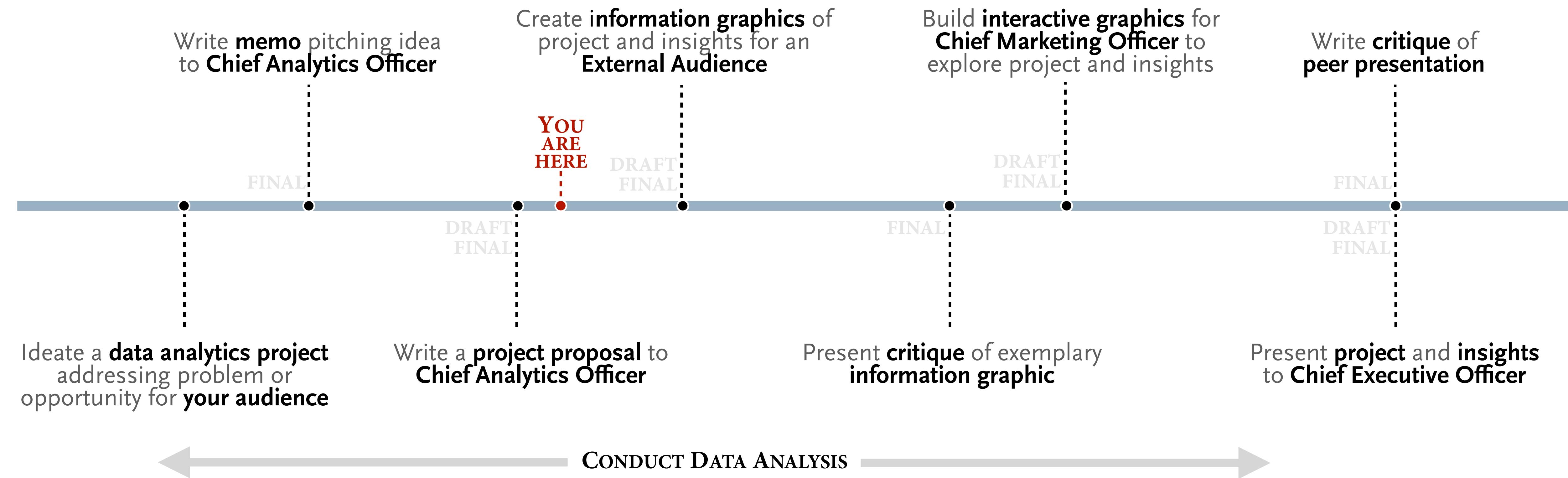


# Storytelling with data

**07 | From exploration to explanation; data graphics in storytelling**

# course overview | main course deliverables



**from exploration to explanation**

exploration to explanation, *adapting to your audience* — remember our goals in communicating with others

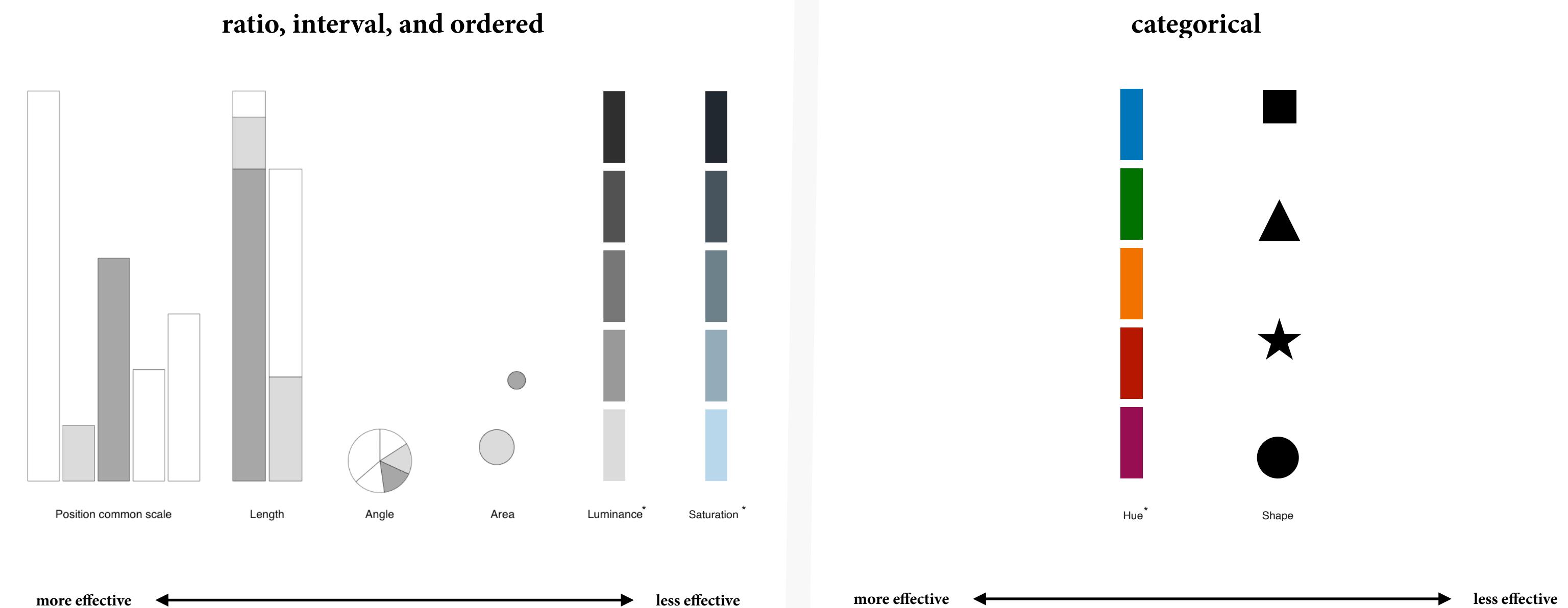
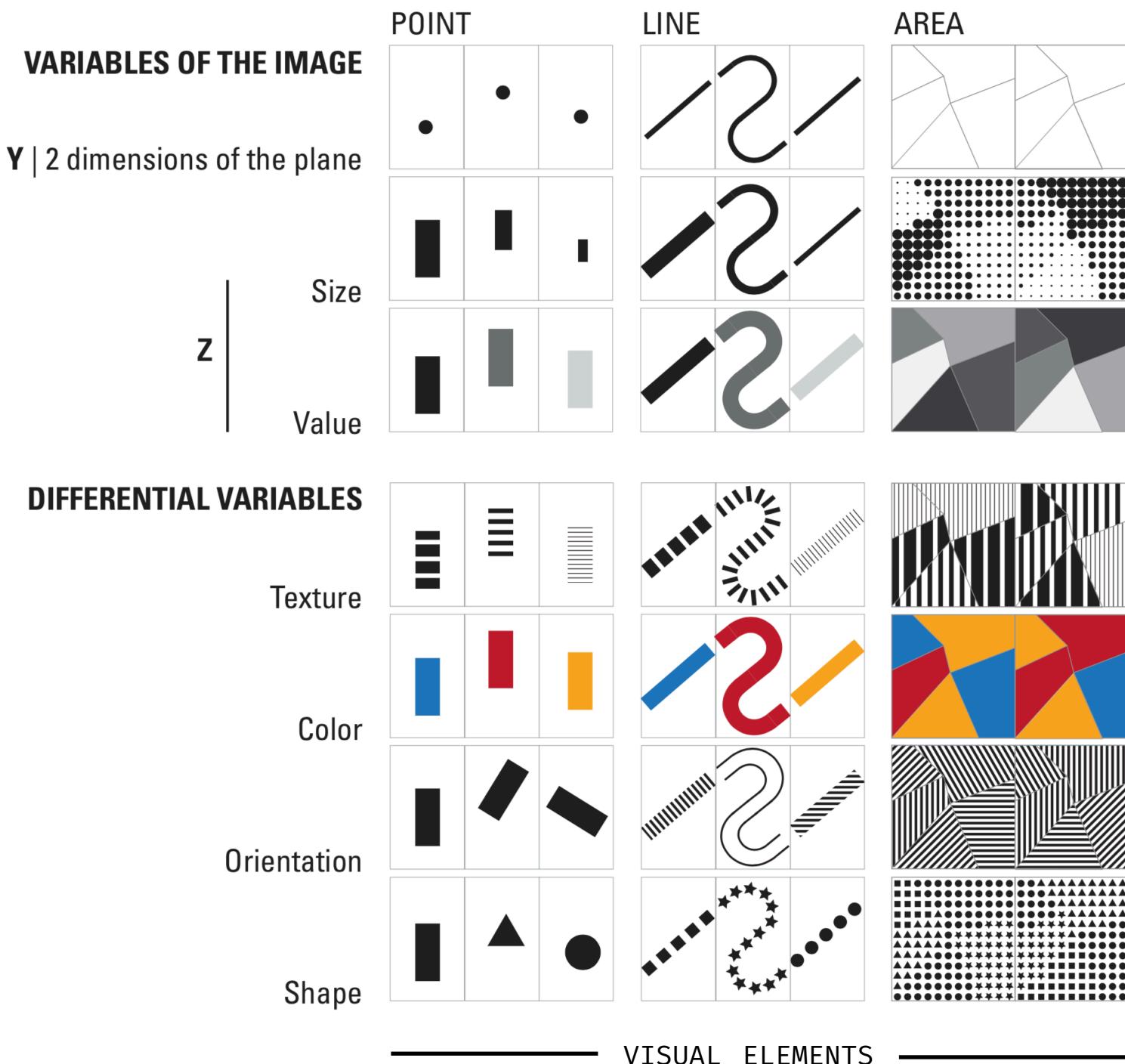
**Get our audience(s) to**

**pay attention to,  
understand,  
(be able to) act upon**



a maximum of **messages**,  
given **constraints**.

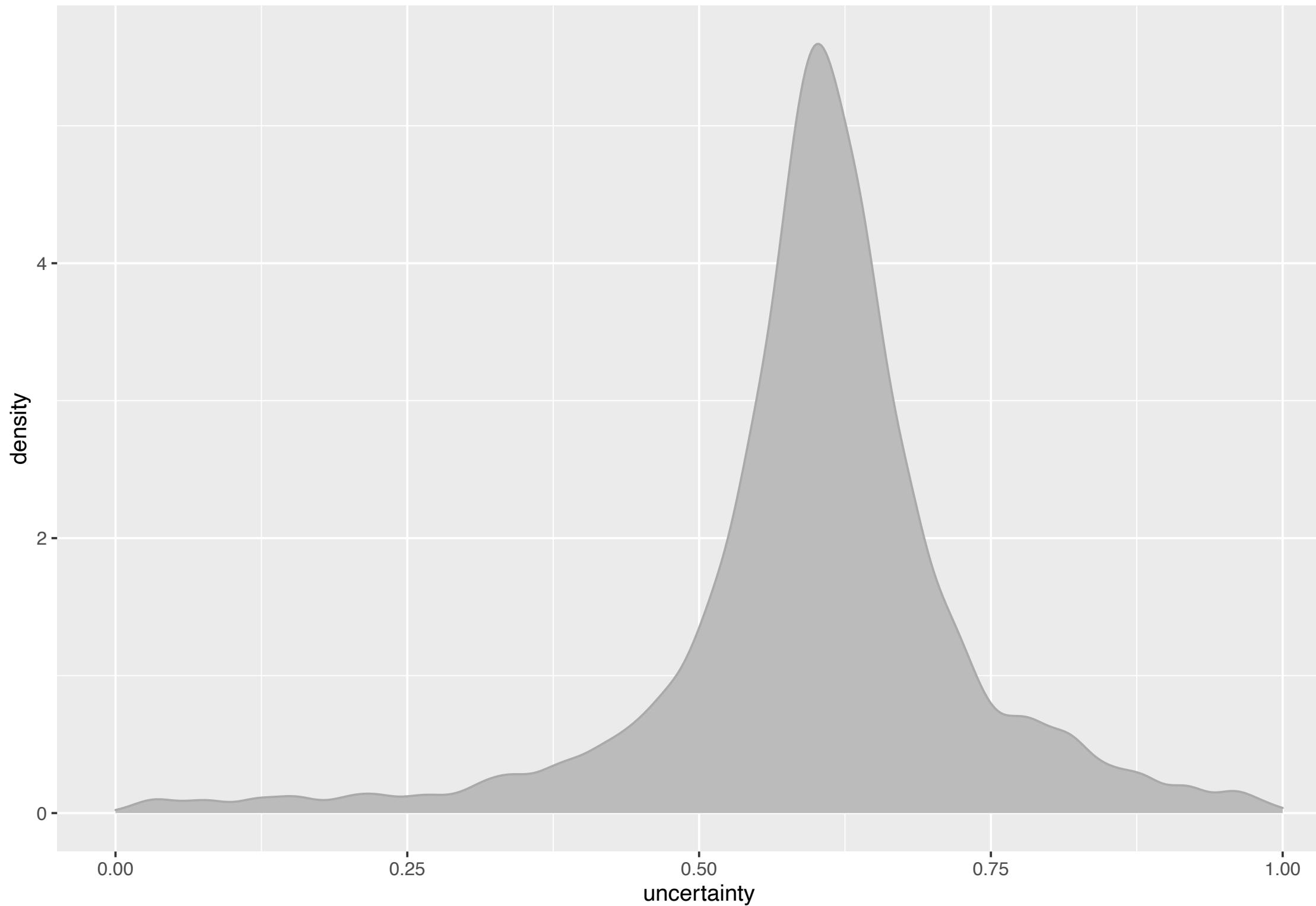
# exploration to explanation, *adapting to your audience* — first, optimize encodings for a communication purpose



exploration to explanation, *adapting to your audience* — then change annotations, *not* optimized encodings

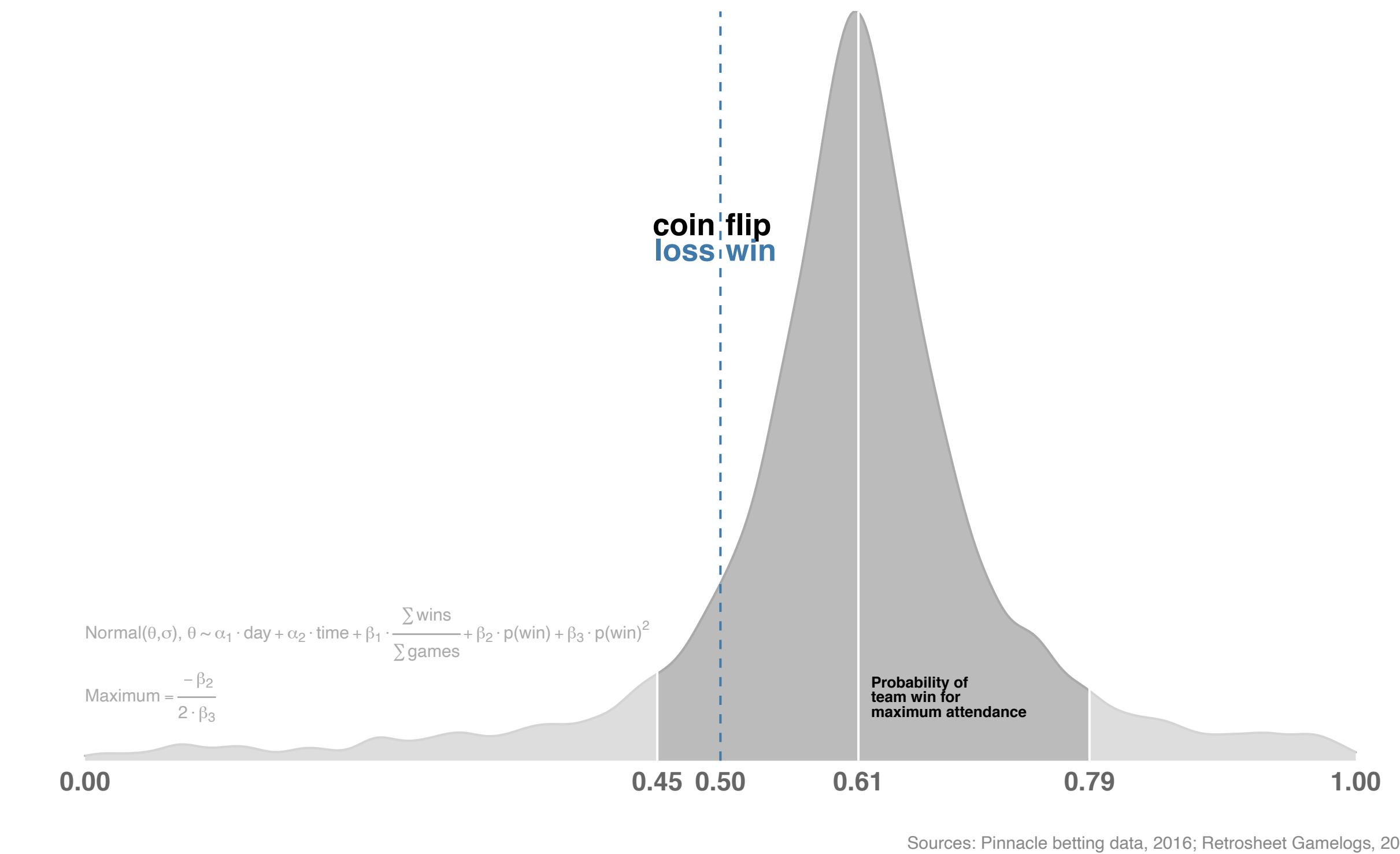
Once data-to-visual encodings have been optimized for showing the intended comparison or trend of interest to our audience, we should generally *adapt it to our audience by explaining*, not by changing optimized encodings.

# exploration to explanation, titles, as an overall graphics annotation, should explain the point of the graphics

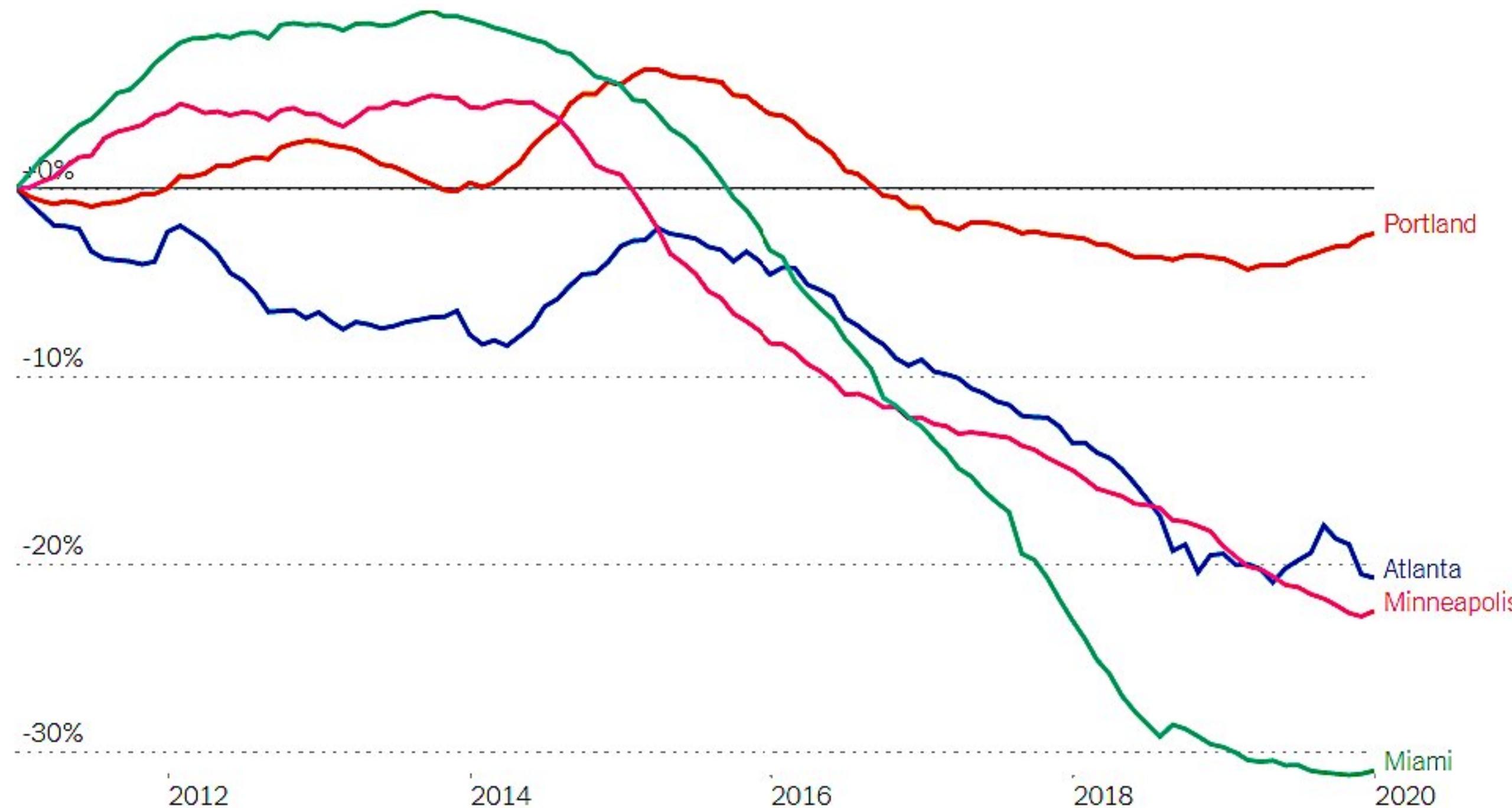


More fans generally pay admission to our games when the chance of winning was near a median of 0.61.

*Fans want favorable odds without predicting the outcome.*



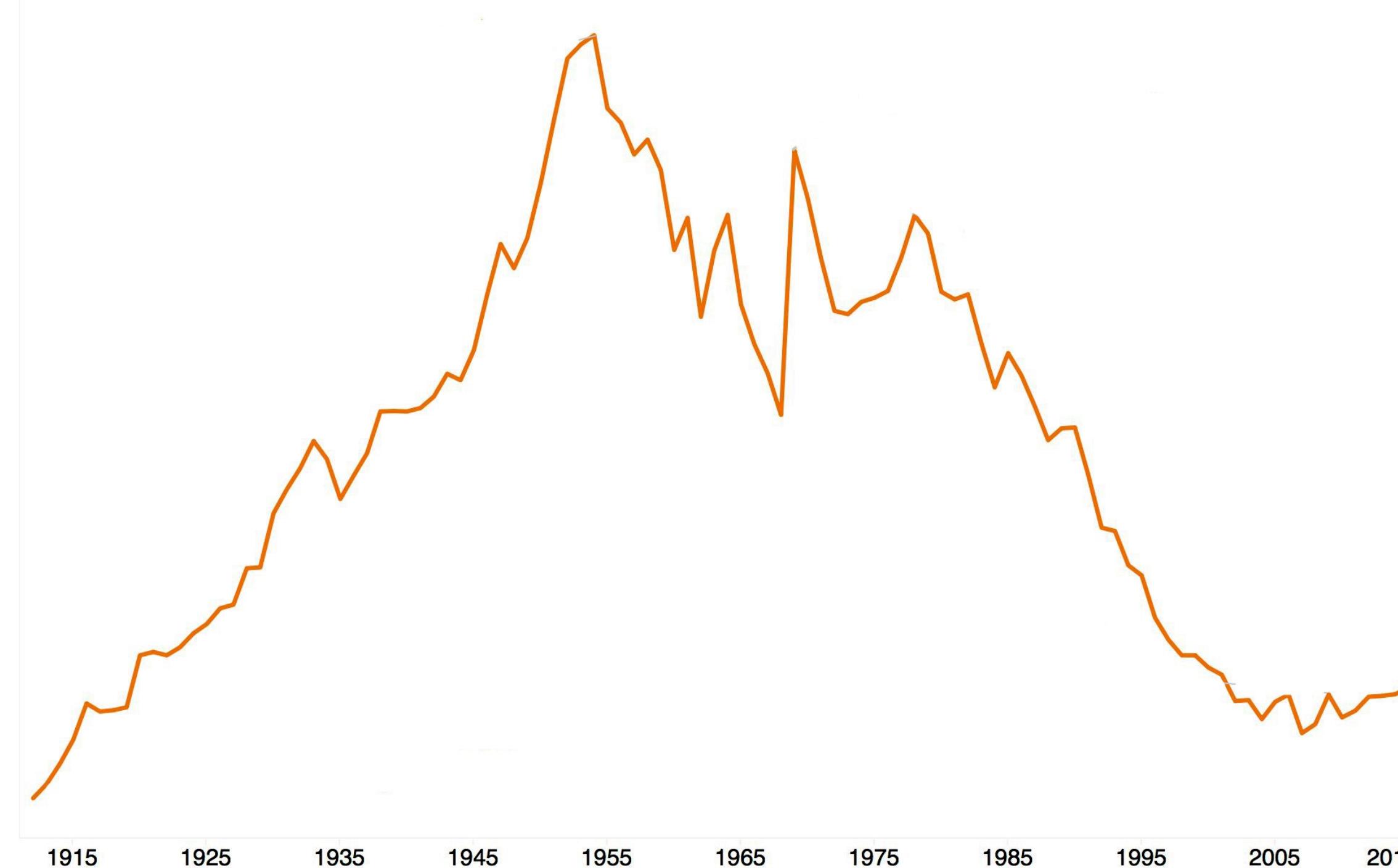
# exploration to explanation, replacing legends with direct data labeling reduces cognitive load



exploration to explanation, annotations go beyond labels, they can help *explain* and *compare* with context

### Rise and Fall of the name **Neil** in the USA Births 1912-2015

Source: data.gov

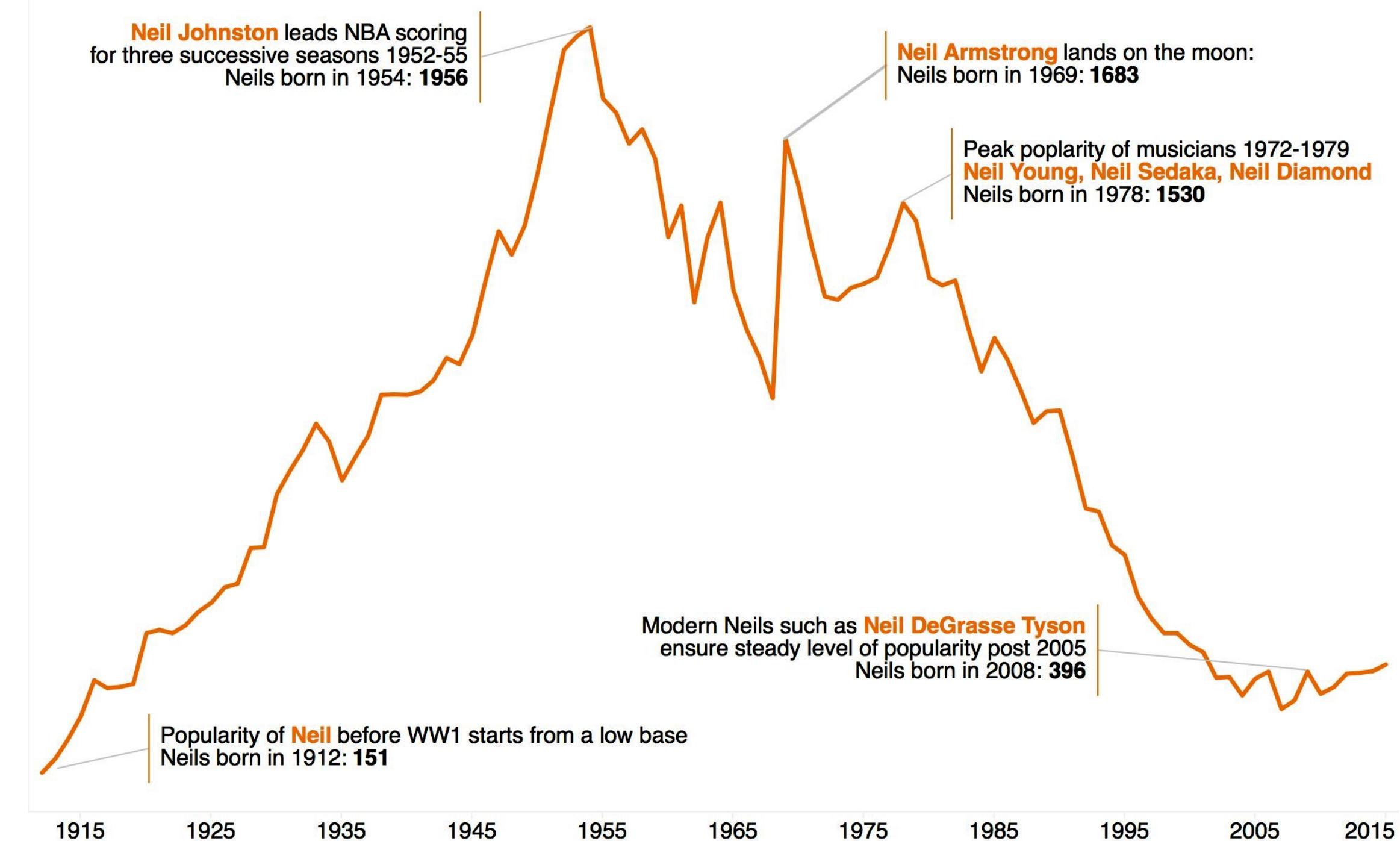


Visualisation: @theneilreichards

#SWDChallenge

### Rise and Fall of the name **Neil** in the USA Births 1912-2015

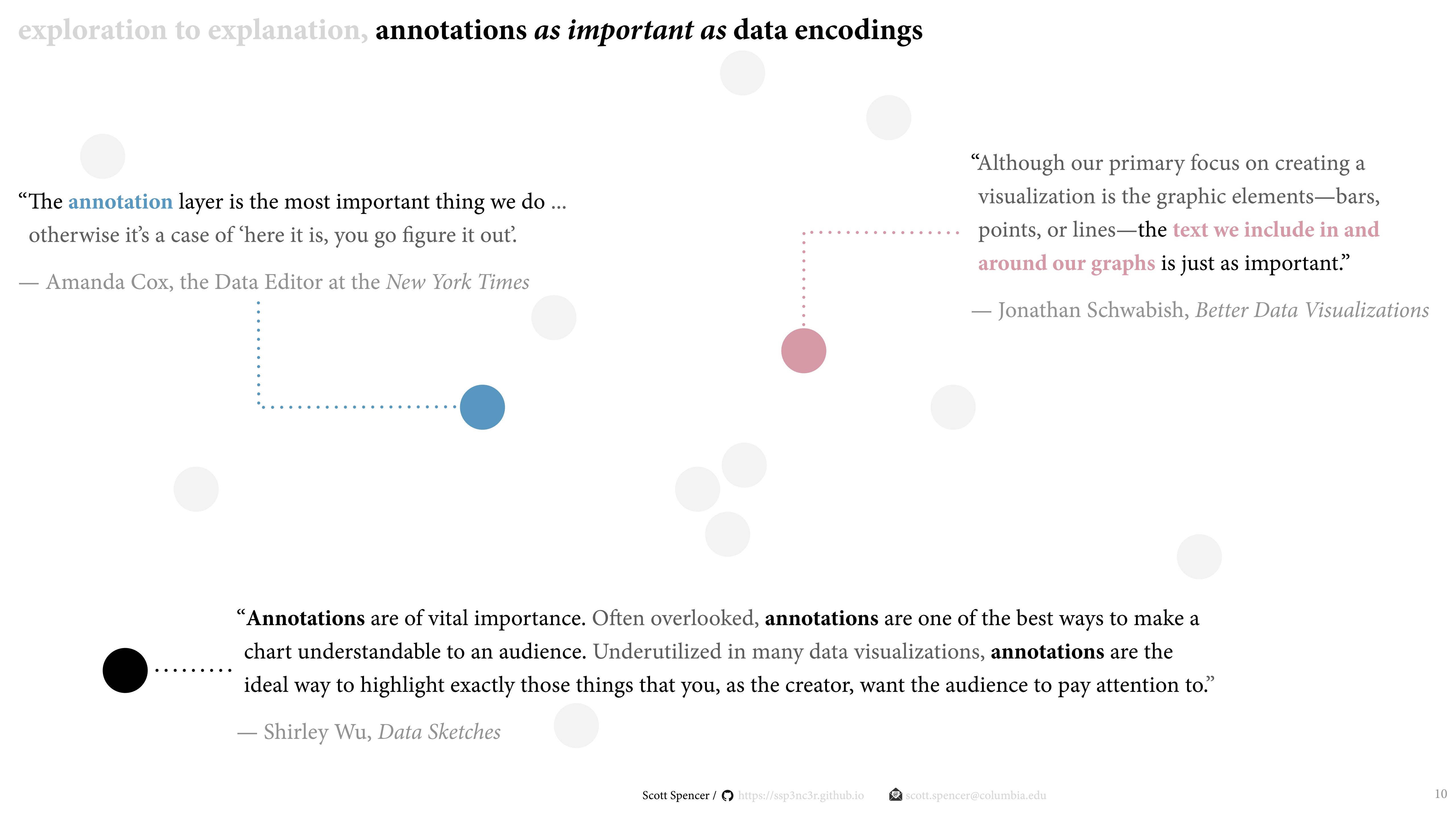
Source: data.gov



Visualisation: @theneilreichards

#SWDChallenge

# exploration to explanation, annotations *as important as data encodings*



“The **annotation** layer is the most important thing we do ...  
otherwise it’s a case of ‘here it is, you go figure it out’.

— Amanda Cox, the Data Editor at the *New York Times*

“Although our primary focus on creating a visualization is the graphic elements—bars, points, or lines—the **text we include in and around our graphs** is just as important.”

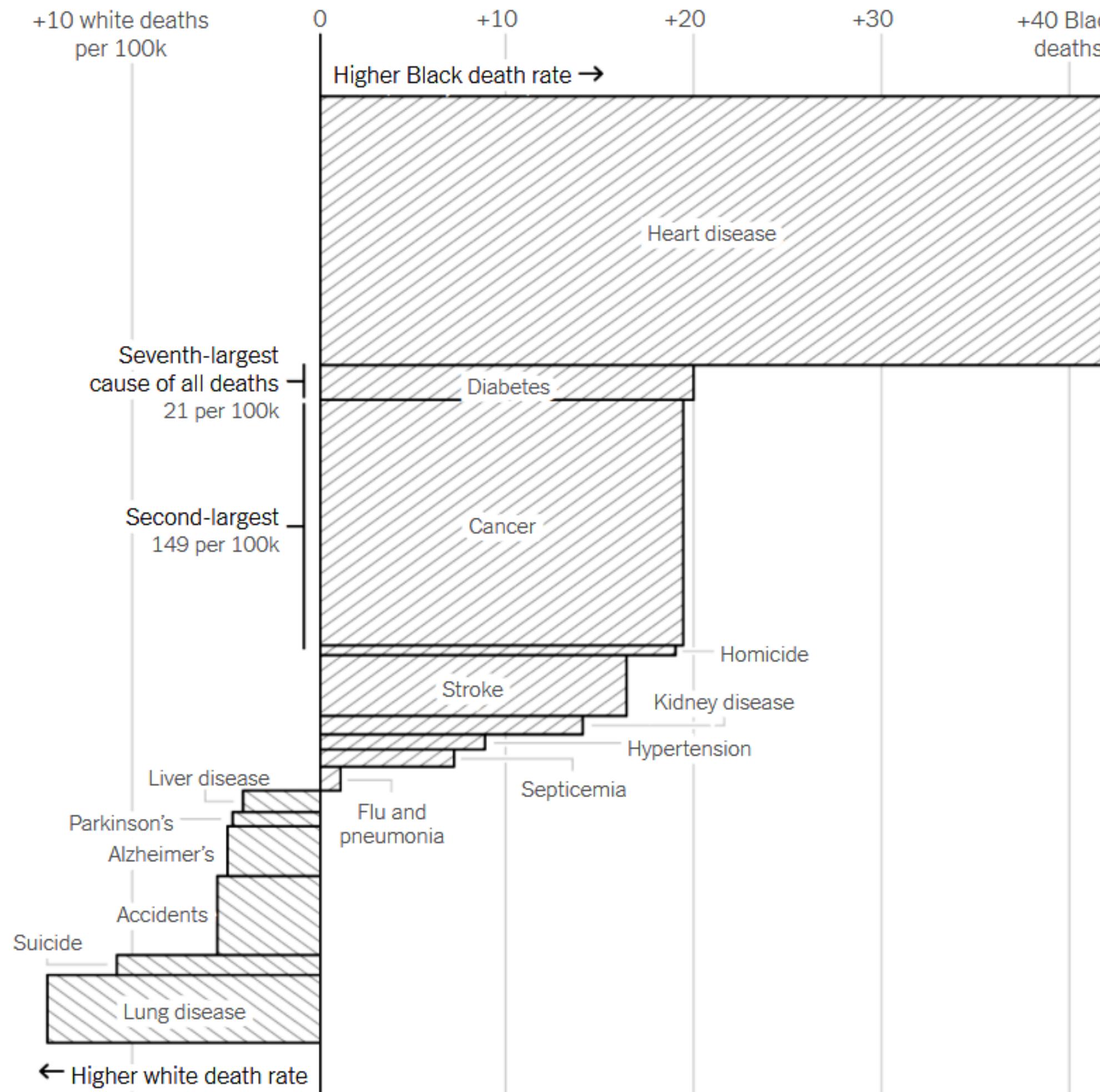
— Jonathan Schwabish, *Better Data Visualizations*

“**Annotations** are of vital importance. Often overlooked, **annotations** are one of the best ways to make a chart understandable to an audience. Underutilized in many data visualizations, **annotations** are the ideal way to highlight exactly those things that you, as the creator, want the audience to pay attention to.”

— Shirley Wu, *Data Sketches*

# exploration to explanation, external or general audiences *can understand complex graphics, with guidance*

Gaps between Black and white mortality rates for the top 15 causes of death



Note: For non-Hispanic Black and white people in 2018. Rates have been adjusted for age and sex. Source: Centers for Disease Control and Prevention

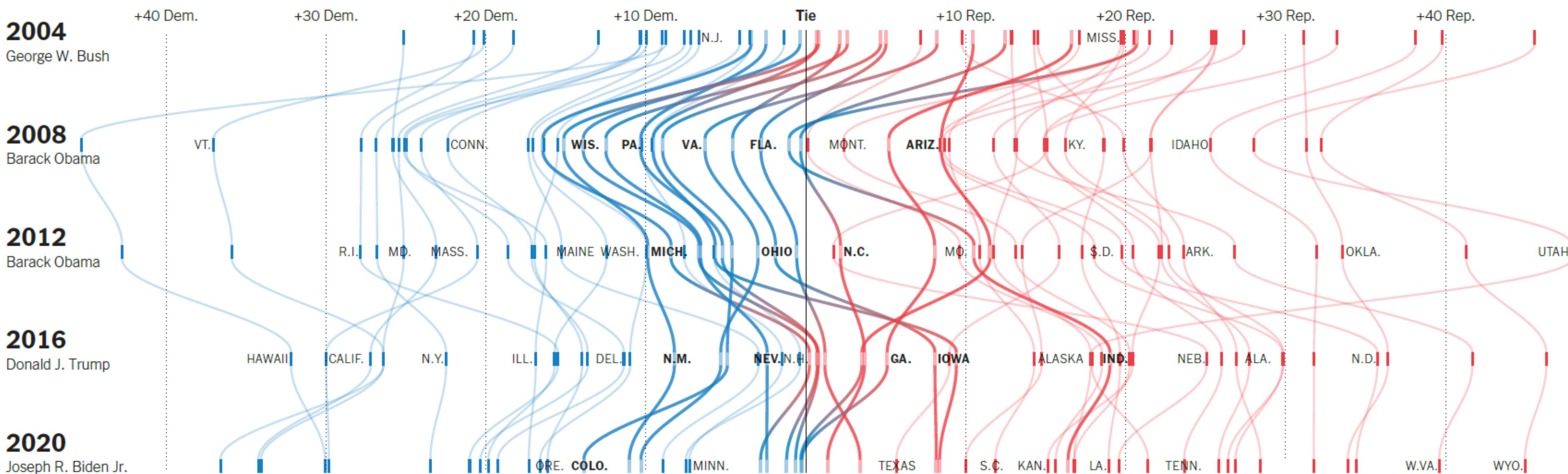
*with guidance*

Wezerek, Gus. "Racism's Hidden Toll." *The New York Times*, August 11, 2020, sec. Opinion. <https://www.nytimes.com/interactive/2020/08/11/opinion/us-coronavirus-black-mortality.html>.

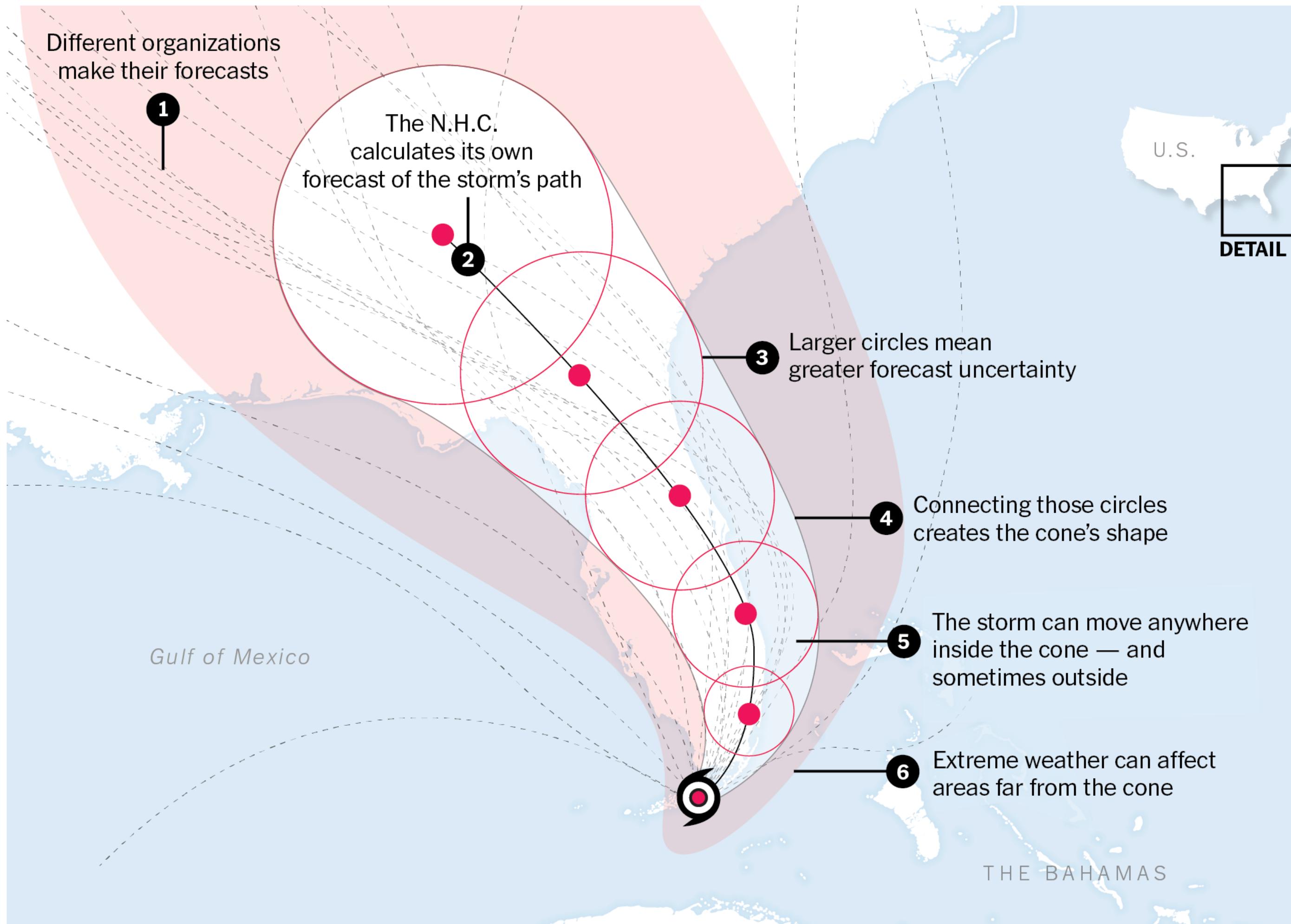
exploration to explanation, external or general audiences *can understand* complex graphics, *with guidance*

*with guidance*

Lu, Denise, and Karen Yourish. “How Did Trump Do in Counties That Backed Him in 2016?” *The New York Times*, November 11, 2020, sec. Politics. <https://www.nytimes.com/interactive/2020/11/09/us/politics/2016-election-trump-counties.html>.



exploration to explanation, external or general audiences *can understand complex graphics, with guidance*



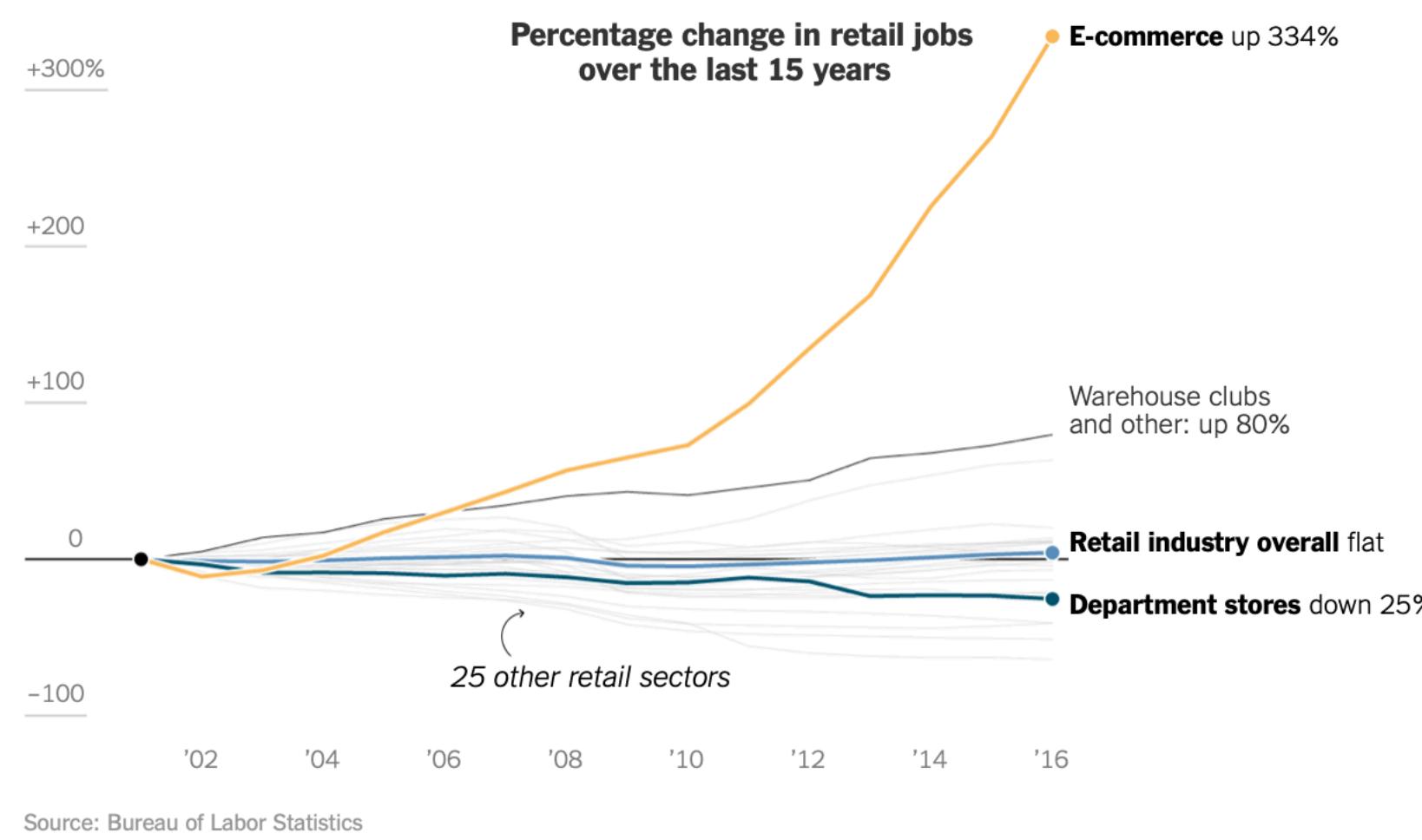
### *with guidance*

Cairo, Alberto, and Tala Schlossberg. "Those Hurricane Maps Don't Mean What You Think They Mean." *The New York Times*, March 10, 2019, sec. Opinion. <https://www.nytimes.com/interactive/2019/08/29/opinion/hurricane-dorian-forecast-map.html>.

exploration to explanation, external or general audiences *can understand complex graphics, with guidance*

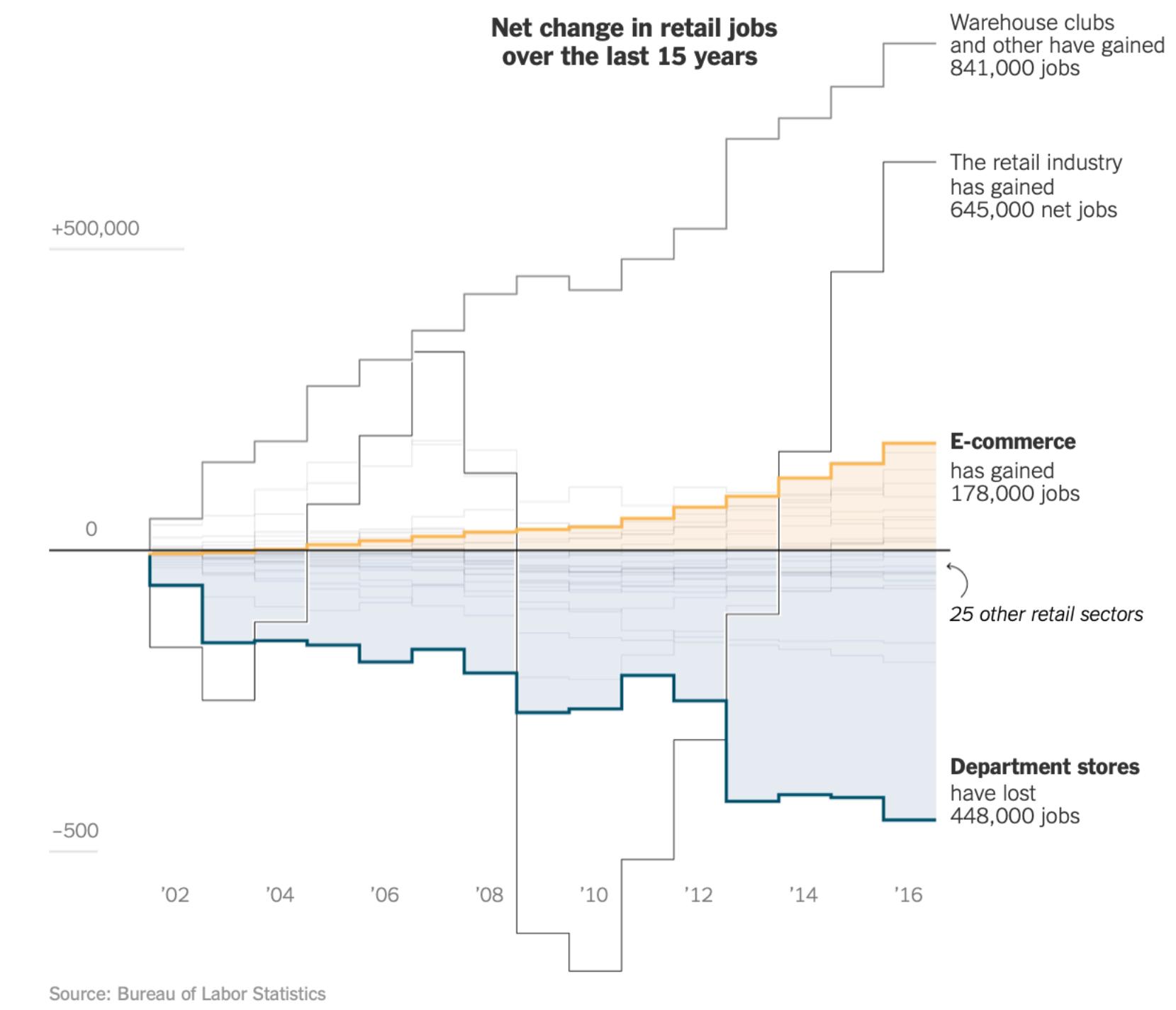
### E-commerce jobs are growing fast ...

Employment attributed to electronic shopping firms has doubled in the last five years, outpacing other types of retail.



### ... but they are still a small component of overall retail employment ...

Even with the fast growth, the number of online shopping jobs is small compared with department stores, warehouse clubs and grocery stores.

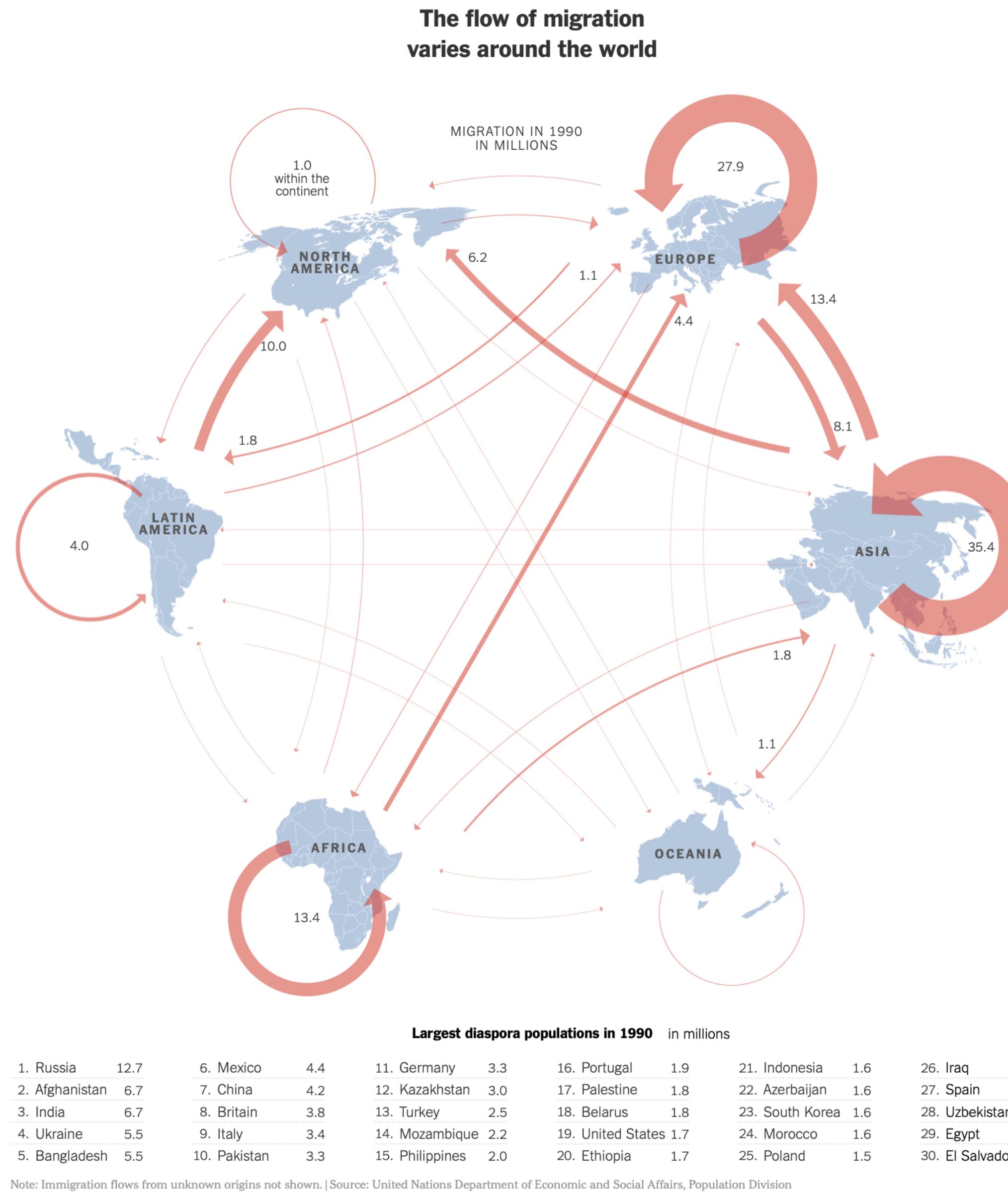


*with guidance*

Bebeloff, Robert, and Karl Russell. "How the Growth of E-Commerce Is Shifting Retail Jobs." *The New York Times*, July 6, 2017, sec. Business. <https://www.nytimes.com/interactive/2017/07/06/business/ecommerce-retail-jobs.html>.

... partly because e-commerce is less labor intensive.

exploration to explanation, external or general audiences *can understand complex graphics, with guidance*



*with guidance*

Porter, Eduardo, and Karl Russell. "Migrants Are on the Rise Around the World, and Myths About Them Are Shaping Attitudes." *The New York Times*, June 20, 2018, sec. Economy. <https://www.nytimes.com/interactive/2018/06/20/business/economy/immigration-economic-impact.html>.

# exploration to explanation, external or general audiences can understand complex graphics, *with guidance*



## Driving Safety, in Fits and Starts

**A**MERICANS drive a staggering number of miles — close to three trillion every year, according to the government. (That is half a light-year, or 120 million trips around the world.) And although traffic accidents remain a major public safety problem, the biggest killer of people ages 5 to 34, vehicle travel is far safer than it was a few decades ago. Several factors appear to account for the sharp decline in fatalities. Technology (like anti-lock brakes and air bags) and road behavior (like wearing seat belts and driving sober)

deaths per miles traveled. But what happens when the metrics are teased apart, and familiar data is charted in an unfamiliar way? Plotting the two most important variables against each other — miles traveled versus deaths per 100,000 population — yields a pattern that looks like a plateau followed by a steep drop. It evokes the theory of punctuated equilibrium, proposed by the paleontologists Stephen Jay Gould and Niles Eldredge, which suggests that instead of continuous gradual evolution, change occurs abruptly after

## *with guidance*

Fairfield, Hannah. "Driving Safety, in Fits and Starts." *The New York Times*, September 12, 2012, sec. Science. <https://archive.nytimes.com/www.nytimes.com/interactive/2012/09/17/science/driving-safety-in-fits-and-starts.html>.

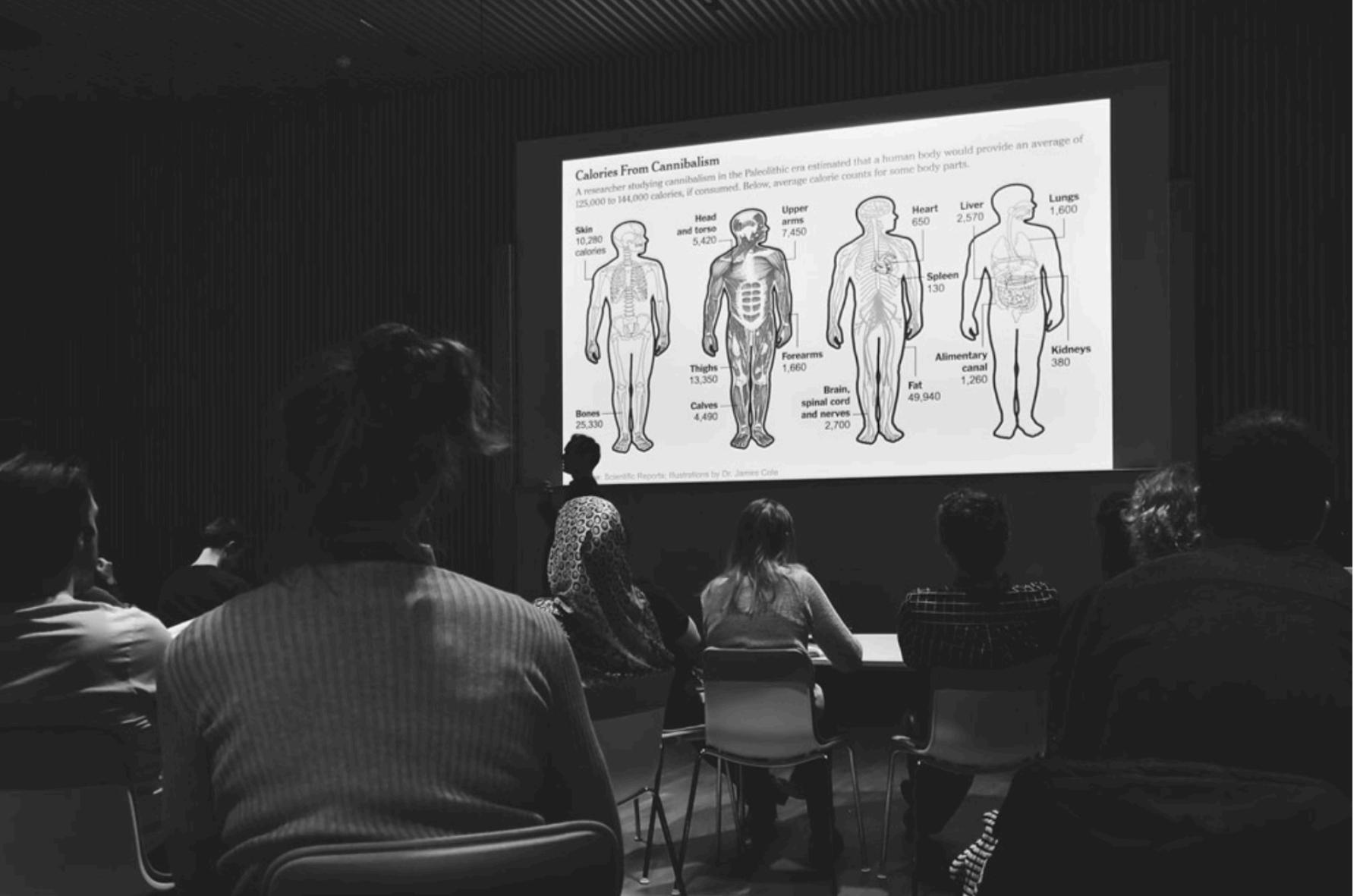
## *empirical study on audience engagement*

Haroz, Steve, Robert Kosara, and Steven L. Franconeri. "The Connected Scatterplot for Presenting Paired Time Series." *IEEE Transactions on Visualization and Computer Graphics* 22, no. 9 (September 1, 2016): 2174–86. <https://doi.org/10.1109/TVCG.2015.2502587>.

exploration to explanation, to (focus) our audience on explained encodings, remove clutter and start with gray

**(re)design for your audience**

# redesigns, advice from Jonathan Corum, Science Editor at the New York Times



Not Secure — style.org

HOME PROJECTS ABOUT STYLE.ORG

## 13pt Design for an Audience

← →

By Jonathan Corum

April 26, 2018

Last week I gave a workshop and talk at **SUND**, the University of Copenhagen's Faculty of Health Sciences.

Here's a lightly edited transcript of the talk:

Thank you very much for being here. Thank you for the

Photo by Niamh Higgins

Find the visual idea

Translate

Tell a visual story

Focus attention, don't scatter it

Show the content, not the frame

Show the content, not the table

Be consistent

What can you remove?

Reference the real world

Connect images and data

Explain why

Provide context

Build a sequence

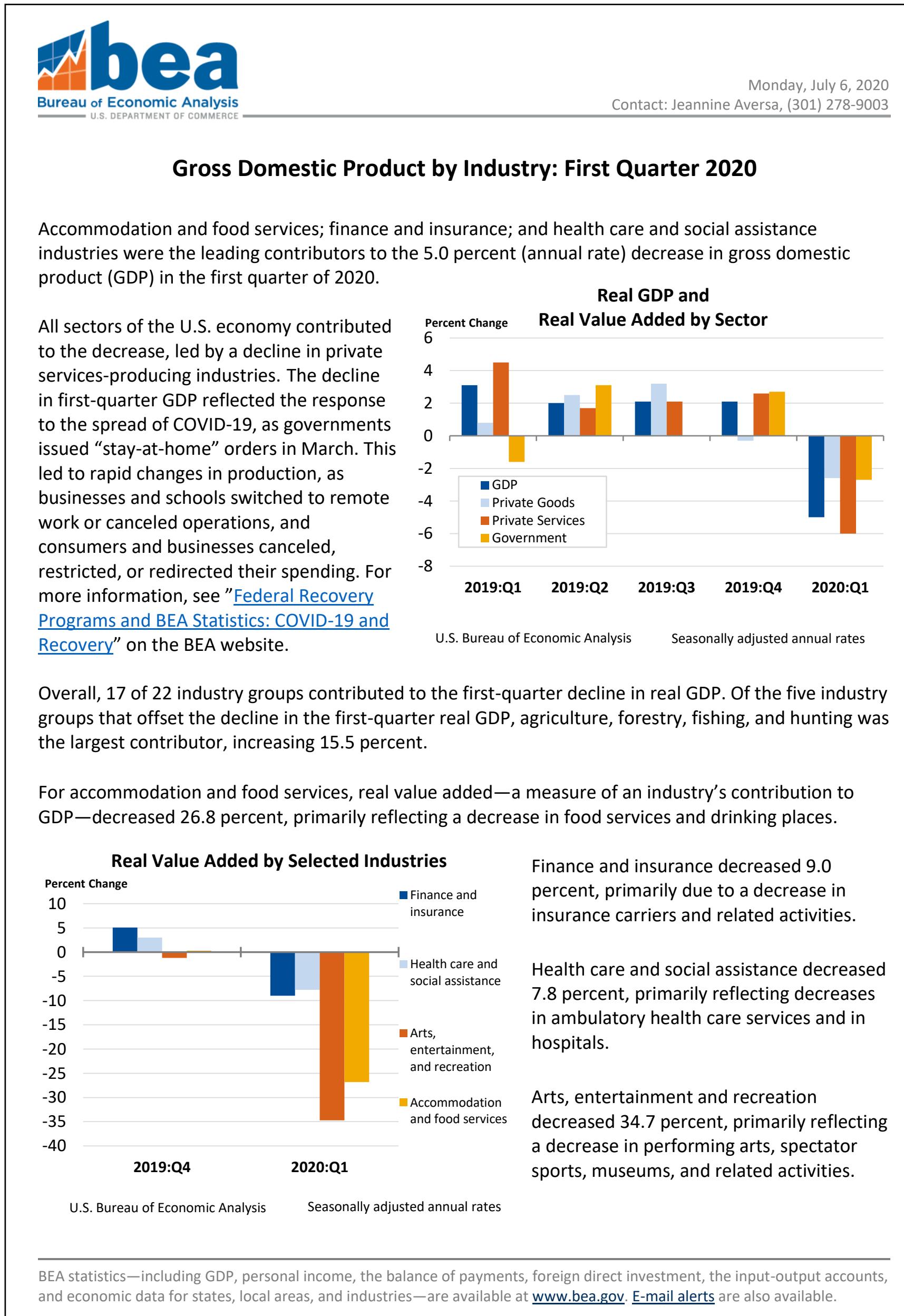
Show movement and change

Encourage visual comparisons

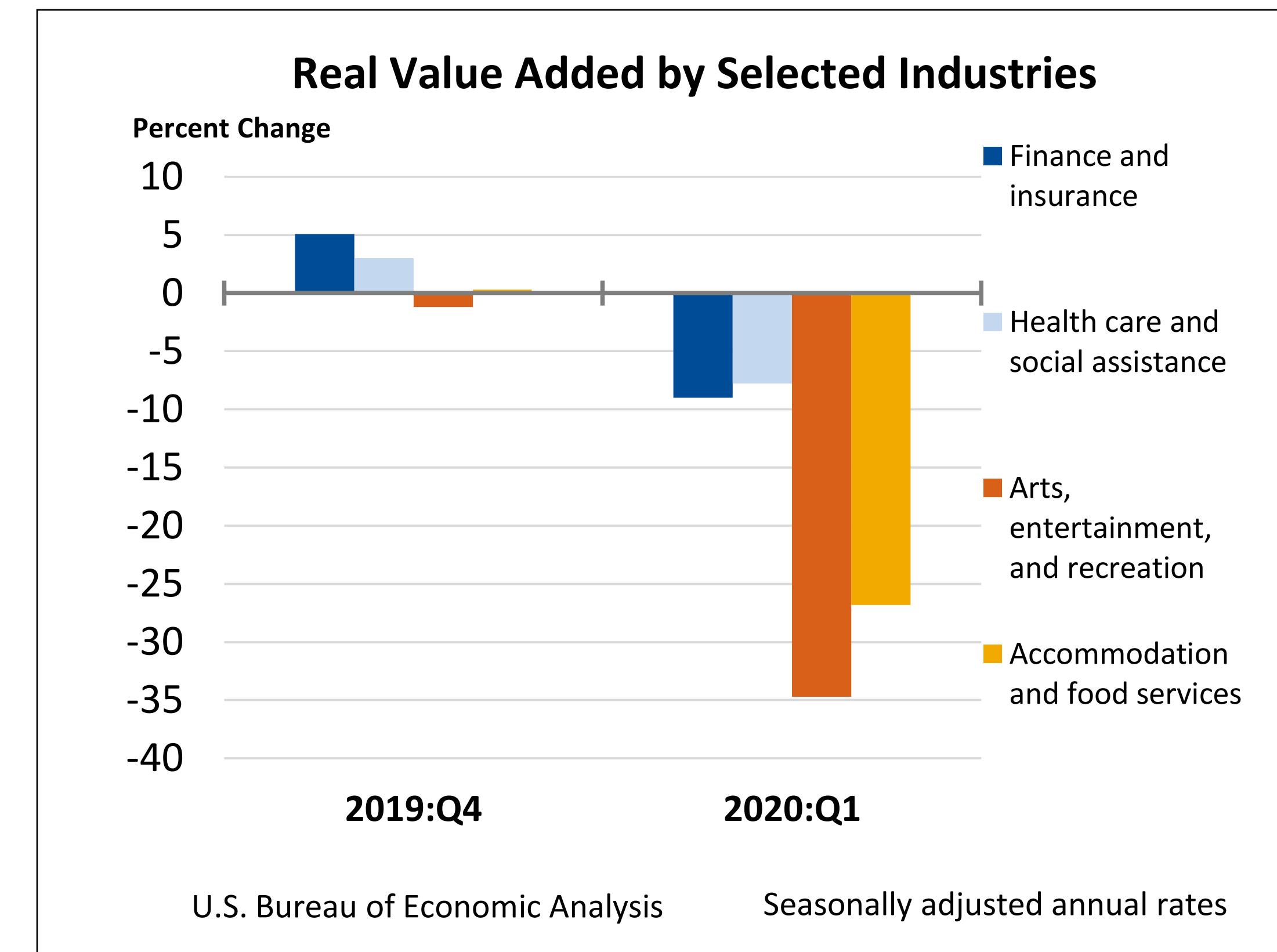
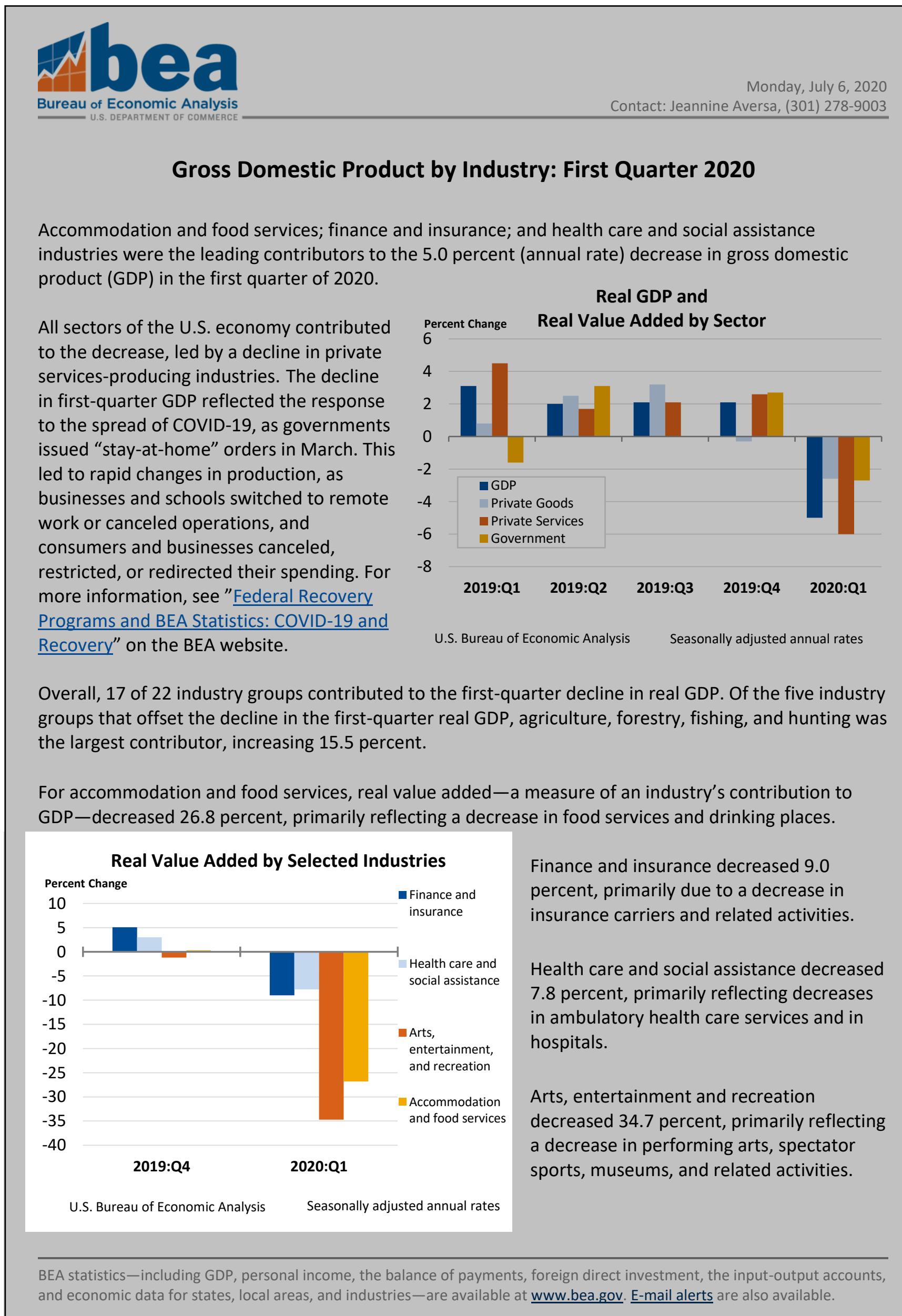
More labels, fewer legends

Annotate

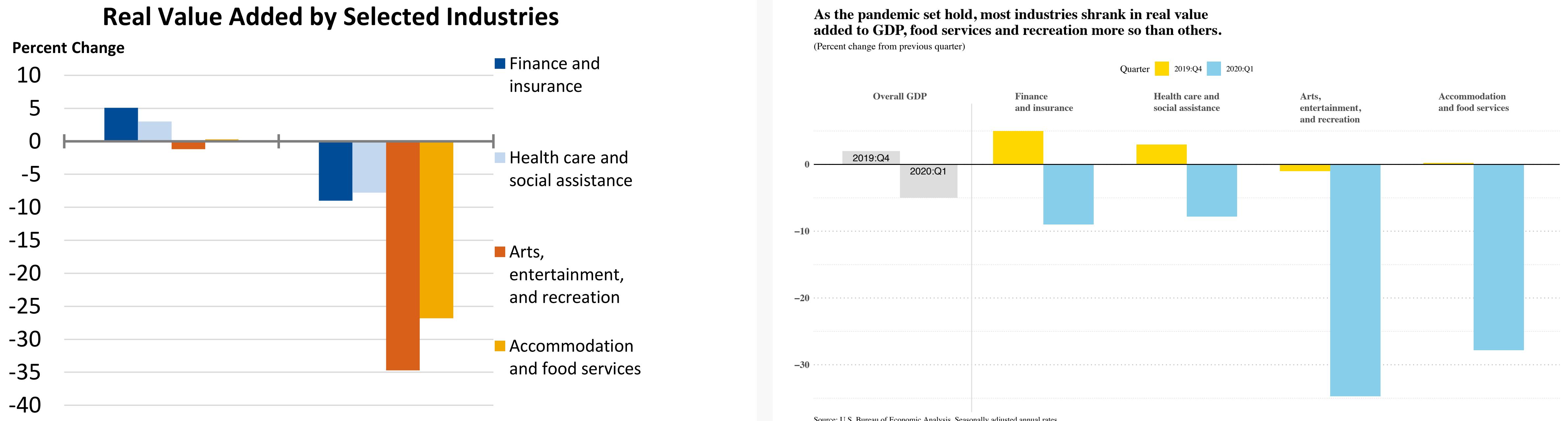
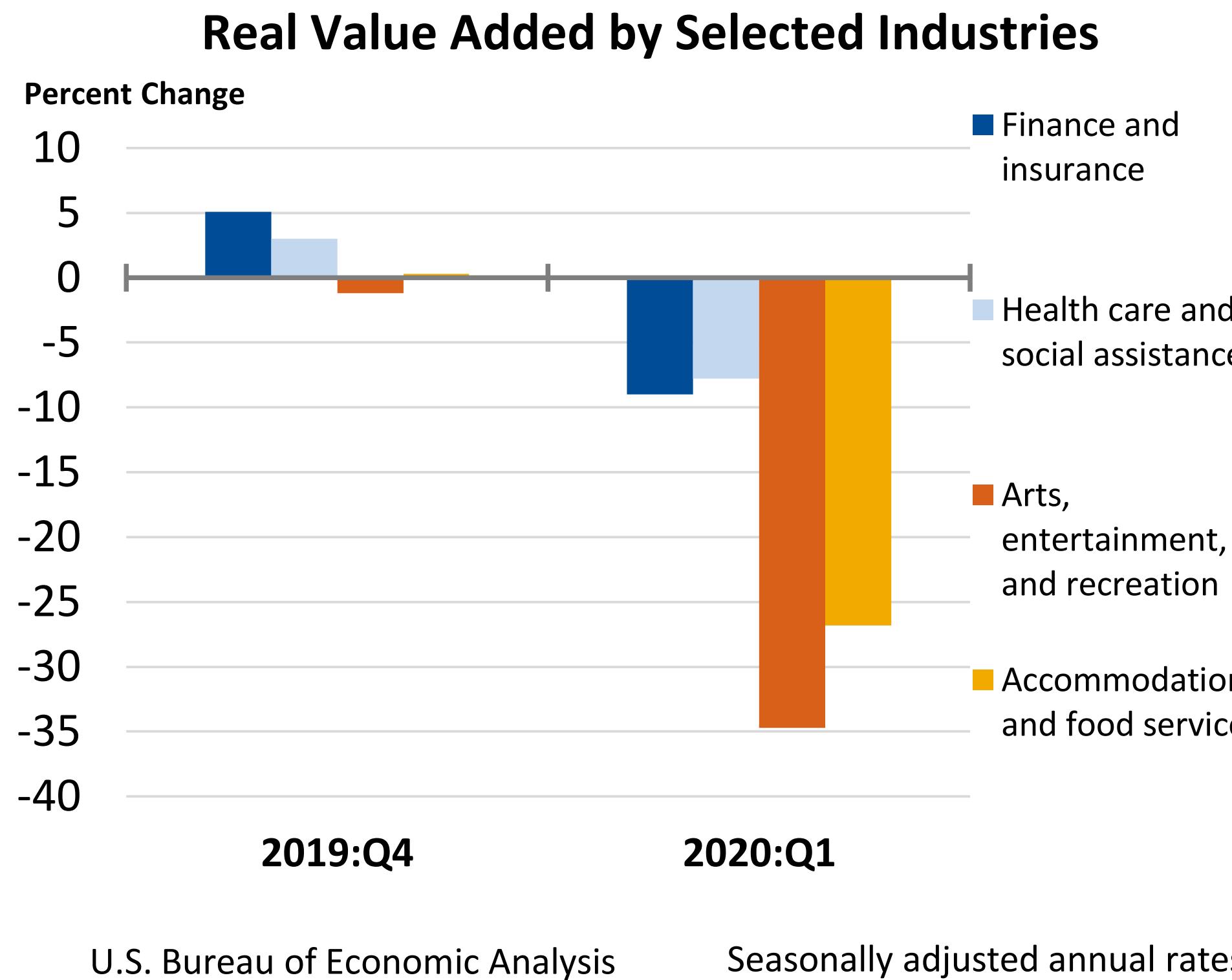
# redesigns, example — original graphic within government publication explaining part of US economy



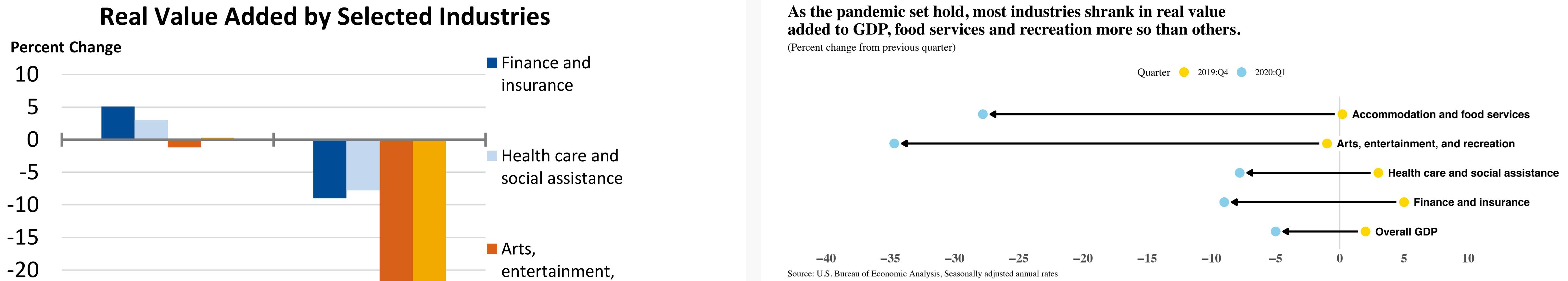
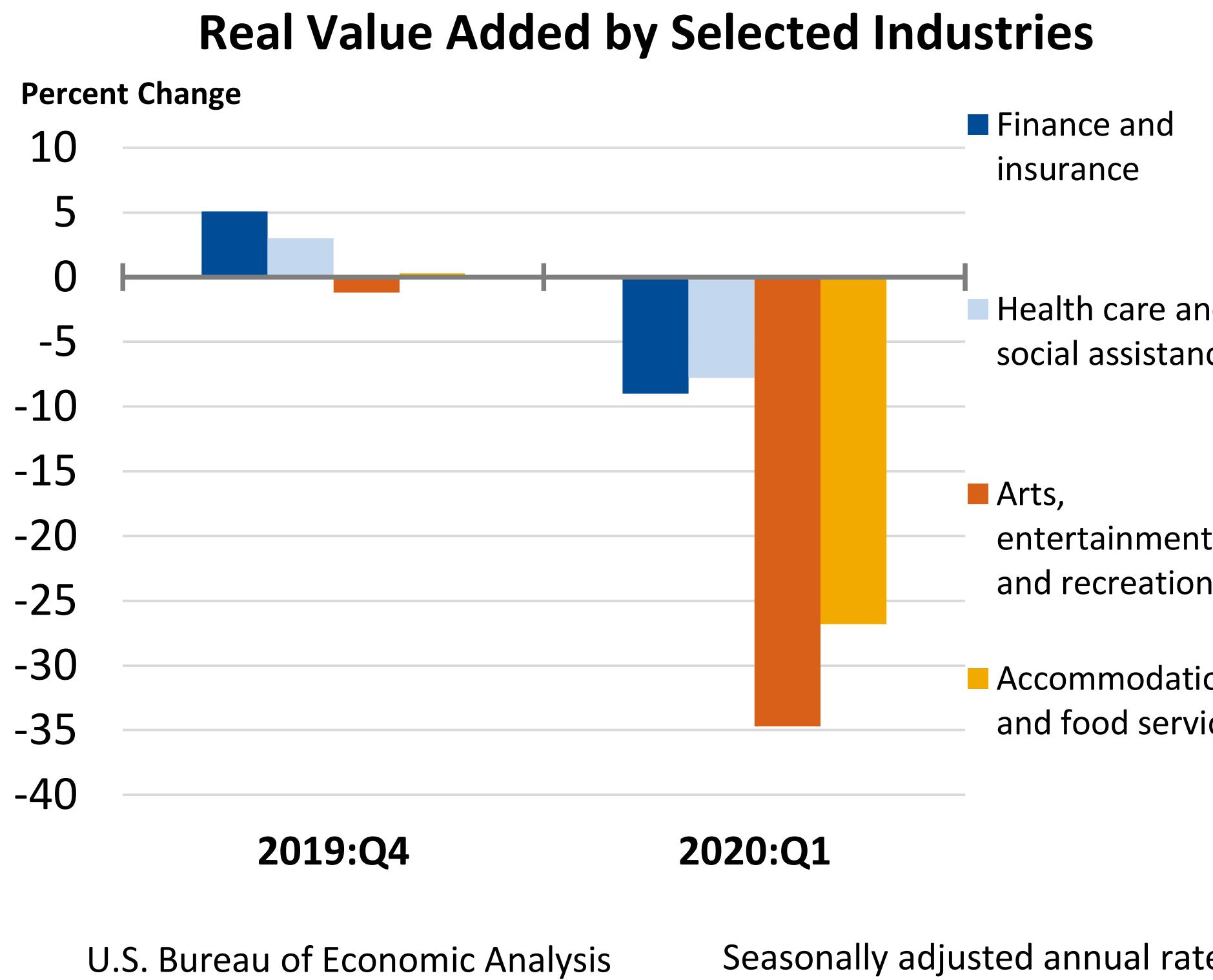
# redesigns, example — what's the point of this graphic? Do encodings intuitively show the point? Let's redesign!



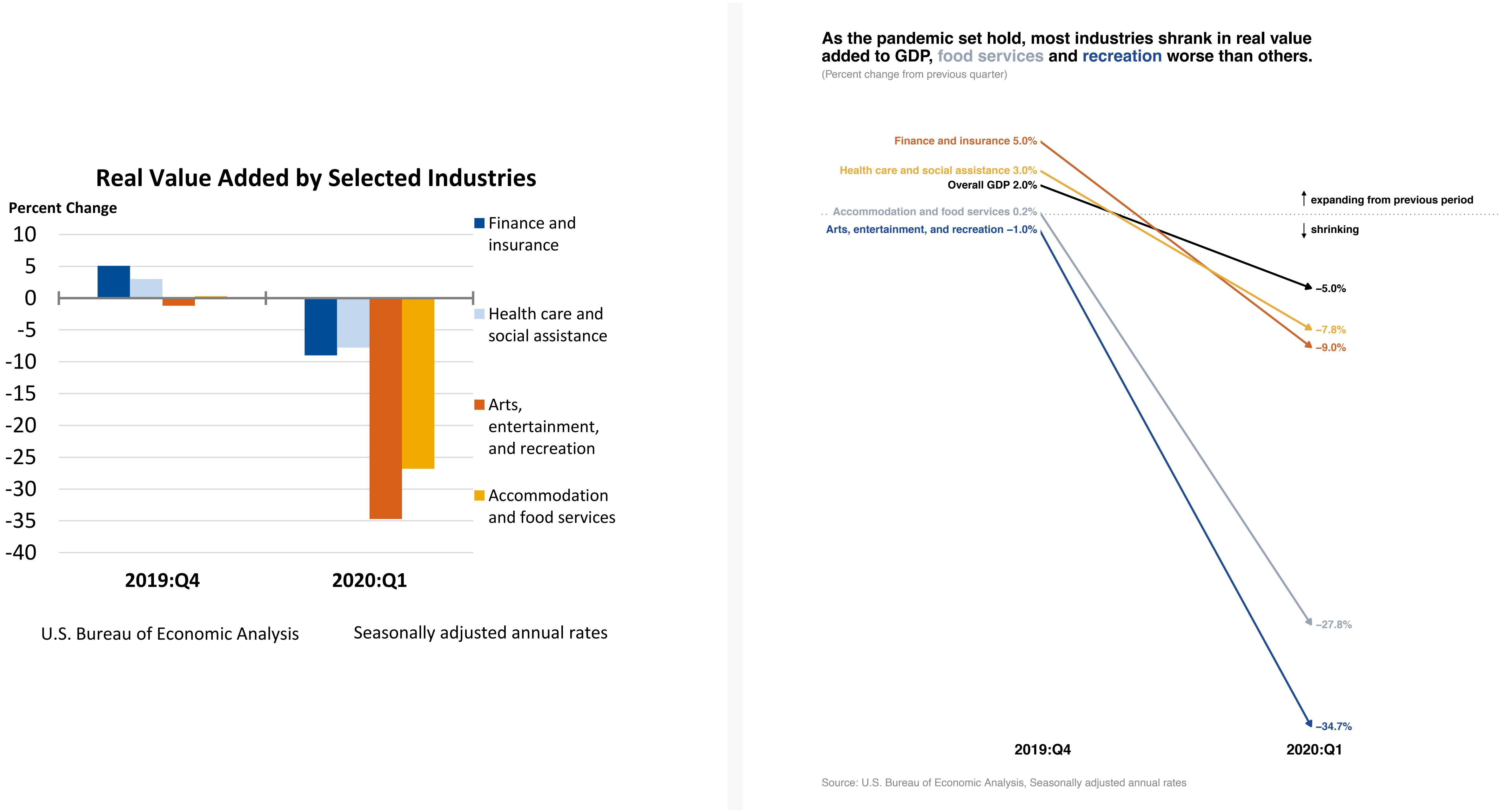
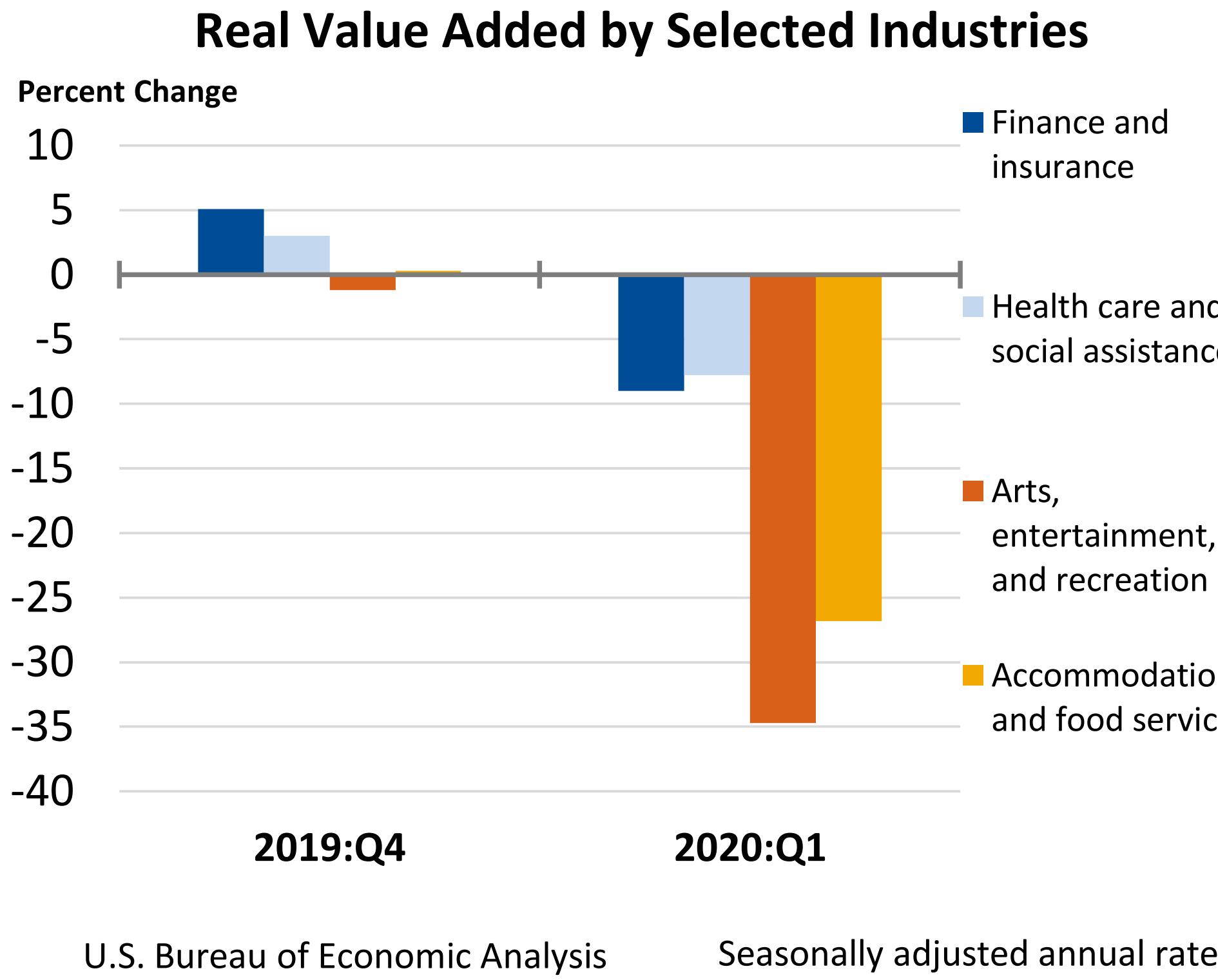
# redesigns, example — first possible redesign. Does this redesign more intuitively convey a point?



# redesigns, example — second possible redesign. Does this redesign more intuitively convey a point?

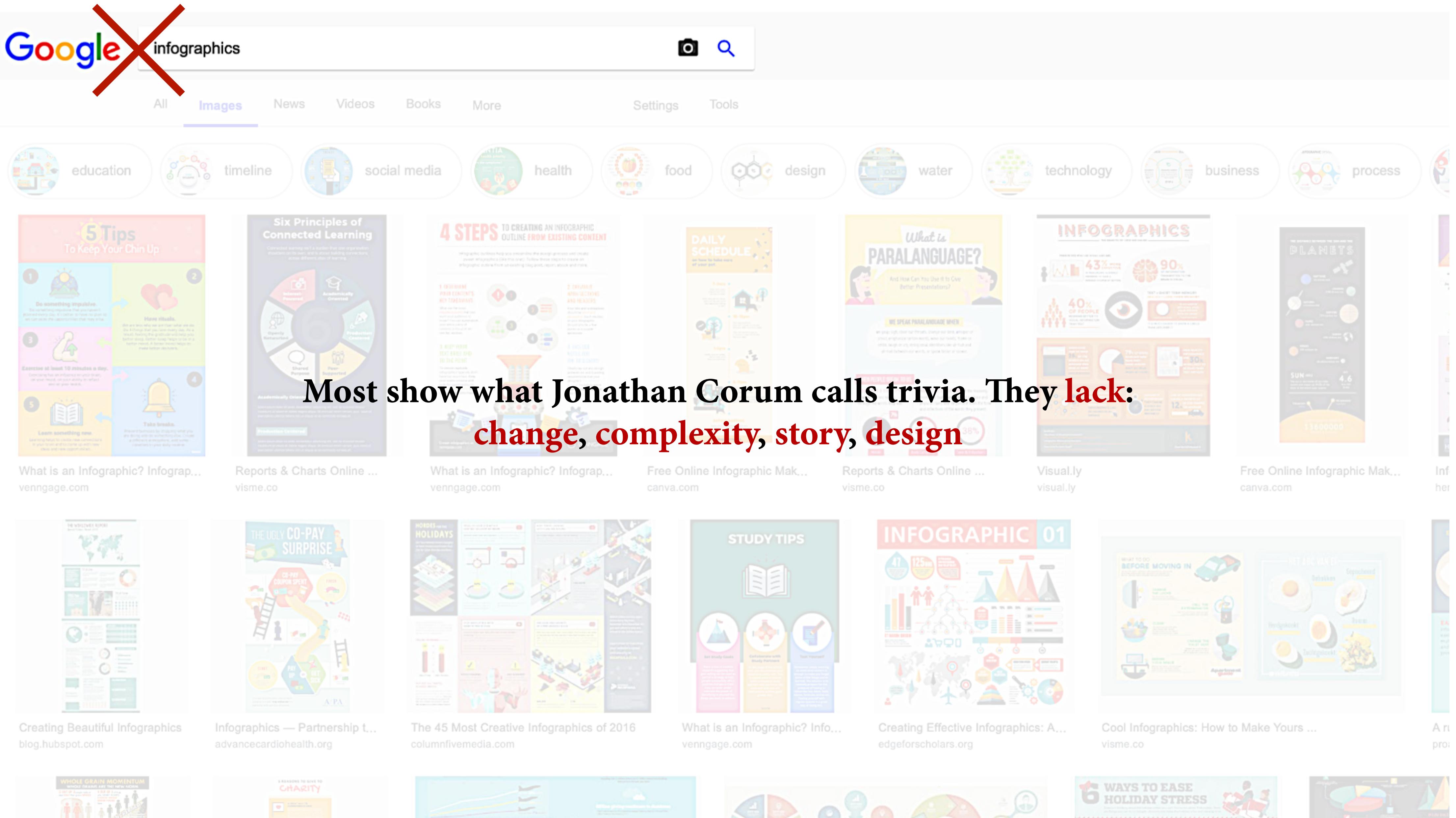


# redesigns, example — third possible redesign. Does this redesign more intuitively convey a point?



**data graphics in storytelling**

# data graphics in storytelling, information graphics — don't generically google this to learn!



Most show what Jonathan Corum calls trivia. They lack:  
**change, complexity, story, design**

# data graphics in storytelling, information graphics — dictionary definition too broad, generic

**INFOGRAPHIC** n. a visual image such as a chart or diagram used to represent information or data in an easily understandable form.

# data graphics in storytelling, information graphics — *viewpoints at Malofiej, the infographics world summit*



**Gregor Aisch**

Infographics is an abbreviated form of “information graphics”. It seems to mean a lot of different things to different people. I rarely use the term.



**Federica Fragapane**

A **visual translation of data** and information: a language to communicate topics, contents and **stories** to people.



**Laris Karklis**

Infographics is . . . using **visuals** to tell a **story**.

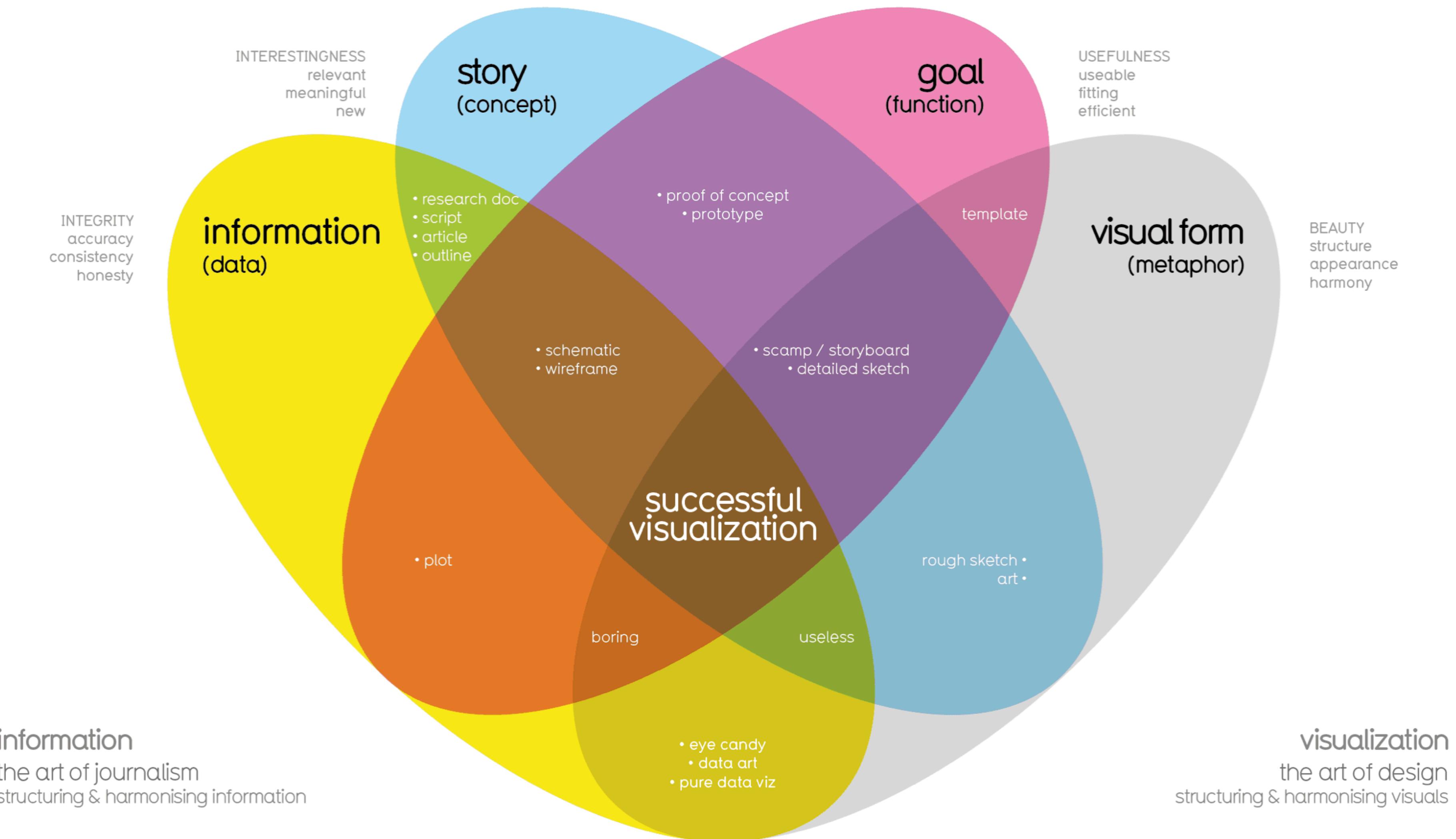


**Nadieh Bremer**

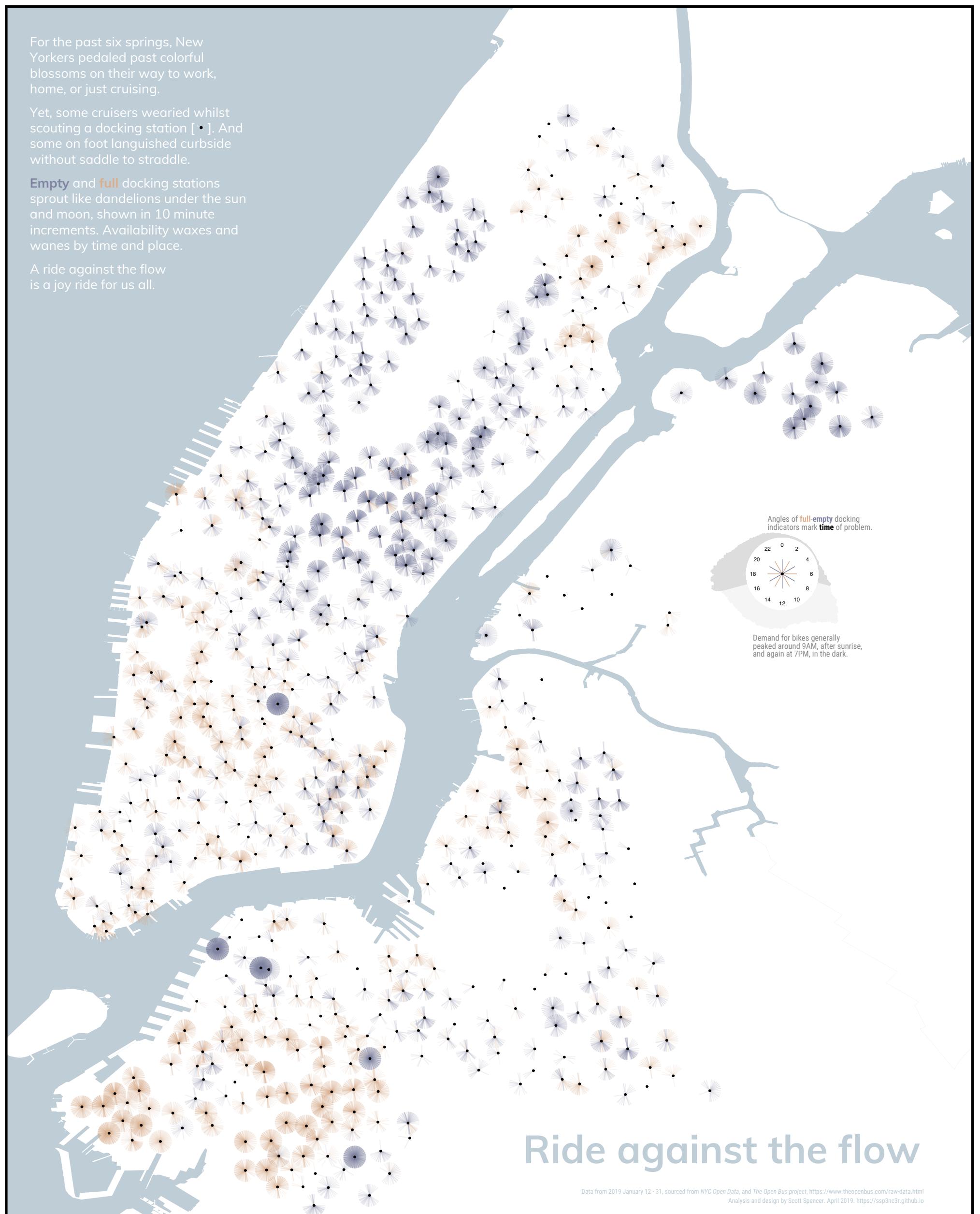
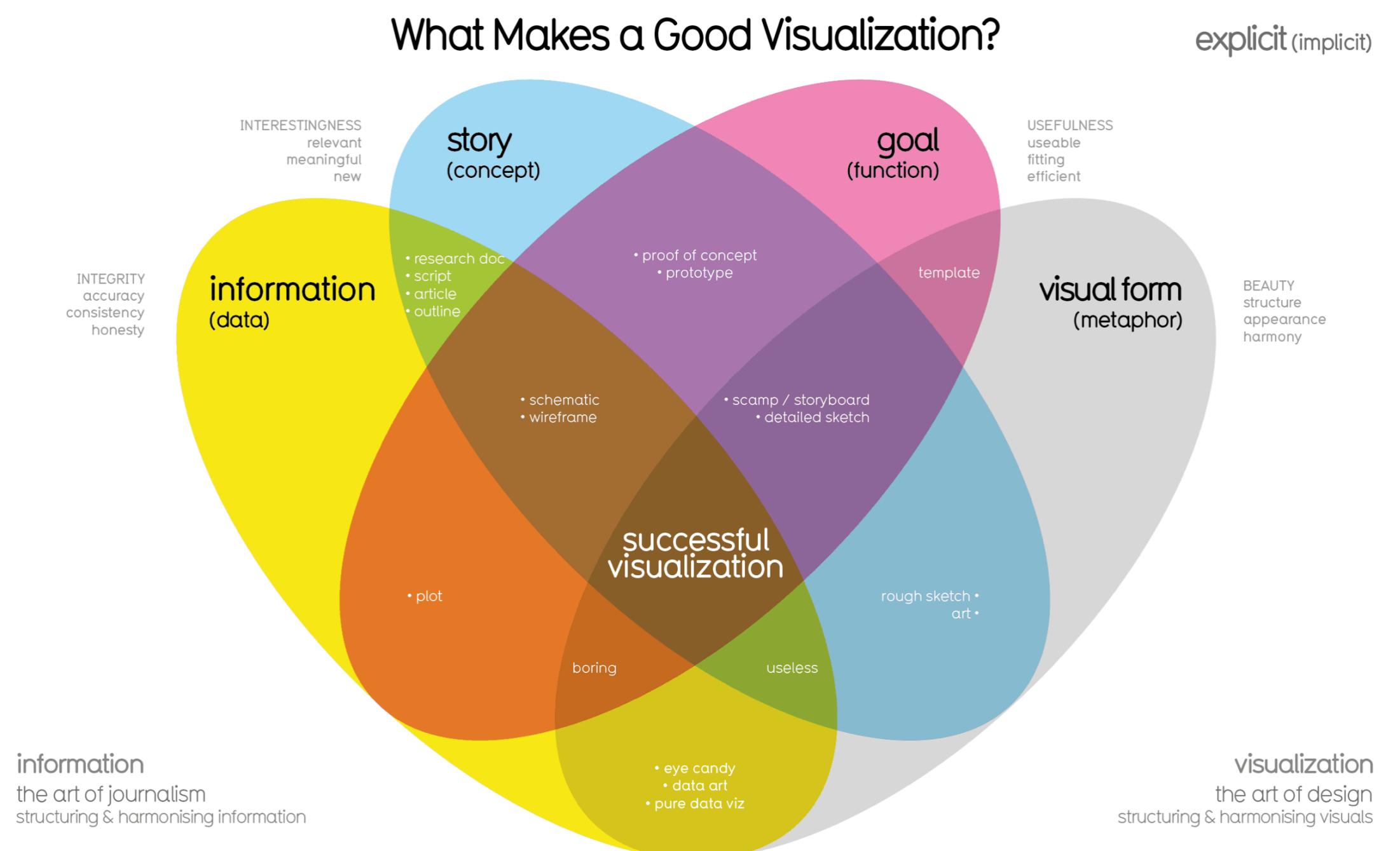
Infographics . . . combine graphical elements, such as a drawn portion of an animal, human, map, etc. with small mini **data visualizations** (a small bar chart for example) and annotations to tell a **story**.

## What Makes a Good Visualization?

explicit (implicit)



# data graphics in storytelling, information graphics — class example (longlisted and showcased in IIB Awards)



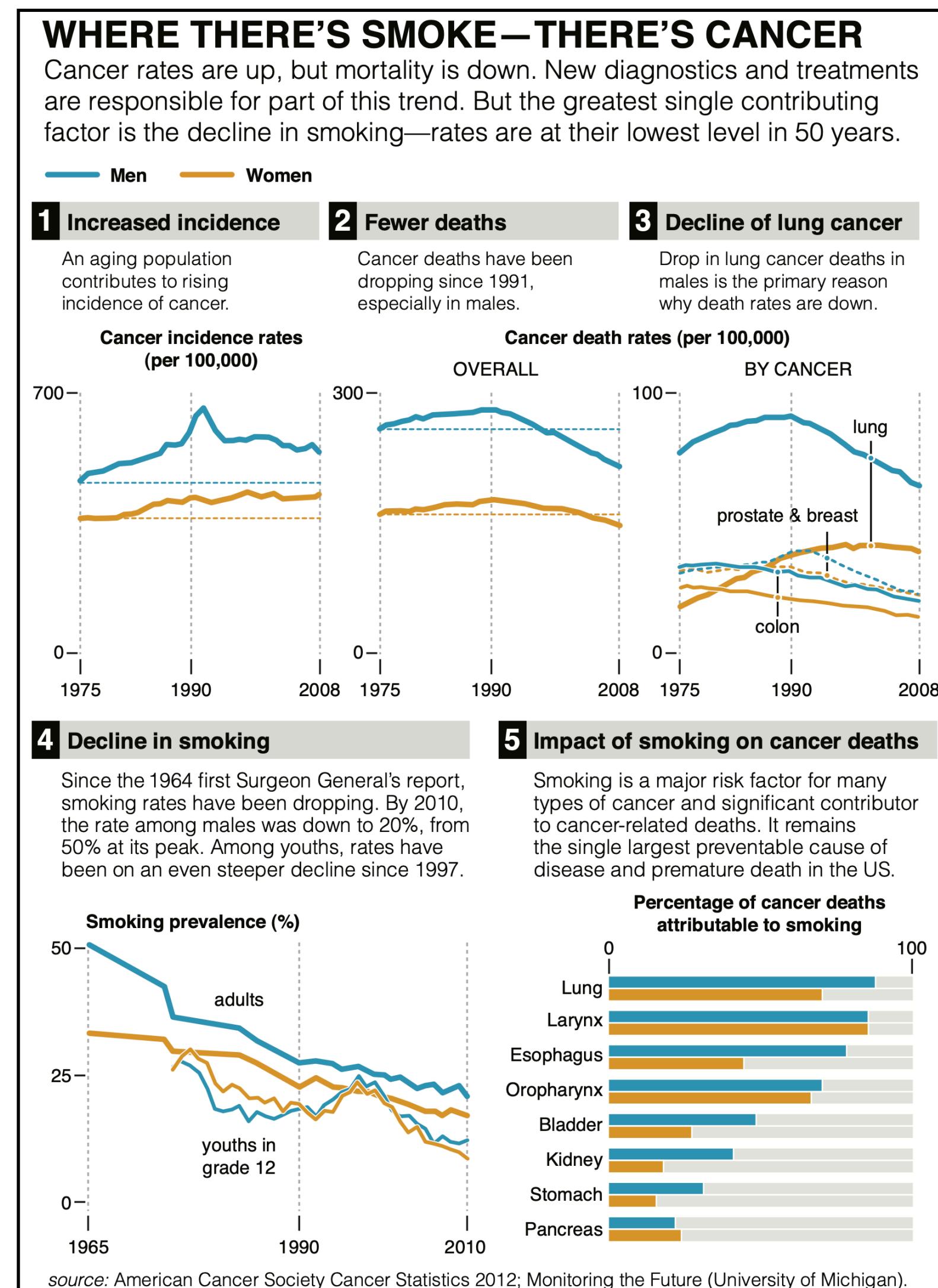
# data graphics in storytelling, information graphics — are stories appropriate to show scientific results?

A story adds meaning and clarity to complex statistics.

Maintain focus ... by leaving out detail that does not advance the plot. Distinguish necessary detail from minutiae; do not give in to the desire to show all your hard-won data. Provide sufficient support for your story, but stick to the plot.

Cairo & Krzywinski — “yes”

Use multiple panels to establish flow, and use colloquial language when addressing a general audience. . . . Always be accurate, but balance qualitative and quantitative expositions. An occasional tangent . . . adds texture to the presentation without diluting the message.

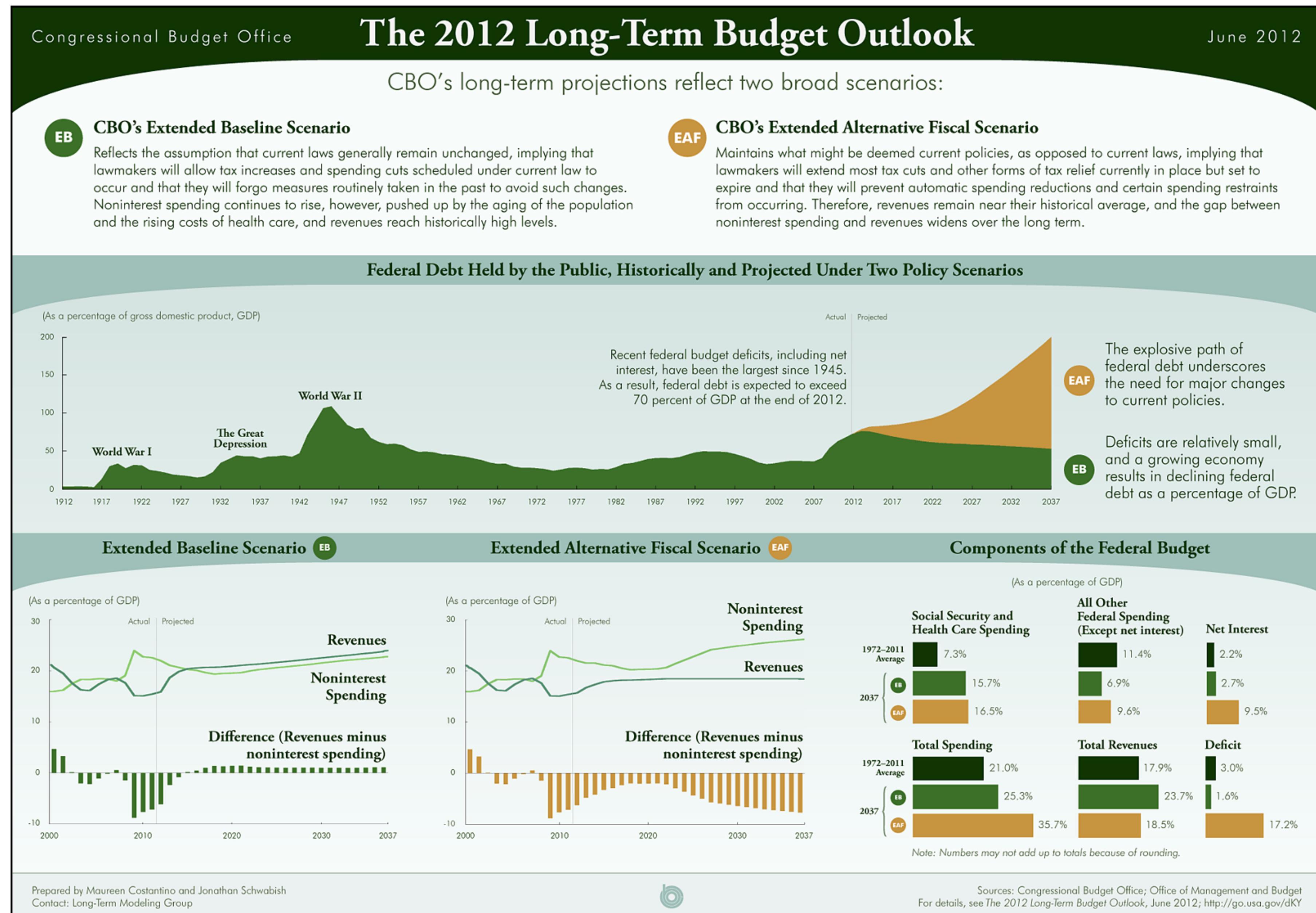


Use of graphics storytelling often result in a **distorted** and **unrepresentative** display of data. Great storytellers **embellish** and **conceal** information to evoke a response in their audience.

Katz — “no”

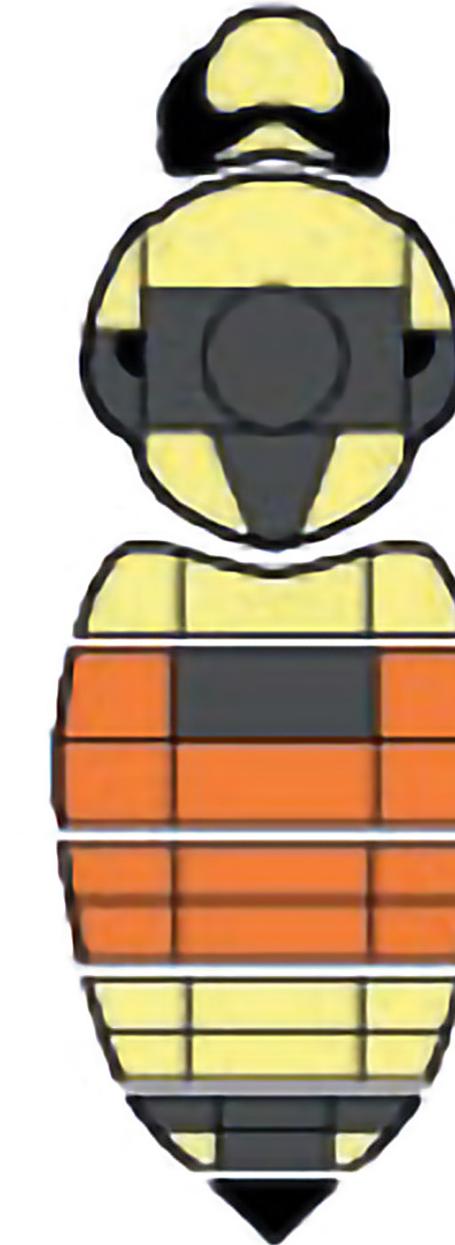
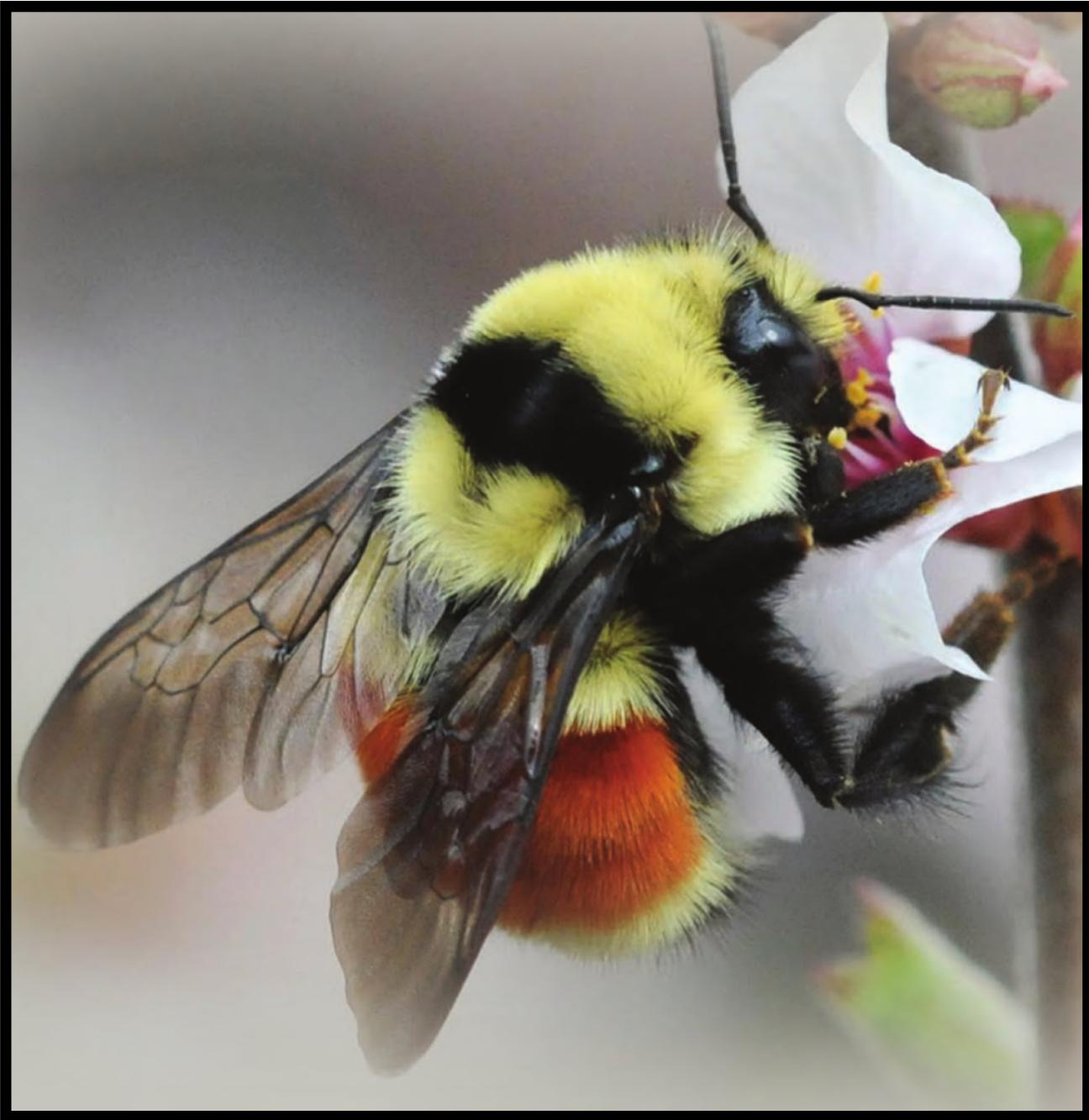
Inconvenient truths are swept away, and marginalities are spun to make a point more spectacular. A storyteller would plot the data in the way most persuasive rather than most informative or representative.

# data graphics in storytelling, information graphics — example from government business



# data graphics in storytelling, *The New York Times* process for creating information graphics

**See, Think, Design, Produce**  
understand      explain



## Search for patterns by comparing

Visualization is not counting. Search for meaningful patterns, try to understand patterns, visualize patterns and try to explain them. Part of this is comparing. Another part is finding what's possible. Look at more ideas than you can use. Finally, practice — a lot!

## Sketch until your aha! moment

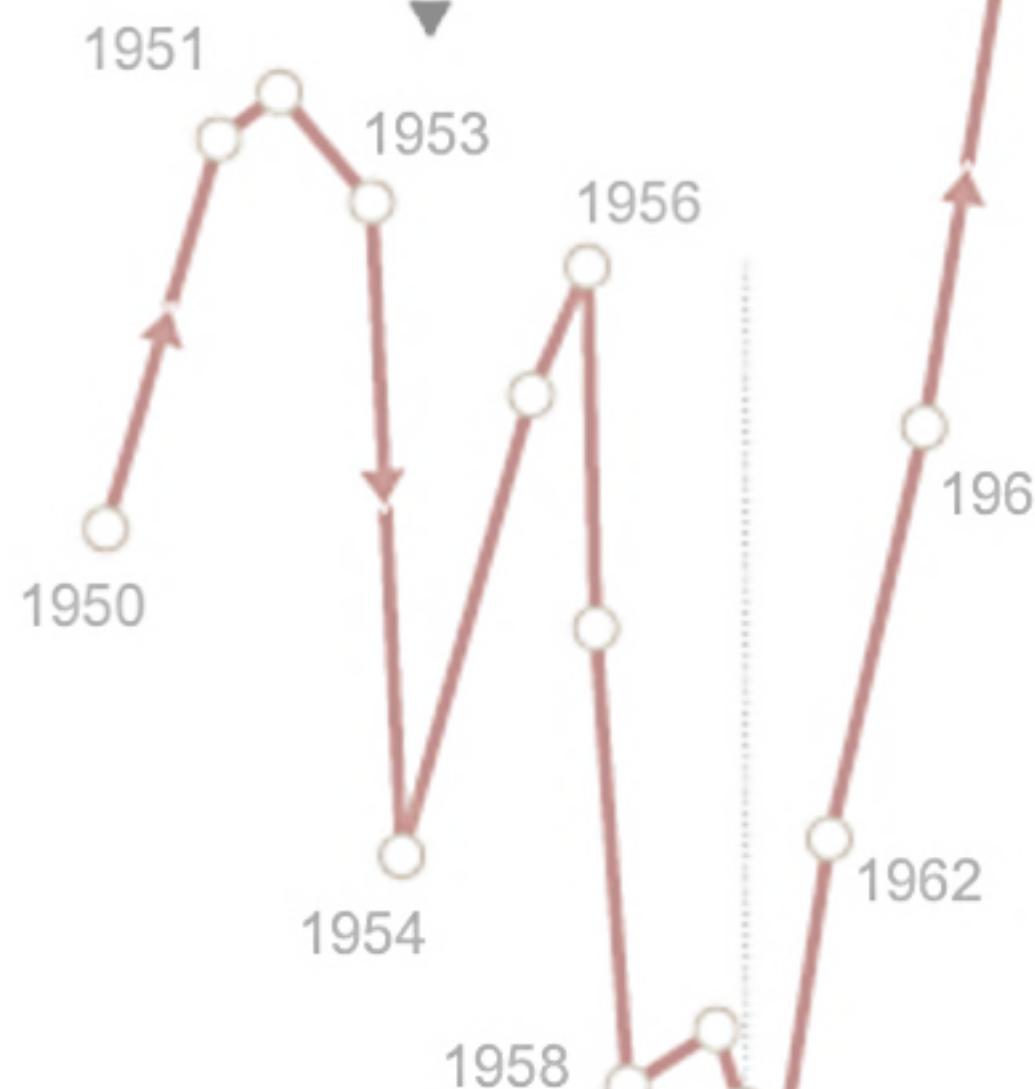
Finding a clear thought through visualization can begin with sketching, on either paper or screen. Sketching is visual problem solving, not a commitment. It's much easier to begin with an ugly sketch and make it prettier as you work on design.

# See, Think, Design, Produce

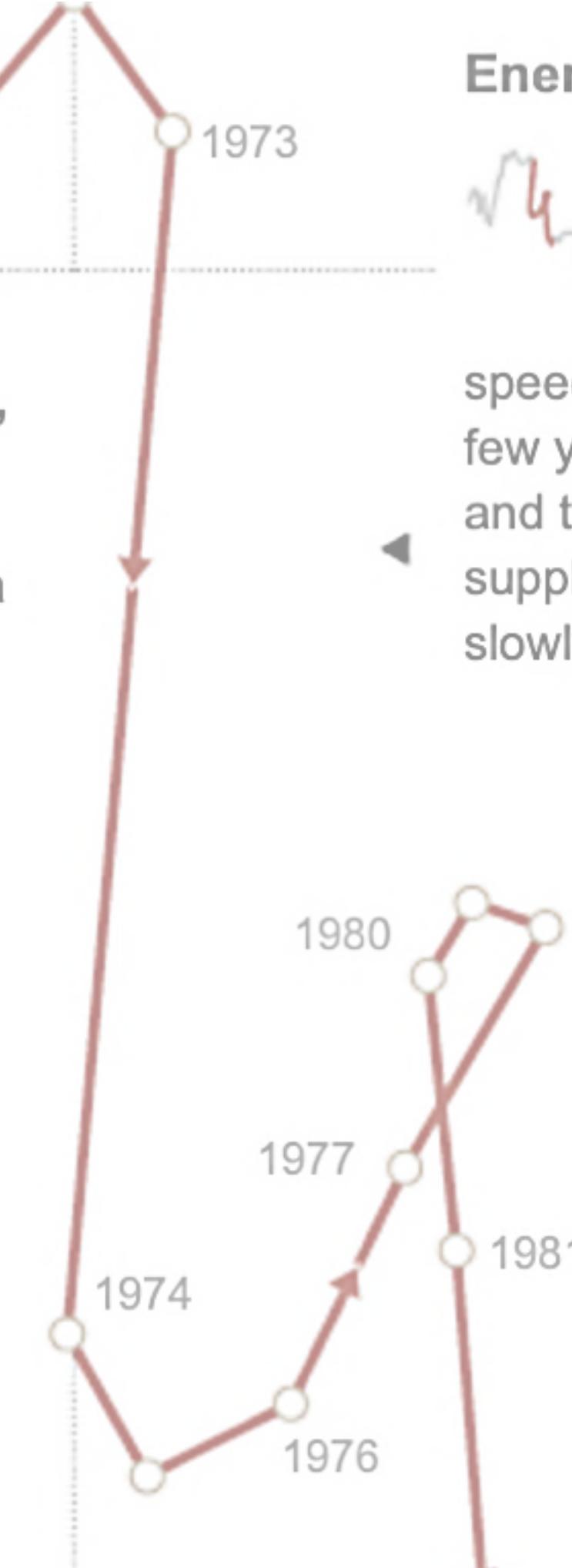
understand

explain

/ — with more V-8 engines in midsize cars  
— more deadly. The Interstate highway system grows, and speeds rise with it.



▲ “Unsafe at Any Speed”  
In 1965, Ralph Nader publishes a best seller about auto companies’ resisting safety features. The government creates the first agency devoted to highway safety. Auto fatalities hit a plateau.



## Energy Crises

After the 1973 Arab oil embargo, President Richard M. Nixon sets a 55 m.p.h. speed limit as national energy policy. A few years later, the Iranian revolution and the Iran-Iraq war curtail fuel supplies. People drive less (and more slowly); fatalities fall.

## Seat Belts and Sobriety

In 1984, New York becomes the first state to require drivers to wear seat belts. Child car seats become the norm: by 1985, all states require them. Many states tighten laws against drunken driving, and by 1988 all states have set the drinking age at 21.

**Design for someone else, show varying details**

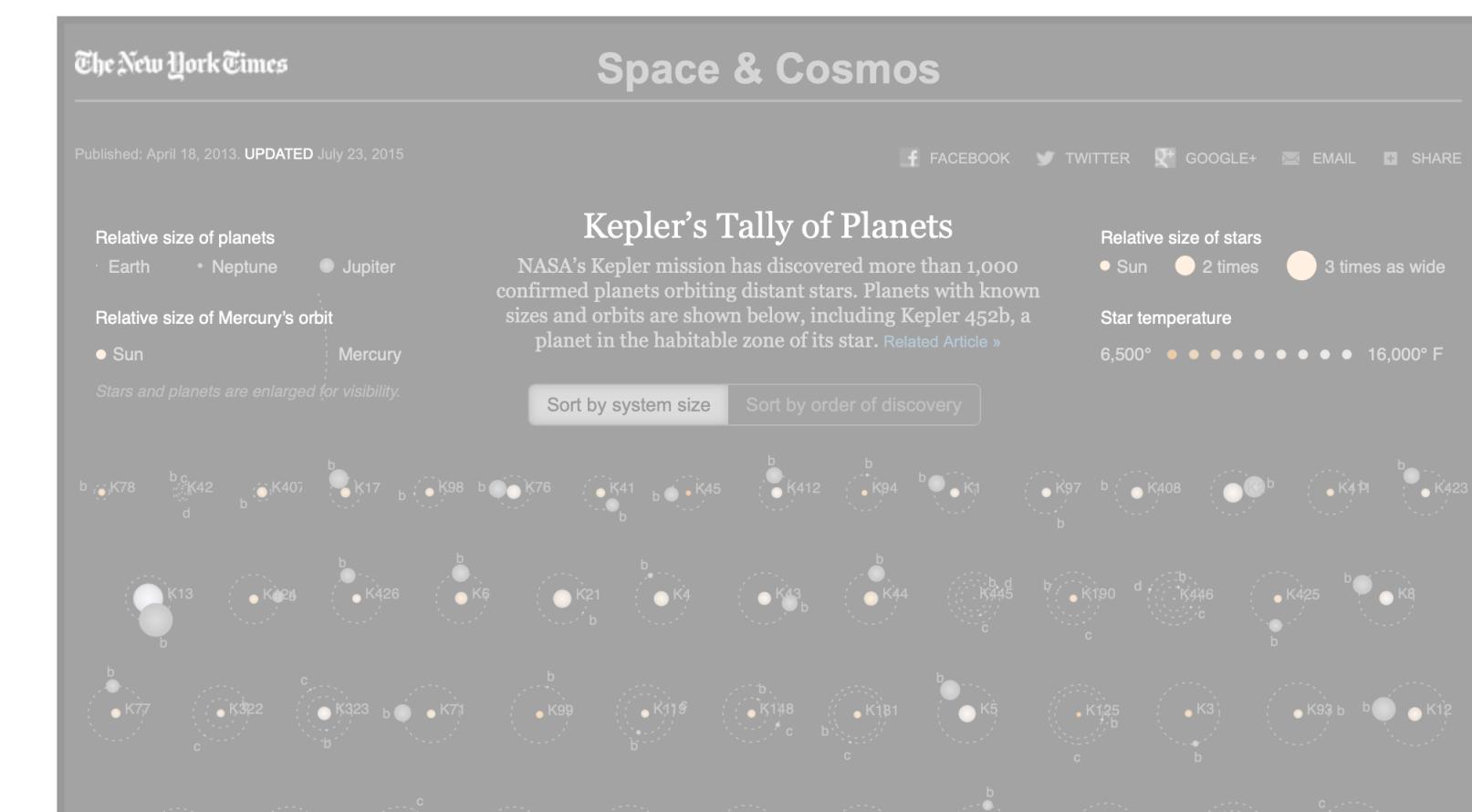
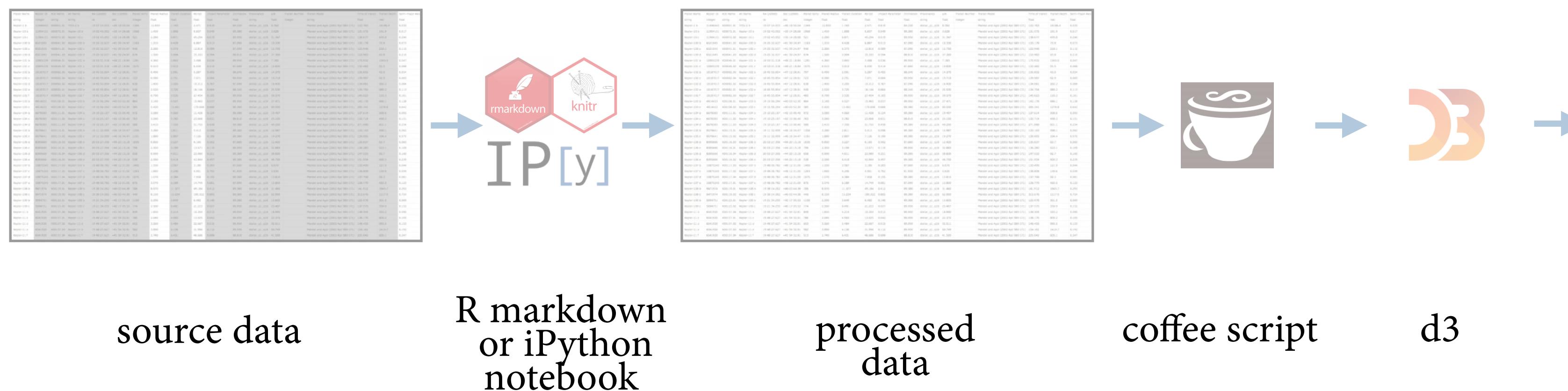
E.T. said “Good design is clear thinking made visible.” The goal of design is to elegantly show your clear thought. Try to use a range of scales, or viewpoints, in what you show. Very important — show change, not trivia! Annotate.

# See, Think, Design, Produce

# understand

# explain

*one of Corum's project process examples*



# Hone ideas within limitations

Embrace limitations; use them to hone your ideas.  
Understand every step—leave nothing to magic—in your production. Design is cumulative decision making.  
Remember what it is like to not understand.

**resources**

# References

**Spencer**, Scott. “Color,” “Layers and separation,” “Maximize information in visual displays,” “Layering and opacity,” Sec. 2.1.3.1-2.2.3 In *Data in Wonderland*. 2021. [https://ssp3nc3r.github.io/data\\_in\\_wonderland](https://ssp3nc3r.github.io/data_in_wonderland).

**Albers**, Josef. *Interaction of Color*. Yale University Press, 2006, and interactive app on iPad: <http://interactionofcolor.com>

**Boronine**, Alexei. “Color Spaces for Human Beings.” HSLuv.org (blog), March 26, 2012. <https://www.hsluv.org> and <https://www.boronine.com/2012/03/26/Color-Spaces-for-Human-Beings/>

**Harris**, Robert L. *Information Graphics: A Comprehensive Illustrated Reference*. New York: Oxford University Press, 1999.

**Koponen**, Juuso, and Jonatan Hildén. *Data Visualization Handbook*. First. Finland: Aalto Art Books, 2019.

**Spencer**, Scott. “Approximating the Components of Lupi’s Nobels, No Degrees.” Blog, March 15, 2019. <https://ssp3nc3r.github.io/post/approximating-the-components-of-lupi-s-nobel-no-degrees/>.

**Tufte**, Edward R. “Layers and Separation” and “Color and Information.” In *Envisioning Information*. Graphics Press, 1990.

———. “Data-Ink and Graphical Redesign” and “Data-Ink Maximization and Graphical Design.” In *The Visual Display of Quantitative Information*. Second. Graphics Press, 2001.

**Ware**, Colin. *Information Visualization: Perception for Design*. Fourth. Philadelphia: Elsevier, Inc, 2020.

**Wickham**, Hadley. “A Layered Grammar of Graphics.” *Journal of Computational and Graphical Statistics* 19, no. 1 (January 2010): 3–28.

**Wilke**, C. *Fundamentals of Data Visualization: A Primer on Making Informative and Compelling Figures*. First edition. Sebastopol, CA: O'Reilly Media, 2019.

**Wilkinson**, Leland. *The Grammar of Graphics*. Second. Springer, 2005.

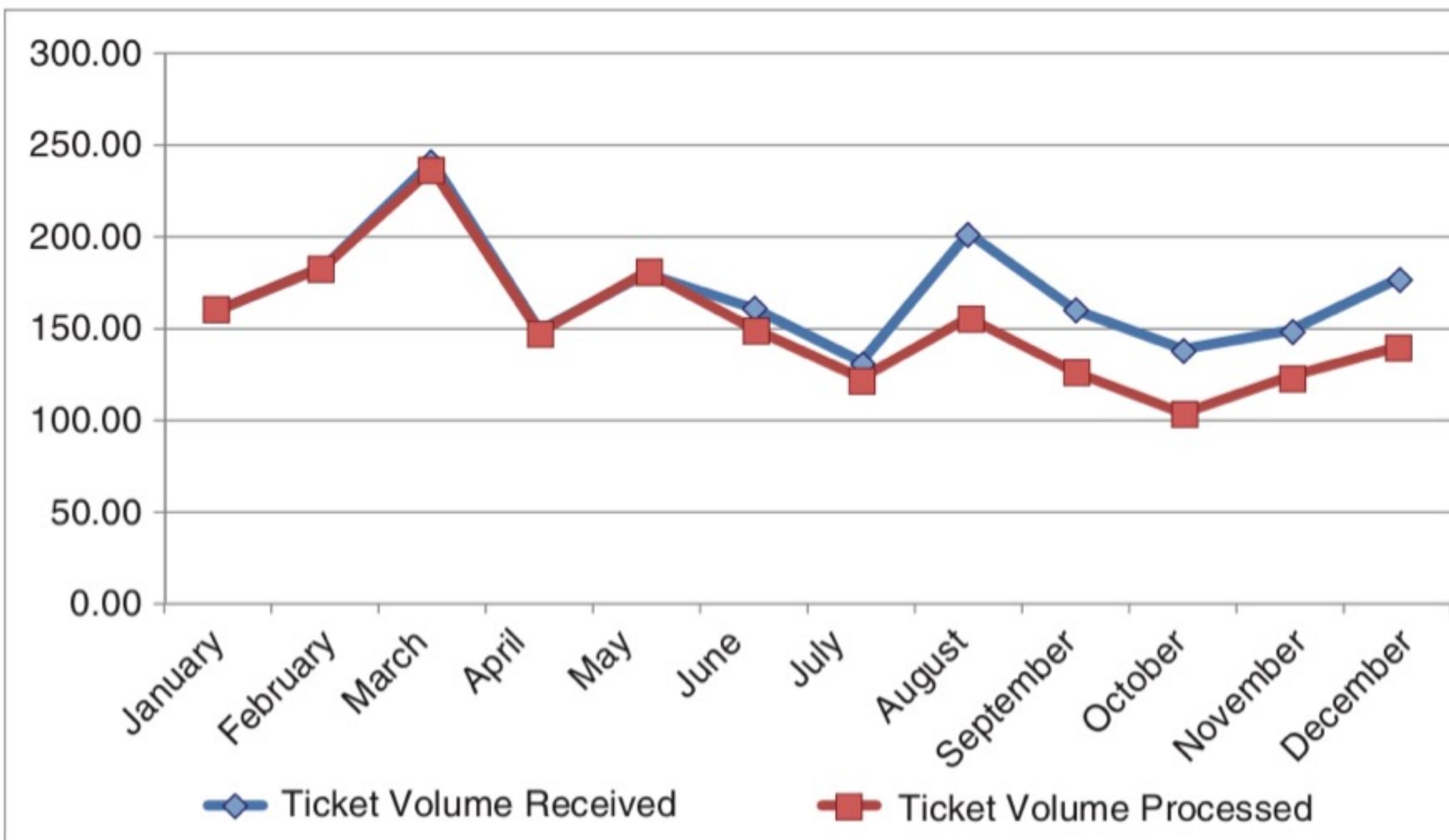
**Save**

## from exploring to explaining, example

### Please approve the hire of 2 FTEs

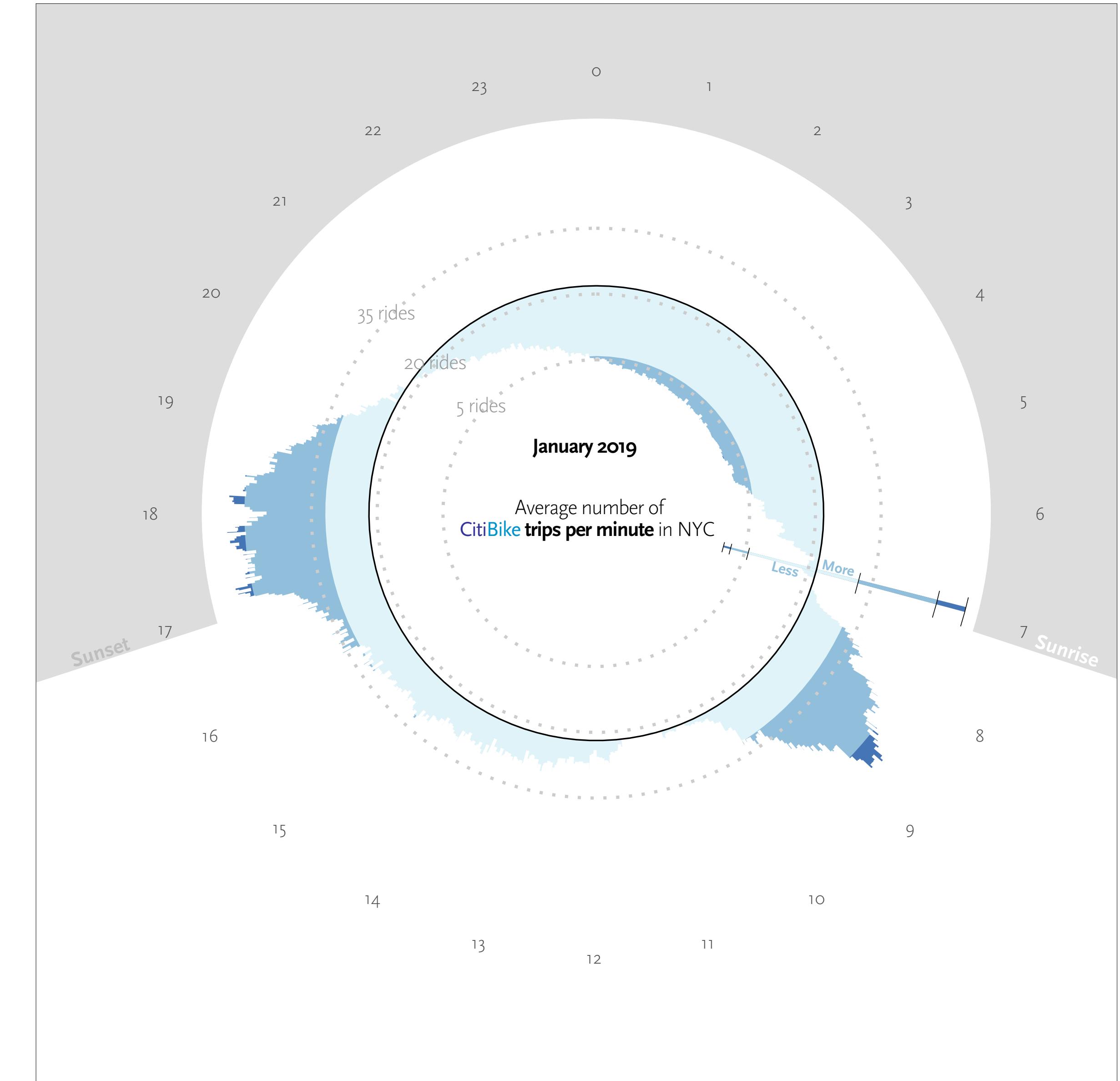
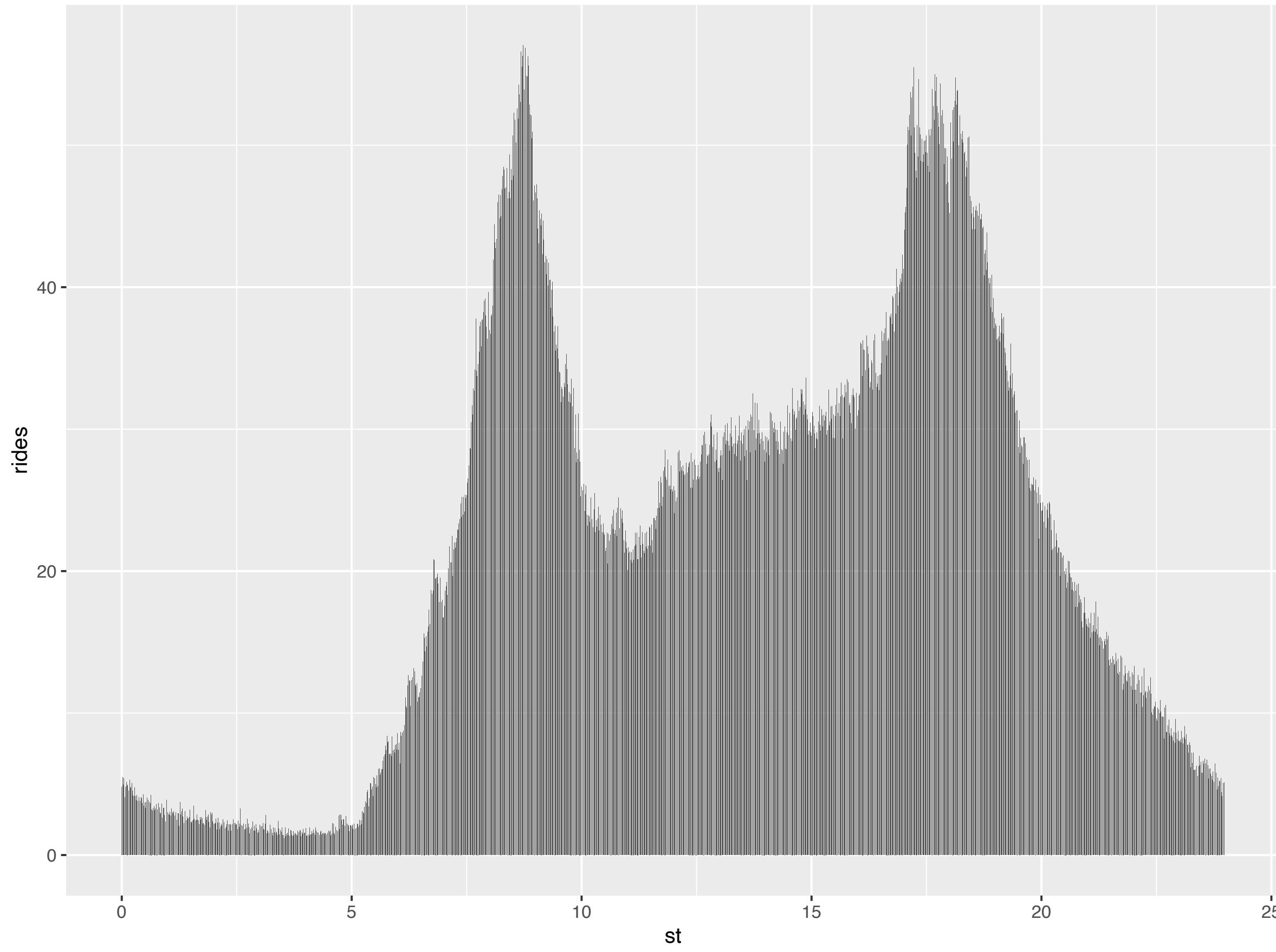
to backfill those who quit in the past year

Ticket volume over time



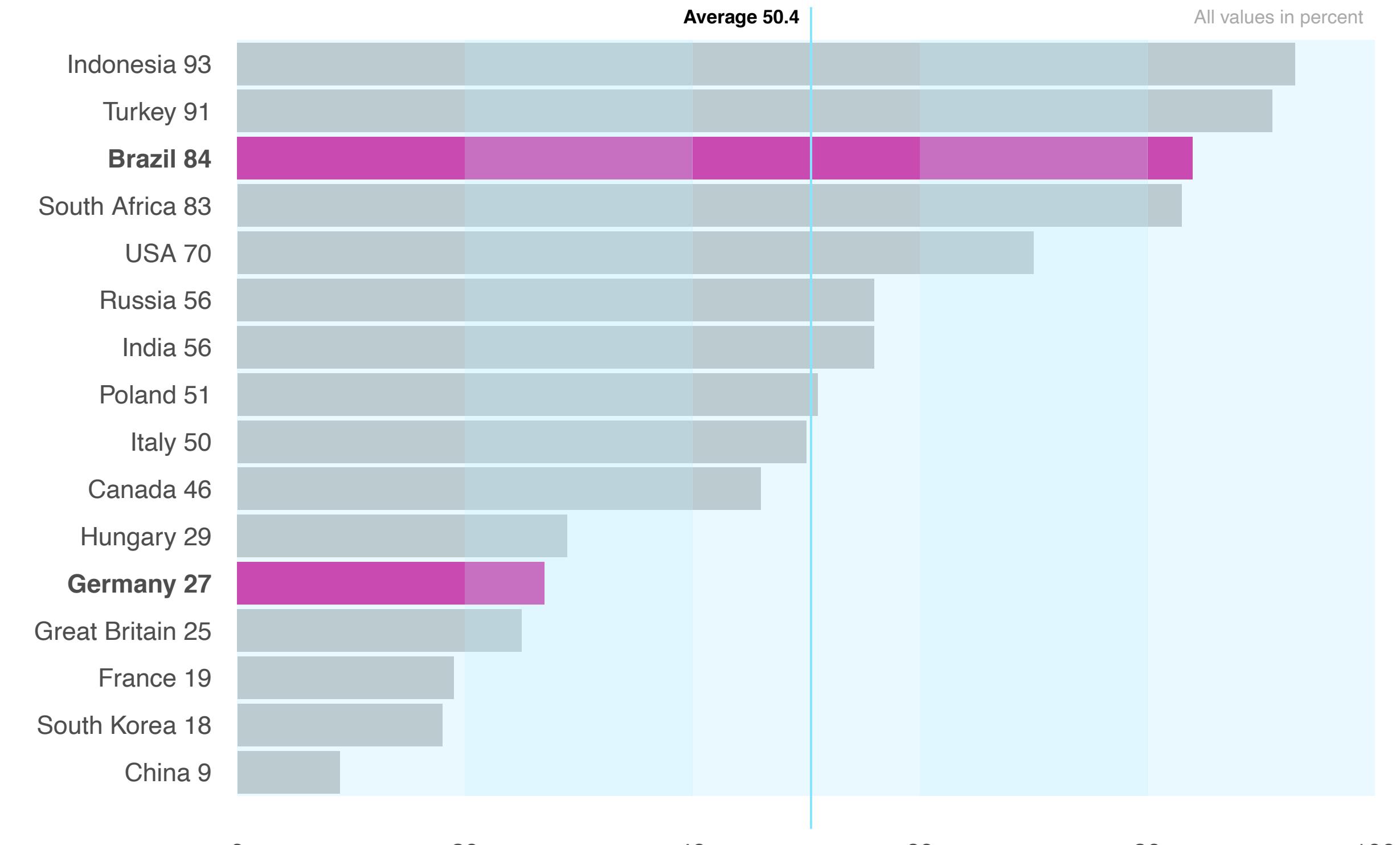
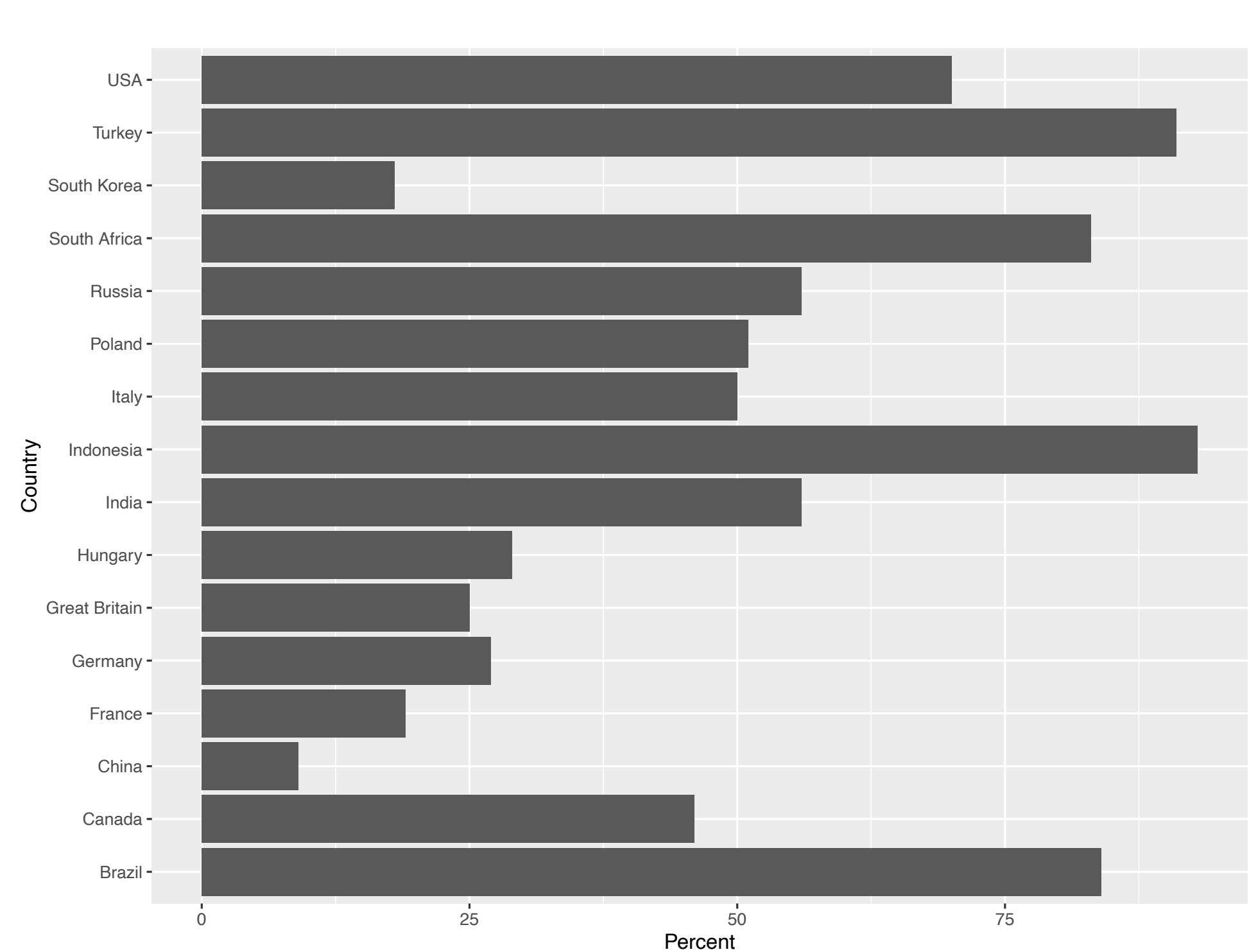
Data source: XYZ Dashboard, as of 12/31/2014 | A detailed analysis on tickets processed per person and time to resolve issues was undertaken to inform this request and can be provided if needed.

# from exploring to explaining, example



# from exploring to explaining, example

'I definitely believe in God or a Supreme Being'  
was said in 2010 in:



Source: [www.ipsos-na.com](http://www.ipsos-na.com), Design: Stefan Fichtel, ixtract