

Why the Industrial Revolution didn't happen in China

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To economic historians like Joel Mokyr, there's nothing inevitable about the incredible wealth and health of the modern world. But for a spark in a little corner of Europe that ignited the Industrial Revolution — which spread incredible advances in technology and living standards first across the north Atlantic coast in the 1700 and 1800s and gradually around the world — we could all be living the nasty, brutish and short lives of our ancestors centuries before. Mokyr, who teaches at Northwestern University, dives into the mystery of how the world went from being poor to being so rich in just a few centuries in a forthcoming book, “A Culture of Growth: The Origins of the Modern Economy.”

Drawing on centuries of philosophy and scientific advancements, Mokyr argues that there's a reason the Industrial Revolution occurred in Europe and not, for example, in China, which had in previous centuries shown signs of more scientific advancement: Europe developed a unique culture of competitive scientific and intellectual advancement that was unprecedented and not at all predestined.

Interview with author Joel Mokyr below.

Why is it important to consider this question, of why the Industrial Revolution occurred?

It is a question that needs to be asked if we want to know how we became what we are. The 19th and 20th centuries are in many ways the most transformative centuries in all of human history. Until about 1800, the vast bulk of people on this planet were poor... I mean they were on the brink of physical starvation for most of their lives.

Life expectancy in 1750 was around 38 at most, and much lower in some places. The notion that today we would live 80 years, and spend much of those in leisure, is totally unexpected. The lower middle class in Western and Asian industrialized societies today has a higher living standard than the pope and the emperors of a few centuries back, in every dimension. That is the result of one thing: Our ability to understand the forces of nature and harness them for our economic needs. If we understood how that happened, we would understand human history. For thousands of years, the material conditions that people lived in changed very little. Then all of a sudden, in 1800, it just zooms up.

That came out of Western Europe and its offshoot in North America after 1800. If it hadn't been for that, you and I would be looking at a life expectancy of maybe 40, and I probably I wouldn't be sipping cappuccino from a fancy machine and talking to you on my smartphone. Look at what we have achieved in every dimension. Technology hasn't just increased our income, it's changed every aspect of daily life. The question is, was all this inevitable? My answer is, absolutely no.

So why did this dramatic change occur? And why did it start in Europe, rather than in China?

China has a glorious past in its scientific achievements. And yet they were never able to turn it into economic growth as the West did. If you look at Europe and China in the 19th century, Europe is advancing at breathtaking speed. It's building a rail network, steamships, factories. By the early 20th century, China looked like it was going to be completely occupied by imperialist powers. Clearly the technological and economic development of East and West diverged from 1850 on. The \$64,000 question is “Why?”

People have given different answers, and I'm giving mine. One way of thinking about it is culture. But to state, “Hey, the Chinese have a different culture because they were Confucianists, and the Europeans were Christian,” I don't buy that for a second. It's much more subtle and complicated. The way I would phrase it is that culture is not independent of political and institutional circumstances.

China and Europe are different in many ways, but one is that after the Mongol conquest in the 12th century, China remains a unified empire run by a single Mandarin bureaucracy. There is nothing that competes with or threatens China. China does get invaded by Manchu tribes in 1644, but they don't change the structure of the state. They learned to speak Chinese, dress like Chinese and eat like Chinese.

In Europe, no one ever succeeds in unifying it, and you have continuous competition. The French are worried about the English, the English are worried about the Spanish, the Spanish are worried about the Turks. That keeps everybody on their toes, which is something economists immediately recognize as the competitive model. To have progress, you want a system that is competitive, not one that is dominated by a single power.

I think that is the major difference. It isn't just that China doesn't have an Industrial Revolution, it doesn't have a Galileo or a Newton or a Descartes, people who announced that everything people did before them was wrong. That's hard to do in any society, but it was easier to do in Europe than China. The reason precisely is because Europe was

fragmented, and so when somebody says something very novel and radical, if the government decides they are a heretic and threatens to prosecute them, they pack their suitcase and go across the border.

Europe creates a competitive world that encourages intellectual innovation. There's the Reformation, which says the religion you had until now is wrong. The same happens in astronomy, chemistry, medicine, mathematics and philosophy. Eventually, it filters down to how we make textiles and shoes, and how we grow corn.

I want to make clear, very few serious historians think China failed. China wanted stability and security, and they achieved that for a long time. The Europeans don't want stability. They want progress. Of course, China's stability gets disrupted by Europeans showing up with more powerful ships and guns. Eventually, China crumbles under the onslaught of European modernity. It's quite a tragic story.

Your book talks about how the Industrial Revolution resulted from a preference for “useful knowledge” and a connection that forms between the social elite and the productive sector of society. Explain that.

Between Columbus's voyage to America in 1492 and the death of Isaac Newton in 1727, the agenda of research in Europe changes. For much of human history, people studied science and natural phenomena, not to make us materially better off, but just to satisfy curiosity. The ancient Greeks made fantastic scientific progress, but there are few instances in which they use it for anything. In fact, Aristotle says science shouldn't be used, because work is something for the lower classes. Learned people didn't work, and working people didn't learn.

Before the Industrial Revolution, learned people in Europe changed the agenda. They say, “Look, we should study nature, but we should do so to improve our material welfare.” To people today, this sounds totally obvious. But it wasn't in the year 1600. By the 18th century, this has become the consensus. That's what I call the Industrial Enlightenment.

Many of the scientific issues they were trying to solve, they couldn't. But they kept trying, and by the 19th century, they start cracking problems. Electricity is one example. For 100 years, people struggle with trying to harness its power. Only by the 1860s is electrical generation cracked, and then all of a sudden you get Thomas Edison, electrical lighting and street cars. The same thing happened in the understanding of infectious disease, which is the main reason life expectancy goes up. These advances took a long time. But they never gave up, and in the end they cracked it. If you think about it, this is quite astonishing.

In China today, people often talk about the country's rich history of invention, for example of printing, gunpowder and the compass. And you mention that China had its own Enlightenment. So how was that different? China was extremely innovative in its heyday, which is basically under the Song dynasty, which ended in 1279. At that time, European and Islamic travelers realized that China was leading the world in technology. And China does have kind of an Enlightenment. And yet, in the end, they did not turn that innovation into sustained economic growth.

I believe the fundamental reason is China's position as a single empire, and also its bureaucracy, which is a unique and peculiar animal. On the one hand, it is very progressive, because it is a meritocracy. In Europe, the people who were in power were the sons and nephews of other people in power. But in China there's an examination, and the people who did the best rose in the Mandarin civil service. So you'd think, “Wow, that's very progressive.” Except if you look at what they were studying for these exams, they were simply regurgitating the classics. It was the perfect tool to keep reproducing from the same mold generation after generation.

In Europe, something different happens. People study classical knowledge, Ptolemy and Hippocrates and Archimedes, and they begin to say, “Most of this stuff is wrong.” You couldn't do that in China. If you said, “This stuff is wrong,” you failed your exam. But in Europe, the ability to challenge received wisdom is irrepressible.

In the 17th century, Europeans build microscopes, telescopes and barometers that allow them to study nature in a way the classics never could. And they become rather cocky. There's a French philosopher in the late 16th century, Pierre de La Ramée, who writes a book with the title “Everything Aristotle Has Said Is Wrong.” That's chutzpah. A century earlier, he would have been strung up.

For example, Aristotle famously thought that a vacuum was impossible. Then one day, Europeans build a vacuum pump. The only conclusion they could reach is Aristotle is wrong. If he was wrong about that, could he be wrong about other things? You bet. Aristotle thought all the stars in the heavens were completely fixed; nothing is added and nothing is subtracted. In 1573, a Danish astronomer called Tycho Brahe observes a supernova. There was a star there before, and now it's not. So people start being skeptical, and skepticism leads to what I call contestability. Arguments are decided not on authority, but on evidence, logic and mathematical proof.