

Plausibility: The Pumpkin or the Tiger?

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Michael Polanyi's (1968 [1962]) essay, "The Republic of Science," weaves an intricate analogy between the conduct of scientific research and the play of the economic market. Both are, in his view, examples of the way in which individuals can maximize socially beneficial outcomes by pursuing their own interests and adjusting, mutually but independently, to the interests of others. In other words, the same "invisible hand" that guides the market guides science. The implication of course is that science as an autonomous, self-governing and self-correcting enterprise should be left alone by government.

A keystone of Polanyi's argument for autonomous science is an essential unpredictability of scientific advance and any technical and societal outcomes dependent upon it, and thus that intentionally guiding research toward any specified human end is doomed to fail. In his own words, "I appreciate the generous sentiments which actuate the aspiration of guiding the progress of science into socially beneficent channels, but I hold its aim to be impossible and nonsensical" (Polanyi 1968 [1962]: 9).

In defense of this claim, Polanyi tells the following anecdote, which I will quote extensively because of its interest here:

In January 1945 [Bertrand] Lord Russell and I were together on the BBC Brains Trust. We were asked about the possible technical uses of Einstein's theory of relativity, and neither of us could think of any. This was 40 years after the publication of the theory and 50 years after the inception by Einstein of the work which led to its discovery....But, actually, the technical application of relativity, which neither Russell nor I could think of, was to be revealed within a few months by the explosion of the first atomic bomb....

Perhaps Russell and I should have done better in foreseeing these applications of relativity in January 1945, but it is obvious that Einstein could not possibly take these future consequences into account when he started on the problem which led to the discovery of relativity at the turn of the century. For one thing, another dozen or more discoveries had yet to be made before relativity could be combined with them to yield the technical progress which opened the atomic age.

Any attempt at guiding scientific research towards a purpose other than its own is an attempt to deflect it from the advancement of science....You can kill or mutilate the advance of science, you cannot shape it. For it can advance only by essentially unpredictable steps, pursuing problems of its own, and the practical benefits of these advances will be incidental and hence doubly unpredictable.

One might have some sympathy for Polanyi and Russell in their rather public failure on the most popular British radio show of its day. But perhaps they could have done better indeed. After all, *people were* working on the bomb in January 1945 because they realized the connection between mass and energy – even if they were laboring in secret, highly compartmentalized districts across

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the United States. And in order to have begun the project, someone must have initially seized upon this connection. In the popular version, this is Leo Szilard, who in 1939 contacted Einstein to write the letter about the possibility of a bomb to President Franklin Roosevelt.

But the point I wish to explore is not whether two of the most highly regarded intellectuals of their day – Polanyi and Russell, both polymaths, both fellows of the Royal Society, the latter a future Nobel laureate and the former the father of one to be – sitting in a BBC radio booth and queried by a disembodied voice, should have foreseen the social and technical consequences, nearly upon them, of a decades-old contribution in a field closely related to their expertises. Rather, I wish to explore the standard, if any, we might judge Polanyi's claim to necessary ignorance and, therefore, his claim for scientific autonomy. For, as the story of Nobel laureate Frederick Soddy demonstrates, scientists were imagining the potential of both peaceful atomic energy and atomic bombs decades prior to Polanyi's profession of ignorance (Sclove 1989). A crucial question, for Polanyi's credibility as well as for scientific responsibility and autonomy, is whether Soddy's worry about atomic bombs as an eventuality of the new physics was plausible, or was fiction and more akin to H.G. Wells' *The World Set Free*, which acknowledges him.

Michael Polanyi



Frederick Soddy



In a later essay, "The Growth of Science in Society," Polanyi (1967) introduces the concept of "plausibility" to a discussion of the mediation of disputes within science and between science and what one might call pseudo-science. To Polanyi, the operation of plausibility explains why scientists may disregard some hypotheses: "Only plausible ideas are taken up, discussed and tested by scientists. Such a decision may later be proved right, but at the time that it is made, the assessment of plausibility is based on a broad exercise of intuition guided by many subtle indications, and *thus it is altogether undemonstrable. It is tacit*" (Polanyi 1967: 536; italics in the original). Such tacit reasoning allows scientists to dismiss with prejudice, in his example, Immanuel Velikovsky's ideas that a rogue comet first caused a number of events described in the Hebrew bible and then settled into orbit to become the planet Venus – despite the fact that spacecraft later confirmed Velikovsky's hypothesis, contrary to the expectation of many planetary scientists, that Venus was hot and had plentiful hydrocarbons in its atmosphere.

In other examples, Polanyi describes how plausibility operates in science even for more pedestrian claims, and operates as well to exclude ideas that ultimately prove correct as well as ideas that never enter the canon. In attempting lay out some analytic version of this intuition, he dismisses reliance on the pragmatic, technological success of science (because Lysenko-ism in the Soviet Union persisted for so long despite its practical failures in agriculture). Rather,

Polanyi (1967: 542) offers a suite of characteristics that make a hypothesis or finding “interesting to science.” One is *reliability, or exactitude*. The second is its *systematic importance to the rest of scientific knowledge*. The third is the *intrinsic interest of the subject matter*.

Using these characteristics as a yardstick to measure Soddy’s vision of the atomic energy and the atomic bomb, I cannot imagine low scores on the measures of systematic importance or intrinsic interest (although of course “cannot imagine” is not a good criterion!). That leaves exactitude or reliability. One could be tempted to evaluate exactitude or reliability by asking, “Are all the pieces in place?” Polanyi himself might have used such a phrase, because in “The Republic of Science” as well as in “The Grown of Science in Society” he uses puzzle metaphors to express the scientific task. Indeed, this is how philosopher of science Heather Douglas seems to evaluate the visions of atomic energy. Once Hahn, Frisch and Meitner had identified the fission of uranium, one would say, all the pieces fell into place: “As word of fission crossed the Atlantic in January 1939, it was clear to all what fission meant: the possibility for useful nuclear energy, either as a power source or a bomb” (Douglas 2009: 83). Yet this word had not yet reached Polanyi, if we take him at his word, by January 1945, and even Einstein (as Douglas rightly points out) needed Szilard to rouse him to this possibility. And perhaps, even at the risk of exculpating Polanyi, all the pieces were not in place, as many years of many scientists’ and engineers’ labors lay stretched out six or seven years into the future ushered in at Trinity.

But having “all the pieces in place” or even all of them face up, seems too great a demand to place on mere plausibility: likelihood, eventuality, or even in Douglas’s words “possibility” could bear this. But plausibility is a weaker, more exploratory concept than any of these. Pushing Polanyi’s puzzle metaphor, I would argue that plausibility is more about having enough of the pieces turned up that you can begin to conceive of what the complete picture might look like.

Enough orange and black pieces would have you thinking tiger or jack-o-lantern. If the puzzle pieces are really bits of reality, is it not at this point that you would want to start asking, “what happens if it is a tiger?”



References

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