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## HOW DID CHANGE ACCELERATE?

The world changed during the rise of agrarian civilizations and changed again when connections grew between early cities and states. Around 1500 CE, the pace of change accelerated. In this two-part lecture, David Christian examines the factors that were most critical to accelerating change and shaping the modern world. After watching the videos and reading this guide, you should be able to explain each of the factors and use a map to show how the varied pace of change played out in the 20th century.

### Key questions

- 1 What factors contributed to the acceleration of change since 1500 and why were these factors so critical?
- 2 Where and why did the first modern societies emerge? What were the implications?

### Transcript: Part 1

In the last 500 years our world has been utterly transformed. At the heart of those transformations was a sharp increase in human control over the resources of the biosphere. You can see this increase very clearly if you look at population figures. In 1500 there were 500 million humans living on Earth. In 1900, just four centuries later, there were 1.6 billion humans. Today, early in the 21st century, there are almost 7 billion humans.

The changes that made this possible transformed our world and created today's world. At their heart is a sharp **increase in rates of innovation**. But why did rates of innovation increase so suddenly? That's a question that historians have debated for over a century. It's not a problem we're going to solve right now, but what we can do is look at three of the most crucial factors.

The first crucial change was a breakdown in the barriers between the **four world zones**. This allowed a rapid expansion in the size and diversity of exchange networks as different regions contributed their own plants, animals, customs, trade goods, ideas to an emerging global network — the first in human history.

Between 1519 and 1522 a Portuguese fleet traveled all around the world — the first time that had ever been done.

**0:11-1:13**

HUMAN CONTROL OF BIOSPHERE

RATE OF INNOVATION INCREASES

**1:13-2:09**

BARRIERS BREAK DOWN

By the 1550s, the middle of the 16th century, American corn was being grown in China — in parts of China where you couldn't grow rice. It led to rapid population growth. Other American crops were also being grown in Afro-Eurasia, such as tomatoes, potatoes, and sweet potatoes, and everywhere populations began to rise.

**2:09-3:00**

EXCHANGE  
IN CROPS

Afro-Eurasian crops also moved in the opposite direction, such as sugar and coffee, and so did Afro-Eurasian animals: horses, oxen, sheep, pigs.

Actually, horses were really ironic because horses had originally evolved in the Americas and it seems that they had been driven to extinction by the first humans to arrive in the Americas. When the Spaniards brought horses back to the Americas they would transform the lifeways of those Americans who lived on the North American plains.

EXCHANGE IN  
DISEASE

Diseases also crossed the Atlantic, such as smallpox. Their impact was devastating amongst American populations that lacked any immunity. In fact, the die-off as smallpox arrived in the Americas may have been greater than that that was caused by the Black Death in Afro-Eurasia.

**3:00-3:54**

EXCHANGE IN  
METALS

In the 1570s silver from a mountain of silver in Potosi — in what is now Bolivia but was then part of the Spanish empire — began to flow through Mexico and Europe and the Philippines to China, becoming the first global currency.

New information also traveled. Information about new lands, new peoples, new customs, new plants, new crops, new stars even, even new gods. That gave people entirely new ideas about the world and may have contributed to the scientific revolution.

EXCHANGE  
IN INFORMATION

By the 1800s, the Australasian and Pacific world zones were being incorporated within this emerging global system. There was now the largest, most diverse, and richest exchange network that had ever existed in human history.

The second crucial change was an increase in the importance of **commerce** and **markets**.

**3:54-4:57**

In agrarian civilizations, as we've seen, elites and rulers tended to extract resources through the threat of force. But there were many groups such as merchants or artisans or wage earners who actually had to get revenues on competitive markets. What they did was they sold their goods or their labor or their services on competitive markets.

COMMERCE AND  
MARKETS

To succeed on competitive markets what you have to do is you have to innovate. That means you have to offer better goods, services, or labor than your rivals. That explains why where competitive markets flourish you tend to get a lot of innovation.

COMPETITION AND  
INNOVATION

That's why throughout the agrarian era trading cities such as Venice or Baghdad tended to be areas where you got much innovation and so did areas between agrarian civilizations, where goods had to be traded on markets rather than exchanged through the threat of force.

**4:57-5:53** After 1500, expanding global networks of exchange increased the importance of commerce and markets everywhere and they began to transform society.

GOVERNMENTS SUPPORT COMMERCE Governments began to realize that there were huge sources of revenues available in commerce and they began to support merchants. This was particularly true in Europe, where governments were constantly at war, constantly looking for new sources of revenue, and where merchants were deeply involved in international trade.

WAGE WORK But these changes also affected ordinary people, particularly peasants and particularly in regions where growing populations meant that peasants were short of land. Now what they had to do was find new ways of raising money, and that often meant wage work of various kinds. So peasants too began to enter markets as perhaps weavers or artisans.

**5:53-6:46** The third crucial change was the discovery of new sources of energy from **fossil fuels**. In some regions, such as Britain, there had appeared a shortage of wood and wood was the main source of energy in the premodern world. This prompted a search for new sources of energy.

NEW ENERGY FROM FOSSIL FUELS  
STEAM ENGINES HARNESS COAL In the 1700s, some innovators such as James Watt began to develop cost-efficient steam engines that could turn the world's vast and largely untapped sources of **coal** into cheap energy. The **steam engine** marked the beginnings of an energy revolution that would revolutionize our world.

By the early 19th century, steam engines were being used for industrial scale production of textiles and many other goods. With the invention of railways and steamships they began to revolutionize transportation as well.

STEAM ENGINES  
POWER INDUSTRY  
AND TRANSPORT

By the late 19th and early 20th centuries new innovations such as the creation of the **internal combustion engine** made it possible to harness the power of two other fossil fuels, **oil** and **natural gas**. Never before had so much cheap energy been available.

**6:47-8:00**  
INTERNAL  
COMBUSTION  
HARNESSES OIL  
AND GAS

To give some idea of this, here are some statistics. We estimate that in the Paleolithic era each human used on average something like 2,000 to 3,000 kilocalories of energy a day. That's a little bit more than you need just to survive.

With agriculture, the domestication of animals, and the harnessing of wind and water power, that figure may have risen in some regions to perhaps 10,000 or 12,000 kilocalories a day per person.

CONTEXT FOR  
ENERGY USAGE

In the early 21st century it's estimated that each person is using on average perhaps 200,000 kilocalories of energy a day, and most of it comes from fossil fuels. Now, imagine what it would mean if fossil fuels vanished overnight and you had to cut your personal energy budget by 90 or 95 percent.

## Transcript: Part 2

**8:04-8:42** By the early 19th century these three factors — the creation of the first global networks of exchange, the expansion and the importance of commerce and markets, and the discovery of fossil fuels — began to transform societies in some parts of the world. Those tended to be regions best placed to benefit from these changes, and they tended to be in Europe and around the North Atlantic seaboard. In some of these regions societies grew rapidly in wealth and power to create the first truly modern societies.

MODERN  
SOCIETIES START  
NEAR THE NORTH  
ATLANTIC

**8:42-9:24** By 1900, industrial methods of production based on fossil fuels had spread to Europe, to North America, to Russia, and Japan.

PRODUCTION AND  
TRANSPORTATION  
CHANGE

Innovations particularly affected the production of textiles, of iron and steel, and of chemicals such as dyes and fertilizers. They also transformed communications and transportation with the creation of railways, of steamships, of the telegraph, of the telephone, and of the radio, and also the introduction of commercial scientific laboratories. All of these processes exchanged or accelerated the exchange of people, of goods, and of ideas.

**9:24-10:19** These factors also transformed governments. As governments began to face new managerial challenges in a world increasingly dominated by commerce and markets, no longer was it possible for governments to simply skim off resources from peasants through the threat of force. Now, as increasing numbers of their citizens became wage earners, they had to become managers of markets.

NEW ROLE FOR  
GOVERNMENTS

During the French and American revolutions governments began to develop entirely new types of partnerships with their citizens through the creation of elections and the introduction sometimes of compulsory military service. They also began to provide new services such as mass education or banking. All in all, governments became more powerful, more complex, more market oriented, and much, much wealthier.

The Industrial Revolution transformed the international balance of wealth and power. It shifted it right away from the old hub regions of the agrarian era; of the Mediterranean, Mesopotamia, India, and East Asia. And it shifted it towards a new hub zone whose center was the North Atlantic region. Other beneficiaries included European settler societies such as the Americas, South Africa, and Australasia.

By the late 19th century, early industrializing societies, including Britain, the USA, France, Germany, and then Russia and Japan, began to use their growing wealth and modern military technologies — such as ironclad gunships and machine guns — to build powerful armies and eventually to create empires.

**10:19-11:10**

SHIFTS IN THE  
BALANCE OF POWER

**11:10-12:09**

INDUSTRIALIZATION  
MEANS POWER

The newly industrializing societies conquered the old superpowers India and China. By 1900, India was ruled by Britain and the Chinese economy was dominated by a consortium of industrialized powers. The Middle East, Southeast Asia, and Africa were also carved up into colonies. By now it was clear that industrialization meant power.

A WORLD DIVIDED

So by 1900, the world seemed to be divided into two regions: a smaller, industrial, wealthy, and extremely powerful region and a much larger, weaker, unindustrialized, and much poorer region. It began to seem as if the main changes of recent centuries, or the main result of those changes, was to create two regions to benefit one region at the expense of another. To create a rich region and a poor region.