



## Scientific Revolution and the Age of the Enlightenment

Global interconnections and a widening world in the sixteenth century set the stage for even more intellectual growth. The Scientific Revolution brought new concepts, understandings of the universe, and even new evidence and methods for arriving at conclusions. Thinkers started looking for laws and simple principles using tools like mathematics. This in turn led them to think about their communities, asking radical questions about rights and what government should be. These kinds of discussions kicked off political movements and even impacted industrialization and imperialism, making these intellectual movements important factors in the making of the modern world.



00:01

As we get into the 1500s, the Renaissance has been going on for roughly 200 years. Especially Europe has been rediscovering the knowledge from the Greeks and from the Romans, and as they enter into the 16th century, they start to go beyond the knowledge of the Greeks and the Romans.

*Copernicus's work appears on a timeline that stretches from 1500 to 1900*

In 1543, Nicolaus Copernicus publishes "On the Revolutions of the Heavenly Spheres," famous for suggesting that Earth is not the center of the universe, but that the Earth revolves around the sun. What was powerful about this is, it challenged centuries-old ideas about how the universe worked, and, at a meta level, it was about using new methods and evidence in order to make conclusions, no matter how revolutionary those conclusions might be.

00:54

*The Scientific Revolution and Newton's 'Principia' show up on the timeline*

And this publication is often cited as the beginning of what will be known as the Scientific Revolution. Many people view the capstone of the Scientific Revolution to be Newton's publication of "Principia" in 1687, and this is an incredibly powerful publication. It describes the laws of the universe. It's a universe in which most things can be explained with simple principles, with mathematics. This is so powerful that it would not be challenged for over 200 years, until Albert Einstein comes on the scene with his theories of relativity. But even today, Newton's laws, this is what is taught in a first-year physics class. This is what you'll learn in an introductory engineering class.

01:46

So there's many things to think about. Why did this happen at this period of time? How was it related to the Renaissance? How was it related to things that were happening in politics in Europe at the time? But needless to say, it gave humanity a new perspective on the universe, and it gave humanity new powers, and we began to challenge all assumptions. And so as we get into the late 1600s and early 1700s, people start trying to use these same tools, the same deductive reasoning, on some of the oldest questions that humanity has ever asked itself: questions like, what rights do we have as human beings? Who gets those rights? What duty and obligation do we have towards each other? What is the role of government? Who has the right to rule?

02:41

Now, some of these questions have been the fodder of philosophers and religion for thousands of years. But now there was the power and the tools and the challenging notions of the Scientific Revolution. And this philosophical movement that is really tied to the Scientific Revolution is known as the Enlightenment. And just to have an example of the thinking during the Enlightenment, here is a passage from John Locke, who is considered one of the pillars of the Enlightenment. This is published in 1689. It's the "Second Treatise Concerning Civil Government."

03:20

*John Locke's text*

"The state of nature has a law of nature to govern it, "which obliges everyone, and reason, which is that law..." So reason is the law of nature to govern it, "Teaches all mankind who will but consult it "that being all equal and independent, "no one ought to harm another "in his life, health, liberty, or possessions. "And when his own preservation comes not in competition, "ought he as much as he can to preserve the rest of mankind "and may not, unless it be to do justice on an offender, "take away or impair the life "or what tends to the preservation "of the life, the liberty, health, limb, or goods of another."

**04:03** Now, to parse what he's saying, he says that reason is this natural law that should govern human action. And he's saying no one ought to harm anyone else, and that if we're not in competition—maybe there's only enough food for one of us, and there's two of us there, in which case we'd be in competition—but if there isn't that competition, we should be trying to help each other and we should be trying to preserve the rest of mankind. And unless it's for the purpose of justice, you don't have the right to take away or impair the life or things that help preserve the life, the liberty, the health, limb, or goods of another.

**04:39** Now, you might say, hey, isn't this common sense? And religions for all of time have touched on some of these issues. But you also have to appreciate that this is a time when kings and emperors ruled the world. What gave them that right? Why are certain people slaves and other people not slaves? Why do certain people in that world have a right to own these other people? And so this was a very controversial idea, challenging some of these fundamental notions of who should rule, who has the right to rule, and to what degree should people exert control over one another.

**05:13**  
*The Enlightenment is added to the timeline*

So, given these challenging notions of the Enlightenment—and John Locke was only one of the actors who would figure prominently in this roughly 100-year period—it's no surprise that as you get into the late 1700s and early 1800s, you have a whole string of revolutions, especially in the Americas, to a large degree inspired by the ideas of the Enlightenment, things like life, liberty, health. In the United States' Declaration of Independence, these things are cited. During the French Revolution, these things are cited. In the various revolutions in Latin America, these ideas are cited.

**05:50**  
*The Industrial Revolution is added to the timeline*

Now, one of the reasons why the Enlightenment came about when it did, not only did we have new tools of thinking and the opportunity to challenge notions, but it might have been that society now had the responsibility to think a little bit deeper about these ideas, because it was getting more and more powers through the Scientific Revolution. And those powers were becoming even more significant when that science was applied during the Industrial Revolution. Now society could produce more than it could ever produce before, but as we talk about in other videos, the Industrial Revolution had a certain hunger for raw materials, and a certain hunger for markets in which to sell your finished product. It also allowed for more powerful weapons and ways to project power and to control a larger empire: methods of communication, methods of force. And many historians tie it directly to the Age of Imperialism, where especially Western European powers sought areas to get raw materials and markets in which they could push their finished products.

**06:51**  
*The Age of Imperialism is added to the timeline (overlapping with the Industrial Revolution)*

And so as the industrialized world had more and more power, these ideas of the Enlightenment became maybe even more relevant, even though they might not have been implemented consistently during the Age of Imperialism. And as we've seen in other videos, even though the technology keeps accelerating during the Industrial Revolution, the philosophy and the moral framework does not accelerate along with it, and in the 20th century, we see one of the bloodiest centuries in all of human history.

**07:21**

*World War I and World War II are added to the timeline*

So let me leave you with a final series of questions. As we go into the 1800s, we talked about the various independence movements, especially in the Americas. We also have the abolishing of slavery in most of the world around this time period, and so to some degree, it looks like the ideas of the Enlightenment are coming to be, but at the exact same time, you have the Age of Imperialism, where more and more control is exerted over people around the planet. This all comes to a head in World War I, which is one of the bloodiest conflicts in all of human history.

**07:58**

So to what degree did the Enlightenment help the world and to what degree did it not get fulfilled? Or maybe in some way, things like World War I and World War II were the birthing pangs, the transition state, from the world before the Enlightenment. Then how close are we truly to those ideals today? In a future video, I'm going to talk about that, and I'm going to talk about the idea of human rights and how we as a civilization have attempted to address it after World War II.