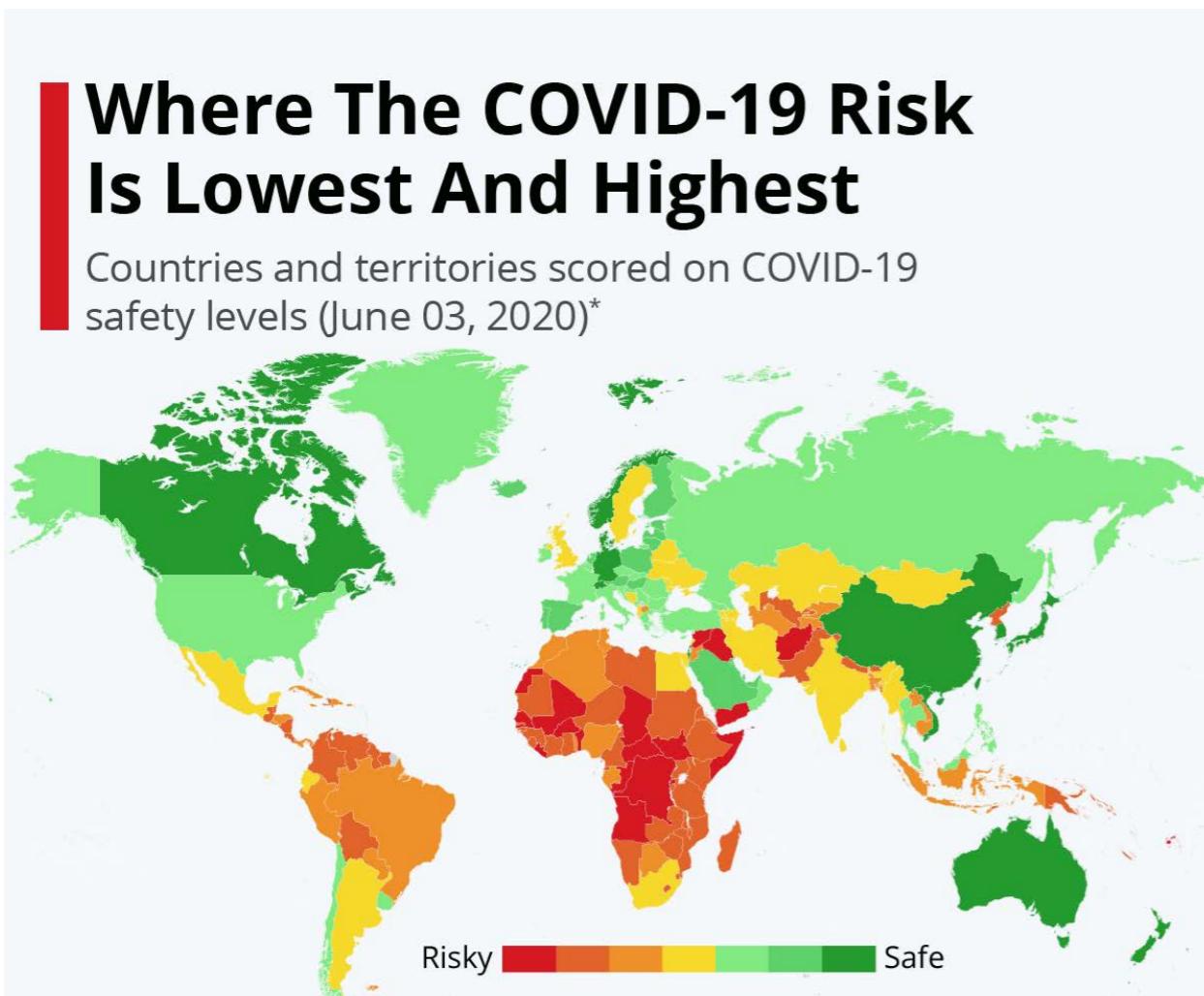
Normal Vision



Red-Green Colorblind

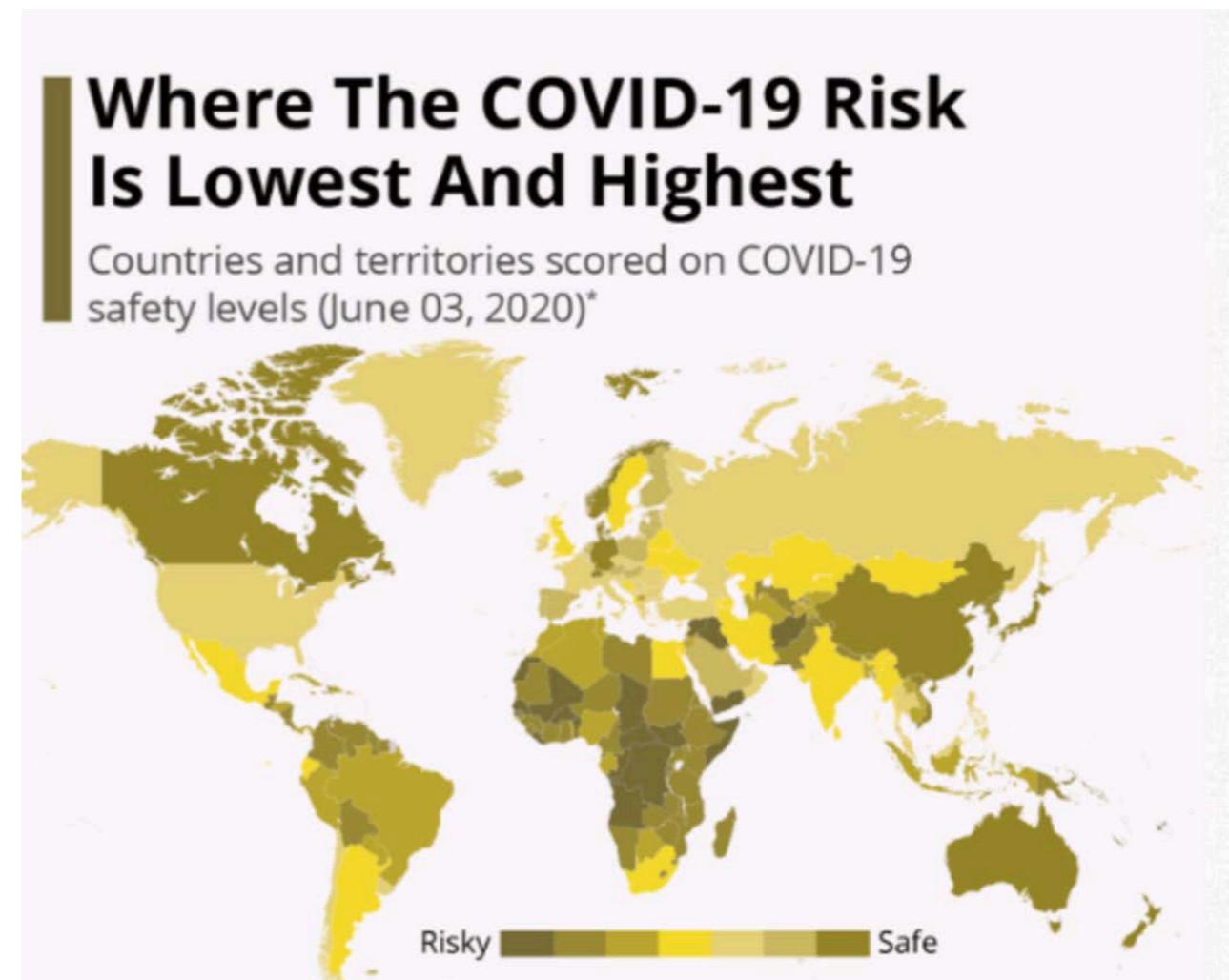
Andy Baio

Normal Vision



statista

Red-Green Colorblind



statista

Colorblindness Simulator

bit.ly/colordeficiency-sim

Drag and drop or paste your file in the area below or: no file selected

Trichromatic view: *Anomalous Trichromacy:* *Dichromatic view:* *Monochromatic view:*

Normal Red-Weak/Protanomaly Red-Blind/Protanopia Monochromacy/Achromatopsia
 Green-Weak/Deuteranomaly Green-Blind/Deutanopia Blue Cone Monochromacy
 Blue-Weak/Tritanomaly Blue-Blind/Tritanopia

Use lens to compare with normal view: No Lens Normal Lens Inverse Lens

[Reset View](#)



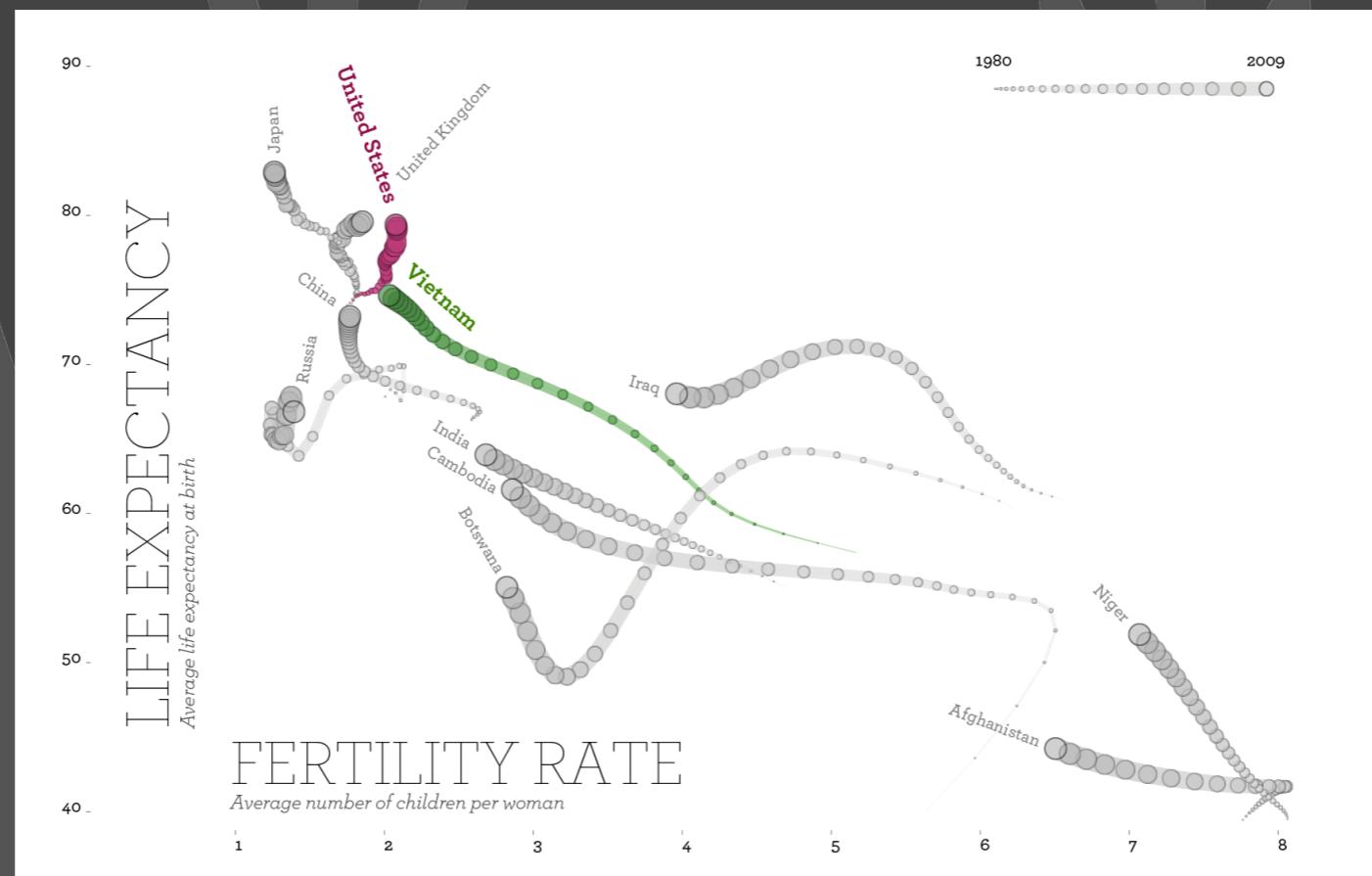
Coffee Break



Activity

How does the following visualization use contrast and pop out? Write down everything you notice as it comes to your attention.

2 min



LIFE EXPECTANCY

Average life expectancy at birth

FERTILITY RATE

Average number of children per woman

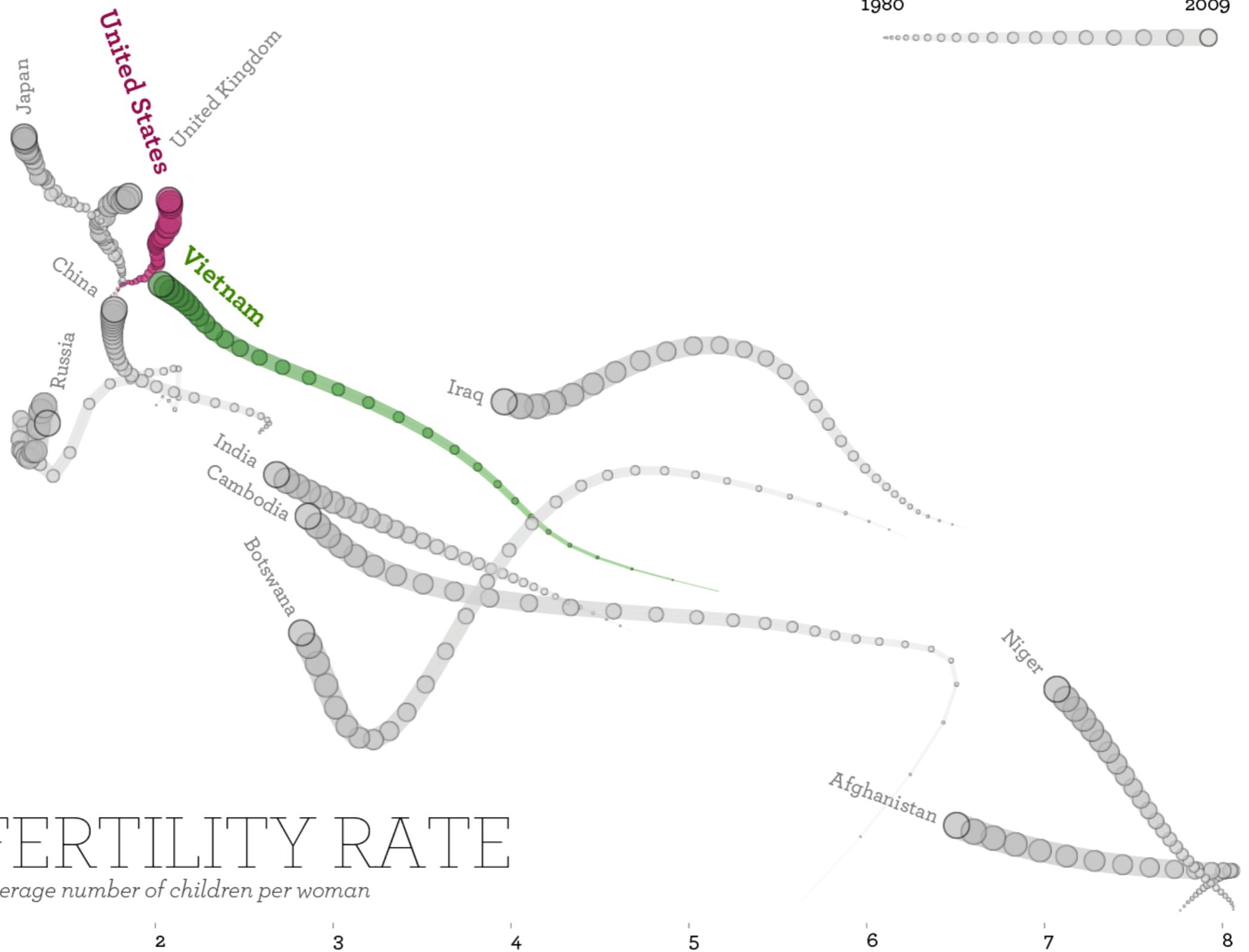


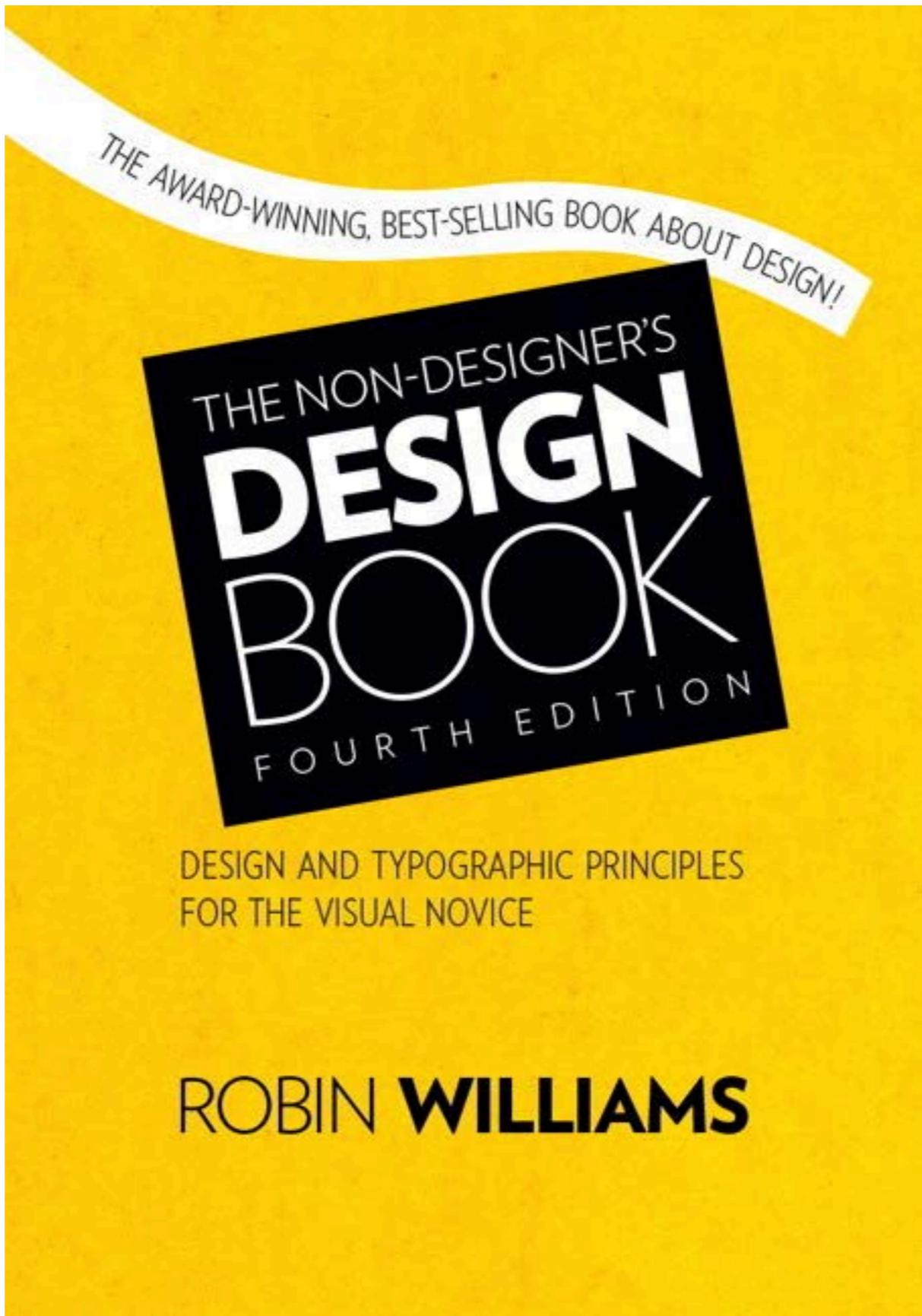


Fig. 1

C.R.A.P.

CS
171





Contrast

Making elements different increases understanding.

Repetition

Repeat visual elements to create strong unity.

Alignment

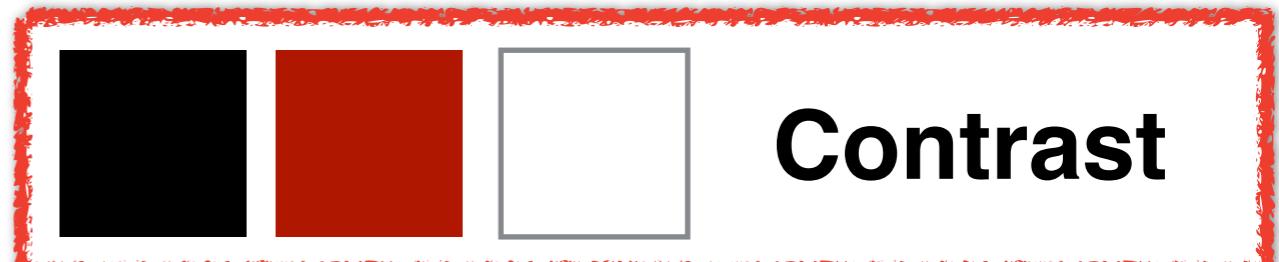
Nothing should be placed arbitrarily. Placement illustrates relationships between elements.

Proximity

Related items should be placed together.

Contrast

Making elements different increases understanding.



Repetition

Repeat visual elements to create strong unity.

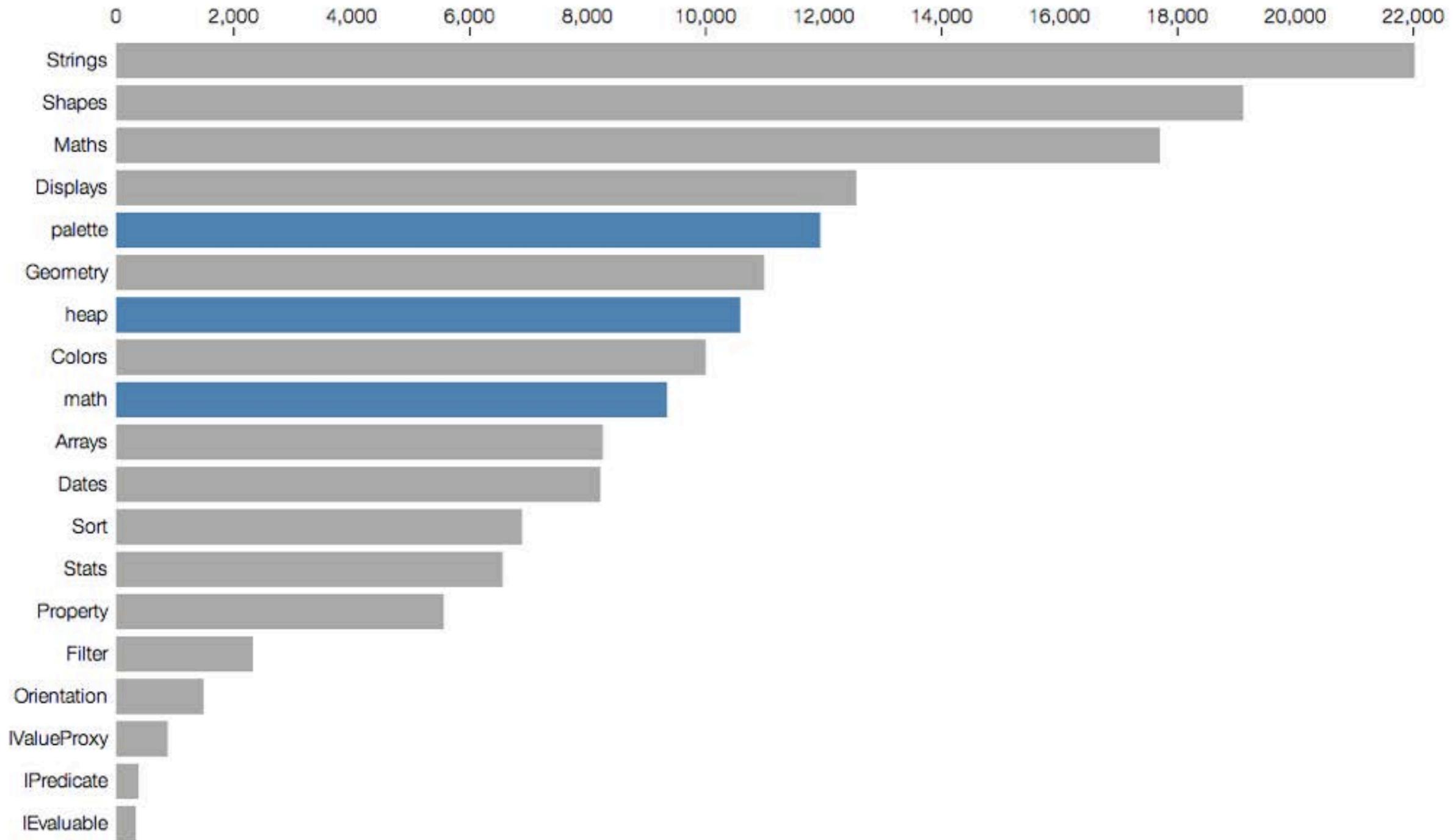
Alignment

Nothing should be placed arbitrarily. Placement illustrates relationships between elements.

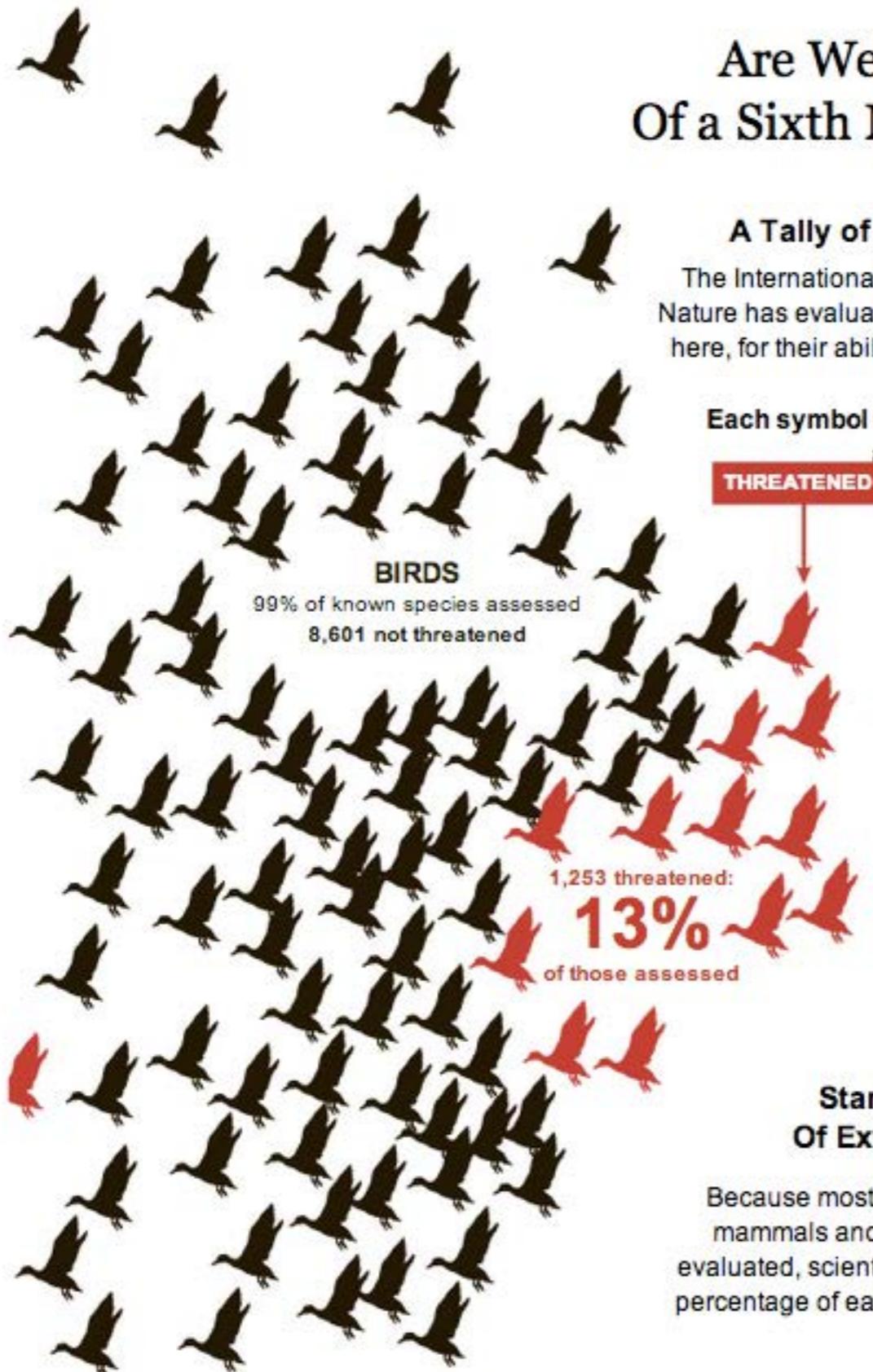
Proximity

Related items should be placed together.

Contrast



Are We in the Midst Of a Sixth Mass Extinction?



A Tally of Life Under Threat

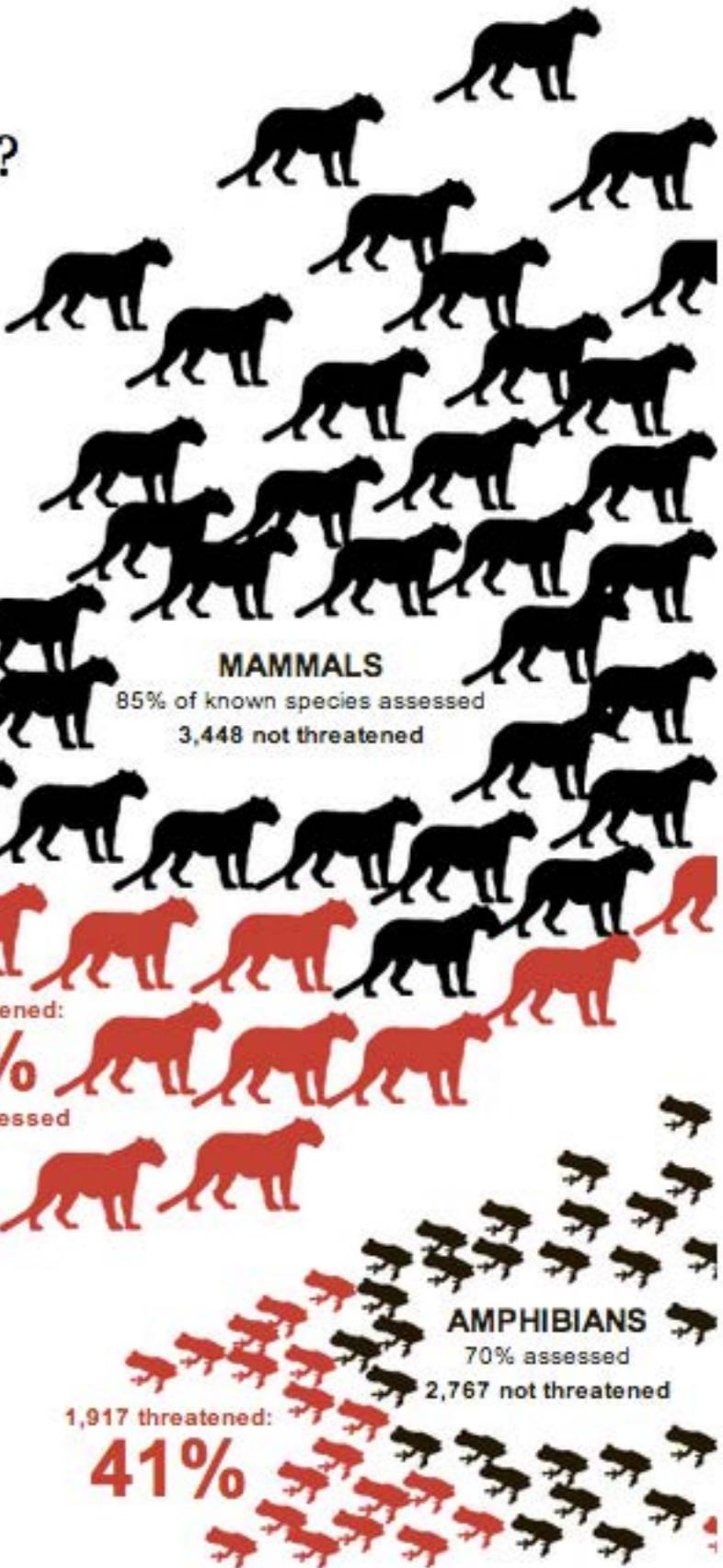
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THREATENED



NOT THREATENED



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Where the Power Is Out and Returning Across the Northeast

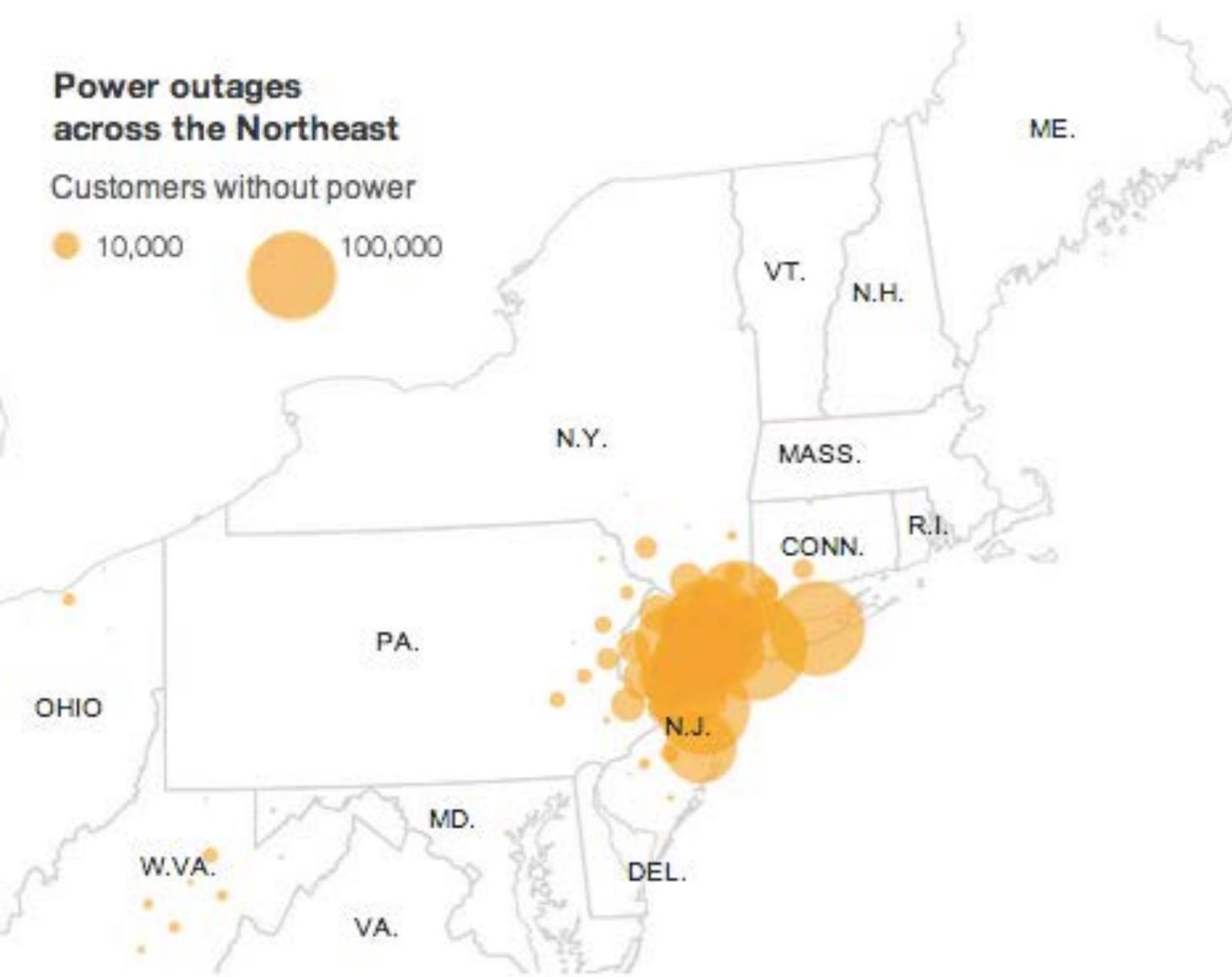
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Customers without power

● 10,000



TRI-STATE AREA

PSE&G

501,074 customers affected



Jersey Central Power & Light

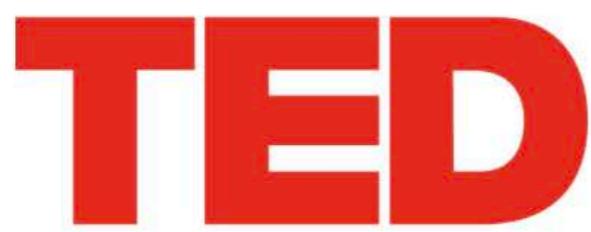
405,816 customers affected



Long Island Power Authority

281,900 customers affected





A Visual Exploration of TED Talks

Information on all audio-video recordings of TED Talks uploaded to the official TED.com website through September 21st,

Data Source: <https://www.kaggle.com/rounakbanik/ted-talks> | Viz Inspiration: <http://thedataface.com/2018/02/education/explore-ted->

Designed By: Chantilly Jaggernauth



1 Explore the Top 5 Most Viewed Talks

Do schools kill creativity?	47.2M views
Your body language may shape who you are	43.2M
How great leaders inspire action	34.3M
The power of vulnerability	31.2M
10 things you didn't know about orgasm	22.3M

2 Select a Scatterplot View*

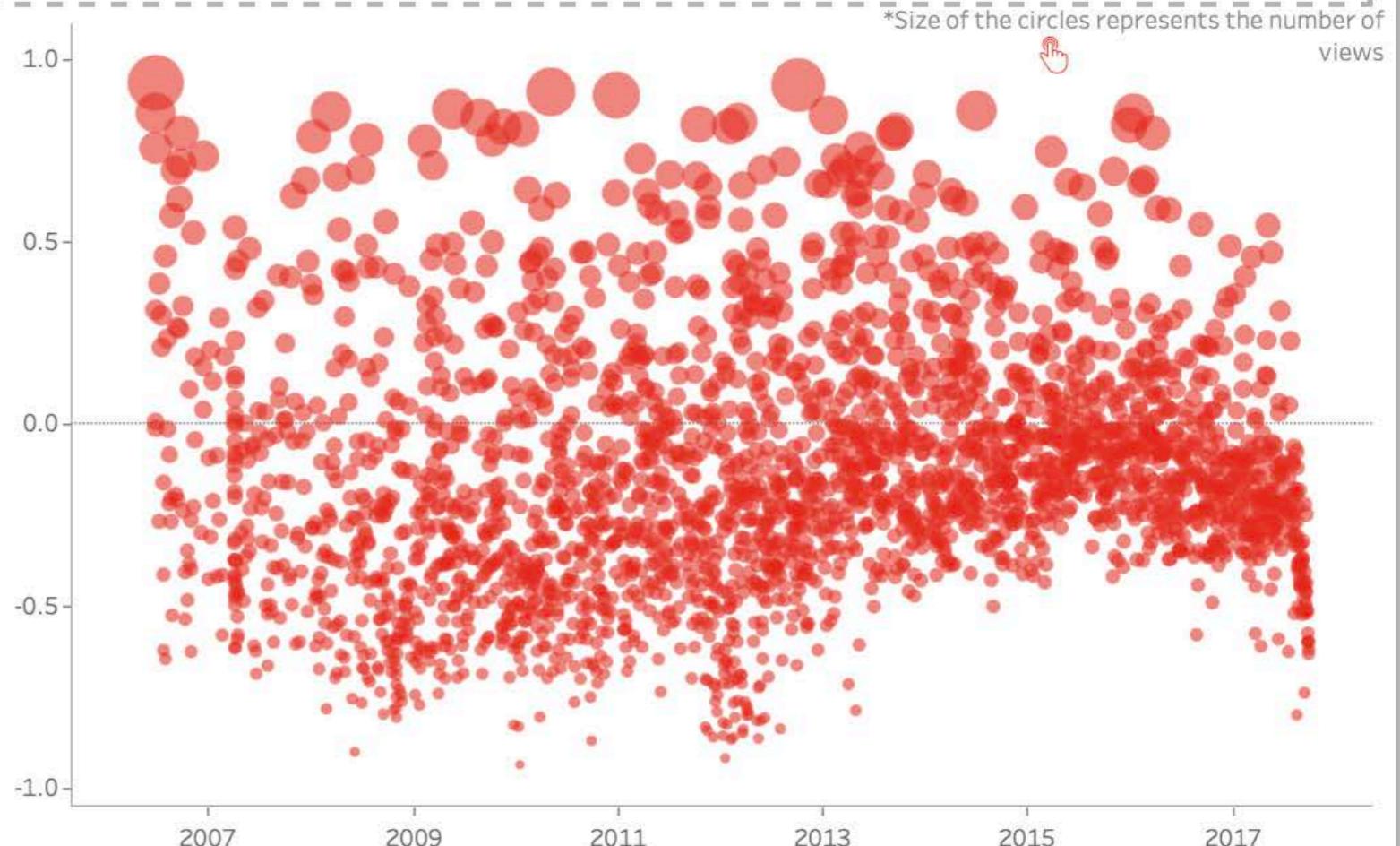
Normalized

3 Highlight & Watch a Particular Talk

Highlight Title

Highlight Main Speaker

Highlight Tags



*Normalization is used to adjust values on different scales to a common scale. In this particular case, the number of views is adjusted to have a value between -1 and 1. 0 represents the mean, 1 represents the most viewed and -1 presents the least viewed.

Contrast

Making elements different increases understanding.

Repetition

Repeat visual elements to create strong unity.

Repetition

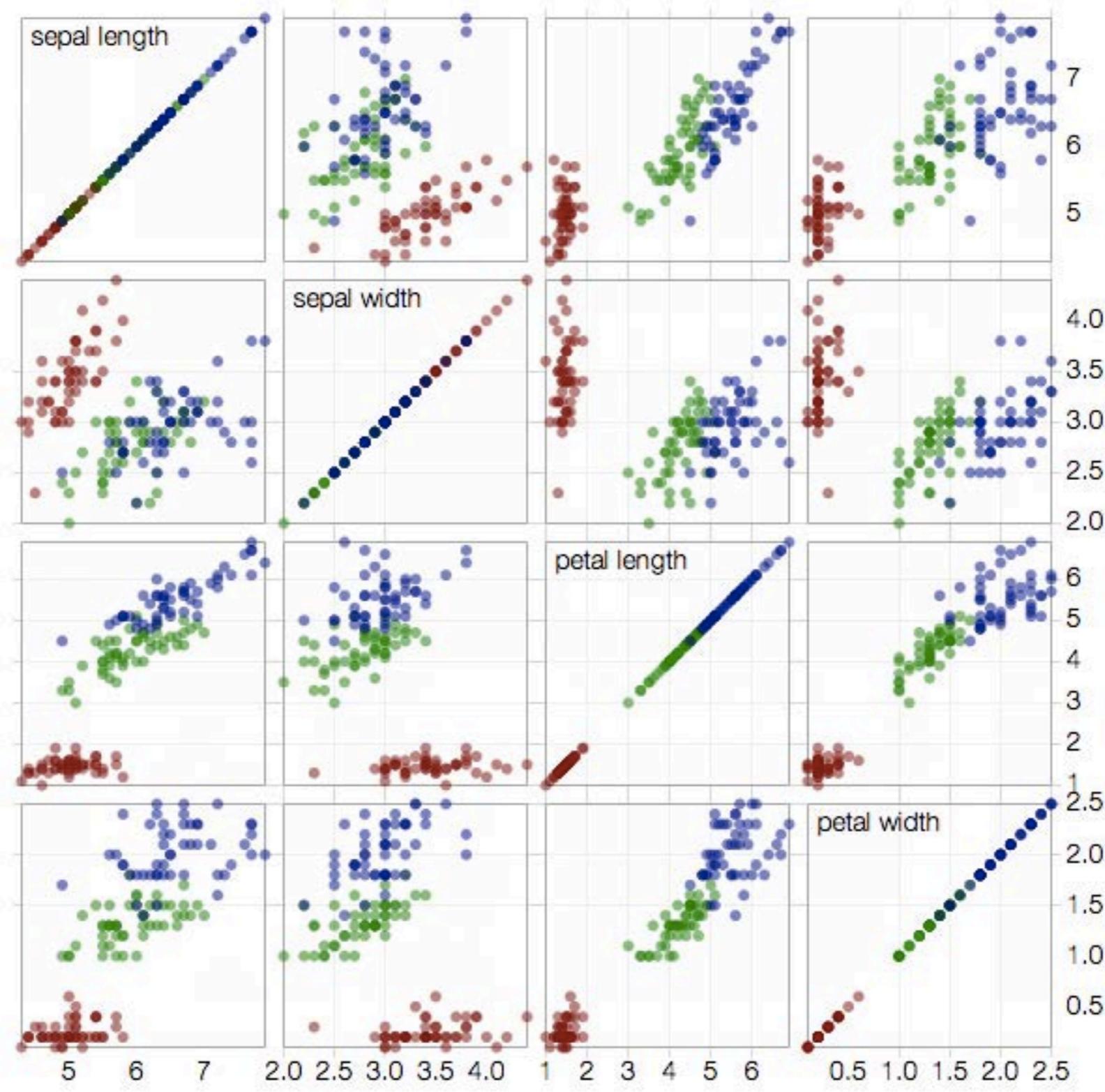
Alignment

Nothing should be placed arbitrarily. Placement illustrates relationships between elements

Proximity

Related items should be placed together.

Small Multiples



2000: State-level support (orange) or opposition (green) on school vouchers, relative to the national average of 45% support

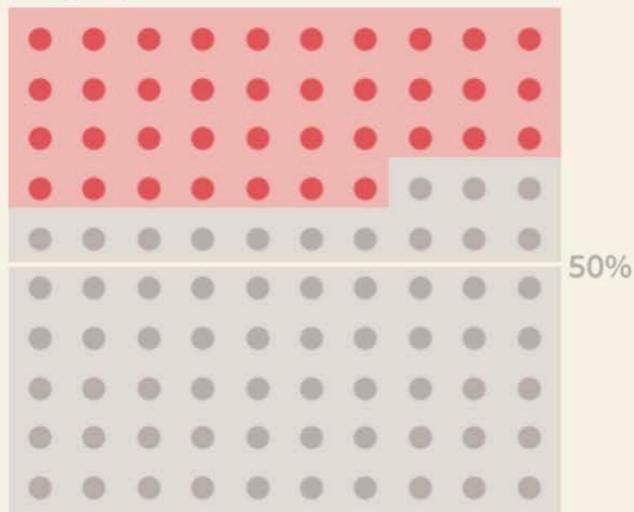


Orange and green colors correspond to states where support for vouchers was greater or less than the national average. The seven ethnic/religious categories are mutually exclusive. "Evangelicals" includes Mormons as well as born-again Protestants. Where a category represents less than 1% of the voters of a state, the state is left blank.

Women in American Orchestras



all players *hover*



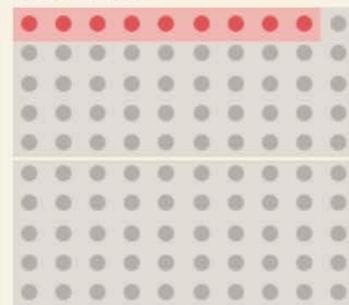
37% women

Visualization created by Jeffrey A. Shaffer

1,833 musicians from the top 20 orchestras in the United States (based on salary)

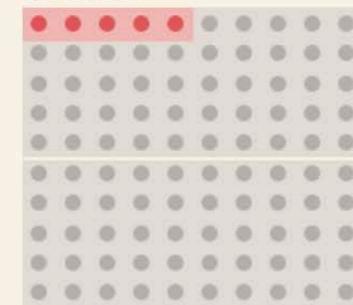
Inspiration: "Graphing Gender in America's Top Orchestras" by Suby Raman

conductor



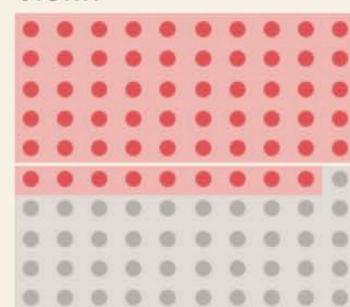
9% women

director



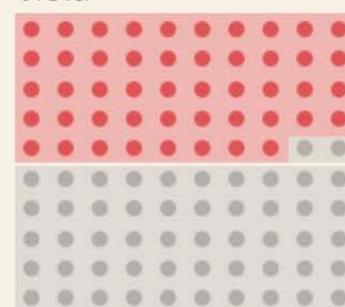
5% women

violin



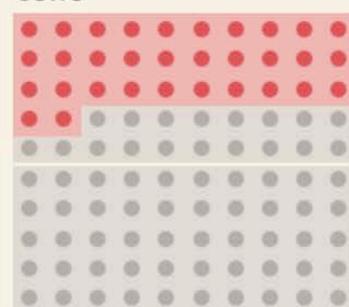
59% women

viola



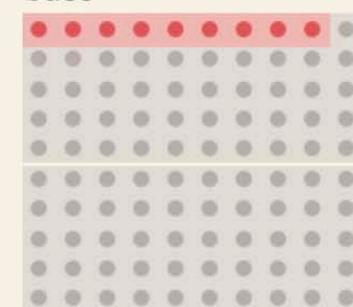
48% women

cello



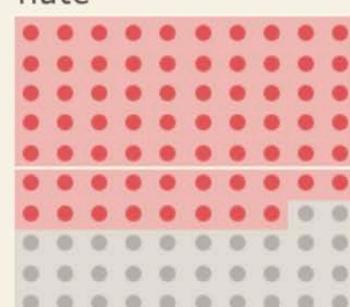
32% women

bass



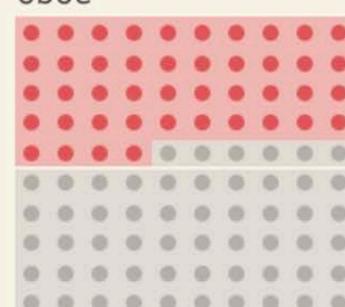
9% women

flute



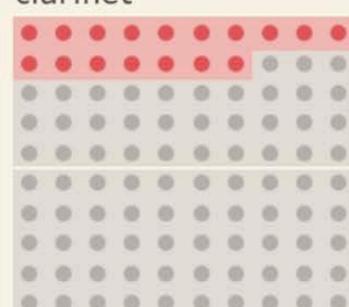
68% women

oboe



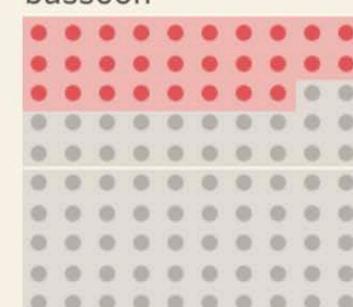
44% women

clarinet



17% women

bassoon



28% women

Contrast

Making elements different increases understanding.

Repetition

Repeat visual elements to create strong unity.

Alignment

Nothing should be placed arbitrarily. Placement illustrates relationships between elements.

Proximity

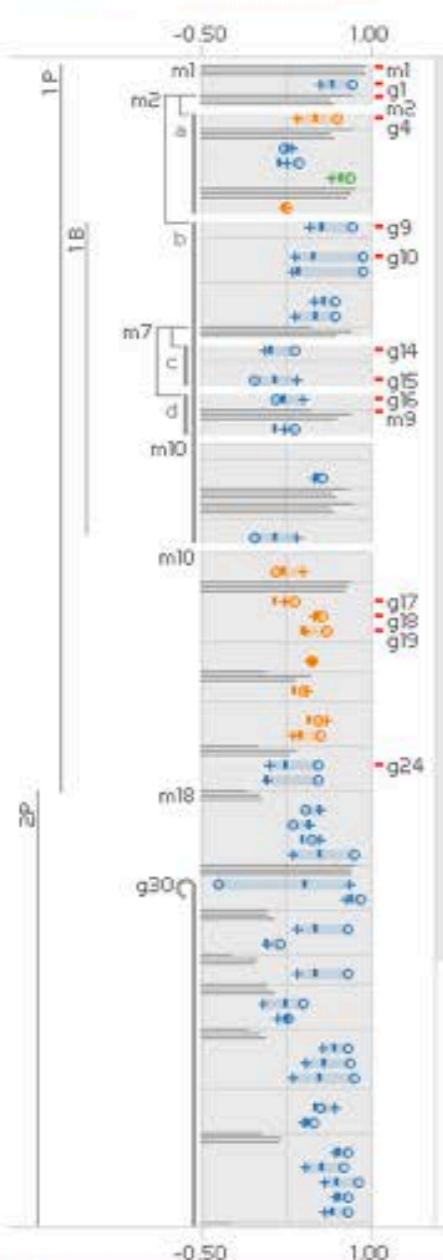
Related items should be placed together.

Alignment

Pathline

PATHLINE

PATHWAY METRIC OVERVIEW

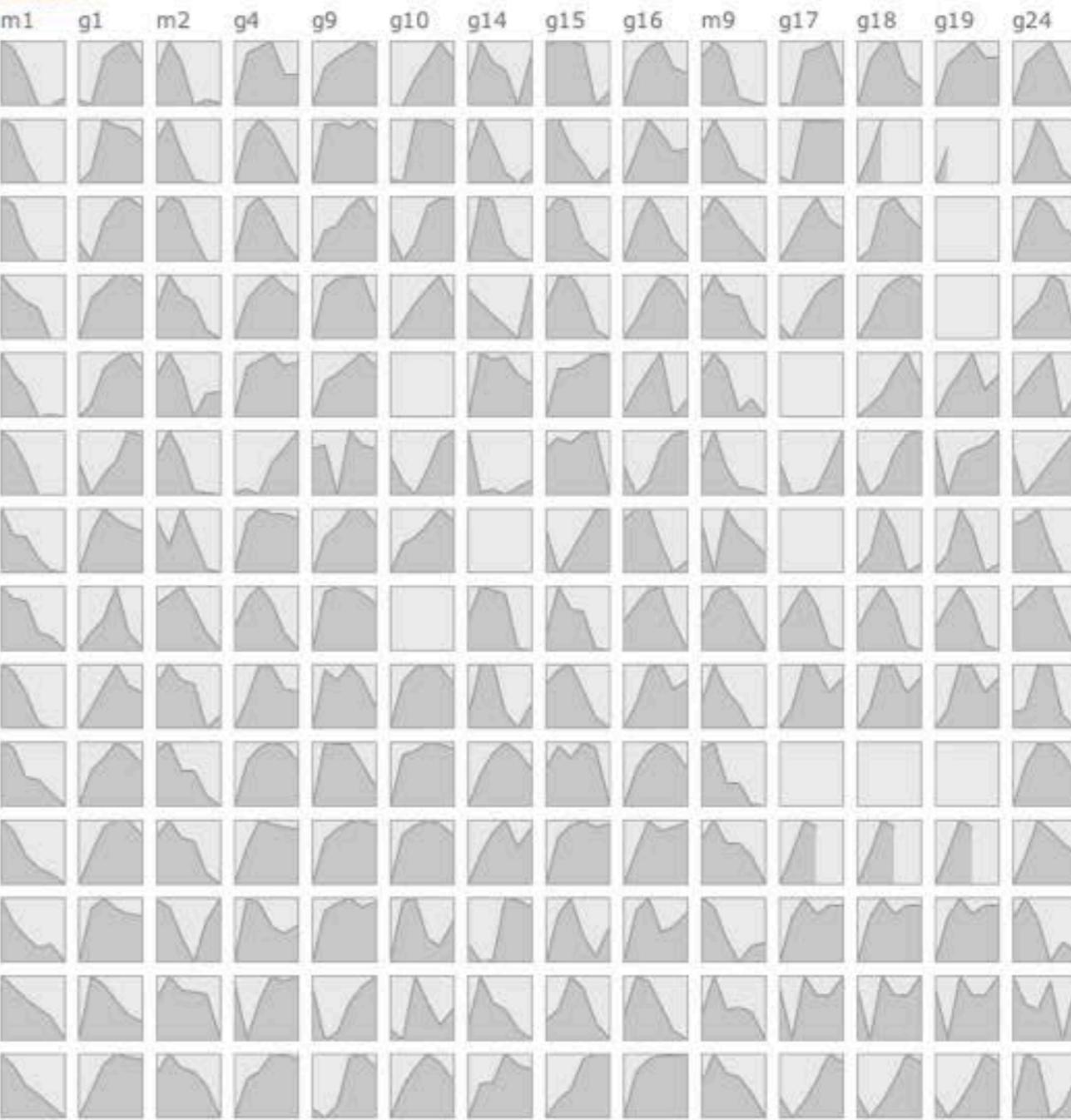


KEY

Genes
■ forward ■ reverse ■ bidirectional

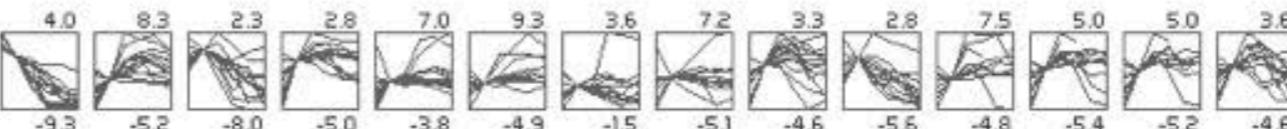
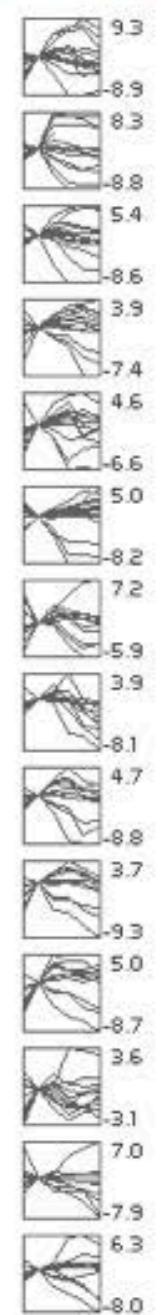
Metabolites Metrics
— PearsonSubgroup1
+ PearsonSubgroup2
* PearsonAll

SPECIES CURVEMAP



A TOOL FOR COMPARATIVE FUNCTIONAL GENOMICS

OVERLAYS

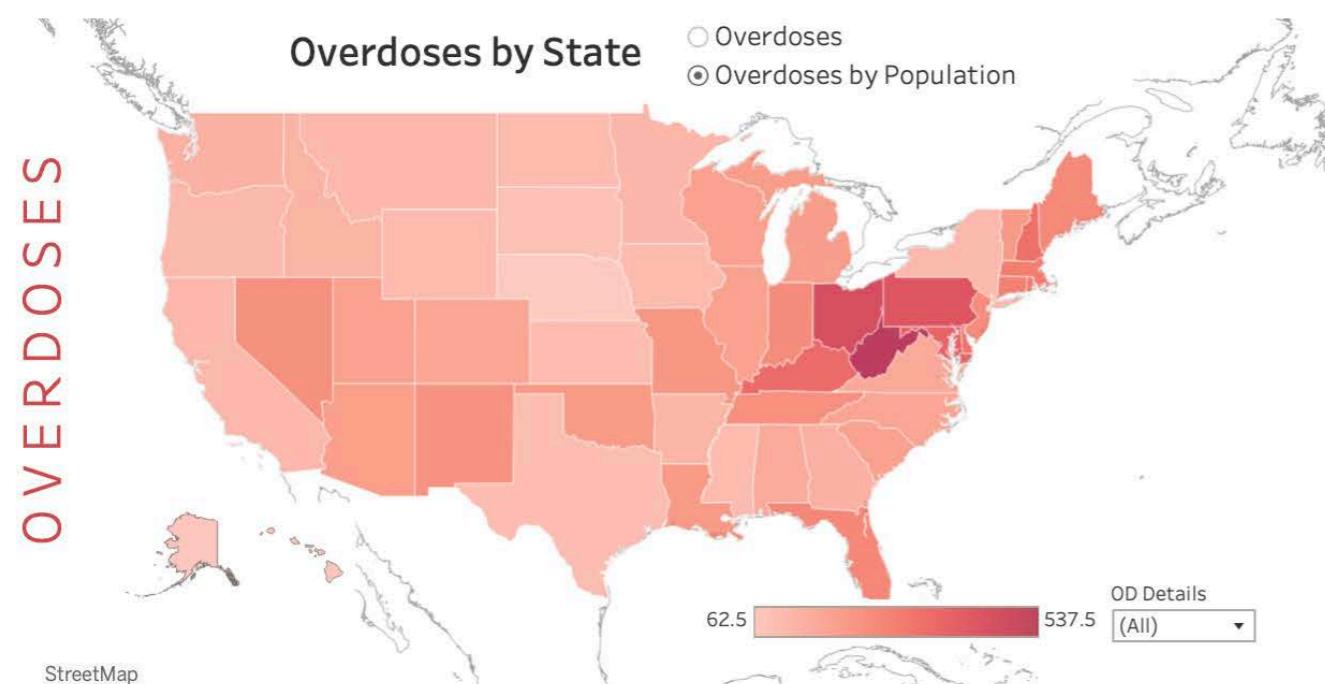


THE OPIOID CRISIS



#####

A story of drug overdoses and/or over-prescription?



Overdose Totals

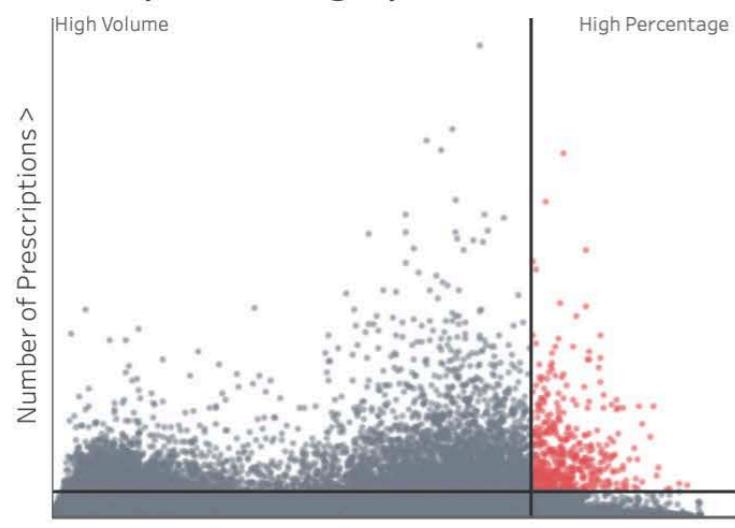
Opioids | All Other Drugs

- (Sort by Number
 Sort by Percent Change)

	2015	2016	2017
Number of Drug Overdose Deaths	48,877	56,236	65,813
Opioids	9,458	11,436	12,787
Synthetic Opioids	2,343	4,296	7,036
Natural & Semi-Synthetic Opioids	4,303	4,736	4,468
Heroin	3,148	4,041	4,201
Cocaine	1,564	2,197	3,034
Psychostimulants	1,292	1,656	2,186
Percent with drugs specified	1,654	1,653	1,659
Methadone	1,152	1,133	1,069

PRESCRIBPTIONS

Who is prescribing Opioids?



Which specialties prescribe the most?

State: All

Orthopedic Surgery
Opioid Claims: 3,149,507
(45.4%)

Physical Medicine and Rehabilitation
Opioid Claims: 3,096,353
(42.8%)

Anesthesiology
Opioid Claims: 2,806,015
(55.1%)

Interventional Pain Management
Opioid Claims: 2,432,977
(57.0%)

Pain Management

Medicaid Spending by State



Sources/Credits

Contrast

Making elements different increases understanding.

Repetition

Repeat visual elements to create strong unity.

Alignment

Nothing should be placed arbitrarily. Placement illustrates relationships between elements.

Proximity

Related items should be placed together.

Proximity

vs

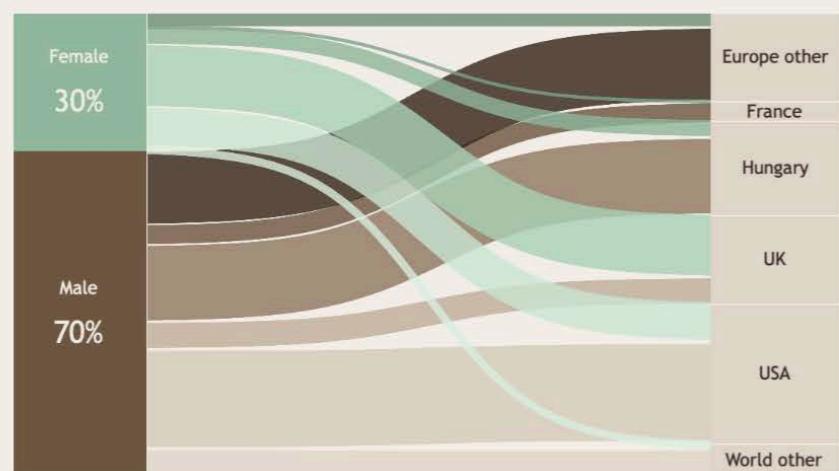


BOOKS I'VE READ IN THE PAST 10 YEARS

In the past 10 years I have read **278 books** that add up to **97,483 pages** from 171 different authors across the globe. 218 of them were written in my native language (Hungarian), 59 I have read in English and only 1 in Russian. From all these books I marked **42 favourite** and gave an average 4.28 star rating (out of 5) versus 4.34 of the reading community.



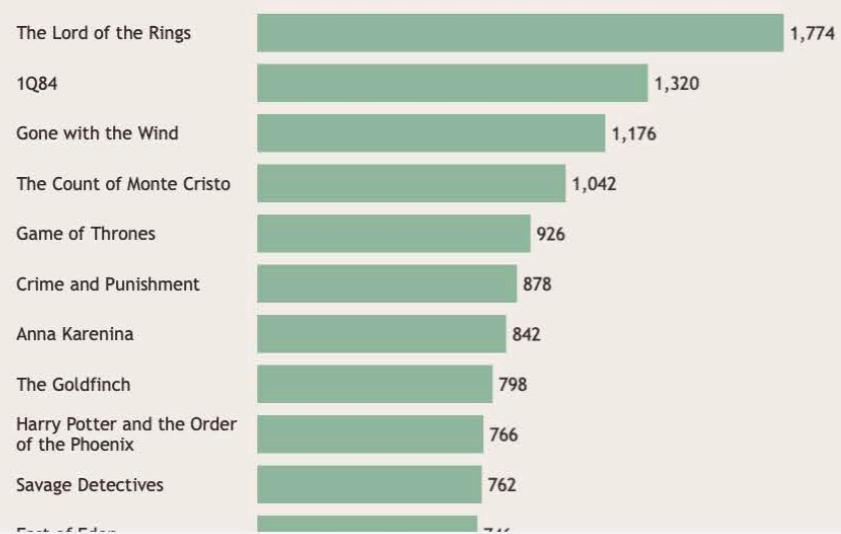
BOOKS BY AUTHOR AND COUNTRY GROUP



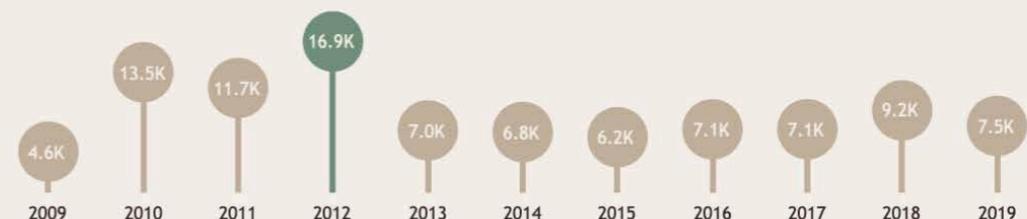
AUTHORS BY BIRTHPLACE



20 LONGEST BOOKS READ



NUMBER OF PAGES READ BY YEAR



TOP 15 AUTHORS BY NUMBER OF BOOKS

- Favourites are marked green -



Activity

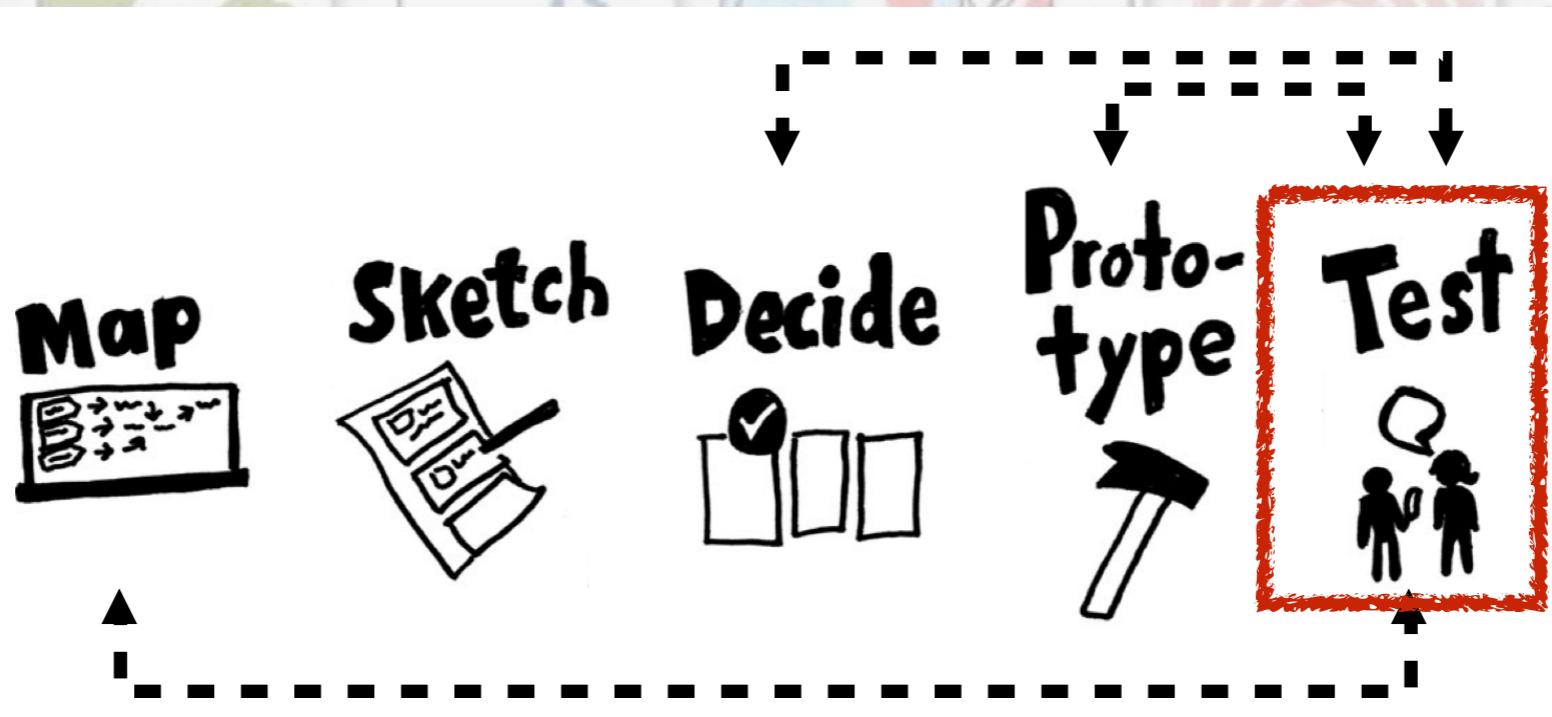
Finish your storylines and, potentially, improve your visualizations based on the perceptual principles we discussed (contrast, color, C.R.A.P.).

10 mins



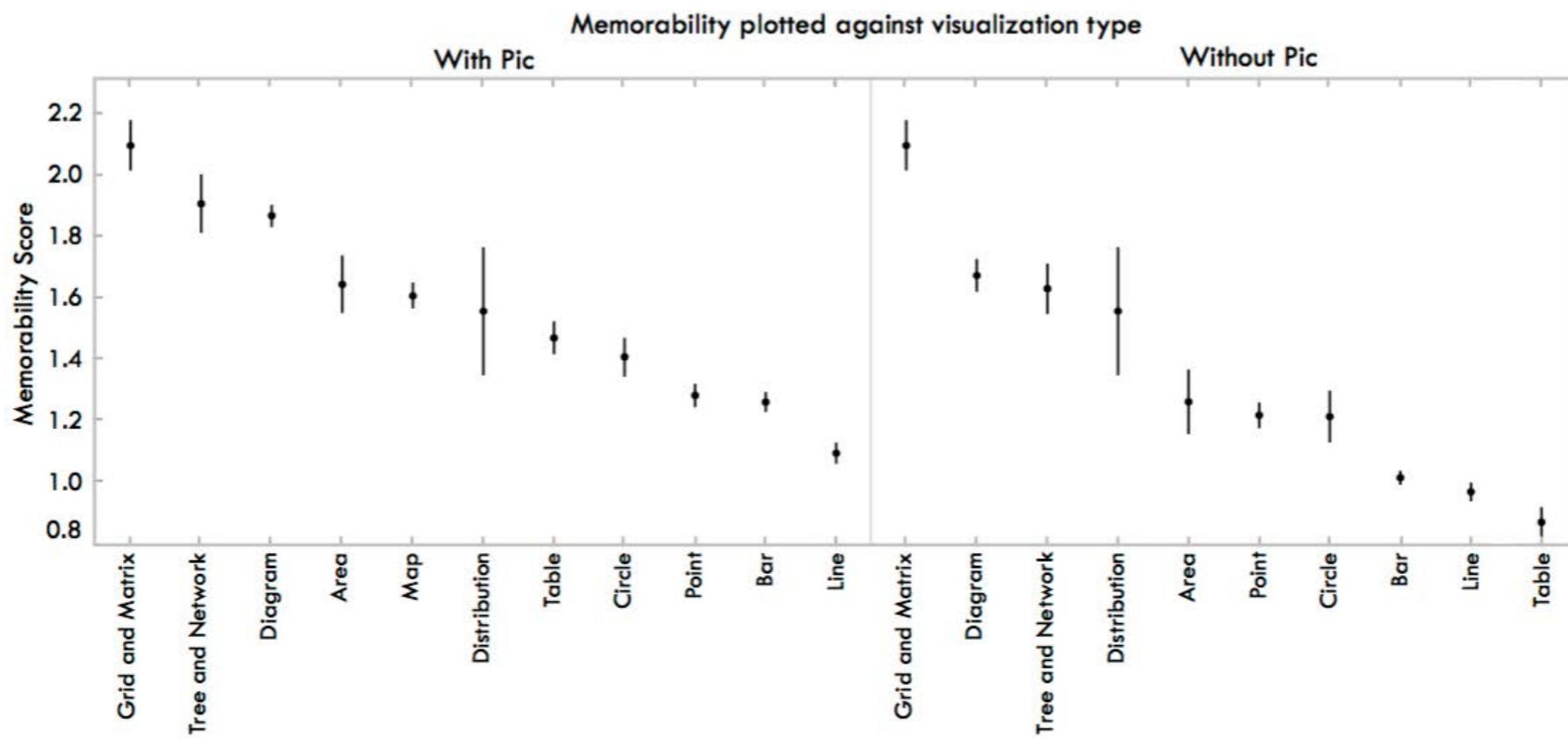
Test - Story

- User Testing
- Think Aloud Studies



Quantitative Evaluation

- Surveys/questionnaires, A/B tests, crowdsourced testing
- Structured, statistical, specific hypotheses



Qualitative Evaluation

- Exploratory, non-statistical, pilot studies
- Design critiques, focus groups, observational studies (“Think Aloud”)

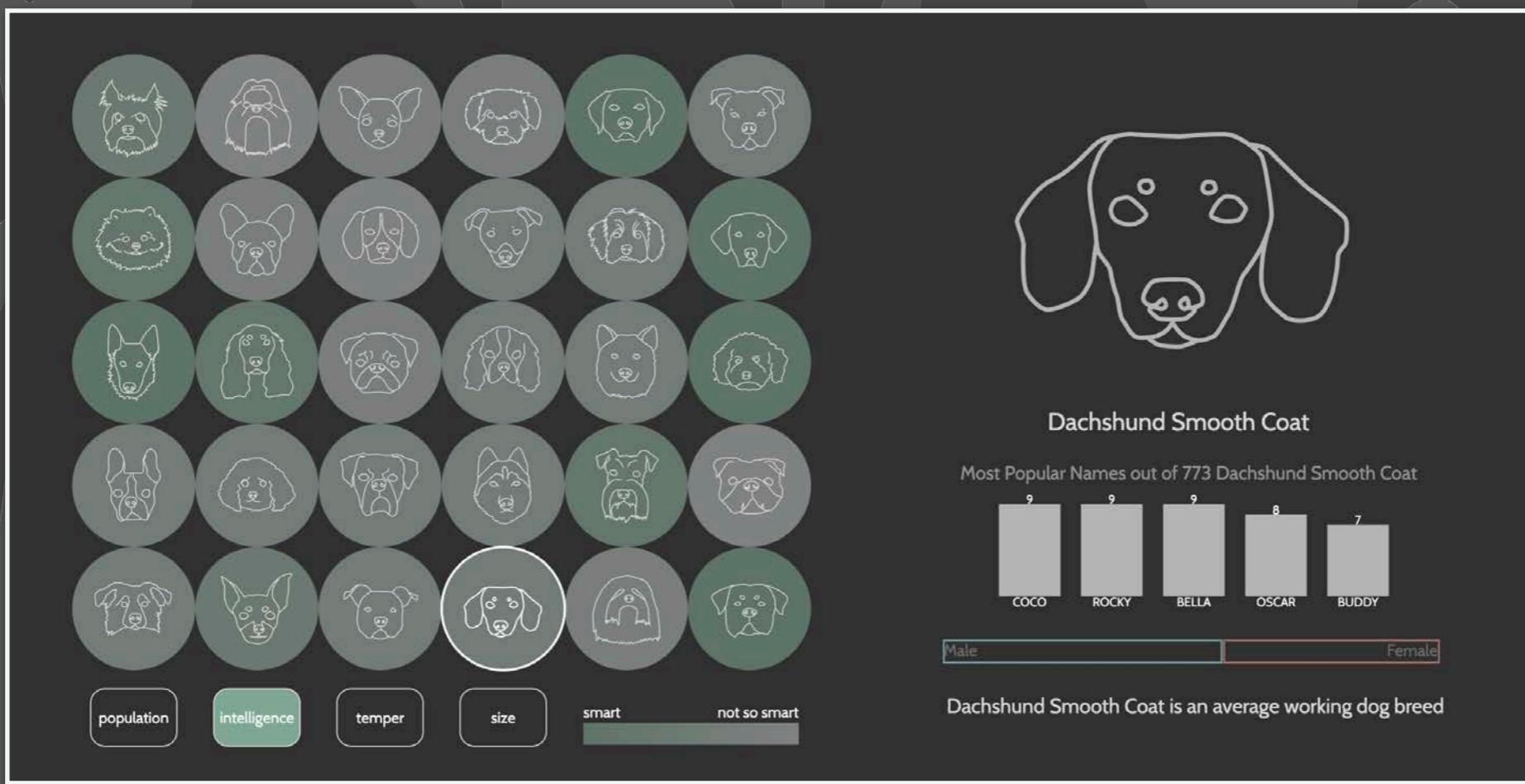


Activity

Think Aloud study demo.

Dogs of New York
What dog breed fits you best?

https://fihenry.github.io/thats_so_fetch_final_project/

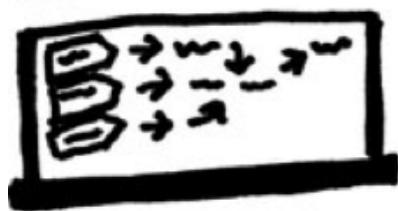


Think Aloud Studies

- Naive (first time) users
- No explanations and interference by evaluator
 - “We are testing the system, not you.”
 - “Will not answer any questions once started.”
- Remind subjects to talk about what they are doing
- Do not reveal structure of the task
- Do not use vocabulary of the interface / tool

Test - Story

Map



Sketch



Decide



Proto-type



Test



Activity

Send one team member to another team to test their dashboard.

Your team leader will be running the think-aloud study and give a brief introduction. The rest of the team is silently observing and taking notes. At the end, the test subject gives some general feedback.

15 mins

Coffee Break



Activity

Based on the feedback you received during testing, improve your storyline and, potentially, your visualizations and dashboard.

10 mins



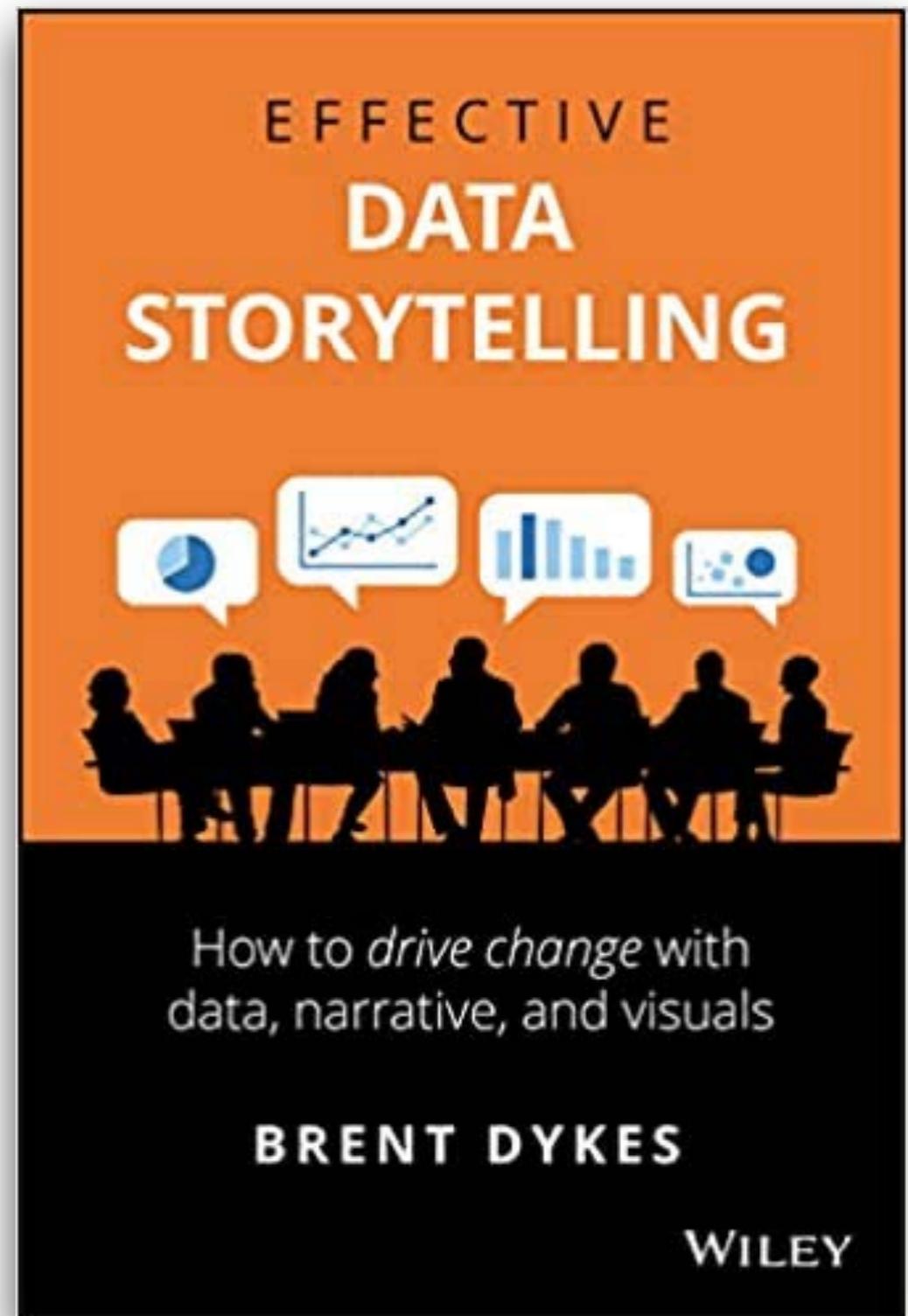
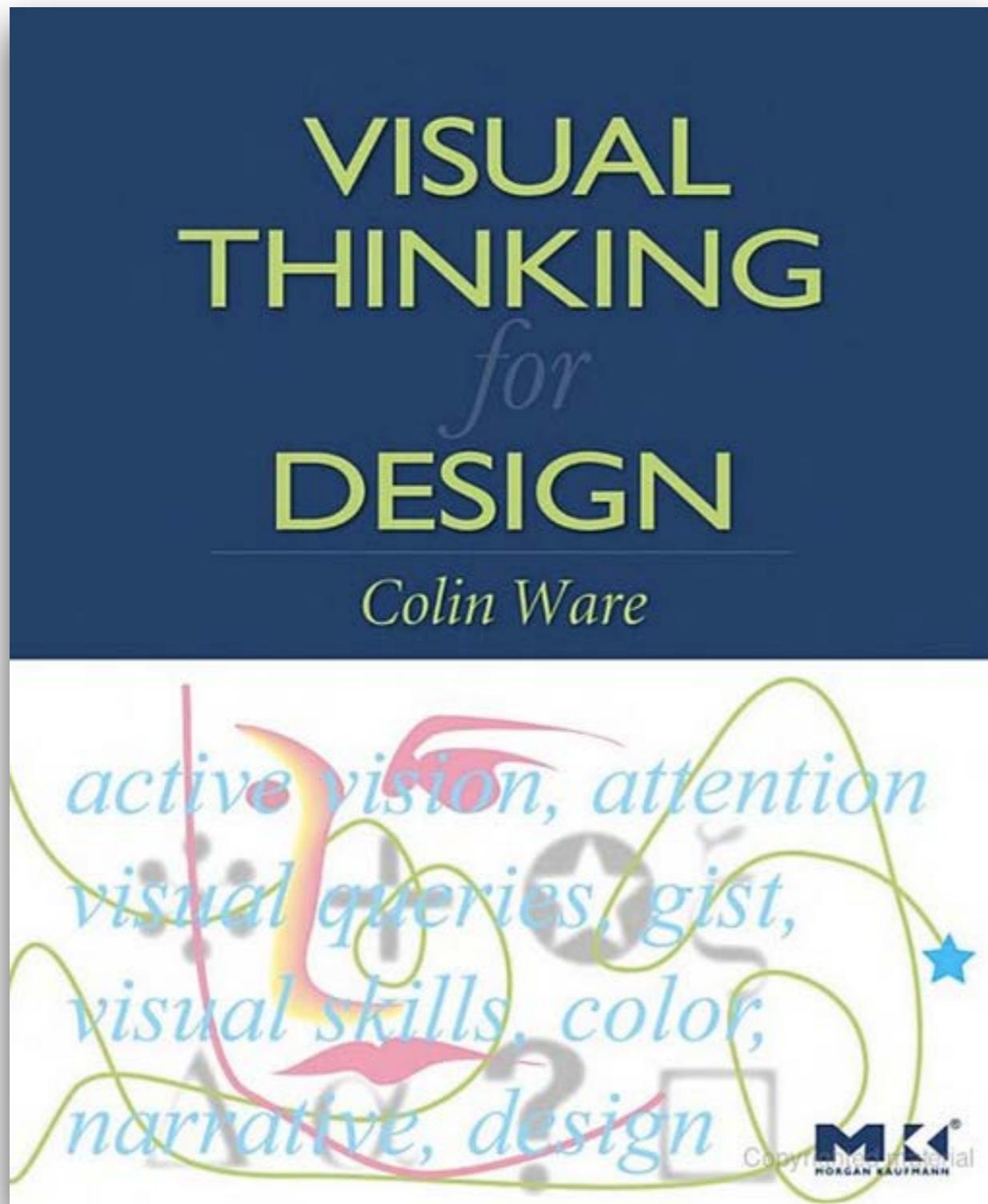
Show & Tell

Course Wrap-Up

Take Aways

- **Data stories** are powerful and can amplify your message using **redundant encodings of visualizations and text**.
- **Story narratives** and **storyboards** help us tell effective data stories with a hook, climax, and call to action.
- Good **dashboard designs** have a beginning, middle, and end. They contain message titles, captions, and annotations.
- We use both **bottom-up** (pattern recognition) and **top-down** (object recognition) perception.
- Using **contrast** allows important visual elements to stand out using **pre-attentive processing** (pop out).
- **Color** is difficult and needs to be used **sparingly** to highlight and contrast. Use a **color blindness simulator**.
- **C.R.A.P. design principles** help us to organize visual content and dashboards.
- **Think-aloud studies** are an effective way to **test** your visualizations and dashboards.

Further Reading

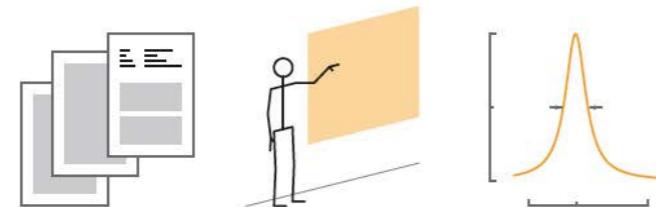


Further Reading

Trees, maps, and theorems

Effective communication for rational minds

Jean-luc Doumont



the functional art

**an introduction to
information graphics
and visualization**

alberto cairo

"Welcome to Alberto's world. Cairo has done it all in *The Functional Art*: theory, practice, examples. And he's done it brilliantly. It is the most comprehensive and sensible book yet on real-world information graphics we won't need another one for a long time."

Nigel Holmes, former graphics director for *Tree* magazine
and founder of *Explorations Graphics*

DVD
Includes a complete introductory
information graphics video course
Copyrighted Material

Thank you!

Thank you all for a **great** course!



100

