Are We on the Threshold of Cyborgization*

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Cyborgization is a hot topic these days. This is an intriguing process that is the subject of many futuristic novels and which at the same time takes place right before our eyes. In the present article the development of cyborgization, its place in Big History, its background and future directions, as well as the problems and risks of this interesting process are discussed The authors are concerned about the question of whether the time will come when a human will mainly or completely consist not of biological, but of artificial material. The article also touches upon other problems and risks associated with future scientific and technological progress.

Keywords: *cyborgization, Big History, collective learning, Cybernetic revolution.*

Introduction. Cyborgization in Big History

The process of cyborgization can be considered as part of the technological evolution. On the whole, all human history, especially the last few centuries, is the period of the triumph of science and technology. Since the advent of *Homo sapiens*, people have been tied to technology (given the popular idea that labor transformed apes into humans, while the labor consisted primarily in the 'production' of stone tools). As a result, humankind, the creator of technology, becomes increasingly dependent on it (Grinin L. and Grinin A. 2015, 2016). At present, technology serves almost every aspect of our lives, but in the near future, more serious transformations are possible, when complex mechanisms and technologies can merge with the human body and mind.

Cyborgization is the process of replacing parts of the human body with cybernetic implants. To some extent, this process began a long time ago. The earliest evidence of prosthetics is recorded in Ancient Egypt. Researchers have discovered a prosthetic big toe made of wood and leather in Cairo, dating from between 950 and 710 BC (Finch *et al.* 2012). Another oldest recovered prosthesis was found in a tomb in Capua (Italy) in 1858, dated from the Samnite wars in 300 BC. It was made of copper and wood (Bennett Wilson 1964). In the Middle Ages, prostheses of iron were made by armorers for knights who had lost limbs in battles (Sellegren 1982). One of the famous examples is the prosthetic arm of the German

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Imperial Knight, mercenary, and poet Götz von Berlichingen, made at the beginning of the sixteenth century, which had a complex mechanism for that time (Goethe n.d.).

Progress in the field of artificial body parts has become so significant that almost every one of us today is a bit of a cyborg. Without a doubt, most people on the planet have false nails, artificial teeth, glasses or contact lenses. FDA estimated that 324,200 people had received cochlear implants worldwide (Technavio 2016). In 2016 the Ear Foundation in the United Kingdom estimates the number of cochlear implant recipients in the world to be about 600,000 (The Ear Foundation 2017). Artificial heart (DeVries *et al.* 1984), kidney, liver, pancreas (Stamatialis *et al.* 2008), bionic eyes (Boyle *et al.* 2003), bionic limbs (Farina and Aszmann 2014) and many more are reality now.

Unfortunately, despite the rapid development of cyborgization, there are not many theoretical concepts that shed light on the origin and developmental trends. Among the popular theories are transhumanism, whose fundamental ideas were first put forward in 1923 by the British geneticist John Burdon Sanderson Haldane (Haldane 1924; Huxley 2015), and the singularity by Ray Kurzweil (2010).

We suppose that the origin and development trends of cyborgization can be well understood within the framework of Big History. Cyborgization is an important milestone in Big History, this is the intersection of Human (or Upper Paleolithic) revolution and a new 'post-human' revolution whose consequences are not clear in many respects yet, but it will obviously start the era of an intensive impact on the human body. We see the origins of cyborgization in collective learning, which is the 6th threshold of Big History. Collective learning is a term, which was coined by David Christian (see, *e.g.* Christian 2018, 2012). This is a sufficiently powerful system of communication and sharing information in such volume and with such precision that new information accumulates at the level of the community and even the species (*Idem* 2015). Collective learning has become the basis for the development of technology which provided next important thresholds 'Agriculture' and 'The Modern Revolution'(Christian *et al.* 2014; Spier 2015). The future 9th threshold in our view is the threshold of cyborgization. Collective learning will develop in the global system of information exchange between the human brain and computer interfaces. Thus, there can appear a new system of collective learning which will give an impetus for the further development of Big History. It might even be the beginning of a new kind of evolution. As Richard Dawkins wrote 'Whenever conditions arise in which a new kind of replicator can make copies of itself, the new replicators will tend to take over, and start a new kind of evolution of their own' (Dawkins 2006).

Cybernetic Revolution

Now are at the threshold of post-human revolution. Perhaps, it will be less radical than transhumanists and other followers of practical immortality imagine. But anyway we are speaking about considerable extension of life, replacement of the increasing number of organs and cells of the human body with non-biological materials, implantation of electronic and other elements into the human body.

In the 1950s and 1960s the world (first of all, the developed countries) witnessed the major technological revolution which continues to this day. At the end of the twentieth century, the achievements of this revolution, especially in the field of information technologies, has widely spread all over the world. We denote this revolution as *Cybernetic Revolution* (Grinin L. and Grinin A. 2015) since cybernetics is the science about information and its transformations in various complex systems. Cybernetic revolution during its first phase (from the 1950s to the present day) has radically changed the information processing, as well as provided a breakthrough in regulating of complex processes in a wide range of natural and artificial systems, which became part of the production process (and in the future it will provide a breakthrough by creating a fundamentally new environment, a world of self-regulating systems).

Cybernetic Revolution became the third largest production revolution of human history after the Agrarian (Neolithic) and Industrial ones, but it has not yet ended. We consider the revolutionary changes, which the world will face in the coming six or seven decades, will happen during the second (the final) phase of Cybernetic revolution.[1]

Cyborgization development as one of the trends has important prerequisites in the coming phase of Cybernetic revolution. First of all, it is a general trend of improving the quality of life and longevity. Secondly, it is a trend of development of various self-regulating systems and technologies (we define such systems and technologies as those that can operate without direct human intervention).

One of the most important driving forces of the final phase of Cybernetic Revolution will become medicine, additive, bio- and nanotechnologies, robotics, ICT and cognitive technologies, which will together form a sophisticated system of self-regulating production. We abbreviate this complex as *MANBRIC-technologies.*

There are reasons why medicine will become the core of Cybernetic Revolution. Firstly, the share of medical services is rapidly growing accounting for about 10 per cent of the world GDP (WHO 2020) and it will continue to grow. Secondly, peripheral countries develop a huge middle class, as well as reduce poverty and illiteracy. As a result, the focus will shift from elimination of unbearable conditions to the problems of raising the standards of living, health care, *etc*. So, there is a great potential for the development of medicine. The third important issue is the problem of population aging (see, *e.g.,* Vollset *et al.* 2020). An aging population will be typical not only of developed countries, where it will become crucial for democracy, but also for a number of developing countries, in particular, China and India. The problem of pensions will become more acute (as the number of retirees per worker will increase) and at the same time the lack of a qualified labor force will increase (which in a number of countries is critical). Thus, countries will have to solve the problem of labor force shortages and pension contributions by increasing the retirement age by 10 or 15 years. It also applies to people with disabilities for their full involvement in the work process due to new technologies and medical advances. At the same time the birth rates in many developing countries will significantly decrease (*Ibid*). On the whole, these conditions will entail government involvement, as well as major investments, business activity, science development in order to provide a breakthrough in health care. The formation of such unique conditions is necessary for the beginning of a new phase of Cybernetic Revolution. This, most likely, will also be facilitated by the dan-

[1] It is important to mention that Cybernetic Revolution itself is a continuation of a major trend. At the macro scale, technological growth has been increasing, at least over the past 40,000 years, albeit with fluctuations (Grinin, Grinin, and Korotaev 2020).

ger of pandemics (as it was shown by COVID-19), which requires urgent solutions in medicine and attracts large financial resources.

Leading Technologies of Cyborgization

At present there is a growing number of self-regulating technologies in different branches of medicine, Such as life support systems and artificial organs. Other systems are only moving towards self-regulation. For example, flexible controlled instruments which allow doctors to perform a surgery in the most inaccessible parts of human body with minimal incision (often using endoscopes and video cameras). One can anticipate that in the nearest future a lot of operations will be performed without human participation (*e.g.,* robotic operations, see, *e.g*., forecast in Fortune Business Insights 2019).

We suppose that many self-regulating systems will play a crucial role in development of cyborgization. Among them are different biosensors or bio-chips. This is a new trend representing a combination of medicine and nanotechnologies. Biochips are able to register a wide range of physiological changes and respond to them or perform specific actions. In the long term they will make it possible to constantly monitor a person's health. Because of the constant diminishing of resistor's size (Peercy 2000) some biochips are so small that they can be inserted into cells (so they are often called nanochips). These biochips can be used for different purposes, for example, for targeted drug delivery (Wang *et al.* 2015). Further miniaturization will allow to create a system, which will constantly monitor important parameters of the body, record activities, as well as to track the location of a person. Such systems will be very common in the final phase of Cybernetic Revolution.

Another important self-regulating technology is the brain–computer interface (BCI). This is an interaction between brain and computer systems that can be realized via electrode contact with the skin on the head or via electrodes implanted into the brain. Today BCIs are widely used, especially in medicine, for example, in artificial visual systems or in bionics. In the future they will significantly improve rehabilitation for people with strokes, head trauma, and other disorders. BCIs can become an essential way to make artificial parts of the body directly controlled by the brain. It will be especially important in orthopaedics or bionics. According to the World Health Organization, more than 1 billion people are living with some form of physical disability, and about 190 million adults have a major functional difficulty (World Bank 2011).

An important direction is artificial organs, which are very complex self-regulating systems. At present, there are many different artificial organs: heart, ear, eye, limbs, liver, lungs, pancreas, bladder, ovaries, trachea, *etc.* (Murphy and Atala 2014; Stamatialis *et al.* 2008). Artificial organ development will also be able to change human reproductive capabilities. The artificial womb will provide an opportunity to have children for all people irrespective of age and gender (Corea 1986; Rosen 2003).

Of course, in reality cyborgization will be based on a combination of these and other technologies. Also, the same result can be achieved by means of different technologies. For example, bionic eye, most probably will be an artificial eye (an artificial copy of the natural one). Or it can be a camera, integrated into eyeglasses, which captures images and transmits them to the optic nerve via BCIs (such technology already exists, see *e.g.* Ong and da Cruz 2012).

Speaking of cyborgization, one cannot mention the development of robots. Robots will become a well-developed self-regulating system and will spread into virtually every area of our lives. The robotics market is expected to grow (Technavio 2020), especially healthcare robots (*e.g.,* surgical as we mentioned before or robots for rehabilitation therapy (Burgar *et al.* 1999).

Waiting for Radical Changes

Many researchers suppose that we have already approached or are approaching some fundamental changes and most probably they will occur in the next decades. Some speak about the approaching the singularity point. This is a certain unprecedented level of technological progress, after which the curve of technological development will change to a new trend. There is a widespread belief that after the singularity point there will begin a new radical phase of human development (Raymond Kurzweil's works should be emphasized here, *e.g.* Kurzweil 2010 which can be evaluated as an extreme technological optimism).

We suppose that technological growth will not be infinite. Our analysis shows that there is a number of reasons to expect that in the forthcoming decades global technological growth rate will return for some time to a hyperbolic trajectory when the final phase of Cybernetic Revolution will begin. This acceleration will continue up to the late twenty-first century. According to our calculations, technological growth at the end of the twenty-first century will gradually slow down to the singularity point approximately in 2106. It is significant that the global aging factor will play a leading role here. After the singularity point the rate of technological progress will slow down compared to the previous epoch and the pattern of scientific-technological development itself will change dramatically. However, in the end of the twentieth century one should expect a rapid increase in the possibilities of changing the human nature.

From a Human to a Cyborg

There is a popular idea of transhumanism that cyborgization will develop by placing the brain and consciousness in an abiotic immortal body. On the whole, immortality is one of the main issues of transhumanism (Fukuyama 2004; Haldane 1924; Hansell 2011; Huxley 2015; More 2013). How much is this possible? On the one hand, this direction seems quite logical, as medicine has been moving in this direction for many decades. Currently, bioprinters can create different tissues and organs (Murphy and Atala 2014), and neural interfaces allow to control some devices and equipment 'by power of thought' (Schalk *et al.* 2004). Besides, there is some kind of the oncoming development of technologies in terms of rapprochement of people and artificial systems, in particular in the construction of humanlike robots (see, *e.g.,* Hirose and Ogawa 2007). Since these robots will be used not only for work and entertainment, but also for very close or even intimate contacts with people (Yeoman and Mars 2012), the borders between the human and artificial anthropomorphous systems are likely to dissolve. Not to mention technologies such as virtual reality where even now it is becoming difficult to distinguish reality from illusion (Burdea and Coiffet 2003).

But, on the other hand, over millions of years, biological evolution has balanced all the elements of organism and its functions in an optimal and efficient (but sensitive to change) way. It is doubtful that the human brain is able to work without body, because the main purpose and function of the brain is to control the body. It is also seems irrational to change all organs and parts of the body, usually most of which work fine. It might be much more efficient and cheaper to change only broken or less durable parts. It is more probable that the process of cyborgization will never go too far, it will always remain 'supplementary' for the biological component of organism, capable to significantly improve quality of life and to prolong it.

Today the scientists learn to create artificial biological tissues and parts of the body by means of stem cells or other biotechnologies. We suppose that this way of 'repairing' our body will be very promising. In case of basic vital organs such as the heart, lungs, liver, *etc.*, it can be more preferable and more effective than artificial non-biological organs. Today we already know about the cases when a person's heart was successfully replaced six times (and once a kidney) throughout life.[2] Now only a very rich person can afford it. However, in the future it will be possible 'to repair' quite a large number of people by means of laboratory-grown organs.

Systematizing the Risks

The development usually starts from euphoria from implementation of new technology, much later there comes the understanding of problems which it brings, and only after that restrictive measures are taken to reduce some negative consequences. The question arises why discuss the dangers today if they will not come soon? The matter is that the future can turn out to be quite unexpected and even terrible. Thus, one should anticipate and think about that in advance.

Ethical and moral problems

The development of artificial organs, bio-chips, genetic engineering, *etc.* raises questions: What matter will a future human be made of – natural biological or artificially made biological substance or will it be a non-biological being at all? How will humans reproduce? How will human brain and consciousness function? Any such change will dramatically change human fundamental institutions, including morality and interpersonal relations. Morality and human relations do not exist separately from technology, especially from human physiology and, in a broader sense, from the biological basis. It is the result of complex sociobiological evolution and may disappear after the loss of its material biopsychic shell.

We assume that cyborgization as a whole is a process of transformation of human nature by changing human biological and adaptive abilities. Real cyborgization will involve a change in human senses and consciousness. A recent study presents a conceptual framework for the development of cyborgization, which should be based on the collaboration and fusion of biological and AI units that will shape the intelligence of cyborgs (Wu *et al.* 2016).

Moral aspects of cyborgization is not a new problem (see Bernal *et al.* 1929; Haldane 1924). However, with increasing technological development today, there appear more specific research on this topic, such as the impact of the ethical judgement of a person's decision to become a cyborg (Pelegrín-Borondo *et al.* 2020) or even on the ethical issues of cyber animals (the modification of body parts of animals with electronic or mechanical devices such as a cyborg beetle) (Xu *et al.* 2020).

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[2] The multi-millionaire David Rockefeller underwent the last heart transplantation at the age of 99 years.

An important problem was raised by Bill Joy about increasing dependence on machines. This will wean humans from thinking and solving problems, thus eliminating any practical choice, since all the decisions will be machine-made. Yet, Joy probably overestimates when writing, 'The human race might easily permit itself to drift into a position of such dependence on the machines that it would have no practical choice but to accept all of the machines' decisions'(Joy 2000: 2). Possibly, Joy also exaggerates that 'Eventually a stage may be reached at which the decisions necessary to keep the system running will be so complex that human beings will be incapable of making them intelligently. At that stage the machines will be in effective control. People won't be able to just turn the machines off, because they will be so dependent on them that turning them off would amount to suicide' (*Ibid.*). In the future, when the systems will perform most of the human mental work, our brain will be able to work less and, therefore, can become weaker than the brain of the modern human, just as muscles of many our contemporaries, who have no need in physical activity. Naturally, there will appear more systems facilitating and supporting intellectual work. Here the positive feedback will come to the fore: mind does not want to work, devices facilitate its work, and the mind weakens even more. Therefore, it is not surprising if in the future 'a mental gymnastics' will be promoted as an exercise, similar to simple physical activities today. Nevertheless, the danger of heavy reliance on technological systems is not so speculative. This is an important moral issue, since the exploitation of this reliance is quite possible, and the future 'freedom of choice' for independent thinking is unclear.

Another important moral problem is the resistance against scientific-technological progress which has a long history. The best known examples are Luddites, that is a radical organization of English textile workers in the nineteenth century, which destroyed machinery as a form of protest (see, *e.g.*Binfield 2004; Jones 2013). This struggle was caused not only by obscurantism, but also by a real necessity or grounded fears, since the progress would often exacerbate the situation, as well as to lead to many bankruptcies and throw overboard many professions; sometimes it would even desolate whole cities and territories, and also often deteriorate the quality of products. Sometimes it opened unexpected opportunities for abuse or was a source of desperate social struggle and oppression. Nevertheless, nobody managed to slow down this process. The toughening requirements for new drugs, banning GMO or cloning today, as well as many other things are modern manifestations of this struggle. It is clear that many of these restrictions and bans are absolutely necessary. On the one hand, it is difficult to expect that it is possible to get the development of scientific and technical progress under a full control. On the other hand, progress in fight for the environment-oriented production or safe drugs shows that it is quite possible to achieve a certain level of control here. In general, the mechanism of minimizing the damage from innovations consists in establishing certain institutions and rules optimizing the control over technologies; but it is especially important to make it beforehand.

The irreversible demographic transformations

Each phase of production revolution is connected with demographic change. During the initial and intermediate phases (the current phase) of Cybernetic Revolution a tremendous growth of the world total population takes place. This growth is occurring primarily in developing countries and is an ongoing trend in the demographic revolution of the industrial era. But on the other hand, in the developed countries demographic revolution has culminated in the so-called demographic transition, which means a decrease in birth rate. At the same time life expectancy and its quality have considerably increased. The demographic transition is actually the result of the initial phase of Cybernetic Revolution. Not without a reason in an increasing number of developing countries the fertility rates have been falling, in some of them we also observe a noticeable population aging. During Cybernetic Revolution demographic structure has significantly changed. It has transformed from pyramidal (when children and youth make up the majority of the population) into a rectangular one, when the number of elderly people is almost equal to the number of young people (for more information about global aging and technological progress see. In the coming decades, we will observe world population aging, as a result of which its structure takes the form of a reverse pyramid (when the number of children and young cohorts will be less than of the elderly people). In some developed countries the life expectancy can increase up to 95–100 years old, and generally it can reach the level of today's most successful countries (such as Japan), that is 80–84 years, but it may even become higher (Statista 2015; Vollset *et al.* 2020). Meanwhile, an especially rapid growth of elderly cohorts will be observed in the next three decades. As a result in three decades the world will be divided not into the first and third worlds, but into the worlds of old and young nations. But by this time, an aging population will be noticeable in most countries of the world (possibly, with the exception of African states). At the same time the slowing down fertility rates and the exhausted demographic dividend in most countries of the Third World will lead to the fact that the demographic structure will change considerably, and the share of children and youth will decrease while the proportion of the elderly people will increase (Grinin L., Grinin A., and Korotayev 2016; Vollset *et al.* 2020).

The decline of democracy and the struggle between generations

Population aging can lead to the decline of the democratic system. Democracy can evolve into gerontocracy, from which it will be difficult to escape (Berry 2012; Tepe and Vanhuysse 2009). The crisis of democratic governance is generally quite probable in the context of the struggle for votes. With the growing life expectancy and reduction of youth share in population structure, the number and role of elderly and old people will inevitably increase along with a probable sexual distortion: women in the western countries and men in some eastern countries. Also, since the elderly generation is more conservative in its preferences and habits, it can influence the choice of policy and many other political, social and economic nuances that can disadvantage young and middle generations.

Especially alarming is the fact that the growing life expectancy can cause a conflict between generations, since the growing number of elderly people will require an increase in working age and working capacity by 10–20 years or more (along with the full involvement of people with disabilities into labor process due to the new technical means and advances in medicine). However, in that case senior generation will probably impede the younger generation's career development. Also the elderly population can contribute to society's growing conservatism that can also slow down technological growth in the future (besides it will be difficult to replace elderly workers for whom it will be very difficult to be retrained). To move away the elderly people from the young people's way will become a difficult task, and we may eventually have to adopt a form of institutional 'ageism' in order to allow young people to enter the workforce in the world with high expected life duration.

It is important to note that such a turn to gerontocracy will be most quickly outlined in European countries and the USA. On the one hand, these countries have the strongest democratic traditions, and on the other hand, ethnocultural imbalance is also the most noticeable here (thus, in the future, one can expect in the USA an opposition between the young Latin and elderly white population, while in Europe between young Islamic and elderly white Christian population). It means that the North–South divide will be reproduced in every country where the elderly indigenous people will live alongside with much younger population having different cultural traditions. The conflicts between generations in these countries caused by the above-described crisis of democracy will inevitably affect the fate of the whole world within globalization.

The geopolitics of an artificial reproduction

At the end of the last century it became clear that the opportunities to influence human genome and reproduction can generate a lot of complex social, political, ethical and legal problems in the future. Nevertheless, modification of human embryos has already begun. For example in 2015 China declared about the conducted work on modification of the human embryo (Cohen 2019), as well as Russia in 2019 (Cyranoski 2019). If such researches and methods of raising children outside the maternal placenta develop, the structure of population reproduction will change dramatically. We have considered this issue with respect to the breaking links between generations. But there is also a global aspect. Will the countries and the world as a whole be ready for such changes? And will some countries not want to derive benefit from their demographic advantages (which would be quite a natural course of things)? There is plenty of room for imagination. On the one hand, it is obvious that in the future, when creating some planetary structures and developing quotas for different states, a country's population number will become much more important than it is today, especially in international relations (today a country's status is rather measured by its wealth and military power). But will the West accept that countries with a much larger population will dictate their terms?

On the other hand, why do not some political elites use new reproductive technologies and, for example, launch a population growth race?

Conclusion. Between Technological Optimism and Reasonable Caution

The faster changes proceed, the more difficult it is for the society to follow them and the more heterogenic it becomes in social (and often ethnocultural) terms. During the Cybernetic Revolution, the amount of information increases dramatically. This makes it difficult for many people to learn new technologies and divides the society. 'The young see themselves as "digital natives", and look down a bit on the "digital immigrants", the elderly who grew up with books and pens and paper', wrote the presidents of the Club of Rome (von Weizsäcker and Wijkman 2018: 46) In some way technological progress accelerates itself by increasing necessity to adapt and learn, and thus more and more to rely on technologies. This forms a new collective learning, which will be a combination of human experience and technological capabilities, will give impetus for the future 9th threshold and the further development of Big History.

Human power increases with the growth of technology, but along with this many previously unknown problems occur. That is why, if we want to make use of the new opportunities (and why should not we?), it is necessary to foresee problems and to minimize their consequences and 'future shock'.[3] Unfortunately, humanity does not learn much from its own mistakes and pays little attention to future problems. It is also rather difficult to foresee problems; therefore, we need certain institutions or administrative-legal systems which would generally take the technological development under control and would develop in cooperation with technologies while preserving their functionality. However, for this purpose it is necessary to regulate the rate of scientific and technological progress in the world. We believe that sooner or later it will become possible. Unfortunately, so far it is unachievable since the competition between countries is primarily based on the different level of economic growth. It becomes obvious that the control over hazardous changes will also require certain political transformations which can turn extremely complicated and sensitive (Grinin and Korotayev 2013).

Meanwhile, in society for a long time and still there are two main regulators, without which it cannot exist. These are morals and law, which are also based on psychological structures of society (Grinin L. and Grinin A. 2016). But the faster technology develops, the less recognized moral becomes, since it fails to find a new balance. Also it is rather possible that beyond a certain limit of the speed of scientific-technological development, a noticeable destruction of moral (or its disintegration into different varieties) can start. And it is all the more dangerous when powerful technological opportunities of transformation of the human body develop. Due to the lack of moral restrictions and the desire to make big profits, various dangerous phenomena may prevail: from the fashion for body corrections to attempts to become superhuman with the help of new medical technologies.

Having appeared in the agrarian and craft societies the Law became mature during the period of industrialism (while the rule-making process takes place within any society). The law, being more flexible than moral, nevertheless, demands a certain stability which is hardly achievable in conditions of rapid technological changing technologies. According to Stanisław Lem (1968: 269), society and its legal rules most often become weak in the face of technological innovations, if only they do not enter into a direct conflict with laws. And, as Lem fairly notes, 'the intensity with which "simplifying" technology undermines values is positively correlated with their effectiveness'. This means that the more effectively technologies solve certain issues, the more they change the society, its moral and legal pattern, whose consequences we begin to realize much later. In what way the future society will organize itself is not clear yet. During the previous epochs, the moral and law could be compared with two feet on which the society stood quite firmly. But, figuratively speaking, if one 'foot' (moral) disappears and the other (the law) weakens will the society be able to keep the balance on such a weak basis at such high rate of progress?

[3] We are constantly facing such shocks, therefore, the issue raised by Alvin Toffler in his well-known *Future Shock* nearly half a century ago still remains relevant.

It is difficult and actually senseless to try to impede progress. However, there is always a question of what to consider as progress at every particular epoch and what are the costs. Anyway, it is better not to rush into changes with vague consequences. When treading new ground, it is better to be careful than to rush. Science, innovations and changes too quickly put a lot of new legal, moral, and economic problems and cause sharp disputes, conflicts, trade wars, and phobias. The public consciousness definitely lags behind. The uncontrollable technological progress can be compared with the Roc, the legendary bird from the Arabian Nights that quickly carries the humankind but demands human sacrifice. Are we ready for it? And the question of what we are ready to sacrifice for the sake of progress is one of the most important.

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