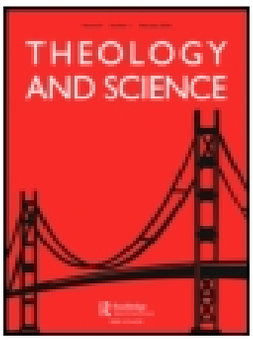

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Scientific Naturalism: A Manifesto for Enlightenment Humanism

Michael Shermer

ABSTRACT
The success of the Scientific Revolution led to the development of the worldview of *scientific naturalism*, or the belief that the world is governed by natural laws and forces that can be understood, and that all phenomena are part of nature and can be explained by natural causes, including human cognitive, moral and social phenomena. The application of scientific naturalism in the human realm led to the widespread adoption of *Enlightenment humanism*, a cosmopolitan worldview that places supreme value on science and reason, eschews the supernatural entirely and relies exclusively on nature and nature's laws, including human nature.

KEYWORDS
Scientific naturalism; Enlightenment humanism; scientism; is-ought fallacy; witch crazes

In June of 1510, 64 women and men were burned at the stake in Val Camonica, Italy, for causing drought and fires and for harming people, animals and land.

In July of 1518, 60 women and men were burned at the stake in Breto, Italy, for triggering thunder and lightning and for causing sickness and death of nearly 200 people.

In June of 1582, the wife of an English sawyer named Alice Glosscock from the town of Chelmsford was stripped naked and her body searched for "the marks of a witch," which were found, leading to her conviction and execution.

In May of 1653, a Connecticut colonialist named Elizabeth Godman asked her neighbor Goodwife Thorp if she had any chickens to sell, but none were available. The next day Thorp's chickens dropped dead, leading to Godman's arrest and trial.

In May of 1692, seven teenage girls writhed on the floor of a Salem, Massachusetts, courtroom during the trial of a suspected witch named Martha Carrier, crying out "There is a black man whispering in her ear!" Carrier was one of 20 people executed in what became the most famous witch trial in history.

What were these people thinking?[1] It is convenient to dismiss them as unthinking naïfs caught up in the hysterics of a moral panic, but in fact they were thinking quite clearly and they had the authority of the Bible behind them, as in Exodus 22:18: "Thou shalt not suffer a witch to live." They also had the power of the Roman Catholic Church behind them. In 1484, Pope Innocent VIII issued the Papal Bull, *Summis desiderantes affectibus,* in which he pronounced that many people had …

> abandoned themselves to devils, incubi and succubi, and by their incantations, spells, conjurations, and other accursed charms and crafts, enormities and horrid offences, have slain

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> infants yet in the mother's womb, as also the offspring of cattle, have blasted the produce of the earth, the grapes of the vine, the fruits of the trees, nay, men and women, beasts of burthen, herd-beasts, as well as animals of other kinds, vineyards, orchards, meadows, pasture-land, corn, wheat, and all other cereals; they hinder men from performing the sexual act and women from conceiving … [2]

Inspired by the Bull, two years later, the German Dominican inquisitor Heinrich Kramer published his *Malleus Maleficarum* (*Hammer of the Witch*), the infamous how-to manual on finding and prosecuting witches, which was promptly put to use and culminated in the murder of some 100,000 people.[3]

Such theological bafflegab and administrative argle-bargle was believed by most Europeans half a millennium ago. Today, no one in the West employs what I have called the *witch theory of causality*, and its disappearance gives us some insight into how moral progress is made—by employing a better understanding of causality. The primary difference between us and these early modern Europeans is, in a word, science. Lacking any systematic empirical method of determining the correct cause of things and specialized fields to explain specific phenomena—meteorology for the weather, epidemiology for plagues, medicine for illness and miscarriages, agronomy for crop production, animal husbandry for cattle diseases—they acted rationally according to what they believed to be true.[4] These inquisitors and their willing executioners were not evil so much as they were mistaken. We refrain from burning witches today not because our laws prohibit it, but because we do not believe in witches and so the thought of incinerating someone for it never even enters our minds.

Although the rise of science was not the only variable at work in the decline of the witch craze, in *Religion and the Decline of Magic*, the historian Keith Thomas concludes that the first and most important factor

> was the series of intellectual changes which constituted the scientific and philosophical revolution of the seventeenth century. These changes had a decisive influence upon the thinking of the intellectual élite and in due course percolated down to influence the thought and behavior of the people at large. The essence of the revolution was the triumph of the mechanical philosophy.

By this Thomas means the Newtonian clockwork universe, the world-view that holds that all effects have natural causes and the universe is governed by natural laws that can be examined and understood. In this world-view, there is no place for the supernatural, and that is what ultimately doomed the witch theory of causality, as it did other supernatural explanations for natural occurrences. "The notion that the universe was subject to immutable natural laws killed the concept of miracles, weakened the belief in the physical efficacy of prayer, and diminished faith in the possibility of direct divine inspiration."[5]

From scientific naturalism to Enlightenment humanism

Scientific naturalism is the principle that the world is governed by natural laws and forces that can be understood, and that all phenomena are part of nature and can be explained by natural causes, including human cognitive, moral and social phenomena. According to a Google Ngram Viewer search, the term "scientific naturalism" first came into use in the 1820s, picked up momentum from the 1860s through the 1920s, then hit three peaks in the 1930s, 1950s and early 2000s, where it is now established as a core component of

modern science.[6] It incorporates *methodological naturalism*, the principle that the methods of science operate under the presumption that the world and everything in it is the result of natural processes in a system of material causes and effects that does not allow, or need, the introduction of supernatural forces. "Methodological naturalism" spiked dramatically in use in the mid-1990s and continues climbing into the 2000s,[7] most likely the result of the rise in popularity (and polarization) of "scientific creationism" and Intelligent Design Theory, the proponents of which complained that *methodological naturalism* unfairly excludes their belief in what I have called *methodological supernaturalism*, or the principle that supernatural intervention in the natural world may be invoked to explain any allegedly unexplained phenomena, such as the Big Bang, the fine-tuned cosmos, consciousness, morality, the eye, DNA and, notoriously, bacterial flagella.[8]

In the centuries following the Scientific Revolution, the gradual but systematic displacement of religious dogmatism, authority and supernaturalism by scientific naturalism, particularly its application toward explaining the human world, led to the widespread adoption of *Enlightenment humanism*, a cosmopolitan world-view that places supreme value on science and reason, eschews the supernatural entirely and relies exclusively on nature and nature's laws—including human nature and the laws and forces that govern us and our societies—for a complete understanding of the cosmos and everything in it, from particles to people. Humanism's roots, however, actually predate the Scientific Revolution, and are usually traced back to the fifteenth century when, for example, the Italian philologist Lorenzo Valla exposed the Latin document *Donatio Constantini*—the *Donation of Constantine*, which was used by the Catholic church to legitimize its land grab of the Western Roman empire—as a fake through the use of historical, linguistic and philological evidence. "He was skeptical, he was empirical, he drew an hypothesis, he was rational, he used very abstract reasoning (even counterfactual reasoning)," the University of Amsterdam humanities professor, Rens Bod, told me.[9] Inspired by Valla's philological analysis of the Bible, the Dutch renaissance scholar, Erasmus (who already carried the sobriquet "Prince of the Humanists"), employed these same empirical techniques to demonstrate that, for example, the concept of the Trinity did not appear in Bibles before the eleventh century. In 1606, the Leiden University professor, Joseph Justus Scaliger, published a philological reconstruction of the ancient Egyptian dynasties, finding that the earliest one of 5285 BC predated the Hebrew Bible chronology for the creation of the world by nearly 1300 years. This led later scholars like Baruch Spinoza to reject the Bible as a reliable historical document. "Thus abstract reasoning, rationality, empiricism, and skepticism are not just virtues of science," Bod concluded. "They had all been invented by the humanities."

Why does this distinction matter? Because in the late twentieth century, the humanities took a turn toward postmodern deconstruction and the belief that there is no objective reality to be discovered and no idea that is closer to the truth than any other—the basis for the charge of "scientism." Because humanism as a movement became political in the late twentieth century, moving away from its roots in science and objective truth and toward progressive liberal politics and activism. And because at a time when students and funding are fleeing humanities departments, and support for and membership in humanist organizations is dwindling because they've alienated all those who do not share their narrow political agenda, the argument that humanism and the humanities are at least good for "self-cultivation" misses their real value, which Bod has forcefully articulated in his 2014 book, *The Forgotten Sciences: A History of the Humanities*.[10] The

transdisciplinary connections between the sciences and humanities is well captured in the German word, *Geisteswissenschaften*, which means the science of expressions of the human mind. This, in fact, is everything humans do, including the scientific theories we generate about the natural world. "Too often, humanities scholars believe that they are moving towards science when they use empirical methods," Bod reflected. "They are wrong: humanities scholars using empirical methods are returning to their own historical roots in the *studia humanitatis* of the fifteenth century, when the empirical approach was first invented."

True enough, and regardless of which university brick-and-mortar building scholars inhabit, we are all working toward the same goal of improving our understanding of the true nature of things, and that is the way of both the sciences and the humanities. Call it a *scientia humanitatis*. This is what I mean by *Enlightenment humanism*, a relatively new term that a Google Ngram Viewer search shows did not come into popular use until the 1980s.[11] In 2011, it was moved center stage by Steven Pinker in his 2011 book, *The Better Angels of Our Nature* (and will be more fully defended in his forthcoming *Enlightenment Now*), to reflect the influence of that era's scientists and philosophers on modernity. Pinker explains the logic of how the successful application of scientific naturalism in biological matters can adduce principles that lead to social and moral progress when applied to human affairs:

> When a large enough community of free, rational agents confers on how a society should run its affairs, steered by logical consistency and feedback from the world, their consensus will veer in certain directions. Just as we don't have to explain why molecular biologists discovered that DNA has four bases—given that they were doing their biology properly, and given that DNA really does have four bases, in the long run they could hardly have discovered anything else—we may not have to explain why enlightened thinkers would eventually argue against African slavery, cruel punishments, despotic monarchs, and the execution of witches and heretics.[12]

And enlightened thinkers did exactly that, which is why slavery, torture, and witch-hunts were abolished, and civil rights, women's rights, children's rights, gay rights and animal rights were legislated.

Scientific naturalism and Enlightenment humanism made the modern world. Many of the founding fathers of the United States, for example, such as Thomas Jefferson, Thomas Paine, Benjamin Franklin, James Madison and John Adams, were either practicing scientists or were trained in the sciences, although at the time they would have considered themselves experimental or natural philosophers, as the term *scientist* wasn't coined until 1840 and did not come into common use until the 1860s.[13] They deliberately adapted the scientific method of gathering data, running experiments and testing hypotheses to their construction of the nation. Their understanding of the provisional nature of findings led them to develop a political system in which doubt and disputation were the centerpieces of a functional polity. They thought of political governance as a *problem solving technology* rather than as a power-grabbing opportunity. They thought of democracy in the same way that they thought of science—as a method, not an ideology. They argued, in essence, that no one knows how to govern a nation, so we have to set up a system that allows for experimentation. Try this. Try that. Check the results. That is the heart of science. "The methods of science—with all its imperfections—can be used to improve social, political and economic systems," noted Carl Sagan in the final chapter

of his 1996 book, *The Demon-Haunted World*. "The great waste would be to ignore the results of social experiments because they seem to be ideologically unpalatable."[14]

Think about the 50 different states, each with its own constitution and set of laws. These are 50 different experiments. Every state has different gun control laws, for example, so we can treat these as experiments from which we can gather results and draw conclusions: states with more guns and fewer controls have higher homicide and suicide rates.[15] Every time an amendment to the Constitution is ratified and enacted into law, that is an experiment. The 19th Amendment that granted women the right to vote in 1920 worked, so we still abide by it. By contrast, the 18th Amendment passed in 1919 that prohibited alcohol to test the hypothesis that it would reduce drinking and crime failed, so in 1933, the 21st Amendment was enacted, overturning the 18th. Changing your mind when the evidence changes is a virtue in science.

These are not controlled laboratory tests, but they are nevertheless valuable experiments to social scientists, policy makers and the public. For example, policy experiments showed that teaching abstinence in sex education classes did not stop teens from having sex,[16] and criminalizing abortions did not curb the practice.[17] In both cases, information and contraception work better.[18] We can't run laboratory-like experiments in real-world governance, but we can use the comparative method to compare the outcomes of different economic and political systems, which is what Jared Diamond did in *Guns, Germs, and Steel* to explain the differential rates of development of different peoples around the world over the past 13,000 years.[19] A dramatic experiment began in August of 1945 when North and South Korea were divided at the 38th parallel. Both countries began the experiment with an annual average per-capita GDP of $854 and were in lock-step through the 1970s when South Korea implemented economic measures to grow their economy and North Korea turned into a full-fledged dictatorship. Today, the per capita GDP of North Korea is $1800, compared to $33,000 for South Korea.[20] You can also see the difference from space: one is dark and impoverished, while the other is bright and flourishing.

Foreign policy decisions are also experiments. The U.S. intervention in Germany from 1942–1945 was an experiment that very likely prevented the unnecessary deaths of millions of people. The United States *not* intervening in Rwanda in 1994 was an experiment that very likely resulted in many *more* unnecessary deaths. The United States intervention in Iraq appears to have been a failed experiment, whereas the result of today's intervention in Syria is unknown. Sometimes science can be very complicated and its results difficult to interpret. In *The Science of Liberty*, the science writer, Timothy Ferris, notes of the architects of the United States: "The founders often spoke of the new nation as an 'experiment'. Procedurally, it involved deliberations about how to facilitate both liberty and order, matters about which the individual states experimented considerably during the eleven years between the Declaration of Independence and the Constitution."[21] We are all citizen scientists now.

Scientific naturalism, Enlightenment humanism and the is-ought fallacy

At this point in the process of applying science to human affairs, many scientists and philosophers pull back from the precipice and dismiss such grand synthesizing as *scientism*, a calumny that I, for one, gladly embrace. Ever since the philosopher David Hume identified what is known as the *Is-Ought Problem* (or the *Naturalistic Fallacy*), most people hold that

there is an unbreachable wall between *descriptive* statements (the way something *is*) and *prescriptive* statements (the way something *ought to be*).[22] It is repeated like a mantra the moment you attempt to apply science to values, morals and meaning. "But, but, but … Hume!," they sputter, as if that were all that is needed to refute such an argument.

I think some confusion arises here from what is meant by *is* or *natural*. For example, I would agree that the statement, *there has always been war, so war must be natural and the way things ought to be*, is a fallacy.[23] But here I mean something different by *is*. I mean the true condition or nature or cause of a thing. When we undertake a study of war in order to understand its causes so that we may lessen its occurrence and attenuate its effects, this is an *is-ought* transition grounded in the true nature of war. And by nature I do not just mean the biological propensity (or not) of humans to fight. I mean all of the factors that go into the causes of war: biology, psychology, geography, culture, politics, economics, ideology, etc. That is the *is* we want to understand so that we can do something about it (the *ought*). In this sense, if morals and values ought not to be based on the way something *is—reality*—then on what should they be based?

In point of fact, we have been breaching the wall separating facts and values for centuries, and in my 2015 book, *The Moral Arc*,[24] I contend that this has been a major driver of moral progress. In brief, here's how. The Scientific Revolution of Copernicus, Kepler, Galileo and Newton that culminated in the mechanical world-view led scientists in other fields to strive to do the same. In the arena of governance, for example, the English philosopher, Thomas Hobbes, consciously applied the principles and methods of the physical sciences to the political and moral sciences in his 1651 book, *Leviathan*, considered to be one of the most influential works in the history of political thought. In it, Hobbes deliberately modeled his analysis of the social world after the work of Galileo and the English physician, William Harvey, whose 1628 *On the Motion of the Heart and the Blood* outlined a mechanical model of the workings of the human body. As Hobbes later immodestly reflected:

> Galileus … was the first that opened to us the gate of natural philosophy universal, which is the knowledge of the nature of motion. … The science of man's body, the most profitable part of natural science, was first discovered with admirable sagacity by our countryman, Doctor Harvey. Natural philosophy is therefore but young; but civil philosophy is yet much younger, as being no older … than my own *de Cive*.[25]

A century later, the French *philosophe*, Montesquieu, consciously invoked Newton in his 1748 work, *Esprit des Lois* (*The Spirit of the Laws*), when he compared a well-functioning monarchy to "the system of the universe" that includes "a power of gravitation" that "attracts" all bodies to "the center" (the monarch). And his method was the deductive method of Descartes: "I have laid down first principles and have found that the particular cases follow naturally from them." By "spirit" Montesquieu meant "causes" from which one could derive "laws" that govern society. One such law was the relationship between trade and peace, in which he noted that hunting and herding nations often found themselves in conflict and wars, whereas trading nations "became reciprocally dependent," making peace "the natural effect of trade." The psychology behind the effect, Montesquieu speculated, was exposure of different societies to customs and manners different from their own, which leads to "a cure for the most destructive prejudices." Thus, he concluded, "we see that in countries where the people move only by the spirit of commerce, they make

a traffic of all the humane, all the moral virtues."[26] This early version of the *trade theory of peace* has held up well in modern empirical studies, and here we can draw the links from empirical science to moral values: if you agree that peace is better than war (the *ought*), then the application of the principle of free trade and open economic borders between nations is a means of attaining that goal (the *is*).

Following in the natural law tradition of Montesquieu, a group of French scientists known as the physiocrats declared that all "social facts are linked together in necessary bonds eternal, by immutable, ineluctable, and inevitable laws" that should be obeyed by people and governments "if they were once made known to them" and that human societies are "regulated by *natural laws* … the same laws that govern the physical world, animal societies, and even the internal life of every organism." One of these physiocrats, François Quesnay—a physician to the king of France—modeled the economy after the human body, in which money flowed through a nation like blood flows through a body, and ruinous government policies were like diseases that impeded economic health. He argued that even though people have unequal abilities, they have equal natural rights, and so it was the government's duty to protect the rights of individuals from being usurped by other individuals, while at the same time enabling people to pursue their own best interests. This led them to advocate for private property and a free market. It was, in fact, the physiocrats who gave us the term *laissez faire*.[27]

The physiocrats asserted that people operating in a society were subject to knowable laws of both human and economic nature not unlike those discovered by Galileo and Newton, and this movement grew into the school of classical economics championed by David Hume, Adam Smith and others, and that forms the basis of all economic science and policy today. Consider Smith's monumental 1776 work. Most people think the title is *The Wealth of Nations*. Its full title is far more revealing as to its intent: *An Inquiry into the Nature and Causes of the Wealth of Nations*. Smith employed the terms "nature" and "causes" in the scientific sense of identifying and understanding the cause-and-effect relationships in the natural system of an economy, with the underlying premise that natural laws govern economies, that humans are rationally calculating economic actors whose behaviors can be understood, and that markets are self-regulated by an "invisible hand."

In these and many other examples, we see both the connection from the physical and biological sciences to the social sciences, and also the point of my focusing on this period in the history of science—our modern concepts of governance arose out of this drive to apply reason and science to any and all problems, including human social problems. In other words, we can ground human values and morals not just in philosophical principles such as Aristotle's virtue ethics, Kant's categorical imperative, Mill's utilitarianism, or Rawls' fairness ethics, but in science as well.

But what about Hume and that is-ought fallacy? What is the ontological and epistemological justification of shifting from is to ought? Those who reject scientific naturalism tend to turn to the divine, relying on what is known as Divine Command Theory. God is the ontological foundation of morals and values, the outside source from which we can derive real *oughts*. Unfortunately for methodological supernaturalists, Plato refuted Divine Command Theory with his "Euthyphro's dilemma," in which he asked, in so many words, "Is what is morally right or wrong commanded by God because it is inherently right or wrong, or is it morally right or wrong only because it is commanded by God?" For example, if murder is wrong because God said it is wrong, what if He said it

was okay? Would that make murder right? Of course not! If God commanded murder wrong for good reasons, what are those reasons and why can't we base our proscription against murder on those reasons alone and skip the divine command stage altogether? In other words, if murder is really wrong in the moral universe, then it doesn't matter what God thinks, or if there's a god or not, it's still wrong. Here are three ways we can reason our way from is to ought and derive moral values.

First, morality is derived from the Latin *moralitas*, or "manner, character, and proper behavior." Morality has to do with how you act toward others. So I begin with a *Principle of Moral Good*:

> Always act with someone else's moral good in mind, and never act in a way that it leads to someone else's moral loss (through force or fraud).

You can, of course, act in a way that has no effect on anyone else, and in this case morality isn't involved. But given the choice between acting in a way that increases someone else's moral good or not, it is more moral to do so than not. I added the parenthetical note "through force or fraud" to clarify *intent* instead of, say, neglect or ignorance. Morality involves conscious choice, and the choice to act in a manner that increases someone else's moral good, then, is a moral act, and its opposite is an immoral act.

Second, morality involves how our thoughts and actions effect the *survival and flourishing of sentient beings*. By *survival* I mean the instinct to live. By *flourishing* I mean having adequate sustenance, safety, shelter, bonding and social relations for physical and mental health. Any organism subject to natural selection will by necessity have this drive to survive and flourish, for if they didn't, they would not live long enough to reproduce and would therefore no longer be subject to natural selection. By *sentient* I mean *emotive, perceptive, sensitive, responsive, conscious*, and therefore able to feel and to suffer. Our moral consideration should be based not primarily on what sentient beings are *thinking,* but on what they are *feeling*.[28]

Third, given that moral principles must be founded on something *natural* instead of *supernatural*, and that science is the best tool we have for understanding the natural world, applying evolutionary theory to the ultimate foundation of morality, it seems to me that it is *individual sentient beings* that is our starting point because (1) the individual is the primary target of natural selection in evolution; and (2) it is the individual who is most effected by moral and immoral acts. Thus:

> The survival and flourishing of individual sentient beings is the foundation for establishing values and morals, and so determining the conditions by which sentient beings best survive and flourish ought to be the goal of a science of morality.

Here we see a smooth transition from the way nature *is* (the individual struggling to survive and flourish in the environment of our evolutionary ancestry) to the way it *ought to be* (given a choice, it is more moral to act in a way that enhances the survival and flourishing of other sentient individuals). In *The Moral Arc*, I proposed an analogy with what I called "a public health model of moral science," noting the startling advances in improving health and prolonging life for more people in more places over the past two centuries through flush toilets, sewers and waste disposal technologies, clean water, vaccinations, Pasteurization, occupational safety, family planning, and nutrition and diet and many others. If you agree that it is better that millions of people no longer suffer from

and die of yellow fever and small pox, cholera and bronchitis, dysentery and diarrhea, consumption and tuberculosis, measles and mumps, and many other assaults on the body, then you have offered your provisional assent that the way something *is* (diseases cause suffering and death) means we *ought* to prevent them through vaccinations and other medical and public health technologies.

Or consider the fact that according to the World Bank, the percentage of people living on less than $2.50 a day (poverty) and $1.25 a day (extreme poverty) has fallen by more than half since 1990 and is projected to disappear entirely by around 2035.[29] The end of poverty—imagine that![30] If the *survival and flourishing of individual sentient beings* is the foundation of values and morals, then we can say objectively and absolutely that ending poverty is real moral progress. On what basis can we make such a claim? *Ask the people who are no longer living in squalor*. They will tell you that surviving on more than $2.50 a day or $1.25 a day is better than suffering on less. Why is it better? Because it is in our nature to prefer flourishing to suffering. Or consider the fact that the number of polio cases has decreased from 350,000 in 1988 to 222 in 2012. Is that an absolute moral good? Ask the 349,778 people who did not die of polio. They'll tell you. If that is not objectively quantifiable moral progress, then I don't know what is.

Conclusion

Thanks to the world-view of *scientific naturalism* and *Enlightenment humanism*, never again need we be the intellectual slaves of those who would bind our minds with the chains of dogma and authority. In its stead we use reason and science as the arbiters of truth and knowledge. As I said in my 2012 Reason Rally speech before a crowd of over 20,000 humanists and science enthusiasts on the mall in Washington, DC:[31]

Instead of divining truth through the authority of an ancient holy book or philosophical treatise, people began to explore the book of nature for themselves.

Instead of looking at illustrations in illuminated botanical books scholars went out into nature to see what was actually growing out of the ground.

Instead of relying on the woodcuts of dissected cadavers in old medical texts, physicians opened bodies themselves to see with their own eyes what was there.

Instead of human sacrifices to assuage the angry weather gods, naturalists made measurements of temperature, barometric pressure, and winds to create the meteorological sciences.

Instead of enslaving people because they were a lesser species, we expanded our knowledge to include all humans as members of the species through evolutionary sciences.

Instead of treating women as inferiors because a holy book says it is a man's right to do so, we discovered natural rights that dictate that all people should be treated equally through the moral sciences.

Instead of the supernatural belief in the divine right of kings, people employed a natural belief in the legal right of democracy, and this gave us political progress.

Instead of a tiny handful of elites holding most of the political power by keeping their citizens illiterate and unenlightened, through science, literacy, and education people could see for themselves the power and corruption that held them down and began to throw off their chains of bondage and demand their natural rights.

The constitutions of nations ought to be grounded in the constitution of humanity, which science and reason are best equipped to understand. That is the heart and core of scientific naturalism and Enlightenment humanism.

Notes

1. These and many other accounts of witch trials are available here: John Demos, *The Enemy Within: 2,000 Years of Witch-Hunting in the Western World* (New York: Viking, 2008); Robin Briggs, *Witches and Neighbors: The Social and Cultural Context of European Witchcraft* (New York: Viking, 1996).
2. Medieval Sourcebook: Witchcraft Documents [15th Century] Innocent VIII: Bull Summis Desiderantes, December 5, 1484. http://bit.ly/2q0bSVs (accessed June 2, 2017).
3. The historian, Brian Levack, estimates that a minimum of 60,000 people were executed based on the number of trials and the rate of convictions (often close to 50 percent), while the medieval historian, Anne Llewellyn Barstow, pushed the total upward to 100,000 based on lost records. See: Brian Levak, *The Witch-Hunt in Early Modern Europe* (Abingdon: Routledge, 2006); Anne Llewellyn Barstow, *Witchcraze: A New History of the European Witch Hunts* (New York: Harper Collins, 1994).
4. There were, of course, other factors involved in the witch crazes—including the exploitation of women, the poor and the elderly, financial and sexual opportunism, revenge, insanity and preemptive denunciation (accuse others before you are accused)—but these are secondary and tertiary issues to the primary belief in supernatural agents acting in the natural world, which underlie the conviction that witches were real. Even the early judicial reformers who lobbied against the use of torture as a viable means of extracting useful information from accused witches, such as the German Jesuit Friedrich Spee, whose 1631 *Cautio Criminalis* played a role in bringing about the end of the witch mania, never doubted the existence of witches.
5. Keith Thomas, *Religion and the Decline of Magic* (New York: Charles Scribner's Sons, 1971), 643–644.
6. A Google Ngram Viewer search for "scientific naturalism" reveals these results: http://bit.ly/2qT5Kxn (accessed June 2, 2017).
7. A Google Ngram Viewer search for "methodological naturalism" reveals these results: http://bit.ly/2pVwcJi (accessed June 2, 2017).
8. Michael Shermer, *Why Darwin Matters: The Case Against Intelligent Design* (New York: Henry Holt, 2006).
9. Personal correspondence, June 2015.
10. Rens Bod, *The Forgotten Sciences: A History of the Humanities* (Cambridge: Oxford University Press, 2014).
11. A Google Ngram Viewer search for "Enlightenment humanism" reveals these results: http://bit.ly/2ppE5Ui (accessed June 2, 2017).
12. Steven Pinker, *The Better Angels of Our Nature* (New York: Penguin, 2011), 180. See also his forthcoming: Steven Pinker, *Enlightenment Now: The Case for Reason, Science, Humanism, and Progress* (New York: Penguin, 2008).
13. The term "scientist" was coined by the British philosopher of science, William Whewell, in 1833 and canonized in his 1840 classic work, *The Philosophy of the Inductive Sciences*. For a history of the word, see: Sydney Ross, "Scientist: The Story of a Word," *Annals of Science* 18:2 (1962), 65–85. This is confirmed by a Google Ngram Viewer search of "scientist": http://bit.ly/2qjFgZP (accessed June 2, 2017).
14. Carl Sagan, *The Demon-Haunted World: Science as a Candle in the Dark* (New York: Random House, 1996), 424.
15. Michael Shermer, "The Sandy Hook Effect," *Skeptic* 18:1 (2013), http://bit.ly/1uUZL7V (accessed June 2, 2017).
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21. Timothy Ferris, *The Science of Liberty: Democracy, Reason, and the Laws of Nature* (New York: Harper, 2010).
22. David Hume, *A Treatise of Human Nature* (London: John Noon, 1739), 335.
23. Other solutions to the is-ought problem have been proposed, such as John Searle's widely cited 1964 paper, "How to Derive 'Ought' From 'Is'," in which he proposes, for example, that the act of making a promise becomes the "is" and as such it becomes an obligation that one "ought" to fulfill: John R. Searle, "How to Derive 'Ought' From 'Is'," *Philosophical Review* 73:1 (1964), 43–58.
24. Michael Shermer, *The Moral Arc: How Science and Reason Lead Humanity Toward Truth, Justice, and Freedom* (New York: Henry Holt, 2015).
25. Thomas Hobbes, *De Cive, or the Citizen* (New York: Appleton-Century-Crofts, 1642), 15.
26. All quotes from Olson, 1990, 191–202 passim. See also: Thomas L. Hankins, *Science and the Enlightenment* (Cambridge: Cambridge University Press, 1985), 161–163.
27. Richard Olson, *Science Deified and Science Defied: The Historical Significance of Science in Western Culture*. (Berkeley: University of California Press, 1990), 15–40.
28. Jeremy Bentham was the first to articulate the grounding principle of animal rights: "The question is not, Can they *reason*? nor, Can they *talk*? but, Can they *suffer*?": Jeremy Bentham, Introduction to the Principles of Morals and Legislation (1823), Chapter XVII, footnote 122. See full text copy: http://bit.ly/1XdYerr (accessed June 2, 2017).
29. Data source: World Bank, and Francois Bourguignon and Christian Morrisson, "Inequality among World Citizens: 1820–1992," *The American Economic Review* 92:4 (2002), 727–744.
30. See also: Max Roser's web page tracking progress in poverty and many other areas of human and social life: https://ourworldindata.org/ (accessed June 2, 2017), along with the Cato Institute's web page: http://humanprogress.org/ (accessed June 2, 2017).
31. You can watch the speech here: http://bit.ly/1nUaL4L (accessed June 2, 2017). You can read the full text of the speech here: http://bit.ly/2qQ12RY (accessed June 2, 2017). You can read my essay about the rally and my experiences here: http://bit.ly/2qetArg (accessed June 2, 2017).

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