

Philosophy begins where physics ends, and physics begins where philosophy ends

Ashutosh Jogalekar

Physicist Sean Carroll has some words of wisdom for physicists who might have less than complimentary things to say about philosophy. The most recent altercation between a physicist and philosophy came from Neil deGrasse Tyson who casually disparaged philosophy in a Q&A session, saying that it can be a time sink and it doesn't actually [...]

Physicist Sean Carroll has some [words of wisdom](#) for physicists who might have less than complimentary things to say about philosophy. The most recent altercation between a physicist and philosophy came from Neil deGrasse Tyson who casually [disparaged](#) philosophy in a Q&A session, saying that it can be a time sink and it doesn't actually provide any concrete answers to scientific questions. Now I am willing to give Tyson the benefit of doubt since his comment was probably a throwaway remark; plus it's always easy for scientists to take potshots at philosophers in a friendly sort of way, much like the Yale football team would take potshots at its Harvard counterpart.

But Tyson's response was only the latest in a series of run ins that the two disciplines have had over the past few years. For instance in 2012 philosopher David Albert [castigated](#) physicist Lawrence Krauss for purportedly claiming in his most recent book that physics had settled or at least given plausible answers to the fundamental question of existence. In reply Krauss called Albert "moronic" which didn't help much to bridge the divide between the two fields. Stephen Hawking also had some harsh words for philosophers, saying that he thought "philosophy is dead", and going further back, Richard Feynman was famously disdainful of philosophy which he called "dopey".

In his post Carroll essentially deconstructs the three major criticisms of philosophy seen among physicists: there's the argument that philosophers don't really gather data or do experiments, there's the argument that practicing physicists don't really use any philosophy in their work, and there's the refrain that philosophers concern themselves too much with unobservables. Carroll calls the first of these arguments dopey (providing a fitting rejoinder to Feynman), the second frustratingly annoying and the third deeply depressing.

I tend to agree with his take, and I have always had trouble understanding why otherwise smart physicists like Tyson or Hawking seem to neglect both the rich history of interaction between physics and philosophy as well as the fact that they are unconsciously doing philosophy even when they are doing science. For instance, what exactly was the philosophy-hating Feynman talking about when he gave the eloquent Messenger Lectures that became "[The Character of Physical Law](#)"? Feynman was talking about the virtues of science, about the methodology of science, about the imperfect march of science toward the truth; in other words he was talking about what most of us would call "the philosophy of science". There's also more than a few examples of what could fairly be called philosophical

musings even in the technical "Feynman Lectures on Physics". Even Tyson, when he was talking about the multiverse and quantum entanglement in "Cosmos" was talking philosophically.

I think at least part of the problem here comes from semantics. Most physicists don't explicitly try to falsify their hypotheses or apply positive heuristics or keep on looking for paradigm shifts in their daily work, but they are doing this unconsciously all the time. In many ways philosophy is simply a kind of meta, higher level look at the way science is done. Now sometimes philosophers of science are guilty of thinking that science in fact fits the simple definitions engendered by this meta level look, but that does not mean these frameworks are completely inapplicable to science, even if they may be messier than what they appear on paper. It's a bit like saying that Newton's laws are irrelevant to entities like black holes and chaotic systems because they lose their simple formulations in these domains.

My take on philosophy and physics is very simple: *Philosophy begins where physics ends, and physics begins where philosophy ends.* And I believe this applies to all of science.

I think there are plenty of episodes in the history of science that support this view. When science was still in a primitive state, almost all musings about it came first from Greek philosophers and later from Asian, Arab and European thinkers who were called "natural philosophers" for a reason. Anyone who contemplated the nature of earthly forces, wondered what the stars were made up of, thought about whether living things change or are always constant or pondered if there is life after death was doing philosophy. But he or she was also squarely thinking about science since we know for a fact that science has been able to answer these philosophical questions in the ensuing five hundred years. In this case philosophy stepped in where the era's best science ended, and then science again stepped in when it had the capacity to answer these philosophical questions.

As another example, consider the deep philosophical questions about quantum mechanics pondered by the founders of quantum mechanics, profound thinkers like Bohr, Einstein and Heisenberg. These men were brilliant scientists but they were also bona fide philosophers; Heisenberg even wrote a readable book called "[Physics and Philosophy](#)". But the reason why they were philosophers almost by default is because they understood that quantum mechanics was forcing a rethinking about the nature of reality itself that challenged our notions not just about concrete entities like electrons and photons but also about more ethereal ones like consciousness, objectivity and perception. Bohr and Heisenberg realized that they simply could not talk about these far flung implications of physics without speaking philosophically. In fact some of the most philosophical issues that they debated, such as quantum entanglement, were later validated through hard scientific experiments; thus, if nothing else, their philosophical arguments helped keep these important issues alive. Even among the postwar breed of physicists (many of whom were of the philosophy-averse, "shut up and calculate" type) there were prominent philosophers like John Wheeler and David Bohm, and they again realized the value of philosophy not as a tool for calculation or measurement but simply as a guide to thinking about hazy issues at the frontiers of science. In some sense it's a good sign then when you start talking philosophically about a scientific issue; it means you are really at the cutting edge.

The fact of the matter - and a paradox of sorts - is that science grows fastest at its fringes,

but it's also at the fringes that it is most uncertain and unable to reach concrete conclusions. That is where philosophy steps in. You can think of philosophy as a kind of stand-in that's exploring the farthest reaches of scientific thinking while science is maturing and retooling itself to understand the nature of reality. Tyson, Hawking, Krauss, and in fact all of us, are philosophers in that respect, and we should all feel the wiser for it.

The views expressed are those of the author(s) and are not necessarily those of Scientific American.



Ashutosh Jogalekar

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Ashutosh Jogalekar is a chemist interested in the history, philosophy and sociology of science. He is fascinated by the logic of scientific discovery and by the interaction of science with public sentiments and policy. He blogs at The Curious Wavefunction and can be reached at curiouswavefunction@gmail.com.