Utilizing Visualization for Program Evaluation:
Practical Strategies for Effectively Communicating Evaluation Findings

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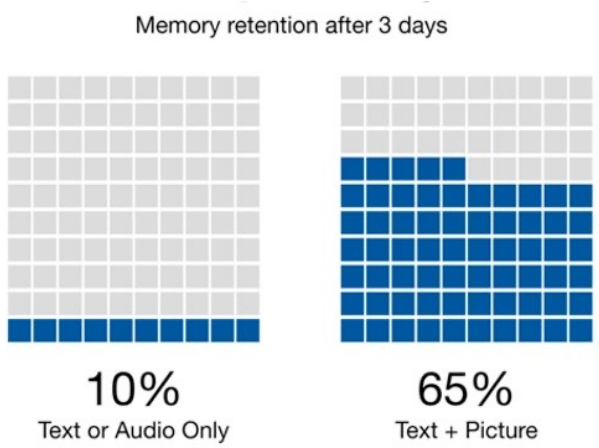
Centers for Disease Control and Prevention
Data Visualization Science Advisory Group

December 4, 2023

Why Visualize Data?

Data visualization is the visual representation of information and data.

The end goal is to help users pull out insights quicker and more effectively than in non-visual formats.



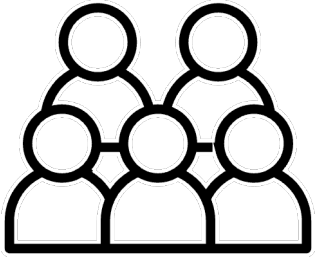
Krum R. Cool Infographics: Effective Communication with Data Visualization and Design. 2014.

3 Steps to Effectively Communicate Your Findings

1

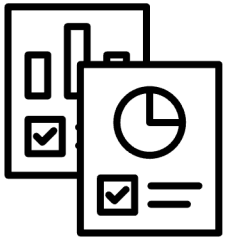
What is the objective and the message?

2



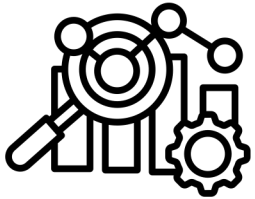
Who is the audience?

3



How best to deliver it?

The Objective



Explore

Help users navigate the data

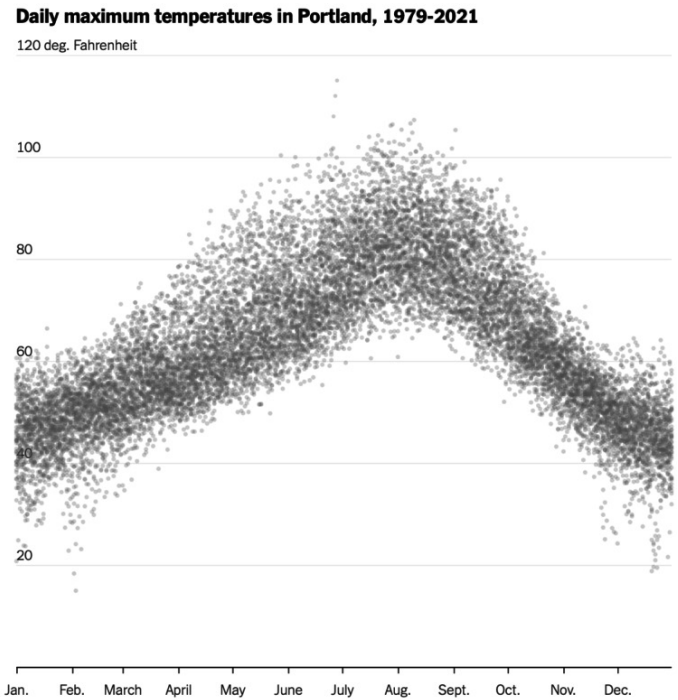
Explain

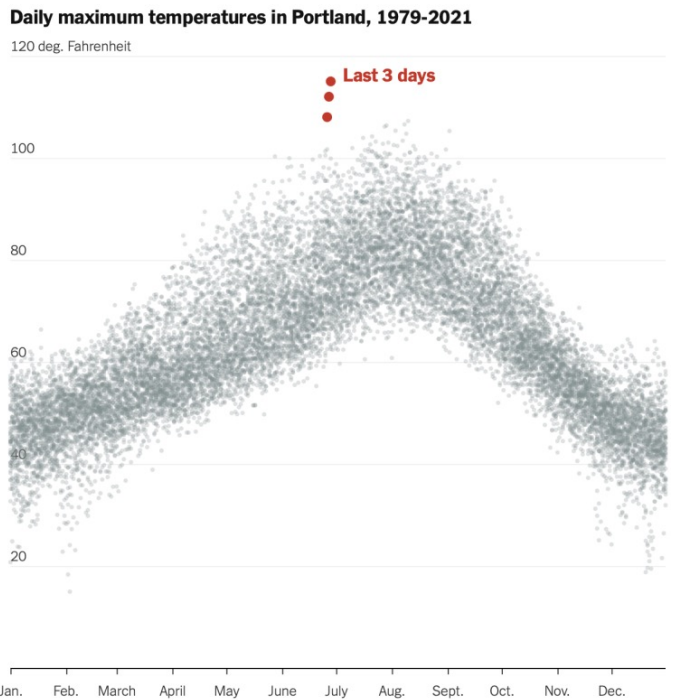
Inform, present an argument, convince

Excite

Inspire an emotional response

The Message: What Do You Remember?

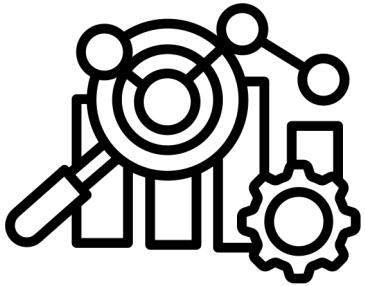




Yau N. “Analytical Stand-in – The Process 146”. https://flowingdata.com/2021/07/01/process-146-analytical-stand-in/.

Poll: Share with us!

What is the most common objective of the reports/visuals you work on?



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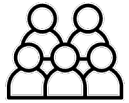
WHO 

Understanding Your Audience

Who is consuming this information?

- Tone
- Familiarity with topic
- Areas of interest

When, where, how will they be interacting with the visualization?

- Context and environment
- Time available
- Device

Gunn E. Who is your chart for? 2020. https://medium.com/nightingale/who-is-your-chart-for-753fee6b5d16

Chat: Share with us!

> **Who do you most often communicate evaluation findings to?**

Using Social Math for Complex Statistics

Social math is simplifying complex statistics by reframing them within more familiar contexts.

- **Use whole numbers when possible.**
  - People tend to think on a log scale (one, two, few, many).
- **Simplify percentages and proportions** to "One in ____" statements.
  - Easier to interpret denominators in 10s, 100s, 1000s.
- **Use metaphors.** Compare statistic to something familiar to your audience.
  - Familiar object, city, landmark.

Berkeley Media Studies Group. Using social math to support your policy issue. 2015. http://www.bmsg.org/blog/using-social-math-to-support-your-policy-issue/

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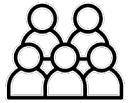
Image by Mona Chalabi (@MonaChalabi)

Berkeley Media Studies Group. Using social math to support your policy issue. 2015. http://www.bmsg.org/blog/using-social-math-to-support-your-policy-issue/.

WHO

Chat: Share with us!

> **Convert this statement into a social math statement: 7,000 high school students drop out every day.**

WHO 

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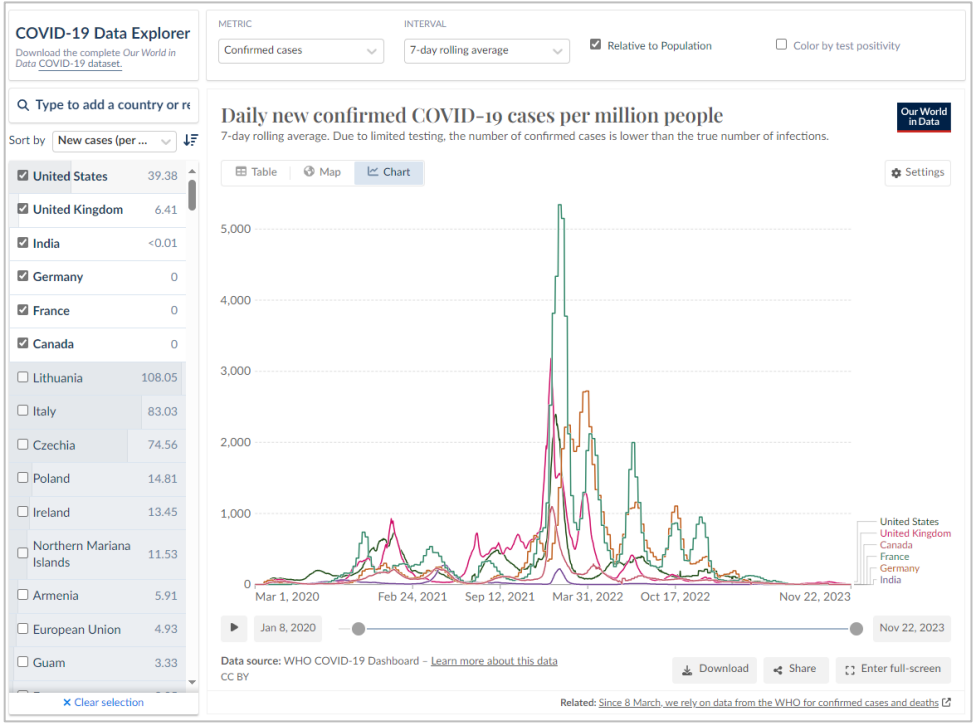
Picking the Best Format

- What is the objective?
- How much time does your audience have?

Dashboards give lots of options for exploration but require time.



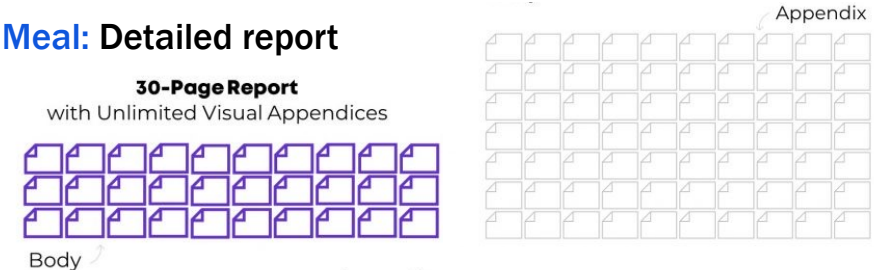
Edouard Mathieu, Hannah Ritchie, Lucas Rodés-Guirao, Cameron Appel, Charlie Giattino, Joe Hasell, Bobbie Macdonald, Saloni Dattani, Diana Beltekian, Esteban Ortiz-Ospina and Max Roser (2020) - "Coronavirus Pandemic (COVID-19)". Published online at OurWorldInData.org. Retrieved from: 'https://ourworldindata.org/coronavirus' [Online Resource]

Picking the Best Format

- What is the objective?
- How much time does your audience have?

Content in a large report can be repurposed for different audiences.

Meal: Detailed report



Snack: Concise summary

Bite: Most important information in a single image

Emery A. Unlimited visual appendices: The bare minimum for designing reports that actually inform decisions. https://depictdatastudio.com/the-30-3-1-approach-with-unlimited-visual-appendices-the-bare-minimum-for-designing-reports-that-actually-inform-decisions/

Picking the Best Format

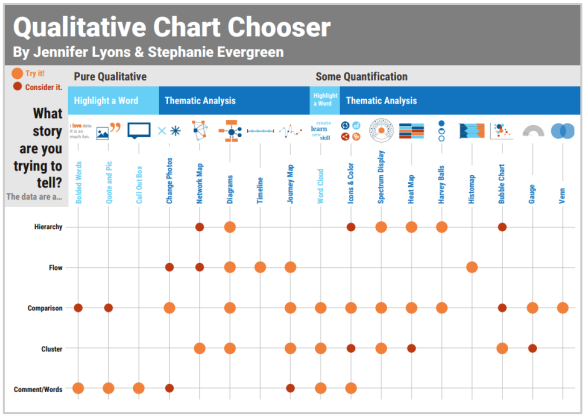
- What is the objective?
- How much time does your audience have?

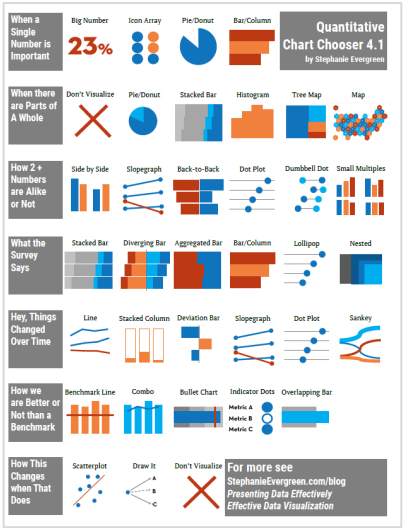
Posters and creative formats can get a message across at-a-glance.

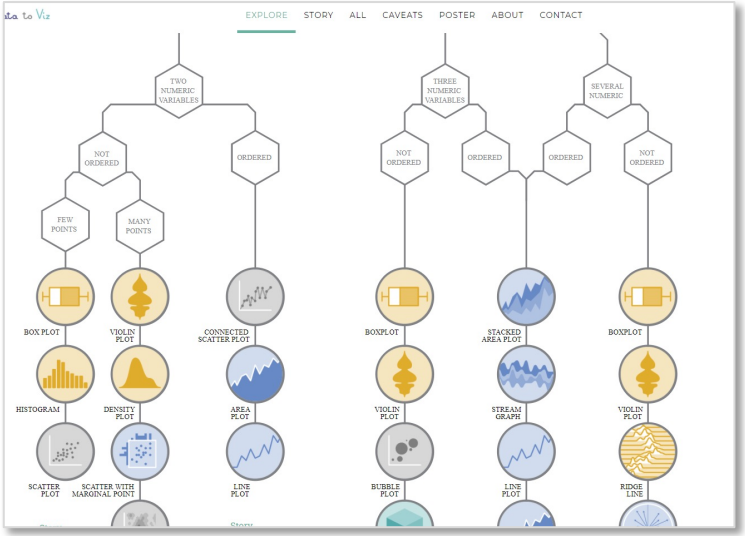
https://housingtrustfundproject.org/campaigns/making-your-case/communication-strategy/being-heard/social-math/

Selecting Your Visualization Type

Visualization type depends on **objective** and **variable types**. Data visualization catalogues are a good place to start.





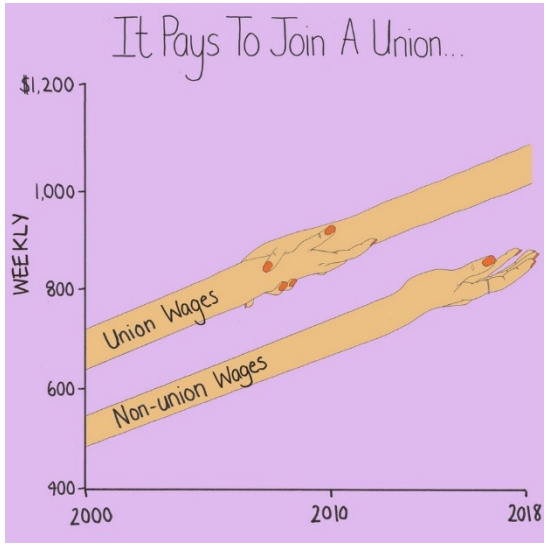


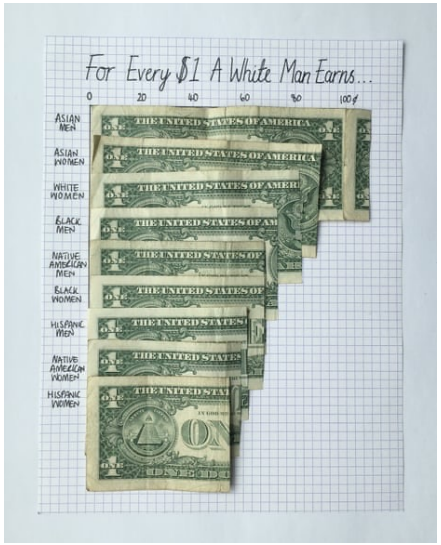
Evergreen Data. https://stephanieevergreen.com/

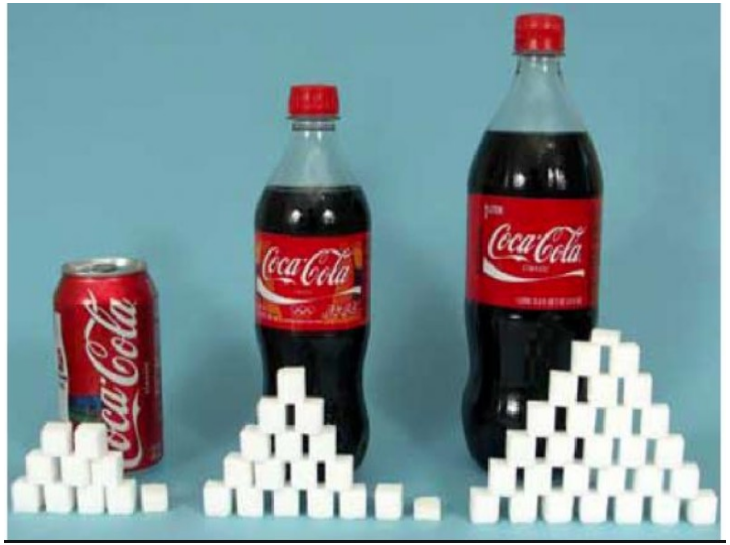
The Data Visualization Catalogue. https://datavizcatalogue.com/

Selecting Your Visualization Type

- Reformat traditional visualizations to catch attention.





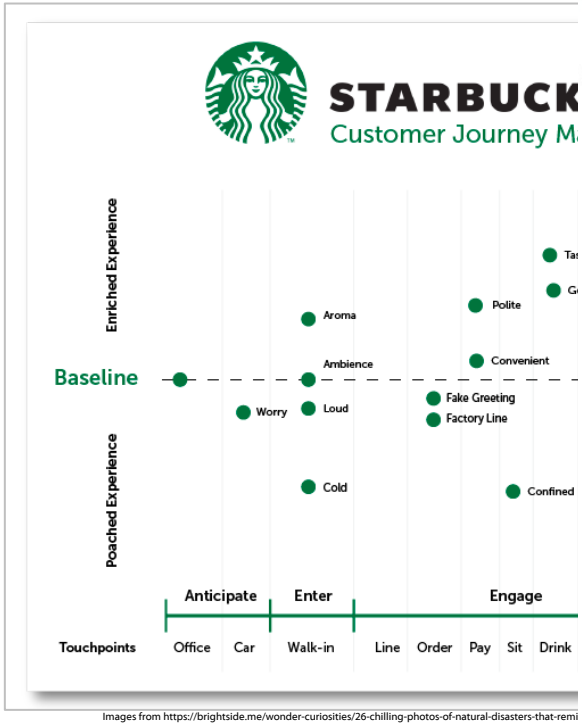


Graphics by Mona Chalabi (@MonaChalabi)

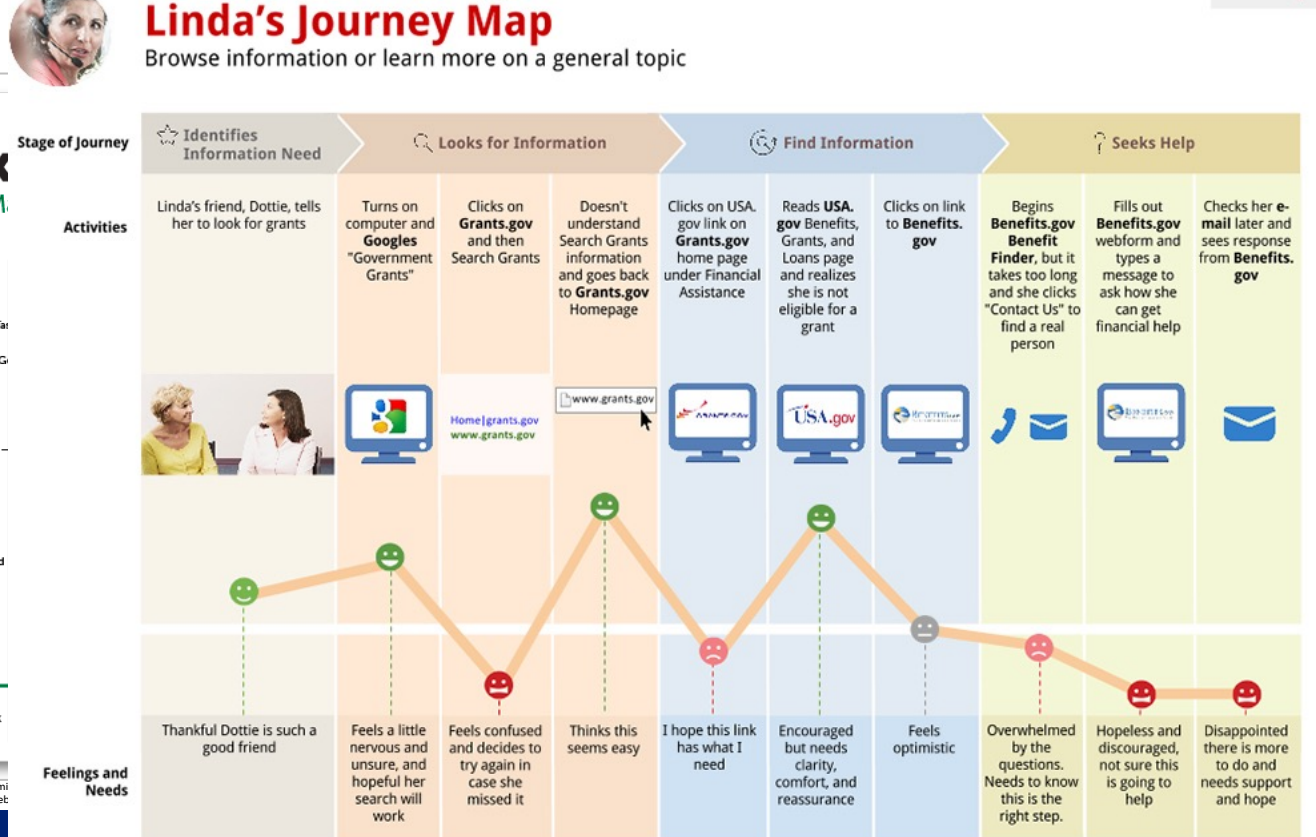
Yocco, V. and Pulli, A. 2016. Social Math: A Method to Make Complex Data Meaningful. *Bulletin of the Association for Information Science and Technology*. https://onlinelibrary.wiley.com/doi/full/10.1002/bul2.2016.1720420507

Selecting Your Visualization Type

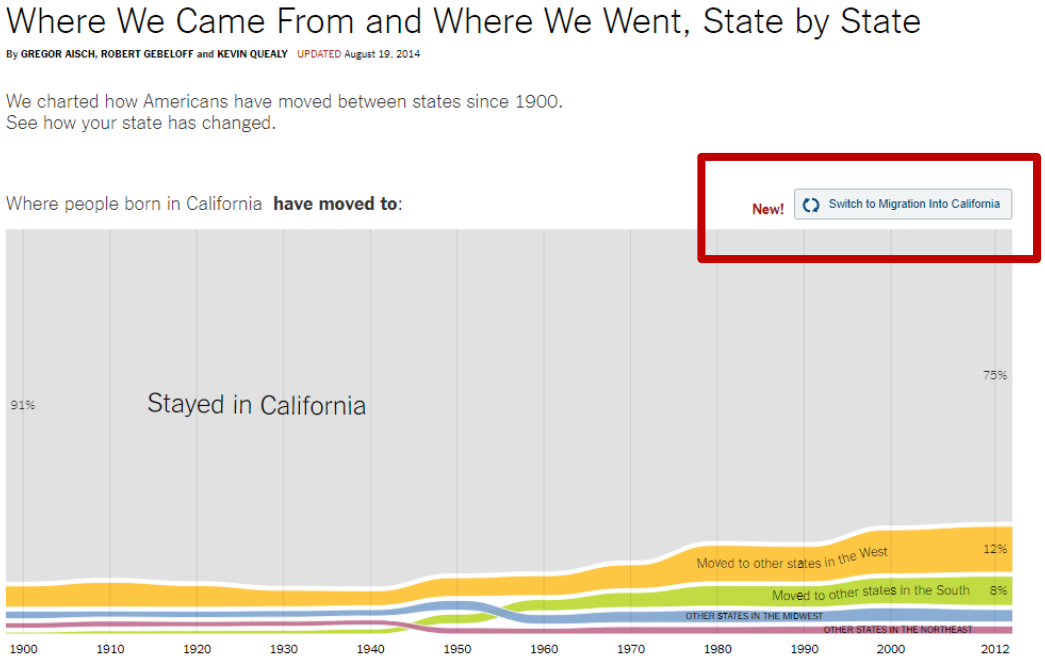
- Journey Maps



Images from https://brightside.me/wonder-curiosities/26-chilling-photos-of-natural-disasters-that-remi
source=brightside_web&utm-medium=article&utm-campaign=faceb



Testing and Iterating



Aisch G, Robert G, Quealy K. Where we came from and where we went, state by state. 2014. https://nyti.ms/2jRA6xh

Testing and Iterating

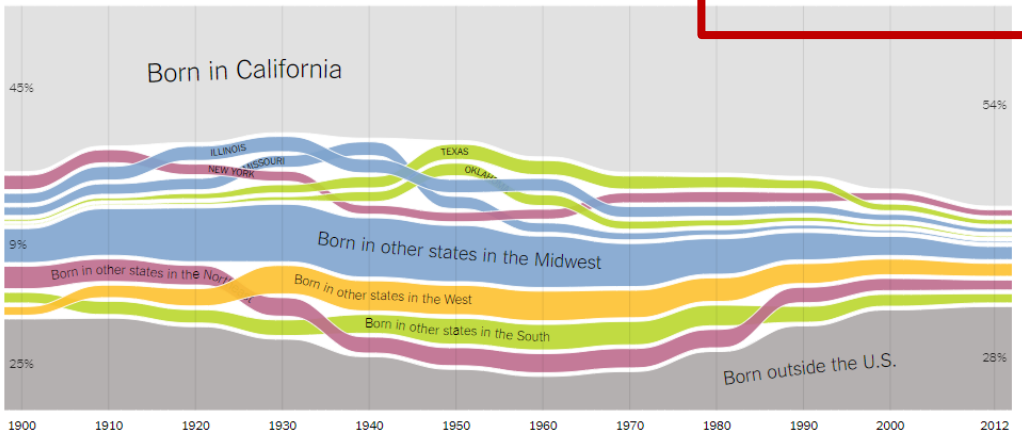
Where We Came From and Where We Went, State by State

By GREGOR AISCH, ROBERT GEBELOFF and KEVIN QUEALY UPDATED August 19, 2014

We charted how Americans have moved between states since 1900.
See how your state has changed.

Where people living in California **were born**:

New! Switch to Diaspora Out of California



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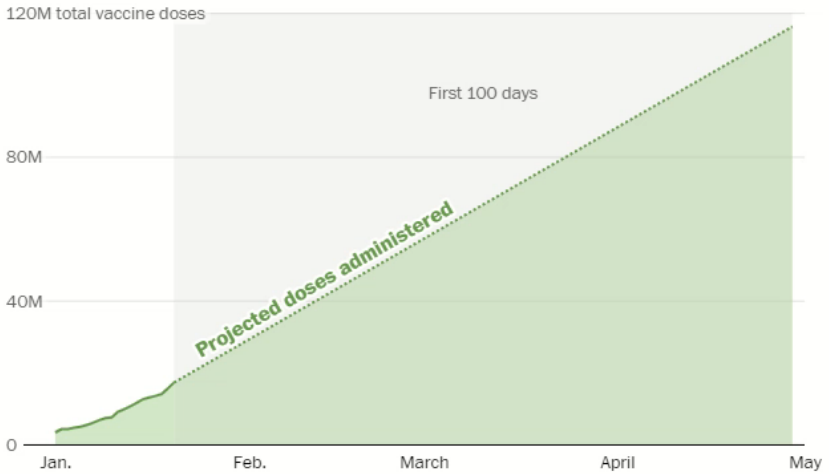
Testing and Iterating

How a sluggish vaccination program could delay a return to normal and invite vaccine-resistant variants to emerge

Shots per day **1.00M**

1M 3M 5M

That day, Biden reaffirmed his "100 million shots in 100 days" pledge to administer **1 million** shots per day over his first 100 days in office.



Stevens H, Steckelberg A, Ahmed N. How a sluggish vaccination program could delay a return to normal. 2021.

Improving Your Visualizations

Step-by-step examples for creating more effective visuals

Example #1

Main message:
Customers experienced issues with webinar

Types of issues:
- AV quality
- Deficient visuals
- Unclear agenda
- Other issues

Sample comments

Action item

BEFORE

When responding to the question "What could have been improved?", customers' top 3 responses were complaints with A/V (poor video quality), the presenter's visuals and an unclear agenda.

Complaints with A/V quality:
- "The main challenge was logging into the webinar."
- "The AV quality is was difficult."
- "Sometimes the presenter's voice was very garbled for me. Very distracting to the flow and when asking a question, I didn't know if I was heard/understood."

The presenter's visuals were lacking:
- "Technical issues impacted my ability to see the presenter's visuals."
- "Many times the PPT froze or didn't work."

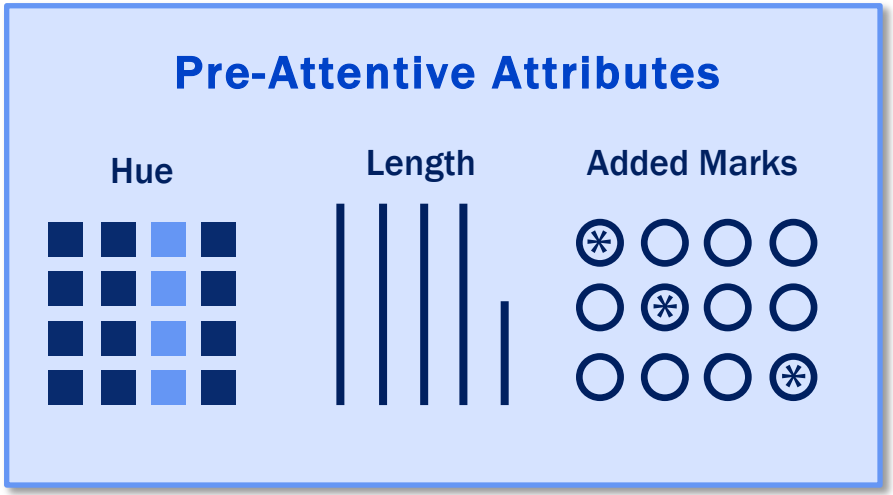
The agenda was unclear:
- "The webinar started late with a lot of time wasted."
- "Bad pre-sharing of information, no time keeper, no clear goal."
- "The agenda seemed very fluid and I was confused around the main point."

http://www.storytellingwithdata.com/blog/2018/10/10/three-tips-for-storytelling-with-qualitative-data

Making Your Message Pop

Good data visualizations deliver insights by leveraging the things our brains do well for free.

- Use **pre-attentive attributes** sparingly and consistently to direct attention
- Declutter
- Use text to explain if needed
- Create a visual hierarchy to organize



Example #1

LARGEST TEXT SIZE

1. **Main message:** Customers experienced issues with webinar

3. **Types of issues:**
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   - Deficient visuals
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   - Other issues

4. **Sample comments**

2. **Action item**

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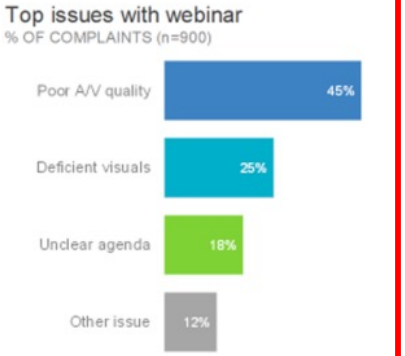
Example #1

- ☑ Takeaway message is clear
- ☑ Top three areas for improvement are clear
- ☑ Given option to look at sample comments grouped by area
- ☑ Action item is prominent

AFTER

Customers experienced issues with webinar



Sample verbatim comments

The main challenge was logging into the webinar | AV quality was difficult | Sometimes the presenter's voice was very garbled for me. Very distracting to the flow and when asking a question, I didn't know if I was heard/understood.

Technical issues impacted my ability to see the presenter's visuals | Many times the PPT froze or didn't work.

The webinar started late with a lot of time wasted | Bad pre-sharing of information, **no time keeper,** no clear goal | The agenda seemed very fluid and I was **confused around the main point.**

Lack of interest | Topic was not relevant | Unspecified

Let's discuss an immediate action plan for next quarter.

http://www.storytellingwithdata.com/blog/2018/10/10/three-tips-for-storytelling-with-qualitative-data

Example #2

Create a report on tobacco product use among high school students after data release

- Interested in **most popular tobacco product** used in 2018
- Interested in **change over time** (2011 to 2018)

Tobacco use in the past 30 days among adolescents in grades 9–12, 2011 and 2018

Product	2011	2018
Cigarettes	15.8	8.1
Cigars	11.6	7.6
Electronic cigarettes	1.5	20.8
Hookah	4.1	4.1
Pipe tobacco	4.0	1.1
Smokeless tobacco	7.9	5.9
Pipe tobacco	4.0	1.1

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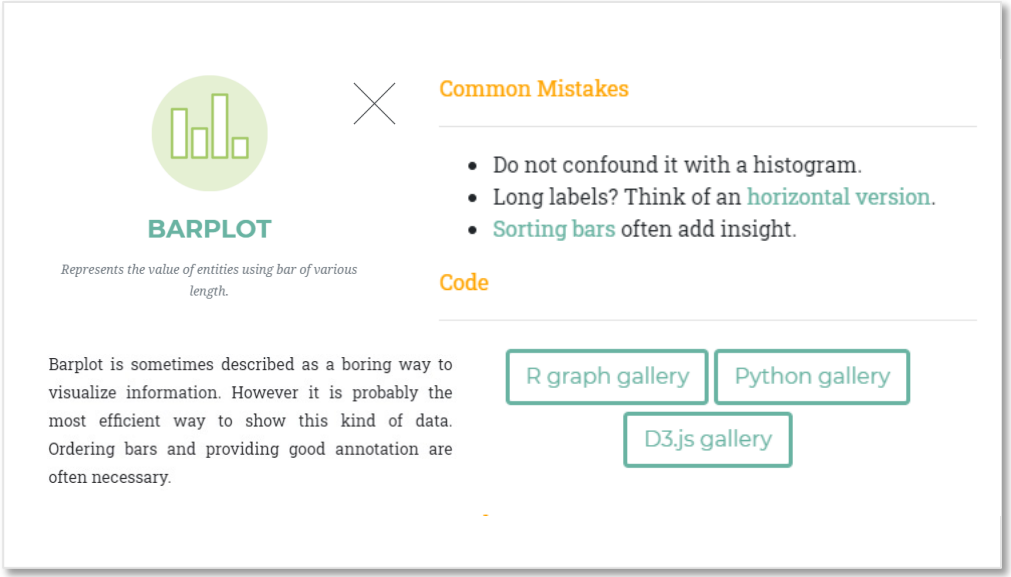
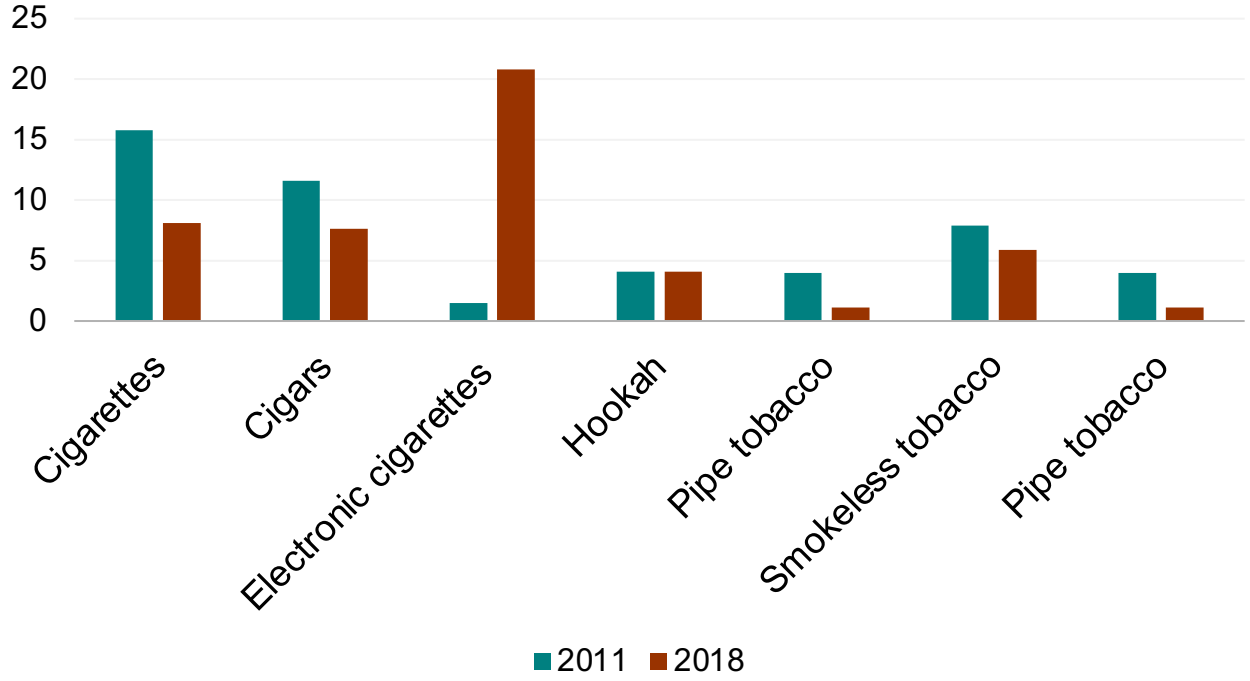


Tobacco use in the past 30 days among adolescents in grades 9–12, 2011 and 2018



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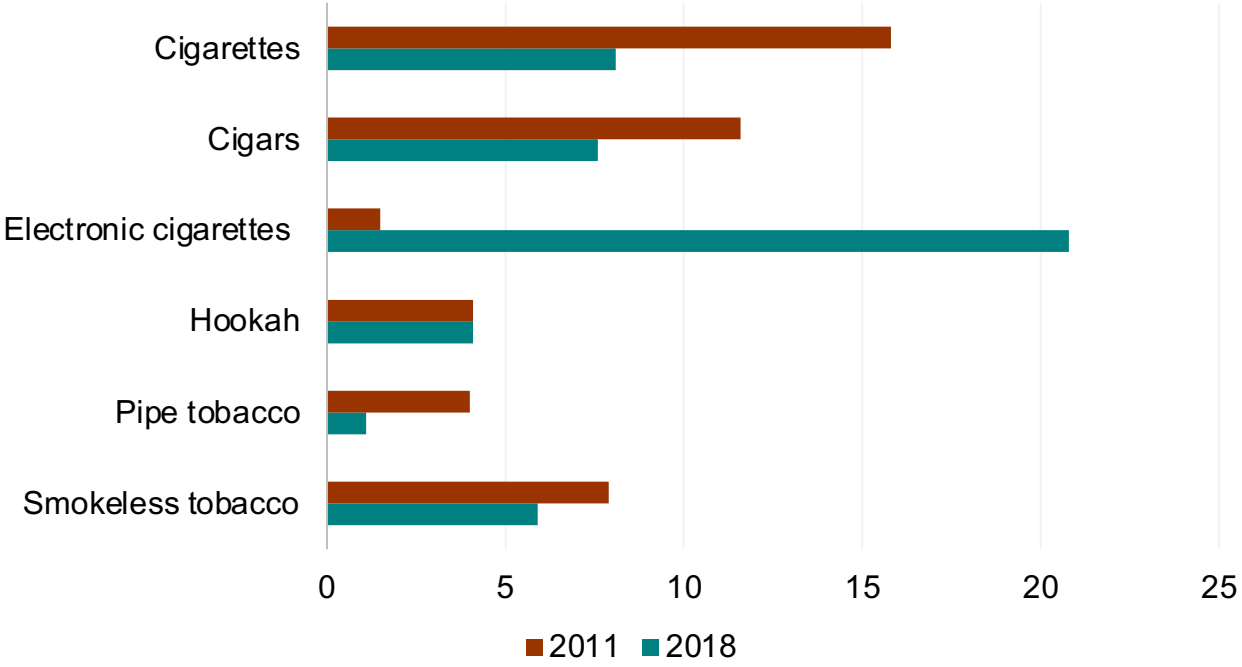

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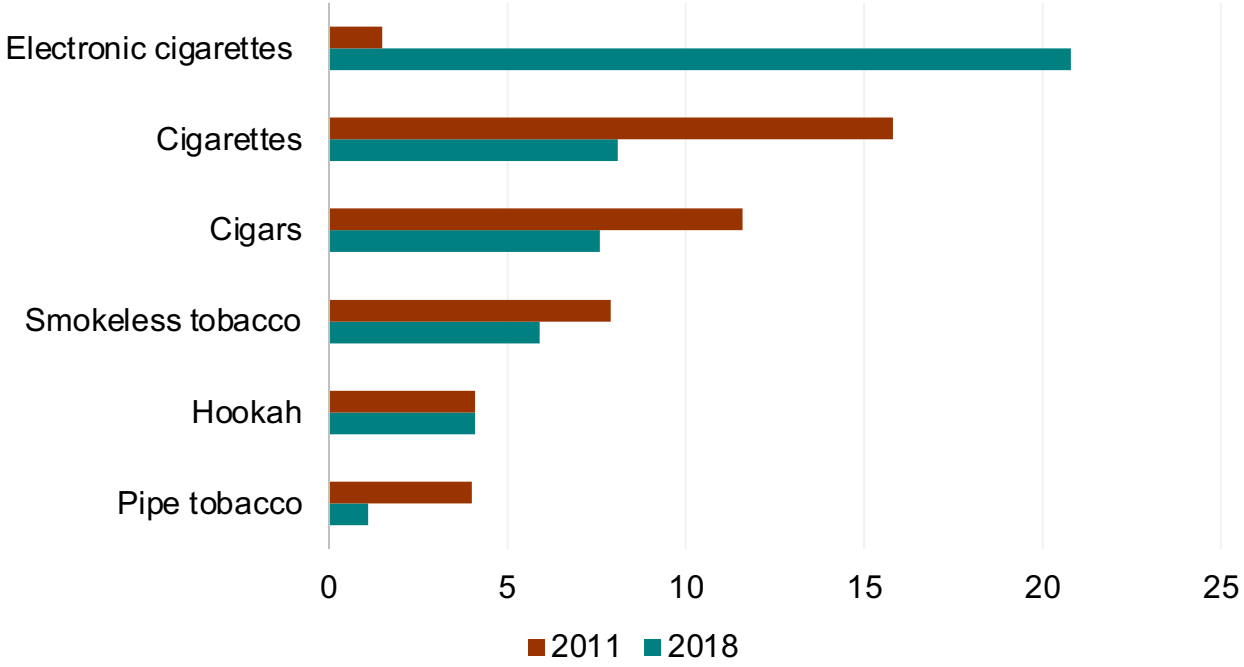
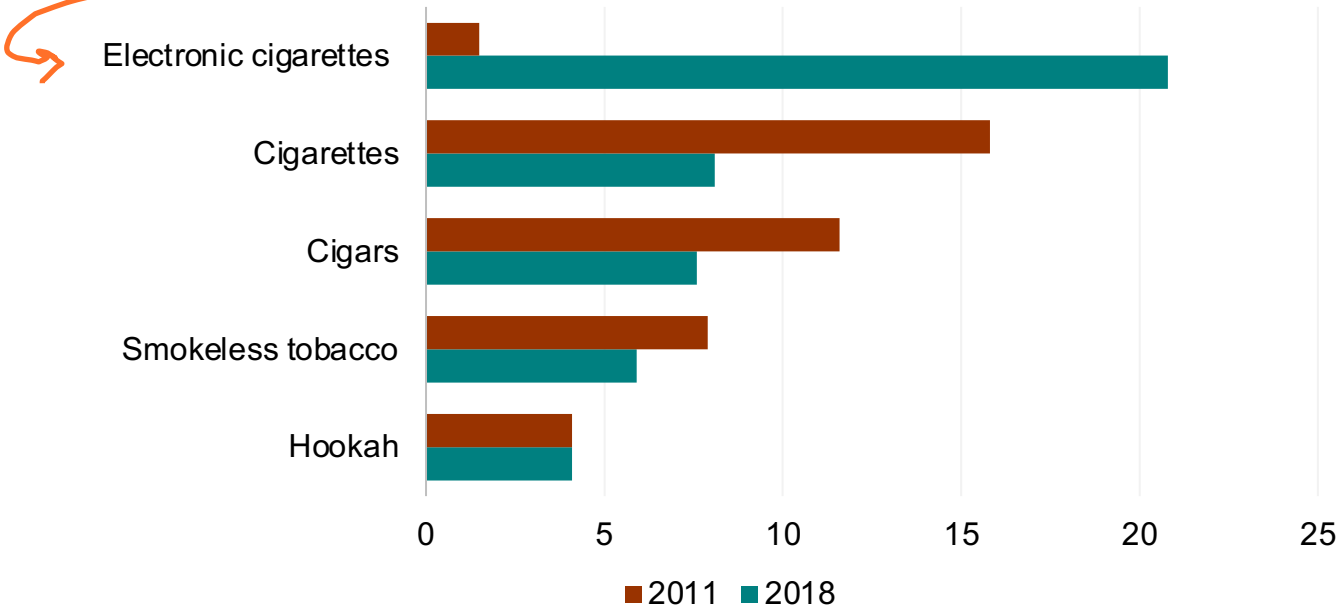


Most used tobacco products in the past 30 days among high school students, 2011 and 2018



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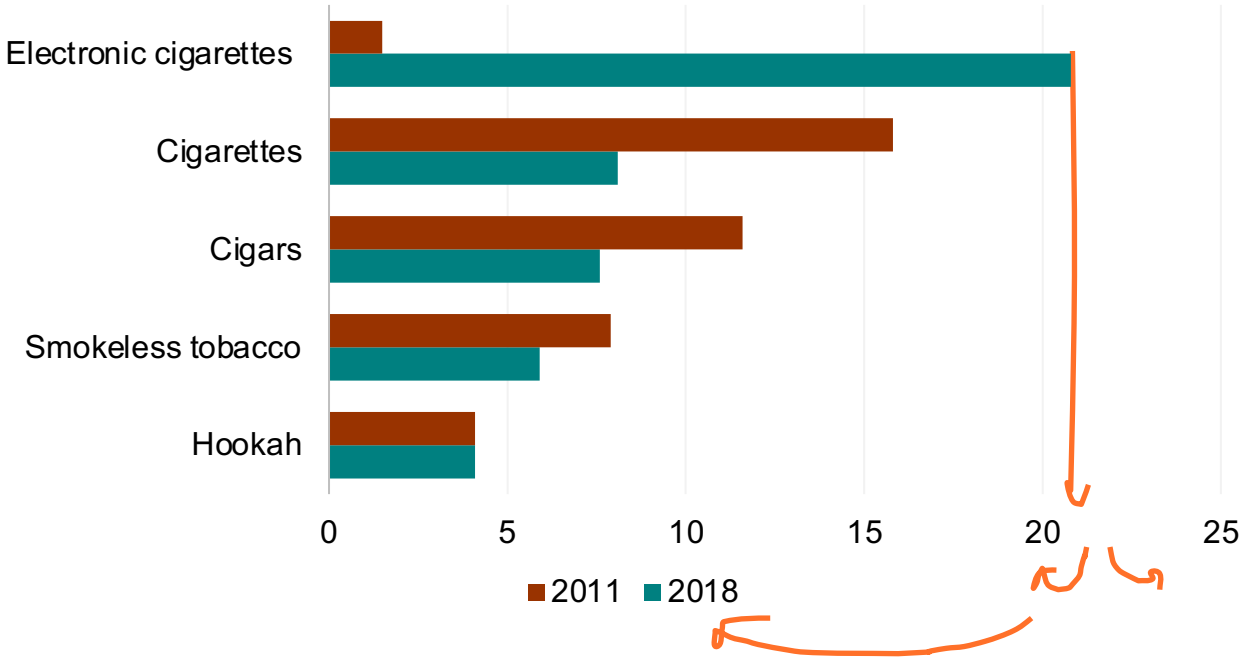
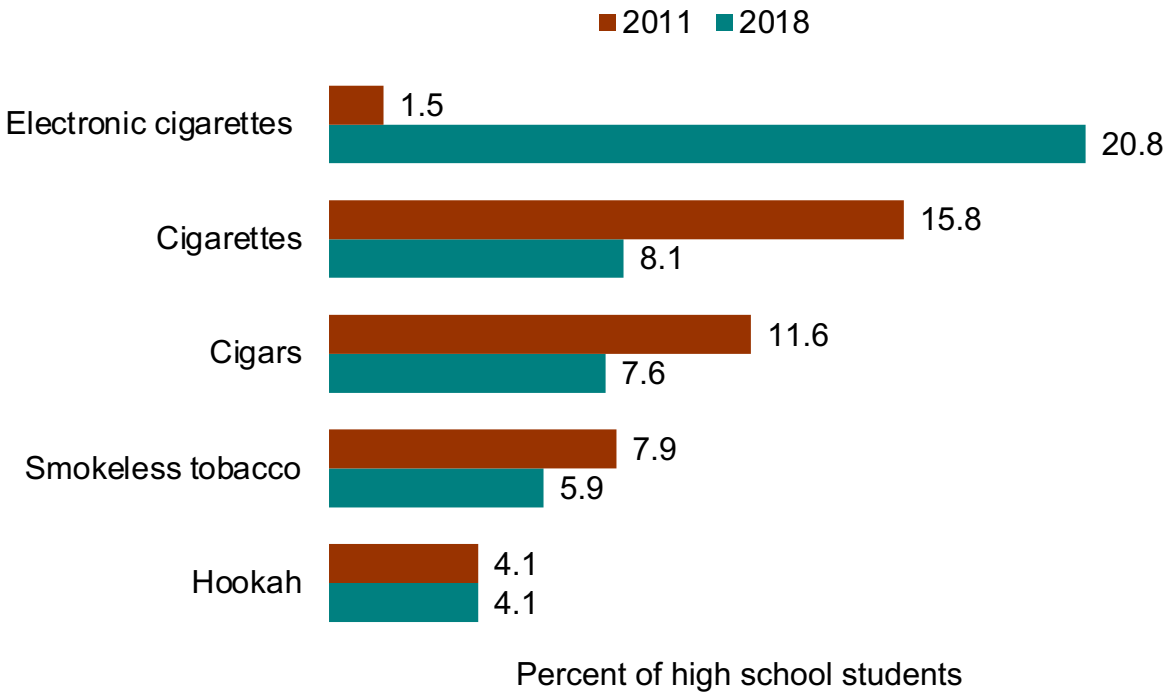


Most used tobacco products in the past 30 days among high school students



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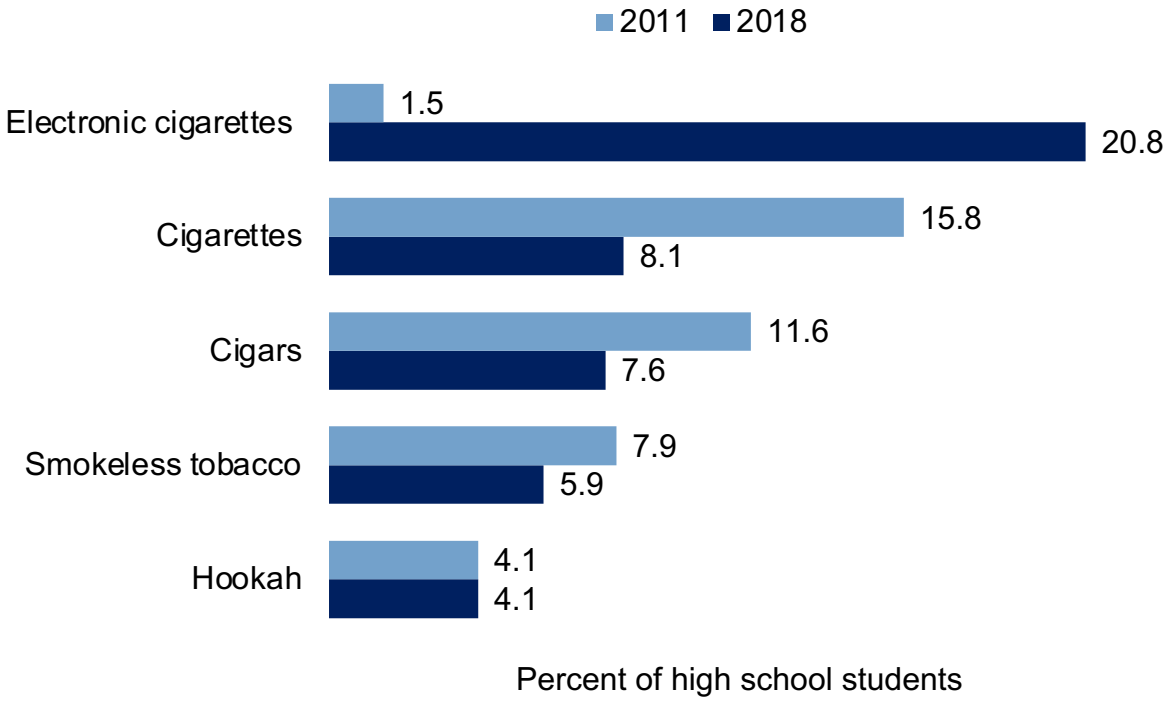

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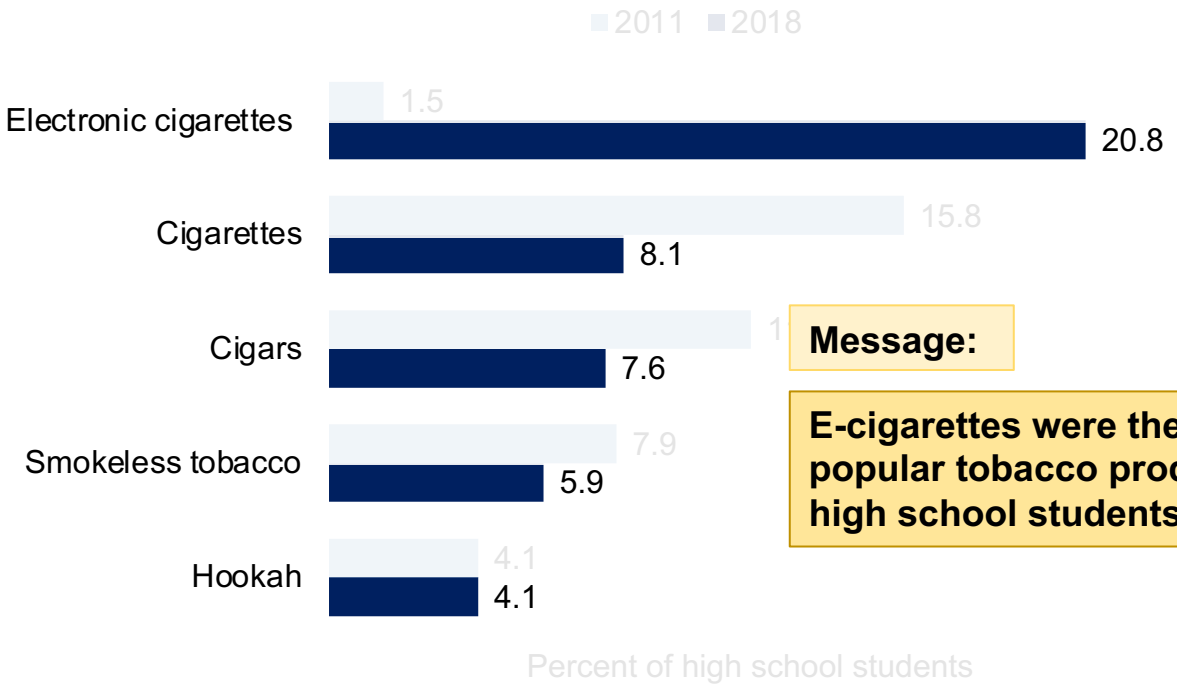
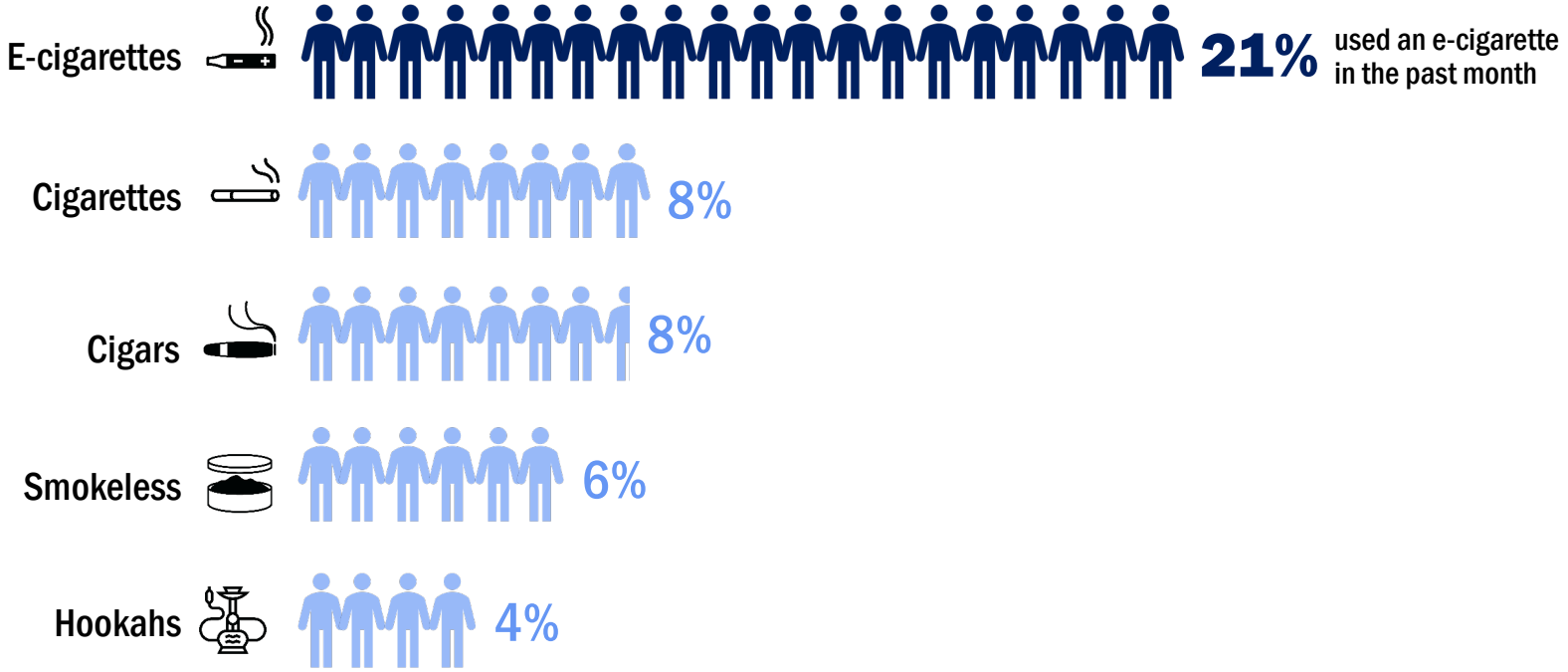


Message:

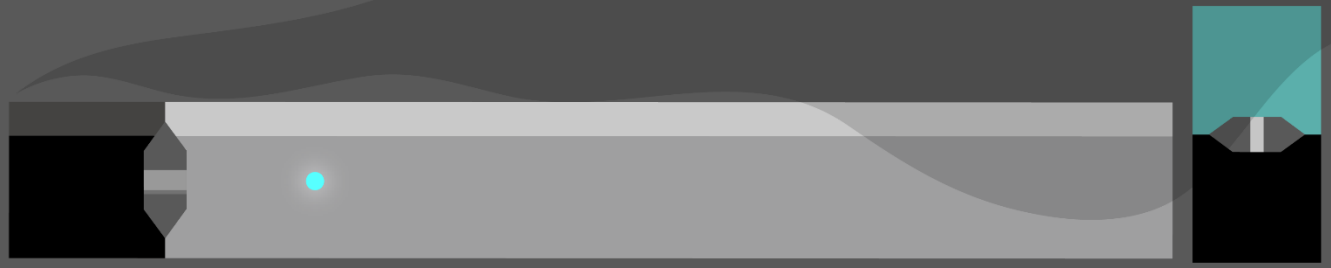
E-cigarettes were the most popular tobacco product among high school students.

In 2018, e-cigarettes were the most popular tobacco product among high school students.



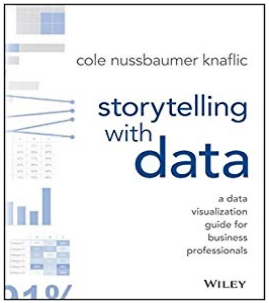
E-cigarette use

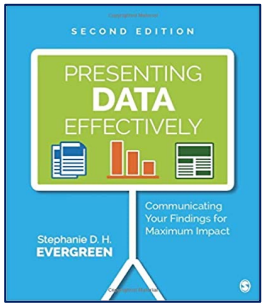
E-cigarettes are the **most-used tobacco product** among students in grades 9–12. In 2018, **1 in 5** currently used an e-cigarette.

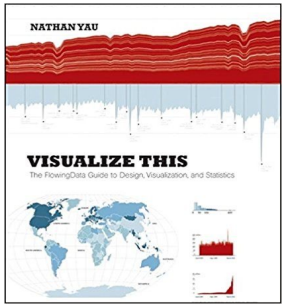


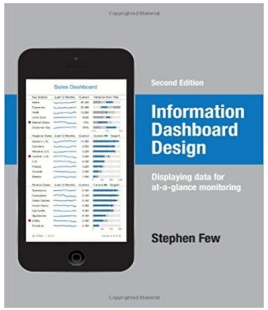
Resources

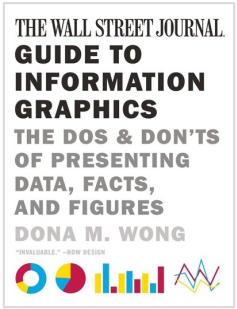
Books











Websites

EvaluATE

American Evaluation Association
AEA 365
A TIP-A-DAY BY AND FOR EVALUATORS

Nightingale
Journal of the Data Visualization Society

Other Resources

1. Stephanie Evergreen & Ann Emery: Data Visualization Checklist
2. Ann Emery: Beginners Step by Step Guide to Data Viz Design Process
3. Amy Cesal, Maxene Graze, Jonathan Schwabish, Alan Wilson: Data Visualization Style Guide
4. Lisa Charlotte Rost: An Alternative to Pink & Blue: Colors for Gender Data
5. Erica Gunn: How to Use Whitespace, the Punctuation Between Visual Elements

Resources

Other Examples

1. USGS Viz Lab https://labs.waterdata.usgs.gov/visualizations/index.html#/
2. NY Times Graphics https://www.nytimes.com/spotlight/graphics
3. WaPo Data Viz Newsletter https://www.washingtonpost.com/newsletters/how-to-read-this-chart/
4. Policy Viz Blog https://policyviz.com/blog/

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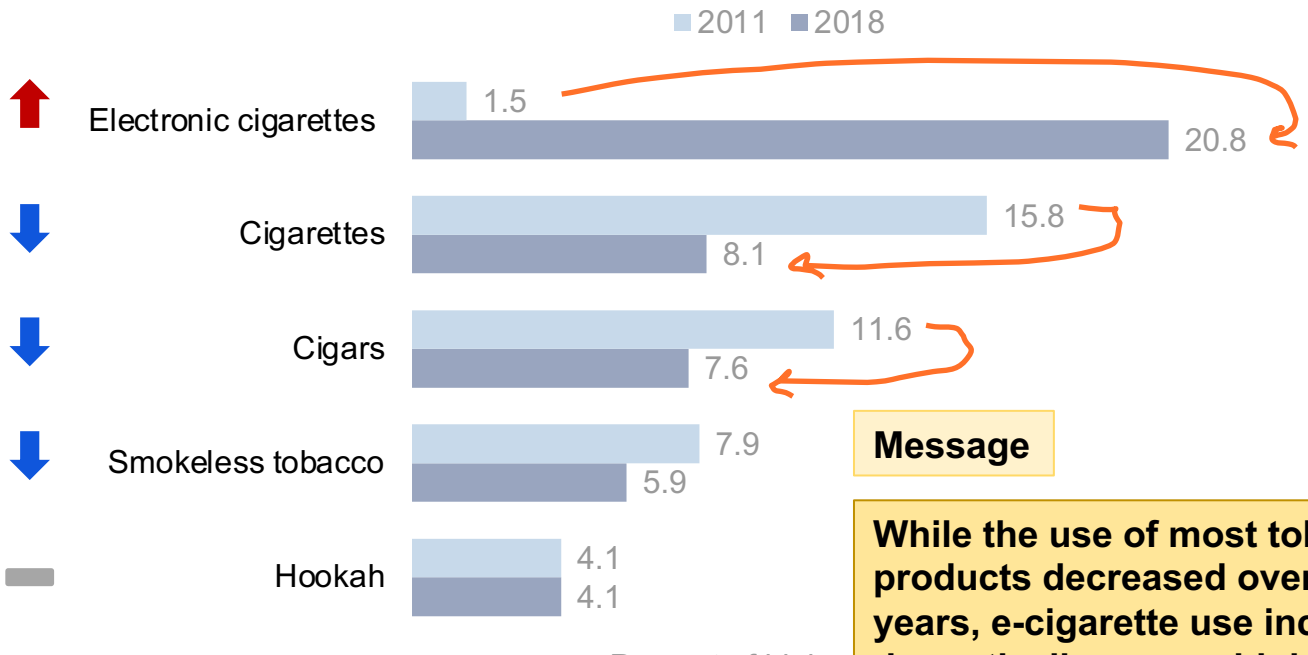
The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

Extra Slides

Most used tobacco products in the past 30 days among high school students

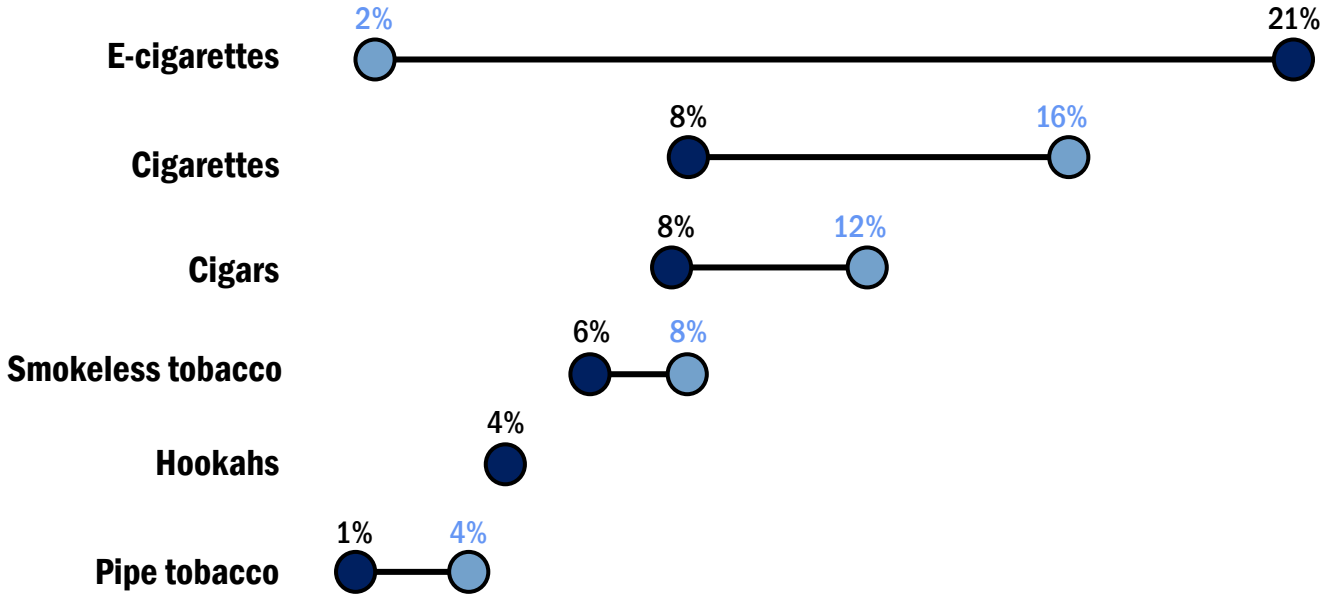


Message

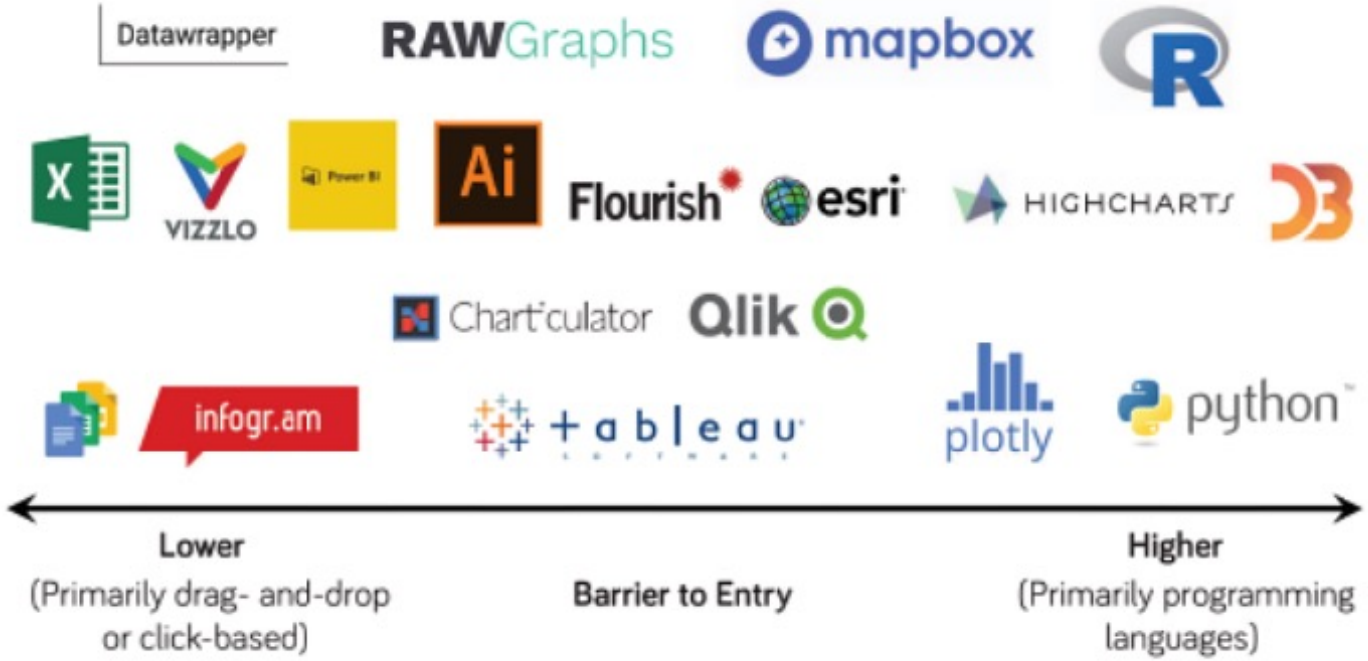
While the use of most tobacco products decreased over the last 5 years, e-cigarette use increased dramatically among high school students.

Between 2011 and 2018, e-cigarette use among high school students increased by 19 percentage points.

Use of other tobacco products either decreased or did not change.



Tools



Schwabish, J., 2021. *Better Data Visualizations: A Guide for Scholars, Researchers, and Wonks*. Columbia University Press.