Storytelling with Data Visualization

WiMLDS Boston Talk
Elsie Lee-Robbins 2022
University of Michigan

Storytelling with Data

Hans Rosling's TED talk

https://www.ted.com/talks/hans_rosling_the_best_stats_you_ve_ever_seen

How to create effective data visualizations

- **Communicative Intent:** What is your goal? What would be a successful outcome?
- **Design Principles**: Declutter graphs of extraneous information, focus attention on the main takeaway

Eytan Adar & Elsie Lee-Robbins (2020). **Communicative visualizations as a learning problem.** IEEE Transactions on Visualization and Computer Graphics.

Kiran Ajani, Elsie Lee-Robbins, Cole Nussbaumer Knaflic, Cindy Xiong, William Kemper, Steven Franconeri (2021). **Declutter and Focus: Empirically evaluating design guidelines for effective data storytelling.** IEEE Transactions on Visualization and Computer Graphics.

What is your purpose?

Exploratory Data Analysis

- You have hypotheses, but you aren't sure what's in the data
- You are the analyst/audience for the graph
- Quicker iterations

Communicative Visualization

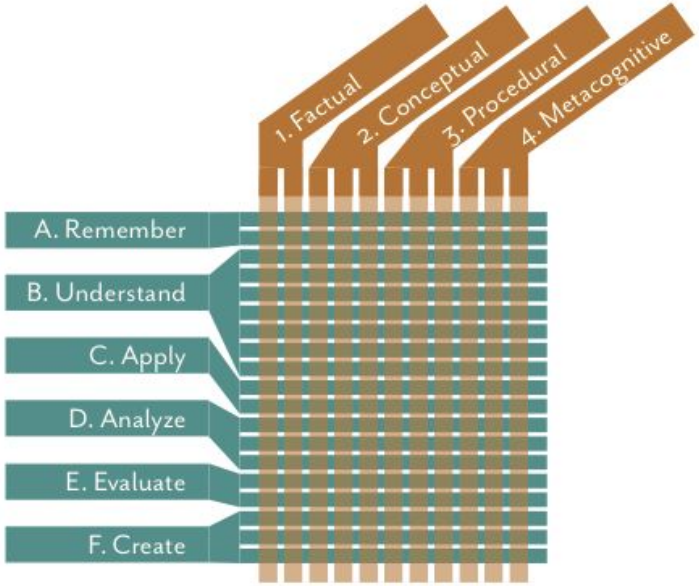
- You have a clear message
- Someone else is your audience
- Spend more time finding the best format and polishing the design

Communicative Intent

What you want to communicate to the audience

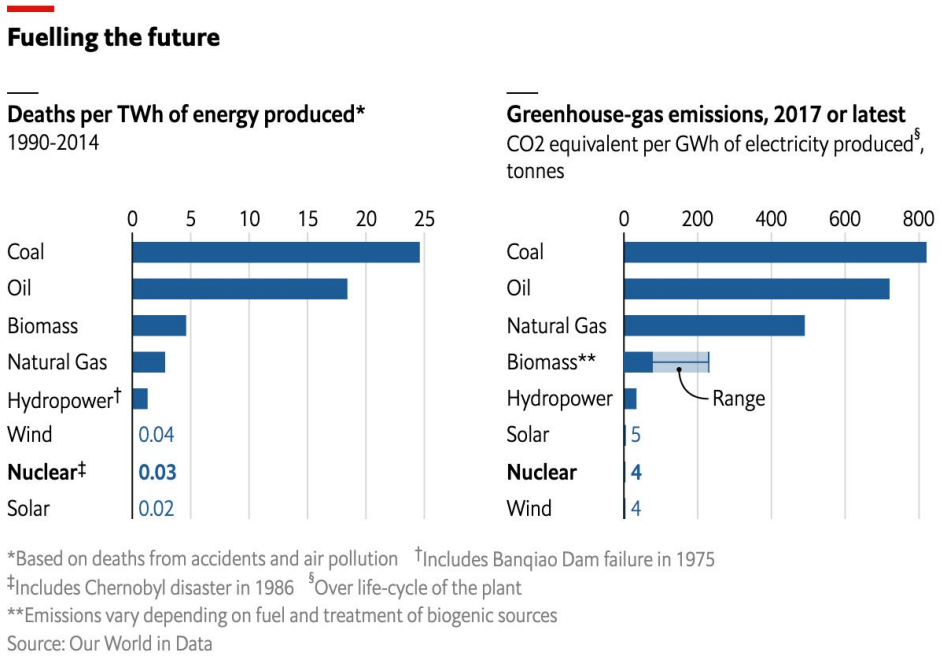
Learning Objectives

- The viewer will [**verb**] [**noun**].
- **Verbs**: Remember, Understand, Apply, Analyze, Evaluate, Create
- **Nouns**: Facts, Concepts, Procedures, Metacognitive knowledge
- http://visualobjectives.net/



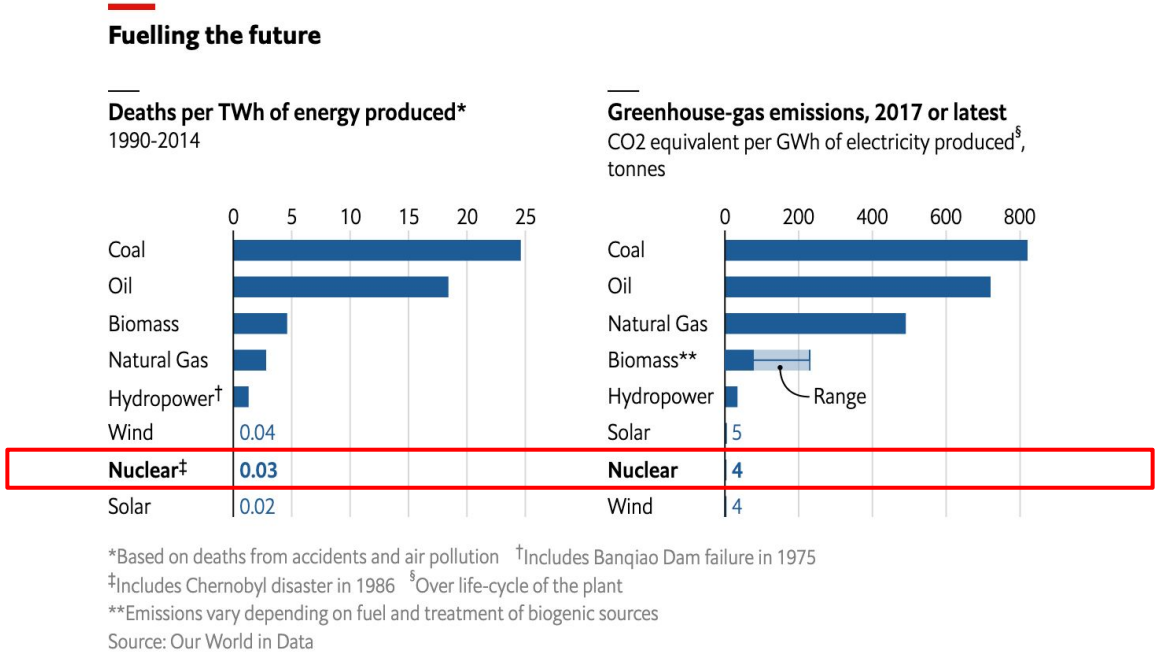
Eytan Adar & Elsie Lee-Robbins (2020). Communicative visualizations as a learning problem. IEEE Transactions on Visualization and Computer Graphics.

What is this graph communicating?



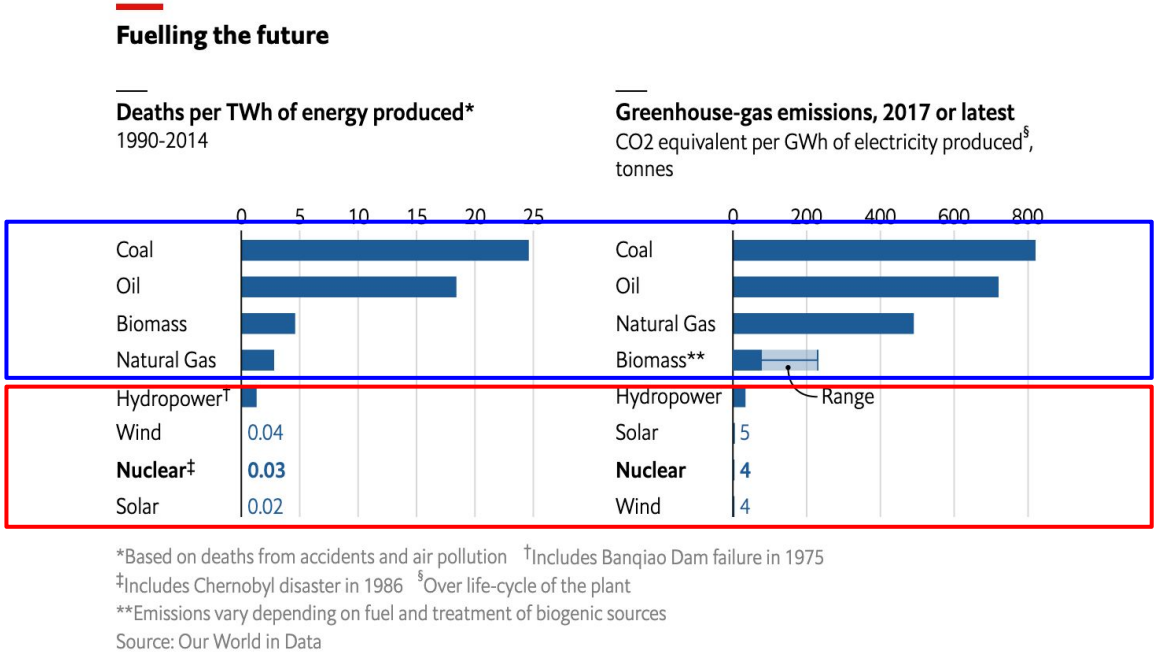
The Economist. “How safe is Nuclear Energy?” 2022.
https://www.economist.com/graphic-detail/2022/07/19/how-safe-is-nuclear-energy

The viewer will **recall** that nuclear is a safe source.



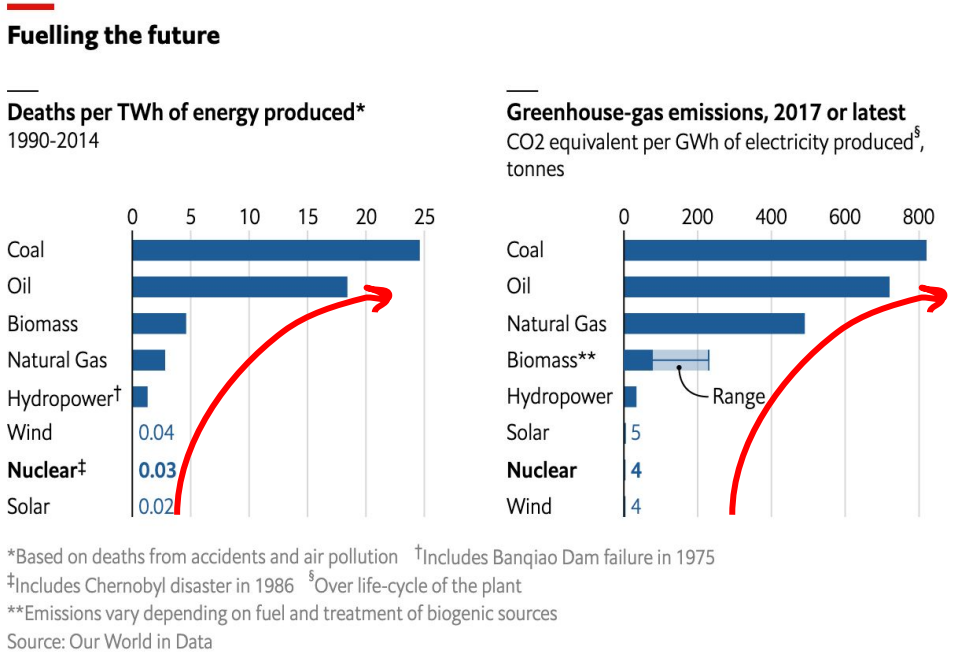
The Economist. “How safe is Nuclear Energy?” 2022.
https://www.economist.com/graphic-detail/2022/07/19/how-safe-is-nuclear-energy

The viewer will **compare** sustainable energy sources to traditional fossil fuels.



The Economist. “How safe is Nuclear Energy?” 2022. https://www.economist.com/graphic-detail/2022/07/19/how-safe-is-nuclear-energy

The viewer will **analyze** the correlation between deaths and greenhouse-gas emissions.



The Economist. “How safe is Nuclear Energy?” 2022.
https://www.economist.com/graphic-detail/2022/07/19/how-safe-is-nuclear-energy

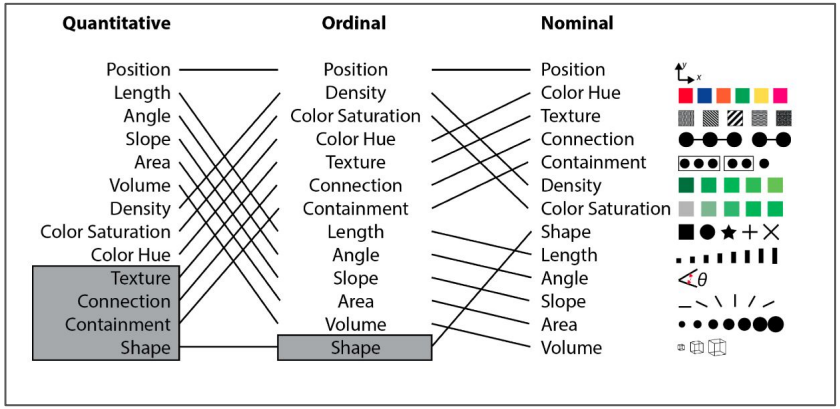

If you don't know where you're going, any road will take you there.

How specification formats impact design

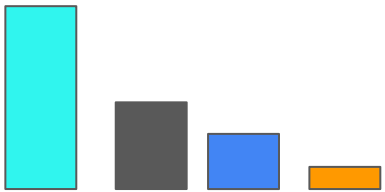
- Specifications: Insights, Learning Objectives, and Assessments
- Designer preferences
- Viewer performance
- Specifications > No guidance at all
- Insights and Learning Objectives > Assessments

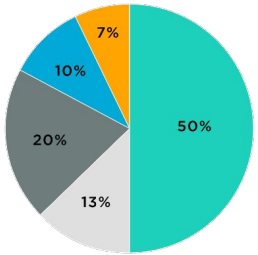
Elsie Lee-Robbins, Shiqing (Licia) He, & Eytan Adar (2021). Learning objectives, insights, and assessments: How specification formats impact design. IEEE Transactions on Visualization and Computer Graphics.

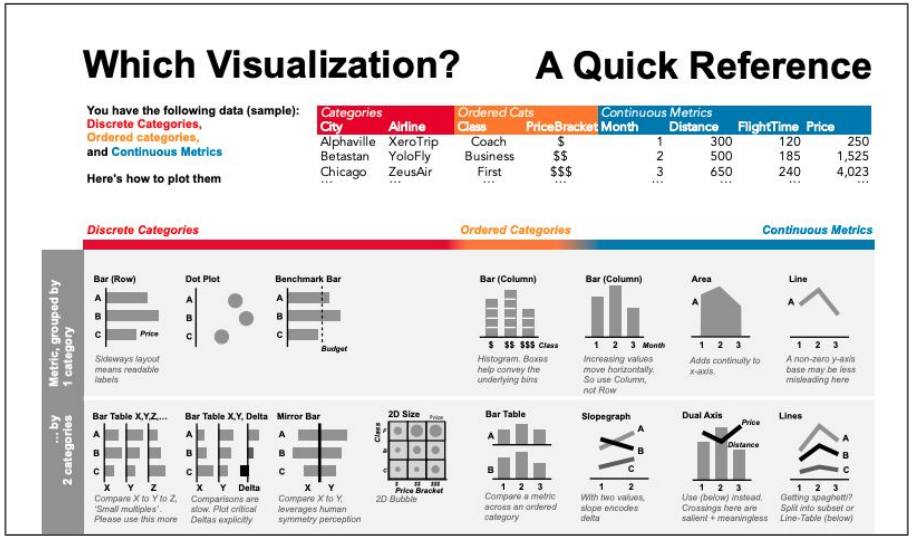
How to Choose the Right Chart Type



Mackinlay, J. (1986). Automating the design of graphical presentations of relational information. Acm Transactions On Graphics (Tog), 5(2), 110-141.







ExperCeption.net by Steve Franconeri

Iteration!

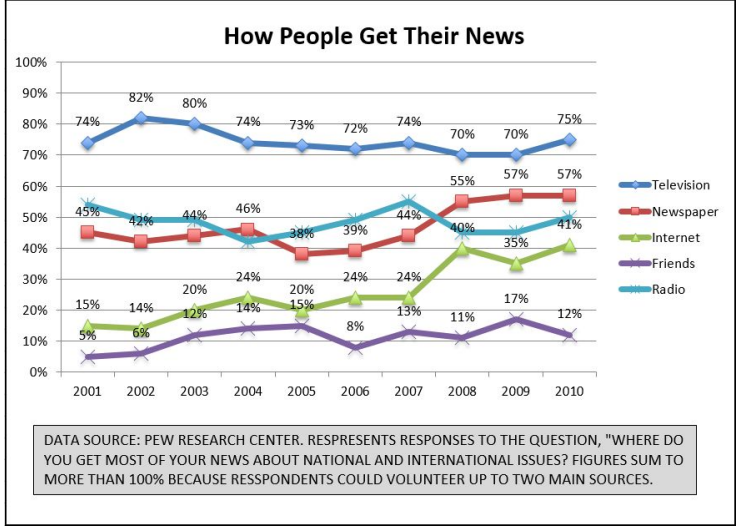
Design Principles

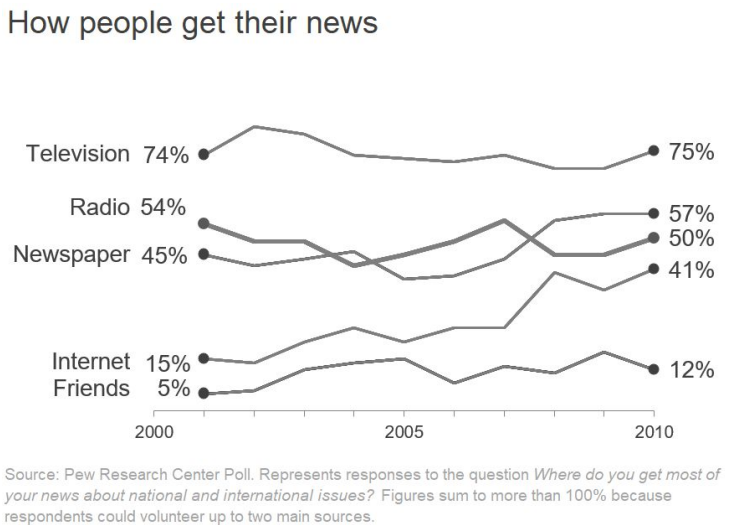
Declutter and Focus

Guidelines: Declutter and Focus

Declutter

- No 3D!
- Only a few colors
- No extraneous data labels
- No extraneous axis ticks
- No extraneous gridlines
- Directly label legend
- Left-align title



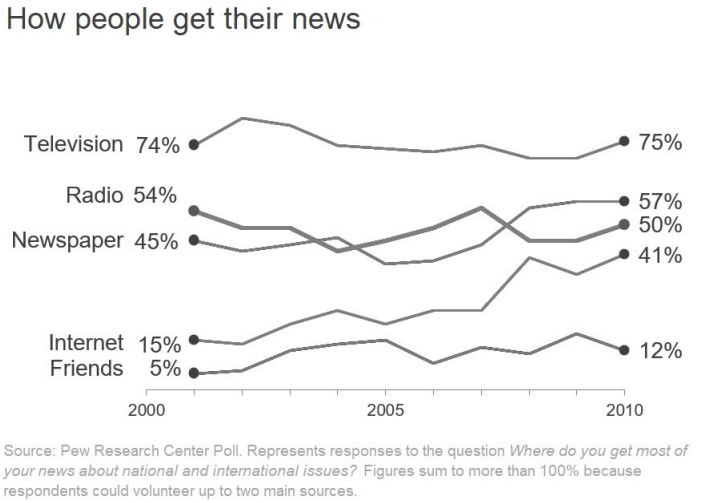


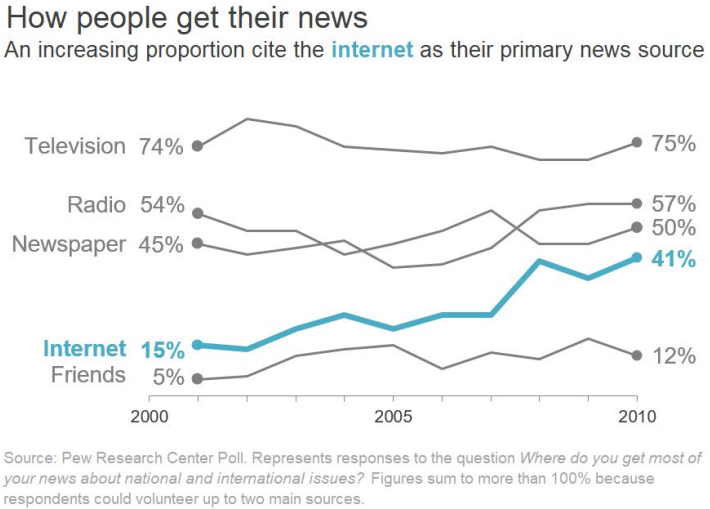
Kiran Ajani, Elsie Lee-Robbins, Cole Nussbaumer Knaflic, Cindy Xiong, William Kemper, Steven Franconeri (2021). Declutter and Focus: Empirically evaluating design guidelines for effective data storytelling. IEEE Transactions on Visualization and Computer Graphics.

Guidelines: Declutter and Focus

Focus

- Titles that summarize the main conclusion
- Add annotations to point out interesting trends
- Use color to guide the reader





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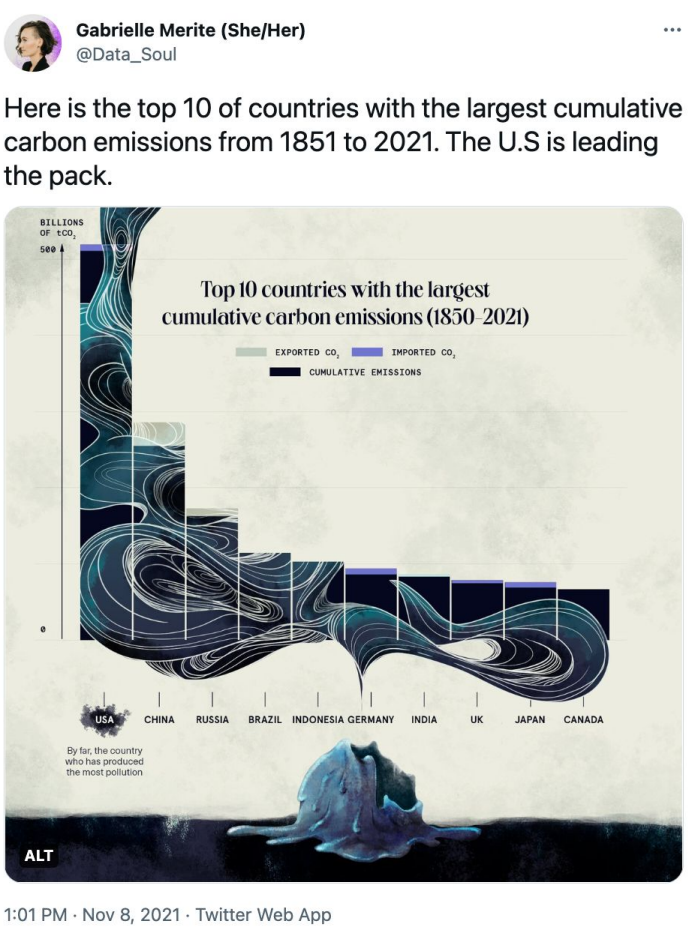
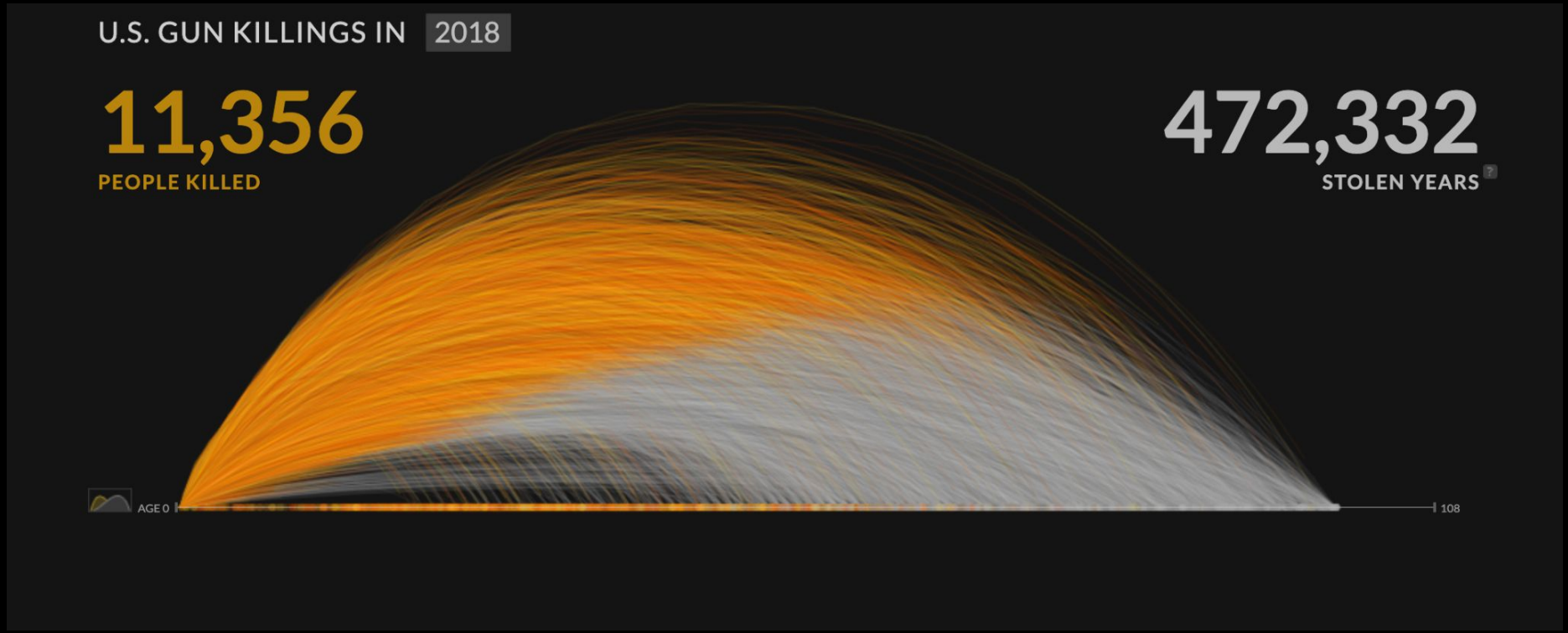
Context and Other Media

- In a tweet or an instagram post
- Embedded in an article
- Featured in a video
- Alongside personal narratives
- Presented by a narrator



Affective Intent

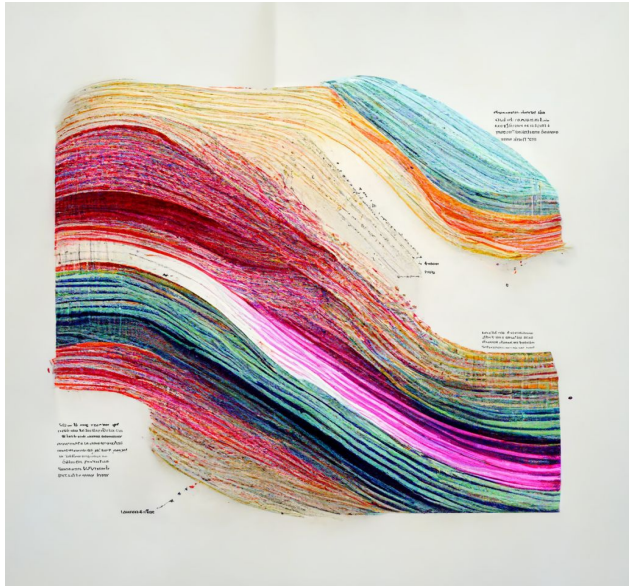
Reaction or a response to an appraisal, attitude, or value



Periscopic, 2018. guns.periscopic.com

Affective Objectives

- Data visualizations are not neutral
- Some designers perceive that “persuasive” goals are not socially acceptable
- Designers should acknowledge their affective intent and subjective biases



Elsie Lee-Robbins & Eytan Adar (2022). Affective Learning Objectives for Communicative Visualizations. IEEE Transactions on Visualization and Computer Graphics.

Storytelling with Data Visualizations

Purpose/Goals

- Who is your audience?
- What is your communicative intent?

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Design Decisions

- What is the best visualization format?
- Declutter and Focus
- Get feedback! Test it out! Iterate!

Storytelling with Data by Cole Nussbaumer Knafflic

Thank you!

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Additional Resources

Some of my personal favorite books:

- **Data Feminism** by By Catherine D'Ignazio and Lauren F. Klein (favorite)
- **How Charts Lie** by Alberto Cairo
- **Data Sketches** by Nadieh Bremer and Shirley Wu (fun!)
- **Making Numbers Count** by Chip Heath and Karla Starr (not about dataviz specifically, but a recent favorite of mine)

Colors:

- ColorBrewer
- Viz Palette
- Coolors (more just for fun)
- More Info

More places I like:

- The Pudding
- Nightingale
- Data Visualization Society