

Showing uncertainty should build trust, but new research shows it makes people more likely to doubt data

The finding by an ASU PhD student exposes a troubling incentive to appear more certain than reality

By Kelly deVos, ASU News
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On a Tuesday night in November 2026, millions of Americans will do the same thing at the same time: Stare at a map as it glows from televisions, laptops and phone screens.

News anchors will stand before massive touchscreens, tapping counties and discussing paths to electoral victory. But what you likely won't see is how uncertain that picture really is.

If the map showed the ambiguity behind every projection and estimate, it would look unstable, blurred and full of doubt.

And according to new research, that's exactly when people would start to trust it less.

That paradox sits at the center of a new study presented this year at the [Association for Computing Machinery Conference on Human Factors in Computing Systems](#) in Barcelona, Spain.

In "The Impact of Uncertainty Visualization on Trust in Thematic Maps," researchers found something troubling. The more honestly you show the limits of your data, the less people trust it. But even more surprisingly, the researchers found that a lack of trust in the map did not change the perception of the person who made it.

It's a finding with uncomfortable implications for journalism, science and any field that relies on data-driven graphics to tell a story. Maps like the ones we'll see in November are more than visual aids; they're elements of storytelling that can shape how we understand and remember key

moments.

“The intuition has always been that transparency builds trust,” says lead author Varun Srivastava, an industrial engineering doctoral student in the [School of Computing and Augmented Intelligence](#), part of the [Ira A. Fulton Schools of Engineering](#) at Arizona State University.

“But what we’re seeing is that when you show people uncertainty, they don’t interpret it as honesty. They interpret it as unreliability.”

People trust maps; that’s the problem

Srivastava worked on the study under the supervision of Fulton Schools Professor [Ross Maciejewski](#) and Professor Emeritus [Alan MacEachren](#) of Pennsylvania State University. Maciejewski is a leading authority on data visualization while MacEachren is a globally recognized expert in cartography.

Their starting point was simple. People tend to trust maps. Sometimes, a little too much. In one widely reported incident, [a tourist in Venice, Italy, walked straight into a canal](#) while following directions from Google Maps.

Maps now shape how people understand everything from the economy to elections. These are known as thematic maps, visualizations designed to show patterns across geography. In the past decade, they’ve become commonplace.

What was once the domain of trained cartographers is produced at scale by newsrooms, governments, advocacy groups and anyone with access to data and design tools. Maps circulate constantly on TV, in articles and across social media feeds, framing how people interpret complex issues.

But if people rely on maps to make sense of the world, shouldn’t the visuals also show how reliable their data is?

In theory, yes. Every dataset carries uncertainty. Making those limits visible should help people interpret what they’re seeing more carefully and come to more reliable conclusions.

So the researchers set out to test that idea.

Srivastava, who is preparing to graduate this summer, recruited participants and showed them a series of U.S. maps on topics like crime, housing and health. Some participants saw standard versions that were crisp, familiar and easy to read. Others saw nearly identical maps where uncertainty was built into the design, with data points softened or blurred to signal less reliable estimates. After each map, participants rated how accurate and trustworthy it felt.

The results showed a clear trend. Participants consistently rated the uncertain maps as less trustworthy.

The map versus the mapmaker

To understand why, the researchers looked at how people interpret trust itself.

They found that it's not a single judgment but a combination of two different instincts. There's cognitive trust, or a belief in the accuracy of the data, and affective trust, or a belief in the integrity of the person presenting it.

Uncertainty hits those instincts in very different ways.

When participants saw blurred or unstable visuals, they didn't think, "This mapmaker is being honest." They thought, "This data might be wrong."

Ratings for qualities like "accurate," "correct" and "error-free" dropped sharply. But perceptions of "fairness" and "honesty" barely moved.

In other words, showing uncertainty doesn't make you look more trustworthy. It makes your information look weaker. That distinction matters in environments like election night coverage, where authority is important and maps are helping shape the narrative in real time, giving viewers a sense of control over a chaotic process.

If your goal is to maintain trust, you may be better off not showing uncertainty at all.

"If you know that adding uncertainty will reduce how much people trust the visualization, there's no reward for including it," Srivastava says. "From a communication standpoint, it's a real dilemma."

That dilemma extends beyond elections and into climate models, economic forecasts and public health dashboards because all of them rely on data that is inherently uncertain.

The researchers are careful not to argue against showing uncertainty altogether. Instead, they suggest that how uncertainty is presented may matter as much as whether it's presented at all.

The study used one specific technique — visual fuzziness — to signal uncertainty. Other approaches, like layered explanations or interactive elements, might help audiences process ambiguity without immediately discounting the data.

But those solutions assume that people are willing to sit with uncertainty in the first place.

Maciejewski, who also serves as director of the School of Computing and Augmented Intelligence, worries that communicators increasingly face a choice between presenting the world as it is or as people want it to be.

"It's natural to want clear answers," Maciejewski says. "But the reality is, data almost never gives us certainty. It gives us probabilities. The question is whether we're ready to see the truth and whether we'd believe it if we did."

This story originally appeared on [ASU News](#).

Main image



Varun Srivastava poses with a map of the Phoenix metropolitan area. Srivastava, an industrial engineering doctoral student in the School of Computing and Augmented Intelligence, part of the Ira A. Fulton Schools of Engineering at Arizona State University, worked as part of a team conducting new research on how the public perceives data presented in thematic maps. Photo by Erika Gronek/ASU

Text image(s)



Srivastava presents the team's findings at the Association for Computing Machinery Conference on Human Factors in Computing Systems held in Barcelona, Spain, in April. Photo courtesy of Varun Srivastava



Sample maps from the experiment showing how uncertainty was visualized. In standard versions (top left), data points appear crisp and precise. In uncertainty-enhanced versions, circles become

increasingly blurred to represent low, moderate and high uncertainty in the underlying data.
Graphic courtesy of Varun Srivastava