Jeffrey D. Sachs

# The Ages of Globalization





## Geography, Technology, and Institutions

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—**Gordon McCord**, University of California, San Diego

# The Ages of Globalization

*For Nina*

*Our family's newest arrival to the Digital Age, with our hopes and aspirations for peace, prosperity, and environmental sustainability.*



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## Geography, Technology, and Institutions

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# Preface

The COVID-19 epidemic hit as this book was going to press. A most global phenomenon—a pandemic disease—was suddenly provoking the most local of responses: quarantines, lockdowns of neighborhoods, and the closure of borders and trade. In just three months, the virus spread from Wuhan, China, to more than 140 other countries. In the fourteenth century, the bubonic plague spread the Black Death from China to Italy in the course of some sixteen years, 1331 to 1347. In our time, the pathogen arrived within days by nonstop flight from Wuhan to Rome.

This book is about complexities of globalization, including the powerful capacity of globalization to improve the human condition while bringing undoubted threats as well. The interconnections of humanity across the globe enable the sharing of ideas, the enjoyment of diverse cultures, and the exchanges of diverse and distinctive goods across vast geographies. I savor my morning coffee, which arrives not from the coffee shop across the street but from the sloping tropical hillsides of Ethiopia, Indonesia, and Colombia, thousands of miles away. I delight in having visited these places as well, and have enjoyed their rich cultures and great natural beauty. I have learned from such visits and my work that human kindness, our aspirations for our children, and our enjoyments of life are common to all humanity, no matter how diverse our backgrounds and our material conditions.

The new coronavirus reminds us yet again that the benefits of global trade and travel have always been accompanied by the global spread of disease and other ills. In this book, I will discuss how Adam Smith, the father of modern economics, viewed the voyages of discovery of Christopher Columbus and Vasco da Gama. He wrote that the discoveries of the sea routes from Europe to the Americas and to Asia were the most important events of human history, because they linked all parts of the world in a web of transport and commerce, with vast potential benefits. Smith also wrote, with dismay, that the new sea routes occasioned a massive repression of native societies by European conquerors and colonizers.

Because Smith lived a century before Robert Koch, Louis Pasteur, Giovanni Grassi, Ronald Ross, Martinus Beijerinck, and others who elaborated the bacterial and viral transmission of disease, he did not realize the key role that Old World pathogens played in devastating the Native American societies. Columbus brought to the Americas not only conquerors but also a massive biological exchange. The Europeans brought horses, cattle, and other plants and animals to the Americas for farming, and also many new infectious diseases, including smallpox, measles, and malaria, while bringing back to Europe the cultivation of the potato, maize, tomatoes, and other crops and farm animals. This "Columbian Exchange" united the world in trade while dividing the world in new kinds of inequalities of wealth and power.

The excess mortality of Native Americans caused by Old World diseases was devastating. The native populations were "naïve" to the Old World pathogens, and hence unprotected immunologically. In the same way, the world population today is immunologically naïve, and hence vulnerable, to the new coronavirus sweeping the planet. It is highly likely, thank goodness, that the illnesses and deaths caused by COVID-19 will be far less severe than the epidemics that ravaged Native American societies in the sixteenth century. Nonetheless, the current pandemic will influence global politics and society as other diseases have in the past.

In fact, we don't have to go back to the fourteenth-century Black Death or the sixteenth-century Columbian Exchange to recognize the profound role of diseases in shaping societies and economies. Until late in the nineteenth century, Africa's heavy burden of malaria created a kind of protective barrier against European imperial conquest. West Africa was known as the "white man's grave," since European soldiers succumbed in such high

proportions to malaria. This barrier fell when the British learned to extract an antimalarial treatment, quinine, from the bark of the Andean cinchona tree. Gin and tonic (containing quinine) thereby became the beverage of British imperial conquest. Since then, Africa's malaria burden has stood as an obstacle to child survival and economic development, though new drugs and preventative measures are enabling humanity to fight back against this age-old scourge.

More recently, another killer pathogen circled the globe and caused devastation and havoc: the human immunodeficiency virus, HIV, the cause of AIDS. HIV, like COVID-19, is a zoonosis, that is, a pathogen of animal populations that jumps to human populations through some kind of interaction and perhaps genetic mutation. AIDS entered the human population most likely from West African apes that were killed for bushmeat. COVID-19 entered the human population most likely from bats. In the case of AIDS, the virus apparently spread among Africans for decades in the middle of the twentieth century, then was transmitted internationally in the 1970s and early 1980s. HIV/AIDS was diagnosed for the first time in San Francisco in the early 1980s, decades after its first introduction into the human population. By that time, many millions of Africans were already infected by, and dying from, the HIV virus.

AIDS marked another major event of globalization, at both its most devastating and its most inspiring. The deaths from AIDS quickly mounted into the tens of millions, with vast attendant suffering. Many of those with HIV infection were from socially marginalized groups: the very poor, ethnic minorities, the LGBT community, intravenous drug users, and others. This delayed the response of many governments, but civil society groups, led first and foremost by people infected with HIV, demanded action and step by step moved the world's governments, although after costly delays.

Impressively, the scientific community sprang quickly into action, making rapid and fundamental discoveries about the nature of the virus, the causes of disease, and the ways to fight both. Within roughly a decade of the identification of HIV as a new zoonotic disease, scientists discovered a number of antiviral medicines that could turn the HIV infection from a nearly certain deadly ailment to a chronic and controlled infection. In these breakthroughs and the subsequent distribution of the new medicines, globalization played a huge role. The science of discovery was global, with new scientific knowledge moving rapidly across all continents.

The distribution of the new medicines was also a coordinated global effort. A notable initiative was the launch of a new Global Fund to Fight AIDS, TB, and Malaria, in which I was thrilled and honored to play a role during its early formulation and development. The speed of policy implementation and health interventions was greatly spurred by rising public awareness and the crucial activist leadership of civil society.

COVID-19 similarly provokes the reckoning of the balance sheet of globalization, and the policy challenge of promoting the positive sides while limiting the negative consequences. The early steps in fighting COVID-19 have involved closing down international trade and travel, and even restricting the movements of people between and within cities of single nations. Quarantines are back, the word itself referring to the forty days (*quaranta giorni* in Italian) that Venetians held ships away from the port when the ships were suspected of carrying plague. The policy of quarantine dates back to the late fourteenth century. As did the AIDS crisis, the COVID-19 pandemic will require great attention and sensitivity to social justice in implementing measures to confront the disease.

Some concerns are being raised once again in our own time: that open trade is simply too dangerous, that we should revert to closed borders and national autarky (self-sufficiency). This is an illusion. While quarantines may indeed limit the spread of disease, they rarely stop the spread of the pathogens entirely. And their successes surely come at very high cost. Closures of trade bring their own kinds of miseries, starting with the massive losses of economic output and livelihoods. Throughout history, it has been important to understand the threats arising from globalization (disease, conquest, war, financial crises, and others) and to face them head on, not by ending the benefits of globalization, but by using the means of international cooperation to control the negative consequences of global-scale interconnectedness.

This has entailed the invention of new forms of global cooperation, one of the most important themes of this book. From the late eighteenth century onward, philosophers, statesmen, politicians, and activists have sought new ways to govern globalization in order to promote its benefits while controlling its many potential harms. The fight against pandemic disease has loomed large in the efforts at cooperation. Indeed, the International Sanitary Conferences that began in 1851 and continued until 1938 were among the first modern efforts at intensive global scientific and policy

cooperation. These efforts at disease control gave rise to the World Health Organization in 1948, one of the first major agencies of the new United Nations, which was founded at the end of World War II in 1945. WHO, of course, is currently at the center of the global fight against COVID-19. WHO has helped to coordinate scientific information about the pathogen and how to control it, and to coordinate and monitor the global push to contain and end the pandemic.

Globalization enables one part of the world to learn from others. When one country shows successes in containing the spread of COVID-19, other parts of the world quickly aim to learn of the new methods and whether they can be applied in a local context. The development of new drugs and vaccines to fight COVID-19 is also a global effort, as was the case with HIV. The clinical trials to test the new candidate drugs and vaccines will involve researchers spanning the world. The distribution and uses of the new drugs and vaccines will also require cooperation on a global scale.

Disease control is not the only area where global cooperation is vital today. The case for global cooperation and institutions extends to many urgent concerns, including the control of human-induced climate change; the conservation of biodiversity; the control and reversal of the massive pollution of the air, soils, and oceans; the proper uses and governance of the internet; the nonproliferation of nuclear weapons; the avoidance of mass forced migrations; and the ever-present challenge of avoiding or ending violent conflicts. All of these challenges must be confronted in a world that is too often divided, distrustful, and distracted, and now, preoccupied with a new zoonosis that has suddenly become a new pandemic.

This book will not provide simple answers or antidotes to these ills and threats. The history of globalization is a history of humanity's glorious achievements, cruelties, and self-inflicted harms, and of the great complexities of achieving progress in the midst of crisis. Globalization, we shall see, involves the intricate interplay of physical geography, human institutions, and technical know-how. COVID-19 is at once a physical phenomenon, a sudden intruder into our politics and social life, and a target of scientific discovery. It is, therefore, the kind of phenomenon of globalization that has been part of human experience from the very start of our species. I hope this book will shed light on that long experience of global interconnectedness, and on the role of globalization in shaping our humanity and lives.

# 1

# Seven Ages of Globalization

Humanity has always been globalized, since the dispersals of modern humans from Africa some seventy thousand years ago. Yet globalization has changed its character from age to age. Those changes have often come quickly and violently. In the twenty-first century, we need to change peacefully and wisely; in the nuclear age, there may be no second chances in the event of global war. By studying the history of globalization, we can arrive at an informed understanding of globalization in the twenty-first century and how to manage it successfully.

In my interpretation, we have passed through seven distinct ages of globalization from the deep past to the present day. In each of these seven ages, global change emerged from the interplay of physical geography, technology, and institutions. Physical geography in this context means the climate, flora and fauna, diseases, topography, soils, energy resources, mineral deposits, and Earth processes that affect the conditions of life. Technology refers to both the hardware and software of our production systems. Institutions include politics, laws, and cultural ideas and practices that guide society. Geography, technology, and institutions are subject to remarkable variability and change, and they interact powerfully to shape societies across place and time.

Understanding the interplay of geography, technology, and institutions is fundamental to understanding human history. This understanding is also

fundamental to navigating the changes under way in the twenty-first century. By examining the history of globalization, we can make wiser choices for our societies and economies in our own time.

Philosophers, historians, theologians, and others have long asked: Is there a direction to history? Can we speak of long-term change or only of repeating cycles of history? Is there long-term progress? I will suggest that, yes, there is an arrow of history. In each age, human beings have become more aware of the wider world. Technological advances—especially in transport and communications—and demographic changes in the size and structure of human populations have intensified our global-scale interdependencies and awareness. As a result, politics too has gone from being very local to being global, never more so than in our own time.

Let us keep our eye on five big questions. First, what have been the main drivers of global-scale change? Second, how do geography, technology, and institutions interact? Third, how do changes in one region diffuse to others? Fourth, how have these changes affected global interdependence? Fifth, what lessons can we glean from each age to help us meet our challenges today?

## The Seven Ages

Globalization signifies the interlinkages of diverse societies across large geographical areas. These interlinkages are technological, economic, institutional, cultural, and geopolitical. They include interactions of societies across the world through trade, finance, enterprise, migration, culture, empire, and war.

To trace the history of globalization, I will describe seven distinct ages: the Paleolithic Age, our prehistory when humans were still foragers; the Neolithic Age, when farming first began; the Equestrian Age, when the domestication of the horse and the development of proto-writing enabled long-distance trade and communications; the Classical Age, when large empires first emerged; the Ocean Age, when empires first expanded across the oceans and beyond the accustomed ecological zones of the homeland; the Industrial Age, when a few societies, led by Great Britain, ushered in the industrial economy; and the Digital Age, our own time, in which nearly the entire world is instantaneously interconnected by digital data.

In the Paleolithic Age, which I date from 70,000 BCE to 10,000 BCE, long-distance interactions were by migration, as small groups migrated from one place to another. As these groups moved, they carried with them their tools, their know-how, and their emerging cultures. As migrating groups of *Homo sapiens* (anatomically modern humans) entered new regions, they had to fend for themselves in new ways, confronting other hominins (members of the genus *Homo*) such as Neanderthals and Denisovans, new predators and pathogens, new ecological conditions (such as living at high elevations), and of course, other competing groups of modern humans. That competition contributed to cultural patterns that have continued to the present day.[1]

The end of the last ice age and the onset of a warmer climate enabled the next phase of globalization, the Neolithic ("new stone") Age, which I date from 10,000 BCE to 3000 BCE. The fundamental breakthrough was agriculture, both crop cultivation and animal husbandry. As foraging gave way to farming, nomadism gave way to sedentary life in villages. The range of human interaction widened from the clan to the village and to politics and trade between villages. Trade in precious items—gemstones, shells, minerals, tools—was pursued at distances of hundreds of kilometers.

The domestication of the horse ushered in a third age of globalization, the Equestrian Age, which I date from 3000 BCE to 1000 BCE. This period is typically labeled the Copper and Bronze ages, though I prefer to emphasize the role of the horse over that of the minerals. With the domesticated horse, rapid, long-distance overland transport and communications became possible. The horse served several basic roles: animal traction (horsepower), communications (conveying messages), and military (cavalry). In modern jargon, we would say that the domesticated horse was a "disruptive technology," somewhat like the invention of the steam engine, locomotive, automobile, and tank combined. In politics, the horse hastened the arrival of the state, by enabling the reach across much greater distances of public administration and coercive force.

The next age, known to us as the Classical Age, which I date from 1000 BCE to 1500 CE, marked the rise and intense competition of large land-based empires. Starting around 1000 BCE, some states—such as the neo-Assyrian state in Mesopotamia and, soon after, the Achaemenid state of Persia—embarked on vast territorial expansions, which succeeded as the result of advantages in governance, both military and political.

Ideas mattered enormously in the rise of the empires. The major empires were spurred by new religious and philosophical outlooks, such as the new philosophies of the Greco-Roman world, that profoundly shaped the outlooks of these societies. The imperial age ushered in trans-Eurasian trade, such as between the Roman Empire in the west and the Han Empire of China in the east, carried out both overland and by sea routes along the coastlines of the Indian Ocean and the Mediterranean.

By around 1400 CE, advances in oceangoing navigation and military technologies led the transition to a new era, the Ocean Age, which I date from 1500 to 1800. During this new age, empires became transoceanic, indeed global, for the first time, with temperate-zone imperial powers of Europe conquering and colonizing tropical regions in Africa, the Americas, and Asia. Revolutionary changes in global trade ensued, such as the rise of multinational corporations, the vast expansion of transoceanic trade, and the mass movement of millions of people across the oceans, including the forcible enslavement of millions of Africans bound for American mines and plantations. Politics also became global in scale for the first time, leading to the first global wars fought simultaneously across several continents.

The Industrial Age, which I date from 1800 to 2000, marked another profound acceleration of global change. Changes that used to take place over the course of centuries or even millennia now occurred over just a few decades. The Industrial Age was marked by remarkable waves of technological advance, and a powerful new alliance of science and technology. With the tapping of fossil fuels, made possible by the invention of the steam engine and the internal combustion engine, industrial production soared. Global populations soared too, as the result of massive increases in food production. While the Ocean Age gave rise to transoceanic empires, the Industrial Age gave rise to the first global hegemon, Great Britain, and later, the United States. These two powers bestrode the entire globe with unprecedented military, technological, and financial power. But, as the end of the British Empire demonstrated, even hegemons can quickly lose their place at the apex of the global competition.

We have now entered the Digital Age, from 2000 to the present, the result of the astounding capacities of digital technologies: computers, Internet, mobile telephony, and artificial intelligence, to name a few. The global transmission of data is pervasive: computational power has multiplied billions-fold, and information technologies are disrupting every

aspect of the world economy, society, and geopolitics. We are moving from an era of hegemonic power to a multipolar world, in which several regional powers coexist. The ubiquitous flows of information have globalized economics and politics more directly and urgently than in the Industrial Age. We have seen how a hiccup in one part of the world economy, for example, the failure of the Wall Street investment bank Lehman Brothers on September 14, 2008, can within days create a global-scale financial panic and economic crash.

Table 1.1 summarizes the seven ages, with their time intervals, major technological changes, and scale of governance.

## The Acceleration of Change

At the dawn of human history, all humans were foragers, engaged in hunting and gathering food for their survival. There was no urban-rural divide, as there were no villages, much less cities. The Neolithic revolution in agriculture gave rise to farm villages and sedentary life, mostly (but not completely) displacing foraging and nomadism. For thousands of years, up to the start of industrialization itself, almost all of humanity lived in rural areas, and most engaged in subsistence agriculture. Each farm family struggled to feed itself, with only a tiny margin of surplus, if any, sold in the marketplace or used to pay taxes.

Up until the twentieth century in much of the world, and until today in the poorest countries, agricultural production was so meager that the risk of famine and mass hunger was ever present. The French Revolution in 1789 was partly provoked by widespread hunger during attempts by the government to raise taxes to cover public debts. The Irish famine of the 1840s claimed around 1 million deaths. In the second half of the nineteenth century, repeated famines in British India and other colonized regions killed tens of millions.[2]

Industrialization and the accompanying advances in farm mechanization and agronomic know-how vastly expanded the food production per farmer in the industrial economies. Where it was once necessary for almost all households to be engaged in farming in order to grow enough food for the population, it became possible for a smaller and declining share of the workforce to feed the rest. The expanded food output led to sharply

Table 1.1 Ages of Globalization: Dates and Breakthroughs

| Globalization age | Approximate dates | Primary energy | Information, media | Agriculture | Industry | Transport | Military | Governance |
|---|---|---|---|---|---|---|---|---|
| Paleolithic: global dispersal | 70,000–10,000 BCE | Human, ocean currents | Language, petroglyphs | Hunting, gathering | Stone tools | Foot, raft, canoe | Stone weapons, bow and arrow | Clan |
| Neolithic: farming and villages | 10,000–3000 BCE | Oxen | Hieroglyphs | Crops, animal husbandry | Bronze, copper | Foot, sail | Bronze weapons | Village |
| Equestrian: horse-based state | 3000–1000 BCE | Horse | Early writing system, stela | Plow | Iron, wheel, cart | Horse, donkey, sail | Cavalry | State |
| Classical: imperial-scale governance | 1000 BCE–1500 CE | Windmill, waterwheel | Alphabet, book | Large-scale grain trade | Engineering, infrastructure | Horse, road network, sail | Infantry, cavalry, gunpowder | Empire |
| Ocean: global empires | 1500–1800 | Ocean, wind | Printing press | Global trade of crops | Ocean navigation | Transoceanic sail | Cannon, musket | Global empire |
| Industrial: industrial mass production | 1800–2000 | Fossil fuels: coal, oil, natural gas; hydroelectric | Telegraph, telephone, broadcasting | Use of chemical fertilizers | Steam engine, textiles, steel | Ocean steamer, railroad | Machine gun, air, tanks, nuclear, space | Global empire, constitutional government, high capitalism |
| Digital: connectivity, computation, artificial intelligence | Twenty-first century | Solar, wind | Internet, artificial intelligence | Precision agriculture | Digital networks | Virtual, space | Cyberwarfare | Global rule of law? |

lower risks of generalized famines and widespread hunger. The "surplus" agricultural workers, replaced by farm machines, left for the cities to find employment. Britain, the world's first industrial society, became more than half urban around 1880, at a time when most of the world was still overwhelmingly rural. As industrialization spread, albeit very unevenly around the world, urbanization and living standards began to rise.

The remarkable fact is how long it took for humanity to break free of omnipresent and nearly all-encompassing poverty and hunger. Looked at in the long sweep of the human experience, most economic and demographic change has occurred in the blink of an eye, during the past two hundred or so years of our roughly three hundred thousand years as a species. The first lesson of long-term global change, then, is that it has been super-exponential, meaning that it has come at a rising rate, with the largest changes occurring in the very recent past.

Let us consider three dimensions of long-term change. The first is the total human population. The second is the rate of urbanization—that is, the share of the global population residing in urban areas. The third is the global output per person. The Hyde 3.1 Project has heroically worked to construct consistent estimates of population and urbanization globally and by region during the period since 10,000 BCE.[3] It is a remarkable accomplishment and a vital body of evidence. The estimates of output per person come from a similarly remarkable effort, that of Angus Maddison, a late and great economic historian.

The estimated total world population over the past twelve thousand years is shown in figure 1.1. Between 10,000 and 3000 BCE, during the Neolithic Age, the estimated population rose from 2 million to 45 million, an annualized growth rate of just 0.04 percent. Between 3000 and 1000 BCE, the Equestrian Age, the growth rate rose slightly to 0.05 percent. From 1000 BCE to 1500 CE, the Classical Age, the growth rate rose again to 0.06 percent. During 1500 to 1800, the Ocean Age, the annualized growth rate rose further to 0.25 percent, and the global population doubled from an estimated 461 million to 990 million. Then, during 1800 to 2000, the Industrial Age, the growth rate jumped to 0.92 percent, resulting in a more than sixfold increase in world population—from 990 million to 6.145 billion. Thus, for most of human history, the rise of population year to year, even century to century, was imperceptible. With the Ocean and Industrial Ages, the global population soared.