Using data visualization to make better decisions—faster

Steve Wexler

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Twitter: @DataRevelations

Six things every businessperson should know about data visualization

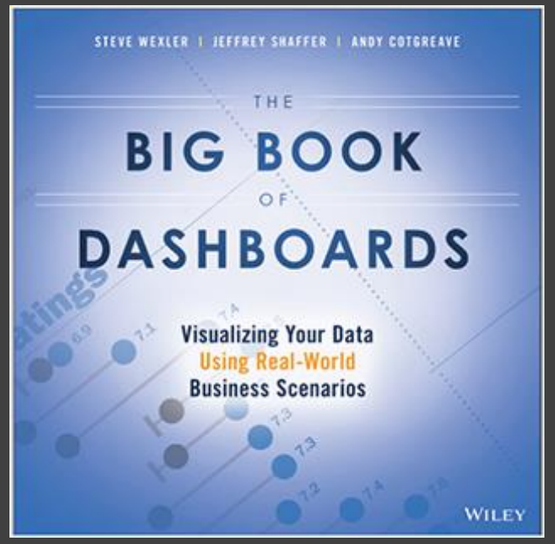
Steve Wexler

Founder of Data Revelations

Tableau Iron Viz Champion

Tableau Zen Master (Hall of Fame)

Author



You are
encouraged
to disagree

Why “just the numbers” isn’t good enough

You can have my spreadsheet...
... when you pry it from my cold, dead hands.

Sales by category over time

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Consumer	$256,800	$335,700	$315,000	$337,500	$331,180	$321,000	$179,500	$287,400	$299,500	$310,700	$318,900	$315,000
Corporate	$345,000	$475,000	$245,600	$465,700	$455,000	$476,300	$459,100	$427,800	$456,900	$417,900	$425,000	$521,000
Education	$215,700	$265,400	$183,400	$192,500	$175,800	$209,400	$225,000	$198,600	$201,300	$175,000	$167,200	$168,000

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Corporate	$345,000	$475,000	$245,600	$465,700	$455,000	$476,300	$459,100	$427,800	$456,900	$417,900	$425,000	$521,000	$5,170,300
Education	$215,700	$265,400	$183,400	$192,500	$175,800	$209,400	$225,000	$198,600	$201,300	$175,000	$167,200	$168,000	$2,377,300

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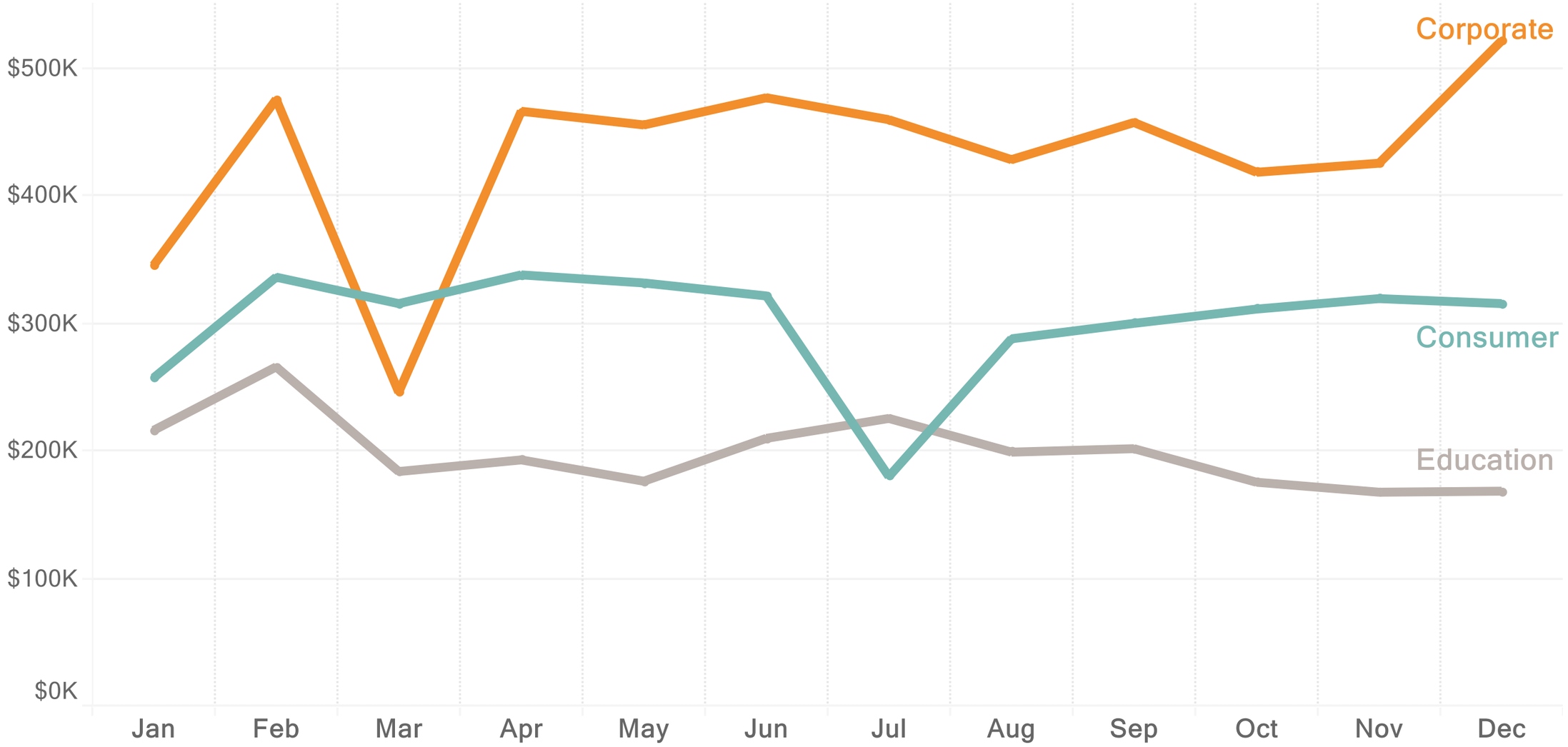

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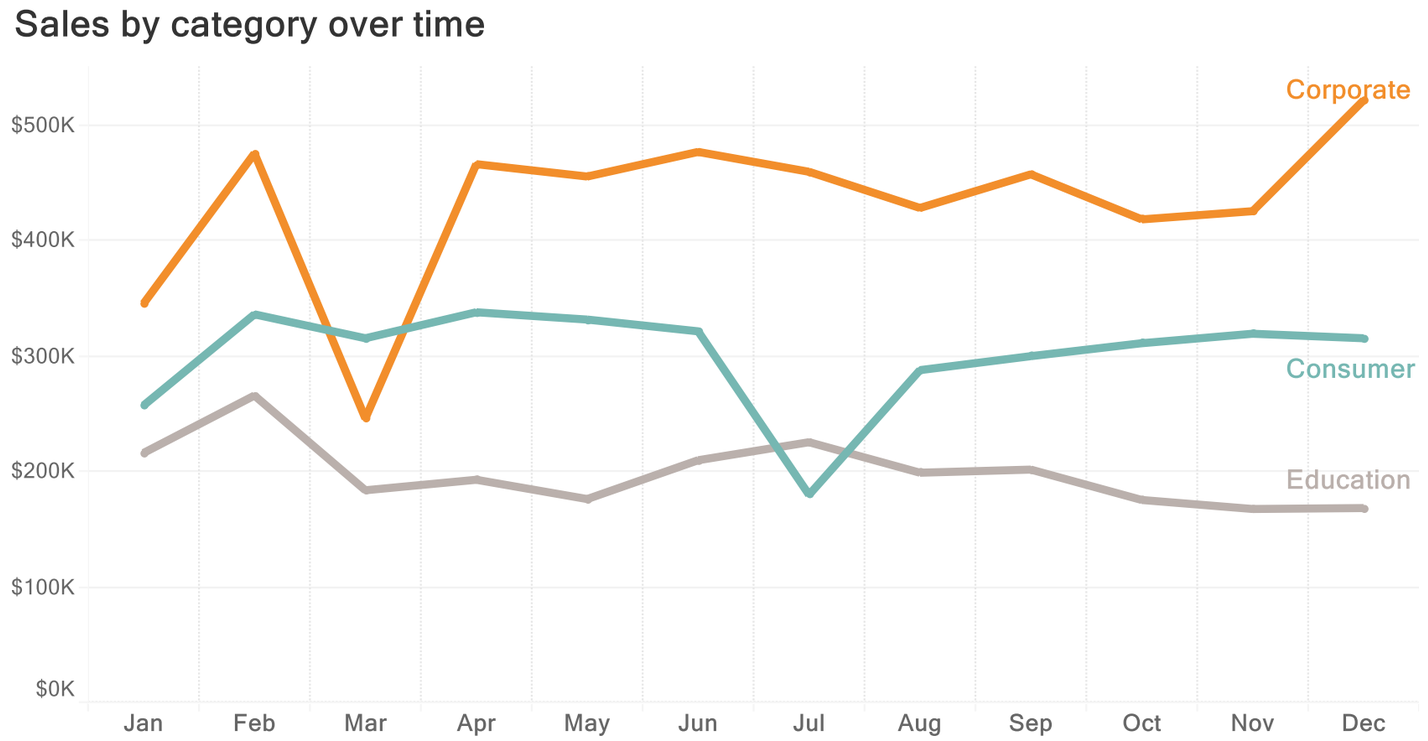

Highlight Table

(The “gateway” drug to data visualization)

Profit by region and subcategory

Product Category	Product Sub-Category	Region			
		Central	East	South	West
Furniture	Bookcases	$73	($10,151)	($22,417)	($676)
	Chairs & Chairmats	$37,920	$33,583	$34,026	$44,409
	Office Furnishings	$26,293	$14,523	$25,121	$30,941
	Tables	($19,777)	($50,677)	$26,172	($16,990)
Office Supplies	Appliances	$22,950	$16,812	$26,986	$31,276
	Binders & Accessories	$73,951	$71,420	$69,530	$92,273
	Envelopes	$10,825	$7,482	$19,182	$11,222
	Labels	$2,429	$4,041	$3,479	$3,740
	Paper	$11,047	$13,510	$10,997	$10,433
	Pens & Art Supplies	$2,781	$2,856	$1,397	$518
	Rubber Bands	($174)	($238)	$156	$178
	Scissors, Rulers and Trimmers	($1,765)	($1,179)	($2,903)	($1,953)
	Storage & Organization	($68)	($7,233)	$11,836	($2,018)
Technology	Computer Peripherals	$11,971	$14,808	$30,475	$37,280
	Copiers & Faxes	$513	$67,254	$63,598	$35,997
	Office Machines	$38,876	$47,277	$129,060	$61,377
	Telephones & Communications	$79,393	$73,715	$78,985	$84,860

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Tweet activity

By hour and day of week

	Mon	Tue	Wed	Thu	Fri	Sat	Sun
12 AM	109	100	103	115	126	81	100
1 AM	113	79	124	86	104	103	92
2 AM	65	115	133	88	109	100	102
3 AM	66	117	125	112	147	171	81
4 AM	35	142	80	67	130	88	118
5 AM	49	19	72	17	53	6	36
6 AM	6	17	39	9	10	7	4
7 AM	6	1	13	2	9	6	2
8 AM	4	4	6	1	3	2	1
9 AM	23	17	35	4	13	9	19
10 AM	98	115	199	69	104	28	59
11 AM	183	225	226	229	220	208	85
12 PM	241	244	230	333	276	273	204
1 PM	184	210	249	234	221	200	209
2 PM	174	176	239	176	146	125	166
3 PM	116	124	119	126	166	102	117
4 PM	75	104	87	74	110	113	108
5 PM	79	72	98	93	105	77	77
6 PM	69	112	73	84	69	89	112
7 PM	103	92	133	75	82	146	143
8 PM	97	82	97	113	133	143	117
9 PM	104	103	138	83	124	175	102
10 PM	110	107	105	114	132	220	100
11 PM	109	113	108	115	111	142	128

January 20, 2017 - May 2, 2020

Source: trumptwitterarchive.com

Tweet activity

By hour and day of week

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	
12 AM	109	100	103	115	126	81	100	734
1 AM	113	79	124	86	104	103	92	701
2 AM	65	115	133	88	109	100	102	712
3 AM	66	117	125	112	147	171	81	819
4 AM	35	142	80	67	130	88	118	660
5 AM	49	19	72	17	53	6	36	252
6 AM	6	17	39	9	10	7	4	92
7 AM	6	1	13	2	9	6	2	39
8 AM	4	4	6	1	3	2	1	21
9 AM	23	17	35	4	13	9	19	120
10 AM	98	115	199	69	104	28	59	672
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9 PM	104	103	138	83	124	175	102	829
10 PM	110	107	105	114	132	220	100	888
11 PM	109	113	108	115	111	142	128	826
	2,218	2,490	2,831	2,419	2,703	2,614	2,282	

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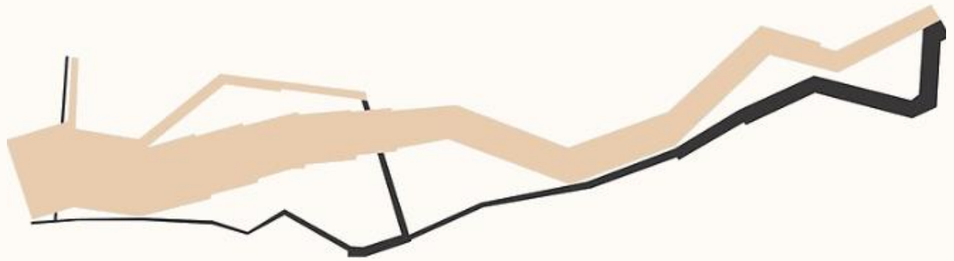
10 AM

11 AM

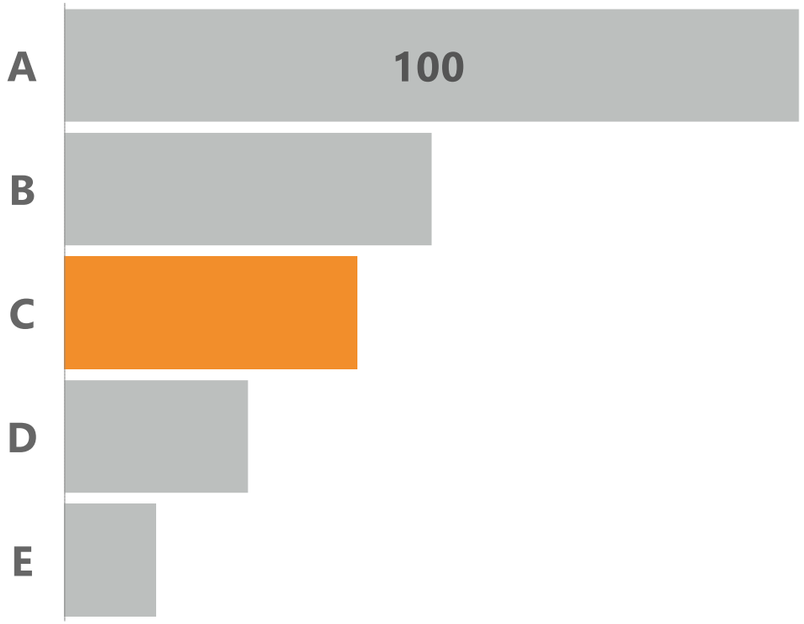
10 AM
11 AM

“We can say that one shade is darker than another; that is obvious. But to say that it is two or three times as dark is not visible, it is not readable.”



Charles Minard, 1861

From RJ Andrews’ translation of Minard’s treatise on GRAPHIC TABLES AND FIGURATIVE MAPS. See https://infowetrust.com/project/minard1861



Why the F*&$ do we see so many bar charts?

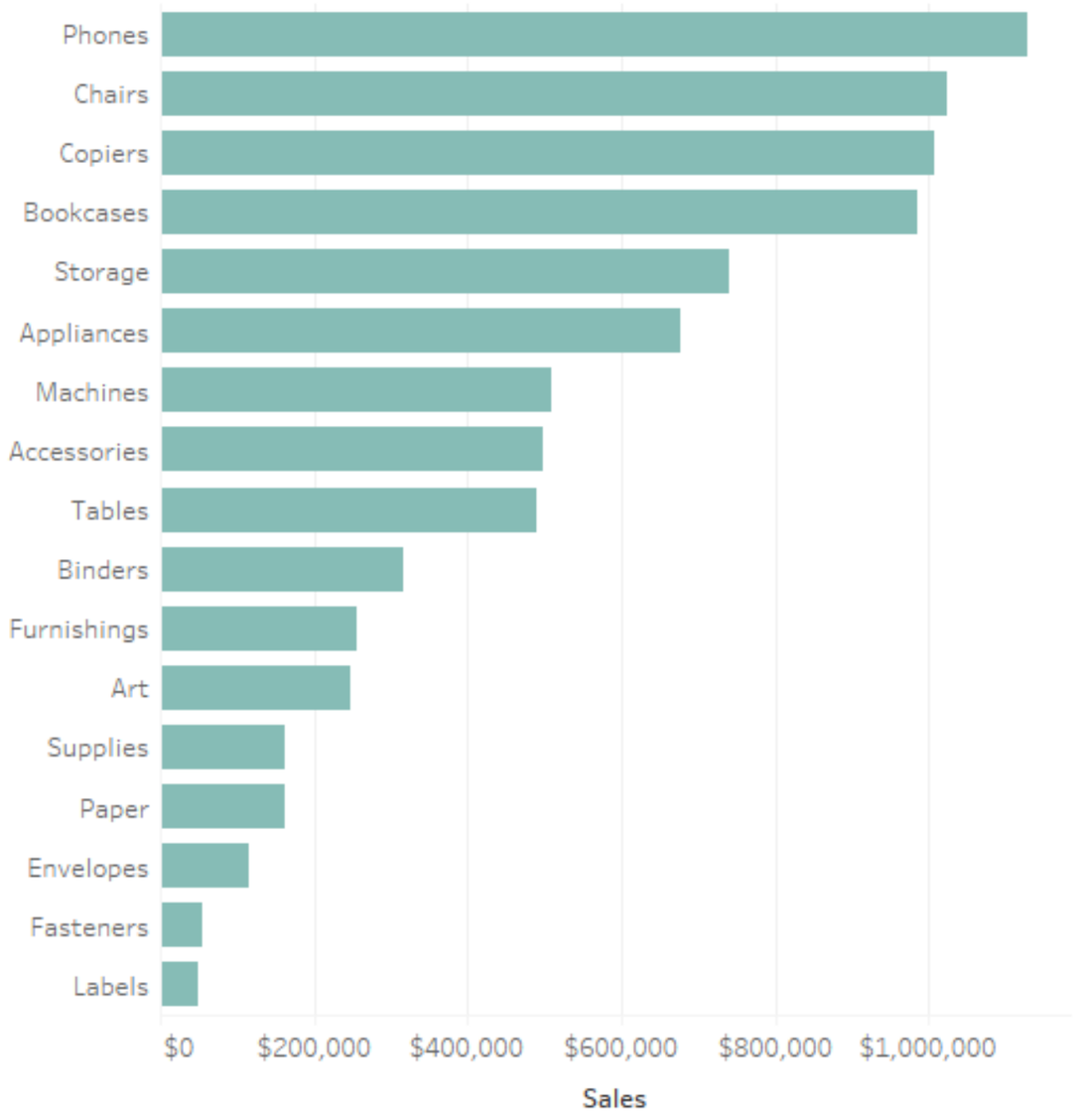
Who thinks bar charts are boring?

It’s not the bar chart… it’s *your data* that’s boring!

Sales

Accessories	$498,533
Appliances	$677,678
Art	$246,969
Binders	$317,245
Bookcases	$986,513
Chairs	$1,022,757
Copiers	$1,007,801
Envelopes	$115,422
Fasteners	$54,855
Furnishings	$256,244
Labels	$49,668
Machines	$508,127
Paper	$161,464
Phones	$1,127,198
Storage	$740,262
Supplies	$162,604
Tables	$490,011

Bars


Phones
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Copiers
Bookcases
Storage
Appliances
Machines
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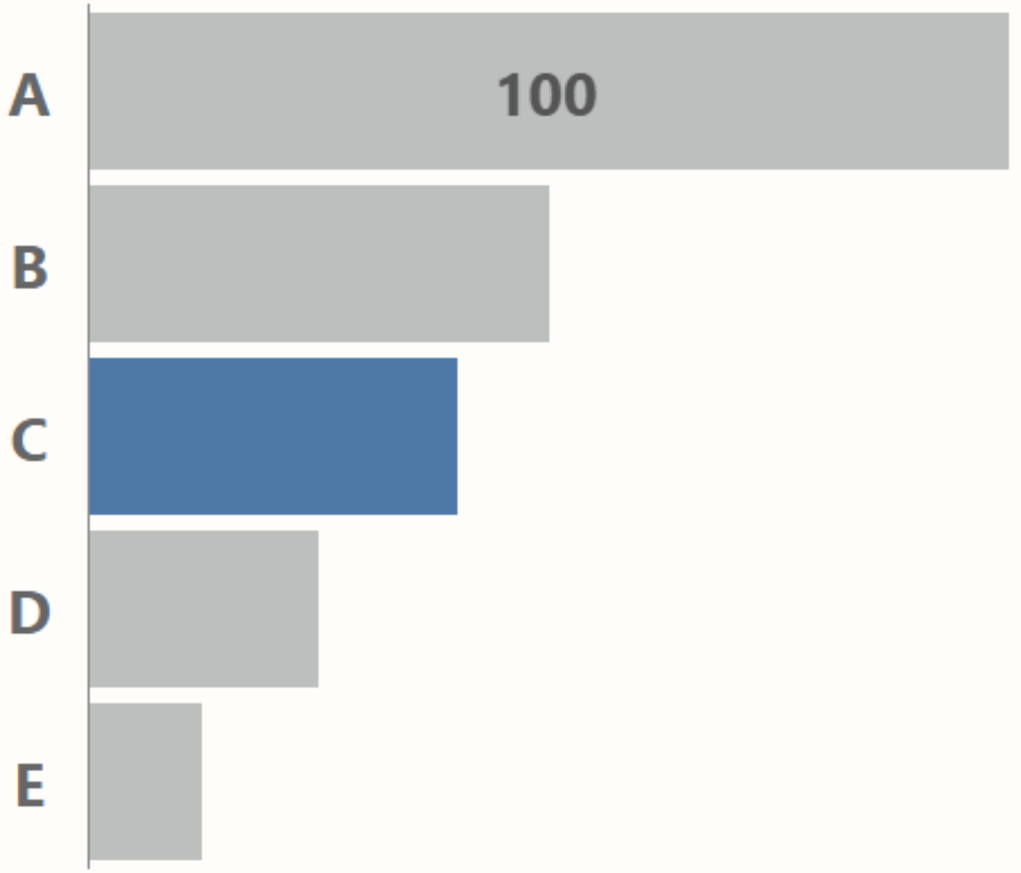
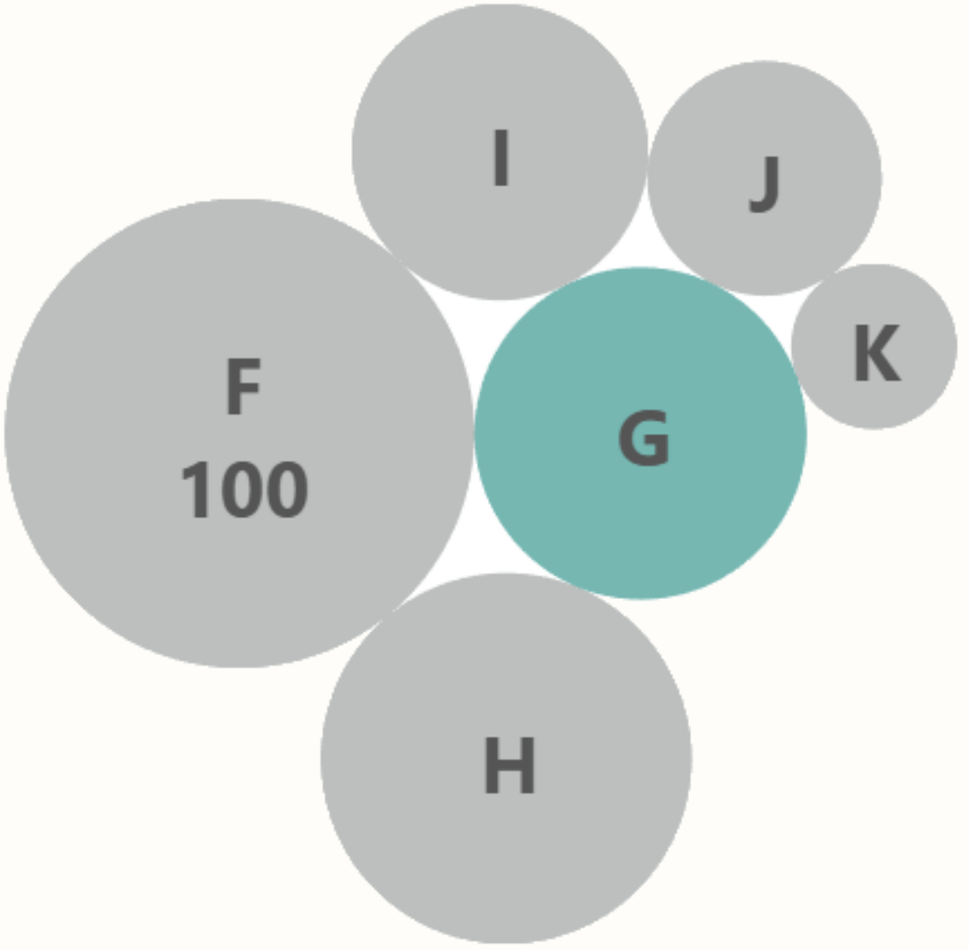
Tables
Binders
Furnishings
Art
Supplies
Paper
Envelopes
Fasteners
Labels
$0
$200,000
$400,000
$600,000
$800,000
$1,000,000
Sales

What are the values of C and G?





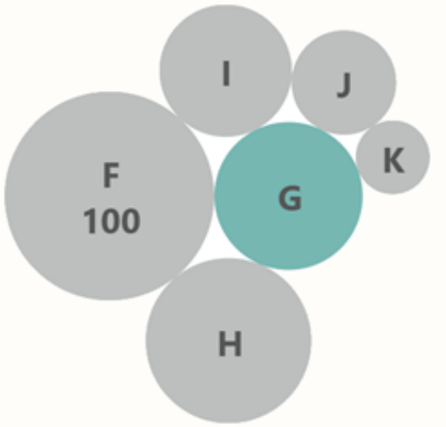
Submit answer: bit.ly/BarsAndCircles

The results…

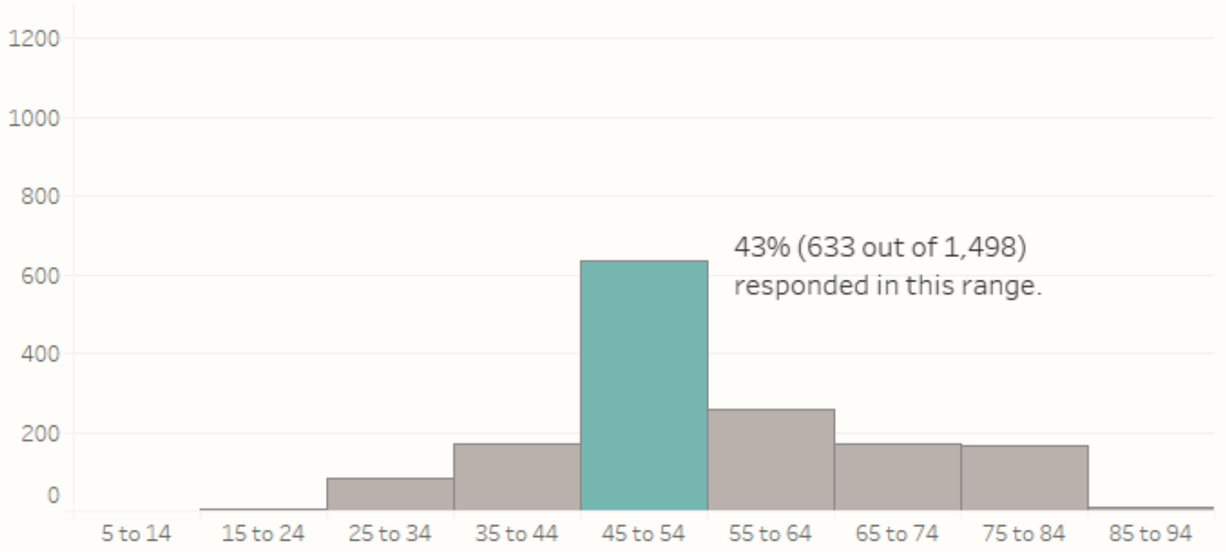
Circles and Bars: The Results

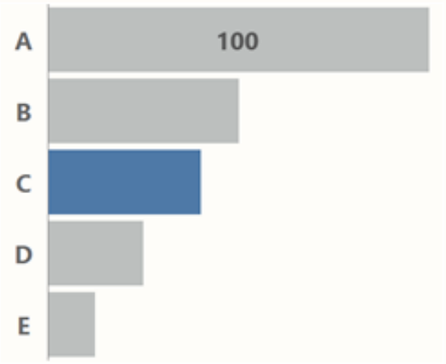
Responses: 1,498

Updated: 9/9/2019 11:53:43 AM

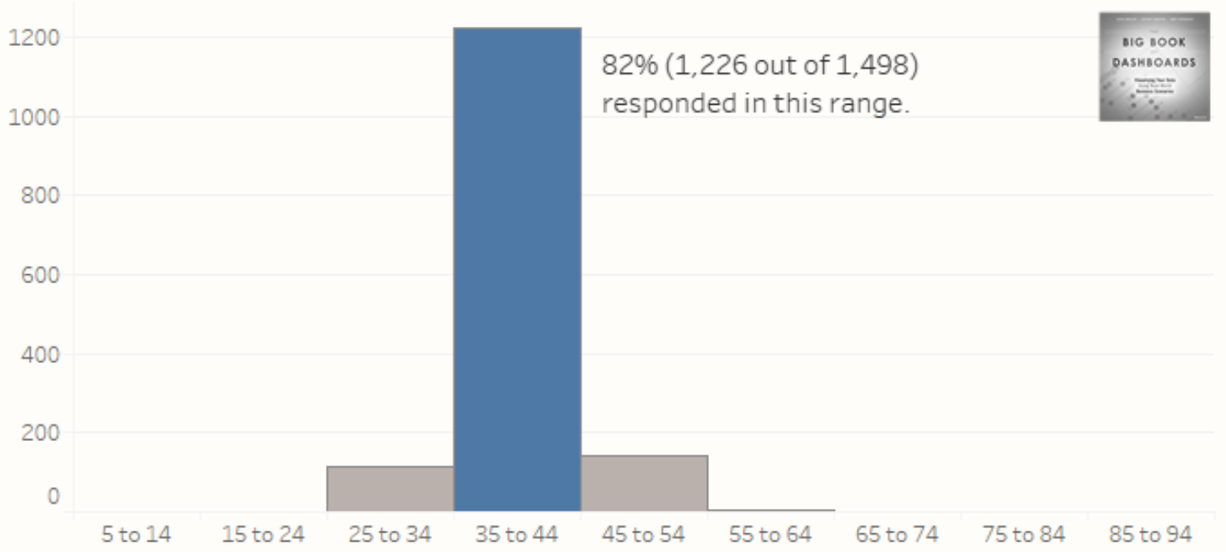


The circle is **50**. Here are the guesses.





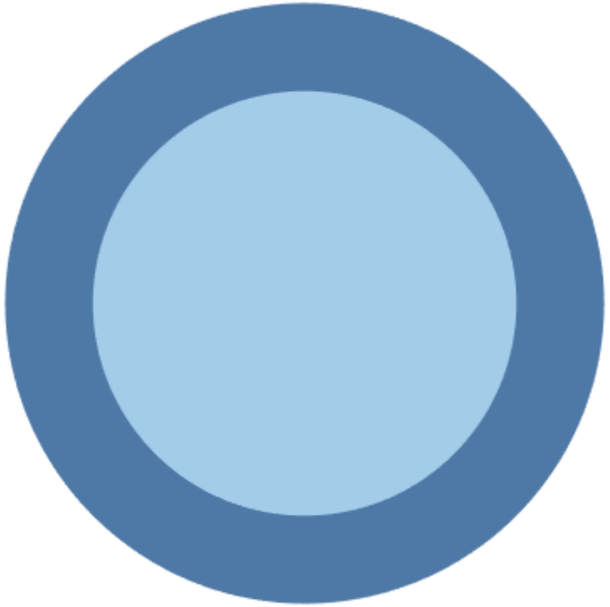
The bar is **40**. Here are the guesses.

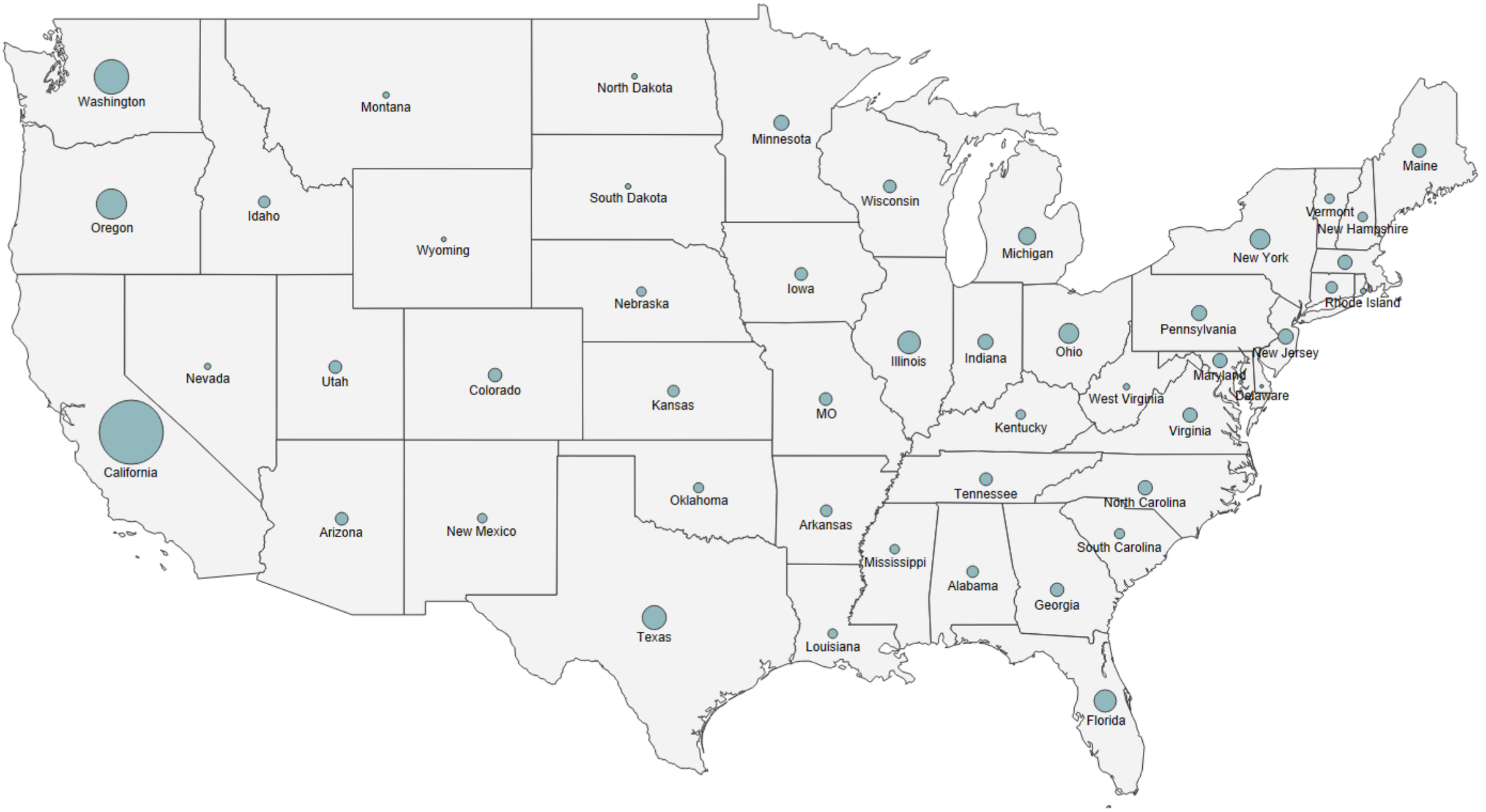


“What is data visualization?

The representation and presentation of data that exploits our visual perception abilities in order to amplify cognition.”

Andy Kirk




Washington
Montana
North Dakota
Minnesota
Maine
Oregon
Idaho
South Dakota
Wisconsin
Vermont
New Hampshire
Wyoming
Michigan
New York
Nebraska
Iowa
Rhode Island
Pennsylvania
Illinois
Indiana
Ohio
New Jersey
Nevada
Utah
Colorado
Kansas
MO
Maryland
Delaware
West Virginia
Kentucky
Virginia
California
Tennessee
North Carolina
Oklahoma
Arkansas
Arizona
New Mexico
Mississippi
South Carolina
Alabama
Georgia
Texas
Louisiana
Florida

Sales by store location
Rio de Janeiro
Jacaranda
Zaria
Ladenberg
Winnipeg
Kingston
Saint Petersburg
Bogota
Jinan
Dayton
Ulsan
Hildalgo
Rio de Janeiro
Kent
Jesolo
$0K
$200K
$400K
$600K
$800K
$1,000K
$1,200K

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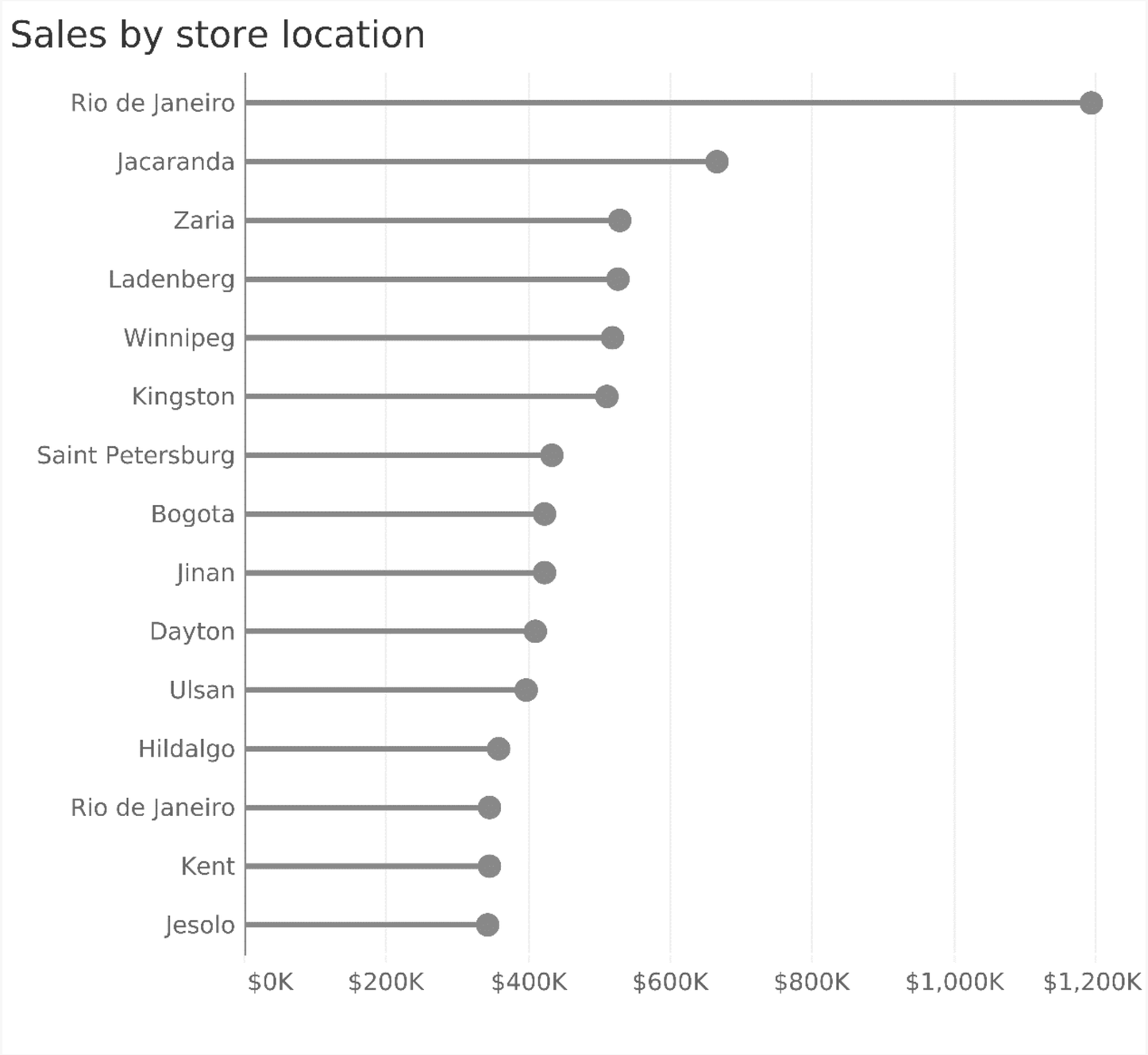
$1,200K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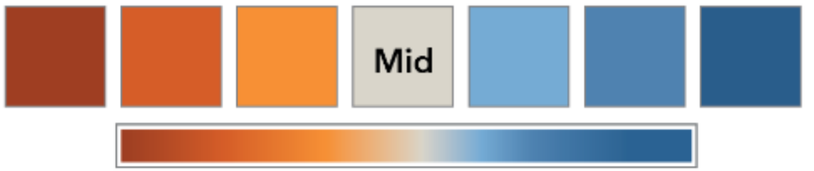
Hildalgo
Rio de Janeiro
Kent
Jesolo
$0K
$200K
$400K
$600K
$800K
$1,000K
$1,200K

Use
of
color

The Use of Color in Data Visualization

Sequential
color is ordered from low to high

Diverging
two sequential colors with a neutral midpoint

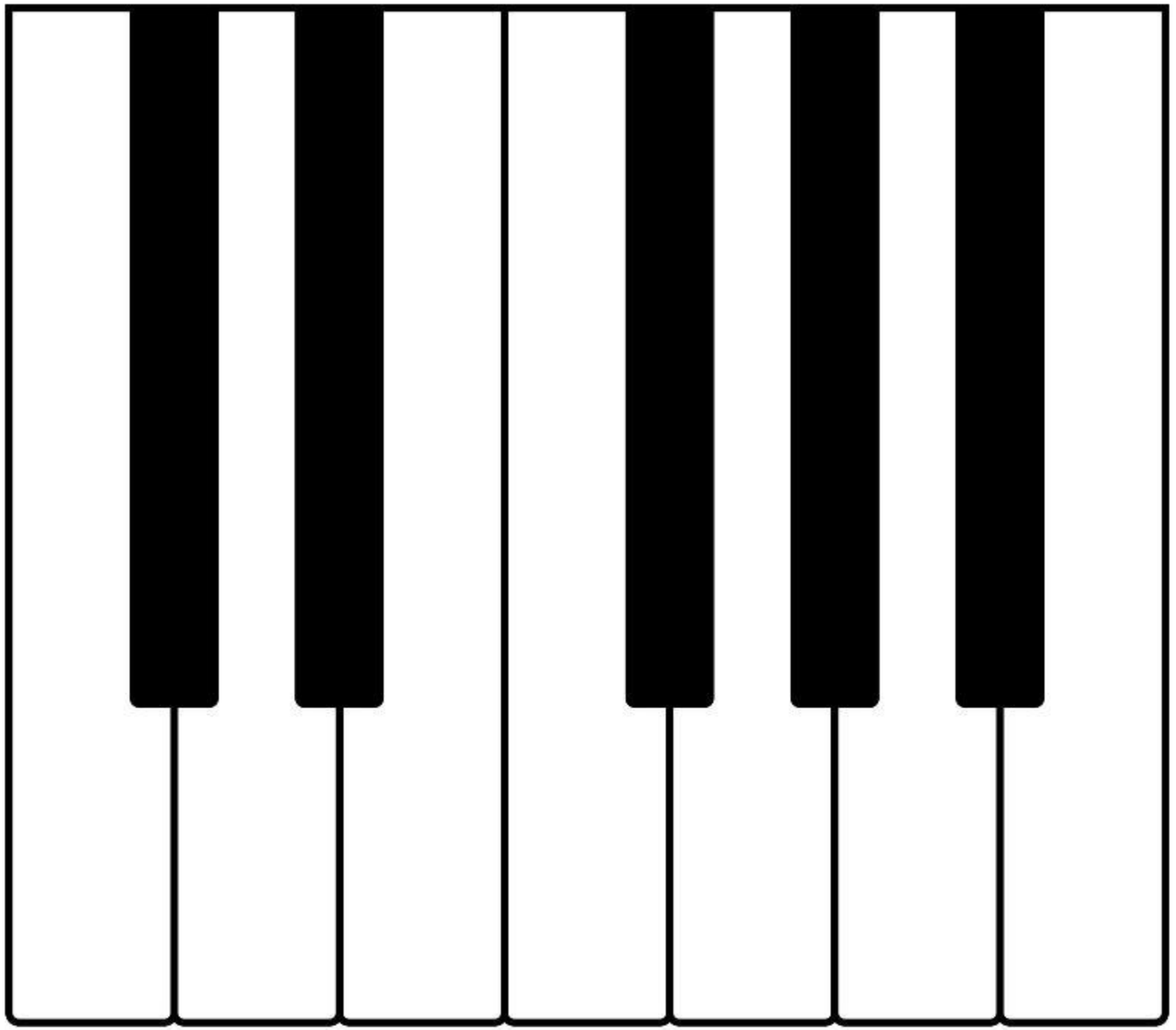


Categorical
contrasting colors for individual comparison

Highlight
color used to highlight something

Alert
color used to get reader's attention

Source: *The Big Book of Dashboards* (BigBookofDashboards.com)



The Use of Color in Data Visualization

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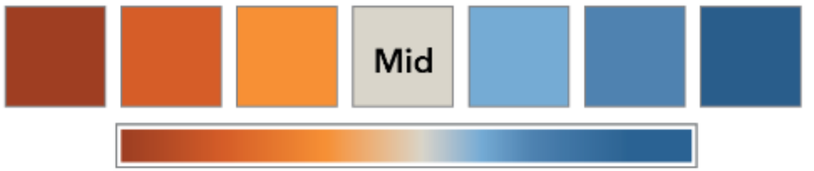
color is ordered from low to high

Diverging
two sequential colors with a neutral midpoint



Categorical
contrasting colors for individual comparison

Highlight
color used to highlight something

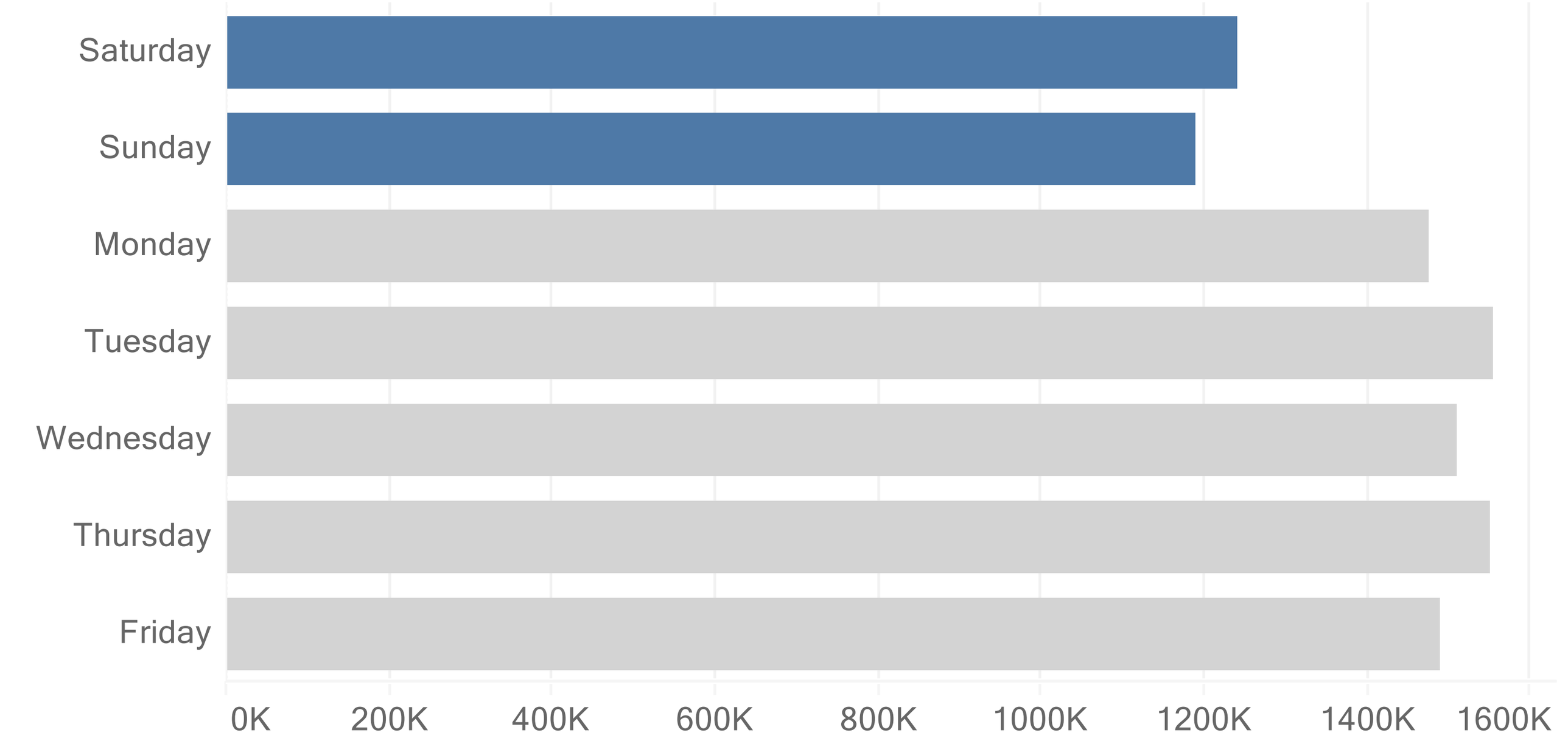
Alert
color used to get reader's attention

Source: *The Big Book of Dashboards* (BigBookofDashboards.com)

Pop quiz! What do you conclude from the following chart?

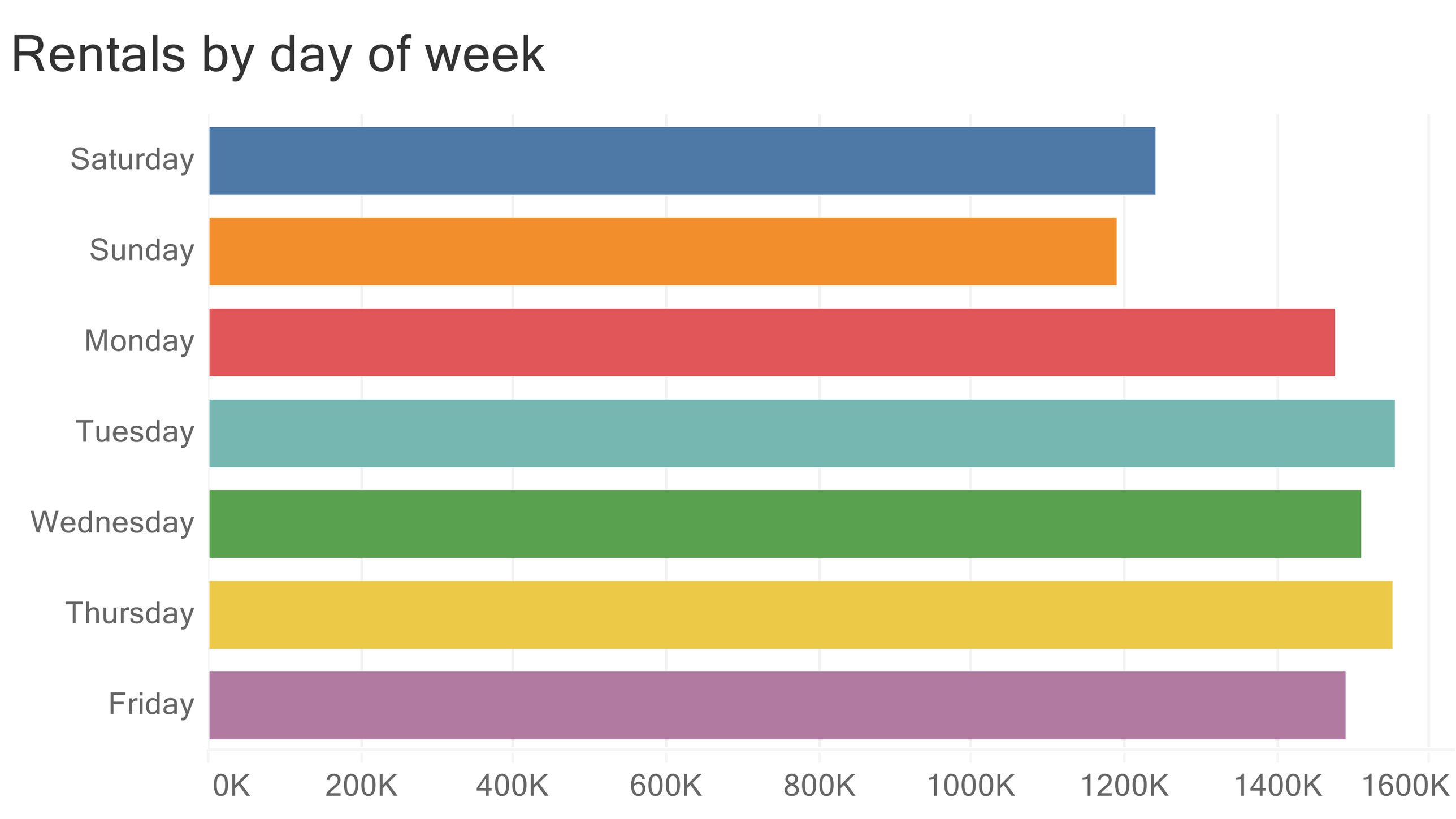
I'm going to ask half of you to close your eyes

Rentals by day of week



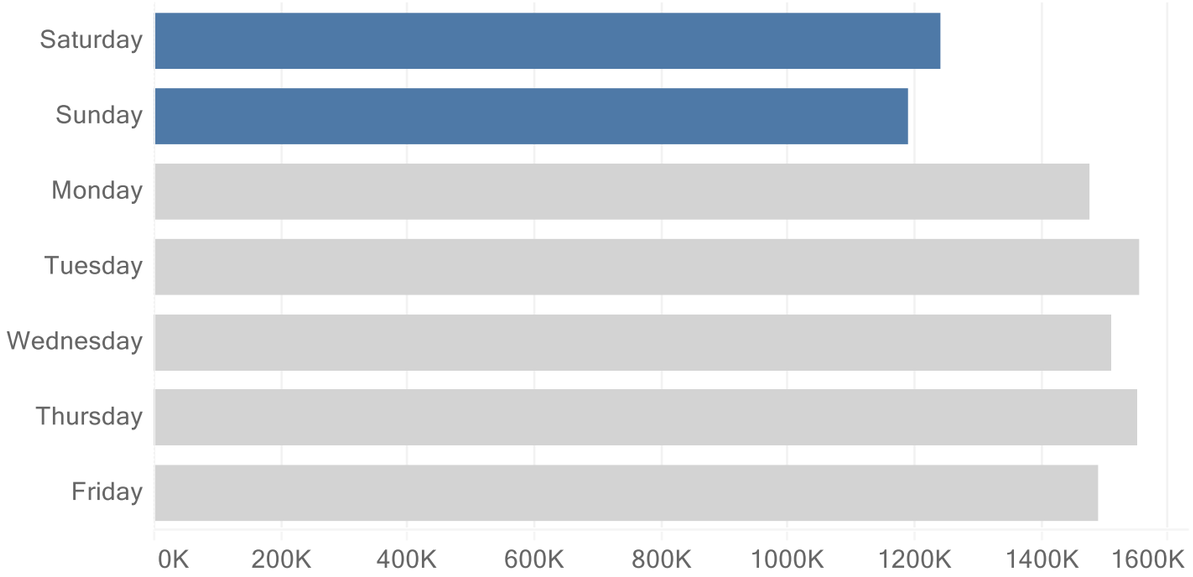
Now the other half

Rentals by day of week

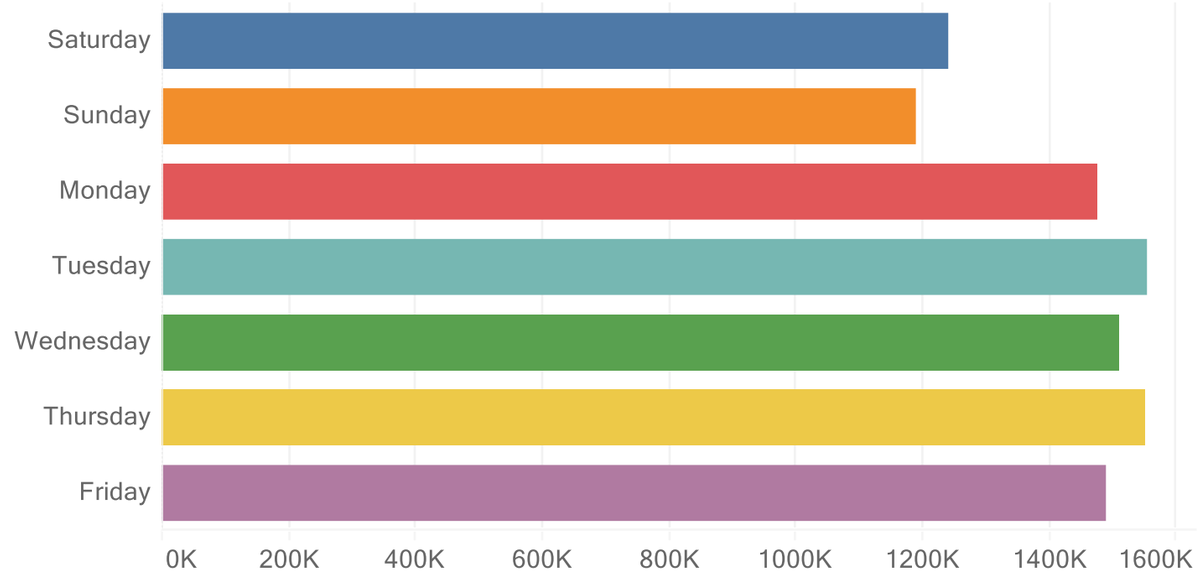


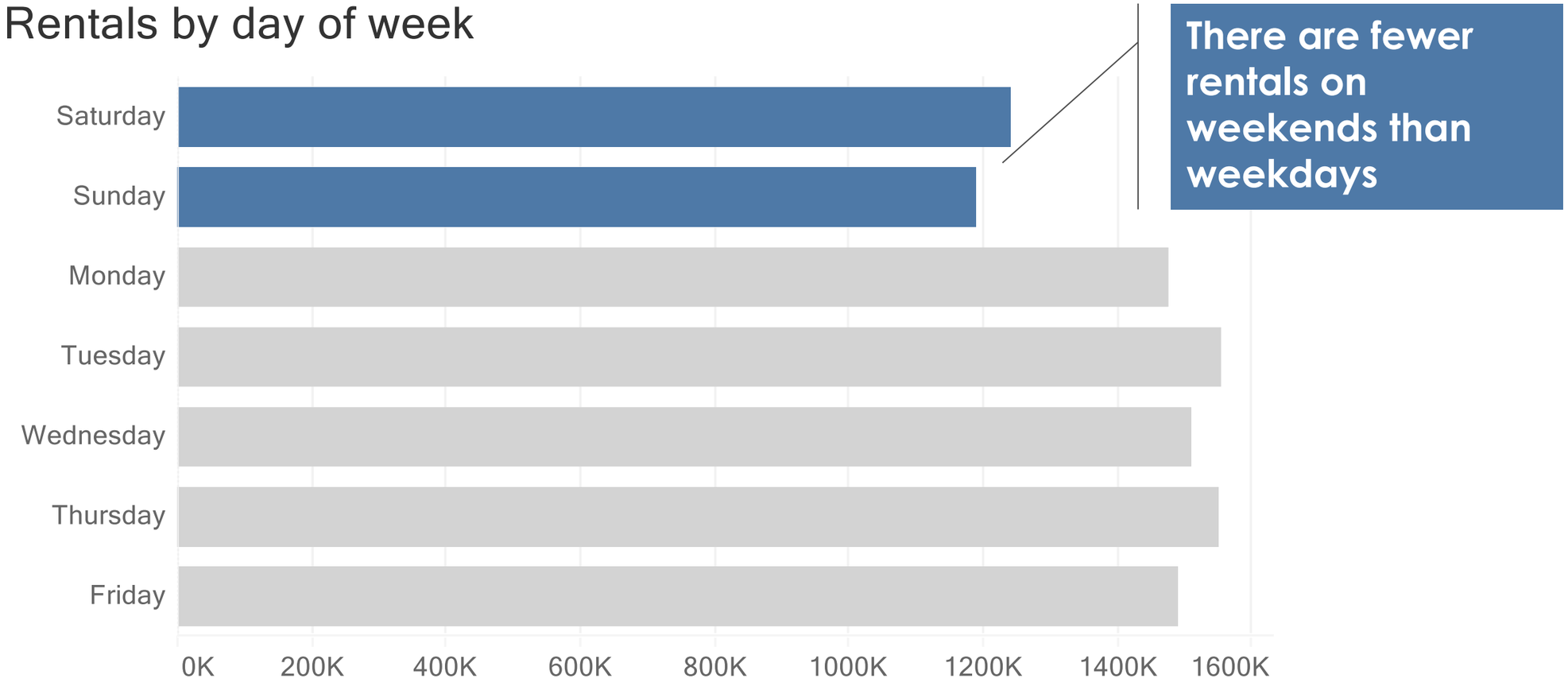
First group: What conclusions did you reach?

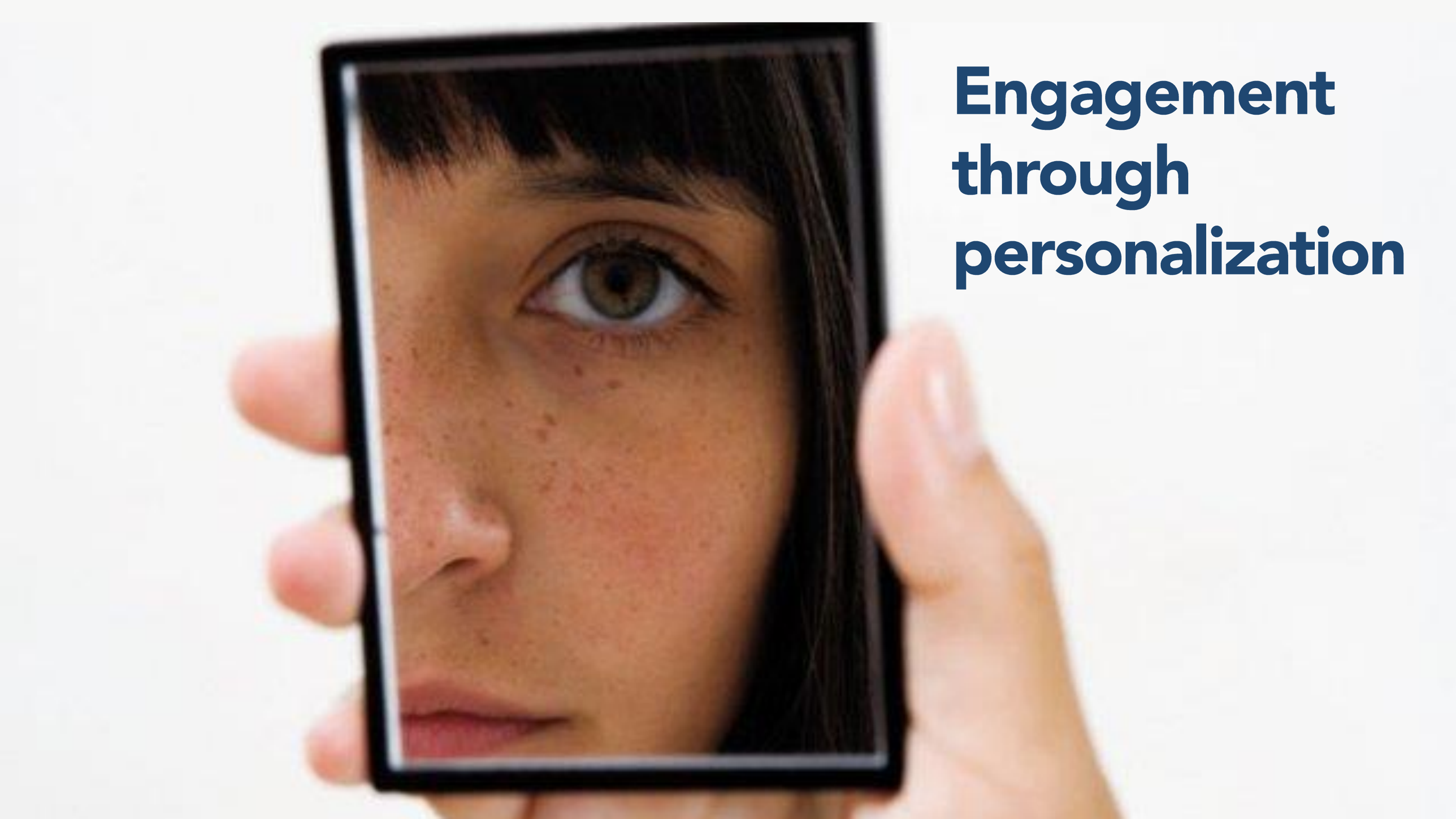
Rentals by day of week



Rentals by day of week




Rentals by day of week
Saturday
Sunday
Monday
Tuesday
Wednesday
Thursday
Friday
0K
200K
400K
600K
800K
1000K
1200K
1400K
1600K
There are fewer rentals on weekends than weekdays



Engagement through personalization

How am I doin’?

How am I doin’?

How much older / younger am I than others?

How is the store I manage performing compared with all other stores?

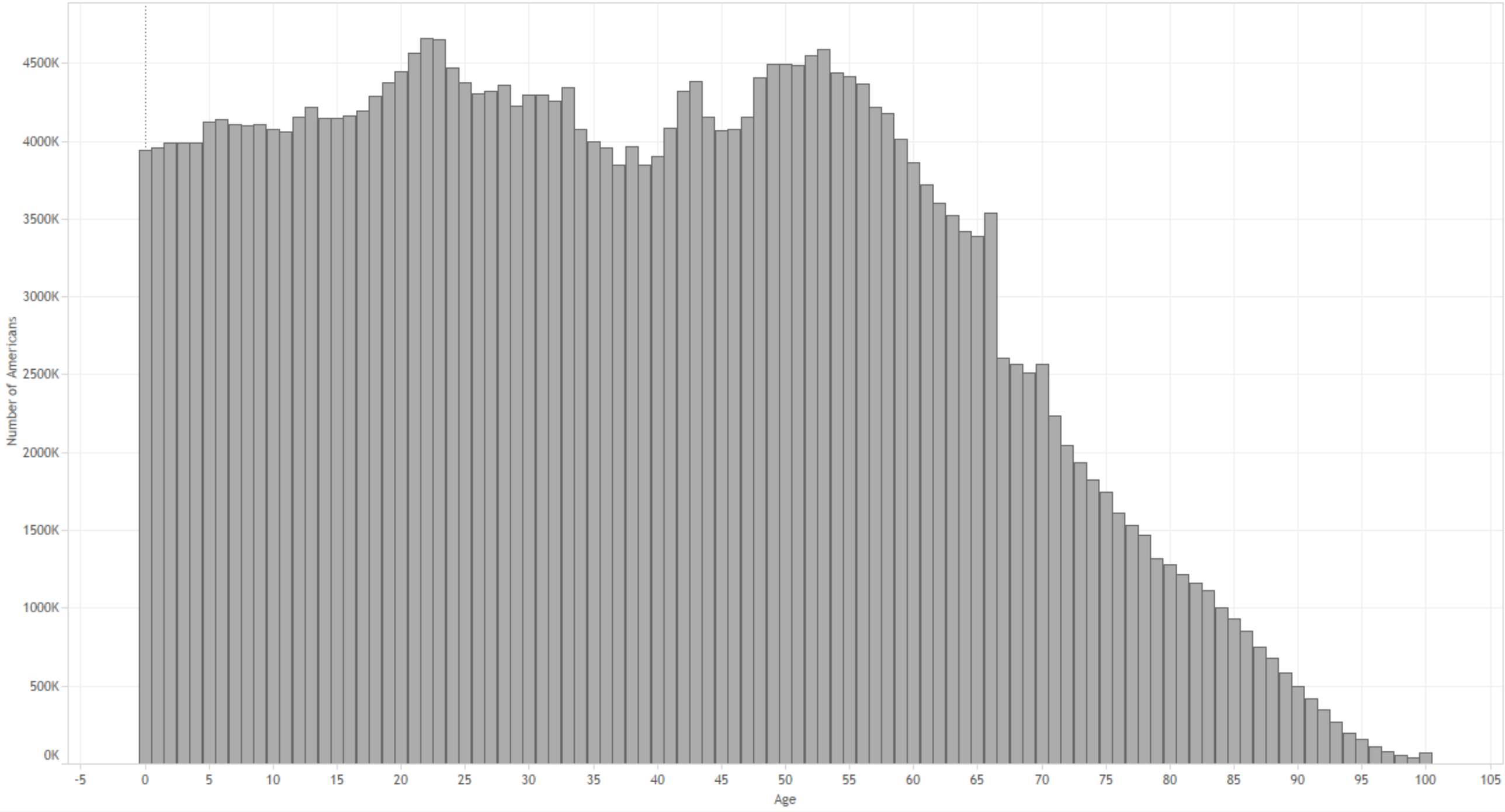
How did my session compare with others?

What is my salary compared with others?

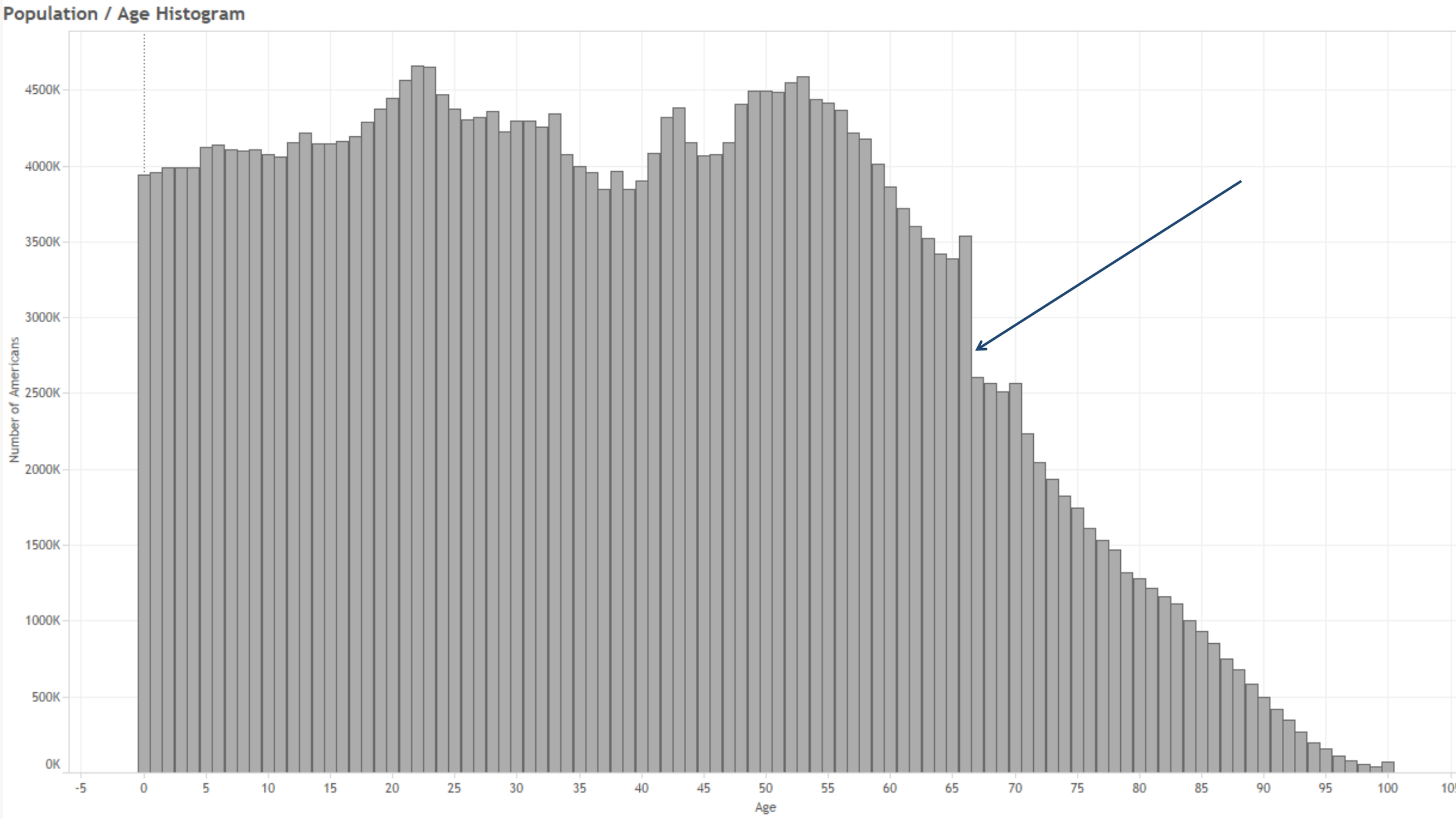
How common is my birthday?

How much will I save if I use a generic drug?

Population / Age Histogram



zzz...


Population / Age Histogram
Number of Americans
4500K
4000K
3500K
3000K
2500K
2000K
1500K
1000K
500K
0K
-5
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
85
90
95
100
Age

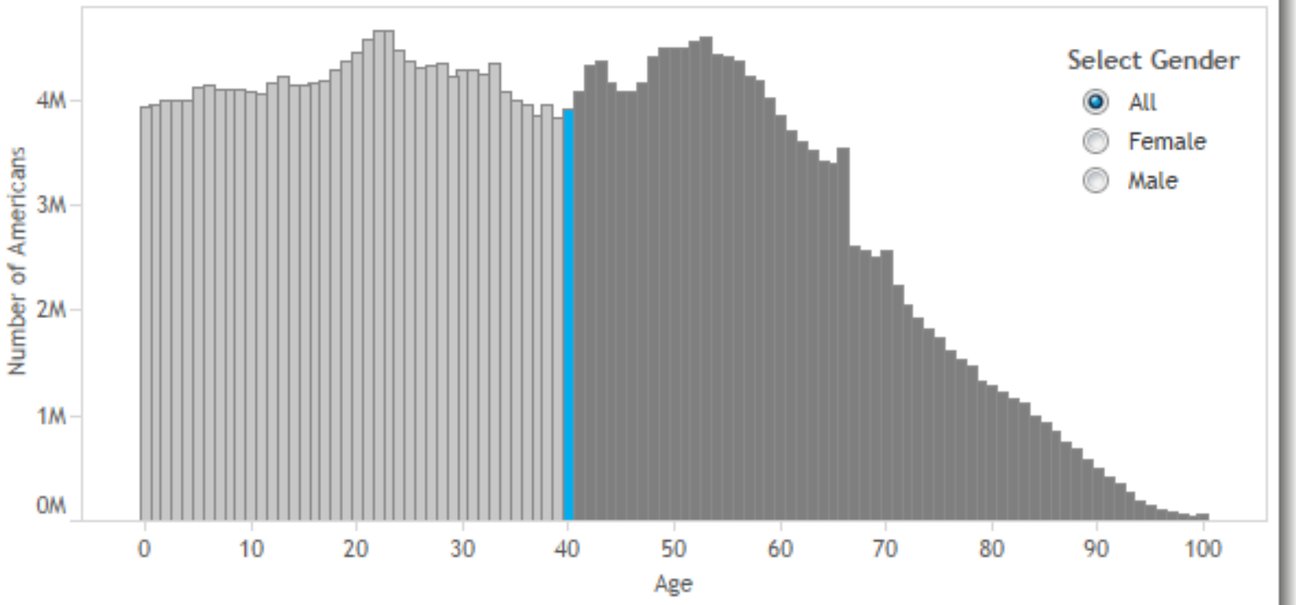
Are you over the hill?

See how many Americans are older and younger than you

Move slider to select your age

40

You are older than 53.0% of All Americans



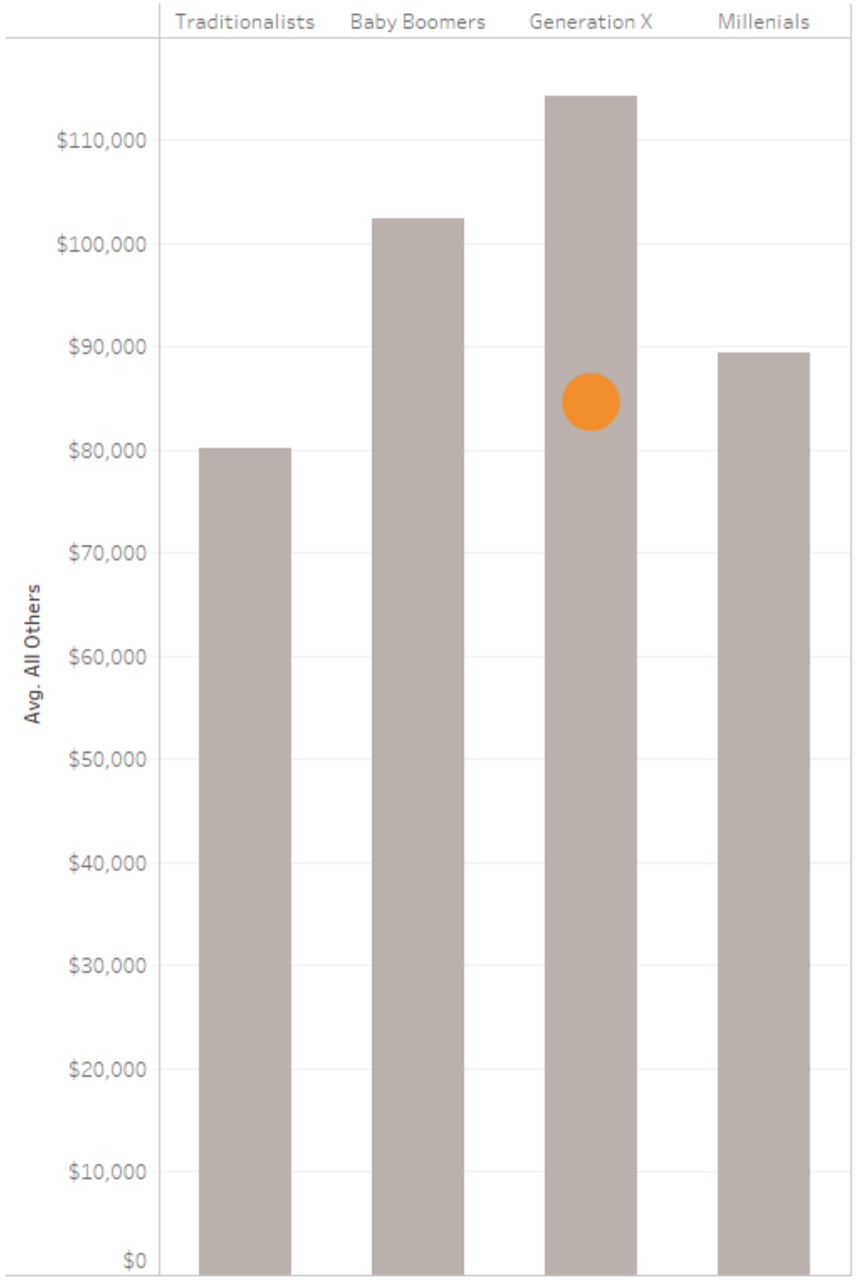
Americans younger than you	167,491,882
Americans the same age as you	3,904,767
Americans older than you	144,732,190

DATA REVELATIONS

Population estimates as of 2013. Source: United States Census Bureau https://www.census.gov/popest/data/. Special thanks to Chad Skelton at http://blogs.vancouversun.com/author/chadskeltonvansun/.

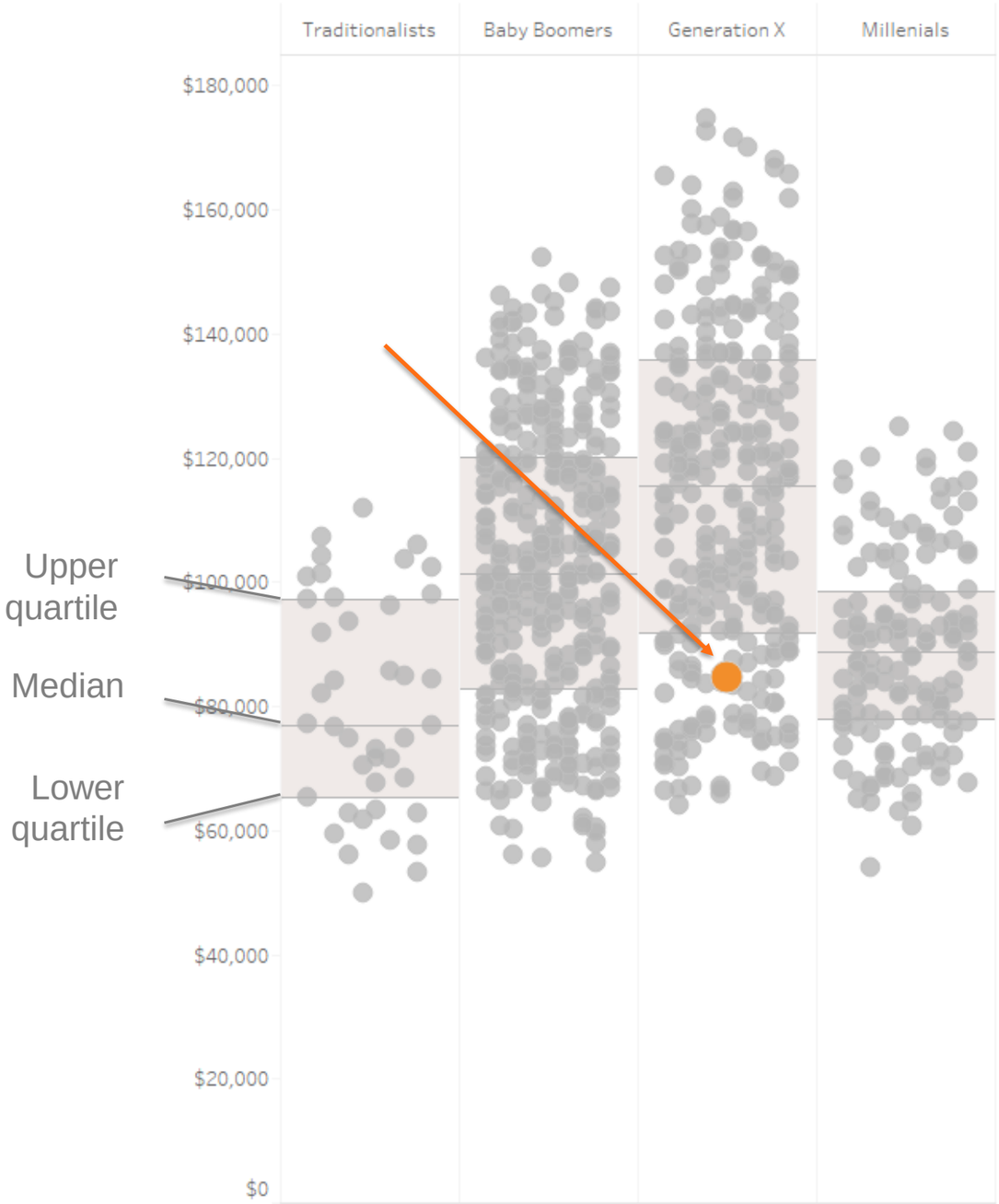
Salary breakdown by Generation

Respondent 1016 compared with all others



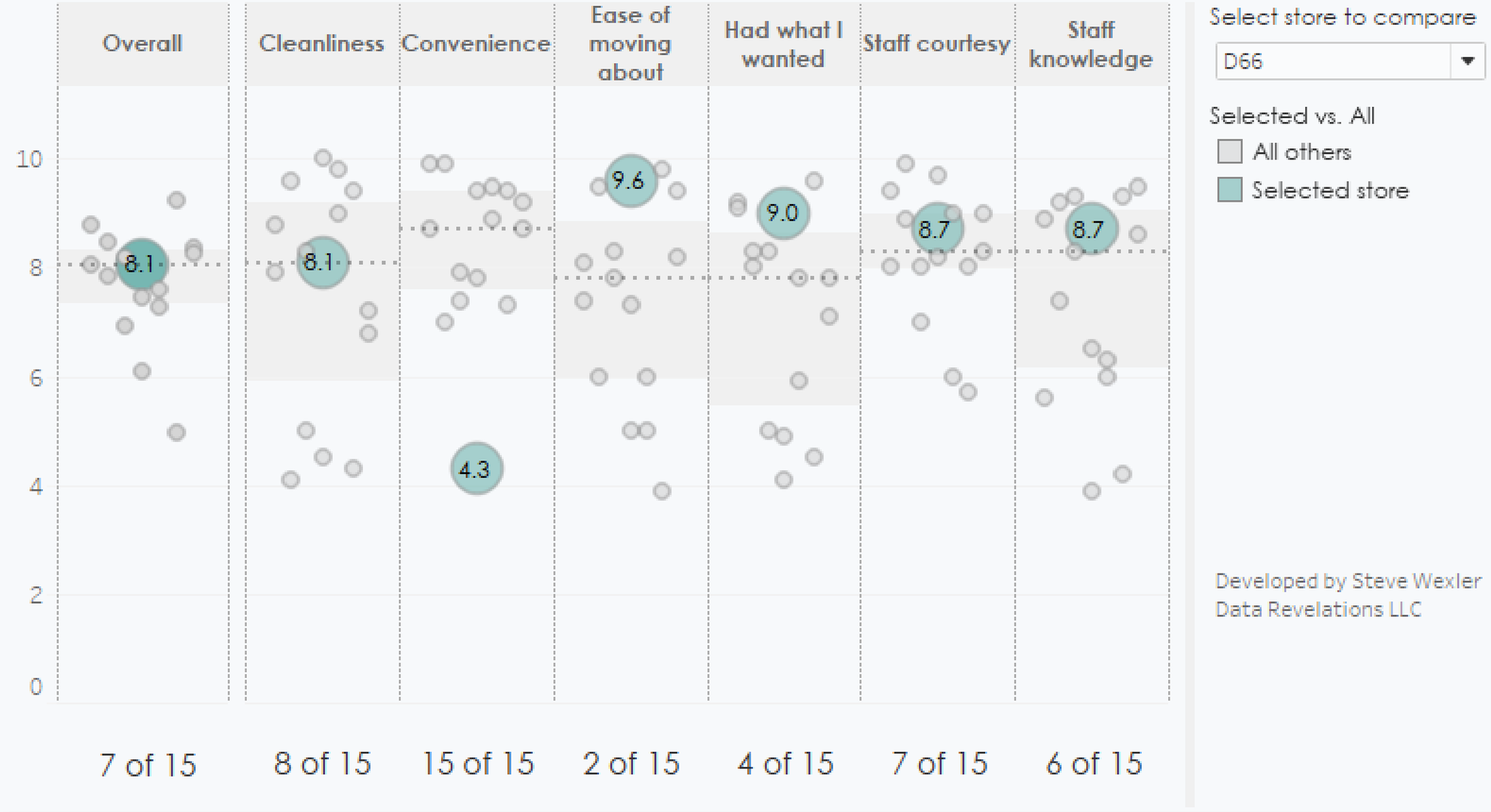
Salary breakdown by Generation

Respondent 1016 compared with all others



Store Comparison

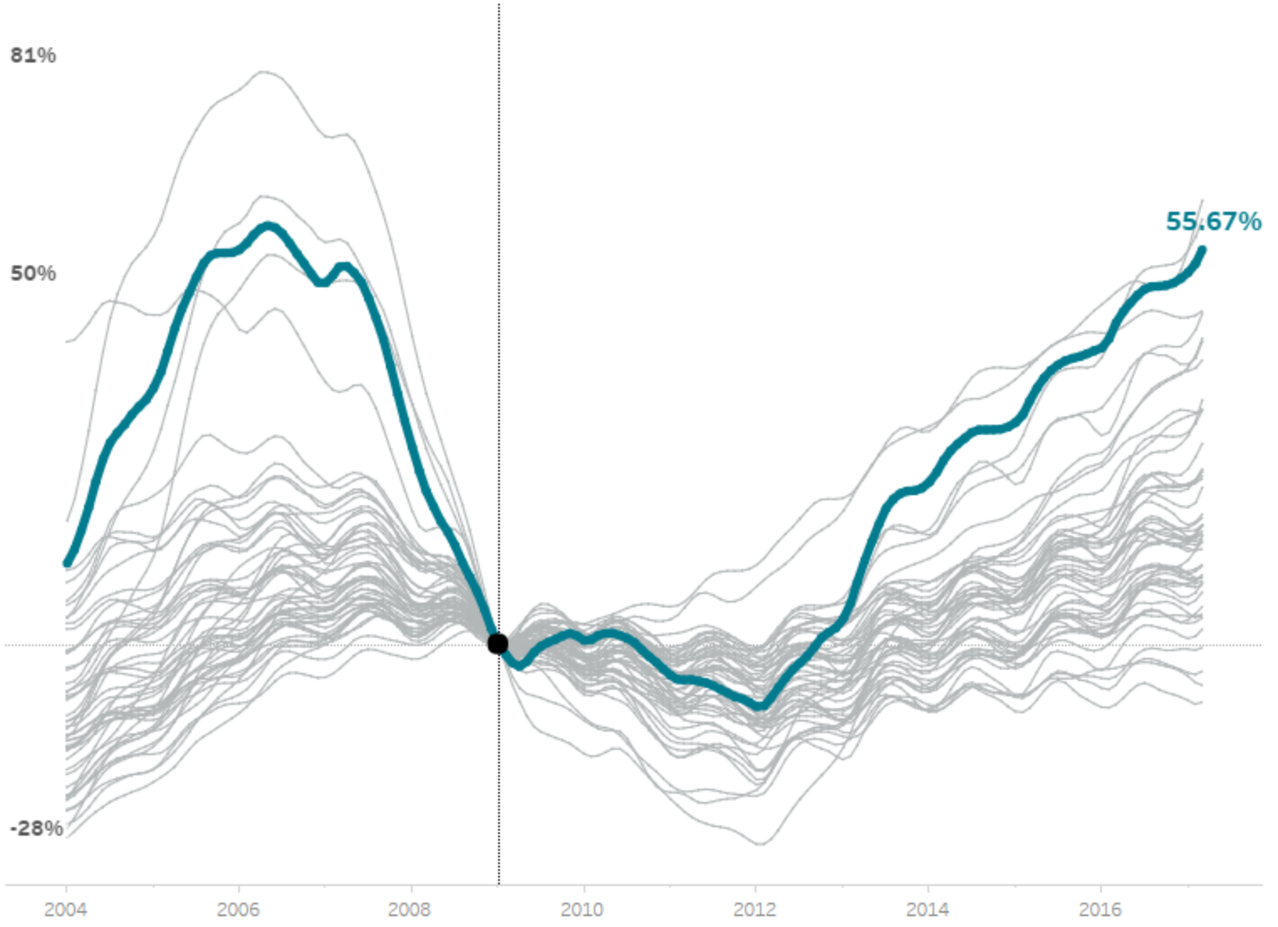
(Showing D66 and all others)



HOW HAS **YOUR HOME** PRICE CHANGED SINCE YOU PURCHASED?

WHEN? January 2009 | WHERE? CA | HOW MUCH? $500,000

Relative to **CA home prices** in **January 2009**, your **$500,000** home has moved **55.67%**, placing your home's current value around **$778,340**



SOURCE: FREDDIE MAC

DESIGNED BY: @HARRIS7CURTIS

INSPIRATION: @LENKIEFER

Why I’m so high on the Jitterplot

Incidence of diabetes

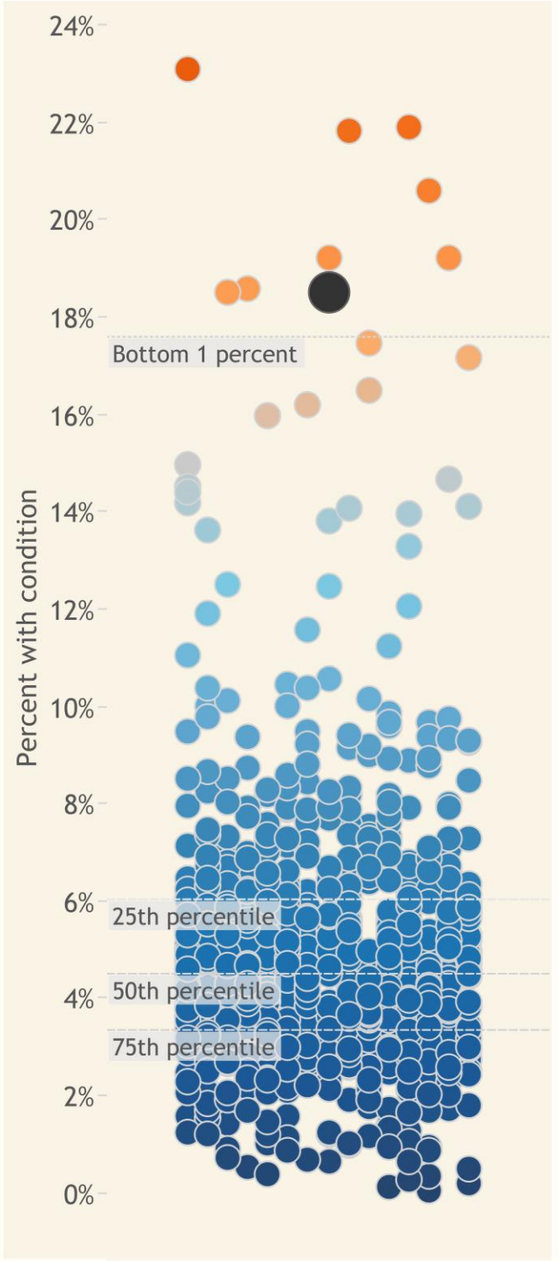
Your organization:	18.5%
Average of all organizations:	4.9%

Incidence of diabetes

Your organization vs. other organizations

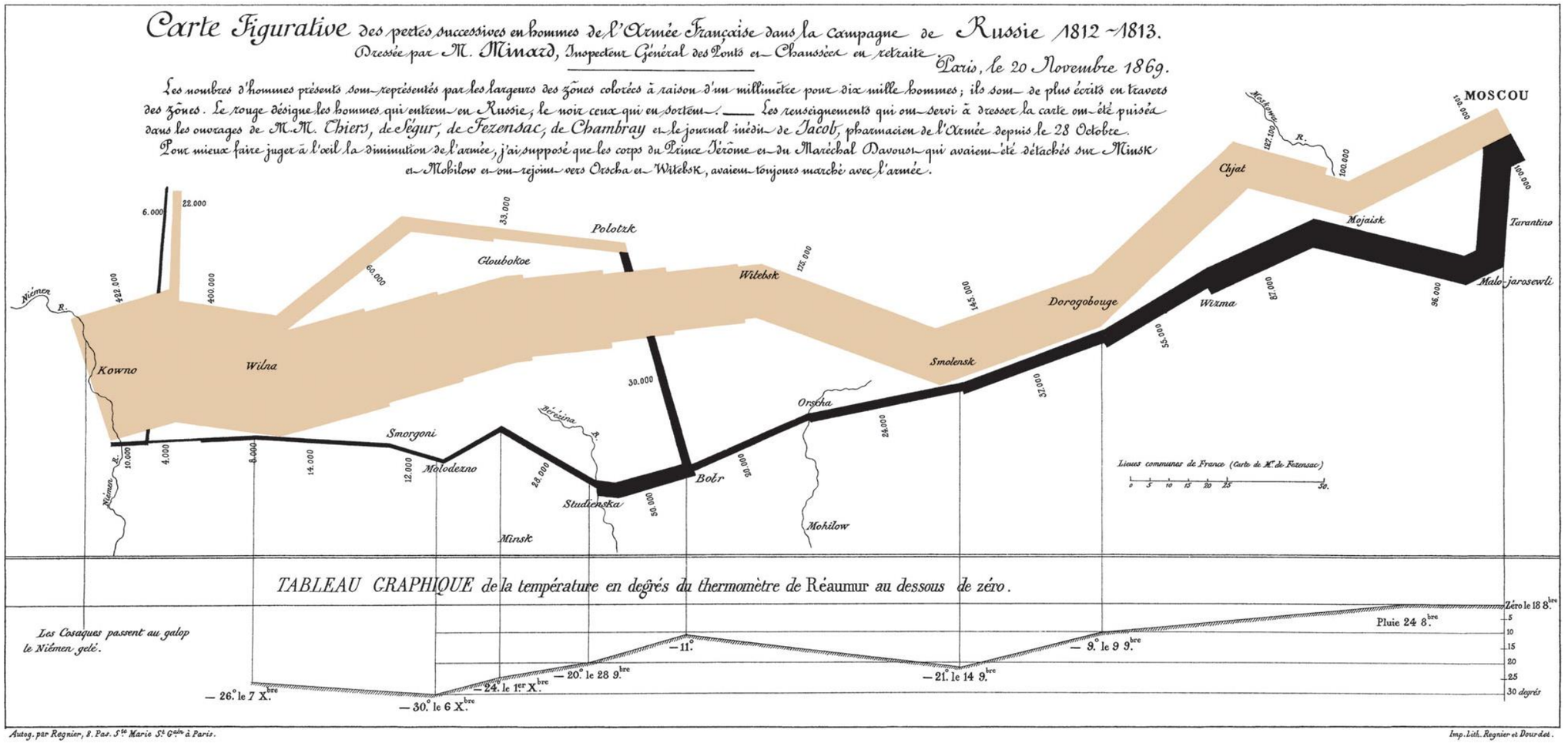
There are 790 different organizations, each represented by a dot.

Dots near the bottom indicate a low incidence of diabetes; dots near the top indicate a high incidence.



What you should always keep in mind

Mid 19th Century: Charles Minard



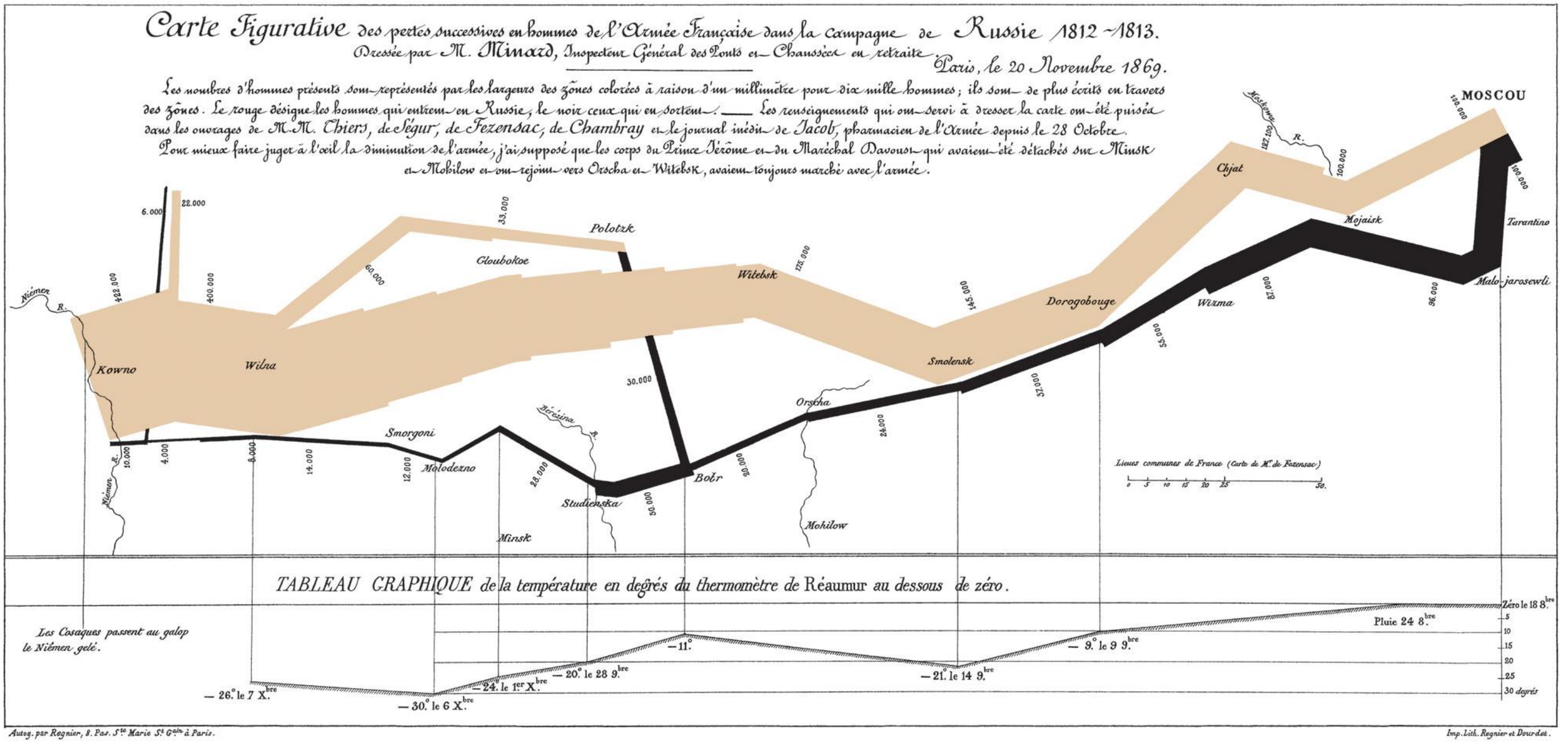
Figurative map of the successive losses in men of the French Army in the Russian Campaign 1812-1813 by Charles Minard, published in the Tableaux Graphiques et Cartes Figuratives de M. Minard, 1845-1869.

Images used under the Wikipedia Creative Commons license. http://www.wikipedia.com

Napoleon's Russian Campaign, 1812

Plotted on modern map

Best Statistical Graph ever done?



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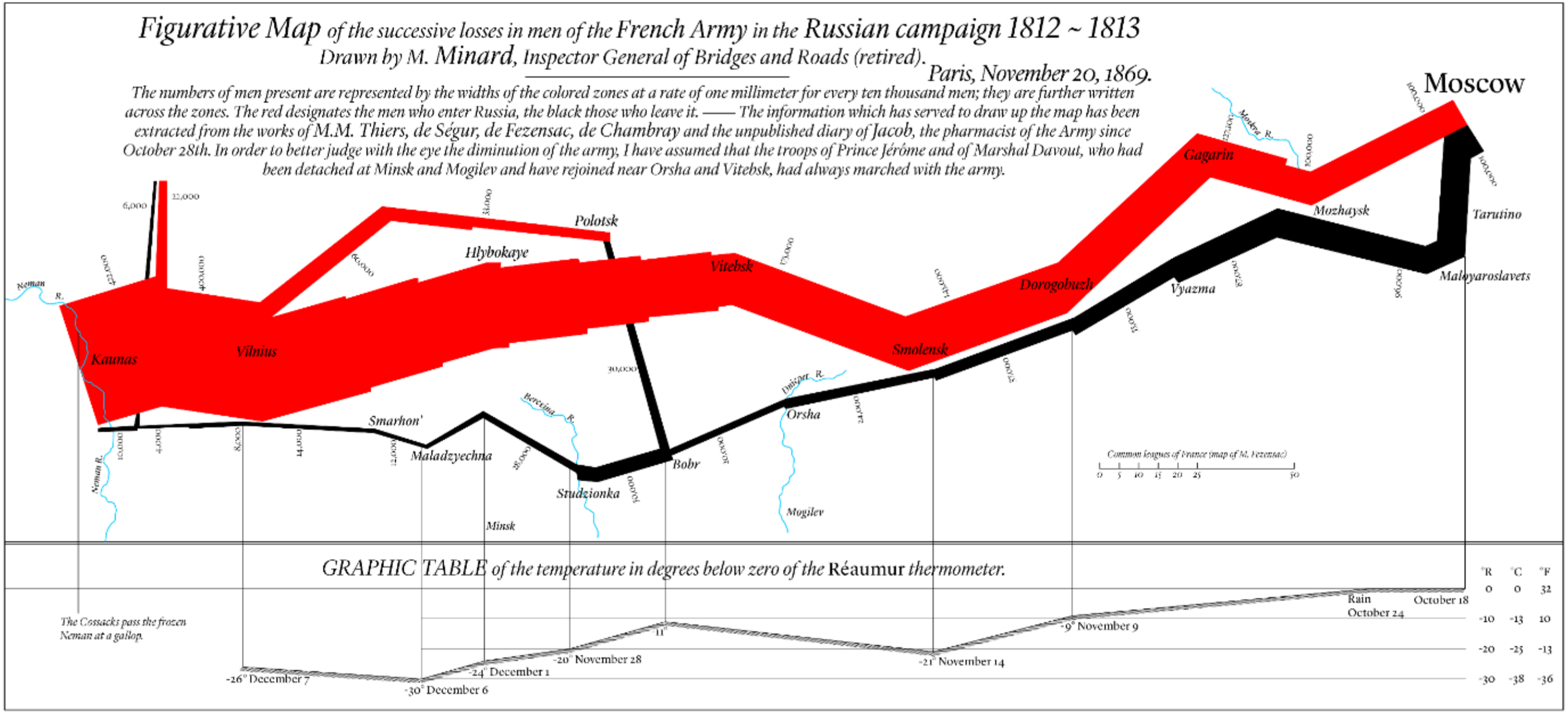
Best Statistical Graph ever done?



By DkEgy - Own work, CC BY-SA 4.0,
https://commons.wikimedia.org/w/index.php?curid=61466910

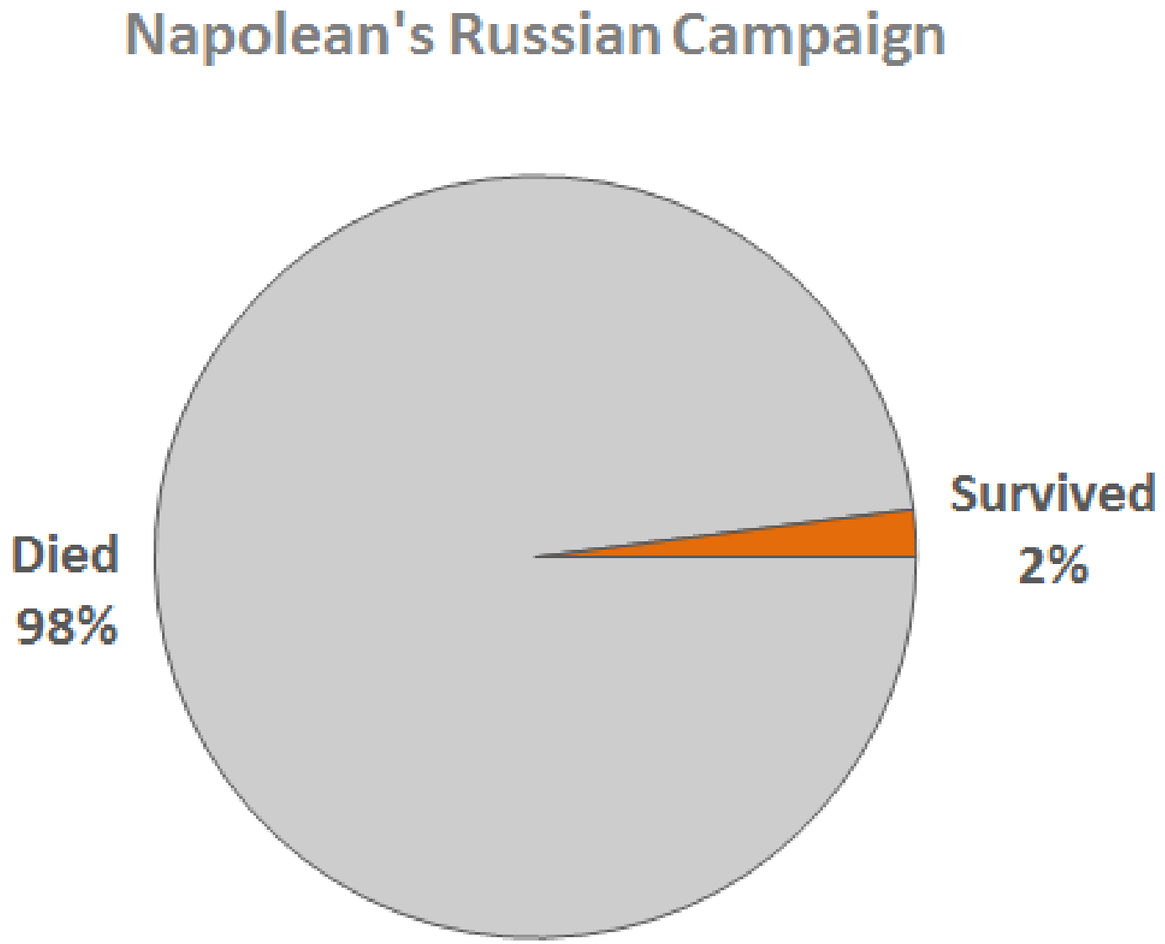
Seth Godin, Best-selling Author on Minard's graph:

"This is one of the worst graphs ever made…

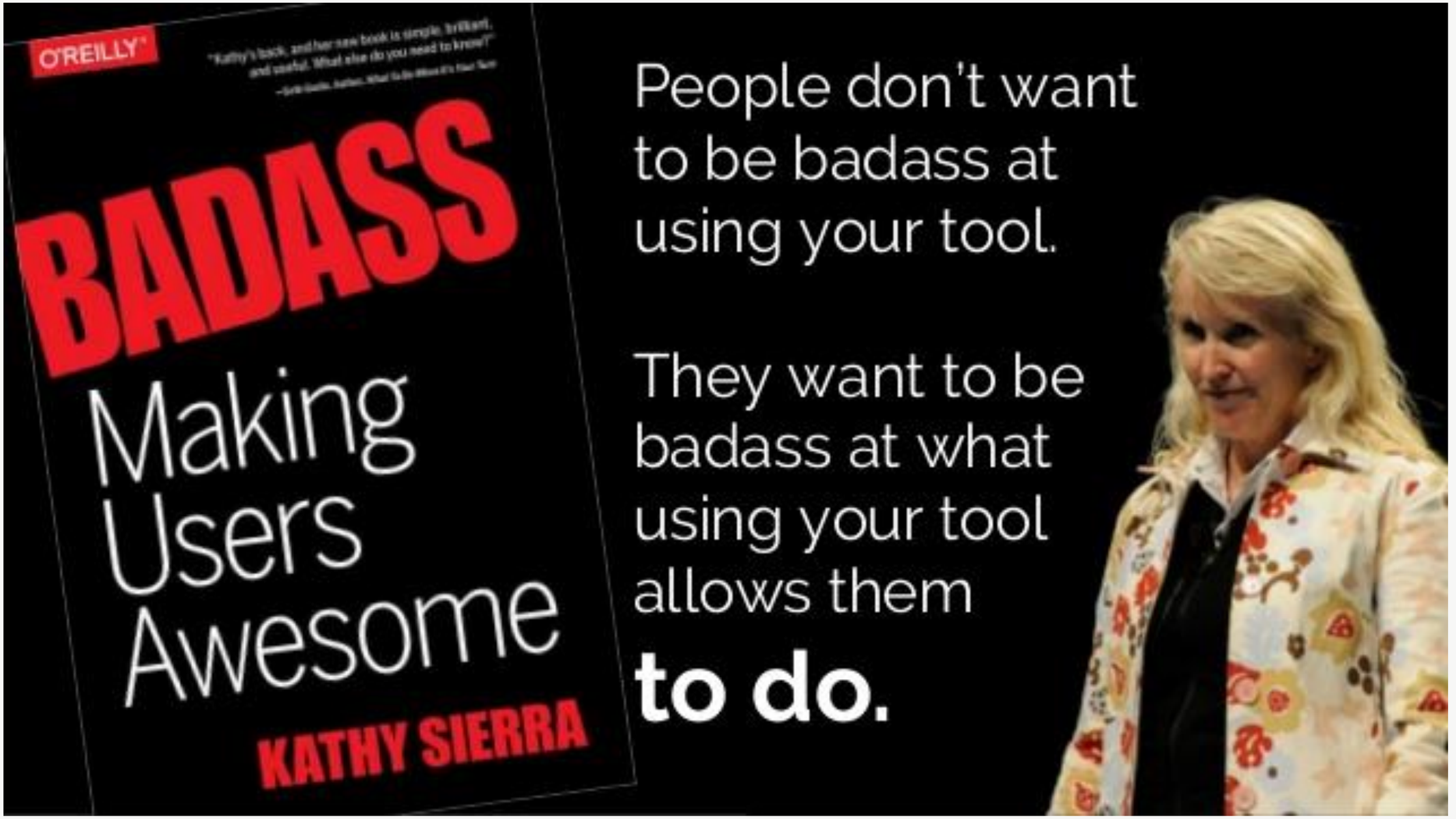
…[Tufte]'s very happy because it shows five different pieces of information on three axis and if you study it for fifteen minutes it really is worth a thousand words.

I don't think that's what graphs are for. I think they try to make a point in two seconds for people who are too lazy to read the forty words underneath."

“Dumbing it down for the executive”



Recreation of Jorge Camoes Redesign
(www.ExcelCharts.com)


O'REILLY
BADASS
Making Users Awesome
KATHY SIERRA
People don't want to be badass at using your tool.
They want to be badass at what using your tool allows them
to do.

Typical Agenda Slide

8:30 – 9:00	Breakfast
9:00 – 10:30	Fundamentals of database design
10:30 – 10:45	Break
10:45 – 12:00	Hands-on exercises
12:00 – 1:00	Lunch
1:00 – 2:30	Introduction to object-oriented databases
2:30 – 2:45	Break
2:45 – 5:00	Hands-on exercises
5:00	Workshop end

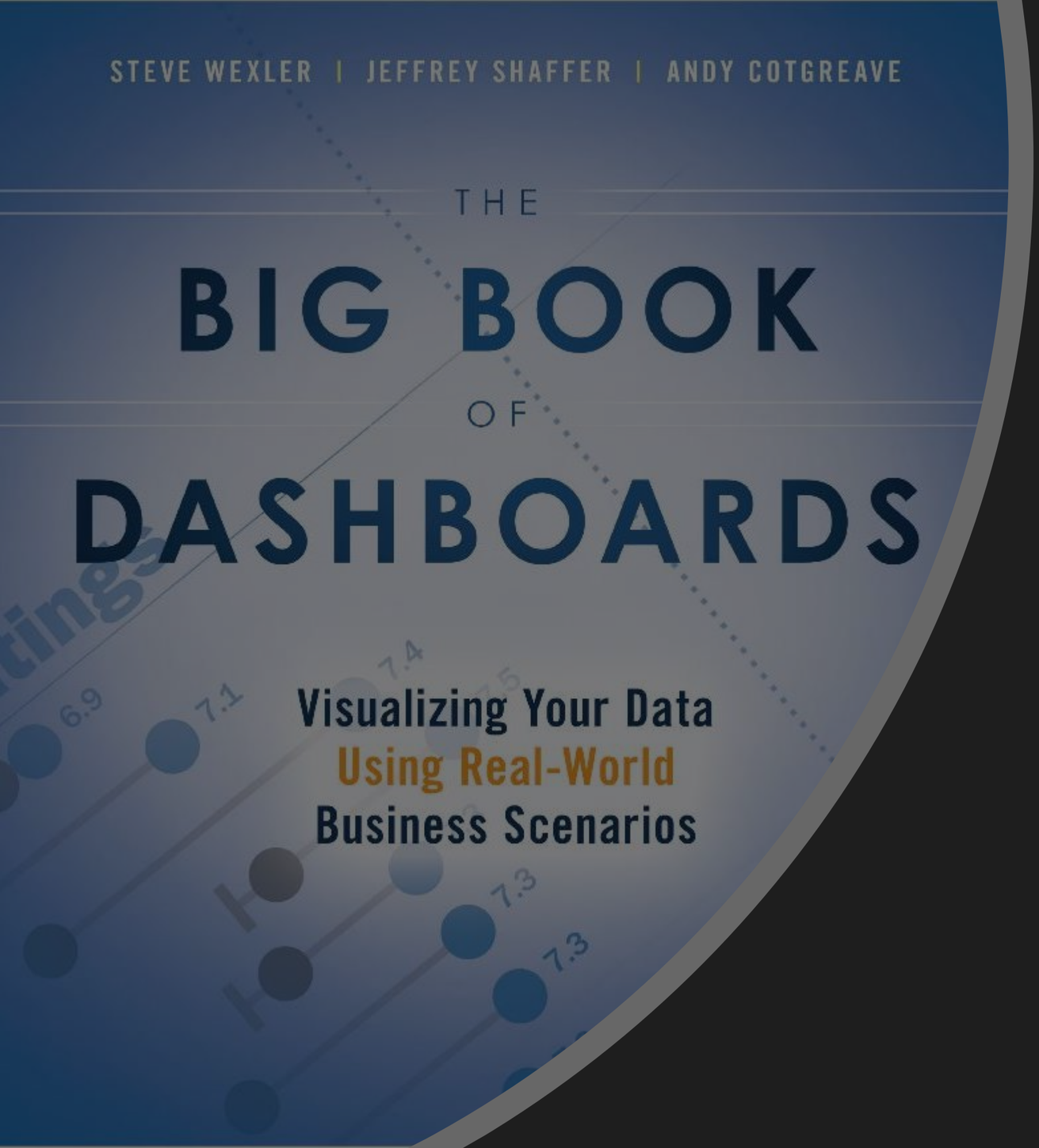
Agenda with audience needs in mind

8:30 – 9:00	Breakfast
9:00 – 10:30	Blah blah blah blah blah
10:30 – 10:45	Break
10:45 – 12:00	Blah blah blah blah blah
12:00 – 1:00	Lunch
1:00 – 2:30	Blah blah blah blah blah
2:30 – 2:45	Break
2:45 – 5:00	Blah blah blah blah blah
5:00	Happy hour

WHO
IS YOUR
AUDIENCE?

What's the message?

Provide the greatest degree of understanding with the least amount of effort.



DataRevelations.com

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