

Afterword

Threats and Risks of the Future World of Self-Regulating Systems

How can we coexist with scientific and technical progress? We have completed our analysis of the history of development and of the current state of technologies as well as made some assumptions about the directions of their further development. But, of course, life will turn more diverse than any forecasts and even imaginations, and it is difficult to define what will become reality and what will not.

But nevertheless, we have no doubts that the development will head for creation of self-regulating systems. We think there is coming a heyday of the systems which will work mostly independently and at the same time more insistently controlling the most diverse aspects of human life. All this claims for a deep understanding and some activity in order to minimize the emerging problems; for example, to prevent the emergence of a new and even more supervising 'Big Brother' knowing much more about us than the 'Brother' that visibly controls all our life on the Internet today. Not only our on-line chat, but also the genealogic tree, medical history, individual peculiarities of the organism and probably, even our thoughts will become accessible soon. Who, how and for what for purpose will use this information, can hardly be ignored.

There also exist some other problems. Bill Joy (2000) describes the situation when an increasing dependence on machines will wean humans from thinking and solving problems and thus, eliminate any practical choice since all the decisions will be machine-made. Yet, Joy, probably, overestimates when writing that: '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'. Possibly, Joy 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 will not be able to just turn the machines off, because they will

be so dependent on them that turning them off would amount to suicide' (Joy 2000). Nevertheless, the danger of heavy reliance on technological systems is not so speculative. And what will remain of the human 'freedom of choice' is absolutely unclear.

Besides, in the future when the systems make the most part of human mental work our mind will start to work less and thus, become weaker than the mind of the modern human; as a result, it will weaken just as the muscles of many of 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' (in the form of some multiplication tables) will be promoted as a very useful exercise, similar to simple physical activities today.

Human power increases with the growing number of technologies subjected to him, but along with that many changes occur in the mode of life as well as we face numerous previously unknown challenges. That is why, if we want to make use of emerging opportunities (and why should we miss them?), it is desirable to learn to foresee problems and to minimize their consequences since a more significant technological breakthrough is likely to bring more sweeping changes and 'future shock'.¹ Unfortunately, humankind learns little from own mistakes and pays little attention to future problems. At best we behave like the generals in famous Churchill's aphorism which prepare not for the future, but for the past wars. As a result, we solve the problems to which we have already adapted and not for the forthcoming problems.

It is known, the fight against scientific and technological progress has a long history. And each manifestation of this fight 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 lead to many bankruptcies and throw overboard entire professional categories; sometimes it would even desolate entire cities and territories, and also often deteriorate the quality of products. Sometimes it opened unexpected opportunities for abuses or was a source of desperate social fight and oppression. Nevertheless, nobody managed to slow down this pro-

¹ 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 (Toffler 1970).

cess. The toughening requirements to testing of new drugs, closing APS, banning GMO or human cloning today, as well as many other things are modern manifestations of this fight. It is clear that many of these restrictions and bans are absolutely necessary. Others are caused by natural and rather grounded fears. On the one hand, it is difficult to expect that one can get the development of scientific and technological 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 institutes and rules optimizing the control over technologies; but it is especially important to make it beforehand.

One should also remember that there are always parties concerned with technologies and progress. Thus, there always exist ambitious forces that are interested in their development and advance hoping to get some profits; besides, innovations always have a number of mercenary as well as unselfish adherents, as well as there are always people who prefer simple illusion to a more difficult path of achieving a goal while thinking that science will be able to solve any problem in future. Hence any promotion of valuable and important innovations is usually far from altruistic.² Therefore, we should not become victims and all the more slaves of scientific and technological progress (according to Francis Fukuyama) and its impetuous apologists.

Due to the convergence of interests in the sphere of innovations it should be clear: it is much easier and cheaper to get control over the things that have not been created yet than over the things that has already been developed and earn billions in profit.

But it is rather difficult to anticipate problems; therefore, we need certain institutes (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 pace of the world scientific and technological progress. We believe that sooner or later it will become possible (see, *e.g.*, Grinin 1998a, 1999, 2005, 2008; Grinin and Korotayev 2009). Unfortunately, so far it is unachievable since the competition between countries is primarily based

² As well as the fight against these or those consequences of scientific and technological progress.

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 2006b; Grinin and Korotayev 2010c).

The costs of progress. Thus, it becomes quite clear that the scientific and technological progress cannot be hampered. Lock the door before it, it will enter through the window, but will inevitably come. And still it depends on us what price we will pay for it. And the cost of progress is always considerable even if it is expressed not in bloody wars, but in pleasures. Has not such convenient and promoting growth of pleasure technologies as contraception led to the fact that women give birth to less children which turns the society into ‘an institution for elderly care’? Another seemingly pleasant, but actually an expensive way of payment for progress is computer games whose unknown consequences are still to come in some decades. As a result, today many millions of children and young people (as well as grown-ups) are seriously dependent on them. While staying in the virtual world and exciting far from harmless passions and feelings in themselves, they waste time, lose health and normal human relations as well as miss opportunities. It is obvious that it would have been rather easy to perform timely pedagogical and psychological evaluations for such games and to take some preventive measures.

What will be the costs of the future development? One can hardly hope that further advancement will by itself correct everything to increase the glory of scientific and technological progress, since these corrections may turn rather costly. It becomes obvious that today technological and scientific achievements access the natural essence of human living and its biological nature. And, therefore, stakes are high. Thus, one should consider the real consequences and what we want to avoid for that matter. Moreover, the radical changes in human body can dramatically change the relation to such basic phenomena as family, relationships, gender, relation to life, to own body and many other things which it is even difficult to imagine now.³ Meanwhile, our institutes and perceptions are not ready for the changes that revolutionary technological innovations can bring out.

Is the best always more preferable to good? During the last two centuries humankind has been living according the principle ‘The best is

³ But it can be seen already that these concepts which used to be fundamental are degrading now.

often the enemy of the good'. But after a certain point this principle becomes rather dangerous and ruinous.⁴ In some respects (*e.g.*, nature), fortunately, there appeared forces which appeal to people to behave from the position of reasonable egoism at least and to leave something for the future generations but not to live by the principle 'after us the deluge'.⁵ In fact, the concern about the future of our own children and grandchildren gives us a strong impetus since we would like to provide them with the best conditions and preserve what is valuable for us. Undoubtedly, the link between generations is one of the pillars for a society's sustainability. However, the trouble is that this link is weakening at present. One of the reasons is that every ten years there emerges a new technosphere in which the seniors feel themselves uneasily unlike the juniors. That is why it becomes more difficult for parents to pass on their experience to children (see Grinin 1998a, 2006b; Grinin and Korotayev 2009).

But the most dangerous events in this context can expect us ahead. The future transformations can turn negative for the development of the next generations. In particular, are we ready that the link between generations can be interrupted entirely after the new reproduction technologies make it possible to incubate children in artificial wombs? Are we ready to refuse the concept of children and parents, grandparents and grandchildren? It is hardly probable. But if we do not think about it now nobody will ask us later. Has not the progress virtually taken away the only children from parents, brothers and sisters from hundreds millions of people? And if such an artificially brought up generation not knowing parents and relatives⁶ appears, will the desire to take care of others weaken both among the senior and the younger generations?

Such a transition, if it takes place, will undoubtedly strike a mortal blow to the institution of the family which is already weakened. If at

⁴ For example, the economic growth at any costs can lead to resource depletion and senseless expenses; the abundant food together with ideology of consumption can cause obesity epidemic and increasing number of diseases; the hedonism ideology and infinite thirst for pleasure – to increasing selfishness and weakening of the sense of duty towards others and society; safe sex leads to crossing the line of permitted sexual behavior; increasing number of shows and games – to mental instability especially at younger generation, etc.

⁵ It should be noted that the future climate warming so much spoken about, can cause a flood per se. However, climatologists definitely have little agreement about this problem.

⁶ By the way, according to Platon in the development of ideal of utopia, in which he wrote that children have to be common in the exemplary state, let fathers not know their children, and children their fathers (Platon. State 5, 457d). Naturally society has rejected such ideas long ago. However, even Platon could not suppose that mothers can be common.

least one generation breaks this link between parents and children tested by countless generations and many millions of years there will be no way back any more. Hardly anyone will agree to bear this burden ...

Systematizing the risks. While discussing future technologies in our monograph we have little spoken about the reverse side of the forthcoming changes. Therefore, it seems logical that this conclusion will reflect the possible problems and risks resulting from the logic of changes at the final phase of the Cybernetic Revolution.

Forecasting such problems can help to create in advance the appropriate social, legal, and other tools to prevent the unexpected changes and to minimize their negative consequences. Of course, over the three decades biomedical ethics has been done insufficient, although during this period it has become an established field of knowledge with broad specialization that has its own international centers and holds conferences and issues periodicals. The question is not so much about ethics, and ethical and legal collisions rather than about the future of the human as a biological organism. Therefore, one can rather speak about a *bio-humanitarian categorical imperative*, about the development of fundamental principles and forms which should be taken into account on the path to the new pattern (and which are desirable to be confirmed in some international legislation).

The analysis of various risks would demand a considerable extension (see Grinin L. and Grinin A. 2015 for details). Now let us focus mainly on the risks associated with the demographic situation changing under the influence of natural processes which are sharply strengthened by achievements in medicine.

The irreversible demographic transformations. Each phase of production revolution is always associated with demographic changes. During the initial and intermediate phases of the Cybernetic Revolution a tremendous growth of the world total population takes place. This growth occurs first of all in the developing countries and is actually the continuing trend of the demographic revolution of the Industrial era. But on the other hand, in the developed countries demographic revolution has been completed by the so-called demographic transition which means a decrease in birth rate. At the same time life expectancy and its quality have considerably improved. The demographic transition is actually the result of the initial phase of the Cybernetic Revolution. Not without a reason in an increasing number of developing countries the

fertility rates have been declining today, in some of them we also observe a noticeable population ageing.

Thus, the Cybernetic Revolution has significantly changed the type population replacement: a) it has reduced fertility rates along with a sharp reduction of child mortality, this has led to the fact that the average number of children in families has considerably decreased; b) it has sharply reduced total mortality that has resulted in the unprecedented life expectancy; c) we observe the population aging when in a number of countries the average (median) life expectancy is 40 years and more. As a result, the demographic structure has significantly changed. It has transformed from pyramidal (when children and youth make the main part of the population) into a rectangular one when the number of older persons is almost equal to youth number.

Yet, the already available achievements as well as the future advances in medicine and other branches can make a more substantial contribution to the change of the replacement pattern. In the next decades we will observe the global population aging resulting in its structure becoming a reverse pyramid in shape (when the number of children and young cohorts will be less than of the elderly people). Let us consider some consequences and possible risks of this situation.

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. 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.*⁷

But by this time the population aging will become noticeable in most countries of the world (probably except for the African states). At the same time the decreasing 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 dramatically decrease while the proportion of the elderly people will grow.

⁷ It can also lead to a certain geopolitical tension when the world is divided into the North where women of advanced age will be set the pace in politics as Francis Fukuyama wrote, and the South where angry young men with untied hands (as T. Friedman called them) will be the driving force (Fukuyama 2002).

The decline of democracy and struggle between generations?

Population aging can lead to the decline of democratic system. Democracy can evolve into gerontocracy which will be difficult to escape from, and the crisis of democratic governance is generally quite probable in the conditions of fighting for votes. The matter is that 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: prevalence of women in the western countries and men in some eastern countries. Since the elderly generation is more conservative in its predilections and habits, it can influence the choice of policy and many other political, social and economic nuances which can put young and middle-aged generations in disadvantage.

Especially alarming is the fact that the growing life expectancy and activity can cause a conflict between generations since to make provision for the increasing number of the aged people will require to raise the labor age and to increase the working capacity for 10–20 and even more years along with a full involvement of disabled people into labor process due to the new technical means and achievements 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 the technological growth in the future (besides it will be difficult to replace elderly workers for whom it will be very difficult to be re-trained). To move the aged from the young people's way will become a hard task, and as Fukuyama (2002) suggests that 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 time to think about how to combine the need of increasing working age for the elderly and the possibility of advance for the young people.

It is important to note that such a turn to gerontocracy will be most quickly outlined in the European countries and the USA. On the one hand, these countries have the strongest democratic traditions, and on the other, the ethnocultural disproportion is also the most notable here (thus in the future, one can expect in the USA an opposition between the young Latin and elderly white population, while in Europe it will be 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 alien population with different cultural traditions (Fukuyama 2002; on the different education levels of indigenous people and ethnic migrants see Sarrazin 2010; Buchanan 2015).

The conflicts between generations in these countries caused by the above-described crisis of democracy will inevitably affect the destinies of the whole globalizing world.

The geopolitics of an artificial reproduction? Now let us return to the issue of possible changes in human reproduction. If technologies of growing up children beyond the maternal placenta appear, the population reproduction structure will considerably change (especially if there appear some other technologies such as cloning). We have considered this issue in terms of breaking links between generations. But there is also a global aspect. Will the countries and the world in general be ready for such changes? And will not some countries want to derive benefit from their demographic advantages that would be quite a natural course of things? Here is some room for imagination. On the one hand, it is obvious that in the future while creating some all-planetary structures and developing the quotas for different states a country's population number will become much more important characteristic than it is today, especially in international relations (today a country's position is rather estimated by its wealth and military power). But will the West take it that the countries with much larger population will begin to dictate their terms?

On the other hand, why do not some political elites use new reproductive technologies? Therefore, it is quite possible that political elite in the future will be able to use 'industrial' reproductive technologies in their geopolitical purposes. For example, they can launch a population growth race. But if some countries try to solve the problem of shortage of children by incubating them in artificial placenta, the race of 'reproduction of children' will inevitably start, and nobody knows what it will bring.

Standing on a lame leg? The quicker changes proceed, the more difficult is for the society to follow them and the more heterogenic it becomes in social (and often ethnocultural) terms. Not incidentally during the last half of the century more and more minorities emerge often asserting rather vague rights, and society yields to their pressure under the slogan of tolerance. But how long can this process go on? Tolerance and

political correctness will eventually lead to the situation when it becomes more and more difficult to distinguish good from bad (the criteria of these concepts are eroding), the moral categories become the categories of an individual choice or taste, but not an estimation of 'good and bad, due and harmful', *etc.*

Meanwhile, since long ago and till now two main regulators have been working in society without which it cannot exist. These are morals and law which are also based on psychological structures of society and people, operating at almost subconscious level (see Grinin 1997, 1998a, 2003b, 2006b). But the quicker technology develops, the less recognized becomes moral as it fails to find a new balance.⁸ Also it is rather possible that beyond some limit of speed of scientific and technical development there will begin a noticeable destruction of moral or its disintegration into numerous group versions. And it is all the more dangerous when powerful technological opportunities of transformation of the human body can appear. Because of the lack of moral constraints and in aspiration for large profits from morally questionable innovations various ugly phenomena can prevail: from fashion for annual corrections of body to attempts to turn into superhumans by means 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). Being more flexible than moral the law, nevertheless, demands a certain stability which is hardly achievable in the conditions of rapidly changing technologies as we can see it. According to Stanisław Lem (1968), society and its legal rules most often turn weak in the face of technological innovations if only they do not enter into a direct conflict with laws. And, as Stanisław Lem fairly notes, the intensity with which 'the technical means facilitate performing tasks' undermine the values has a positive correlation with their efficiency. This means that the more effectively technologies solve certain problems, the more they change the society, its moral and legal pattern, whose consequences we begin to realize much later. Therefore, although the law will apparently exist longer than moral (of course, if not to take radical measures to preserve it and reduce the degree of tolerance),

⁸ Thus, for example, the need for women to come into work massively has significantly changed their behavior, clothes, the way of life and relationship with males, has sharply increased the number of divorces and strengthened female legal protection etc. The weakening role of religion under the influence of education and science has brought enormous changes to interpretation of the moral principles.

however, there is a definite risk that it will also erode.⁹ Similar to morals, the law can transform from common for everybody to different laws for various religious and other groups as it was observed in the Medieval Ages (*e.g.*, today some claim to adjust school curricula and some other rules for the Muslim habits). Or under the pressure of different groups the law can transform so it will permit many of things forbidden today (this process has been observed for several decades). All the more the law has already been challenged by the integration of the national and international principles.

In what way the future society will organize itself in that case is not clear. During the previous epochs, the moral and law could be compared with two feet on which the society stood quite firmly (and if there was some imbalance, *e.g.*, the law was insufficiently developed the society was also obviously destabilized). 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 speed of progress?

The issues of the future societal institutes can become extremely important also in connection with the emergence of innovations capable to replace or modify the previous forms of regulating the relations. The fully developed self-regulation is available just within social systems. Although when speaking about the future era of self-regulating systems we have marked out the techno-biological systems, the development of these systems will also inevitably affect the mechanisms regulating public relations. Therefore, it is worth thinking about technology of social anticipation and correction before mass distribution of dangerous innovations. Thus, in the future we are expecting either to find the way towards new unprecedented horizons or to unprecedented problems and even cataclysms.

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We are rapidly moving forward groping as usual along an unknown path and not thinking about the consequences of innovations. And this is really disturbing. Even without realizing it the human rapidly changes the life on Earth (Field 2015). But it is high time to think of the consequences of every new step forward. And since there is no other alterna-

⁹ It is easy to imagine, for example, the robots or other systems will become subjects of law in the future.

tive but to move on the way, we need a maximum care, wisdom, prudence and even some humility before the majesty of the Universe and the world, as well as a deep respect for the heritage resulting from the billion-years biological evolution. And then our persistency, knowledge and (although still weak) ability of anticipating will allow reaching new summits of human power safely and leaving the descendants capable to preserve it.