

The Scientific Inquisition

Tuomas E. Tabko finds a place where metaphysics and science meet

It is tempting to start a discussion about what metaphysics is or should be by making clear what metaphysics is *not*. Professional philosophers frown when they see the word “metaphysics” being associated with crystals, enchanted spell candles, and incense. Even at distinguished bookstores the “Metaphysics” section is dominated by astrology, auras and chakras, freemasonry, even Rosicrucianism. Scientifically-minded philosophers engaged in metaphysics certainly have nothing to do with any of this.

But what if we turn the picture upside down? Recently, metaphysicians have been fighting off a kind of Scientific Inquisition, a line of thinking in contemporary philosophy that aims to convert us all to naturalism and to denounce the false gods of intuitions, *a priori* reasoning, and thought experiments. (If you’re looking for an example of the Scientific Inquisition in action, Peter Unger argued in this magazine that typical philosophical thought experiments produce nothing but “Empty Ideas”, *TPM* 57.) Perhaps the Scientific Inquisitors are right. There are probably many debates in metaphysics that are based on dubious intuitions or fantastic – should I say magickal – thought experiments. But we shouldn’t forget that the actual Inquisition also attacked Galileo, whose scientific methods were, at that time, regarded as at least as dubious as metaphysical thought experiments are now. Nobody expects the Scientific Inquisition to undermine central scientific methods!

Galileo is of course a particularly nice example because thought experiments were a crucial part of his methodology: Galileo is said to have refuted the Aristotelian theory of motion (heavier bodies fall faster than lighter ones) by means of a thought experiment rather than an actual empirical experiment. The refutation is simple. Just consider a cannon ball and a tennis ball that are attached together via string; according to Aristotle’s theory, the combination of these objects should fall faster than the cannon ball alone. But it should also fall slower, since the light tennis ball is supposed to slow down the heavy cannon ball. This is a contradiction, which shows that Aristotle’s views about motion are suspect, and no one actually needs to drop a cannon ball or a tennis ball to find out.

Here is how I see the relationship between metaphysics and science. Both are in the business of studying reality; they share the same subject matter. However, their respective methods seem to be different, given the apparent lack of empirical research in metaphysics. The obvious question is: how could we possibly study reality without using empirical methods? The answer should be equally obvious: we can employ the very same methods used by Galileo and the vast majority of scientists both before and after him. Both philosophy and science make use of thought experiments. It is important to realise that there is more to scientific methodology than empiricism.

The similarity of scientific and philo-

sophical thought experiments is sometimes questioned. One possible line is to insist that thought experiments are only valuable when they lead to actual empirical experiments. This is what happened with the Einstein-Podolsky-Rosen (EPR) thought experiment, which attempts to explain away the “spooky action at a distance” phenomenon (as Einstein called it) of quantum entanglement. If we measure, say, the spin of an electron in a system that consists of two electrons travelling in different directions, this apparently has an immediate effect on the other electron in the system. This is the case even though the two electrons are seemingly independent of each other and could even be miles apart; thus the “spooky action at a distance”.

How could we possibly study reality without using empirical methods?

The thought experiment is presented in the form of a paradox: quantum mechanics suggests that information between the two electrons can travel faster than light, but this would appear to violate the Special Theory of Relativity. The upshot is that because of the paradox, there must be something more to reality than the standard quantum theory suggests. Einstein, Podolsky, and Rosen explained the phenomenon by introducing “hidden variables”: some unknown local properties of the system that should account for the paradoxical result.

The thought experiment was presented in 1935. It was only after John Bell’s 1964 work

that the thought experiment eventually led to real experiments, and it is generally thought that these confirmed standard quantum theory rather than the hidden variable theory that Einstein favoured. It seems reasonable to say that the EPR thought experiment was valuable regardless of this. If this is the case, thought experiments can be valuable while failing to correspond with actual reality; that is, thought experiments by themselves do not need to be a reliable guide towards how things are in the actual world.

However, thought experiments that do not relevantly correspond with the actual world might not appear to be very interesting. But the goal of philosophical thought experiments is clearly different – it would seem that it is enough if the thought experiment describes a (metaphysically) possible scenario. Now, it should be immediately noted that one area of debate with regard to many philosophical thought experiments is exactly whether they are possible – or indeed even conceivable. These are exactly the kind of thought experiments that the Scientific Inquisition typically targets. One example, mentioned also by Unger, is Donald Davidson’s Swampman. This doppelgänger thought experiment produced a heated debate in the philosophy of mind.

Your Swampman doppelgänger is a molecule-for-molecule physical duplicate of you produced by a freak chemical reaction generated by a lightning strike and swamp gas. The question is whether your physical duplicate is also mentally identical to you. Opinions are divided, with one side insisting that of course the duplicate is also mentally identical and the other side claiming that something would be missing – perhaps the duplicate would be a phenomenological “zombie” lacking con-



scious experience. These two very different intuitive reactions are empirically untestable. The upshot is that the doppelgänger thought experiment produces irredeemably contradictory conclusions, even among experts. Perhaps the doppelgänger thought experiment is a bad one, and the Scientific Inquisition is right to rid us of such intuition-mongering. After all, it does not seem to have inspired any actual experiments, contrary to the scientific ones.

Incidentally, it is now 29 years since Davidson introduced us to Swampman. Bell's theorem, which resulted from the experiments

inspired by the EPR thought experiment, was introduced exactly 29 years after the EPR thought experiment. Should we conclude that if a thought experiment hasn't inspired any real experiments within 30 years of its inception, then it's worthless? How long should we wait?

These are clearly the wrong questions. There are thought experiments that obviously have value even though they could never produce real experiments. Hilary Putnam's Twin Earth thought experiment – where we imagine a world where water has a different microstruc-

ture (XYZ not H₂O) but all the same macro-physical features – is a case in point. We could certainly never test this, because it's plausible that there is only one molecular structure that produces *exactly* the same set of chemical properties that water actually has. So it's physically impossible that XYZ could produce the same chemical properties as H₂O. I think the Scientific Inquisition would be right to question some of the speculation that followed Putnam's work, exactly because of the lack of scientific detail in this discussion. At the same time, I think it's quite clear that this thought experiment, and others, have been extremely valuable. Let me briefly explain why.

Both philosophy and science make use of thought experiments

There is a hidden assumption underlying the Twin Earth thought experiment, one that is not entirely clear in Putnam's philosophy. This assumption is that what makes water *water* is precisely its microstructural composition. In other words, it is simply assumed that the boiling point of water, its ability to dissolve salt, the surface tension of water and so on can be explained in terms of the molecular structure of water. It's true that chemistry and physics can give us a good idea about the microstructural basis of these properties of water. But in order to establish the metaphysical results that are typically associated with the Twin Earth thought experiment, something much stronger is needed: we need to show that microstructure *determines* macrostructure with a 1:1

correlation. Only then could we confirm that H₂O – and only H₂O – produces the chemical properties we know and love. Only then could we conclude that chemical substances ought to be defined in terms of their microstructure.

It turns out that the story I've just told is controversial: scientists are happy to exploit the chemical properties of various chemical substances, but they might hesitate to commit to the thesis concerning microstructural determination that I've just outlined. So it would appear to be a philosophical thesis. Putnam did not discuss the scientific details of this thesis, but my suggestion is that here we are exactly at the interface of metaphysics and science. If this is where the Scientific Inquisition wants to push us, I am willing to follow – we need empirical work to get to such results. Yet, remember that this was all spurred on by a distinctively philosophical thought experiment.

Of course, I have given you merely a glimpse of the relevant scientific work; there is much more to this story. But I have only hoped to show that by starting from intuition-driven thought experiments, which are still at the heart of analytic metaphysics despite their apparent flaws, we can arrive at a place where metaphysics and science must meet and can do so in a fruitful manner.

Tuomas E. Tahko is university lecturer in theoretical philosophy and academy research fellow at the University of Helsinki. He is the author of An Introduction to Metametaphysics (Cambridge University Press, 2015) and editor of Contemporary Aristotelian Metaphysics (Cambridge University Press, 2012).