

DATA POINTS

A Quick Guide to Spotting Graphics That Lie

We tend to believe what numbers say, but just because they're on a chart, that doesn't make them true.

BY **CHIQUI ESTEBAN**, NATIONAL GEOGRAPHIC



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Chiqui Esteban is the Deputy Director for Art, Maps, and Graphics at *National Geographic* magazine.

Data Points is a new series where we explore the world of data visualization, information graphics, and cartography.

Numbers themselves don't lie, but how we represent them can be really misleading. While charts and graphics can help us visualize large amounts of data, they can also be dangerous in the wrong hands.

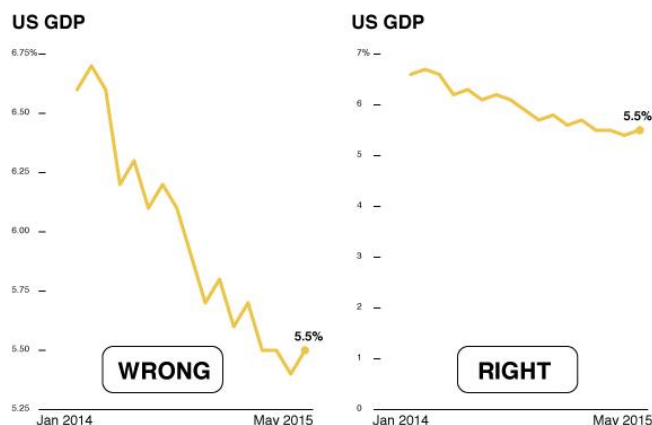
The good news first: If the chart is not plain lying, just playing with the way we perceive visual information, there are some tips you can use to reveal the truth. The bad news is that you might have to do this analysis quickly if a chart flashes by quickly on a TV screen. Also, let's be honest: Not everybody is willing to look further into a chart if the result confirms what they want to believe.

If you want to detect a cheating chart, here's a quick guide to the most common tricks:

1. Broken scales show drama where it doesn't exist.

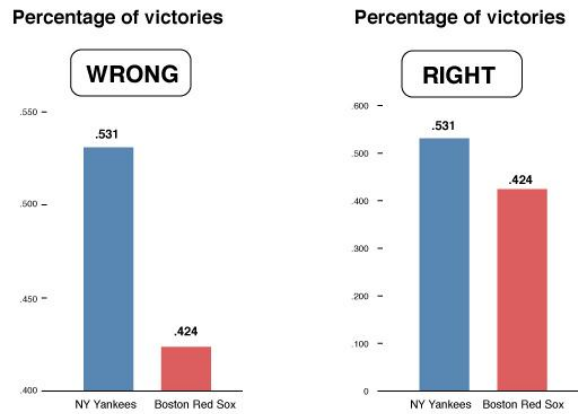
This is probably the most common way graphics lie, whether intentional or not. Something that changes by 0.1 percent over 10 years and something that changes by 1,000 percent in one year can look exactly the same depending on the scale, or range of values used on the chart.

Both charts show how unemployment rate has changed in the United States from January 2014 to May 2015 (6.6% to 5.5%). The chart on the left breaks the scale (left) to begin at 5.25%, which depicts a more dramatic scenario than reality (right).



not just adding drama to the change, we're making unfair comparisons.

When we don't show the full extent of the bars, the difference between bars looks much bigger than it really is, missing the point of the visual comparison.



SOURCE: MAJOR LEAGUE BASEBALL

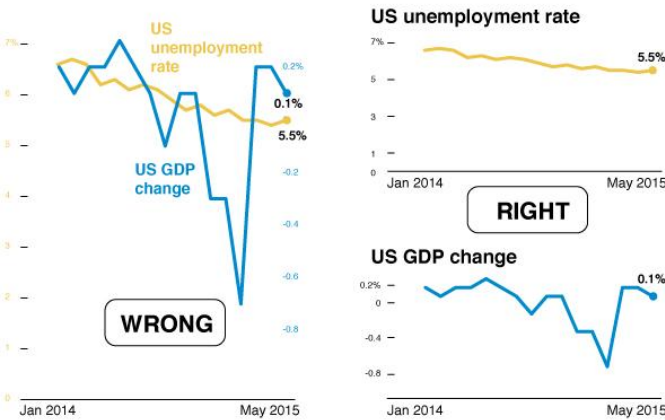
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That doesn't mean that charts should never break a scale. Maybe we want to show deviation from 50%, and that should be our starting point. But there has to be a good reason to do it. Showing a more dramatic view of the change is not one.

2. Showing data on two different scales can make for an apples-to-oranges comparison.

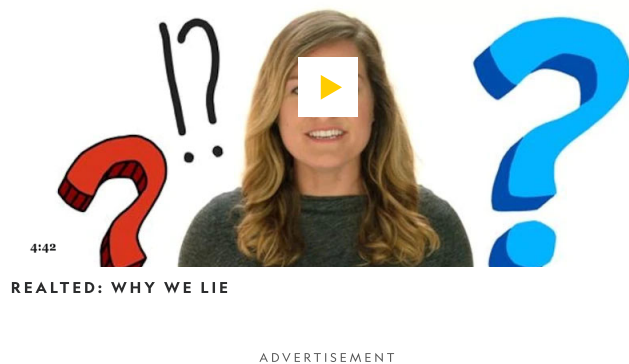
Is 170 pounds more or less than 5 feet 8 inches? The question has no answer because we're talking about two unrelated units, although they speak about related fields. Still, many charts draw these kind of correlations.

Looking at the chart on the left could make you think U.S. gross domestic product (GDP) surpassed the unemployment rate around March 2015. But that comparison is meaningless.



SOURCE: BUREAU OF LABOR STATISTICS

This lie is usually unintentional. Many people just want to include all their information in less space, but the results still draw conclusions that aren't

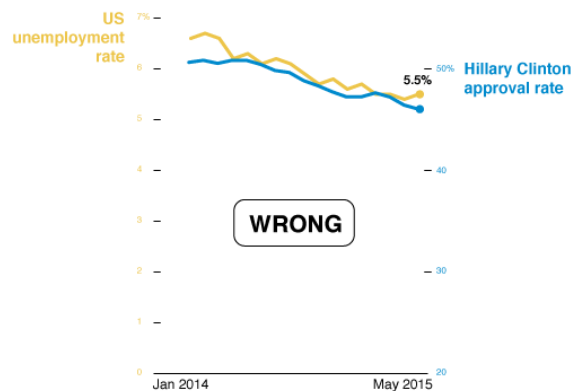


3. Showing a correlation can imply causation.

Two people doing the same dance moves may not be dancing to the same song. The same way, just because two sets of numbers follow a similar path doesn't mean there's a correlation.

There's even a [website devoted to make fun](#) of this non-existing game of cause and effect. Don't let the form of change look like the reason of change.

The lines show a similar trend, but the relationship between Clinton's approval rate and unemployment seems improbable. In this example, there's no right way to do it. They are just unrelated.



SOURCES: BUREAU OF LABOR STATISTICS; THE HUFFINGTON POST

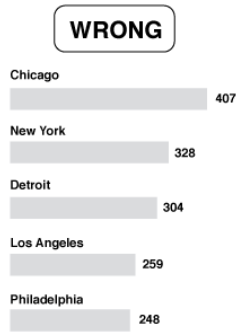
4. Ignoring population size makes rates impossible to compare.

There are also many ways to [lie with maps](#), which we won't dive into in this post. Still, when we're talking about where people live it's important to have in mind how many people live there.

Chicago and New York suffered more murders in 2014 than Detroit, but that doesn't mean they're more dangerous. If you look at how many people live in each city, the comparison changes greatly.

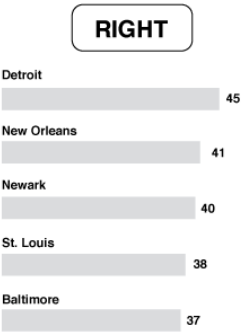
Most dangerous cities

Total murders in 2014



Most dangerous cities

Murder rate in major US cities in 2014, per 100,000 people



SOURCE: FBI'S UNIFORM CRIME REPORT

Which cities have the highest number of murders? Not the most dangerous, but the most populated. More people = more everything.

5. Decoration can be deceiving.

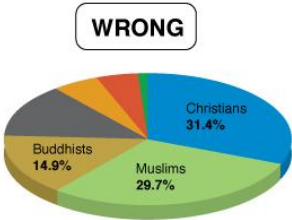
Who doesn't love 3D pie-charts? (Disclosure: many people, including me.) Yet they have a big audience in scientific papers, economic reports, and PowerPoint charts. They look fun and modern, but including volume and perspective in a chart where they don't mean something is a big no-no.

If you're making a chart to visualize amounts and you distort the way amounts are visualized... what's the point of making a chart?

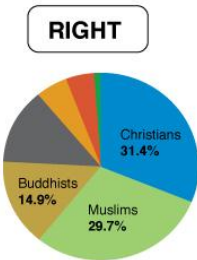
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In the chart on the left, the percentage of Christians is the biggest value, but a larger amount of green shows for Muslims because of the 3-D effect.

Religions in the world



Religions in the world



SOURCE: PEWRESEARCHCENTER

Of course, there are many more ways to lie with charts—some subtle, some not—just as there are ways to mislead with words and pictures. The biggest enemies of chart cheats are context, analysis, and common sense. Try to