

J. Marshall Shepherd is a meteorologist, professor at the University of Georgia's Department of Geography, the director of the university's atmospheric sciences program, and was the president of the American Meteorological Society in 2013. Below is the full transcript of this TED Talk titled: **3 Kinds of Bias That Shape Your Worldview.**

Transcript:

I'm a meteorologist by degree, I have a bachelor's, master's and PhD in physical meteorology. So I'm a meteorologist, card carrying.

And so with that comes four questions, always. This is one prediction I will always get right.

And those questions are: *"Marshall, what channel are you on?"*

"Dr Shepherd, what's the weather going to be tomorrow?"

And oh, I love this one: *"My daughter is getting married next September, it's an outdoor wedding. Is it going to rain?"*

Not kidding, I get those, and I don't know the answer to that, the science isn't there.

But the one I get a lot these days is, "Dr Shepherd, do you believe in climate change?"

"Do you believe in global warming?"

Now, I have to gather myself every time I get that question. Because it's an ill-posed question — science isn't a belief system.

My son, he's 10 — he believes in the tooth fairy. And he needs to get over that, because I'm losing dollars, fast. But he believes in the tooth fairy.

But consider this Bank of America building, there, in Atlanta. You never hear anyone say, "Do you believe, if you go to the top of that building and throw a ball off, it's going to fall?" You never hear that, because gravity is a thing.

So why don't we hear the question, "Do you believe in gravity?"

But of course, we hear the question, "Do you believe in global warming?"

Well, consider these facts. The American Association for the Advancement of Science, AAAS, one of the leading organizations in science, queried scientists and the public on different science topics.

Here are some of them: genetically modified food, animal research, human evolution. And look at what the scientists say about those, the people that actually study those topics, in red, versus the gray, what the public thinks.

How did we get there? How did we get there? That scientists and the public are so far apart on these science issues.

Well, I'll come a little bit closer to home for me, climate change. Eighty-seven percent of scientists believe that humans are contributing to climate change.

But only 50% of the public? How did we get there?

So it begs the question, what shapes perceptions about science? It's an interesting question and one that I've been thinking about quite a bit.

I think that one thing that shapes perceptions in the public, about science,

is belief systems and biases. Belief systems and biases. Go with me for a moment.

Because I want to talk about three elements of that: **confirmation bias**, **Dunning-Kruger effect** and **cognitive dissonance**.

Now, these sound like big, fancy, academic terms, and they are. But when I describe them, you're going to be like, "Oh! I recognize that; I even know somebody that does that."

Confirmation bias

Finding evidence that supports what we already believe.

Now, we're probably all a little bit guilty of that at times. Take a look at this. I'm on Twitter. And often, when it snows, I'll get this tweet back to me: "Hey, Dr Shepherd, I have 20 inches of global warming in my yard, what are you guys talking about, climate change?" I get that tweet a lot, actually.

It's a cute tweet, it makes me chuckle as well. But it's oh, so fundamentally scientifically flawed. Because it illustrates that the person tweeting doesn't understand the difference between weather and climate.

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I often say, weather is your mood and climate is your personality. Think about that.

Weather is your mood, climate is your personality. Your mood today doesn't necessarily tell me anything about your personality, nor does a cold day tell me anything about climate change, or a hot day, for that matter.

Dunning-Kruger

Two scholars from Cornell came up with the Dunning-Kruger effect. If you go look up the peer-reviewed paper for this, you will see all kinds of fancy terminology: it's an illusory superiority complex, thinking we know things.

In other words, people think they know more than they do. Or they underestimate what they don't know.

And then, there's **cognitive dissonance**. Cognitive dissonance is interesting. We just recently had Groundhog Day, right? Now, there's no better definition of cognitive dissonance than intelligent people asking me if a rodent's forecast is accurate.

But I get that, all of the time. But I also hear about the Farmer's Almanac. We grew up on the Farmer's Almanac, people are familiar with it. The problem is, it's only about 37% accurate, according to studies at Penn State University.

But we're in an era of science where we actually can forecast the weather. And believe it or not, and I know some of you are like, "Yeah, right," we're about 90% accurate, or more, with weather forecast. You just tend to remember the occasional miss, you do.

So confirmation bias, Dunning-Kruger and cognitive dissonance.

I think those shape biases and perceptions that people have about science. But then, there's literacy and misinformation that keep us boxed in, as well.

During the hurricane season of 2017, media outlets had to actually assign reporters to dismiss fake information about the weather forecast. That's the era that we're in. I deal with this all the time in social media.

Someone will tweet a forecast — that’s a forecast for Hurricane Irma, but here’s the problem: it didn’t come from the Hurricane Center. But people were tweeting and sharing this; it went viral.

It didn’t come from the National Hurricane Center at all.

So I spent 12 years of my career at NASA before coming to the University of Georgia, and I chair their Earth Science Advisory Committee, I was just up there last week in DC. And I saw some really interesting things.

Here’s a NASA model and science data from satellite showing the 2017 hurricane season. You see Hurricane Harvey there? Look at all the dust coming off of Africa.

Look at the wildfires up in northwest U.S. and in western Canada. There comes Hurricane Irma. This is fascinating to me.

But admittedly, I’m a weather geek. But more importantly, it illustrates that we have the technology to not only observe the weather and climate system, but predict it.

There’s scientific understanding, so there’s no need for some of those perceptions and biases that we’ve been talking about. We have knowledge.

But think about this. This is Houston, Texas, after Hurricane Harvey. Now, I write a contribution for “Forbes” magazine periodically, and I wrote an article a week before Hurricane Harvey made landfall, saying, “There’s probably going to be 40 to 50 inches of rainfall.” I wrote that a week before it happened.

But yet, when you talk to people in Houston, people are saying, “We had no idea it was going to be this bad.” I’m just...A week before.

But — I know, it’s amusing, but the reality is, we all struggle with

perceiving something outside of our experience level. People in Houston get rain all of the time, they flood all of the time. But they've never experienced that Houston gets about 34 inches of rainfall for the entire year. They got 50 inches in three days. That's an anomaly event, that's outside of the normal.

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So belief systems and biases, literacy and misinformation.

How do we step out of the boxes that are cornering our perceptions?

Well we don't even have to go to Houston, we can come very close to home. Remember "Snowpocalypse?" Snowmageddon? Snowzilla? Whatever you want to call it. All two inches of it.

Two inches of snow shut the city of Atlanta down. But the reality is, we were in a winter storm watch, we went to a winter weather advisory, and a lot of people perceived that as being a downgrade, "Oh, it's not going to be as bad."

When in fact, the perception was that it was not going to be as bad, but it was actually an upgrade. Things were getting worse as the models were coming in. So that's an example of how we get boxed in by our perceptions.

So, the question becomes, how do we expand our radius? The area of a circle is " πr^2 ." We increase the radius, we increase the area.

How do we expand our radius of understanding about science?

Here are my thoughts. You take inventory of your own biases. And I'm challenging you all to do that. Take an inventory of your own biases .Where do they come from? Your upbringing, your political perspective, your faith — what shapes your own biases? Then, evaluate your sources — where do you get your information on science? What do you read, what do you listen to, to consume your information on science? And then, it's important to speak out.

Talk about how you evaluated your biases and evaluated your sources. I want you to listen to this little 40-second clip from one of the top TV meteorologists in the U.S., Greg Fishel, in the Raleigh, Durham area. He's revered in that region.

But he was a climate skeptic. But listen to what he says about speaking out.

Greg Fishel: The mistake I was making and didn't realize until very recently, was that I was only looking for information to support what I already thought, and was not interested in listening to anything contrary.

And so I woke up one morning, and there was this question in my mind, "Greg, are you engaging in confirmation bias? Are you only looking for information to support what you already think?" And if I was honest with myself, and I tried to be, I admitted that was going on.

And so the more I talked to scientists and read peer-reviewed literature and tried to conduct myself the way I'd been taught to conduct myself at Penn State when I was a student, it became very difficult for me to make the argument that we weren't at least having some effect.

Maybe there was still a doubt as to how much, but to say "nothing" was not a responsible thing for me to do as a scientist or a person.

J. Marshall Shepherd: Greg Fishel just talked about expanding his radius



3 Kinds of Bias That Shape Your Worldview: J. Marshall Shepherd (Transcript) | 8

of understanding of science.

And when we expand our radius, it's not about making a better future, but it's about preserving life as we know it.

So as we think about expanding our own radius in understanding science, it's critical for Athens, Georgia, for Atlanta, Georgia, for the state of Georgia, and for the world.

So expand your radius.

Thank you.

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