Will Truth Prevail?

by Drew Pendergrass '20

On a cloudless morning the summer after freshman year, as a break from my research job, I decided to read a research paper. Light streamed into the lounge of Harvard’s Center for the Environment and illuminated the printed pages I had spread across a wooden table. The paper, written in 1963 by MIT meteorologist Edward Lorenz, A.M. ’40, was a pioneering work in chaos theory—the study of systems that follow strict mathematical laws, yet spin off wildly if they are slightly bumped. The atmosphere resists our attempts to predict and control it because it is a chaotic system. One of the figures in the paper showed curves wrapping themselves wildly around the x and y axes, evidence for Lorenz’s view of chaos. I felt I had glimpsed something hidden through a keyhole in the text, a secret feature of the universe. Lorenz described how minuscule inaccuracies in his model snowballed unpredictably, making long-term prediction of the weather impossible. In the middle of such a complex system, there is precious little to hold onto.

Grifters have always taken advantage of complexity, selling simple stories to an audience that is in over their heads—wellness tinctures and crystals in place of medicine, for example. Although Lorenz’s chaos model was designed to help show the limits of day-to-day weather forecasting, climate-change deniers use the ideas in this paper to suggest that the future is completely unknowable. In their hands, chaos transforms from a sophisticated mathematical concept into a magical shroud that covers the entire world.

There is nothing mystical about chaos. It arises under simple conditions: for example, in the atmosphere, when air, heat, and water vapor interlock with one another. Lorenz showed that chaos goes right along with change in an interconnected world. The theory suggests we could put together a perfect mathematical model of the atmosphere—and still be unable to perfectly predict the future so long as we lack exact knowledge of the motion of every individual molecule at the beginning. I thought of the grand non-answer that God gives to Job when explaining his fate, which is the same answer that chaos gives us: “Where were you when I laid the foundations of the earth?”

I grabbed up my papers and wandered toward the central cast-iron staircase, feeling overwhelmed. Taking science seriously leads to lots of questions. How do we know anything? I asked as I plodded down the steps. I was drawn to atmospheric science in part because of the poetry of chaos, but studying chaos is less beautiful than it sounds: how do we find the signal in the noise? Climate science is based on the observation that even though everyday weather is chaotic and can be predicted only a few days ahead of time, the weather in aggregate is much easier to handle. We may not be able to say exactly which days will be rainy each year, but we are pretty sure how much rain will fall in total. Climate, governed by the slow warming and cooling of the oceans with the seasons, follows different rules than weather does—much as humans follow rules different from those of their myriad individual cells. Chaos does not mean the future cannot be predicted, just that it cannot be predicted exactly.

I stepped outside into the summer air and watched the wind bend the trees one way and then another, disappearing as quickly as it appeared. You could spend a lifetime studying what just happened. There’s a million-dollar prize for anyone who can figure out what turbulence really is. It is a marvelous paradox, that the wind blowing through my hair on an unremarkable morning is among the most mysterious things on earth.

On the walk back to Leverett House, I started to think about how delicate science is. Nothing enforces Lorenz’s findings except the power of his evidence and arguments. Scholarship has no armies, no money, and makes nothing happen—at least not on its own. The towering brick laboratories to either side of me on Oxford Street seemed so immovable and authoritative, but actually studying earth science is a great way to shatter illusions of science’s invincibility. I had recently read Merchants of Doubt, co-authored by professor of the history of science Naomi Oreskes, which outlines how a small group of contrarian, industry-funded scientists misled the public about the dangers of both tobacco and human-caused climate change. The countercultural grifters have always taken advantage of complexity, selling simple stories to an audience that is in over their heads. Science is a counterweight to simple stories, offering a way to recognize the limits of our knowledge and to keep asking questions.

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change. By sowing doubt, exaggerating scientific uncertainty, and creating their own institutions to publish junk papers that would never survive peer review, these individuals undermined public trust in consensus science, delaying action on dangerous problems for years. Their funders made a fortune in the meantime. Countless other issues—acid rain, leaded gasoline, the ozone hole—have been treated with the same ruinous pattern of denial and delay. It isn’t people like Lorenz who rule the world.

What is science, founded on nuanced arguments, against a coordinated political assault? Centuries of burning libraries show that truth alone is no guarantee of survival. In fact, it is very easy to obscure reality—advertising and PR can be as effective as censorship. I thought of a line from Blaise Pascal’s bundles of notebooks, left unorganized when he died at 39: “Truth is so obscure in these times, and falsehood so well established, that, unless we loved the truth, we could not know it.”

Scholarship in the public sphere is in sorry shape. Climate science is treated like the Apostles’ Creed, a set of beliefs either taken on faith or cast aside. Whether people accept the creed depends mostly on their political views—broadly speaking, conservatives deny and liberals believe—in part because of those merchants of doubt. Science should not be like this. The motto of the Royal Society is nullius in verba: take nobody’s word for it, not even the word of scientists. At its best, science is about letting evidence speak for itself. Everything should be questioned; all authority should be challenged and critiqued. No belief required.

I picked up the pace, having lost track of time with Lorenz. Some friends and I had organized a reading group called the “Continental Breakfast Club”—dedicated to studying continental philosophy over continental breakfast, served at noon to accommodate the nocturnal schedule of college students. Our conversation that week centered on power. I had to pick up the bagels.

The reading group was surprisingly popular, especially for a summer program composed mostly of science students. Sixty years ago, C.P. Snow’s The Two Cultures argued that the sciences and humanities were so different, they effectively spoke two languages, setting up high walls between the disciplines. Why would a science student take the time to trudge through not just any philosopher, but through Foucault, that harbinger of the post-truth age, postmodernism’s poster child, who was on the docket for the week?

I think it is because students training to be scientists today cannot afford the false naiveté that truth will prevail—and because the “two cultures” idea has always been a little fake. Perhaps Donald Trump woke some people up. Or maybe the free food was the main draw. In any case, we all shared the sense that these thinkers had a lot to teach us about the way the world works. “Postmodernism” is a vague term, almost as vague as “continental philosophy.” The words get slung around like bludgeons, meaning everything from “political correctness” to “relativist” to “post-truth.” I like Jean-François Lyotard’s definition, that postmodernism is a general skepticism toward narratives that try to explain everything about the world. If we scientists no longer believed that knowledge would win on its own, then maybe we should rethink the stories we tell ourselves.

As the cream cheese circulated, our conversation quickly turned to power and knowledge. Foucault thought the two were intimately related. We were reading about the panopticon: a kind of circular prison designed so that each inmate could be observed by a single guard in the central tower. Because the prisoners never know exactly when they are being watched, their behavior is controlled not through blunt force, but through disciplinary observation. Foucault thought that modern power was similar: totally intertwined with knowledge. By knowing people you can control them, and by controlling people you gain further knowledge of them. He anticipated the surveillance state.

To our philosophy club, there were similarities with the state of science. Coordinated denial happens because ideologues believe that a certain kind of knowledge will push them out of power, and so they use power to cloud knowledge. We all left the table feeling a little unsettled and full of carbohydrates, which, after all, is what college is all about.

As people trickled out of the dining hall, I pulled out my laptop and started writing some data-analysis code for my research. As I typed, I was struck by a moment of dissonance. It was strange to pay so much attention to methodology, to worry so much about getting every detail right, after our conversation about power. Would it count for anything?

I had met a scholar in the School of Public Health earlier that summer, who would later become one of my research advisers. Although I can’t imagine him reading Foucault, he seems to have found the same insights on his own. He ascribes our failure on climate change to a lack of power, not a lack of knowledge. “Our house is on fire,” he likes to say about current ecological crises. Urgency, however, does not excuse sloppiness. As an adviser, he has encouraged me to make science useful to activists and changemakers. The response to bad actors is not to become one, but to make the truth even clearer, and to fight for it to prevail.

To me, the power of natural science comes from something that is ultimately irrepressible, a little bit like poetry, a little bit like beauty. Science exists solely on the force of its evidence and argument, and dares us to defy it. “Go ahead and try to make a perfect weather model,” Lorenz might have said. For all the flaws of science, and for all its obstacles, I am proud of this kind of work: few things in our world of double-speak try to stand on their own two feet and frankly say the truth.

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