

# The Savor of Science | Shalom Carmy

## *Authors*

Can people who are not scientists find a path to God through casual study of the physical sciences? After Kant, the standard answer has been “no.” He argued that human knowledge is structured by mental concepts that give the illusion of metaphysical knowledge, not its reality. These categories are adequate for our knowledge of the “phenomenal world” of sense experience but fail to disclose the truth about the world beyond the senses. In philosophy, to be sure, hardly anything is settled forever, so some reputable philosophers continue to work with the cosmological proof, which seeks to show how the existence of finite reality implies the existence of a Creator.

A greater number give weight to some form of the argument from design, which infers from evidence of structure, order, and purpose in the universe the existence of a Designer. Design arguments are by their very nature probabilistic: Given what we know about the world, is it more or less likely that the universe, or certain features of it, evolved by chance? Therefore, design arguments never attain 100 percent certitude. But by the same token, they cannot be counted out. Kant himself recognized that arguments from design are for this reason harder to refute convincingly than strictly metaphysical arguments, which rely on our intuitions about causality, existence, and necessity.

About twenty years ago, everyone was talking about the anthropic principle. The universe we live in is clearly compatible with the existence of rational beings capable of reflecting on the world. It didn't have to be that way. General laws of physics could obtain in a world without any form of consciousness. It is a contingent matter that our world is fine-tuned in a manner that makes our existence possible. How likely is it? Some theists argue that consciousness and knowledge are more probable on the hypothesis of design. How much more probable has provoked vigorous dispute. Based on the literature I've studied, the various forms of the argument were far from conclusive, and the initial excitement seems to have subsided.

I find myself curious about these kinds of arguments, but not greatly so. The religious core of my life is tied to revelation, the experience of God, Torah, and the peculiar history of God's covenant with the Jewish people. I do seek God in the natural world, and with age the beauty and sublime character of the created world become more vivid. These experiences blend together with the great creative art and the magnificent music by which human beings have both expressed and transcended sensuous experience. When scientists and philosophers and theologians discuss the distinctive place of human beings in our world in terms of probability theory, I am characteristically more moved by the sheer uncanniness of our conscious and reflective presence than by the degree of logical support such arguments offer to the reality of faith.

There is a palpable uncanniness in the scientific discoveries we have come to take for granted. Recently I came across Hasok Chang's [\*Inventing Temperature: Measurement and Scientific Progress\*](#). This philosopher and historian of science

recounts the development of our concept of temperature from the early modern period into the nineteenth century. How does one attempt such measurement in the absence of thermometers? Assuming that the boiling point and freezing point of water are significant fixed points, how do we define the phenomena of boiling and freezing? Does water boil when it first begins to bubble or when it reaches a certain degree of evaporation, and so forth? What are we to make of variations in the boiling point depending on air pressure or on the amount of air in the water? How can we make progress on these questions when we lack adequate definitions of heat and cold?

Progress in answering these and other questions required painstaking experimentation with primitive instruments. At one time, eminent savants devoted their free moments to shaking water containers in order to separate air from liquid. It also demanded an attention to epistemological questions. Why assume the uniform expansion of water or mercury in the thermometer, and what to do when this assumption turns out to be false? All of this is elementary compared to the technological ingenuity needed to obtain data about extreme temperatures, when ordinary thermometers melt or crack with cold. To this was added the intellectual work necessary to theorize temperature change as a thermodynamic function.

Reading Chang's book and others like it, I delight in the variety of natural phenomena and the astonishing inventiveness of famous and not-so-famous trailblazing scientists, who combine technological prowess and raw brainpower. I am also drawn to meditate on the strange fact that science is successful at all. It's not merely that there are scientists, thinking creatures numerous enough to constitute a critical social mass that devotes time and energy to reflecting on our environment. I wonder at the fact that nature herself allows scientific hypotheses to progressively capture her secrets.

All science begins in error. Humanity's first theoretical intuitions about natural phenomena invariably fail. They are soon contradicted by observed data. Of course, one may explain away or simply ignore inconvenient results. As a provisional strategy, this common approach may be reasonable. It is true that if our initial beliefs don't fit the facts, then surely the theory based on those beliefs will be defective. Yet a state of perpetual flux in our scientific knowledge would deny us the stability to move ahead. Skepticism may be a healthy corrective, but it cannot be the foundation of scientific progress. It is better to sail with an imperfect compass than with none at all.

Following the mid-twentieth-century philosopher of science Herbert Feigl, Chang emphasizes the "robustness" of certain middle-level empirical regularities or laws. These are not individual observations or sense data, nor are they explanatory theories. Instead, they are established fixed points that may be refined but not distrusted. Think of Archimedes's law of the lever in mechanics, or Snell's law in optics that describes the angle of refraction of light as it passes through glass or water. Without these principles—more than data, yet less than explanation—we would not have been able to venture forth to accumulate more data and to test bold, ambitious, and increasingly accurate theories. However you attempt to explain the existence of these middle-level scientific laws, recognizing their role in the evolution of scientific culture adds another layer of contingency to the odd fact that our species has performed the almost miraculous feat of understanding so much about the physical world.

Chang advances another thesis that seems to me illuminating and important. Many

of us lament the estrangement of the super-specialized scientist from the general educated public. Chang suggests that studying the history of science, particularly with a philosophical perspective, can substitute the experience of past scientific endeavors for the inaccessible science of the present.

For some, the layman's alienation from the frontiers of science is a great misfortune, for in a democracy, voters and officials must make crucial, sometimes exigent, decisions about policy and funding, feeling compelled to take the recommendations of scientists on trust. Such one-sided dependence is unhealthy; it breeds resentment, perhaps even sullenness and defiance. Chang's proposal may soften, if not remove, this impediment.

I am concerned with a less pressing but deeper issue. Perhaps I am predisposed to respond this way because of my primary intellectual experience. The study of Torah addresses all Jews, regardless of their ability to attain genuine mastery and authority. It is a tradition of investigation and analysis that values the process of inquiry as much as the bottom-line results. But as I see it, this attitude is what liberal arts education is all about. The quest for scientific knowledge is as much an expression of human grandeur as art or music or the apprehension of natural beauty. Therefore, a life unacquainted with the savor of science is an impoverished, intellectually (maybe even religiously) limited life.

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