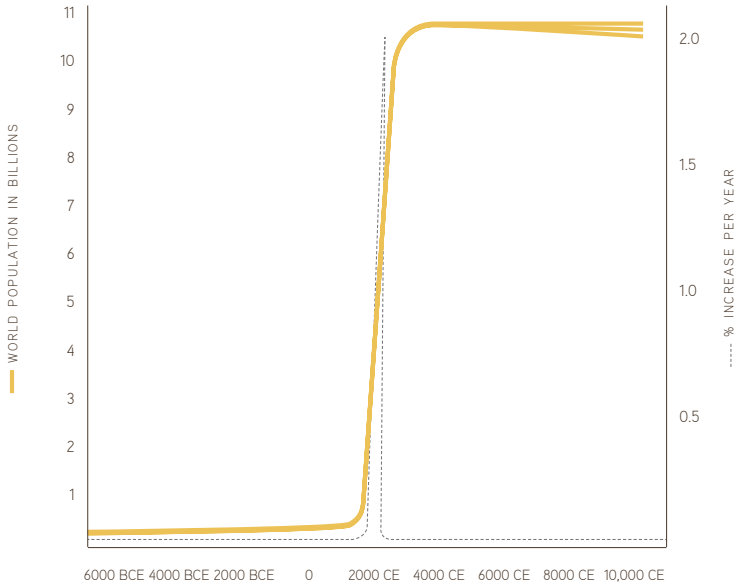


A New Reality

HUMAN EVOLUTION FOR A SUSTAINABLE FUTURE

Jonas Salk and Jonathan Salk
with David Dewane

City Point Press

JONAS SALK, 1954

Jonas Salk's wish was that his ideas would continue to be disseminated so that, like a vaccine, they might have the most positive effect on the greatest number of people.

Jonas Salk, who died in 1995, was in the mid-1950s the developer of the first effective vaccine against poliomyelitis. He went on to found and help design the Salk Institute for Biological Studies in La Jolla, California, now a renowned center for basic biological research. What few people know is that in the last third of his life, he devoted much of his time and creative energy to the development of an evolutionary philosophy based on biological and natural principles. His wish was that these ideas would have the effect of giving people a scientific basis for hope and provide opportunities to enhance human well-being throughout the world.

Contents

Foreword

An inescapable reality is that there are now too many humans on Earth for us, or the planet, to handle well. Population growth, a burning topic some years ago, has somewhat faded from public prominence in recent years. This small but compelling book is a welcome and timely reminder of the issues of overpopulation, with a fresh look at the ways we can approach this reality.

The burgeoning world population of humans has commonly been framed in Malthusian terms, emphasizing Darwinism with its brutal selection of the "fittest" as an inevitable, and perhaps only, consequence of an overcrowded world. Jonas Salk took seriously, throughout his life, the overarching guideline called *Tikkun olam* (Hebrew: תיקון עולם) literally translated as "repair of the world," alternatively meaning "construction for eternity"). *Tikkun olam* is a concept in Judaism that has been taken to mean aspiration towards actions and behaviors that are constructive and beneficial. Jonas Salk's better-known life work, development of the polio vaccine that has been a life saver, literally, for millions around the globe, can be regarded as a remarkable exemplar of *Tikkun olam*. But Jonas Salk's legacy should rightly be broadened beyond even this, because the way he thought about the looming human population problem was to envisage a new era to which humanity could aspire.

In short, as is elegantly unfolded in this book (co-authored by Jonas Salk and his son Jonathan Salk), Jonas Salk envisioned that an inflection point in human population growth—a transition from exponential rapid growth, to slower and, eventually, zero population growth—would also usher in an inflection point in human social behaviors and mores, leading to a much more collaborative ethos and way of doing things. Rather than our latter-day humanity's central focus on competing in order to gain one's own individual betterment and achievements (defining what Salk dubs "Epoch A"), individuals would evolve toward ways more attuned to

thinking beyond that, through expanding into wider and more generous frames of mind and spirit to encompass the needs, wellbeing and attainment of many more, across more societies ("Epoch B"). Through use of simple diagrams and the building up of ideas, the book draws us gently but implacably into this vision.

Salk certainly is onto something here. While he was ahead of mainstream thinking at the time of the publication of the first edition of this book (1981), many of his ideas are already echoed much more commonly than they were then. As we look around us, in more recent years we see such trends at play in many arenas. Witness the evolving views of corporate leadership toward being more team- and participant-driven, rather than dictated by a sole top dog figure. More and more academic learning and research are accomplished through fruitful interactions among multiple individuals, rather than solely through the lonely genius. And, *sine qua non*, we are realizing that to tackle shared world problems such as planetary climate challenges, individual, local, and national barriers get in the way. Thus, we will keep needing more worldwide, Paris Agreement-like, movements.

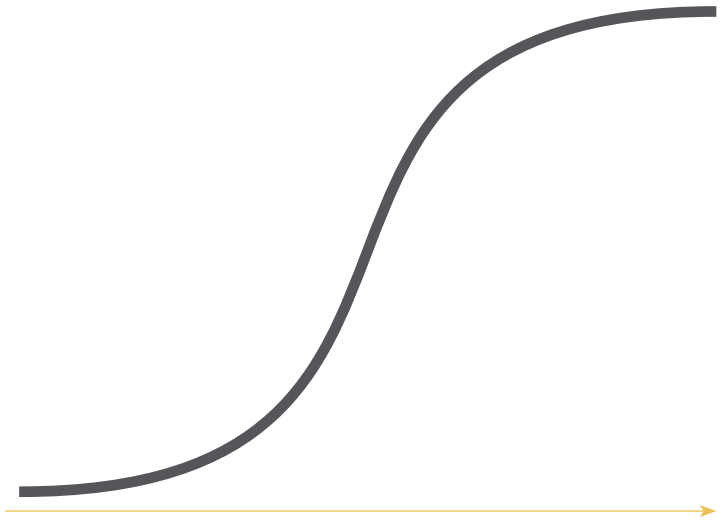
The extent of Jonas Salk's legacy deserves to be appreciated in full. As this book presages, his help in ameliorating humankind's scourges may yet turn out to be not confined to the near-eradication of polio. This elegant and hopeful book is small, but far from small in its vision and aspiration for humanity's betterment. We will all be better off if we listen to it and heed it.

Elizabeth H. Blackburn, Ph.D.
February 2018

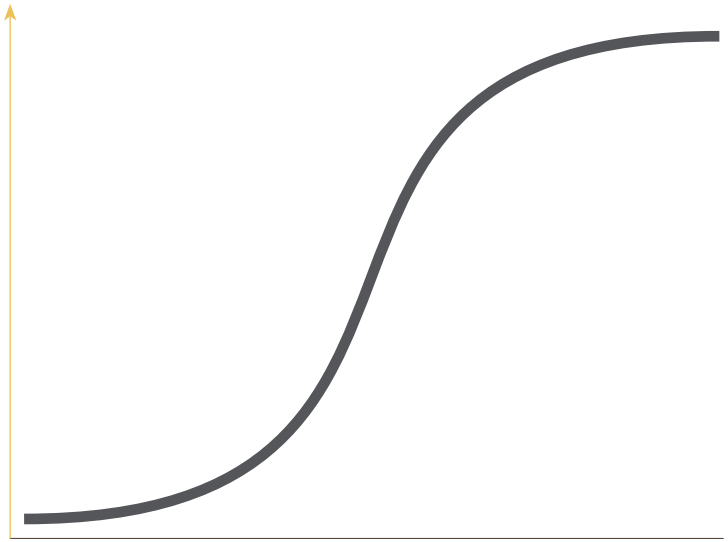
PART ONE

Sigmoid Curves

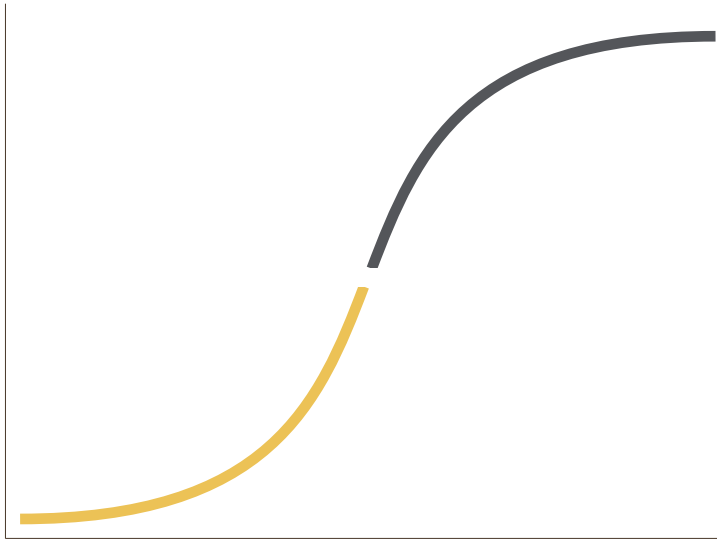
In this essay, the sigmoid curve will be used as a "thinking tool" and as a symbol. Its shape reflects a pattern that applies to growth in living systems and reflects the transformational character of change in our time.



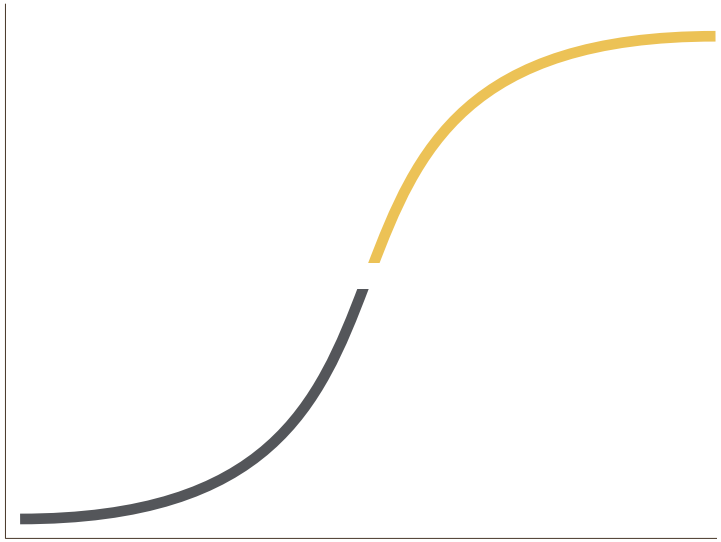
In this figure, and in those that follow, the horizontal axis represents time...



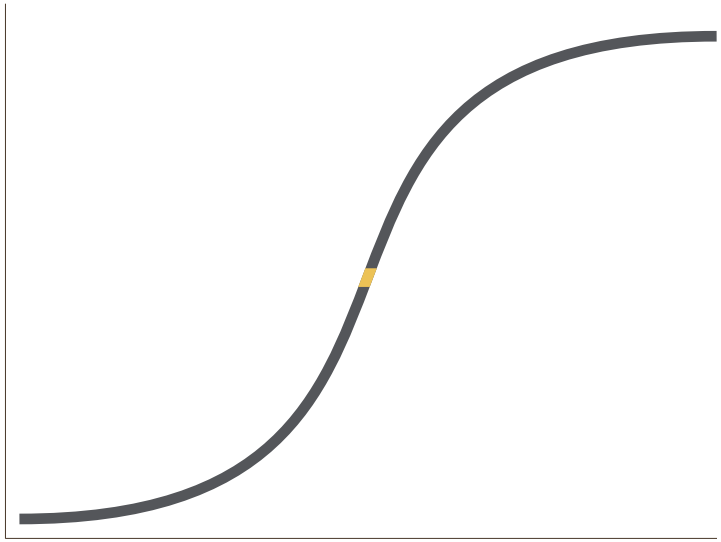
...and the vertical axis represents number.



In the first, upturned portion of the curve, population growth follows a pattern of acceleration;

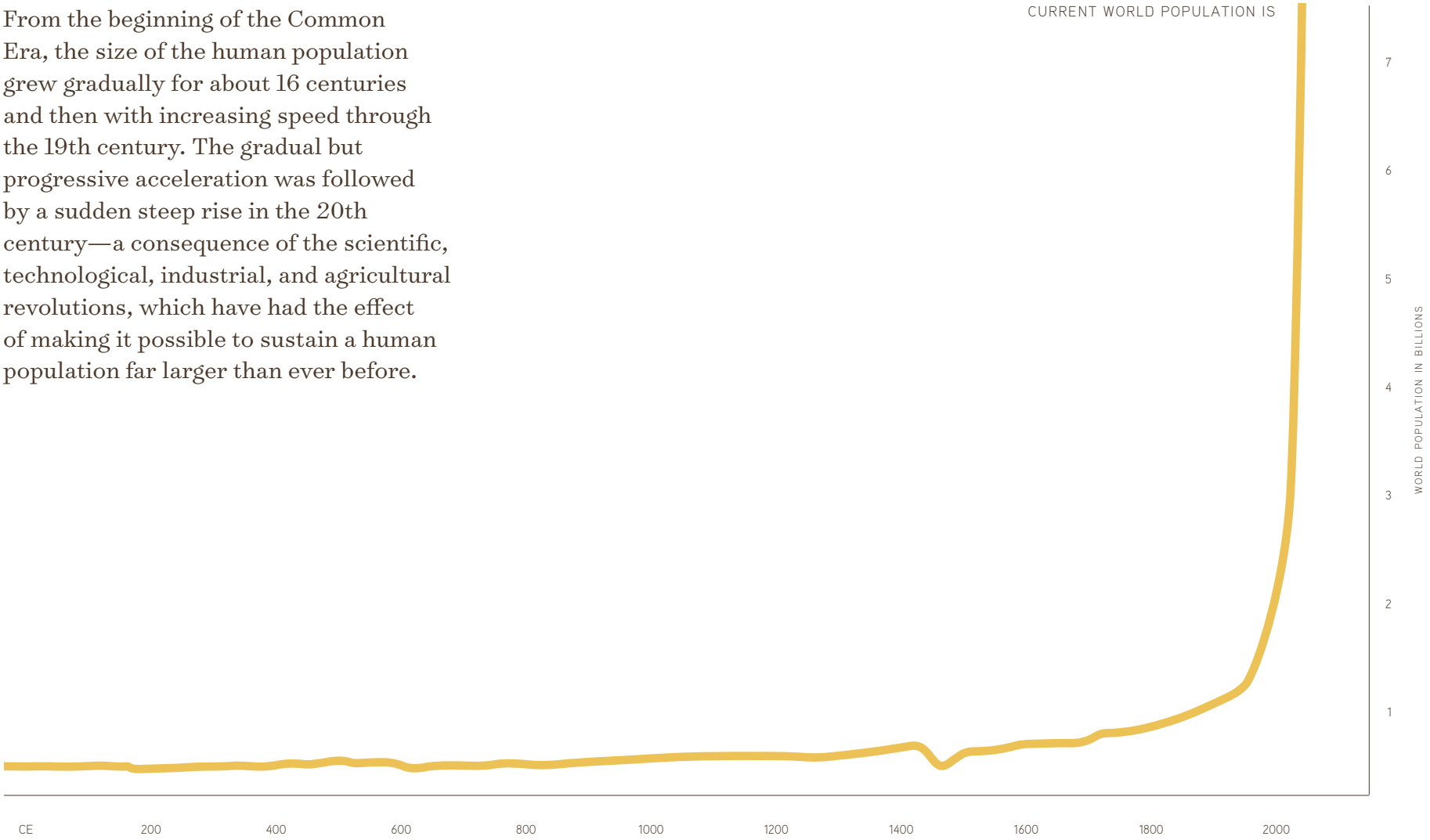


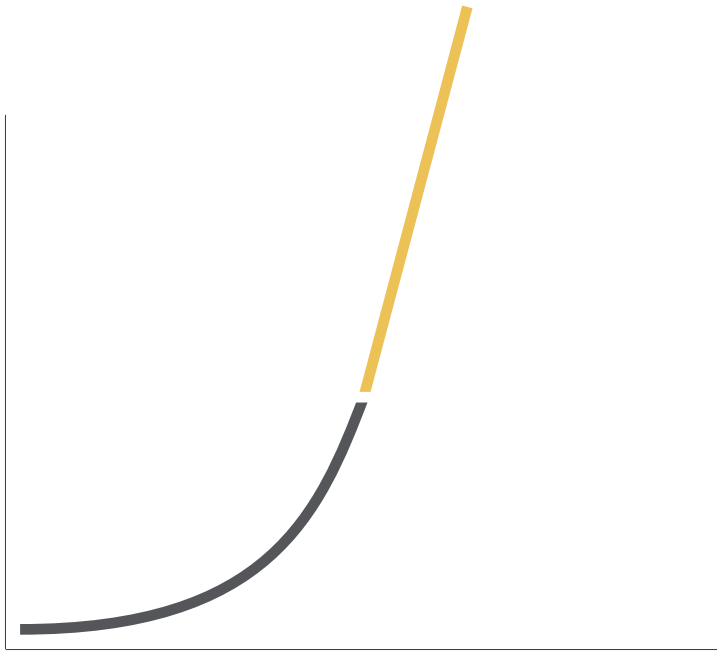
in the second part, growth decelerates and a plateau is reached.



The gap in the curve emphasizes the *point of inflection* — the point of change from accelerating growth to decelerating growth.

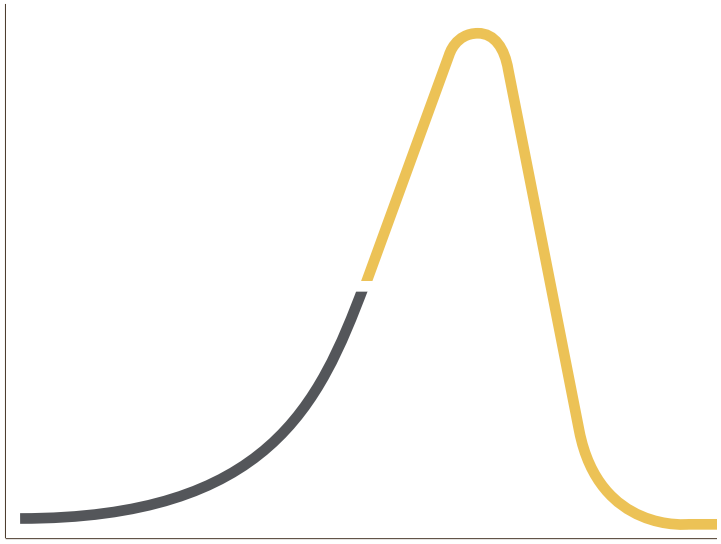
From the beginning of the Common Era, the size of the human population grew gradually for about 16 centuries and then with increasing speed through the 19th century. The gradual but progressive acceleration was followed by a sudden steep rise in the 20th century—a consequence of the scientific, technological, industrial, and agricultural revolutions, which have had the effect of making it possible to sustain a human population far larger than ever before.



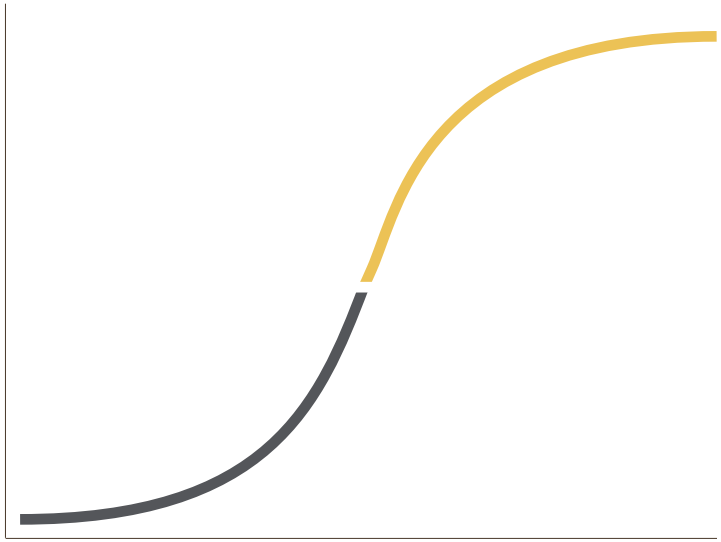


The sharp increase in the size of human population in recent times raises reasonable questions:

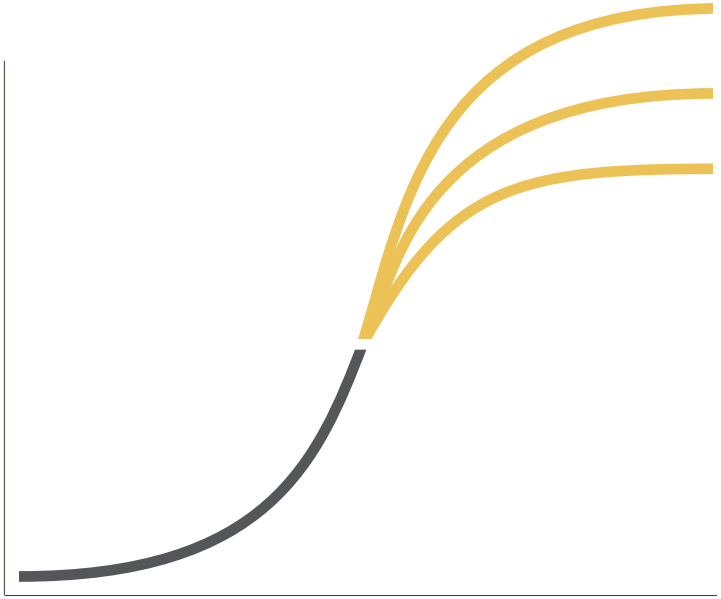
Will the curve continue to rise at its present rate?



Will it crash?



Or will it bend and assume
a sigmoid shape?



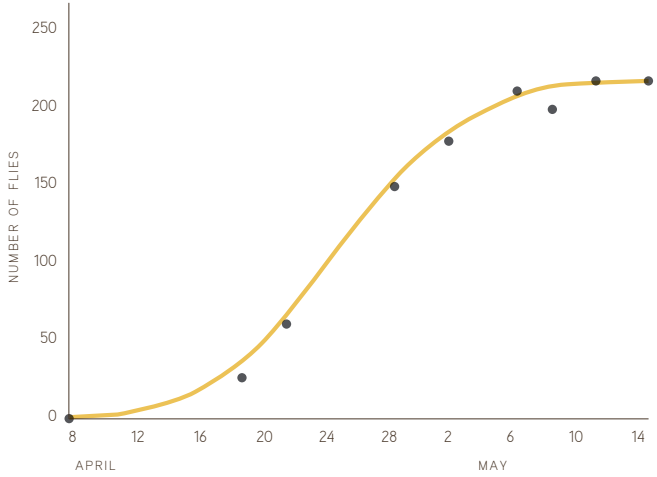
If the curve will inflect, when might this occur and at what level will population size plateau?

That an inflection can be anticipated is suggested by the figures in the pages that follow. In part 2, we will see that the inflection of the human population growth curve has already occurred; the height of the plateau is still uncertain, however, and is subject to our influence.

The S-shaped growth curve is seen in many living systems. We will present a few examples before focusing on human population growth.

Fruit Fly

DROSOPHILA MELANOGASTER



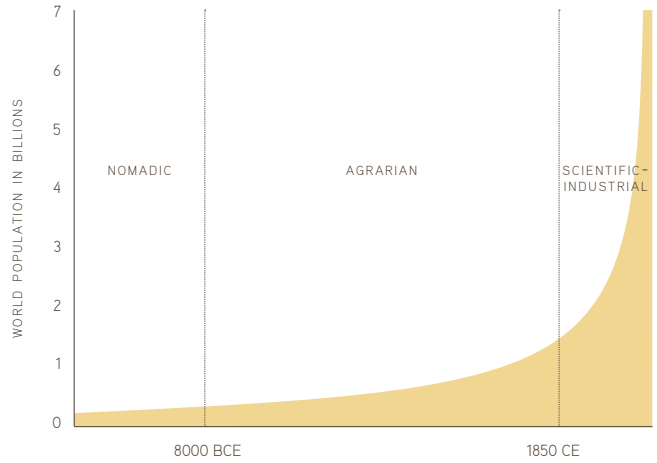
This figure is a plot of the growth of a population of fruit flies in a laboratory experiment. A small number of flies were introduced into a chamber of fixed size, and the increase in population was observed over a period of approximately five weeks. The population grew slowly at first and then more rapidly as the number of flies increased. After about two and a half weeks, however, growth began to slow. Over the next two and a half weeks, the number of flies that were being born approached the number that were dying, and the curve reached a plateau

PART TWO

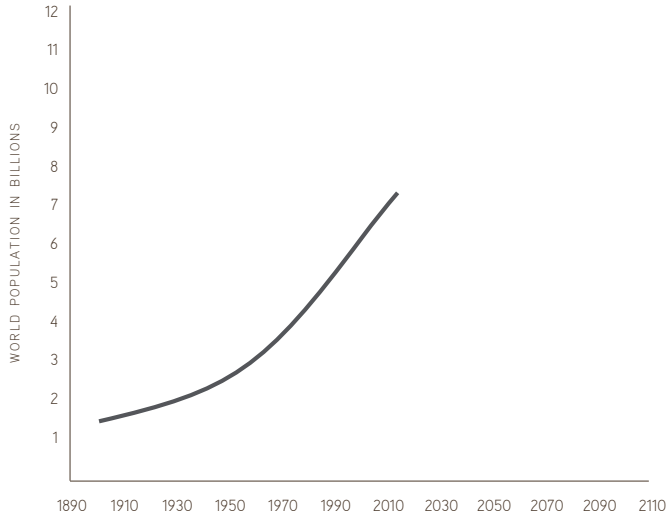
World Population Trends

For 200,000 years before the advent of agriculture, human population increased very slowly. Agriculture emerged 10,000 to 15,000 years ago, making more food and energy available to support greater numbers of human beings. A pattern of gradual increase then continued throughout the agrarian period. In the last two centuries, scientific, technological, industrial, and agricultural developments have reduced mortality and made it possible to support and feed far larger numbers of people, resulting in the recent sharp rise in population.

The factors involved in human population growth are far more complex than those affecting the populations seen in part 1. The picture is complicated by family, cultural, sociopolitical, economic, and technological factors. Marked differences between patterns of population growth in the more and less developed regions of the world are also significant. Nevertheless, in part 2 we will see that, taken globally, a similar pattern is emerging.



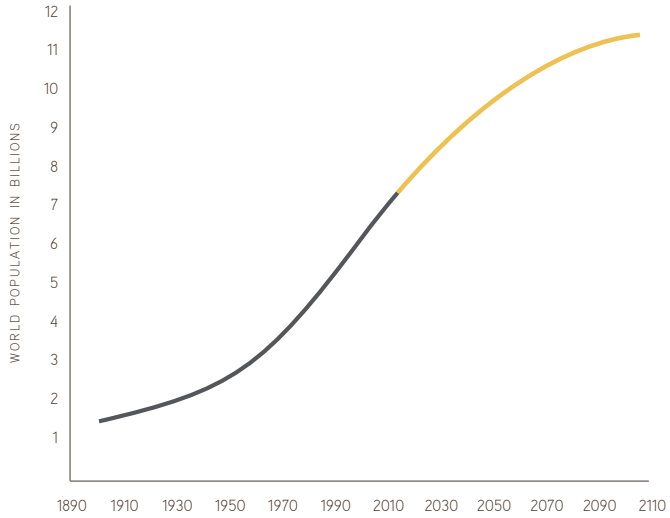
This figure narrows the focus, showing population growth from 1890 to the present. We see that, when looking at a shorter time period, the growth curve resembles the first part of the curves seen in part 1.



In this figure, we have added the median variant United Nations(UN) projection to 2100.

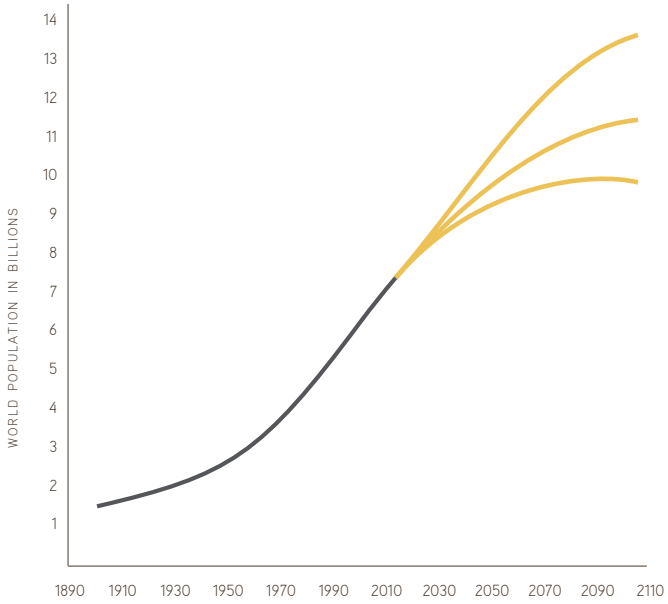
We see the change from accelerating growth to decelerating growth. We also see that the inflection point of the curve was passed in the last decades of the 20th century and that, as of this writing, we are living in an age of slowing growth, one that may be very different, in terms of environmental limits and human social interactions, from the previous period. In part three, we will explore that difference.

Population projections are based on present knowledge of continually changing trends. As such, they cannot be taken as firm predictions of the future, but they do provide us with a perspective for viewing and understanding the present human situation.



This figure shows the median variant along with the 95% prediction interval for projected population growth from 2016 to 2100 as estimated by the Population Bureau of the UN. We can see that the more optimistic projection is a plateau at a level of under 10 billion, whereas the higher estimate points to a world population of approximately 13.5 billion.

There is a considerable difference between meeting the needs of a population of 10 billion and meeting those of 13.5 billion. Actions we take now will influence the curve to plateau sooner rather than later. These actions will have a huge impact on what life will be like in 50 or 100 years. In the coming pages, we will see that this influence will come through improvements in social, economic, and environmental conditions in all regions of the world. Thus, doing what we can to improve quality of life for all and positively affect the course of growth is of the utmost importance.

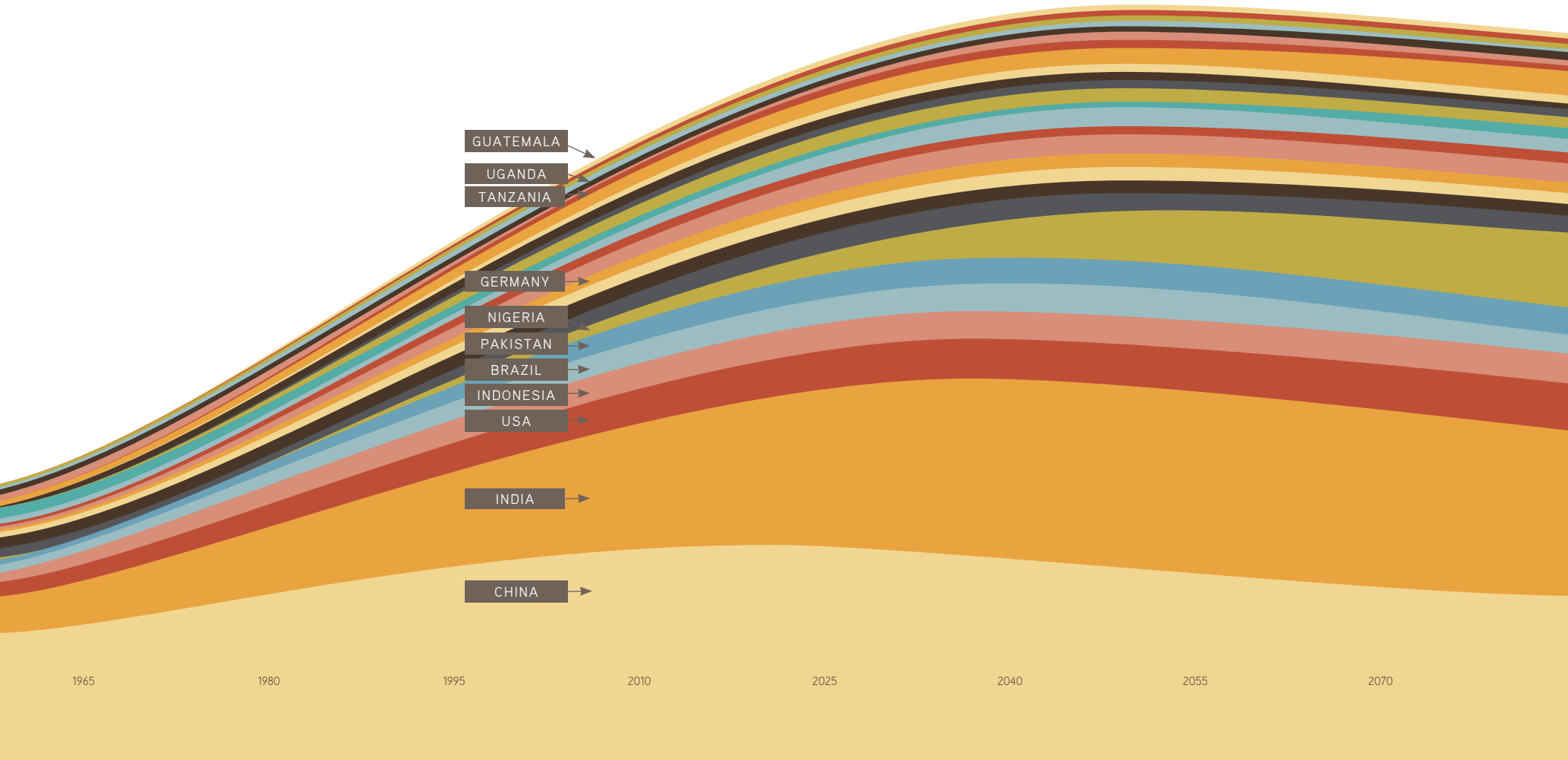


Why does population growth slow?

The dynamics of population growth are complex, but it appears that improvements in health care, lowering of infant and maternal mortality, availability of education—particularly for women—and overall economic development result in people deferring the birth of the first child and having smaller families. The further lowering of birth rates and slowing of growth are thus closely tied to improving conditions throughout the world.

It is a notable phenomenon that reducing problems and increasing well-being accompany slower population growth. We once thought that more people would lead to more problems, but our approach and perspective have shifted. Now we understand that more solutions lead to slower growth.

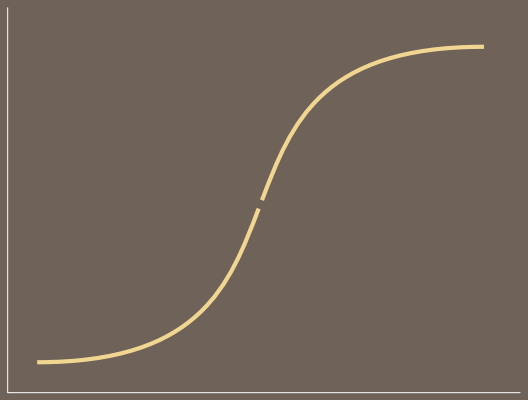
This figure schematically shows population curves for a number of countries based on UN data and projections as of 2010. Each colored band represents the population size of a single country; these are stacked one upon the other, and their sum is the size of world population. In the figure, we can see the relative impact of population size and growth of individual countries within the overall picture of world population. The diversity of the change in terms of timing and magnitude is apparent, as is the similarity of the overall pattern of growth.



PART THREE

A New Epoch

The sigmoid growth curve consists of two sections of different shape: the upturned portion describes a phase of progressive acceleration of growth; the second portion is downturned and describes a phase of progressive deceleration. The difference in shape between the two portions of the curve suggests both quantitative and qualitative differences in human life between the two periods of time. It not only indicates differences in population growth patterns but also suggests differences in the characteristics of prevailing conditions and the nature of human life in the two periods.*

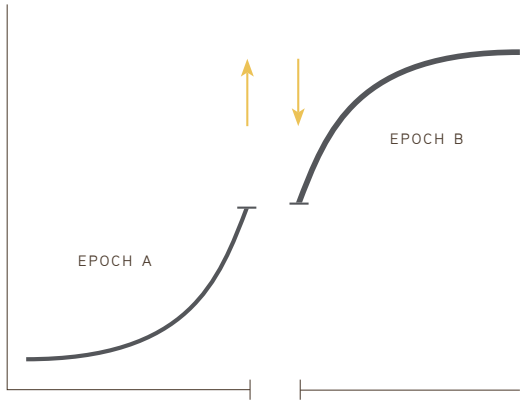


* We are using the sigmoid curve as an image of qualitative as well as quantitative change over time, but in this and the following sections we have not labeled the axes. When the curves are used to reflect quantity, the horizontal axis indicates time and the vertical axis, number. When the curves reflect qualitative differences, the horizontal axis reflects time and the vertical axis indicates change in relative prevalence.

Given the difference between the two periods, it is likely that certain attitudes, values, and behavior that were of positive value in Epoch A may be of negative value in Epoch B.

A clear example is population size. In Epoch A, progressive increase in population was seen to be positive; in Epoch B, this increase is now of negative value and, if left unchecked, threatens our very existence. On an individual level, in the past it was economically and socially desirable to have large families. As society changes, it becomes more desirable to limit family size.

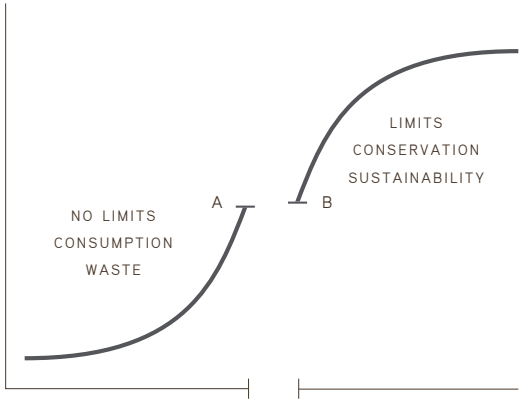
In a way that parallels biological evolution, certain human traits and tendencies that were advantageous in Epoch A were selected for. In the differing conditions of Epoch B, there is a shift such that other traits and tendencies will be of greater advantage and become more prevalent.



Perhaps the clearest example of the shift from A to B is that of resource use. During the period of exploration and expansion by European colonial powers, followed by the period of industrialization in both Europe and the United States, resources seemed limitless. They could be exploited without regard for the effects either of consumption or of the disposal of waste. This would correspond to Epoch A, in which positive value was placed on growth, consumption, and unlimited use of resources.

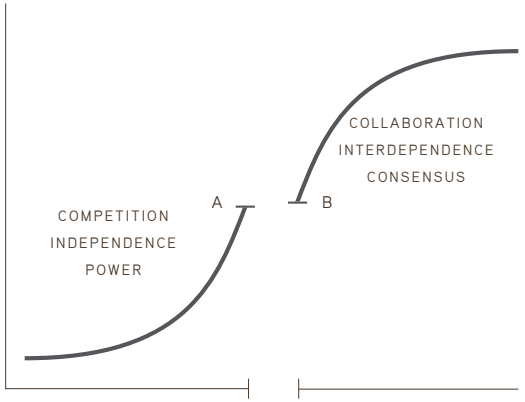
In the last 50 to 75 years, however, there has been increasing awareness that resources are limited and that unfettered consumption, along with disregard for the effects of waste products, endangers our survival. Our adaptive response has been to place increasing value on awareness of limits, on conservation, and on sustainability.

Thus, the conditions of Epoch A support and are consistent with values of unlimited growth and consumption, while the different conditions of Epoch B will lead to the different values of sustainability and conservation.



Similarly, qualities of competition, independence, and use of power were successful and tended to dominate in Epoch A. In the different conditions of Epoch B, strategies involving collaboration, interdependence, and consensus will likely be of more value in resolving conflicts and providing for basic human needs.

We have recently seen evidence of this shift toward collaboration and consensus in the accord signed by 191 nations with respect to climate change. This is a momentous agreement that is emblematic of the shift from Epoch A to Epoch B.



PART FOUR

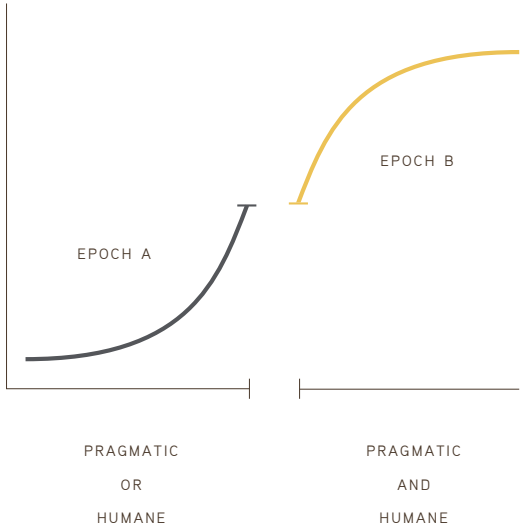
Paradox and Conflict

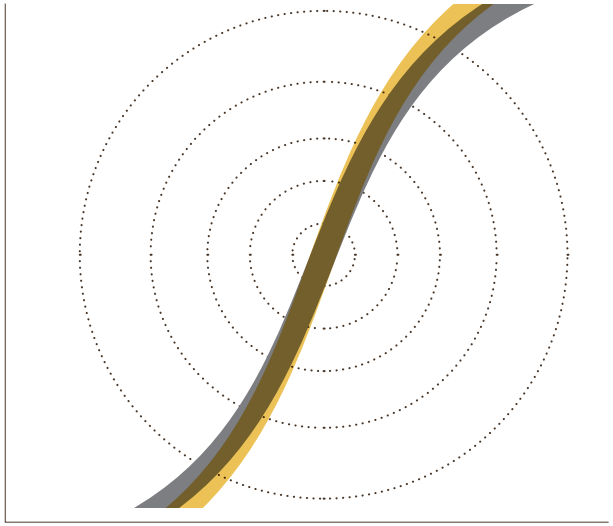
In the region of inflection, growth rates are highest; acceleration is changing to deceleration; and values are shifting most rapidly. The period can be expected to be a time of increased conflict. In the following section, we will look more closely at this period.

In the context of Epoch A, the generous or humane attitudes appropriate in Epoch B were not perceived as pragmatic. However, in the different reality of Epoch B, such attitudes will be both pragmatic and humane.

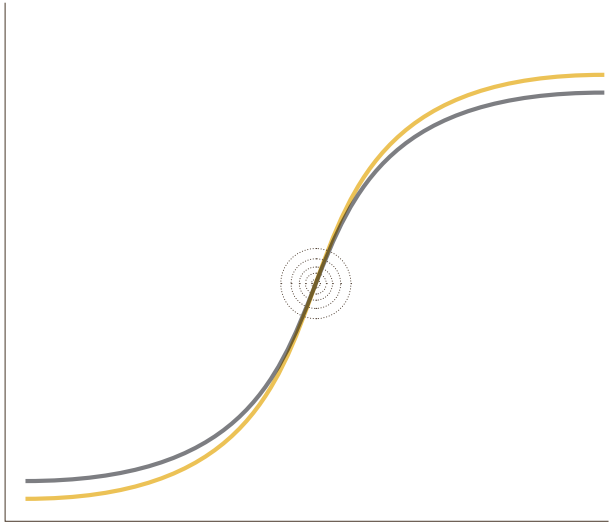
Thus, the shift will not come about simply because Epoch B values are morally or spiritually better than those of Epoch A. They will change because the values of Epoch B, in the context of that epoch, will be more advantageous.

For example, improvement in the quality of life in developing regions and the self-sufficiency of those nations will benefit the people both in those areas and in the more developed world. Improvements in health care, education, and economic viability in the less developed areas will help in ameliorating population pressures, which would benefit the world as a whole. In addition, a balanced relationship of wealth and exchange would lead to more stability as well as an increase in personal satisfaction and well-being. In Epoch A, such changes would have been perceived as conferring no advantage to the interests of the more developed areas; now they are being seen as advantageous to all regions.





When viewed from a short-term perspective, as represented in the figure above, the tension and conflict inherent in this transition may seem chaotic and symptomatic of a disintegrating, collapsing world.



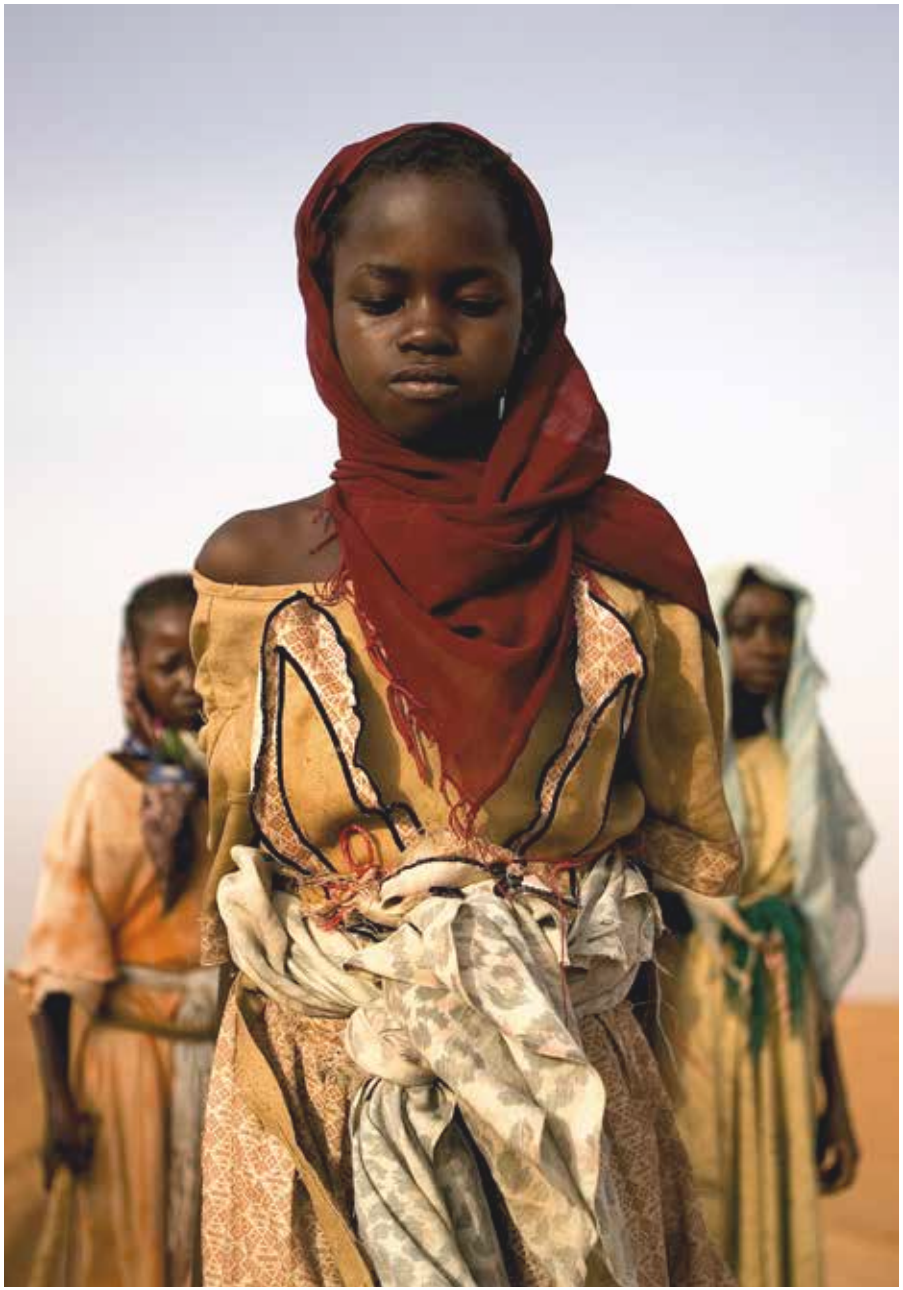
However, when viewed from a longer-range perspective, as shown in the sigmoid curves in this figure, these conflicts and uncertainties can be seen as part of an orderly if somewhat difficult process of nature. Looked at in this way, the disturbances of the present time may be seen not as a symptom of a disease that must be treated or eradicated but as a result of the obsolescence of formerly successful patterns of life and the uncertain beginnings of new patterns appropriate to the emerging conditions.

PART FIVE

Resolution and Integration

Epoch A was a period of technological development like no other seen in human history.

This development will continue in the foreseeable future, but the integration of these advances with emerging human values will be necessary for successful adaptation in the decades to come.



It is now well known and understood that changes in human thought, feeling, and behavior are accompanied and mediated by changes in cellular and molecular interactions in the human brain and the entire human organism. The changes and adaptations from Epoch A to Epoch B will take place not just at the social level; they will involve, affect, and be affected by the biology—at the level of molecules, cells, and tissues—of all of us and our descendants.

The challenges of the transition are of such magnitude that they can be met only if approached in a cooperative, interdisciplinary manner by varied groups of people.

For example, the problems of reducing poverty, enhancing health and education, and promoting sustainable economic development have to be addressed by collaborators from the fields of economics, international relations, agriculture, education, medicine, and technology. Those who can facilitate cooperation across huge cultural, political, and geographic gaps will also play a vital role. It is important to note that such problem solving cannot be planned and implemented solely by those in the Western, developed world. Collaboration, cooperation, and mutual understanding of local traditions, beliefs, values, and cultural practices will be part of the effort. This human-to-human problem, while difficult to resolve, must be addressed.

Ultimately, as a species, we have to adapt and live in balance with the constraints and opportunities of nature and of the planet. The integration of values of balance, moderation, conservation, and sustainability, as well as seeing the long-term consequences of actions and understanding the wholeness of the ecosystem in which we exist, is the framework in which we will develop our family, community, cultural, social, economic, political, and international institutions and practices of the future.

We are at a point in the course of human social evolution when the demands of survival converge with the higher ideals of humankind and the well-being and flourishing of human society. It is up to us to see that we navigate this transition, adapting to and emerging in a new reality.