

Chapter 2

The Children of Technology

Abstract It is important to keep in mind that our ancestors, before the technological era, were animals. Technology has not only contributed to the creation of *Homo sapiens*; it has also granted us the opportunity to live long and protected lives. Can a continued technological evolution create a balance between a modern way of life and the planet's ecosystem? I believe that the answer to that question is definitely yes; which is why it is of great significance to fully understand the essence of technology.

Try to imagine a group of ape-like creatures sitting huddled together somewhere on the African savannah, about three million years ago. They would have been busy using stones to crush the bones of a carcass that a pride of lions had left behind—an everyday task to access the nutritious marrow inside. On this particular day, however, something unusual happened. Instead of hitting a bone fragment, one of the creatures smashed a stone against another stone.

The other members of the group would probably have considered such behaviour as counterproductive, since there is nothing edible inside a stone. However, by breaking the stone our inventive hero managed to create a much sharper stone fragment—a hand tool—making it possible to obtain food faster and easier than all the others in the group. The stone-breaking method was soon adopted by the entire group, thus establishing the first technological innovation in human history.

This is how we imagine that technological development began, a journey that has transformed us from primitive primates¹ to space travellers. Incredibly, the catalyst that set off this long chain of development almost certainly came from a simple tool used in the immediate fight for survival.

As people today become increasingly cocooned in the technosphere² they are finding it increasingly difficult to step outside of their reality and view things from

¹**Primates** are the group of animals that includes apes and humans. Together with certain whales, the primates are the animals with the largest brains and highest intelligence.

²**Technosphere**, a term for the parts of the earth's surface and adjacent areas that are affected by technological processes.

another perspective. For many, such a task is almost on a par as it would be for a fish to explore the world outside of the hydrosphere.

The technosphere is our world, our natural habitat.

It is only by studying the first technological breakthrough when hominines³ began to make tools, that we can better understand how, and why, our material environment is continuously expanding around us.

The impact that technology has on humankind is much stronger than we tend to believe, and it touches upon the very soul of what actually makes humans human. The very idea that humanity can be regarded as a *creation* of technology, for example, is a supposition that is bound to cause great controversy—the traditional objection being that man is capable of thoughts and feelings, and is not a semi-robot. People advocating a different view to this line of reasoning are often derided as unemotional simpletons with a naive belief in science and technology—a type of reaction reminiscent of the upset Darwin caused when he first presented his theories, dethroning man from the divine pedestal.

Nevertheless, the fact that technology has played an important role in the rise of *Homo sapiens* is a fairly well-accepted thesis among scientists in the diverse fields of archaeology, anthropology and evolution. However, a source of considerable controversy between the disciplines remains when it comes to deciding on exactly *how* important that technological part is.

A common misconception in early human evolution theory was that the brain and intelligence of our ancestors were developed before tools were manufactured. Such a claim, however, has been contradicted by later evolutionary research and archaeological findings. For example, a study by Daniel E. Lieberman and Katherine D. Zink from Harvard University—recently published in *Nature*—supports the hypothesis that early stone tools were created long before there were hominines with brains of a size comparable with ours.

Consequently, the evolutionary step where the *Homo* genus was separated from the other primates could not have taken place without technology. (The technology we are dealing with here is defined as all artificial objects, including primitive artefacts like the simple stone tools that were in use approximately three million years ago.)

The archaeologist Timothy Taylor, professor at Bradford University in the UK, writes in his book *The Artificial Ape* that the evolution of our genus started thanks to stone tools. These tools also contributed to the development of traits like walking upright, shortened arms, less body hair, a larger brain and increased intelligence.

An ape's skull is formed the way it is because apes have to tear and chew their food using their teeth and powerful jaw muscles. Generally, apes don't prepare their food with tools as do the members of the *Homo* genus. The *Homo* genus represents the evolutionary line from the early hominines to our current species, *H. sapiens*.

³**Hominines**, ancestors of man, the evolutionary branch of primates that was separated from the chimpanzee branch several million years ago.

Earlier along the same line we find the *Homo habilis*, the *Homo erectus*, the *Homo neanderthalensis*, and others.

Technology has directed the evolution of the *Homo* genus in a very concrete way—it has affected the way we look and, above all, the size of our brain and the way it is programmed. An average human brain today is about twice as heavy as a hominine brain from 2.5 million years ago.

Chimpanzees—our closest living relatives—and other apes have not undergone the same dramatic change as *H. sapiens*, because their evolution has not been accelerated by the use of artificial tools. Thanks to stone tools, the members of the *Homo* genus became better at foraging and were able to consume more nutritious substances, like important fats and proteins, which were needed to increase the weight and volume of their brains. Current research (e.g. the study by Daniel E. Lieberman and Katherine D. Zink from Harvard University mentioned earlier) has shown that, first and foremost, it was plentiful and more nutritious food that modified the hominines' physiology and anatomy.

Technology Makes a Difference

According to Taylor and other archaeologists, two parallel evolutionary processes were probably interacting with each other in small steps. The result was a development spiral, where simple technology nurtured and stimulated the pre-human brain and innovative capability, which in turn empowered the development of more advanced technology.

In due course, the early hominines made several important innovations, like improving the stone tools with wooden handles. Thanks to the axe handle, the strike could be aimed and focused on the right spot, and the handle also served as a lever, augmenting the strength of the arm. The handle made a difference, and in a historical perspective it was an innovation of the same or even greater importance than any advanced machine today.

Consequently, this interaction between biological and technological evolution is a proven driving force behind the evolution of the species *H. sapiens*, which appeared on the stage about 200,000 years ago. Without technology, we wouldn't have looked the way we do, and we wouldn't have been the most intelligent species on earth. In fact, we wouldn't even exist. This may seem strange, but without all the artificial objects that we associate with technology, the evolution would have followed entirely different tracks. As it were, humankind has created itself with the use of technology.

Another important milestone in humankind's past was the gradual conversion from a life as hunter-gatherers to an agricultural society. It is plausible that men first became domiciled and started to cultivate the earth sometime between ten and twenty thousand years ago. The original hunter-gatherers were nomads and their nativity was low, but when they became settled, their populations skyrocketed. In

additional to the larger food supply, the growing number of people also affected evolution, because the genetic variation increased.

Once again, technology was a prerequisite for development, this time in the form of all sorts of picks, spades, and levers. In the area of the Middle East known as the Fertile Crescent, archaeologists have found harvesting tools made of honed volcanic glass, that remain sharp even according to modern standards. These innovations, tools and stationary cultivation—in combination with a beneficial climate—were the conditions required for a lasting agricultural society. The agricultural revolution was one of the most important steps in the rise of civilisation.

We represent the first species of this planet that—to a large degree—has evolved by artificial means. Our development is still ongoing, not least because of medical technology.

Culture Is Technology-Driven

It is not only human biology that has been affected by technology; our entire culture—including lifestyle and behaviour—has also been affected. This is contrary to the traditional way of describing human development, where artificial objects are considered to be products of a culture, rather than the opposite.

Tools, clothing, vessels and fundamental building principles have kept our ancestors warm, fed and reasonably healthy, while simultaneously driving the development of culture in various directions. In this light, it is possible to state that virtually all major technical innovations have guided the development of culture into new paths.

It is easy to imagine how the simple artefacts that made it possible for the early hominines to control fire half a million years ago created new ways of social interaction. Sitting around a fire created a feeling of security, which undoubtedly brought along a new sense of togetherness and solidarity. Some scientists have suggested that this was also the period when language development rapidly advanced. It is an interesting thought. Perhaps a distant genetic memory of such a time may explain why we still experience a special kinship when sitting around a camp fire together. Who knows—perhaps even the first sparks of romance were ignited around those early fires!

Research has shown that at the time we are dealing with here, members of the *Homo* genus began to create more sophisticated tools, and of a greater variety than before. Other things that appeared at about the same time were body-painting, jewellery and other items of beauty—early portents of the cosmetics and fashion concepts of our times.

Our ancestors gradually became more social-minded and more ready to cooperate, even with different tribes. Tolerance increased and aggression decreased.

Findings of early baby carriers and similar artefacts show the extent to which various *Homo* species at various times have been able to create aids and tools to facilitate everyday life, all the way back to the beginning three million years ago.

The baby carrier was particularly important since it freed women's hands for other tasks, which made various food-related work easier.

Thanks to the baby carrier, which is considerably older than the 200,000-year-old *H. sapiens*, the early hominids could have children whose heads continued to grow after birth. The children could be born in an unfinished condition, so to speak, meaning that the head would achieve its full size outside of the womb.

If the head grew too big in the womb, the child (and probably the mother) would die. The child would also die if the birth was premature, before the skull was fully developed. This is where the baby carrier appeared on the scene making it possible for the "prematurely" born babies to survive.

This is yet another example of a technological aid that guided the *Homo* genus' evolution on the way towards eventually becoming beings with larger brains—*H. sapiens*.

Man—A Domestic Animal

Given the culture and lifestyle of today, man is totally unable to survive without the help of technological aids. As a species, man is like a domestic animal, utterly helpless if placed alone in the wilderness. This is actually not a new idea at all, since there is one thing that we can be certain of: *H. sapiens* have *never* lived in a kind of harmony with nature. On the contrary, we have always been in a constant state of war against nature.

It may seem odd that nature should be considered humankind's adversary, but we have to remember that the concept of nature includes a lot of things, not all of which are pleasant: predators, insufficient food, bacteria, sickness and bad weather. In humankind's persistent struggle against nature, we have prevailed thanks to our talent for innovation and technological aids. Nevertheless, it is import never to lose sight of the fact that nature is essential for our survival.

Our thinking capability has developed through an intimate interaction between ourselves and the artificial world with its artefacts that we have created around us. In this respect, our thinking does not exist separately from our artificial surroundings.

The philosophy professor Andy Clark at the University of Edinburgh argues that the *H. sapiens* species' cognitive development and talent for problem solving are products of technology, rather than the opposite.

This becomes more understandable when we consider the development of a baby's brain. Small children who are stimulated by interaction with their parents and play with physical objects are simultaneously programming their brains. Conversely, children who for some reason have been deserted or isolated, suffer from a lack of stimulation; they develop fewer brain cells and synapses and are far more liable to behavioural disorder.

The making and use of tools by those early hominids obviously stimulated the evolutionary development of their brains in a similar way. A recent discovery to support this theory was made when a group of scientists tried to persuade some apes to create tools by knocking stones together. They found that the stone-knocking activity stimulated exactly the parts of the brain where the understanding of language is situated, which supports the theory that language and toolmaking share a common evolutionary background. The fact that apes lack this ability to understand language is something that may explain the great difference between apes and men.

This integrated interaction between man and his artificial world is obvious when we study the Renaissance. The great improvements in this period—i.e. scientific progress, increased urbanisation and travel, a virtual explosion of information interchange thanks to the invention of the printing press etc.—occurred simultaneously with a revolution in art and literature.

Today, culture is changing at a faster pace than ever before. It would be a huge understatement to merely claim that the culture development of today is empowered by the internet, computers and social media. A more comprehensive description would be that today's culture is actually *created* to a very high degree by modern technology, if not exclusively so. Billions of people spend a large part of their time in interaction with social networks. In fact, nothing in the earlier history of mankind can be compared with the cultural revolution currently in progress.

The Expansion of the Technosphere Is Accelerating

The pace of technology is accelerating, for better or worse. However, although technology is the source of our anthropogenic environmental problems, it can also provide us with the solutions.

Today, we have greater possibilities than ever before to control the development of our species and culture, through technology in general and gene technology in particular. Unfortunately, there is no certain way of knowing where the technology era—which started with a few simple stone tools three million years ago—will bring us in the long run. However, a retreat to a simplistic existence with minimal technology seems to be an extremely improbable outcome.

One of the world's leading genealogists, Craig Venter, suggests that humankind is currently entering a new phase of evolution. Other scientists argue that humans today have assumed control over their own evolution—or that we are playing God, as the critical voices claim. Gene technology may seem frightening, but it also creates enormous possibilities for progress. And in reality, there is nothing new with the idea that we can affect our own evolution by artificial means. As mentioned earlier, we already started doing this at least three million years ago.

It is important to keep in mind that our ancestors, before the technological era, were animals. Technology has not only contributed to the creation of *H. sapiens*; it has also granted us the opportunity to live long and protected lives.

We have now arrived at a point in time when this development is being questioned. The modern way of life—with high levels of consumption—has made the planet cough, which scares some people out of their wits.

Many believe that development is no longer sustainable, due to the ecological footprints we are creating. However, in all probability, the forces of evolution that have provided the good things in modern life can also eliminate the drawbacks!

Can a continued technological evolution create a balance between a modern way of life and the planet's ecosystem? I believe that the answer to that question is definitely yes; which is why it is of great significance to fully understand the essence of technology.

One Planet Is Enough

Tackling Climate Change and Environmental Threats
through Technology

Westergård, R.

2018, XVI, 150 p. 11 illus., 7 illus. in color., Hardcover

ISBN: 978-3-319-60912-6