

How Charts

Lie



Getting Smarter about
Visual Information

Alberto Cairo

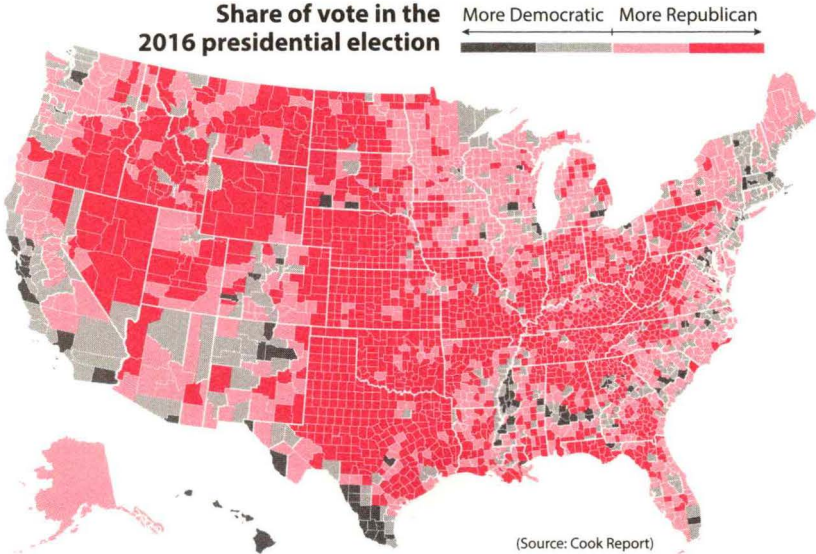


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Introduction

On April 27, 2017, President Donald J. Trump sat with Reuters journalists Stephen J. Adler, Jeff Mason, and Steve Holland to discuss his accomplishments in his first 100 days in office. While talking about China and its president, Xi Jinping, Trump paused and handed the three visitors copies of a 2016 electoral map:¹



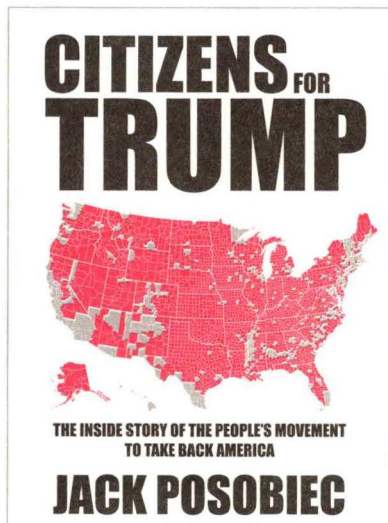
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The president then said, “Here, you can take that, that’s the final map of the numbers. It’s pretty good, right? The red is obviously us.”

When I read the interview, I thought that it was understandable President Trump was so fond of that map. He won the 2016 election despite most forecasts, which gave him between 1% and 33% chances of succeeding; a Republican establishment that distrusted him; a bare-bones campaign that was often in disarray; and numerous controversial remarks about women, minorities, the U.S. intelligence services, and even veterans. Many pundits and politicians predicted Trump’s demise. They were proved wrong. He seized the presidency against all odds.

However, being victorious isn’t an excuse to promote misleading visuals. When presented alone and devoid of context, this map can be misleading.

The map appeared in many other places during 2017. According to *The Hill*,² White House staffers had a large, framed copy of it hanging in the West Wing. The map was also regularly touted by conservative media organizations, such as Fox News, Breitbart, and InfoWars, among others. Right-wing social media personality Jack Posobiec put it on the cover of his book, *Citizens for Trump*, which looks similar to this:



I've spent the last two decades making charts and teaching others how to design them. I'm convinced that anyone—including you, reader—can learn how to read and even *create* good graphics, so I'm usually happy to offer my free and constructive advice to whoever wants to take it. When I saw Posobiec's book on social media, I suggested that he needed to change either the title or the map, as the map doesn't show what the book title says.

The map is misleading because it's being used to represent the *citizens* who voted for each candidate, but it doesn't. Rather, it represents *territory*. I suggested that Posobiec either change the graphic on the cover of his book to better support the title and subtitle, or change the title to *Counties for Trump*, as that is what the map truly shows. He ignored my advice.

Try to estimate the proportion of each color, red (Republican) and grey (Democratic). Roughly, 80% of the map's surface is red and 20% is grey. The map suggests a triumph by a landslide, but Trump's victory wasn't a landslide at all. The popular vote—Posobiec's "citizens"—was split nearly in half:

Share of the popular vote in the 2016 presidential election



We could be even pickier and point out that turnout in the election was around 60%;³ more than 40% of eligible voters didn't show up at the polls. If we do a chart of *all eligible voters*, we'll see that the citizens who voted for each of the major candidates were a bit less than a third of the total:

Percentage of eligible voters



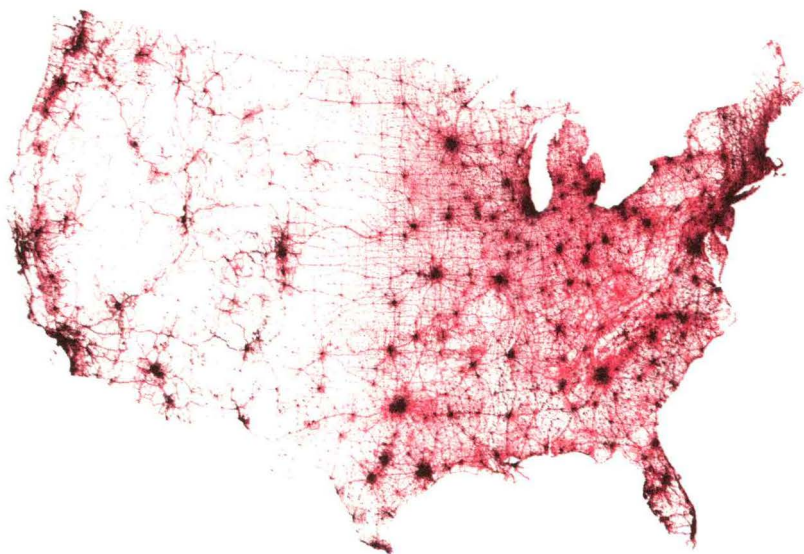
And what if we count *all* citizens? There are 325 million people in the United States. Of those, around 300 million are citizens, according to the

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Kaiser Foundation. It turns out that “Citizens for Trump” or “Citizens for Clinton” are just a bit more than one-fifth of all citizens.

Critics of President Trump were quick to excoriate him for handing out the county-level map to visitors. Why count the square miles and ignore the fact that many counties that went for Trump (2,626)⁴ are large in size but sparsely populated, while many of the counties where Clinton won (487) are small, urban, and densely populated?

That reality is revealed in the following map of the continental U.S., designed by cartographer Kenneth Field. Each dot here represents a voter—grey is Democratic and red is Republican—and is positioned approximately—but not exactly—where that person voted. Vast swaths of the U.S. are empty:



As someone who strives to keep a balanced media diet, I follow people and publications from all ideological stripes. What I’ve seen in recent years makes me worry that the increasing ideological polarization in the U.S. is also leading to a divide on chart preferences. Some conservatives I read love the county-level map President Trump handed out to reporters. They constantly post it on their websites and social media accounts.

Liberals and progressives, on the other hand, prefer a bubble map proposed by *Time* magazine and other publications.⁵ In it, bubbles are sized in proportion to the votes received by the winning candidate in each county:



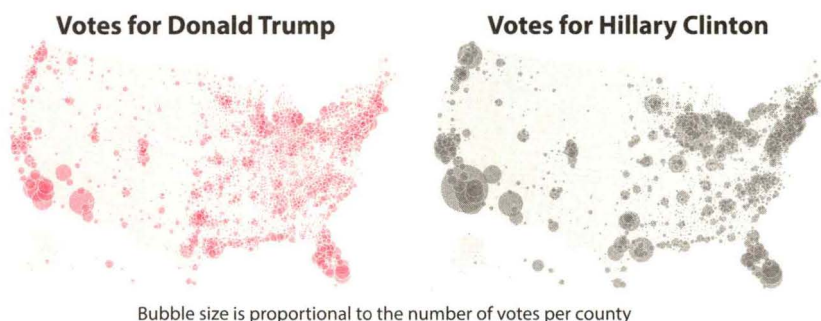
Both conservatives and liberals laugh at the other side's stupidity. "How can you tweet *that* map? Don't you see that it distorts the results of the election?"

This is no laughing matter. Both sides in this debate are throwing different charts at each other because we all often use information to reinforce our beliefs: conservatives love to convince themselves of a crushing victory in the 2016 election; liberals console themselves by emphasizing Hillary Clinton's larger share of the popular vote.

Liberals are correct when they claim that the colored county map isn't an adequate representation of the *number* of votes each candidate received, but the bubble map favored by liberals is also faulty. By showing only the votes for the winning candidate in each county, this chart ignores those received by the *losing* candidate. Plenty of people voted for Hillary Clinton in conservative regions. Many voted for Donald Trump in very progressive ones.

Kenneth Field's map or the pair of maps below may be a better choice if what we care about is the popular vote. There are many more visible red bubbles (votes for Trump) than grey bubbles (votes for Clinton), but the fewer grey ones are often much bigger. When these maps are put side by side, it's easier to see why the election was decided by a relatively small number of

votes in a handful of states; if you add up the area of all red bubbles and the area of all grey bubbles, they are roughly the same:



Having said this, both conservatives and liberals are missing the point. What makes you win a presidential election in the United States is neither the territory you control, nor the number of people you persuade to vote for you *nationally*. It's the Electoral College and its 538 electors. To win, you need the support of at least 270 of electors.

Each state has a number of these folks equal to its congressional representation: two senators plus a number of representatives in the House that varies according to the state's population. If you are a small state with the fixed number of senators (two per state) plus one representative in the House, you are allotted three electors.

Small states often have more electors based on their populations than what pure arithmetic would give them: the minimum is three electors per state, no matter how small the population of that state is.

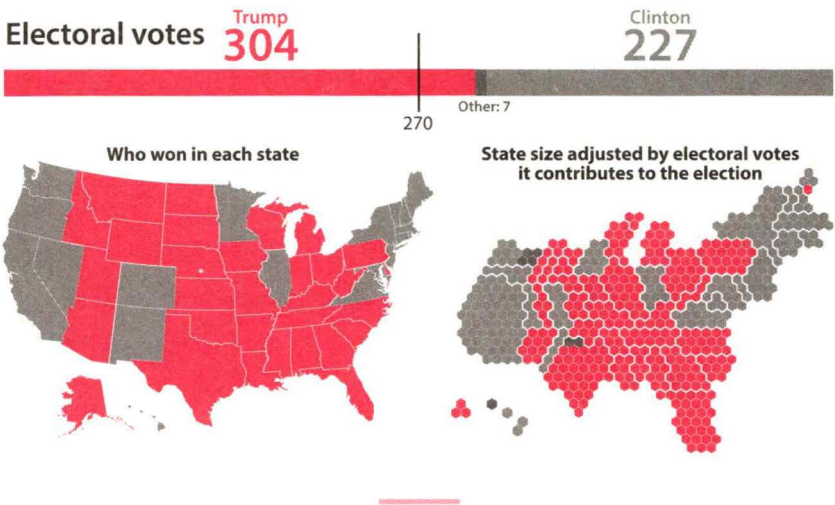
Here's how you receive the support of a state's electors: with the exception of Nebraska and Maine, the candidate who wins even a razor-thin advantage in a state's popular vote over his or her opponents is supposed to receive the support of *all* that state's electors.

In other words, once you've secured at least one more vote than any of your opponents, the rest of the votes you receive in that state are useless. You don't even need a majority, just a *plurality*: if you get 45% of the popular vote

in one state, but your two opponents get 40% and 15%, you'll receive all the electoral votes from that state.

Trump got the support of 304 electors. Clinton, despite winning the national popular vote by a margin of three million and getting tons of support in populous states like California, received only 227. Seven electors went rogue, voting for people who weren't even candidates.

Therefore, if I ever got elected president—which is an impossibility, since I wasn't born in the U.S.—and I wanted to celebrate my victory by printing out some charts, framing them, and hanging them on the walls of my White House, it would be with the ones below. They are focused on the figures that really matter—neither the number of counties, nor the popular vote, but the number of *electoral* votes received by each candidate:



Maps are among the many kinds of charts you'll learn about in this book. Sadly, they are among the most misused. In July of 2017, I read that a popular U.S. singer called Kid Rock was planning to run for the Senate in the 2018 election.⁶ He'd later claim that it was all a joke,⁷ but it sounded like a serious bid at the time.

I didn't know much about Kid Rock, so I wandered through his social