

The Demon-Haunted World

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“We’ve arranged a global civilization in which most crucial elements profoundly depend on science and technology. We have also arranged things so that almost no one understands science and technology. This is a prescription for disaster. We might get away with it for a while, but sooner or later this combustible mixture of ignorance and power is going to blow up in our faces.”

- Carl Sagan, *The Demon-Haunted World: Science as a Candle in the Dark*.

The White Sands Proving Ground sits in the Jornada del Muerto desert, southeast of Socorro, New Mexico. On July 16, 1945, it became the test site for the world’s first nuclear detonation. The Manhattan Project – the race to build the bomb – had started modestly enough six years earlier, but as it gained momentum would go on to employ more than 130,000 people and expend the equivalent of \$26 billion in today’s money.

Among the scientists and military men in attendance, there was no consensus as to what the results might be. The physicist Norman Ramsey forecast that the bomb would fail to go off completely. Robert Oppenheimer predicted an explosive yield equivalent to 300 tons of TNT. The Ukrainian-American chemist George Kistiakowsky plumped for 1,400 tons of TNT. The German-American physicist Hans Bethe went for 8,000 tons of TNT. The Polish-born physicist Isidor Isaac Rabi chose 18,000 tons of TNT (he would win the bet).

But the Italian physicist Enrico Fermi proposed a different wager altogether. He darkly suggested two options: given that the atmosphere would ignite, would the blast destroy just the state, or would it incinerate the entire planet ?

Fermi’s prediction was not as outlandish as it sounds today. Earlier in the war, in the spring of 1942, German physicists approached Hitler’s Minister for War Production, Albert Speer, to discuss the possibility of their building a nuclear bomb. Speer asked Werner Heisenberg, spokesman for the scientists, whether a successful detonation could be kept under control or whether it might continue, unchecked, throughout the atmosphere. Heisenberg did not give a definitive answer.

Speer later wrote in his memoirs,

Hitler was plainly not delighted with the possibility that the earth under his rule might be transformed into a glowing star.

One of the American physicists who worked on the Manhattan Project would go on to have a glittering career. Richard Feynman, one of the most charismatic and brilliant scientists to have lived, was always aware of the limitations of human knowledge. He once excoriated the pretensions of 'social scientists' and supposed experts:

They don't do scientific...they follow the forms...you gather data, you do so and so and so forth but they don't get any laws, they haven't found anything, they haven't got anywhere yet, maybe someday they will but it's not very well developed, but what happens is...even on a more mundane level we get experts on everything. They sound like a sort of scientific experts. **They are not scientists.** They sit at the typewriter and make up something.. Maybe true but it hasn't been demonstrated one way or the other but they sit there on the typewriter and make up all that stuff as if it's science and then become experts on food, organic foods and so on. There is all kind of myths and pseudoscience all over the place. Now I might be quite wrong, maybe they do know all these things but I don't think I'm wrong. You see, I have the advantage of having found out how hard it is to know something, how careful you have to be about checking the experiments, how easy it is to make mistakes and fool yourself. **I know what it means to know something** and therefore I can't...I see how they get their information and I can't believe that they know it. They haven't done the work necessary, haven't done the checks necessary, haven't done the care necessary. I have a great suspicion that they don't know that this stuff is...and they are intimidating people by it.

The problem is bigger than false science. Because we, the public, crave certainty, even – and especially – where it simply cannot exist.

In his lecture 'This Unscientific Age', Feynman put it as follows:

Suppose two politicians are running for president, and one goes through the farm section and is asked, 'What are you going to do about the farm question ?' And he knows right away – bang, bang, bang. Now he goes to the next campaigner who comes through. 'What are you going to do about the farm problem ?' 'Well, I don't know. I used to be a general, and I don't know anything about farming. But it seems to me it must be a very difficult problem, because for twelve, fifteen, twenty years people have been struggling with it, and people say that they know how to solve the farm problem. And it must be a hard problem. So the way that I intend to solve the farm problem is to gather around me a lot of people who know something about it, to look at all the experience that we have had with this problem before, to take a certain amount of time at it, and then to come to some conclusion in a reasonable way about it. Now, I can't tell you ahead of time what conclusion, but I can give you some of the principles I'll try to use – not to make things difficult for individual farmers, if there are any special problems we will have to have some way to take care of them,' etc. etc.

Now such a man would never get anywhere in this country, I think. It's never been tried, anyway. This is in the attitude of mind of the populace, that they have to have an answer and that a man who gives an answer is better than a man who gives no answer, when the real fact of the matter is, in most cases, it is the other way around. And the result of this of course is that the politician must give an answer. And the result of *this* is that political promises can never be kept. It is a mechanical fact; it is impossible. The result of *that* is that nobody believes campaign promises. And the result of that is a general disparaging of politics, a general lack of respect for the people who are trying to solve problems, and so forth.. It's all generated, maybe, by the fact that the attitude of the populace is to try to find the answer instead of trying to find a man who has a way of getting at the answer.

Max Planck famously suggested that science advances one funeral at a time. New scientific theories invariably come up against opposition from the 'old guard'. Only when that stubborn 'old guard' disappears from the scene do those new theories stand a chance of gaining wider currency. We have seen from the scientific community's variously shambolic, terrified, petty and disorganised response to coronavirus that Planck's warning still rings true.

The nuclear tests in 1945 introduced the world to places like Alamogordo. The conclusive reckoning with the Nazis one year later brought another city to world attention that today's politicians and their scientific advisers might wish to contemplate. That city was Nuremberg.

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