ON THE MECHANISMS OF MORAL DEVELOPMENT IN EVOLUTIONARY HISTORICAL PSYCHOLOGY

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Rough calculations demonstrate that while demographic densities and the technical capacity for mutual destruction have increased throughout the millennia, the violent death rate – the average number of deliberate killings per capita per time unit – has been decreasing. The resulting downward trend appears highly non-linear and mediated by man-made crises and catastrophes, but still, in the long term, consecutive. Meanwhile, there is no direct evidence of falling aggressiveness of the humans in the course of history – natural aggressive impulses were rather growing up with population concentration. Obviously, some perfecting cultural and psychological mechanisms of aggression-retention have compensated for technological and demographic growth. This issue is explored using the pattern of techno-humanitarian balance.

Keywords: Aggression, violence, non-violence, self-organization, technological might, mental regulation, Bloodshed Ratio, techno-humanitarian balance, internal sustainability, external sustainability, anthropogenic crisis, Homo praecrisimos syndrome, psychological fitting, phylogenesis, historical| development, cultural revolutions.

J. Piaget (1997) and his followers (Volovikova, Rebeko, 1990) have demonstrated a positive link between individual intellectual and moral development. The ethnographers' observations have empirically verified the "conflict-enculturation hypothesis": the downward course of violence with increasing age was revealed both in Western and other cultures (Munroe, et al., 2000; Chick, 1998). The American psychologist L. Kohlberg (1984) tried to apply the notion of moral development to human history as a single progressive process, but his optimistic conclusions are still subject to criticism, even by the social evolutionists.

In this article, we expound on some cross-disciplinary results carried out lately by the Russian scientists. Insights from archeology, comparative history, social psychology, cultural anthropology, ecology and biology have been synthesized. A synergetic (i.e. chaos-theory) view of society as a sustainable non-equilibrium system and of culture as a complex anti-entropy mechanism served for data integration.

Trying to discover common mechanisms and causal links, certain regularities are noted that may throw new light on two points thoroughly discussed in historical sociology and psychology. One is whether or not "panhuman history" may be reasonably construed; another is whether or not there may be observed any kind of evolution in human mentality.

In chaos-theory terms, human history and prehistory is the story of one "self-similar" system, which exists on a scale of 2.5 million years and has been successively transforming itself to maintain sustainability. Retrospective analytical procedures have shown at least five mainstreams of consecutive global transformations: *increases of world population, of technological power, of organizational complexity, and of mental information capacity,* and *perfection of cultural regulation mechanisms.*

The first three mainstreams are inferred as "empirical generalizations" that are easily illustrated with figures. The fourth and the fifth require particular arguments (Nazaretyan, 2004). It is argued that the perfection of cultural regulation mechanisms in conformity with developing instrumental intelligence has been a basic condition for all the other mainstreams.

The model of techno-humanitarian balance

Zoologists have gathered substantial evidence concerning *ethological balance*: that is, the more powerful species' natural killing power, the stronger the inhibition of intra-species aggression. Summing up remarkable observations in his brilliant book about aggression, Lorenz (1981) noted that we ought to regret not having the 'nature of the predator'. For had humans descended from lions instead of biologically harmless *Australopithecus*, he explained, we would have a much stronger aggression-retention instinct preventing warfare.

Meanwhile, comparative calculations have demonstrated that lions (and other strong predators), relative to their population, kill each other *more frequently* than humans do (Wilson, 1978).

This result looked sensational. First, it is true that lions, unlike humans, have a strong instinctive ban on killing conspecifies. Second, lions' natural population density differs tremendously from that of human communities, whereas concentration usually increases aggression among both animals and humans. Third, 'killing facilities' are incomparable: the assaulting lion's sharp teeth meet the enemy's strong pelt, while mutual killing among humans who are armed if only with stones, is technically very easy, and since the Stone Age, weapons' 'progress' has been enormous.

The Australian ethnographers received another interesting result having compared wars among the aboriginals with World War II. Out of all participants, only the USSR lost more human lives in relation to population numbers than primitive tribes usually did (Blainey, 1975).

According to our calculations, from 100 to 120 million people perished in all the international and civil wars of the 20th century[1]. The numbers, which also involve indirect warfare tolls, are monstrous. Still, they represent about 1% of the century's planet population (no less than 10.1 billions in the three generations). Approximately a similar ratio occurred in the 19th century (about 35 million war victims to 3 billion population), and probably, in the 18th century, while in the 14th to 17th centuries the ratio had been higher.

Contradictory data and lack of co-ordinate calculation procedures (Wright, 1942; Urlanis, 1994) make comparative inquiry rather difficult. Nonetheless, general estimates reveal a paradoxical fact. While weapons' killing power and people's concentration have been successively growing for millennia, the number of war victims as a percentage of the overall population has not.

Besides wars, a total amount of victims includes people perished in 'peaceful' political repressions, and everyday violence, so that in the 20th century, up to 4-5% of world population seems to have died in the acts of *deliberate* violence (Nazaretyan, 2008). The decreasing trend is more manifest when non-war violence victims are compared. To calculate them retrospectively is even more difficult, but as far as the orders of magnitude are concerned, we may resort to the indirect evidence.

Wars, repressions, and everyday violence led to approximately similar numbers of human deaths in the 20th century. Meanwhile, the pro-

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[1] See also (Mironenko, 2002). The number 187 millions (Hobsbaum, 1994) looks biased.

portion of non-war victims of violence compared to the warfare ones was different in the past. We may observe this difference distinctly by comparing remote epochs of cultural history.

Thus, J. Diamond (1999, p. 277) summarized his own field observations and critically revised his colleagues' information: "Much more extensive long-term information about band and tribal societies reveals that murder is a leading cause of death". This conclusion apparently considers the total sum of infanticide, geronticide, inter-tribe, inner conflicts, hunting for heads, etc. M. Cohen, a most competent specialist in historical demography, who is also known as an admirer of the Paleolithic, still had to recognize: "Even in groups without patterns of formal warfare… homicide may be surprisingly common when measured on a per capita basis" (Cohen, 1989, p.131).

For a comparative historical research, we used a distinctive cross-cultural index of practical violence – *Bloodshed Ratio (BR)*, a ratio of the average number of killings per unit of time $k(\Delta t)$ to the population size during that period $p(\Delta t)$:

$$BR = \frac{k(\Delta t)}{p(\Delta t)} \qquad (I)$$

For the purpose of global and long-term historical retrospection, we accept Δt = 100 years, as we compare Bloodshed Ratio by centuries. The total number of violence victims is considered as the sum of war victims – wv, repression victims – rv, and everyday victims – ev. The integral population number of Earth during the century is the total sum of demographic data in the beginning (01st year), the middle (50th year), and the end (100th year) of the century.

So, the equation for *Bloodshed Ratio of the century* looks like:

$$BR_{(c)} = \frac{\sum_{i=1}^{3} k_i}{\sum_{i=1}^{3} p_i} = \frac{k_1 + k_2 + k_3}{p_1 + p_2 + p_3} = \frac{wv + rv + ev}{p_1 + p_2 + p_3} \qquad (II)$$

Special calculations demonstrate that the violent death rate decreases irregularly in the context of a successively increasing potential for mutual destruction and population densities in the course of millennia (Nazaretyan, 2008) (see also (Social'noe nasilie…, 2005; Korotaev, 2008)). This contrasting combination of the long-term trends implies an

additional assumption: there should have been a certain cultural factor, which compensated for the growth of instrumental capacities. The factor's dynamics are better shown as we supplement global comparisons with regional ones (see below). As to its essence, it is described by a hypothesis that arises from quite different empirical data; in fact, our calculations are conducted to check a corollary of the hypothesis.

Summing up diverse information from cultural anthropology, history, and historical psychology concerning anthropogenic crises, we suggest that there was a regular relation between three variables: technological potential, cultural regulation quality, and social sustainability. The pattern called *the law of techno-humanitarian balance*, states that *the higher the power of production and war technologies, the more advanced behavior-regulation means is required to enable self-preservation of the society.*

The circumstances of early hominids' existence were of the kind that only a dramatic development of instrumental intelligence gave them a chance to survive (Bromley, 1983). Meantime, having begun tool making, they dramatically interfered with the ethological balance. The power of artificial weapons rapidly exceeded the power of instinctive aggression-inhibition, and the proportion of mortal conflicts within the population grew incompatible with its further existence. This could have been the main reason for the fact demonstrated in archeology (Klix, 1985): many groups seem to be on the margine between animals and proto-humans, but very few could cross it; those few groups managed to cope with the endogenous danger.

Indeed, individuals with normal animal motivation were doomed to mutual destruction in the new unnatural conditions, and the groups in which certain psychostenic and hysterical individuals prevailed, got selective privileges. Their survival required artificial (beyond biological instincts) collective regulation, which was paradoxically provided by pathological changes of the psycho-nervous system, abnormal mental lability, suggestibility, and phobias. Thus, irrational fear of the dead and posthumous revenge is supposed to strongly restrain in-group aggression. It also stimulated care for cripples: archeology gives us evidence of such biologically senseless facts in the early Paleolithic.

The assumption of a "herd of crazies" who seem to be our remote ancestors has been thoroughly argued by the neurologists, cultural anthropologists and psychologists (Davydenkov, 1947; Pfeiffer, 1982; Grimak, 2001; Nazaretyan, 2005). Here, the relevant point is that the initial

forms of proto-culture and proto-morals emerged as an outcome of the first *existential crisis* in human prehistory: neurosis compensated for the insufficient instinct as aggression-inhibitor and served ferment for the development of spiritual reality.

From *Homo habilis* on, hominids' unnatural intra-species killing facility seems to have been a key problem of pre-human and human history: the ways of solving this existential problem influenced essentially the forms of social organization, cultural, and spiritual processes. As far as the further life of the *hominidae* family (including *Homo sapiens*) has not had a natural background any longer, it was to a great extent enabled by the adequacy of cultural regulation with technological power. The law of techno-humanitarian balance has controlled socio-historical selection, discarding social organisms that could not adapt to their tools' power. We shall demonstrate that the pattern helps explain causally both sudden collapses of flourishing societies and breakthroughs of humanity into new historical epochs (which often look still more mysterious).

Although the pattern is based on voluminous empirical evidence, its universal character remains hypothetical. Besides comparative calculations of the victims of violence, there are some additional non-trivial corollaries under verification. Furthermore, a special apparatus is being constructed, which will allow estimating sustainability of social organisms as much as it depends on technological potential and cultural regulation.

For an initial and rough guide, *internal* and *external sustainability* are distinguished. The former, *Si*, expresses capability of the social system to keep away from endogenous catastrophes, and is estimated as the ratio of catastrophes per population number. The latter, *Se*, is capability to withstand natural and/or geopolitical habitat's fluctuations.

If we refer to the quality of cultural regulation as *R*, and technological potential as *T*, a simple equation represents the techno-humanitarian balance pattern:

$$Si = \frac{f_1(R)}{f_2(T)} \qquad \text{(III)}$$

It goes without saying that *T > 0*, for in case of no technology at all we are dealing with a *herd* (not a society) where biological causalities are effective. When technological potential is very low, primitive cultural regulation means is sufficient to prevent anthropogenic crises, as in the

case of the Paleolithic tribes. A system is highly sustainable, up to stagnation, as cultural regulation quality considerably exceeds technological might (Confucian China is a textbook example). Finally, the denominator growth increases the probability of anthropogenic crises, if it is not compensated by growth of the numerator.

Actually, the indices' structure, the methods of quantitative estimation and the definition of functions *f1* and *f2* are under consideration. Thus, the magnitude of *R* is composed of at least three parameters: the social organization's complexity, the culture's information complexity (anthropologists work over calculation procedures for these indices (Chick, 1997)), and the average individual's cognitive complexity (the parameter is investigated by experimental psycho-semantics (Petrenko, 2005)). The last component is the most dynamic one, and we will show that the decline of cognitive complexity under emotional impulse is the leading reason of crisis-causing behavior. In contrast to internal sustainability, the external one is the technological potential's positive function[2].

$$Se = g\,(T...) \qquad\qquad (IV)$$

Thus, *growing technological potential makes a social system less vulnerable to external fluctuations, and more vulnerable to the internal ones, i.e. mass mental states, inadequate decisions of influential leaders, etc. (less "fool-proof").*

One more conclusion is that the specific weight of anthropogenic crises *versus* the ones caused by outside factors (spontaneous climate fluctuations, geological and cosmic cataclysms, incoming aggressive nomads, and so on) has been historically increasing.

The consequences
of techno-humanitarian imbalance

Ethnographic papers are full of tragic stories about the aboriginals of Africa, Asia, and America, as soon as they first mastered European technologies, like the following. During the Vietnam War, a Paleolithic *Mountain Khmer* tribe obtained American carbines. The hunters mas-

tered the new weapon, and soon after that, exterminated the fauna, shot each other down, and those who survived, left the mountains and disappeared (Pegov & Puzachenko, 1994).

Such cases look kike "artifacts", as far as the technologies had come from outside, the society had skipped over several historical phases, and left a deep gap between firearm and Stone Age psychology; therefore, the processes were accelerated, and causes and effects were apparent. Similar leaps do not usually occur in the authentic history, and thus, the disparity between 'instrumental' and 'humanitarian' intelligence (the 'force' and the 'wisdom') is not that manifest. So, causal links are complex, delayed for centuries or, in early history, for millennia. To be revealed, the same causalities require a thorough analysis supplied with an appropriate working model.

To explain the model, we may first resort to a classic experiment in a Petrie dish. Several bacteria impetuously propagate themselves in the closed vessel with a nutrient medium, and soon, the population suffocates in its own wastes. This is a graphic image of living matter's behavior: as long as the capacity of extensive growth prevails over habitat's resistance, the population keeps on capturing available vital space, and repressing as much as it can any counteraction or competition. For this reason, a natural ecosystem is full of ecological micro-crises.

In natural conditions, the aggravations are usually regulated via dynamic equilibration mechanisms, which have been developed for billions of years. Strategically, the processes of breaking and restoring an inner balance lead to increasing variety of ecosystems and their joint sustainability, which go together with the highly irregular conditions of each population's existence (oscillations in 'predator – prey' circuit, etc.).

Culture, in both its material and regulative hypostases, has always been aimed at emancipation from spontaneous environmental fluctuations. Social communities, unlike animal populations, do not behave so rectilinearly as the bacteria colony in a Petrie dish does, until cultural restraints substitute for the environment's resistance[3]. Meanwhile, a

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[2] For example, the tables, which reflect the effects of natural hazards in various regions, demonstrate that the economic damage in technologically advanced countries is usually more considerable while human victims are less numerous than in technologically backward ones.

[3] Those regulators may sometimes horrify an observer who belongs to another culture, but they enable the society's existence in the ecological niche. Many ethnographers reported that a typical method of demographic stability for primitive tribes was normative infanticide, regular extermination of the "unwanted" babies, especially female, and castration. In some tribes, a man may not marry without having killed or castrated another man from a neighboring tribe.

broken balance between grown technological opportunities and former regulation mechanisms can change the situation radically. According to formula *(III)*, it decreases internal social sustainability, but the approaching menace is not noticed right away.

On the contrary, superiority of instrumental intelligence entails the rise of ecological and/or geopolitical aggression. Insufficiency of cultural restraints makes the society's behavior essentially similar to that of a biological population, especially as natural expansion impulses are supplemented with a specifically human factor: needs go higher as soon as they are satisfied.

The psychological aspect is given more detailed analysis in the following section. We must just note here that sooner or later, extensive growth runs against real limits, which leads to anthropogenic crisis. Most frequently, it is followed by the catastrophic phase: the society falls a victim to its own non-compensated power.

Special investigations show that most tribes, states, or civilizations in the past were destroyed not so much by external factors (such cases also took place, but they are less interesting for our subject), but because they had subverted the natural and organizational bases of their own existence. As to military interventions, epidemics, ecological cataclysms, riots, and so on, events of that kind usually accomplished the society's self-destroying activity, like a virus or cancer cells do a similar job in a weakened biological organism.

Numerous facts gathered in relevant papers (Grigoriev, 1991; Global, 2002) testify to the distressing destiny of societies that could not anticipate the delayed consequences of their economic activities. In spite of all peculiarities, a common script was simple: increasing intervention into the ecosystem → landscape destruction → social catastrophe.

As many researchers have indicated, an empire's destruction frequently followed its flourishing, if increasing inner diversity did not accompany extensive growth. A. Toynbee cited various examples to illustrate the inverse relationship between "military and social progress" and was puzzled by the fact that this was surprisingly true about production tools as well as weapons. Modern historians have also repeatedly indicated that new technical achievements usually preceded social decline: "It certainly seems as though… every heightening of efficiency in production were matched by a new vulnerability to breakdown" (McNeill, 1992, p.148).

The facts of social systems' fracture conditioned by technological growth are so numerous that they serve as a pretext, on the one hand, for total technological pessimism and, on the other, for denial of a common human history. The patterns of closed civilization cycles deprived of continuity started to supplant the ones of single historical process in the late 19th, early 20th centuries. The discussion of those problems has resurfaced lately in relevant literature. To a considerable extent, it centers on the psychological aspect: if human consciousness has been transforming historically, whether or not those transformations were 'progressive'?

Nowadays, the idea gets new empirical and conceptual support. The techno-humanitarian balance hypothesis highlights both the facts of a social system's self-destruction and the opposite ones, concerning the constructive solution to anthropogenic crises. The latter have been less frequent in the past; however, they were the turning points of world history.

Namely, as a certain crisis involved a vast region highly saturated with diverse cultures, its inhabitants managed to find a key way out of the deadlock. Each time it was conditioned by a set of irreversible social, political, and psychological transformations (see below), which have been lined up as the consecutive evolution mainstreams. As special analysis shows, society's capacity for the appropriate transformation of its economy, policy and mentality essentially depended on marginal groups, which had been formerly neglected and despised; this we refer to as *the redundant variety rule*.

No less than seven crucial breakthroughs for all of human history and prehistory have been revealed and described. Still, most researchers have so far either confined themselves to phenomenology or left for the future the problem of causes and premises of the revolutionary transformation. Thus, Jaspers (1955) has adduced "the simultaneity puzzle": how could the Axial Revolt occur simultaneously on the immense geographical area from Judea, Persia and Greece to India and China?

The techno-humanitarian balance hypothesis proves helpful for *causal* scrutiny of great historical turning points, each of which had been preceded by a wide-scale anthropogenic crisis. Human consciousness has progressively evolved, restoring step-by-step the disturbed cultural balance. So more curious is the fact we find out as we make a close study of social activities foregoing crises aggravation: pre-crisis

extensive growth phases are attended by psychological states, processes, and mechanisms, which have astonishingly reproduced themselves regardless of the population's cultural and historical peculiarities. That is why a coming crisis may be diagnosed by psychological symptoms while economic, political, and other signs still indicate growing social prosperity.

Mental conditions
on the threshold of a crisis

To begin this section, we consider selected historical episodes that belong to a kind of 'optimistic tragedies'. This will help us observe some specific psychological features of both the pre-crisis state of culture and minds and the one that is present after having coped with the most dangerous aggravations. Here, only the inner logic of the processes is considered; this approach abstracts from the influence of outside factors, up to cosmic ones, on social events.

Apparently, in order to describe those episodes as single separate stories we have to single them out of the continual historical process; for this reason, the conventional beginning and end of each are distinct by means of dots.

…The Upper Paleolithic millennia were marked with an unprecedented development of "hunting automation" and distant projectiles. Hunters learned to dig trap-holes, and invented the lance, lance-thrower, darts, and bow with arrows (Bromley, 1983; Semionov, 1964). This created good conditions for demographic growth and human expansion all over the planet. World population reached 5 – 7 million people (McEvedy & Jones, 1978; Snooks, 1996). As one hunter-gatherer's nourishment required an average territory of 10 – 20 square km., the planet's resources could not provide for many more people.

However, not only demographic growth created the problem (growth by itself is usually a function of a disturbed technology-psychology balance): archeologists reveal the Upper Paleolithic hunting bacchanalia. While natural predators first get sick and weakened individuals, a well-armed hunter had the opportunity (and desire) to kill the strongest and the nicest ones, and besides, the amount of preys far exceeded the hunters' biological needs. Some kind of wild animals' "anthropogenic graveyards" were discovered by the archeologists, and a great part of the meat had not been used by humans. The dwellings made of mammoth's bones exceeded construction needs. In Siberia, 30-40 adult mammoths' bones were spent on each dwelling, plus newly-born mammoths' skulls, which were used as props and, perhaps, for ritual aims. In the basins of Don and Dnepr, pit-stores of mammoths' bones (their predestination is not quite clear) have been found near some dwellings. Enclosure hunting led to annual extermination of herds (Budyko, 1984; Burovsky, 1998; Anikovich, 1999).

Since the fact was discovered that the last mammoths lived on Wrangell Island about 4000 years ago, until the first humans appeared there (Vartanian, et al., 1995), the "overkill" theory of mammoths' and many other big mammals' extinction hardly has an alternative. The first symptoms of mega-fauna elimination are registered near 50000 years ago in Africa, and the process peaked near 20000 years ago in Eurasia, and near 11000 years ago in America (Karlen, 2001). Skillful hunters penetrated into America, quickly spread from Alaska to Tierra del Fuego, and eradicated all big animals, including elephants and camels, which had never before met hominids. Similar effects of mega-fauna extinction followed the first humans' appearance in Oceania and Australia (Budyko, 1984; Diamond, 1999). In total, up to 90% big animals disappeared for ever, although those species had endured twenty Pleistocene climatic cycles.

The trend of merciless extermination was intensified on the threshold of the coming Holocene, the post-glacial epoch, which could have helped foraging economies flourish; instead, it led to a deadlock. Nature could not bear endless pressure on the part of such an unrestrained aggressor as the Upper Paleolithic hunter. Uncontrolled resource exploitation led to the ecosystems' exhaustion and destruction, and it aggravated inter-tribe competition. Population on the Middle latitudes decreased several times.

The Neolithic revolution was society's creative response to the Upper Paleolithic crisis: some tribes made the transition to settled agriculture and cattle breeding, and the new economic idea rapidly spread from several centers (in Eurasia, and later in America). Humans first started "partnership with the nature" (Childe, 1936); their ecological niche essentially deepened. Thanks to developing agriculture, the territories' carrying capacity increased one, and then two, and then three orders of magnitude (Korotaev, 1991), and the population rapidly grew.

Complex transformations in social relations and psychology attended the transition from foraging economy to food production. One needs a relevant mental horizon of delayed causalities to throw into earth eatable grains, or to feed and protect animals instead of kill and eat them. The mind's grown information volume was embodied in all vital activities. Social links and role repertory essentially broadened. Production and combat tools were first differentiated, and a new kind of relationship between agricultural and "warrior" tribes was established. The warriors could guess that it was more profitable to protect the producers, and regularly appropriate production "surplus", than to kill or to drive them away, and the farmers understood it was better to payoff the warriors for protection than to leave the land or to perish in hopeless battles.

Such forms of inter-tribe symbiosis and "collective exploitation" supplanted genocide and cannibalism of the Paleolithic. As Telhard de Chardin (1987) notes, since the Neolithic, physical extermination has been an exclusive or, anyhow, secondary factor: the cruelest warfare still included some form of assimilation. Modern anthropologists have also indicated more than once that only in the Neolithic tribe integration (the chiefdoms), people learned "for the first time in history, how to encounter strangers regularly without attempting to kill them" (Diamond, 1999, p.273).

Population geneticists have recently added a bright trait to the Neolithic portrayal (Sykes, 2001). Unlike previously prevalent scenario, they showed, the substitution of foraging economy by agriculture had not occurred via swimming aside or eliminating the hunters-gatherers by an incoming tide of farmers (for instance, from the South Caucasus to the East and to the North-West) but via displacement of the retrograde technologies and organization. At least, so it was in Europe: most of modern Europeans proved to be genetic offspring of the Cro-Magnon hunters. To all appearance, the European story was not an exception.

This is a sensational discovery. It means that first in human history a progressive idea won through change of mental matrix, instead of physical removal of the old idea bearers, what had been usual for the Paleolithic. So, the competition of social models was not merely a struggle of races any more: it shifted partly to the "virtual" sphere, which imparted a new long-term mechanism to the historical development…

…In the 12-11th centuries BC iron production appeared in the Middle East, Transcaucasia, and East Mediterranean and soon spread to India and China. This produced a steep rise in extensive (including demographic) growth opportunities.

Bronze weapons had been expensive, fragile, and heavy. Small professional armies composed of physically very strong men had waged wars. It had been extremely expensive to prepare and to arm such troops, as well as to replace a killed fighter. Therefore, each commander had tried to spare his own warriors, and exterminate as many enemies as possible. War-captives had been usually killed, and a subjugated population had been terrorized into obedience, by demonstratively destroying or "taking prisoners" the local gods' statues, etc. (Berzin, 1984; Neronova, 1989).

Steel weapons were considerably cheaper, more durable, and lighter than the ones of bronze. This allowed arming the whole male population; something like a 'people's volunteer corps' replaced the professional armies, and competition for productive soils aggravated. Meantime, the combination of new technology with former social, political, and military values made early Iron Age leaders extraordinarily bloodthirsty (Berzin, 1984; Vigasin, 1994).

Emperors and generals hewed on stones boastful 'accounts' to their gods about the numbers of enemies killed, and towns destroyed and burned, which presented sadistic details of their "deeds" (a relevant texts collection from 'Reader on Ancient East History' see in (Nazaretyan, 2008)). Battles became so bloody and diminution of male population so fast that further life of technologically advanced states was threatened.

Culture responded to the challenge with the Axial Spiritual Revolution, the causes of which, as indicated before, has remained a puzzle so far. On vast geographical area, great prophets, philosophers, statesmen and generals set the tone for society's intensive job on the whole value system's revision. Cultures transformed unrecognizably in several centuries. The cognitive complexity of social and individual minds, humans' capacity for abstract thinking and reflection, and the scale of generic identity radically increased. Universal ideas of good and evil, personal choice and responsibility appeared. Authoritarian mythological thinking first in history partly made room for criticism, and the new private self-control instance, the conscience, made an alternative to traditional gods-fear. Enemies learned to see each other as human beings, understand, and sympathize. Aeschylus's tragedy 'The Persians' was the first work of art in history that described warfare as seen by the enemies' side (Jaspers, 1955; Yarkho, 1972; Nazaretyan, 2008).

These mental processes were distinctly reflected in political relations. Objective aim achievement, instead of the number of victims, became a matter of virtue and the combat success criterion. The role of military reconnaissance and propaganda among enemy troops and population grew. A new tradition of the conqueror's protection over local gods and priests appeared. 'Political demagogy' as a means of persuasion and pacification contrasted with the usual terror methods: in 539 BC, the Persian king Cyrus the Great having captured Babel, proclaimed a Manifesto, which said that his army was just going to defend Babylonians and their gods and priests from their own bad king Nabonid. This genial trick soon spread far outside Middle East, to South Europe, India and China...

...All symptoms of the evolution's next deadlock were manifest in II Millennium AD Europe. Development of agricultural technologies stimulated demographic growth; besides, the Christian Church, which had primarily called to refuse marriages and child-bearing, in the 9th century changed its attitude by the opposite one (Arutiunian, 2000). The woods area was decreasing, swamps were being formed, and their water steamed down to rivers, together with all the wastes of growing cities.

The ecological crisis provoked social tension, disorders, and epidemics. Wars were becoming more and more murderous. Even the disaster of Black Death in the 14th century that took away more than 1/3 of Europe population, only temporarily interrupted the demographic tendency (Le Goff, 1977). Development of agricultural and military technologies had produced a new strategic evolutionary deadlock, as hunting technologies had done long before. In the 17th century, the Thirty-Year War with developed artillery and other firearms took lives of about 80-90% adult male population in Central Europe.

The crisis of agricultural civilization was partly softened by mass emigration, and besides, introduction of the overseas plants (potato, maize), and carbon utilization (Le Goff, 1977; Bondarev, 1996). The 'Pre-Industrial Dash' that turned Europe from a Eurasian outsider to the world leader, was forestalled and attended by impetuous development of the ideas of humanism, individualism, enlightenment, and progress. The values of individual success, qualification and education increased unprecedented. According to the calculations of the Russian economic historian V. Mel'yancev (1996, 2004), on the turn of II Millennium, West

European countries fell behind the leading Asian states in literacy of adult population twice and more, while on the threshold of the Industrial Revolt, exceeded them 3 – 3.5 times.

The Thirty-Year War completed with The Westfall Peace Treaty, and relevant political organization saved Europe from most sanguinary religious (or quasi-religious) wars for the next 2.5 centuries. A new legal, economic and moral mentality was being formed, which implied equal natural rights, free market interchange and panhuman ethics in place of the foregoing estate domination and clan mentality. The humanitarian achievements enabled the new historical breakthrough, and it left behind the agricultural crisis (which may be therefore qualified as regional by geographic extension and global by the evolutionary consequences). It also implied the superiority of the active Spirit over the passive Matter and the Future over the Past[4]

European nations spread with fire and sword the light of reason, and their power soon enveloped the whole planet, resources of which fell under parent states' control. European citizens' faith in moral progress and future everlasting peace was based on the indisputable superiority of the Western mind, and was growing together with social and economic prosperity, needs, and ambitions. Wile the soldiers fought in exotic lands, mother countries' inhabitants believed wars and their cruelty were a thing of the past. No wonder: in all the colonial wars of the 19th century, Europeans' losses were 106000 soldiers, in contrast with millions of natives who perished in the same warfare (Urlanis, 1994).

In the early 20th century, reserves of extensive growth were exhausted, while it was yet far from sobering the public. By the following events, by various official and memory documents, and by indirect testimonies, we can see that the inertia of extensive development and corresponding state of minds still dominated. Thirst for new successes and achievements produced joyful expectancies of either a "small victorious war" or a "revolutionary tempest" among politicians, intellectuals, and masses. The photos of August 1914, which show us happy crowds in Petrograd,

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[4]   Some Sinologists (Lin Yufu, 1995) have shown that all technological and economic premises were in place for an industrial revolution in the 14th century China. However, world model and value system did not favor this radical transformation, unlike the situation of the Europeans in the 18-19th centuries who had met the deep crisis and developed a new progress-oriented worldview, which was a psychological compensation of the Late Middle Ages mass alarms and phobias.

Berlin, Vienna, and Paris streets after the war had been declared, are a brightest illustration (Pirozhkova, 1997).

Now, we may observe a result of those social and psychological processes. Whereas European countries' summary warfare losses during the 19th century were about 5.5 million people (about 15% of all war victims in the world), in the 20th century they rose to 70 million – no less than 60%. Two World Wars, Hiroshima, and many years of nuclear "equilibrium of fear" were required for Europeans' psychological alteration. Was it for long time?..

Having compared crisis episodes of the past and the present, we may sum up certain psychological observations. Once new instrumental facilities exceed former cultural restrictions, and an extensive development begins, public attitudes and sentiments acquire peculiar features. A sense of omnipotence and permissiveness is intensified together with increasing needs and ambitions. Optimistic ideas of a world full of inexhaustible resources and the object of subjugation are formed. Success euphoria produces an impatient expectation of new successes and a drive to "small victorious wars" (a mass complex of catostrophophilia, in terms of the political philosopher P. Sloterdeyk). The subjugation process and the search for new moderately resisting enemies are becoming self-valuable and irrational.

The proximity of desired aims intensifies motivational tension: the "aim-gradient phenomenon" in Gestalt psychology. According to another pattern, the Yerkes – Dodson law, the efficiency of a simple activity is proportional to the motivational force, while the efficiency of a complex activity decreases by excessive motivation. This is one of the sources of danger.

As psycho-semantic experiments have shown, emotional tension decreases cognitive complexity (Petrenko, 1982). So, the world picture becomes lower-dimensional, thinking turns more primitive, and the problem situations look elementary, while objectively, the task of the social system's maintenance becomes more difficult as technological opportunities grow. In other words, the numerator index in equation *(III)*, instead of increasing in proportion to the denominator's growth, is falling. Therefore, cultural imbalance lowers the society's internal sustainability.

Exploring the premises of revolutionary crises, J. Davis (1969) has shown that revolutions are usually preceded by an increase in the quality of living standards in terms of economic level, political freedoms, social mobility, etc. Simultaneously, needs and expectations grow as well. In a certain moment, increasing expectancies run against relatively reduced possibilities for their satisfaction. This occurs frequently because of demographic growth and/or unsuccessful warfare, which was expected to be "small and victorious", whereas the expectancies go on increasing via their own momentum. The gap between increasing expectations and actualities produces frustrations, the situation looks unbearable and humiliating, people tend to seek those guilty, and aggression that cannot find release externally, gives vent inside the social system. Emotional resonance (Nazaretyan, 2003) provokes mass disorders, which in many cases become the last act in pre-crisis development tragicomedy.

Having applied Davis's model to various countries and historical situations, we have found that it is applicable both to large communities, such as states or civilizations, and relatively small ones, such as political parties. Nowadays, the model may be used, with certain reservations, in global situation analysis as well.

Since some countries and regions, and planetary civilization as a whole are experiencing typical anthropogenic crises, which are fraught with great dangers in the 21st century, the question of the mechanisms of such crises' aggravation and overcoming them is not a purely academic one. Certain facts show that during the second half of the 20th century great changes for the better took place. Politicians abstained from using the most destructive weapons; new kinds of inter-state coalitions were formed, which were not aimed against any outer force (an original fact in human history!), and effective international ecological measures became usual.

Fifty years ago, many people were not sure the 20th century would successfully change into the 21st, and this doubt had grounds. The most obvious one was a highly probable world nuclear war, still, not only this was the case. Modern ecologists demonstrate that had economic activities of humankind (including atomic weapon tests) remained so 'ecologically dirty' as it was in the 1950-s, life on Earth in the 1990-s would have become unbearable: both human population and longevities would be falling down, etc. (Yefremov, 2004).

Those encouraging facts gave rise to the hope that Western-type cultures had already developed a strong rational control reserve over intrinsic rectilinear expansion impulses.

Unfortunately, what followed one side's unconditional victory in the Cold War demonstrated that maturity of political thought even in the most advanced modern cultures does not yet meet the requirements imposed by actual technological potential. Current *Homo prae-crisimos* psychological symptoms are described in (Nazaretyan, 2004; 2008): lowered political intelligence, decision-making quality and propaganda rhetoric level in the 1990-s compared to the preceding decades.

We may observe how simplified worldview and rectilinear extensive activities are provoking hostility. Meanwhile, emerging forms of sophisticated weapons and new methods of political terrorism make impossible the continuation of the previous half-century practices, which was canalization of the global conflict in local wars. According to the hypothesis of techno-humanitarian balance, actual challenges, including political terrorism with its growing technical opportunities, will either destroy the planet's civilization, or play *an educating role*, comparable to the ones of the atom bomb and other dramatic technical inventions in the past.

An outline of global anthropogenic crises and revolutionary breaks

In conclusion, we briefly enumerate human history's turning points: that is, historical periods when anthropogenic crises, which may be qualified as global ones by their evolutionary meaning, were solved via a breakthrough into the new epoch (see in detail (Nazaretyan, 2008)). As some of them have been mentioned above, we cannot escape repeating certain details to give an overall portrayal of consecutive transformations in macro-social behavior as it is seen from the current perspective.

All appellations of the revolutions in the following list go with quote marks, for some of the terms have not been widely accepted, though all are present in relevant literature.

1. The 'Paleolithic Revolution' (2.5-1.2 million years ago) was connected with the emergence of the first artificial tools (choppers), and hence, disturbance of the ethological balance, which is peculiar to animal populations: the existential crisis of anthropogenesis. Mystical fear of the dead (after-life revenge) was responsible for primary super-instinctive proto-cultural regulation: intra-group aggression was first artificially limited, and an unnatural care for the cripples appeared.

2. The 'Upper Paleolithic Revolution', or the ''*Cro-Magnons*' Cultural Revolution" (35-40 thousand years ago): transition from the Middle to the Upper Paleolithic and conclusive extermination of the *Neanderthals*. Stone material productivity grew, and the portion of tools made of bone and horn increased as well, which gave people relative independence from natural sources of flint. Sign communication systems, including articulate speech, were obviously perfected, and two-dimensional portrayal (the rock pictures) appeared. Why could not *Paleoanthropes*, who had developed complex Mustier culture and dominated their contemporaneous *Neoanthropes* (*Proto-Cro-Magnons*) during no less than 150000 years, resist more? We have to assume that Mustier culture was experiencing a deep crisis, though its essence is not quite clear.

There are two hypotheses to explain this; both well conform to the techno-humanitarian balance pattern. One accents the facts of culture's high material variability and very scanty signs of 'spiritual production'. Free choice of physical actions with insufficient spiritual regulation produced the *Neanderthal's* neurotic syndrome that was expressed in antisocial activity and splashes of uncontrolled aggressive energy (Lobok, 1997). Another hypothesis (Reymers, 1990) attaches the Late Mustier crisis to ecological effects: the *Neanderthals* had hit upon the idea to burn vegetation off, which caused landscapes' higher productivity, but this led to a fatal decrease of biological diversity.

3. The 'Neolithic Revolution' (X-VIII millennia BC): transition from a highly expensive foraging economy to food production, which went along with replacing the usual genocide and cannibalism with rudimentary collective exploitation forms, and was also accompanied by the original symbiosis of agricultural and 'warrior' tribes.

Those deep complex transformations were a response to the Upper Paleolithic crisis, which had been aggravated because of hunter technologies' development. This had led to the elimination of wild animals' populations and species, and to severe inter-tribe competition. During the Upper Paleolithic crisis, previous demographic growth had been replaced by a population decrease, and just after agricultural methods dominated, the population grew again.

4. The 'Urban Revolution' (V-III millennia BC): large human agglomerations were formed, irrigation channels were constructed, and written language and the first legal documents appeared, which regu-

lated large communities' lives, with a high human concentration and complex common activities.

This revolution followed spread of bronze tools, new demographic explosion, and the aggravation of competition for grasslands and fertile soil in some regions (see the theory of environmental circumscription in (Carneiro, 1970)).

5. The 'Axial Revolution' (the middle of the I millennium BC): new kinds of thinkers, politicians, and generals, such as Zarathustra, the Judaic prophets, Socrates, Buddha, Confucius, Cyrus the Great, Asoka, Sun-Tzu, and others, appeared during a short time interval in advanced societies, which were yet weakly linked among themselves, and deeply transformed the world culture. Criticism first supplanted authoritarian mythological thinking; universal ideas of good and evil, and of personality as a sovereign moral choice subject were formed. Aims and methods of warfare changed: victims' numbers ceased to serve as a combat masterpiece measure and a pretext for boasting; the value of communication considerably increased, and primitive violence and terror were partly replaced by intelligence data and 'political demagogy'.

The Axial Epoch followed displacement of bronze with iron weapons, which were cheaper, lighter and more durable, and instead of professional armies, some kind of people's militia had appeared. As a result, battles became extraordinarily bloody, and former values and norms in new conditions could have destroyed advanced societies. Therefore, the Axial Revolution was culture's response to a dangerous gap between new weapons' power and former aggression-retention mechanisms.

(The American cultures that developed separately passed through the same stages, though later in time. There are signs that the European conquerors found advanced societies of both Americas in a deep crisis caused by overpopulation, and on the threshold of a spiritual revolution, which could have been similar to the Old World's Axial Epoch (Semionov, 2009). Meanwhile, the aboriginals of the other isolated continent, Australia, conserved their Paleolithic life, culture, and psychology without having reached the Upper-Paleolithic crisis, the Neolithic Revolution, etc.).

6. The 'Industrial Revolution' (AD 18-19th centuries): introduction of relatively "spare" technologies, which had higher specific productivity than agricultural ones. It was prepared and attended by a complex spiritual framework, the 'indust-reality', in Al. Toffler's term.

The industrial revolution was preceded by a long crisis of agricultural civilization in Europe (12-18th centuries), when uncontrolled extensive growth, cutting down of forests, destruction of ecosystems and people's concentration in the cities had led to outbreaks of bloody warfare and mass mortal epidemics. The development of agricultural technologies had produced a new strategic evolutionary deadlock, as well as, long before, hunting technologies had done.

In its turn, the industrial production having increased power of human effort, gave a new impulse to extensive development, demographic growth, and ecological and geopolitical ambitions. So, like it had been mostly before, the solution of one crisis opened the way towards the following ones.

7. The 'Information Revolution'? In the middle of the 20th century, many people felt that planetary civilization was approaching a new crisis epoch. Its circumstances may also be well described in terms of the techno-humanitarian balance pattern. In the previous 100 years, weapons' power had grown 6 orders of magnitude. Human intelligence had achieved such high instrumental might that the aggression-retention means, which reflected previous historical experience, could not meet the new requirements any more. The instrumental intelligence became dangerous for its own bearer's further existence again…

Discussion

Historically constraining physical violence does not mean that the humans have been turning "less aggressive" in the course of time; on the contrary, concentration as a bio-psychological factor had to stimulate natural aggressiveness, and developing technologies gave new opportunities for multiple killings. Still, developing social system, passing through the crucible of crises and catastrophes due to repeatedly renewing power/wisdom disparities, was impelled to progressively diversify, improve and select creative mechanisms of aggression-sublimation. Cultures have been developing more sophisticated languages of communication and replacing creative activities, and individuals had to perfect their motivation and self-control to sustain collective viability.

The hypothesis of techno-humanitarian balance gives an additional dimension to L. White's conception, which was one of the most influ-

ential models of social evolution in the 20th century. In the words of his Canadian adherent V. Smil (1994, p.1): "From the perspective of natural science, both prehistoric human evolution and the course of history may be seen as the quest for controlling greater energy stores and flows". Now as we find out that excessive power is self-destructive for a social system unless it is internally balanced with proportional cultural and psychological counterbalance, the model of development reduced to energy alone looks substantially insufficient even from the perspective of natural science.

Turning back to the historical experience of man-made crises, including the 'optimistic tragedies', we may note that each new technology, both military and production, usually carried menace of growing destruction of geopolitical and/or natural habitat and after a period of euphoria, caused social catastrophes. This launched the process of dramatic selection of social and value systems, which could respond the challenge. *As soon as the phase of cultural and psychological fitting was completed* (not before that moment!), even war technologies became *life-protecting factor*: calculations in (Nazaretyan, 2008) show that after fitting, the more potentially destructive a weapon is the less murderous effect it really causes.

In case of constructive solution of such crises, it entailed a complex leap forward by all of the five long-term mainstreams mentioned above. More potential technologies provided higher specific productivity, i.e. the paying load for a muscular effort and for a unit of nature's destruction. This implied higher variety of social structure, higher information volume of social and individual intelligence, and more advanced cultural regulation. As a result, humanity's ecological niche broadened and deepened, and population grew. Over time, the evolutionary success entailed increasing social needs and ambitions, and... the way to the next crisis.

This model keeps us oriented within the palliative space of the future, and helps us discriminate between constructive forecasts, scripts and projects, and utopian ones. At the same time, it involves definite conclusions about the past.

In the 19th century, the Russian sociologist N. Danilevsky (1991) argued that there had been no significant landmarks for all of human history, and therefore, no world history at all. In fact, he meant, separate civilizations' ascent, flourishing and decay had taken place, successive

in time but devoid of causal continuity. This 'civilization approach' was later caught up by many Western thinkers, for its pessimistic portrayal conformed to the 20th century mass disappointments. Within the paradigm, Spengler's (1980) notion that "*humankind* is merely a zoological concept" sounded reasonable.

Meanwhile, it was just in the 20th century that the historical discoveries disavowed the argument, and its far-reaching conclusions. As far as we take those discoveries into account, we may accept at least certain statements assertively.

To make sure of the substantially global character of human history, as well as life history, the congruent 'unit' of consideration is to be singled out.

Thus, biological evolution is out of sight, concentrated on populations, species, or separate ecosystems: more than 99% of the species on Earth had become extinct before the first humans appeared. So nothing but life cycles is obvious until we look at the Geochronological Table, which represents the biosphere as a whole at successive geological epochs. Similarly, humankind, or more precisely, the global society-nature system, is the only real subject of social evolution, while countries, nations, regional civilizations, and even hominid species (in the Paleolithic) repeatedly changed one another as the leaders; by themselves, all those smaller subjects cannot serve for an evolutionary portrayal.

Since hominids have once and for all turned to tool making, in spite of countless divergences, migrations and isolations, culture has been a single and common planetary phenomenon. This is proved by many observations and one of the main such observation is the surprising fact that the first standard tools on all inhabited continents (the handaxe) were surprisingly identical. As to the explosive growth of local diversities in the Middle and the Upper Paleolithic and later, it was a typical process of an evolving system's inner diversification.

What we may call 'progress' is neither an aim nor a movement 'from the worse to the better', but *a means of self-preservation*, with which the complex non-equilibrium system responds to the challenges of declining sustainability. A succession of *a posteriori* effects of restored sustainability is retrospectively construed as a step-by-step ascent from more 'natural' (i.e. wild, and relatively equilibrium) states of the society-nature systems to less 'natural' ones. So, having solved dramatic

vital problems, progressive transformations produce more complicated ones, and at the same time, more developed means for their solution. After all, humans are still living on thanks to their virtue to adapt their self-regulation quality to their own increasing might...

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