ИНТЕРВЬЮ

Профессор факультета социологии Уорикского университета (Великобритания), основатель и первый редактор журнала «Социальная эпистемология» **Стив Фуллер** является одним из ключевых исследователей в области социологии и философии науки. Помимо социологических исследований С. Фуллер написал ряд книг о взаимоотношениях науки и религии, в которых он отстаивает креационистские взгляды. Журналу «Социология науки и технологий», членом редколлегии которого он является, проф. Фуллер предоставил право опубликовать интервью, посвященное этому вопросу[1].

An interview with *Steve Fuller*. Are science and religion in conflict?

The "conflict thesis" – that science and religion are in conflict, and perhaps necessarily so – is fairly recent, finding its strongest initial exposition in the 1874 book, *The Warfare of Science*, by Andrew Dickson White, which was followed up with a more detailed discussion in his 1896 book, *A History of the Warfare of Science with Theology in Christendom*. The relative youth of the conflict thesis may be itself a product of the conflict between science and religion – but only if one accepts that there is a necessary conflict between these two grand domains of human thought. The truth, it seems, is complex, as shown from the discussion below with Steve Fuller, Auguste Comte Professor of Social Epistemology at the University of Warwick, UK, who is the author of more than twenty books, the most recent of which, *Knowledge: The Philosophical Quest in History* (Routledge, 2015), explicitly associates scientific inquiry with 'divine psychology', or 'getting into the mind of God', a phrase that even atheistic physicists like Steven Weinberg and Stephen Hawking continue to invoke.

The following interview was conducted by Tam Hunt, a lawyer based in Santa Barbara, California, who has been concerned with both alternative energy and alternative spiritual prospects. He is the author of several books which pursue these lines of thought. The interview will figure in Hunt's forthcoming book, *Deep Science: Further Essays in Philosophy, Science and Spirituality* (Aramis Press, 2016). It is reprinted with permission of both Hunt and Fuller.

[1] Мнение и оценки интервьюируемого могут не совпадать с таковыми редакции.

Is science in conflict with religion and vice versa? Is this conflict inevitable?

The conflict is certainly not inevitable. In fact, the idea that humans as a species might understand the entire universe, the vast majority of which we shall never inhabit, comes from a certain self-understanding that can be found in the Abrahamic religions — namely, that we are created in the image and likeness of the Creator. It's hard otherwise to see how something like physics could have become the gold standard of all knowledge in the modern period. Even the ancient Greeks, who came up with many of our basic scientific concepts, didn't treat what they had done with such seriousness. What we now see as their 'science' was for them a glorified form of chess, a sophisticated leisure activity to keep the mind in shape. This is why there really is no mystery why the Greek interest in science declined over time: after all, sports wax and wane in fashion, too.

The Christians and the Muslims were the ones who began to think that the Greeks had been doing something deep in playing their mind games. Whatever conflict there has been historically between science and religion has been at the level of authority and power, not ideas or aspirations. All sides have been wanting to get into the mind of God or merge with God or even become God. The difference lies in the path chosen to do any of this. And all the so-called conflicts between science and religion have been about that. The 'conflict' typically arises once the 'scientific' side becomes relatively autonomous from the 'religious' side. In other words, when scientists no longer need to be priests or theologians, and start to have their own independent institutional structures with their own sources of power. And of course, this tendency has increased across the world over the past 150 years.

Is the "conflict thesis" dated now? Have the Catholic Church, Islamic authorities, etc. been helpful in the rise of science at times? On balance, has religion helped or hurt the rise of science?

The 'conflict thesis' is an invention of Darwin's followers in the late 19th century, which is then read back into the entire history of science. Thus, the famous portrayal of Galileo against the Catholic Church as having been a matter of evidence v. dogma originates from this period, largely on the basis of then-recently released Vatican transcripts of Galileo's trial, which secularists immediately seized upon. However, historians today generally understand the Church, which tended to tolerate differences in a 'big tent' manner, to have objected only to Galileo's insistence that his 'evidence' (which was not as sound as he claimed or is typically remembered) could trump the collected wisdom of the Church. In other words, Galileo failed to meet to the burden of proof. Of course, Galileo was vindicated in the fullness of time, but at the trial itself he was shown up to be more bluff than stuff, and that resulted in his house arrest.

The case of Islam is more complicated because the challenge that Islam faced from science came originally in the form of the claim that science should be esoteric knowledge for the elites because in the hands of the people, it would cause them to doubt the Qur'an. This view was associated with the medieval lawyer Averroes, who was regarded by the medieval Christians as the greatest commentator on Aristotle. However, within Islam he was seen as a heretic. Generally speaking, Islam has been very supportive of science as a way of ennobling humanity, but it has not tolerated scientific notions that are presented in direct contradiction of the Qur'an. However, it would be a mistake to conclude that science has failed to flourish. For example, embryonic stem cell research is very advanced in Iran, notably at the Royan Institute in Tehran. Here the Qur'an's emphasis on the human body as a vessel into which God deposits himself has encouraged a much more experimental approach to human modes of being than either Christian or even secular culture generally allows.

Is the "conflict thesis" dated now? In the late 19th century, the conflict was indeed palpable, since secular states were increasingly trying to take control of education from the church, which was its traditional location. The emerging scientific community was in the forefront of supporting the state in this regard. Darwin's great public defender, Thomas Henry Huxley, wrote some of the most influential essays on the need to make education secular and science-based. These influenced John Dewey's educational reforms in the US in the early 20th century. But even Huxley, who was always worried about the diminished place of humans in Darwin's world-view, believed that the solution to the conflict was that religion should embrace science as a means by which it might realize its own ends. In other words, Huxley was not calling for the sort of separation of church and state with which Americans are familiar from the Constitution. He wanted religious people to embrace science as a surer means to religious ends than simply blind faith or pious rituals.

If one looks at the responses by theologians to Darwin up to the First World War (i.e. roughly a half-century), they mainly stick to Huxley's advice. Liberal Protestantism is at its peak, most noticeably in Germany, which by 1914 had become the world's scientific leader. However, the carnage of WWI – and especially the humiliation of Germany – led religiously minded people to treat the episode as a Fall comparable to the expulsion from the Garden of Eden. It was in this context that the rise of what we now call 'Christian fundamentalism', as well as the more philosophically sophisticated opposition to science and technology promoted by Martin Heidegger and others, which stress the 'dehumanization' of our being. It goes without saying that these issues were only intensified with the Second World War. As people who continue to deal with the downstream effects of this religiously inspired blowback to scientifically inspired hubris, it is worth keeping in mind that the charges laid on science's doorstep are ultimately more moral than epistemic: In other words, humanity's quest for knowledge has outstripped its quest for knowledge about how to deal with its consequences.

I admire your broadmindedness and magnanimity with respect to the role of religion vis a vis the development of science, but I'm a bit surprised at your general conclusions that the conflict thesis has been magnified beyond what the facts warrant. In my readings in history in general and the history of science more specifically it seems that fear of persecution as a heretic, in both Christianity, for the large majority of its development over the last two thousand years, and in Islam for most of its history too (with the exception of a few centuries from the 9th to the 12th Century), was the default position for any thinker who dared to suggest that religious doctrine was not the whole truth. Like water to a fish, the threat of persecution or even death was ever-present and assumed as the key feature of the intellectual landscape. Do you disagree that Christianity and Islam, through their leadership's roles as arbiters of truth, have generally been strong persecutors of scientists and philosophers who disagreed with religious doctrine?

Yes, I disagree! First of all, both Christianity and Islam have varied considerably over their histories about which sorts of heresies they've pursued and the degree to which they've pursued them. Quite specific local factors often made all the difference. But it's certainly true that general practices such as alchemy have been regarded with the sort of suspicion that you're talking about. But this has nothing to do with the church's opposition to science, but the alchemists' opposition to authority. More specifically, alchemy implied that any intelligent person could get access to divine powers through their own efforts without the mediation of the church or perhaps even God. It's that very idea that was condemned. After all, the church didn't know what most of these alchemists were actually doing, and

we now know (more or less) that the alchemists didn't know what they were doing either. So this whole persecution business was based on a presumption about how one acquires knowledge – namely, through one's own efforts. This helps to explain why Bacon and Descartes are normally regarded as the founders of modern epistemology: They talked about gaining knowledge for oneself without intermediating authorities – just like the alchemists did. And, by the way, neither Bacon nor Descartes made much substantive contribution to knowledge – just like the alchemists! But they invented the narratives that we now still use to justify free scientific inquiry. I think the most helpful contemporary way to think about what establishment Christianity and Islam have opposed is in terms of the strong 'creative destructive' sense of 'innovation' that is so valorized today. While both religions have consistently supported efforts to improve the material lot of their peoples through the arts and sciences, they have been also keen to prohibit forms of knowledge that threatened to set up independent power bases which potentially threaten the livelihood of people (both high and low). In short, Christianity and Islam have taken a more 'precautionary' approach to human welfare than what became the norm during the modern period.

As a concrete example, the Catholic Church (the main branch of Christianity for the last 1700 years) has kept a list of banned books, the Index Librorum Prohibitorum *– until it was finally abolished in 1966. Kepler's major work on Copernican astronomy was on this list from 1621 to 1835, as were many other works of science, philosophy and theology. How do you place this practice in the context of a "non-conflict thesis"?*

Your argument would be persuasive if we would count all the books on the Index as 'science'. (Many of them would be counted as witchcraft, wild speculation, etc.) In fact, what made the books 'prohibited' was simply that they deliberately posed major challenges to key Catholic doctrines. And in any case, Kepler was a Protestant Christian. Protestantism abhorred the idea of an index of forbidden books. Protestants promoted literacy so that people could read everything for themselves – and then they would judge you personally on how you behaved in light of what you read. In other words, here too you may be ostracized or killed, but this would be a moral judgement about you personally, not a judgement about your having been a 'scientist' or having failed to conform to some church doctrine. If Protestantism sounds subjective, yes, indeed it is – typically a collective subjective judgement of the self-recognizing Christian community. That's the difference between, say, the Salem witchcraft trials (a Protestant thing) and Galileo's Inquisition (a Catholic thing).

Another well-known example of very serious harm perpetrated by the Church was the burning at the stake of Giordano Bruno in 1600, after seven years of trial in Rome, for the heresy of, among a number of charges, advocating pantheism – that God is the universe – as well as advocating that there are multiple star systems and planets like Earth in the universe. Bruno's and Galileo's cases were perhaps the most high-profile persecutions by the Catholic Church, but there are literally hundreds and thousands of lesser-known cases of serious persecution over the centuries. The overt acts of persecution had the desired effect in most cases of suppressing freethinkers from speaking out, known today as a "chilling effect." How can the conflict thesis not carry some serious weight given this rather horrific history of the Church and its relationship to freethinkers?

The fact that the Catholic Church conducted its legal business through persecution for a long period of its history doesn't mean that all the persecutions had anything to do with science in the sense that interests people who promote the so-called science-religion conflict. The Church was also the main authorizing agency of secular power, and so you might

usefully think about 'persecution' as comparable to what we now regard as policing at the level of national security. Where you can fault the Church is in its thinking that you could police minds as well as bodies (though our increasing surveillance capacities may force a rethink of this matter in the future). You can already see this pushback reflected in the main Protestant legacy to modern secular law – the insistence on the right of free expression. Indeed, when you and others use words like 'dissenter' and 'freethinker', you're alluding to this Protestant heritage. (But correlative to that has been the right to self-defence – the topic for another conversation.)

Put another way, someone who is upset about the Catholic Church's persecution history should be also upset by secular states that prosecute people for treason and sedition. Indeed, one of the most interesting and influential accounts of Galileo's Trial, by Giorgio de Santillana in the 1950s, was written in the shadow of McCarthyism in the United States. The bottom line is that the issues at stake were never strictly scientific but more generally political. (Paul Feyerabend made a big splash in the 1970s arguing that if Galileo's testimony were judged on strictly scientific grounds, the Church had him bang to rights.)

In short, as someone living today, I am reasonably distressed on political – not scientific – grounds that Galileo was given such a rough ride by the Catholic Church. Moreover, there's reason to think that Galileo thought about his fate in more-or-less in this way, since his responses to the Inquisition were calculated to avoid the difficulties that Bruno's much more open self-declarations encountered, which eventuated in his death.

It seems like you're in agreement that the Catholic Church was primarily interested in protecting its monopoly on orthodoxy, but doesn't that support my point? That is, any power center that is in the business of protecting correct views, under the assumption that its views are the only correct views and is willing to use force to protect those views, becomes an oppressive power. And the Church has well over a thousand years of history doing exactly this, does it not? So whether it's about strictly scientific views or philosophical or theological views (however one chooses to categorize whatever views are at issue, keeping in mind that there wasn't such a distinction until the modern era), isn't it still the case that the Catholic Church pursued a tremendously vigorous role in trying to keep ideas that challenged its perceived orthodoxy out of the public and private sphere?

It's difficult to say whether we're in agreement. My guess is that we agree on many if not most of the facts but perhaps not on the overall interpretation. My difficulty concerns your fixation on the Catholic Church as an institution. When you say it pursued a 'tremendously vigorous role' in preventing anti-orthodox ideas, I wonder what your benchmark is: 'tremendously vigorous' vis-à-vis which other institutions with a similar concentration of power? Or, is your hidden premise that any institution that enjoys such a concentration of power is bound to be oppressive? In other words, you're presuming a libertarian political starting point, and so the Church will look bad simply by virtue of its existence.

However, if you're not presuming libertarianism, then by the standards of other institutions — both sacred and secular – that have claimed hegemonic control, the Catholic Church was pretty uneven and maybe lax, certainly by today's standards. Our own secular 'democratic' societies are much better able to deploy concentrated power on intellectual offenders than the Catholic Church ever did in its long heyday — despite the tough talk and show trials. Simply the presence of a relatively accessible litigation apparatus has enabled ordinary citizens to raise heretical charges against other citizens, as in the several court cases involving Creationism and Intelligent Design over the past 30+ years. The point here should

be obvious: It was much harder for Catholic authorities to find out what people in the provinces were doing. So, unless someone reported them or they made nuisances of themselves (as Bruno and Galileo did), then all sorts of strange heresies could brew for long periods without anyone noticing, and by the time they were discovered it was difficult to do anything about them. The French historian Emmanuel Le Roy Ladurie's *Montaillou* provides an account of just such a situation, which was quite common in the Middle Ages.

I focused on the Catholic Church as the most obvious and relevant example of persecution because it has been the primary defender of religious and intellectual orthodoxy for over a thousand years in the western world. In comparing today's secular societies and their defense of orthodoxy to the Catholic history of persecution aren't you overlooking the rather stark differences in the severity of the consequences? It's been hundreds of years since anyone was burned at the stake or crucified for heretical or unorthodox views! One might lose a job or some friends today over heterodox views, but one's personal safety is generally guaranteed in such cases in western societies, and that's a direct consequence of the triumph of reason and the rule of law over faith and abuse of power, or so it seems to me.

What you describe may be true in the United States, under most circumstances. But of course, modern secular societies have not been afraid to impose capital punishment for treason and sedition, which are basically no more than enacted thought-crimes against the state. And that sensibility is alive and well in certain Muslim countries today. I also think that we need to see a form of punishment like burning at the stake in a somewhat different light. There is a tendency, one reinforced by sociology's founder Emile Durkheim, to see public executions as opportunities for a society to reaffirm its core values. Without denying that function, there is also a formal recognition of the offender's autonomy. Thus, it would be common for those burned at the stake to be burned with their books. In other words, the offender is given a death sentence not because s/he poses such a great material threat to society's well-being (e. g. by murder or property seizure) but because s/he poses a spiritual threat, namely, that s/he would have the society understand itself in a radically different way, which in turn would destroy the society's values — even if the society were to continue to prosper, etc.

In this, perhaps somewhat backhanded way, the offender is given due respect as a sane person, but one operating within a radically different set of values. Such a person does not need to be 'converted' or 'rehabilitated'. They simply need to be removed from a position of influence. Now, of course, death is not the only means of removal. Ostracism (i. e. throwing one out of town) was the main non-violent way of dealing with the matter, and it was typical for those burned at the stake to have led itinerant lives marked by ostracism. So there is an interesting question about the 'break point', when ostracism is no longer sufficient, and public execution is required. In any case, those executed generally understood the rules of this game and so tried to make the most of their predicament by dying as 'heroically' as they could. Thus, Giordano Bruno famously said to his judges, 'Perhaps your fear in passing judgment on me is greater than mine in receiving it'. While we might be inclined to see this as a vain gesture, in fact it was a legitimate worry because of the execution's potential effect on observers, who might be impressed by the significance attached to the condemned person. Here we should remember that such public executions were happening before the advent of the 'psychiatric' approach to the mind, which has made it much easier to interpret even coherent and eloquent people as somehow mentally deranged. So, the fact that, say, Giordano Bruno did not recant, even on the verge of death, would not have been interpreted

as bloody-minded delusion. Rather, it would have been treated as a more open verdict on his ideas, a judgement which history has borne out. My guess is that if you want to understand the rather brutal attitudes that certain 'radicalized' elements of Islam have towards executions and death more generally, then you might wish to imagine them as remaining in this 'pre-psychiatric' frame.

Turning to the history of science itself, rather than the conflict (or lack thereof) between science and religion, why is it that the Scientific Revolution occurred when it did, and not earlier or later in history?

The short answer is the spread of literacy, which was hastened with Protestantism's insistence that Christians confront the word of God for themselves and not simply take clerical authority at face value. By the mid-sixteenth century this general turn of mind had spread in Catholicism as well, especially through the Jesuit order, which was specifically created to combat Protestant readings of the Bible. And what the Bible clearly says is that we're created 'in the image and likeness of God'. St Augustine already drew attention to this verse in his own commentary in Genesis but realized its heretical potential, which was exploited with mixed results in the 1200 years that separated him from the Protestant Reformation. Generally speaking the Scientific Revolution occurred in the places where the Catholic Church's control was weakest during the Reformation, which is why Galileo is such a standout figure. He neither lived in (or moved to) a Protestant country nor kept his work secret. So the seventeenth century, which is normally seen as the time of the Scientific Revolution, marked a tipping point when enough people read the Bible literally in an environment (Protestantism) that was broadly supportive of humanity exploring its godlike potential. Here you should see Francis Bacon as the poster boy for the Scientific Revolution. He oversaw the publication of the King James Version of the Bible (the first nationally authorized English translation) while constituting the scientific method.

As the location of the most impressive early scientific and mathematical developments, why didn't the Scientific Revolution occur in ancient Greece, or Rome once it became the new hegemon after conquering Greece and the rest of the Mediterranean?

The Greek case is relatively easy to explain, as I suggested in response to your first question. Generally speaking, the Greeks did not take what we now regard as their seminal scientific and mathematical ideas with the same seriousness that we do. They took them simply as refinements of native human capacity, an exercise of the mind just like sport is an exercise of the body – both of which are valuable in themselves, without necessarily contributing to anything larger than themselves. However, there are Greek inklings of a view closer to our own, mainly in Plato, for whom mathematized knowledge of physical reality contributed to the education of the philosopher-king. What that would be is unclear, especially since Plato was of a notoriously anti-experimental turn of mind. It may simply be that mathematical physics enables us to see the world as God does. Still that's not without significance. It was the take on Plato that made his revival so central in the Scientific Revolution, when he replaced Aristotle as the go-to-Greek.

Explaining Rome's failure to reach a Scientific Revolution is much harder, given its own self-understanding as the centre of all that mattered in the world, which resulted in unprecedented levels of accommodation with alien ideas, both Greek and Christian. My own speculation is that without a very radical self-understanding of ourselves as gods in the making (of the sort that a literal reading of Genesis allows), civilizations will simply aim for a

sustainable longevity of its members without any further need or expectation of a step change which reorients their world-view. In other words, Ancient China is the historical norm – and Rome is the West's version of China. The Scientific Revolution broke that mould decisively, which shifted the presumption away from harmonizing the past and present as a source of social equilibrium to rejecting the past as a barrier to a better future social order.

Is a willingness to challenge authority key to scientific progress, among many other factors? Eric Weiner's new book, The Geography of Genius*, makes an entertaining case that places like ancient Athens, where genius and creativity flourished, were remarkable for their free-wheeling intellectual discussions as well as being major cultural and trade crossroads. If freedom to challenge authority is a pre-requisite for scientific and intellectual creativity more generally isn't there a pretty good case that religious orthodoxy and persecution of heterodox views on a wide range of subjects was a major reason why scientific progress largely languished for a thousand years during the Middle Ages?*

Valorizing ancient Athens as a source of intellectual genius is like fixating on casinos or lotteries as wealth generators. There are spurts of big wins but the house is the long term winner, and the smart players know when to cash out and shift to a more reliable wealth-creating vehicle. The most interesting question to ask about places like Athens – and there have been loads of such liberal intellectual environments throughout history – is why their brilliance doesn't last. Basically there is no follow-through on the ideas, so they never become the bases for new practices that materially transform large numbers of people well beyond those engaged in the initial conversations. Classical Rome started Greek legacy-building but Christianity and Islam are responsible for its global institutionalisation.

What we now regard as the intellectual 'languishing' of the Middle Ages had less to do with threat of religious persecution than the lack of incentive for scholars to interact with craftsmen to produce the hybrid form of knowledge that we now call 'experimental science'. The European Middle Ages developed most of the seminal modern ideas of science, but the people who developed them either didn't take them sufficiently seriously (i.e. they treated them as mere logical possibilities) or lacked the means to test them properly.

The early thirteenth century Oxford Franciscan monk, Roger Bacon (no relation to Francis) is instructive. He was commissioned by the Pope to do a survey of all knowledge for Christendom, with an eye to emerging trends. Bacon recommended a very proactive approach that would bring in astrology, alchemy and other such semi-dubious arts under the ambit of Christian doctrine, showing in some detail how they could be rendered compatible with Scripture, etc. No doubt, this would have hastened the Scientific Revolution by four centuries. However, Bacon's enthusiasm frightened the Pope, and Bacon himself was eventually imprisoned. But this was not part of any systematic persecution of heretics but rather it was an extreme risk-averse response on the part of Papal authorities to the inclusion of knowledge that had not been acquired by the canonical means. The Franco-Canadian historian Benoit Godin has observed that only once capitalism is in full swing in the second half of the nineteenth century does 'innovation' start to acquire an unequivocally positive meaning. So, rather than focus on 'defiance of orthodoxy', I would stress 'fear of innovation' as key to the medieval resistance to what became modern science.

This is a very different narrative than most observers have offered with respect to the growth of reason and science over the last 2,500 years, no? How is "fear of innovation" functionally different than "defiance of orthodoxy"? Isn't orthodoxy by definition the status quo? And given

the impressive power that religious authorities wielded during the Middle Ages surely this "fear of innovation" is tantamount if not identical to suppression of freethinking and science more specifically?

Here you need to keep together two features of medieval Christendom which tend to be treated separately – namely, that the Church was trying to maintain doctrinal integrity while at the same time it was expanding its reach into non-Christian lands. The expansionist drive encouraged a 'big tent' approach to Christianity, which made relatively light spiritual demands on potential believers. This was something to which Protestants would later point as evidence of the Church's 'corruption'. However, making it easy for people to become Christians is not the same as encouraging people to alter Christian doctrine. The former simply requires tolerating others who live differently, whereas the latter might require changing one's own life substantively. In this respect, the Church operated with a kind of 'neighbourhood liberalism', whereby you're allowed to do what you want as long as you don't disturb the peace. It was left to Protestantism to insist that people lead explicitly 'Christian' lives, as defined according to your local church. As a result, Protestants don't normally recognize 'saints', a category which suggests that only certain exemplary people lead fully Christian lives, while everyone else falls short and hence need to have their sins regularly absolved by the priest.

So in terms of the discussion of innovation, we can put the matter this way: Catholics and Protestants differed significantly in their tolerance of error (the former generally more tolerant than the latter) but neither were inclined to treat error as akin to what the geneticist Richard Goldschmidt called a 'hopeful monster', namely, a mutation that becomes the basis for a new life-form. Virtually all Christian persecution relates specifically to the hopeful monster scenario, whereby an innovation might become the basis for a new norm of conduct. If this sensibility remains obscure to you, think about the *modus operandi* by which the Catholic Church continues to oppose abortion, euthanasia or even stem cell research: They are worried less that *someone* might do these things than that *everyone* might. Thus, the Church has often tolerated specific instances of these activities if they could be understood as 'exceptional' or 'hard' cases, but not the basis of a new rule.

Last, and looking forward rather than backward, do you think modern scientific method is changing very much? Should it be changing, and if so in what directions?

I follow Francis Bacon in holding that the 'scientific method' is the best means we have to break down the world into its essential components so that it can be rebuilt as we see fit. (Bacon himself believed that this was a Biblical entitlement of humanity – and indeed, the way we would in fact extricate ourselves from Original Sin. I have sympathy with this general line of thought as well.) It follows that we make progress in science as our freedom increases to decide how the world shall be. From this standpoint, 'degree zero' of the scientific method corresponds to Aristotle, namely, when you take what stands before your eyes as the world as it was meant to be. The scientific method takes off once you imagine that the world may be remade into something radically different – and better – once we figure out how it works at a deeper level. The search for laws, causes, elements, etc. – the signature objects of modern scientific inquiry come from this sensibility. What's changed in the four hundred years since Bacon is that the scientific method has come to be applied in more abstract and general ways to test many more hypotheses at once. From a single hypothesis tested on subjects in a laboratory, we now have indefinitely many hypotheses at play in computer simulations ranging over 'big data'. To be sure, whatever 'empiricism' remains in the scientific

method is light years away from the sort of naturalistic observation championed by Aristotle, which to some extent was still championed by Darwin. The scientific method today is the artificially staged empiricism of the sort one finds in, say, clinical trials or climate models. Nevertheless the results reached in these ways are still meant to enable us to transform the world to our advantage and benefit.

I can't let this dialogue end right there. You hint in your last response that you are Christian and approaching these questions in that vein – is that the case?

I think of myself as a 'Christian' thinker in the sense that I think mattered to the US founding fathers. Mine is an Enlightenment-style Christianity that avoids church and ritual, yet nevertheless accepts the underlying metaphysics of Christianity, whereby humans are born in a state fallen from our divine nature yet capable of redemption. And like the Enlightenment thinkers, I believe that the royal road to redemption is provided by 'science' (understood broadly to mean free organized inquiry), not by specifically 'religious' practices. Thus, science itself is about getting into 'The Mind of God', just as physicists continue to talk today, even when they claim to be atheists. Thus, my theological predilections are with Deism, Unitarianism and Transcendentalism – all of which are normally seen as Christian heresies.

The thing that I would highlight about this tradition is its empowering character, which starting in the second half of the nineteenth century was secularized – and arguably vulgarized – in the 'self-help' literature of 'the power of positive thinking', 'self-actualization', etc. While the idea of releasing one's inner godhood nowadays sounds like New Age claptrap, I think it should be regarded as a literal ambition, even if the exact mechanisms of its realization are not yet fully understood. For this reason, I have come to embrace 'transhumanism', which explicitly aims to leverage cutting-edge science and technology to create a 'Humanity 2.0', which would have us, say, live forever, colonize planets, and do other god-like things.

I sense that you believe that my sympathetic attitude to the history of Christianity is due mainly to my own Christian beliefs. In fact, I'm basing my responses on my formal training in the history and philosophy of science. From that standpoint, the fixation on ancient Greece seems a little nostalgic, the stuff of 'popular history'. It really isn't that hard to come up with lots of innovative ideas. The Greeks weren't unique in doing this. What's hard is institutionalizing the innovations and, even harder, institutionalizing a culture of innovation — that is, one that isn't afraid to change its underwriting ideas periodically. Christianity and Islam were excellent at institutionalizing Greek innovations but not in developing cultures of innovation. The main reason, I believe, had nothing to do with the founding ideas of these two world religions but with more prosaic matters of power and authority. It also didn't help – at least from the standpoint of developing a culture of practical experimentation – that verbally and manually dextrous people were, generally speaking, located in separate classes of society. However, that bit is a Greek legacy.

My guess that this revival of interest in the Greeks of which you speak is a reflection of our own times, when the thought leaders on innovation tend to underestimate institutionalization as an intellectual task – especially when they operate from a libertarian default position, which imagines that a brilliant idea can be spread indefinitely with a click of a mouse, just as long as the state doesn't get in the way. This is the standpoint that tech critic Evgeny Morozov rightly ridicules as 'solutionism'. Here we need to keep firmly in mind that classical Athens was a cybernetic disaster zone: This is the one take-home lesson of the trial of Socrates. The very culture that fostered the free-wheeling trade in ideas epitomized by Socrates and the Sophists was unable to manage its feedback into public policy. This

led to the city-state's downfall to Sparta in the Peloponnesian War, as ruefully detailed by Thucydides in the first work of 'objective history'. The bottom line is that Athens crashed at the peak of its intellectual ferment. Something similar may be said of Weimar Germany in the early 1930s.

Where I differ from many other people similarly trained in the history and philosophy of science is that I believe that the history continues to be relevant in providing legitimation for present-day activities. For example, given science and technology's extremely chequered record over the past 150 years – enabling enormous benefits while generating enormous harms and risks — it is striking that we still believe that more of the same will be our salvation. Here I don't mean that, say, we'll continue to use the same energy sources, but that we believe that our next major energy source will be due to some new breakthrough in science and technology, if not one that we have yet to fully exploit. The shade of Green which argues for simply rolling back our commitment to science and technology and 'de-industrialize' is generally regarded as a political non-starter, even though in principle it could solve our mounting ecological problems. So where does this faith come from? It comes from humans – even those who claim to believe in Darwin – thinking that they are qualitatively different and superior to animals. Specifically, we don't simply adapt to our habitats (or else die); rather, we transcend our habitats and expand into ever greater spaces. Such faith is a sign of science and technology's residual theological impulse.

Okay, truly the last question: what are your favourite books or other resources on the topics we've covered here (including your own)?

I'll start by getting my own works out of the way. I have written two books specifically on science and religion in light of the 2005 Intelligent Design court case, *Kitzmiller v. Dover Area School District*, in which I was an expert witness: *Science vs. Religion?* (Polity) and *Dissent over Descent* (Icon). I've also written three books on the concept of 'Humanity 2.0', published by Palgrave in the UK. They help to explain my belief that science and technology continue to be informed by a theological imagination as push towards a 'transhuman' future. I also published a book with Routledge in 2015 which tries to embed this narrative in the history of philosophy: *Knowledge: The Philosophical Quest in History*.

In terms of the substantive scholarship that backs what I'm saying, I would point to any book by Frances Yates, Amos Funkenstein or Peter Harrison – starting from the 1960s to the present day – all of which demonstrate in some detail how the specific cast of the modern scientific mind cannot be fully understood without seeing it as trying to address theological issues by secular means. Even an idea as basic as that 'error' is in our minds but the world itself is not deceptive turns out to be a secular version of 'Original Sin', which presupposes both a fallen humanity and a benevolent deity who looks kindly on our endeavours, albeit in ways that our fallen state may inhibit us from learning – that is, without experimentation. From this standpoint, an interesting attempt to damn both Christian theology and modern science precisely for being part of this same general narrative is David Noble's *The Religion of Technology: The Divinity of Man and the Spirit of Invention* (Penguin).