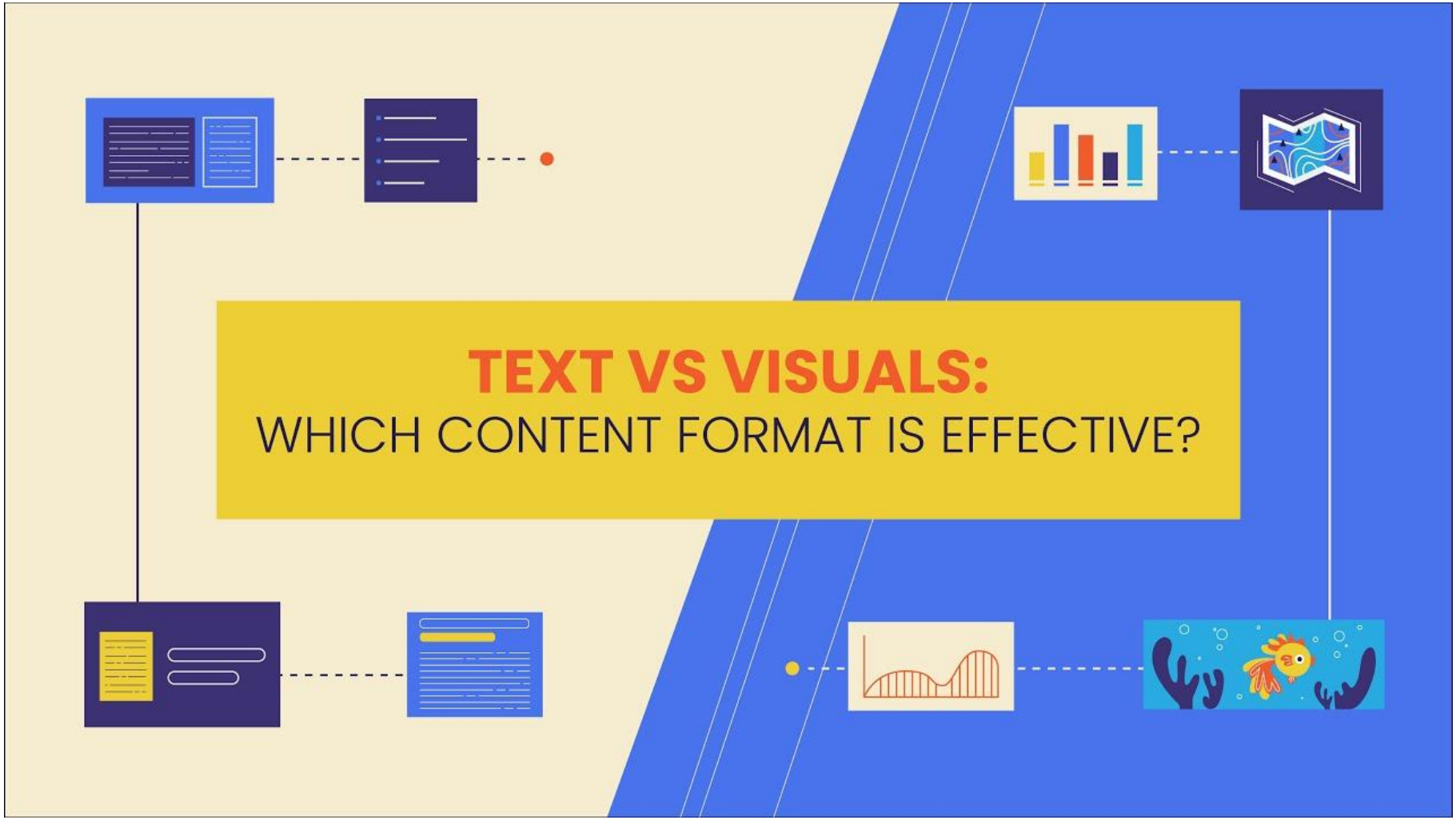
CSCI 491: Data Visualization

2- Intro to Data Viz


TEXT VS VISUALS:
WHICH CONTENT FORMAT IS EFFECTIVE?

The human brain can process entire images that the eye sees for as little as

13 milliseconds.

Source: Trafton, Anne. "In the Blink of an Eye." MIT News, 16 Jan. 2014, news.mit.edu/2014/in-the-blink-of-an-eye-0116.

When an image is seen for only **13 milliseconds** before the next image appears, a part of the brain continues to process the images longer than the amount of time it was seen.

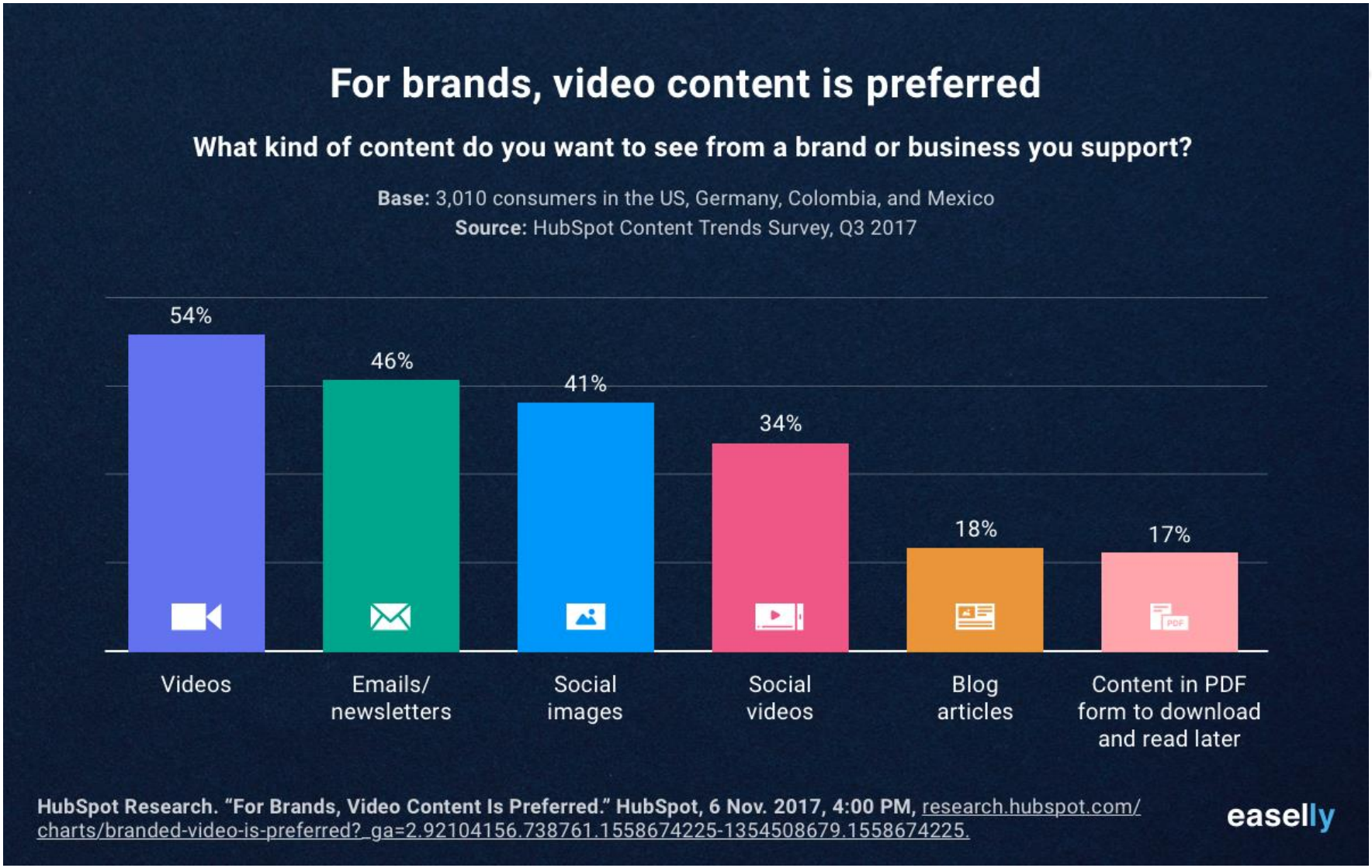
Source: Trafton, Anne. "In the Blink of an Eye." MIT News, 16 Jan. 2014, news.mit.edu/2014/in-the-blink-of-an-eye-0116.

People following directions with text and illustrations do **323%** better than those following directions without illustrations.

Source: Levie, W. Howard, and Richard Lentz. "Effects of Text Illustrations: A Review of Research." SpringerLink, Springer US, link.springer.com/article/10.1007/BF02765184.

When people hear information, they're likely to remember only 10% of that information three days later.

On the other hand, if a relevant image is paired with that same information, people retained 65% of the information three days later.


For brands, video content is preferred
What kind of content do you want to see from a brand or business you support?
Base: 3,010 consumers in the US, Germany, Colombia, and Mexico
Source: HubSpot Content Trends Survey, Q3 2017
54%
46%
41%
34%
18%
17%
Videos
Emails/ newsletters
Social images
Social videos
Blog articles
Content in PDF form to download and read later
HubSpot Research. "For Brands, Video Content Is Preferred." HubSpot, 6 Nov. 2017, 4:00 PM, research.hubspot.com/charts/branded-video-is-preferred?_ga=2.92104156.738761.1558674225-1354508679.1558674225.
easelly

Example

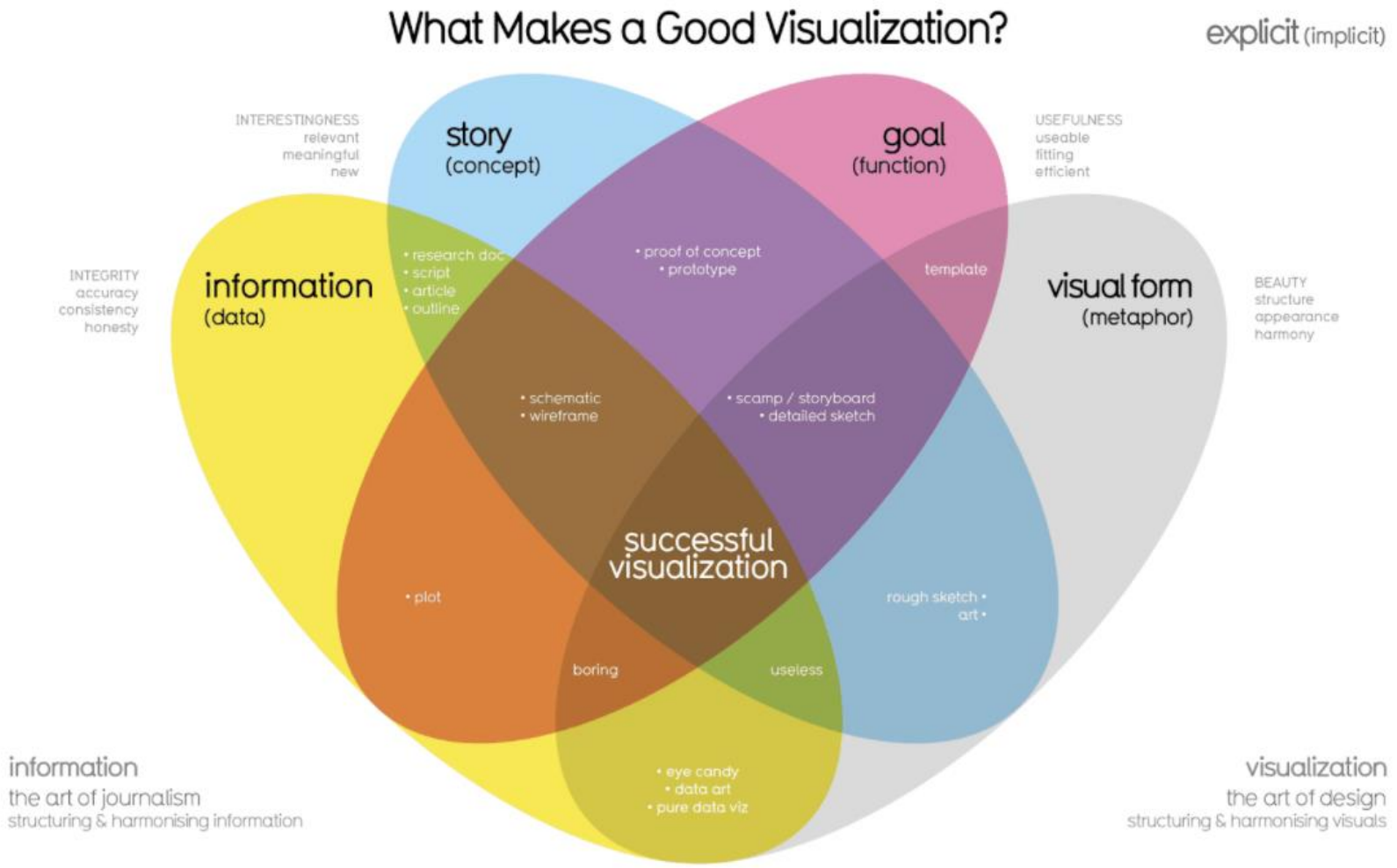
- Hans Rosling's 200 Countries, 200 Years, 4 Minutes
- What was the central message of the presentation?

- What makes it effective?
- Gapminder

- Have you read Factfulness?
- A: Yes
- B: No

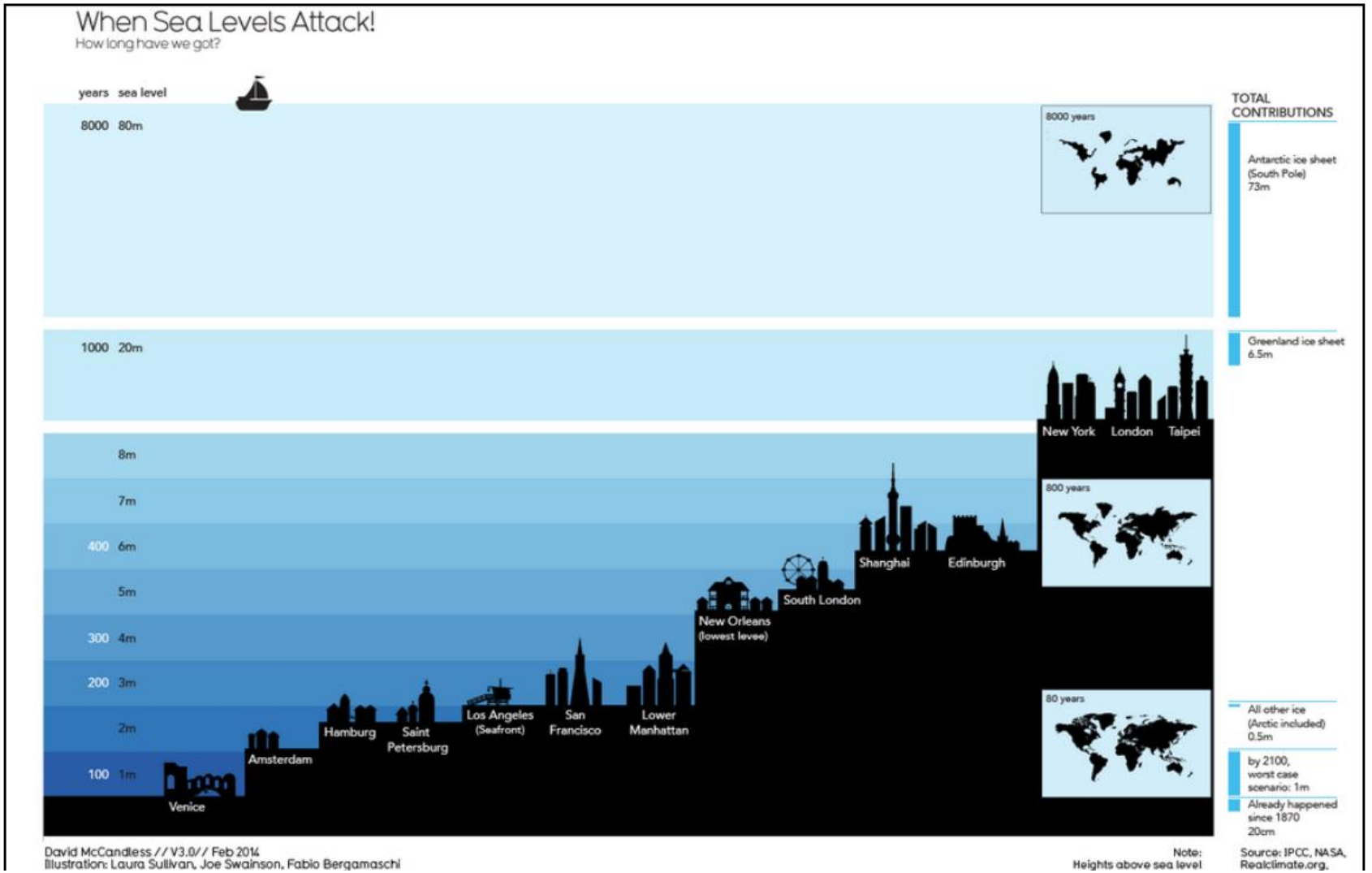
What makes a Good Visualization

David McCandless, Information is Beautiful (2009) and Knowledge is Beautiful (2014).



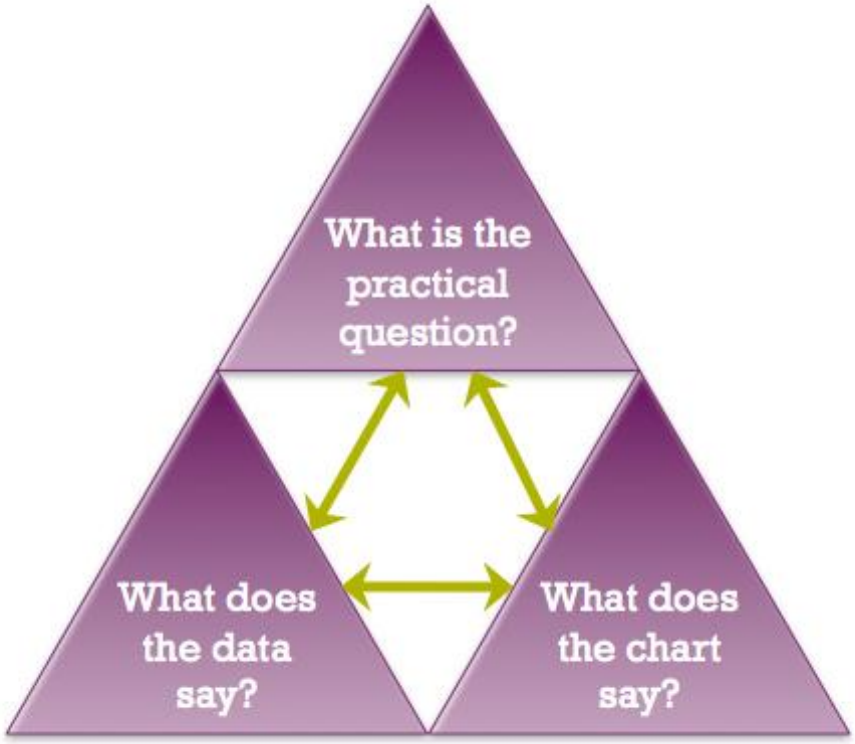
https://www.informationisbeautiful.net/visualizations/what-makes-a-good-data-visualization/

Is it a good visual?

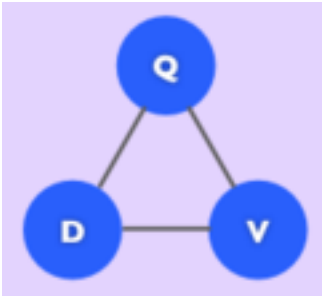


How to Identify a Bad Visualization?

Junk Charts Trifecta Checkup

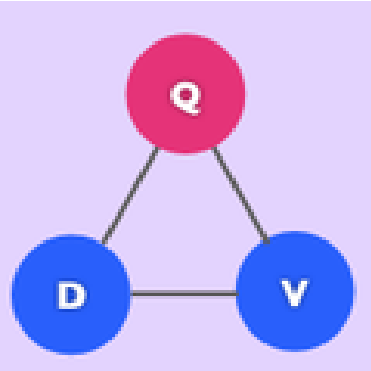


The trifecta

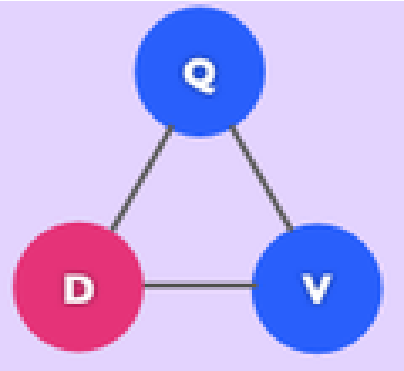


Question:
What is your generic term for a sweetened carbonated beverage?

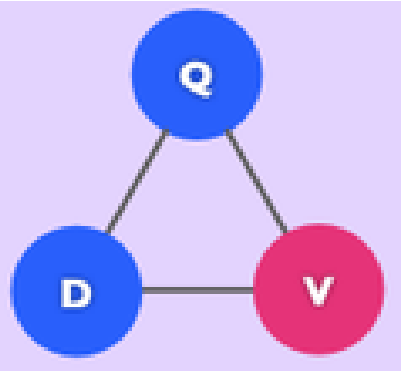
The singles



Some charts use a good source of data effectively presented in a visual display. However, the effort fails because of a poorly defined objective, or an unengaging premise.

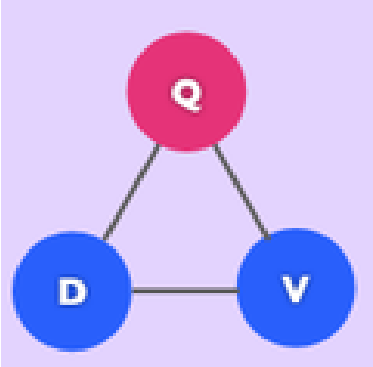


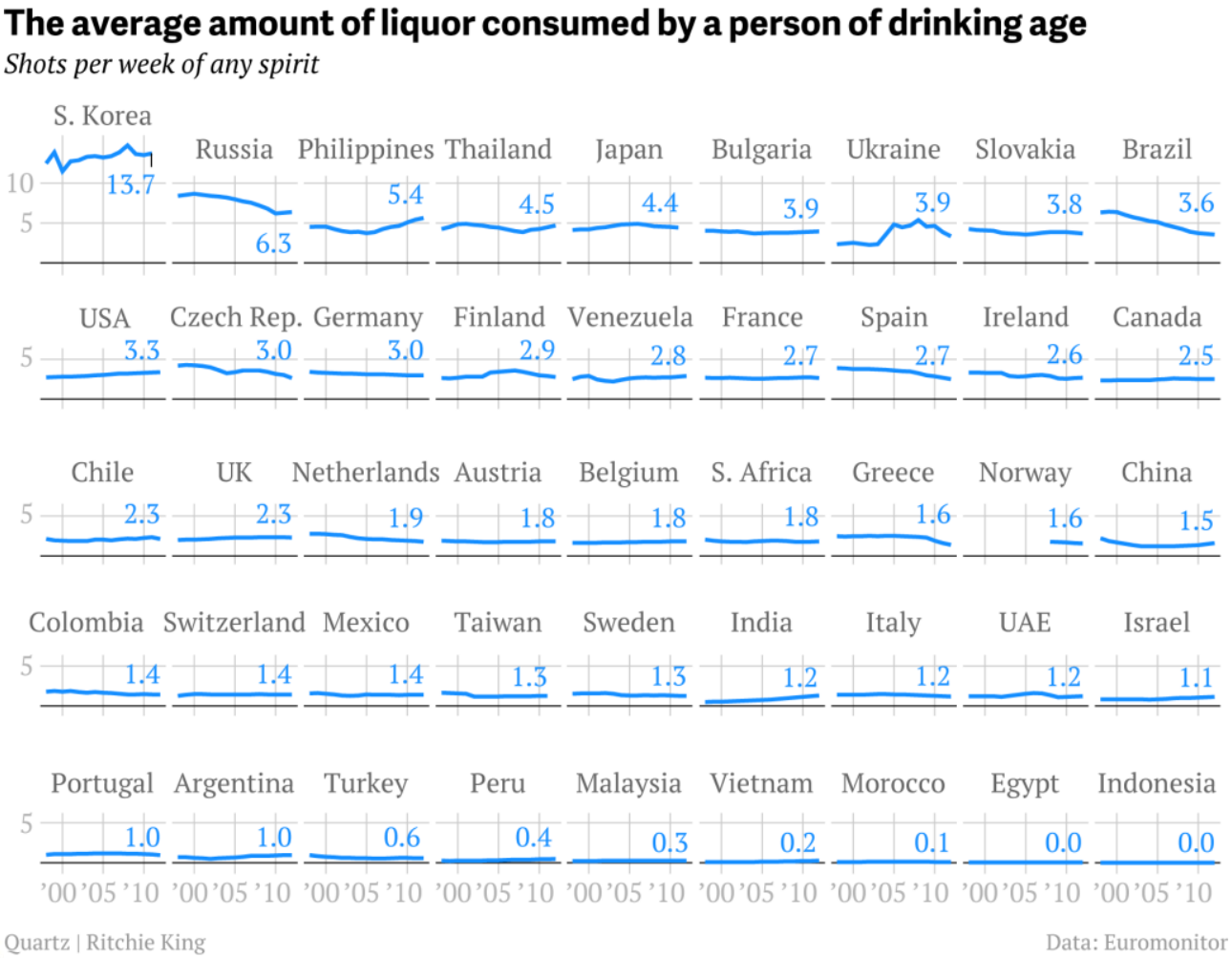
Some designs emerge from well posed and interesting questions, and the graph is well executed. The problem here is the data, which fail to illuminate the question.



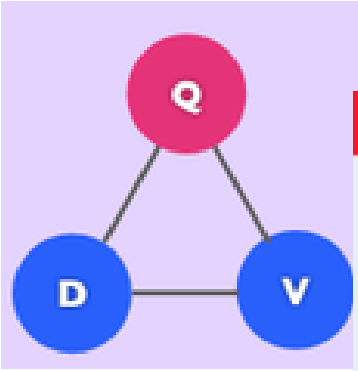
Despite having a good data source and an interesting, well-posed problem, the visual design hides or confuses the message. These charts have long provided fodder for Tufte, Wainer and the like.

Type Q


Q
D
V

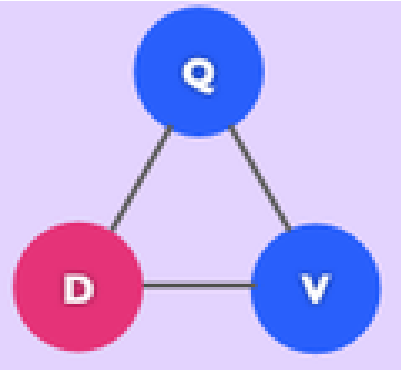

The average amount of liquor consumed by a person of drinking age
Shots per week of any spirit
S. Korea 13.7
Russia 6.3
Philippines 5.4
Thailand 4.5
Japan 4.4
Bulgaria 3.9
Ukraine 3.9
Slovakia 3.8
Brazil 3.6
USA 3.3
Czech Rep. 3.0
Germany 3.0
Finland 2.9
Venezuela 2.8
France 2.7
Spain 2.7
Ireland 2.6
Canada 2.5
Chile 2.3
UK 2.3
Netherlands 1.9
Austria 1.8
Belgium 1.8
S. Africa 1.8
Greece 1.6
Norway 1.6
China 1.5
Colombia 1.4
Switzerland 1.4
Mexico 1.4
Taiwan 1.3
Sweden 1.3
India 1.2
Italy 1.2
UAE 1.2
Israel 1.1
Portugal 1.0
Argentina 1.0
Turkey 0.6
Peru 0.4
Malaysia 0.3
Vietnam 0.2
Morocco 0.1
Egypt 0.0
Indonesia 0.0
10
5
'00 '05 '10
Quartz | Ritchie King
Data: Euromonitor

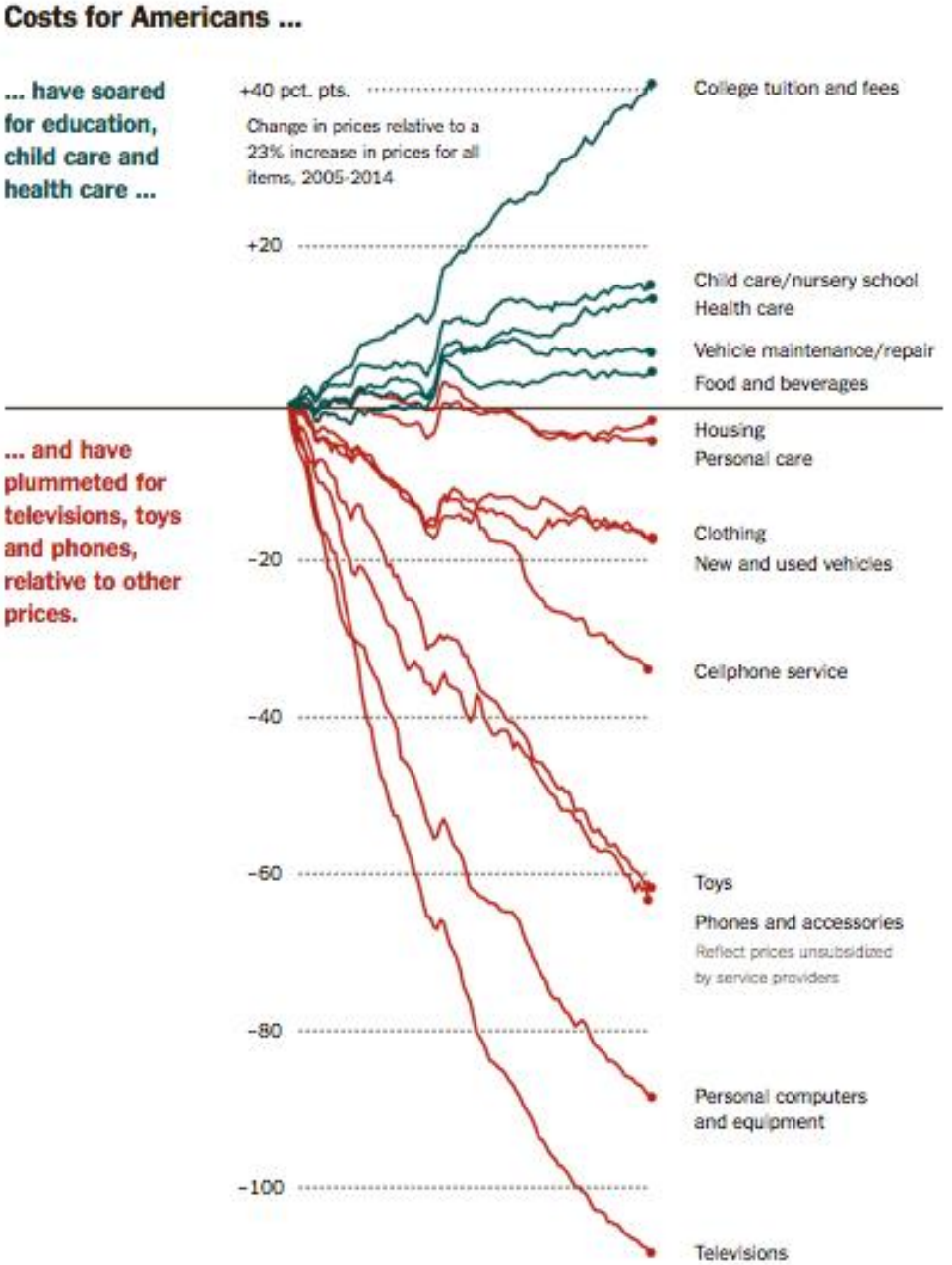
Type Q


Q
D
V

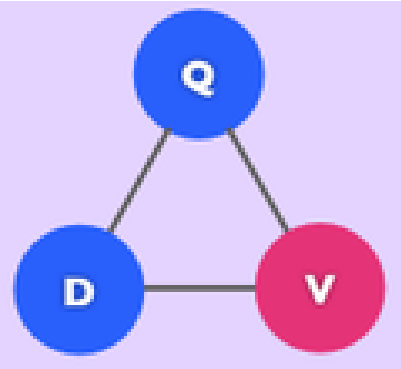
The average amount of liquor consumed by a person of drinking age
Alcohol consumption
People aged 15+
2003-05 average, litres per person
Less than 2.5
2.5-4.99
5-7.49
7.5-9.99
10-12.49
12.5 and over
No data
Source: WHO
'00 '05 '10 '00 '05 '10 '00 '05 '10 '00 '05 '10 '00 '05 '10 '00 '05 '10 '00 '05 '10 '00 '05 '10 '00 '05 '10
Quartz | Ritchie King
Data: Euromonitor

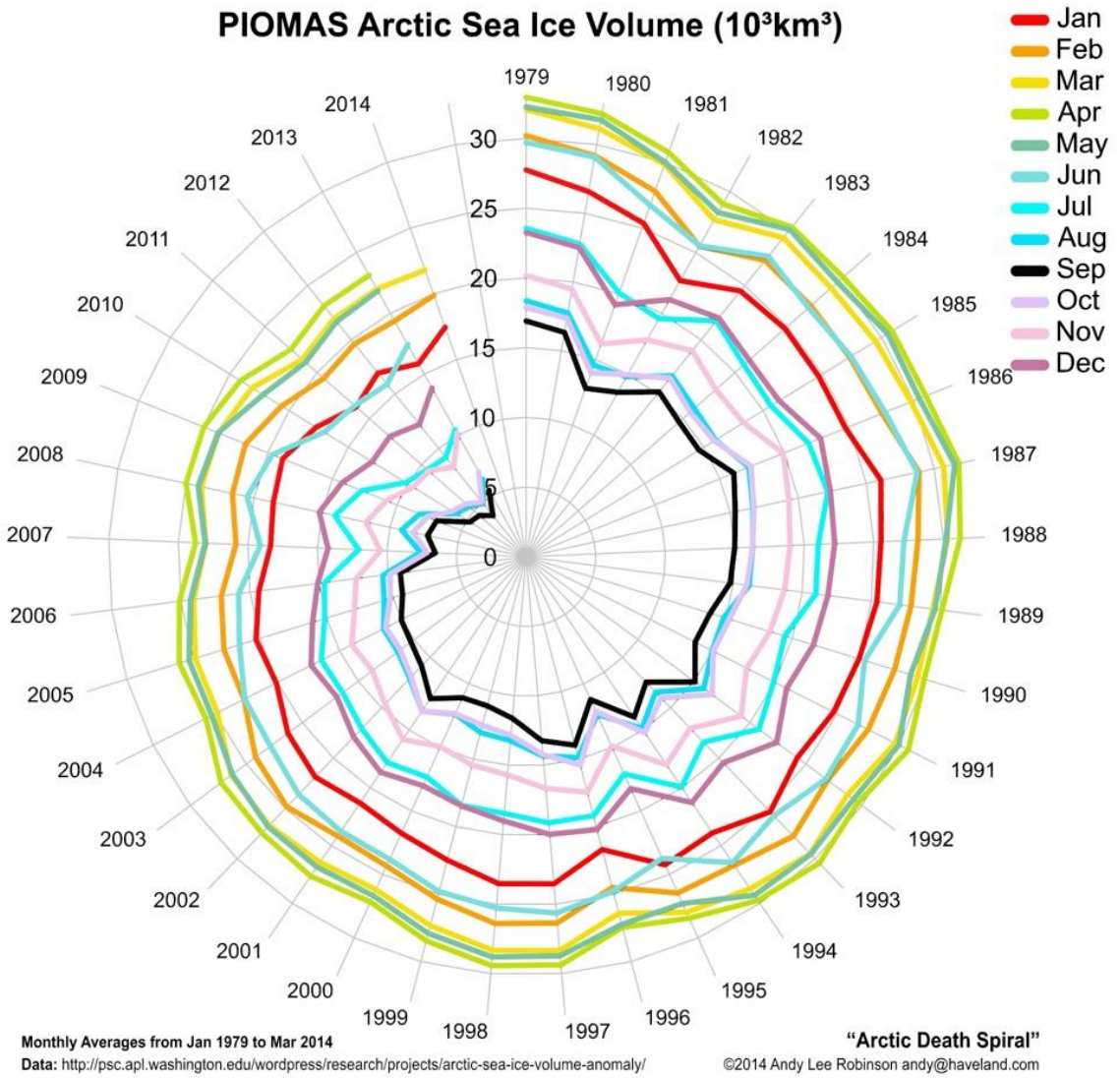
Type D


Q
D
V

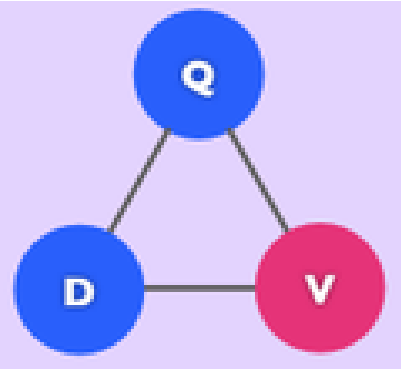

Costs for Americans ...
... have soared for education, child care and health care ...
... and have plummeted for televisions, toys and phones, relative to other prices.
+40 pct. pts.
Change in prices relative to a 23% increase in prices for all items, 2005-2014
+20
-20
-40
-60
-80
-100
College tuition and fees
Child care/nursery school
Health care
Vehicle maintenance/repair
Food and beverages
Housing
Personal care
Clothing
New and used vehicles
Cellphone service
Toys
Phones and accessories
Reflect prices unsubsidized by service providers
Personal computers and equipment
Televisions
BY LARRY BUCHANAN and ALICIA PARLAPIANO
Source: Bureau of Labor Statistics
Note: Based on the Consumer Price Index for All Urban Customers. Data is collected from retail stores and adjusted by specialists to reflect changes in quantity offered in a product or an increase in quality. Much of the drop in prices for electronics reflects an increase in quality over the past 10 years.

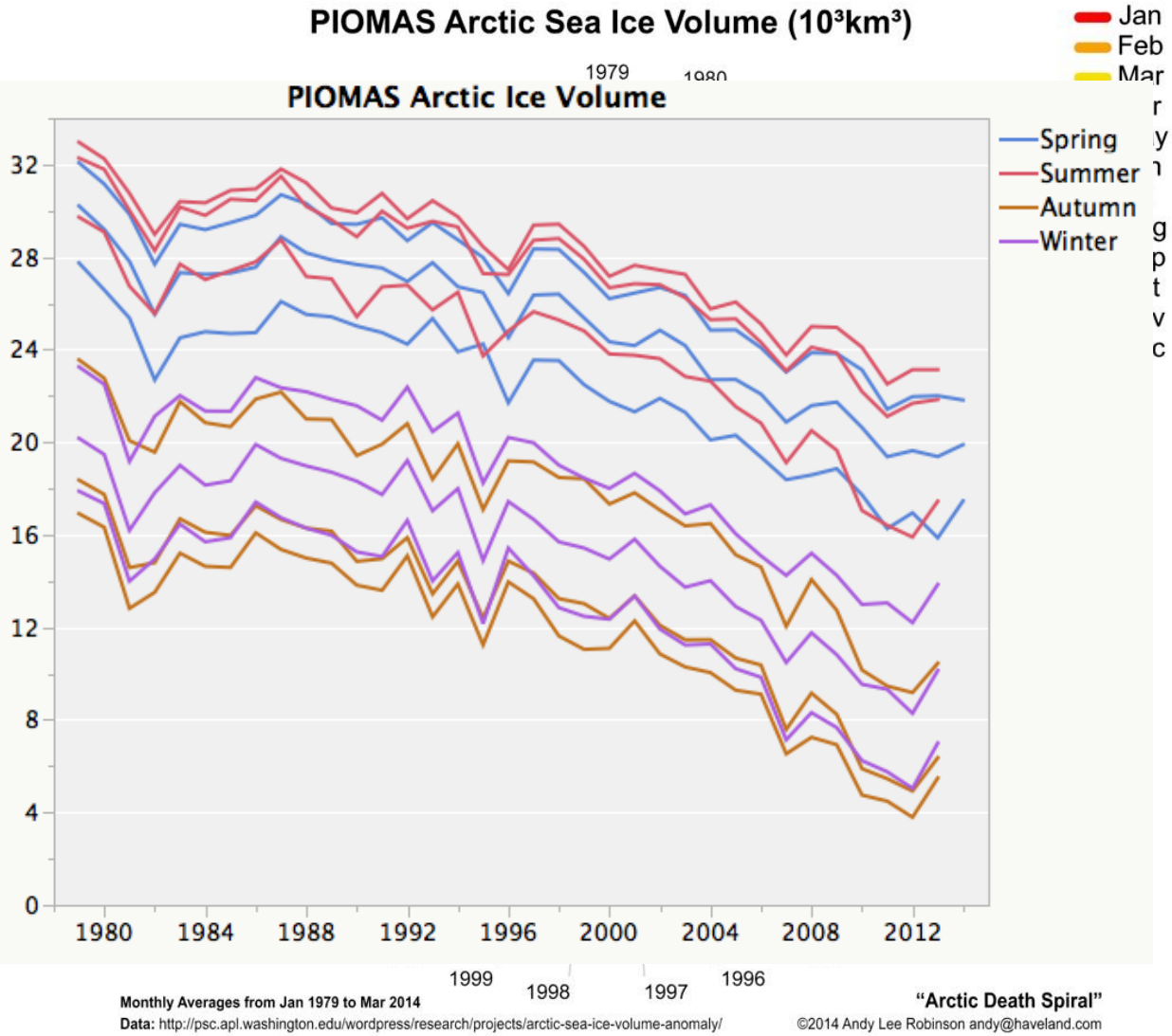
Type V


Q
D
V

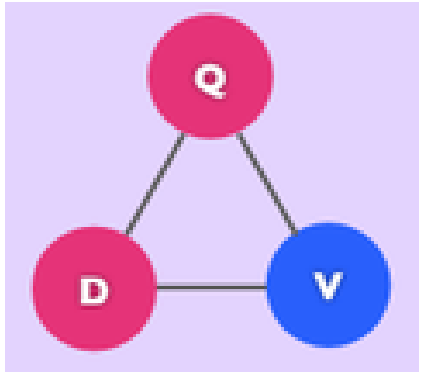

PIOMAS Arctic Sea Ice Volume (10³km³)
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
30
25
20
15
10
5
0
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
Monthly Averages from Jan 1979 to Mar 2014
Data: http://psc.apl.washington.edu/wordpress/research/projects/arctic-sea-ice-volume-anomaly/
"Arctic Death Spiral"
©2014 Andy Lee Robinson andy@haveland.com

Type V

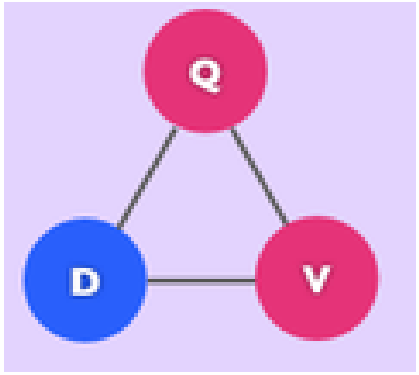

Q
D
V


PIOMAS Arctic Sea Ice Volume (10³km³)
PIOMAS Arctic Ice Volume
Jan
Feb
Mar
Spring
Summer
Autumn
Winter
32
28
24
20
16
12
8
4
0
1980
1984
1988
1992
1996
2000
2004
2008
2012
Monthly Averages from Jan 1979 to Mar 2014
Data: http://psc.apl.washington.edu/wordpress/research/projects/arctic-sea-ice-volume-anomaly/
"Arctic Death Spiral"
©2014 Andy Lee Robinson andy@haveland.com

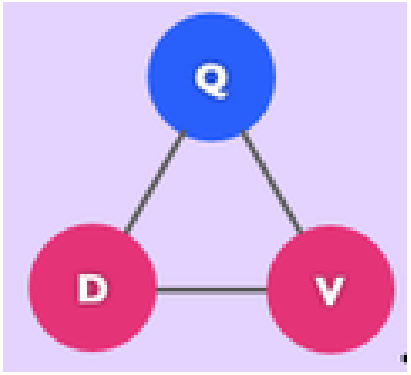
The Doubles



The graphical elements follow best practices, and present the data well. This effort is in vain, because of poor data quality, and an unclear objective.

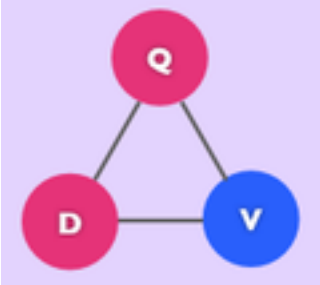


The data has been properly collected and processed. However, the question being addressed has not been clearly defined, and the graphical design fails to bring out the key features of the data.



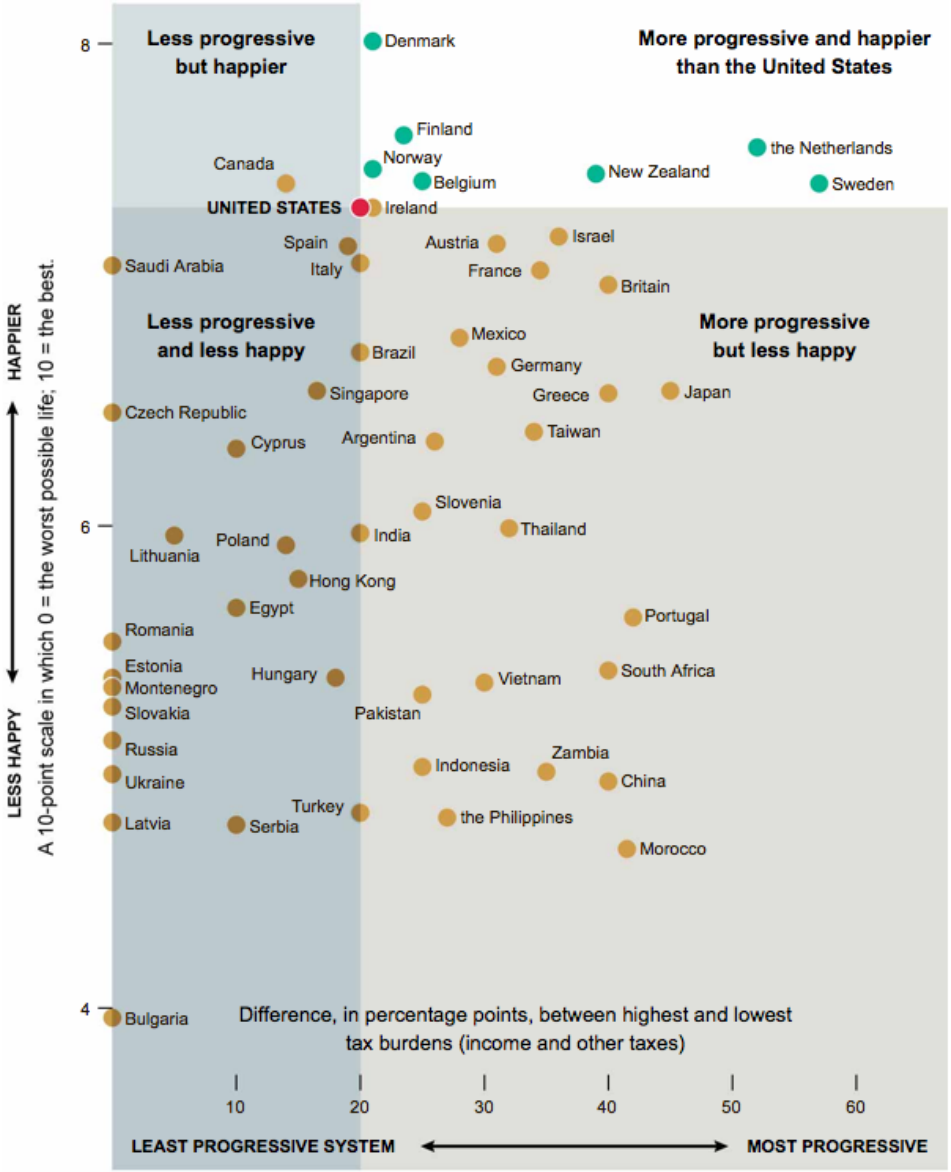
An interesting question has been posed. The data fail to convince, and the cause is not helped by poor execution of the graphical elements.

Type QD



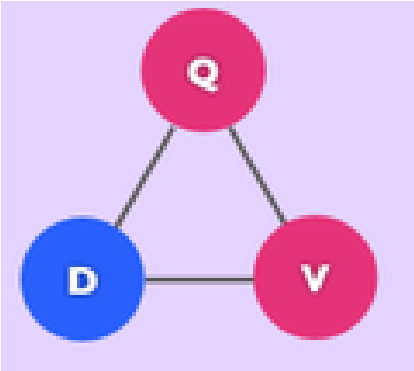
Mirth and Taxes

A study of 54 nations — ranked below — found that those with more progressive tax rates had happier citizens, on average.

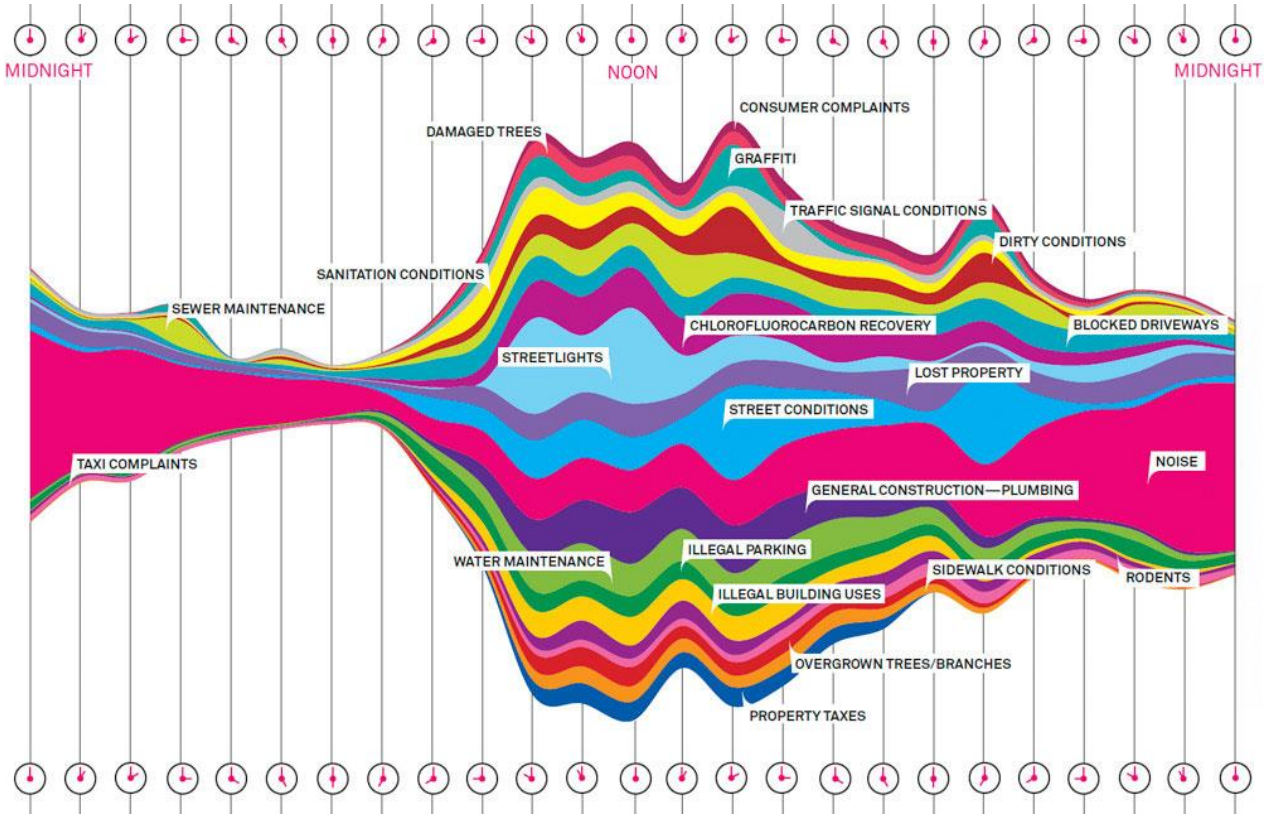


Sources: Shigehiro Oishi, Ulrich Schimmack and Ed Diener in Psychological Science (2007 tax analysis); Gallup (2007 happiness survey)

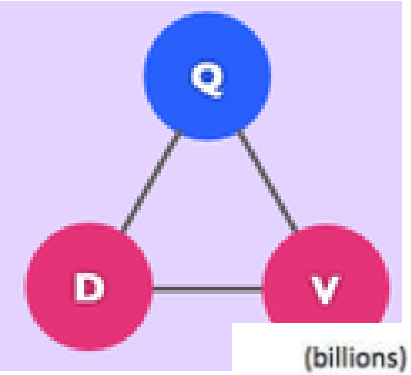
Type QV

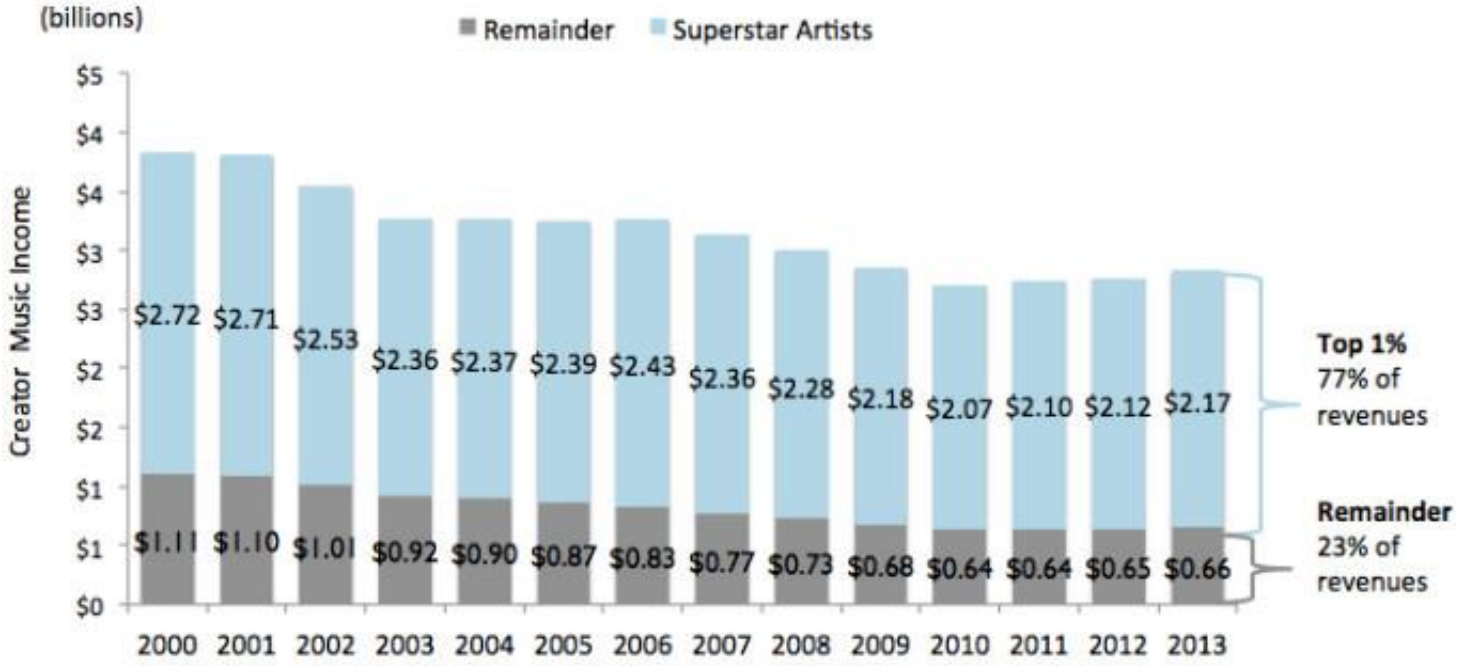


New York City 311 Calls by the hour



Type DV

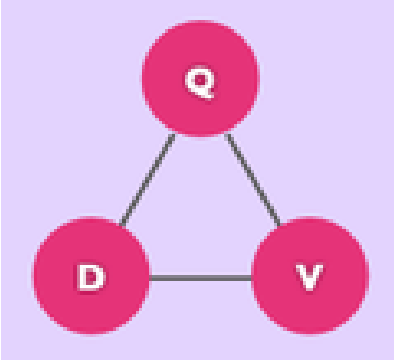

Q
D
V

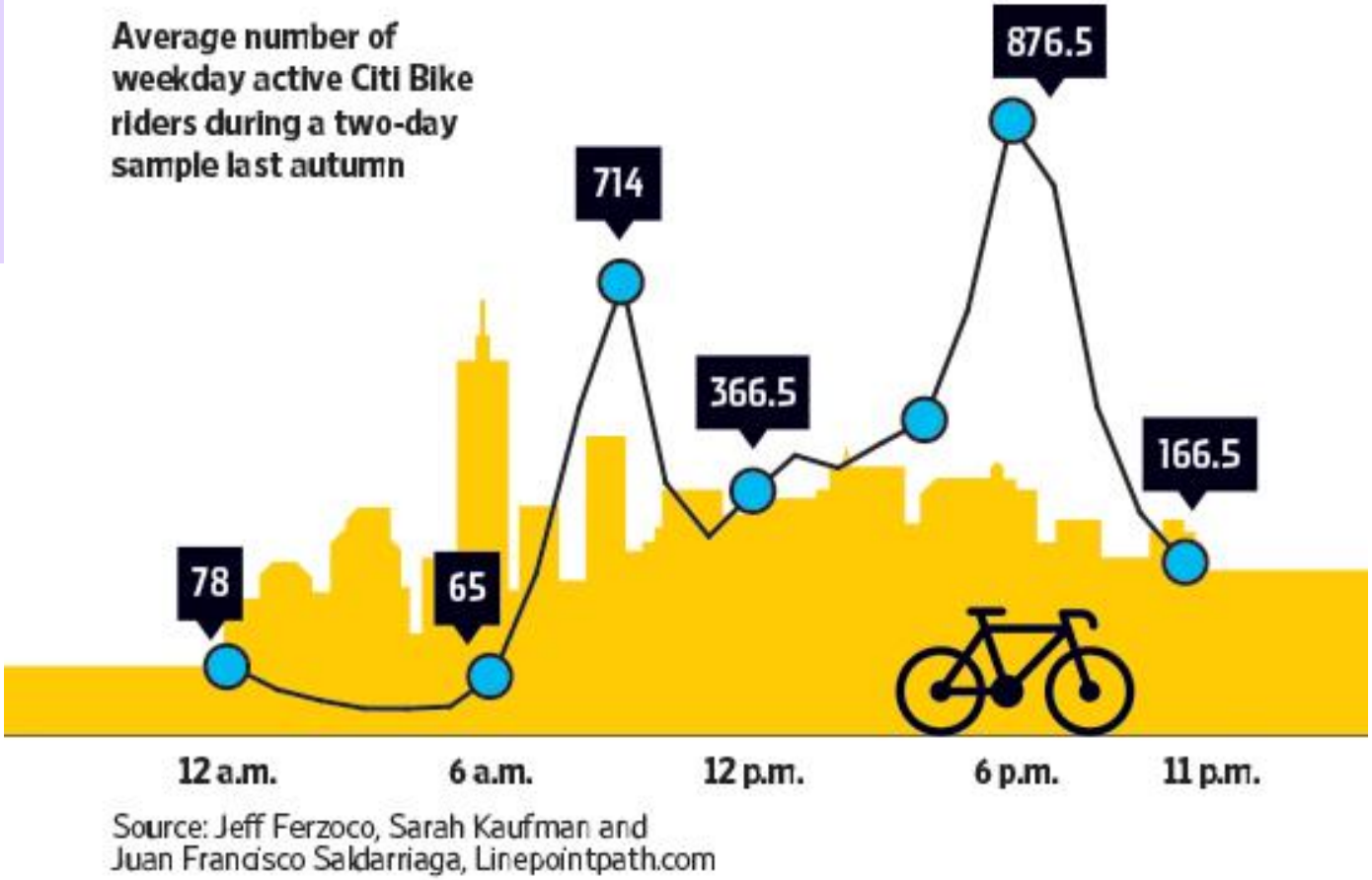

(billions)
Remainder
Superstar Artists
Creator Music Income
$5
$4
$4
$3
$3
$2
$2
$1
$1
$0
$2.72 $2.71 $2.53 $2.36 $2.37 $2.39 $2.43 $2.36 $2.28 $2.18 $2.07 $2.10 $2.12 $2.17
$1.11 $1.10 $1.01 $0.92 $0.90 $0.87 $0.83 $0.77 $0.73 $0.68 $0.64 $0.64 $0.65 $0.66
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013
Top 1%
77% of
revenues
Remainder
23% of
revenues

Triple

iClicker

What is wrong with this one?





Summary

- Data Visualization is about the right combination of art and science
- Good visual presentations tend to enhance the message of the visualization.
- Data storytelling helps to communicate complex data and findings in a way that is easy for others to understand and remember.
- It allows decision-makers to gain insights from data and make informed decisions based on evidence.
- Overall, data storytelling is a powerful tool for turning raw data into meaningful and actionable information.

Assignment 1- The good, the Bad, and the Ugly

- Due is extended to next Friday
- Submit on both D2L and Gradescope

Assignment 1- The good, the Bad, and the Ugly

- Research recent news articles, blog posts or preferred sources. Identify four charts that, in your subjective judgment, represent each of the following categories from the *Junk Chart Trifecta Checkup*:
- A trifecta
- A single issue
- A double issue
- A triple issue

Some News Outlets and Media

General News:

- The New York Times (especially the "Upshot" section)
- The Guardian (Data Visualization section)
- BBC News (Features and Data Stories)
- Washington Post (Graphics team)
- Reuters Graphics

Specialized in Visual Journalism:

- FiveThirtyEight
- Axios (Charts section)
- Bloomberg Graphics
- Al Jazeera (Data Journalism)

MSU Newspaper collection
https://www.lib.montana.edu/services/information-access/collections/newspapers/

Some other sources

- World Bank Open Data
- UN Data and Reports
- U.S. Census Bureau
- Centers for Disease Control and Prevention (CDC)
- NASA Earth Science
- European Union Open Data Portal