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### Santa Fe Science Writing Workshop

# Part 1: What is **science graphics journalism? (**What is it that I do?)

I work on the NYT climate team, where I use data and visuals to report on the causes and consequences of our warming world: <https://www.nytimes.com/section/climate>

That entails:

**Responding to news events / disasters**

<https://www.nytimes.com/interactive/2020/01/02/climate/australia-fires-map.html>

<https://www.nytimes.com/interactive/2021/02/16/us/winter-storm-texas-power-outage-map.html>

**Short-term stories based on studies**

<https://www.nytimes.com/interactive/2019/10/24/climate/air-pollution-increase.html>

<https://www.nytimes.com/interactive/2017/05/24/climate/mapping-50-years-of-ice-loss-in-glacier-national-park.html>

**Data-based explainers**

<https://www.nytimes.com/interactive/2021/08/24/climate/warmer-wetter-world.html>

<https://www.nytimes.com/interactive/2018/12/24/climate/how-electricity-generation-changed-in-your-state.html>

**Visual features**

<https://www.nytimes.com/interactive/2020/08/24/climate/racism-redlining-cities-global-warming.html>

<https://www.nytimes.com/interactive/2021/10/19/climate/dixie-fire-storm-clouds-weather.html>

**… but it’s doesn’t have to be just climate**

<https://www.nytimes.com/interactive/2020/05/28/upshot/coronavirus-herd-immunity.html>

<https://www.theguardian.com/society/ng-interactive/2016/may/25/opioid-epidemic-overdose-deaths-map>

# Part 2: Where do you get **ideas for** **graphics?**

## New **studies, research, dataset releases**

Examples:

* [America’s Air Quality Worsens, Ending Years of Gains, Study Says](https://www.nytimes.com/interactive/2019/10/24/climate/air-pollution-increase.html)
* [How Air Pollution Across America Reflects Racist Policy From the 1930s](https://www.nytimes.com/2022/03/09/climate/redlining-racism-air-pollution.html)
* [New Data Reveals Hidden Flood Risk Across America](https://www.nytimes.com/interactive/2020/06/29/climate/hidden-flood-risk-maps.html?action=click&module=RelatedLinks&pgtype=Article)
* [95-Degree Days: How Extreme Heat Could Spread Across the World](https://www.nytimes.com/interactive/2017/06/22/climate/95-degree-day-maps.html)

Scientists and researchers often publish their data and make it available for download. If not, you can usually email the press contact and they’ll send you what you need.

You’ll want to engage in-depth with the methodology to make sure you understand how the data is put together before you visualize it. It’s much like analyzing the study to determine whether you want to write about it: Ask lots of questions about what assumptions go into the data and speak to independent experts not associated with the study who can help you understand the methodology better and raise red flags.

## Start with a question, then **find the right data to answer it**

Examples:

* [Who Has The Most Historical Responsibility for Climate Change?](https://www.nytimes.com/interactive/2021/11/12/climate/cop26-emissions-compensation.html)
* [How Severe Is the Western Drought? See For Yourself.](https://www.nytimes.com/interactive/2021/06/11/climate/california-western-drought-map.html)
* [Hidden Toll of the Northwest Heat Wave: Hundreds of Extra Deaths](https://www.nytimes.com/interactive/2021/08/11/climate/deaths-pacific-northwest-heat-wave.html)

Here, the data still often comes from studies and research, but they’re not necessarily brand new or just released. A little more care is needed to make sure you’re picking up the right study or dataset to answer your question. You want it to be up to date, comprehensive, and vouched for by multiple sources. Experts can point you in the right direction.

## No data? Think about **collecting your own**

Examples:

* Manually sifting through government data: [The Trump Administration Rolled Back More Than 100 Environmental Rules. Here’s the Full List.](https://www.nytimes.com/interactive/2020/climate/trump-environment-rollbacks-list.html)
* Sensor journalism: [Who Gets to Breathe Clean Air in New Delhi](https://www.nytimes.com/interactive/2020/12/17/world/asia/india-pollution-inequality.html)
* Automated data collection: [NYTimes coronavirus tracker](https://www.nytimes.com/interactive/2021/us/covid-cases.html)

Making your own dataset isn’t always possible, but can be very powerful when it is. Thinking through the right methodology is important. Think about how comprehensive you need to be (and can be).

## And sometimes you might have an idea about how to **visualize existing data in a novel way** …

Examples:

* [How Much Hotter Is Your Hometown Than When You Were Born?](https://www.nytimes.com/interactive/2018/08/30/climate/how-much-hotter-is-your-hometown.html)
* [See How the Dixie Fire Created Its Own Weather](https://www.nytimes.com/interactive/2021/10/19/climate/dixie-fire-storm-clouds-weather.html)
  + <https://twitter.com/nplareau/status/1417351236542636034> ← social media is another great source of inspiration / place to find studies you otherwise might not have

Stories like this are usually based on some data scientists already have in a peer-reviewed study format, but we might visualize it in a new way. We always talk to the scientists whose data it is to make sure our big idea, in fact, works with their data.

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# Part 3: What makes for a **good graphic?**

*Note: Many of these fit into multiple categories, but you’ll get the idea*

## It shows **a** **very clear pattern that catches attention**

The graphic conveys the broader story in one look (i.e. the “visual nut graph”)

* **Outliers**: [Why Does the U.S. Have So Many Mass Shootings? Research Is Clear: Guns.](http://nytimes.com/2017/11/07/world/americas/mass-shootings-us-international.html)
* **Trends:**
* Clear direction: [How Coronavirus cases have risen since states reopened](https://www.nytimes.com/interactive/2020/07/09/us/coronavirus-cases-reopening-trends.html)
* Clear divergence: [Income growth over 34 years](https://www.nytimes.com/interactive/2017/08/07/opinion/leonhardt-income-inequality.html)
* Doesn’t always have to be a line chart to be an obvious trend: [Summers Are getting Hotter](https://www.nytimes.com/interactive/2021/climate/extreme-summer-heat.html)
* **Geographic patterns:** [Two Americas, One Soaked, One Parched](https://www.nytimes.com/interactive/2021/08/24/climate/warmer-wetter-world.html)

*A note of caution with maps: We want to generally make sure the patterns they reflect are indeed really something novel and geographically important, not just reflecting population patterns (i.e. all the big cities light up). See also:* [*When a map shouldn’t be a map*](https://www.ericson.net/content/2011/10/when-maps-shouldnt-be-maps/)

## It helps the reader **put things in context / gives readers a sense of scale**

The graphic answers the question: “Compared to what?”

* **Scale:**
  + [NYT: 19 Countries Vowed to Phase Out Coal. But They Don’t Use Much Coal.](https://www.nytimes.com/interactive/2017/11/16/climate/alliance-phase-out-coal.html)
  + [Reuters: Drowning in plastic](https://graphics.reuters.com/ENVIRONMENT-PLASTIC/0100B275155/index.html)
* **Patterns:** [How bad is the western drought](https://www.nytimes.com/interactive/2021/06/11/climate/california-western-drought-map.html)? ← “Small multiples” are very useful as a comparative graphic // pattern recognition in action!
* **Comparing countries**: [Life expectancy v. health care spending](http://bilhartzmd.com/wp-content/uploads/2017/03/ftotHealthExp_pC_USD_long.png)
* **Comparing demographics:** [Minneapolis Police Use Force Against Black People at 7 Times the Rate of Whites](https://www.nytimes.com/interactive/2020/06/03/us/minneapolis-police-use-of-force.html) ← Inequality often fits “compared to what” theme
* **Geographic comparisons:** [Investors bought a record share of homes](https://www.washingtonpost.com/business/interactive/2022/housing-market-investors/) (comparing neighborhoods)
* **And others:** [Infrastructure breakdown](https://www.nytimes.com/interactive/2021/07/28/upshot/infrastructure-breakdown.html) (what was delivered, compared to what was promised)

## It helps you **see something you couldn’t otherwise see**

The graphic helps visualize something that is otherwise invisible

* [NYT pollution project](https://www.nytimes.com/interactive/2019/12/02/climate/air-pollution-compare-ar-ul.html) + the [AR version](https://twitter.com/kartpat/status/1201862423952707584) ← This piece went a step further in trying to make pollution feel tangible through visualization
* [NYT: Methane infrared camera capture](https://www.nytimes.com/interactive/2019/12/12/climate/texas-methane-super-emitters.html)
* [NYT: Why ventilation is so important in schools w Covid](https://www.nytimes.com/interactive/2021/02/26/science/reopen-schools-safety-ventilation.html)
* Or, it can be as simple as a bar chart of something we couldn’t otherwise see: [Excess deaths from the Pacific Northwest heat wave](https://www.nytimes.com/interactive/2021/08/11/climate/deaths-pacific-northwest-heat-wave.html)

Another subset of this idea: Zooming in on data in great detail

* [The most detailed map](https://www.nytimes.com/interactive/2021/upshot/2020-election-map.html) of the 2020 election
* [The most detailed map](https://www.nytimes.com/interactive/2019/10/10/climate/driving-emissions-map.html) of US transportation emissions
* A detailed view of [Antarctic ocean currents](https://www.nytimes.com/interactive/2021/12/13/climate/antarctic-climate-change.html) and what they reveal

## It helps you **better relate to the data**

The graphic can create a more intimate, personal relationship to a seemingly abstract data

* [How Much Hotter Is Your Hometown Than When You Were Born?](https://www.nytimes.com/interactive/2018/08/30/climate/how-much-hotter-is-your-hometown.html) -- a way of connecting global climate to the individual level
* [The jobless rate](https://flowingdata.com/wp-content/uploads/2009/11/Jobless-rate-for-people-like-you-1536x820.png) [for people like you](https://madigitalmedia.files.wordpress.com/2011/09/screen-shot-2011-09-01-at-17-21-50.png) (dead on NYT page, so all that’s left is this screenshot -- sad! But this was a pioneering graphic using personalization)

## And **more!**

Some graphics that don’t fit neatly into these categories:

* [You Draw It: How Family Income Affects Children's College Chances](https://www.nytimes.com/interactive/2015/05/28/upshot/you-draw-it-how-family-income-affects-childrens-college-chances.html) ← This chart shows a very simple trend that may not be eye-catching at first. Yet the trend actually \*is\* interesting when you stop to think it through it. So Upshot reporters forced you to do that by asking you to guess the trend and making it into a game. That gets you to start thinking about the data more deeply and questioning why this relationship is what it is.
* Showing your work (or the work of scientists):
  + [Guardian: Why climate scientists think the world is on track to warm 3°C](https://www.theguardian.com/cities/ng-interactive/2017/nov/03/three-degree-world-cities-drowned-global-warming) ← Line chart at the top of this piece about flooding shows how scientists arrived at the projection of 3°C warming
* Rhetorical graphics
* Long-scroll: When the sheer mass/number of events is meaningful
* When the parts add up to a broader/larger whole
  + [NYT: Environmental rollbacks tracker under President Trump](https://www.nytimes.com/interactive/2020/climate/trump-environment-rollbacks-list.html)
  + [NYT: Covid deaths graphic](https://www.nytimes.com/interactive/2021/01/27/us/us-coronavirus-deaths-rate.html)
  + [NYT: How to Buy a Gun in 16 Countries](https://www.nytimes.com/interactive/2018/03/02/world/international-gun-laws.html)

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# Part 4: **Tools** **for making graphics**

## Plug-and-go charting tools

* [Datawrapper](https://www.datawrapper.de/)
* [RawGraphs.io](https://rawgraphs.io/)
* Excel/Google Sheets

## More-custom charting tools

* Adobe Illustrator (can be used to create charts, or to redesign SVG charts made elsewhere, like Excel)
* JavaScript (D3, Svelte)

## Data analysis tools

* Excel/Google Sheets
* R/R Studio (also has a charting library: ggplot)
* Python

## Mapping tools

* [Mapshaper](https://mapshaper.org/) ← very powerful and under-used tool by NYT graphics editor Matt Bloch
* QGIS (open-source) and ArcGIS (proprietary) ← info on differences [here](https://gisgeography.com/qgis-arcgis-differences/)
* [Google Earth Engine](https://earthengine.google.com/) and [Google Earth Studio](https://www.google.com/earth/studio/)

And while some of you might like to try making graphics, you don’t have to create your own in order to write smartly about them!

End!