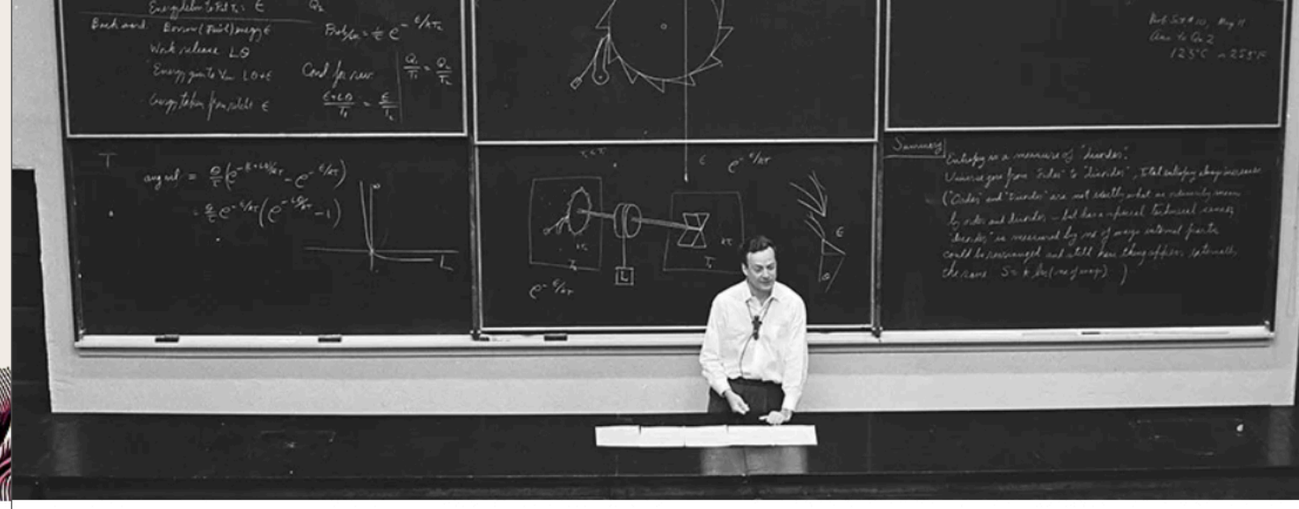
The Value of Science

Richard P. Feynman

"I would rather have questions that can't be answered than answers that can't be questioned."



Feynman teaching a Caltech class

About Feynman

Richard P. Feynman (1918–1988) was a maverick American Nobel Prize-winning theoretical physicist who was famous for his brilliant wit and effervescent personality. He is best known for his work in quantum electrodynamics and particle physics, particularly famed for the Feynman diagrams. He was ranked seventh among one-thirty leading physicists worldwide by the British journal Physics World.

Richard Feynman was also architect of the atomic bomb and has been known as one of science's greatest supporters. But it was he who spoke those forthright words in 1963 at a lecture at the University of Washington.

Years earlier, in the wake of watching his powerful, atom-splitting creations wreak unspeakable havoc and end thousands of lives in Hiroshima and Nagasaki, the affable and cheery Feynman grew melancholic, grappling with a painful nuclear reality—one he was instrumental in establishing—as well as uncertainty over the shape of things to come. Feynman was struggling with an existential crisis only a member of the Manhattan Project could truly experience.

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Of all its many values, the greatest must be the freedom to doubt

FROM TIME TO TIME, people suggest to me that scientists ought to give more consideration to social problems—especially that they should be more responsible in considering the impact of science upon society. This same suggestion must be made to many other scientists, and it seems to be generally believed that if the scientists would only look at these very difficult social problems and not spend so much time fooling with the less vital[1] scientific ones, great success would come of it.

It seems to me that we do think about these problems from time to time, but we don't put full-time effort on them—the reason being that we know we don't have any magic formula for solving problems, that social problems are very much harder than scientific ones, and that we usually don't get anywhere when we do think about them.

I believe that a scientist looking at non-scientific problems is just as dumb as the next guy—and when he talks about a non-scientific matter, he will sound as naive as anyone untrained in the matter. Since the question of the value of science is not a scientific subject, this talk is dedicated to proving my point—by example.

The first way in which science is of value is familiar to everyone. It is that scientific knowledge enables us to do all kinds of things and to make all kinds of things. Of course if we make good things, it is not only to the credit of science; it is also to the credit of the moral choice which led us to good work. Scientific knowledge is an enabling power to do either good or bad—but it does not carry instructions on how to use it. Such power has evident value—even though the power may be negated[2] by what one does.

I learned a way of expressing this common human problem on a trip to Honolulu. In a Buddhist temple there, the man in charge explained a little bit about the Buddhist religion for tourists, and then ended his talk by telling them he had something to say to them that they would never forget—and I have never forgotten it. It was a proverb of the Buddhist religion:

> *"To every man is given the key to the gates of heaven; the same key opens the gates of hell."*

What then, is the value of the key to heaven? It is true that if we lack clear instructions that determine which is the gate to heaven and which the gate to hell, the key may be a dangerous object to use, but it obviously has value. How can we enter heaven without it?

The instructions, also, would be of no value without the key. So it is evident that, in spite of the fact that science could produce enormous horror in the world, it is of value because it can produce *something*.

Another value of science is the fun called intellectual enjoyment which some

[1] **vital** *adj* : absolutely necessary or important; essential (필수적인, 꼭 필요한)

[2] **negate** *v* : to make ineffective (무효화하다, 효력을 없애다)