FIRST THINGS

MATH DELUSION

by
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4 . 9 . 19

Mathematics is useful, and indeed beautiful: the thought of the infinite series of prime numbers is as awe-inspiring as a night sky crowded with stars. But you can have too much of a good thing. And right now, I think, we may be suffering from an excess of mathematics.

In 2013, Wisconsin resident Paul Zilly was convicted of stealing a lawnmower. Before being sentenced he was given a lengthy questionnaire that covered his life history ("How often did you have conflicts with teachers at school?") and ethical views (did he agree that "A hungry person has the right to steal"?). Zilly's answers, along with his previous criminal record, were put into a program called COMPAS, which assessed him—based on its secret algorithm—as highly likely to reoffend. The judge gave him two years.

When Zilly appealed, it emerged that COMPAS had missed quite a lot. Zilly had turned his life around and the recent theft was an uncharacteristic lapse. The judge reduced his jail time, remarking that if he hadn't seen the COMPAS prediction he would have given a shorter sentence in the first place.

There are more general doubts over COMPAS's effectiveness: One study found it was no more accurate than asking members of the public for their predictions. But it continues to be widely used.

Algorithms have spread to the U.S. justice system, just as they have spread to everything from advertising to zoology, because they are assumed to be reliable. That assumption should not have survived the 2007–8 financial crisis, which came about despite all the mathematical models which were meant to calculate the risk of disaster. One early warning came in August 2007. The Chief Financial Officer of Goldman Sachs

said market movements were defying the algorithms' predictions: "We were seeing things that were 25 standard deviation moves, several days in a row." According to researchers at University College Dublin, a twenty-five standard deviation move is as likely as winning the UK National Lottery twenty-one times running. Day after day, the pretty-much-impossible was taking place.

Mathematics can provide an air of authority that fools people who should know better. "A vote to leave," the British Treasury solemnly announced in May 2016, would immediately "push our economy into a recession and lead to an increase in unemployment of around 500,000." That prediction, and many like it, have helped to reduce public trust in politics—something to be lamented whatever you think of Brexit.

Yes, governments and companies often need to use data modeling. But as the mathematician Cathy O'Neil has pointed out, much of today's modeling ignores the basic rules of statistics. A few years ago New York City started rating teachers based on pupils' test results. A teacher called Tim Clifford scored an abysmal 6/100. The next year, without changing his approach, his score surged to 96. The measuring system was worthless, because it was based on too small a sample size. Sometimes, on the other hand, algorithms are all too accurate—as when financial hucksters target people whose Internet history reveals money worries.

O'Neil sees these "Weapons of Math Destruction" as a political problem that calls for better regulation. But there's a deeper issue here, too. For the last few centuries, we have grown steadily less confident in talking about things that can't be measured, to the point where the great questions—love, truth, the nature of being—have become too mysterious to discuss. Love is a feeling. Truth is just my truth, which is different from your truth. Happiness is pleasant emotions. Morality is being nice. Art is a matter of opinion. Meanwhile, everything that can be expressed numerically—credit ratings, calories, clicks, polling data—is obsessively sifted through and studied to death.

Philosophers, who should be leading the resistance, often jump on the bandwagon. The Effective Altruism movement, which began in Oxford's philosophy department, has become a global force. Effective Altruists (lovely people, in my experience) argue that we have a duty to donate as much as possible to charity. And, they observe, you can do even more good if you examine the statistics: Sending malaria nets to Africa may improve children's educational outcomes more than sending textbooks.

So far so good. But the limits of mathematical analysis become clear when the Effective Altruists start handing out career advice. Becoming a doctor is, according to the organization 80,000 Hours, overrated: The average U.K. doctor "will enable their patients to live an extra combined 140 years of healthy life"—that is, not "a huge impact." This estimate says nothing about the other things doctors provide: their daily improvements to people's lives, their gentleness and kindness that quietly change the world, their example as pillars of the community. All of which, of course, is difficult to put on a graph.

Moreover, once you start calculating, where do you stop? Effective Altruists are heavily preoccupied by the chance of existential threats to humanity—like accidentally creating a super-powerful robot that wipes out the human race. On a strictly mathematical basis, preventing such a risk could be more worth donating to than malaria nets: Think how many lives you could potentially save if you head off the genocidal-robot threat! Which just shows that, beyond a certain point, working on a strictly mathematical basis is a way to lose touch with reality.

Perhaps the biggest area in which mathematics has misled the world is population studies. From Thomas Malthus in 1798, arguing that food production could never keep up with population, to Paul Ehrlich in the 1960s, predicting a demographic explosion so cataclysmic that by 2000 there was an "even" chance England would not exist, demography has been a playground for wild predictions. Such theories have done immense harm: For instance, Malthusian ideas helped persuade British civil servants that the Irish and Indian famines weren't worth preventing. It's a grim cautionary tale for what happens when human sympathy is replaced with mathematical computation.

Everyone agrees that there are some things money can't buy. We should be just as sure that there are some questions calculators can't answer.

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