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Social Robots: Approaches and Conceptions
in the Perspective of the Humanities Research

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The article presents the findings of the research project on determination of theoretical basis of social robotics in social science and the humanities. The author suggests to consider the fundamental principles of digital culture, i.e. technological imperative, rule of machines, technological anthropological deficit and Preobrazhensky syndrome, as the basis for social robotics. The author also turns to the issue of cultural and technological determinism, artificial intelligence, ethics and various aspects of social interaction of robots and humans. He outlines the necessity to turn to social-critical discourses.

Keywords: social robotics, digital culture, technological determinism, cultural determinism.

Contemporary discussions of robotics have rapidly moved from the category of discussions of fiction movies or production wonders of the Japanese car industry to the category of analysis and humanitarian examination of active socialization of robotic systems in daily life. It is evident that a large-scale study of this issue is still ahead. In this paper, we propose to the reader an ambitious attempt – one of the first taken in our country – to examine systematically the basis of social robotics (SR) in social and human studies.

To solve this problem, we found it necessary, first of all, to determine some fundamental principles of social robotics, which may be important beyond exclusively engineering perspective. Second, we will consider the fundamental level of the issue and contradictions in social robotics research associated with two approaches – cultural and technological determinism. Further, we will turn to the basis of SR in terms of theory and methodology of artificial intelligence. Then we will consider actual social and socio-psychological aspects using the materials of the most current research in this area.

1. Fundamental Principles

Herewith, in our research, first of all, we would like to offer some kind of axiomatics as justification for social robotics – some basic principles or main points, which serve as the basis for problematics and logics of subsequent arguments.

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b) Rule of Machines

In today's digital culture, in the world based on computing machines, which work in accordance with the principle of digital binary encoding, robotics complies with the general logic of automatics in its digital form. The origin and the history of automatics is the result of the long history of automation, which has often been the subject of analysis and study. This is confirmed, for example, by the excellent works of Russian mathematicians on the history and modeling of machines, as well as their role in the global evolution "from an amoeba to a robot" (Haase-Rapoport, 1961 Haase-Rapoport and Pospelov, 1987).

The starting point of the triumphal march of automatics in the era of European Modern time was a mechanical clock – the first universal machine that man has made his second nature, an integral part of everyday life. It is a clock, where the machine as a principle and an artifact showed its power and has invaded the physical and social structure of life – the machine has captured time, has put it in certain mechanical processes, rhythm of toothed gears. The clock shows us time on its own. We rely on the information provided by a mechanical machine, organizing our day and the rhythm of existence. The mechanical clock already demonstrates the general principle of automation: transfer of a physical process into a universal set of symbolic codes.

Machines of the digital culture implement the same function, but in a much wider field of symbolic codes and, what is important, in a much wider field of organization of technological processes in late industrial societies. If previously communication and personal interaction depended on the proximity in space, in the Internet era telecommunications have taken the advantage over this determinism. Similarly, steam and gasoline engines began the transformation of the physical space and production systems during the era of the industrial revolution in the 18th-19th centuries. Machine is a tool of colonization of space and time, turning them into symbolic systems of measurement and conversion.

Computers and robots continue and will continue this symbolic and functional colonization of life. Computers in form of a desktop screen or a handheld gadget have long become as common as a clock. A technology slave – unobtrusive and obedient, who becomes a master – is the central idea and the drama of the R.U.R. robots of Karel Čapek.

In 1950-1960s thanks to the cybernetics revolution, automation occurred. The founders of cybernetics modeled its principles on different objects: Norbert Wiener tested its basic principles on the homing systems for combat elements of defense, Ross Ashby – on the homeostatic machine model, Gordon Pask – on electrochemical computers, Grey Walter – on turtle robots.

But the universality of the principles of feedback and binary encoding for microprocessor-based electronics showed the possibility of creating a universal machine, i.e. a modern computer. The fundamental promise of cybernetics, however, was not the case. As rightly noted by the American art critic Jack Burnham, speaking about the cybernetic robot sculpture – no doubt the first technical sample of social robotics!, – cybernetics has promised the possibility of artificial life – i.e. not just computing machines, but machines with lifelike behavior (Burnham, 1975). This idea would be obviously close to Russian scientists, who had turned to such issues even earlier (see Haase-Rapoport, 1961). Less than half a century later, we return to these cybernetic ambitions. At this time, cognitive technologies, synthetic biology and robotics with artificial intelligence elements do not promise anything, but are on the verge of creating artificial life, and once again it is cybernetics that is ready to offer the ontological basis for a new culture of artificial life.

*c) Technological imperative
and cultural interfaces*

But what caused this rule of machines – from clocks to computers and robots? The simple answer would be: there are forces and facilities that the human can cope with only by delegating control to devices superior than man in some important functions. For example, long-term maintenance of monotone rhythms (clock), or significant scope of computation (computing machines). In industrial societies, it is obviously associated with different types of production processes, the implementation of which is possible thanks to automated systems only.

In the 20th century, we found ourselves in the culture of machines, which has developed its own framework of values (or a cultural pattern) in the form that may be called the technological imperative. Its statement may sound the following way: all that can be technologized should be technologized. This is a modal axiological principle of technological civilization according to which the power of machines is ubiquitous and abundant. They continue to penetrate everywhere, creating more and more new niches, needs and invariants of their application through the gradual acquisition of the capacity for self-determination.

As a compromise between the world of machines and the human, a communication space is being formed – cultural interfaces that adapt the power of technology to the limited capabilities of the human to control and use them. It is complicated for a common man to understand and control what is happening in a computer, where electronic components perform endless calculations and a transfer of bits of information to each other. But the cultural interface – a screen page imitating documents, a desktop, different objects, and almost "manual' manipulations with them (moving, taking, opening) facilitates this task to the maximum, humanizing and subduing

the machine to the user's desires. And then, it may seem to us that the technological imperative can sound more humane: everything that can be technologized should be technologized in the form of a cultural interface corresponding to the human desires and possibilities.

In our previous work (Galkin, 2002), we tried to show that the virtualization technology of experience is a mechanism of "stitching" realities – everyday, virtual, symbolic. Cultural interfaces are such stitches forming a "patchwork" or a technological text of digital culture, connecting different cultural spaces and times – printed and written culture, virtual reality and artificial life.

d) Technological anthropological deficit

Therefore, the technological imperative in its simple form can be applied mainly to cultural interfaces. In its original formulation though it inevitably creates technological anthropological deficit, i.e. a lack of natural features of the human as a species in order to maintain the functioning of civilization of machines. Human, his organs of perception and movement are not intended for supersonic speeds, vast amounts of information, production manipulations performed in the world today. Thus, for example, any aircraft has an automatic pilot (autopilot robot), nuclear power plant is run by an automatic controller (expert system), and all commutation in the telephone communication systems is performed by an automatic dispatcher (just imagine if cellular communication is maintained by human operators, to say nothing about searching on the Internet!).

Technological anthropological deficit is implicitly present in the use of horses as transportation or use of firearms (the latter, by the way, has undergone revolutionary changes since the introduction of automatic recharging). But it has fully manifested in the era of the Industrial Revolution, when machine labor

began to replace human labor. The critical point in understanding these processes was the birth of the theory of the artificial intelligence (1940-1950s) as a mind capable of becoming a control system for the increasingly complicated world of cybernetic machines. Already in 2000, during panic expectations of computer failures due to a problem with the time settings of computers, it became clear that the dependence on computing machines in the world today was total and fatal.

e) Preobrazhensky Syndrome, or Technological Creationism

Our coordinate system would be incomplete without reference to a vector or a measurement of the carriers of this mission of cultural transformations. In M.A. Bulgakov's famous novel "Heart of a Dog" we find a prophetic story of the creation of artificial life based on science and medical engineering. The protagonist, Professor Preobrazhensky, is a staunch advocate of eugenics demonstrating a set of symptoms of the modernist science, which form the syndrome of scientific and technological creationism (Preobrazhensky syndrome). These symptoms reveal a kind of the scientific unconscious: the desire to imitate the divine knowledge and creative power of the Creator, having given birth to all living things, but not on the basis of religious mythology (the myth of the Golem) or literary fantasy (Frankenstein), but on the basis of scientific methodology and technological systems. In the science of the 20th century Preobrazhensky syndrome had been constantly manifesting. Cybernetics initially declared itself as a methodology of studying and creating machines with lifelike behavior. Its development in the second-order cybernetics and constructionism has only reinforced the tendency to disclose the code of life. Mathematics from George von Neumann to K. Langton tried to create symbolic models of vital processes. Genetics, genetic engineering, molecular and

synthetic biology convincingly demonstrate symptoms described by Bulgakov. Likewise, the theory of complex systems, and even the overall focus of technological NBIC synthesis (Nano-Bio-Info-Cogni) reflect all the same motives and tendencies.

Preobrazhensky syndrome brings contemporary art and science closer together. We have already mentioned that the famous American critic Jack Burnham back in the 1970s described the first experiments in the field of cybernetic art robotic sculpture as the desire of artists to create artificial life. Technological art of 1950-2000s shows numerous examples of such ambitious creationistic projects. In 1990s numerous artists pick up the methodology of artificial life in math and science and create a large number of software, robotics, hybrid projects (K. Sims, K. Sommerer, Stelarc, R. Brown and others). In this paper we characterize these trends as technological and art hybridization.

Preobrazhensky syndrome among artists and scientists is manifested in various forms, which, however, can be systematized. On the one hand, they are working on symbolic models of living, which are implemented on computers as electronic organisms, animats and entire ecosystems. On the other hand, they create hybrids of technical and living systems that combine cognitive, functional, fabric and technical elements.

2. Cultural and Technological Determinism

Justification of social robotics certainly involves an appeal to the problems that have appeared due to the contradictions of cultural and technological determinism. In the interpretation of cultural determinists, technology is a product of specific cultural and historical conditions, whereas in technological determinism they are almost an independent determinant of cultural changes. Thus, social robotics will be either the result of

cultural factors together (producing a diversity of phenomena), or the sum of technologies, changing the life of modern societies. Possible uncritical solution of contradictions in one way or another leads, for example, not only to various controversial theoretical conclusions, but also generates different ideologized arguments (liberal – technology as a progress, radical – technology as a threat).

In the life of the so-called Western societies, technological systems, as we have mentioned above, are subject to the reproduction of deep cultural attitudes. Thus, taking the position of cultural determinism, we see a unique set of cultural determinants as a general source of meaningful social robotics: rationalism (and especially its expression in cybernetics, computer science, artificial intelligence theory) and individualism (personal robots), capitalism, with its emphasis on calculations and achieving high efficiency (industrial robots and robotics as business), militarism and politics of war (drones and other military robots), countercultural deconstruction of the dominant culture. These factors must be complemented by the influence of modernism and the avant-garde art, which has not only contributed to their popularity through artistic experiments with new technologies, but also has resulted in the discovery of new specific cultural forms of technology application.

In its extreme radical version, the principle of cultural determination underlies an influential field of research called "media archeology" (Huhtamo, Parikka, 2011). One of its brightest representatives is a Finnish theorist and cultural historian Erkki Huhtamo associating himself both with Scandinavian culture theory (J. Huizinga) and the critical tradition based on Michel Foucault's studies. Huhtamo argues that all new forms of technology (the Internet, virtual reality, robots and cyborgs) and practice of using them are old formats and their meanings

forgotten or deliberately withdrawn from history, which have already been met before. He called these reproduced and recurring motifs topoi, borrowing a term from literary tradition. For example, a cyborg is unquestionably such a topos: a symbiosis of a man and a machine and one of the most vivid images of the digital culture.

For media archeology unlike any version of technological determinism, the issue of the meaning and significance of the topos, its value message has the fundamental meaning. That is why it seems to subdue any new material medium – photography, cinema or computer.

Technological determinism approves the relative autonomy of technical systems, their own evolutionary logic and complete determination in relation to social systems, which is proved in the extensive study of a French philosopher and historian of technology Gilbert Simondon. His name and work (primarily his fundamental work "On the Mode of Existence of Technical Objects", published in 1958 (Simondon, 1958)), unfortunately, are known to few specialists, although Simondon's ideas greatly influenced the philosophical thought of the 20th century, including creativity of Gilles Deleuze, Jean Baudrillard and Bernard Stiegler.

In his phenomenology of machines under the original name "mechanology", Simondon postulates independent evolution of technology with its immanent laws by analogy with evolution of organisms in nature. Technical objects represented consequential implementation or specification of abstract functions. They are always in a circuit or a series of other objects like living organisms are arranged in families and classes. The abstract technical function finds individuation in different variants of machines (one can easily imagine how many machines there are for counting or movement functions). The human subject – the creator or inventor of technical objects – should just possess special

sensitivity and determine possible variations of the material machine technology. The role of the human is secondary, he doesn't invent a device – he penetrates into the world of technology as pure material formation. Moreover, the human acquires and realizes himself only through technology. That is why Simondon sought to dispel the myth about inhuman and anticultural essence of technology, trying to show humanizing role of technology at the point where human ceases to be a master of technical tools and becomes "service staff" for giant technological systems.

Simondon's theory got an interesting development in the works of Bernard Stiegler. Stiegler establishes a fundamental ontological relationship between technology and time, thus depriving the human of another option to be identified in time and history differently than by technology. Therefore, for technological determinism one of the most important aspects of the technology development is the factor of changes speed.

Another French theorist and historian Paul Virilio develops the same idea regarding technologies. In the works "Speed and Politics" (1977), "Open Sky" (1997), "The Information Bomb" (2000), he suggests a physical model of technological determination process at the level of electronic communications. Virilio proceeds from the idea of speed as a physical substrate of technology (speed of light, speed of sound). Achieving certain speed determines cultural dynamics. In "teletopics of switching" the (post) modern world acquires its determination on the surface of screens, in the network of channels, receivers and transmitters. The world over/behind time and space is formed, possible only in "the real-time perspective". Virilio is a pessimist, he sees the inevitability of fatal errors, failures and disasters in technological determination, insisting that technological acceleration of life (speed of computers, transport, information) brings chaos and disorientation in our daily life, partially due to the fact that human brain and body have not been created for living at such speeds (Virilio, 2001).

Position of technological determinism underlies transhumanism. In this visionary theory, technology – from computers to medical implants and robotics – serve as foundation to create the human of the future – having got rid of diseases, having revealed his creative and intellectual potential, able to respond to any civilization and natural challenges, that has made the technology world his second nature (Bostrom, 2009). This perfect technological post-human is able to extend his life indefinitely, seeking true immortality.

An extremely influential version of transhumanism relying on rigid wing argumentation of technological determinism was proposed by an American theoretician and inventor, one of the leaders of the movement called Singularity, concurrently responsible for advanced research and development at Google, Raymond (Ray) Kurzweil.

His main thesis states a widely known observation about the exponential growth of productivity elemental base of computer technology (of course, we are talking about Moore's Law). However, Kurzweil extrapolates this idea in the form of a global process of accelerating technological growth in different areas – from computer technology and Internet to biotechnology and social robotics, which is exponentially nearing its peak in 2045 (see Kurzweil, 2005; for a more detailed analysis of cultural and technological determinism see Galkin, 2013).

3. Artificial Intelligence

Key role in justification of social robotics belongs to the theory and methodology of artificial intelligence (AI). If we are talking about

a technical device equipped with AI, then this machine to some extent is able to think and talk like a human (based on psychology or physiology of thinking it models logical reasoning) and functions as an autonomous rational agent (acts, gets results, adapts, responds to the matter).

There are different interpretations of artificial intelligence. At the dawn of the theory and development of AI in 1940s thanks to the research of W. Pitts, W. McCulloch, M. Minsky, there were attempts to simulate the machine intelligence with the help of the computer as "artificial neurons" because, as they were able to determine at that time, transfer of signals with neurons is carried out similar to transistors. Therefore, AI was understood as simulation of the work of the neural network of the brain. An alternative conception of AI was proposed by M. Minsky's colleague, John McCarthy, in the mid 1950s. The essence of his approach to AI was that we consider artificial intelligence as a universal logic computer-based machine (AI = logic). The practical meaning of this approach is the ability to simulate solving of human problems by means of AI mainly in any area. In 1960-1970s, a new approach to AI as to an expert system based on knowledge representation, is formed. McCarthy comes to the problem of representation of subject knowledge for AI and M. Minsky comes up with the thesis of microcosms, which should serve as a model area for AI reasoning.

In 1990s the basic principles of "good old AI", based on deductive inference, were substantially revised in the context of the approach that in the late 1980s was called "artificial life", as well as through the development of machine learning systems and automatic recognition of images. In the methodology of artificial life, intelligence is seen as an evolving feature of adaptive behavior of living organisms. For example, a complex model of schooling behavior of birds or ants do not depend on the "intelligence"

of an individual specimen. However, in the chaos of their adaptive behavior for survival, quite an effective form of intelligent life is formed. According to this principle, one can create an intelligent control system for transportation logistics or video games. It is this concept, together with the theory of machine learning that was the basis of the modern breakthrough in the field of social and personal robotics and many modern developers of systems of artificial intelligence and artificial life insist on the primacy of this (autonomous agents, adaptive behavior) as opposed to the logical knowledge approach ("good old AI"), which has long prevailed in the study of artificial intelligence (Meyer J. and Wilson S., 1991; Maes, 1995). It should be noted that the national traditions in the research of "adaptive behavior" are associated with the names of M. Tsetlin (Tsetlin, 1969), V. Turchin (Turchin, 1993) and B. Red'ko (Red'ko, 2005, 2010). Here we should mention the work of outstanding Russian mathematicians M. Haase – Rapoport and D. Pospelov (Haase – Rapoport and Pospelov, 1987). Among the important philosophical prerequisites of these studies can be called an evolutionary concept of intelligence, in which rational cognitive structures are formed on the basis of a simple adaptive behavior, showing complex structural transformations as a result of behavioral dynamics. Among international authors I would like to emphasize R. Brooks and his robotic model of adaptive behavior (Brooks, 1999).

"When we watch a film with digitally generated crowds, be they aliens or ants, we are watching groups of agents acting under Alife models of group behaviour. When we fly in the latest aeroplane, the design of the turbines may have been optimized by artificial evolution" (Brooks, 2001: p. 409).

This is a quote from a popular article in Nature magazine written by Rodney Brooks,

a well-known researcher of modern artificial intelligence and robotics developer of MIT, who was an active participant of the scientific community formed around the issues of artificial life in the 1990s.

Artificial life can be considered as a "bottom up" formation of rational behavior through active learning and adaptation to the environment. To some extent, Brooks refers to the concept of interactive behavior and learning. Simple forms of interaction generate complex forms of autonomous behavior, then intelligence is formed and evolved depending on the complexity of adaptive problems (the researcher insists that we should not take for human intelligence what we know about it today, because it is the product of evolution and it changes in the evolutionary perspective).

Brooks applies these principles in the development of service and humanoid robots, which he predicts to have a great future in the rapidly developing technological world (Brooks, 2002). From the classical cyclic scheme of the robot functioning "outside world – perception – cognitive processing – behavior", he has simply removed the cognitive part (it is still there, but only in the position of the observer) and creates robots in which the dynamics between the outside world, perceptive information and motility determines their adaptive opportunities and autonomous behavior. The latter term can be considered as the key one, because Brooks' robots should behave autonomously and independently in different situations, like living beings. Moreover, for Brooks as a robotics engineer, the issue of materiality and embodiment of a robot, its physical presence in the world and active interaction with a person remains a fundamental one.

Obviously, Rodney Brooks' arguments have convinced many, as the development of autonomous robots on the principles of weak IL

is well under way. Such projects as a commercial hit, a vacuum cleaner iRobot, can be considered quite successful. Paul Levi group has made impressive strides in creating evolving, and self-programming self-replicating adaptive robots, working with gregarious self-organizing of the simplest mobile robotic organisms (Levi etc., 2010).

Functionality of modern AI systems is extremely broad and seeks practical versatility. It is used for natural language processing. Artificial intelligence systems perform translation of texts from different languages (machine translation), define speech and writing (voice interfaces), search for the information and communication is carried out in the natural language. In this function, AI is increasingly being used on the Internet, especially for translation and search of information (it is no coincidence the Director for Research at the largest Internet corporation, Google Inc., is Peter Norvig – formerly a leading developer of intelligent systems at NASA and Stanford professor, author of books on basic AI). The development of AI is of a huge interest to the military. The Pentagon's structure DAPRA that we already know (on the basis of which important Internet elements were developed) finances the creation of robot-cars and other AI-based systems. The U.S. military consider intelligent robotic systems as a priority of new weapons development (see the official website www.darpa.mil). Without AI elements it is impossible to imagine the creation of video games and the behavior of robots in virtual worlds. The characters who oppose a human player are endowed with artificial intelligence and they often successfully win. In this area, the use of AI made a strong impression after IBM Deep Blue supercomputer won the world chess champion Garry Kasparov. In the context of electronic game there is a task to teach a virtual character to talk and act like a human player: to plan actions, to evaluate the

changing environment, to plan and execute tasks (Shampandar, 2007).

4. Social Robotics

AI is the basis of modern robotics practically in all its diversity and largely embodies cybernetic dreams of artificial life. Industrial robots are integrated into the control expert systems. Robotic Intelligence manages satellite groups, aircraft, logistical structures and different functions of a modern car (from the gearbox and suspension to the recognition of road signs). Intelligent robotics more and more penetrates into the entertainment industry and modern art (Bulatov, 2011). More serious steps are taken in the development of social robotics, focusing on education, health care and various service functions (e.g. municipal services).

This situation has been evolving since 1960 and touched little the broad socialization of robotics. In 1990s new trends appeared. Synthesis of robotics and artificial intelligence created opportunities for new applications and application areas. Development of service robots (cleaners, guides, etc.) began to evolve and then social robotics appeared, making an emphasis on the inclusion of robotic systems in social interactions.

Social robotics aims to create robots that should help human in daily activities: maintenance of cleanliness (a cleaning robot), care of people with disabilities (a nurse robot), performing remote functions of a person (an avatar robot), delivery of goods and messages (a delivery robot), monitoring and control of the situation in the rooms and on the streets (robot guard and officer), entertainment and promotional activities (robot actors), participating in art projects (robot artists, robotic installations), organization of the educational process. This list is incomplete, it consists mainly of topical areas for which there are already many completed projects (they will be discussed below in more detail). In this context, conceptually and practically, the ideas about artificial intelligence are changing.

From the standpoint of solving scientific problems, social robotics combines intellectual resources of cognitive and neural science, engineering, robotics, artificial intelligence research, psychology, linguistics, social sciences and philosophy. The range of studied problems is wide enough: the ability to create models of intelligent behavior, representation of knowledge and learning for social robots; issues of ergonomics and adaptation to the interaction of robots and humans; philosophy and methodology of design of social robots; efficiency of interaction between humans and robots; ethics for social robotics; artistic and creative capabilities of robots; issues of safety and reliability of robotics; software principles and architecture; multimodal sensory systems; application of behavior models of humans and animals; justification of the functions and tasks of robots in various social practices.

Ultimately, research in this interdisciplinary field should identify, describe, and constantly update the behavioral patterns of social robots, including the exercise of their functions, interaction with humans, their cognitive and affective components, learning and adapting to different situations, formulation of ethical principles taking into consideration the extent of the autonomous robot behavior. Obviously, to solve such tasks it is essential not only to use, but also to create a new type of socio-humanitarian knowledge.

A demonstrating example of such a theoretical ambiguity is a fundamental work on social robotics of an American robot engineer, visionary and theorist Hans Moravec (Moravec, 2000). In his famous metaphor of robots as "mind children", much has been already said. Since, as to our children, we should certainly wish them a better future and opportunities to beat us in

everything. But behind this humanistic metaphor there is gradual technological determinism: Moravec believes that by 2050 robots' artificial intelligence will surpass human intelligence, while it can learn from people, absorbing and developing the most valuable of human abilities. "Mind children" will create a post-biological world, free from biological constraints set for living organisms.

Socialization of robots, therefore, is an inevitable process, relevant not only to technological dynamics of artificiality of all human functions (labor, memory, vision, etc.), but also to the cultural mechanisms of learning and sharing experience. It was Moravec, who first proposed the concept of a robot as a partner (and not a servant or an employee), with whom we are in a symbiotic relationship, where the boundaries between "natural" and "artificial" are blurred and constantly overcome.

One of the interesting questions is from the perspective of cultural determinism is connected with the fact, whether the developers shall consider ethical behavior of a social robot during software development and include them as a part of the core code? Is it possible to program ethics? In addition, the question about emotional feelings for robots is raised, especially when they are used in working with children and lonely elderly, as well as in the case of intimate robotic services. For such kind of research, summarizing of ethical issues under the general framework of the possibility of giving legal status to social robots is very typical (Lin and Bekey, 2011).

Autonomous performance of important social functions by robots that involve constant interaction with people, really means the need to develop artificial intelligence, which would allow them to make ethical decisions. And although today development of social robots with ethical mind is a problem involving both technical and theoretical aspects, working on it shall start today

for the ethics not to catch up with technological development but to direct it. At least there should be a formulation of some minimum necessary "moral sensitivity" for robots (Wallach W., Allen C., 2010).

Dr. Cynthia Breazeal, one of the pioneers of social robotics, develops these issues in a fairly radical direction and insists that an autonomous social robot is not a tool and not a gadget, but a partner who should be integrated into the social environment and interaction usual for humans (understanding humans, learning from them). Her approach may be called humanistic robotics. A robot can not become social, it cannot share with us the main characteristics of sociality. Therefore, the main task is to decide on the degree and quality of social skills (social intelligence) that are needed both for the robot and the human. Professor Breazeal considers this perspective in her project of the social robot with emotional intelligence – the famous Kismet. The term "sociable robot" that she proposed reflects the concept that combines the communicative involvement of robots to interact with people and the possibility of formation of interpersonal relations between robots and humans .

One of the leading experts in the field of artificial intelligence for social robotics D. Levy has similar to Dr. Breazeal's humanistic ideas. He comes from a thorough analysis of research and development of artificial intelligence and robotics for the five decades in the second half of the 20th century (Levy, 2005), on the basis of which he comes to the conclusion that we need to stop looking at robots as a tool or an object of fear and accept them in a positive sense – as partners, as subjects of relations (join them in marriage, for example) and use them to learn better understand ourselves.

Levy argues quite logical in terms of inevitable closeness and affection for robots on the part of humans. Anyone who plays a significant

and meaningful role in our lives, becomes the object of affection and desire. Robots are no exception. Levy shows how electronic gadgets have evolved, their personalization has been intensified and how important is the element of a kind of a transfer of relations (to people, pets) and human sexuality for personal technology devices. In the case with social robots, this element may become extremely important (Levy, 2008).

Discussion on how emotional connections, socially meaningful contacts and affection between robots and humans emerge and develop is the focus of AI researchers and social robots as sociality of robots is determined not only by the mechanical performance of functions, but also through their emotional involvement. Experimental studies demonstrate the occurrence of such elements of interpersonal relationships in the interaction of children with robots. Obviously, the biggest challenge remains to determine the components of design, interaction mechanisms and opportunities of AI, through which positive social links of social robots and humans can form (Lamers M., Verbeek F., 2011).

Development of humanoid robots is considered to be the most obvious solution to this problem. It is a humanoid, or human-like design that can become dominant in many different directions of development of social robots along with other trends and formats. Developers are aware of the level of complexity of technical challenges in creating humanoid robots and see this as a unique opportunity for fundamental and experimental science at the crossroads of different disciplines. In the first decade of the 21st century we could safely talk about serious progress in the conceptual development and technical decisions regarding development of physical motor activity of robots (muscles, joints analogues, general motor control, including walking on two legs, running, hand grip), development of mechanisms of perception of the environment (visual,

tactile and acoustic methods of perception), effective implementation of intellectual and communicative tasks (neural networks, machine learning, interaction) (Hackel, 2007).

Of course, today some features of a humanoid robot and borders of copying (imitating) human features in social robotics are already clear (e.g. the more a robot is similar to ourselves, the more fear and dislike it arouses). This is partly why the developers pay special attention to such aspects as cognitive and biological convergence of robots and humans (neuro-and biointerfaces, exoskeletons), particularly in medicine and telepresence systems (Bar-Cohen, Hanson, Marom, 2009). This direction of robotics is often characterized as creation of "cyborgs" – "human-robot" symbiotic structures.

Cyborg in varying degrees and configurations can be a neurophysiological continuation of the human body. Such symbiosis is well within the logic of McLuhan, according to which, as we know, any technologies are an extension of the human. For modern transhumanists, cyborg is a sample of a new configuration of the human and machine intelligence as a strategy to empower the human body abilities and to overcome its natural limitations (time, space, power, speed, range of perception, wear and aging, etc.). The strategy of cyborgization of the human has become one of the centers of meaning and social motivators robotics (Benfor G., Malartre E., 2008). It is quite enough to take the development of so-called exoskeletons for medical purposes as an example (exoskeleton is a wearable robot option, reinforcing or compensating the function of the musculoskeletal system). But can we consider this approach an unambiguous consequence of technological determinism? Response or discussion argument can be found in media archeology .

Robots – in the spirit of media archeology! – can be attributed to rather ancient archetypal forms of "artificial people", the stories of which

we learn from ancient mythology (the myth of Pandora or Pygmalion, the myth of the Golem), the literature of the Renaissance and Modern Times (idea of Homunculus, android, humanoid machines) (Rossbach S., Glaser H., 2012). Therefore, the growing interest for robots during the 20th century and the beginning of the third millennium reflects and reconstructs a deeper cultural and historical stratum of discourses and projects of artificial copying of the human. Most likely, cultural anthropology gives many examples that in this context the desire to create an artificial man is not an exclusive achievement of Western European mankind and can be found in other cultures.

In his study of the socio- cultural meanings and origins of the idea of cyborg "Cyborg: Man-Machine", a Canadian Professor Marie O'Mahony argues in favor of the idea that a social robot as a symbiosis of a human and a machine – i.e. cyborg – embodies the ancient dream of omnipotence and immortality of the human. The author shows that in the field of robotics, we are getting closer and more realistic to the practical realization of these ideals. Development of such technologies is inextricably linked with cultural ideas and basic narratives that give a certain fatalistic momentum of technological development from the myths about werewolves to genetic engineering, from androids of science fiction novels to modern humanoid robots (O'Mahony, 2002).

From the perspective of the main idea of our research, development of artificial intelligence and social robots is one of the major trends shaping the culture of artificial life (Galkin, 2013). It is no coincidence that development of social robots is believed to be a big step of evolution, since we are dealing with a new kind of creatures that inhabit our planet (this applies both to cyborgs and robots). Development of robotics as a milestone in the evolution of nature and the inevitable consequence of the logic of the interaction of

human and nature is seen, for example, in the fundamental paper of Pospelov and Haase – Rapoport "From Amoeba to a Robot" (1985). This thesis is also based on the grounds that social robots must demonstrate adaptive lifelike behavior. Development of autonomous robots and cyborgs demonstrate that robots as a new kind of creatures in the global ecosystem is not a fantasy, but the fundamental trend in the development and socialization of technology (Menzel, D'Aluizio, 2001).

Therefore, in contrast to the personalization of computers that we have considered above, socialization and personalization of robots becomes a more complex task not only in the technological but also in the humanitarian context.

And in this regard, as we have seen, the study of AI encounters the problems and limitations that are set by the factors and structures of biological life on the substrate of which intelligence is formed and developed. That is why improving AI and robotics will inevitably lead to the issue of creation of artificial life. Relative to other phenomena of digital culture, an ontological question arises here as robotics has to rely not on the disembodied world of digital computing and pixels on the screen, but on complex material structures, elements of which may be subject to the non-digital "nature" – technical and biological.

Critical reasoning of a French philosopher Jean Baudrillard about robots and robotics is curious. In his book "System of Things" he considers robotics from the perspective of material culture, where robots are metafunctional things and samples of perfect things based on automation. However, this ideal has a "gap of uncertainty" which makes it dependent on the external information and the context of use. And, above all, a robot as an automated thing naturally implies a comparison with the individual. Hence the inevitable tendency toward

anthropomorphism and projection of individual consciousness on a technical object. Automation is just a dream of personalization carried out at the level of things: a robot incorporates all the ways the unconscious in the world of things- i.e., it is the most concentrated expression of the human projection on automatics. However, the realization of this dream comes to excessive functionality and growth of dysfunctions. Being the invention of science fiction, robots are no more than a myth that has nothing in common with the development of technology. The French philosopher concludes that the robot is not only an ideal thing as a projection of our unconscious and the symbol of technical predominance of the human, but also a kind of a mirror that reflects the instability of things, the threat of disintegration of the world and insecurity of life, traces of hidden neurotic frustration.

Conclusion

The analysis of the arguments of Jean Baudrillard and other authors that we have examined shows that justification for social robotics in social sciences and the humanities requires awareness of limited cultural determinism as a set of discourses giving cultural significance to technologies. If the critical theory uses the concept of ideology as a system of concepts and values imposed on everyone in the interests of the ruling class, post-structuralism offers to consider culture as a fluid, unstable space of discourses (which includes ideology), subordinated to the logic of text forms. This approach is connected with the names of such theorists as Michel Foucault, Gilles Deleuze, Felix Guattari, Roland Barthes (we have already mentioned the importance of Michel Foucault's ideas for our research in the introductory section of this paper).

Discourses identify key values that define the parameters of the existence of the human and the society. Discourses are the systems of ideas and knowledge, decorated in the language, they create the world and construct the reality. Therefore, in this context, the analysis of discourses, which stand for technological and artistic (aesthetic) phenomena and which create the latter, becomes especially important. The world of digital culture is also created by certain discourses, which will be discussed below – technologies function in a complex relationship with culture and diversity of cultural narratives and ideological sets. They are included in the space of the meaningful life of people. Consequently, technologies fulfill certain significant functions. Moreover, technologies are associated with nature, physical and biological life, with the cosmos as a whole.

It is necessary to understand the complexity of their functions and combinations in the changing world where everything is constantly flowing, gets complicated and requires new tools for the development of the world. Nature, people and technology adapt to each other in a complex setting of the ontological theater (Pickering, 1995; 2010), new flows and configurations appear that converge and diverge, transform, disappear, appear, exist in parallel or combine. At this point, with the help of post-structuralism, we can see the complexity and dynamic of the processes, which include the development of modern technologies, including computer games.

Further study of the culture of artificial life should not be captured by uncritical acceptance of biological evolutionism, transhumanism, mathematical behaviorism and religious-metaphysical creationism. Proceeding from the perspective, which is given in these approaches to artificial life, we propose to follow the technological creationism approach, which should focus on the totality of artificial life as an alternative design of the living – artificial techno-bio creatures. Development and critical clarification of the "strong" criteria of artificial life

in their relation to these partial "weak" solutions that are available in existing approaches, should become important objectives of technological creationism.

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Социальные роботы:

подходы и концепции

в перспективе гуманитарных исследований

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В статье представлены результаты исследовательского проекта, посвященного определению теоретических оснований социальной робототехники в социальных и гуманитарных науках. Автор предлагает рассматривать базовые принципы цифровой культуры – технологический императив, власть автоматов, технологический антроподефицит и синдром Преображенского – в качестве оснований социальной робототехники. Автор также обращается к проблематике культурного и технологического детерминизма, искусственного интеллекта, этике и различным аспектам социального взаимодействия роботов и людей. Высказывает необходимость обращения к социально-критическим дискурсам.

Ключевые слова: социальная робототехника, цифровая культура, технологический детерминизм, культурный детерминизм.