Nanotechnologies as the Bridge between Artificial and Natural

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I'd like to provide a philosophical analysis of nanotechnologies from the position of constructivism theory. Constructivism ideas are popular nowadays among philosophers and representatives of different humanitarian sciences in Russia and abroad. Their consideration leads to a number of important methodological results concerning the theory of constructivism, its applicability and possible conclusions. Mainly, it is connected with the situation that nowadays it's impossible to predict exactly both the future of science and the future of civilization it determines. In this regard constructivist versions of cognition are in high demand in contemporary philosophical and methodological reflection of science. The reason is they confirm a lot of intuitive insights of science, hide a powerful reserve of its future development and unknown possibilities of its structural organization. Moreover, they require the epistemological principles and methods which haven't been known to the philosophical reflection yet.

If to give a short description, epistemological constructivism is an approach that supposes the construction of the surrounding world by man in the limits of his perception and mentality. The presence of outer world is not denied, however, cognition stops to be defined by the statement of its objective existence. It means that subject's mind doesn't process the information received outside any more or decide the specified problem situations. Following the method of searching thought, the object of a cognition process is a question which the subject of this process hasn't answered yet. Besides, he isn't able to get it from his memory, direct observations, reading textbooks and reference books or asking specialists. While reasoning subject forms an object field. It's a relatively narrow circle of phenomena concerning the search of an answer to a cognitively significant question directly.

The conception of man as a constructor of the real world can be considered like the basis of nanotechnologies. Being a method of getting a fundamental knowledge, nanotechnologies turn into independent force influencing nature, society and man. The active role of cognition is the most important aspect of the constructivism paradigm as the methodology of nanotechnologies. This approach supposes the activity of human mind in perception at all levels as it becomes possible to manipulate not only by individual atoms and molecules, but to create models of animate nature. This opportunity opens unlimited perspectives for individual and collective creative work.

Generality of nanotechnologies indicates on forming a separate discipline – philosophy of technology that acquires an independent meaning. Their concept is widely analyzed and examined in works of such Russian philosophers as V.G. Gorohov (Moscow 2008), V.I. Balabanov, V.I. Beklemyshev, A.A. Abramyan (Moscow 2007) and others. These scientists believe that in contrast with the past technologies, new ones are able to lead to negative results due to accessible mechanisms of matter control at the nano-level and absence of its properties reflection. Such specific features of nanotechnologies as the matter control at atomic and molecular levels allow considering them rather independent and capable to be taken as the beginning of philosophical reflection in which the traditional understanding of the technology doesn't reflect its problems. Does the meaning of technology change for human life when emerging nanotechnologies? There is a reason to say without exaggerating the importance of nanotechnologies that the changes connected with them are more significant than the previous ones. Being a

result of penetration into principles of nature's vital activity they provide a transforming influence on meaning of life, not only its form.

Developing and introducing nanotechnologies leads to the appearance of a new socio-cultural reality that brings up new ethic issues being closely connected with the realization of possible projects such as, for instance, complete description of thinking processes and perception of the reality by human brain; slowdown of aging processes; opportunity of human organism rejuvenation; development of brain/brain or brain/computer interfaces; creation of robots and other devices possessing at least partial individuality; etc. Along with ethical problems originating from the realization of the above projects, the ethical principles that many people follow nowadays will be transformed. Development and penetration of nanotechnologies will provoke a cultural effect related to the intensification of some ethical values and the devaluation of others.

Neurointerface accessibility on the basis of nanotechnologies leads to the unification of man and machine on the qualitatively new level. It can change the level of virtualization of human mind and social relations. Penetration of virtual technologies into human sensuality will create the situation of hybrid reality which obliterates distinctions between man's virtual personality and his physical localization in body. However, the virtual world of social networks leads to egocentrism and man's preoccupation by himself and his thoughts, because the result of it can be the loss of relationships between man and the reality. That's why the conversation about change of the spatial conception concerning physical margin of interpersonal communication and identification can take place. This change will involve reconsideration of human presence in the communication environment if it should be treated both real and virtual simultaneously. Such an approach means a completely new phenomenon of human existence (the margin mentioned exists rather clearly nowadays).

Thus, socio-cultural perspectives of nanotechnologies development include:

- appearing a new life style;
- stemming a phenomenon of "secularized eternity" in public consciousness stipulated by a significant increase of life expectancy;
- changing the meaning of human life in substantial way as man will be able to feel himself like a creator of natural and social worlds.

The constructive paradigm supposes the activity of human mind in perception at all levels while rejecting the existence of non-structured sensor data which are free from any classification. According to the position of nanotechnologies, the cognition process is accompanied by creative and constructive human activity leading to the effects that can reveal themselves, for instance, in the modification of human sensitivity level by means of significant transformation of its physical capabilities. In turn, it can lead to nonreversible consequences. That's why the philosophical reflection of social and cultural results of nanotechnological development is becoming more and more topical. To prevent the global ecologic catastrophe, there is a real necessity to bring out peculiarities of these technologies and to analyze their impact on the social reality. It's also very urgent to start searching a new approach to humanism which is understood traditionally nowadays, to clarify transformations of social values and meaning of human life in the perspective of their development, to study new cultural stereotypes emerging nowadays. On the basis of the above analysis, it becomes clear that nanotechnologies show themselves in three aspects: as technologies of practical activity, psychotechnologies and social technologies.

It becomes clear the unity of cognition and creation as man's constructive activity is one of the main features for the new stage in the development of mankind. There is and there can't be a clear margin between them.

The bright example here is naturalized or natural epistemology which is connected with the solution of epistemological issues while using scientific methods and theories, in particular, taken from natural science. Willard Van Orman Quine formulated the bases of this direction. So far modern Russian philosophers haven't paid enough attention to this philosophical direction. There have appeared some articles describing Quine's ideas in general. In contrast to the philosophical tradition which we can see in the classic cognition theory, the concept of natural epistemology by Quine is a branch of natural science with a psychological foundation. The "old" epistemological tradition tried to involve natural science; it was built on perception. According to Quine, "it studies a natural phenomenon, viz., physical human subject. …We are studying how the human subject of our study posits bodies and projects his physics from his data, and we appreciate that our position in the world is just like his. Our every epistemological enterprise, therefore, and the psychology wherein it is a component chapter, and the whole of natural science wherein psychology is a component book - all this is our own construction or projection from stimulations that we have determined for our epistemological subject" (New York, London 1969, p.82). That is, a double inclusion takes place: first, epistemology into natural science and, second, natural science into epistemology.

Nowadays the project of epistemology naturalization considering social and cultural points of view is widespread. It is described in works of such philosophers as N. Luhmann (Bern 1988, Frankfurt am Main 1984), H. Kornblith (Oxford 1992), V.A. Lektorsky (Moscow 2012). It examines the correlation between natural scientific and social scientific aspects of cognition as opposite or accompanying.

Searching answers on epistemological issues with the application of scientific methods and theories often involves the problem of circulation. These methods and theories should be capable to analyze suppositions and hypotheses and substantiate them. They should also use approaches of transcendental and metaphysical epistemology. The disciplinary differentiation between philosophy and empiric sciences lies in such opposites as fact/ importance, descriptive/ normative, synthetic/ analytic, empiric/ transcendental. The role of natural epistemology is in their unification as a whole.

Thus, any perception is defined by choice and classification which are formed by limitations and preferences inherited or acquired by different ways. As man can control his body on the basis of the sensor information received, even the least mediated feelings will be under influence of these shape-generating principles. It becomes obvious that nanotechnologies allow the physical realization of these propositions extrapolating them to a qualitatively new level. Such leading Russian philosophers as I.U. Alekseeva, V.I. Arshinov and others write that "man will have a desire to master all processes in his body: breath, blood circulation, digestion, fertilization. He will take them under control. …He will put a target to create a more perfected social and biological type - a posthuman" (Moscow 2013, p.18).

What will this a posthuman be? This is a question that hasn't got any definite answer nowadays. Some scientists think that the above biological transformations of human nature can lead to the creation of a monster. Russian academician V.A. Lektorsky, for instance, writes in his latest book that the emerging posthuman "will destroy the existing culture with its ideas of human abilities, the acceptable and the unacceptable, human rights and obligations that compose the human nature" (Moscow 2012, pp.22-23). It's difficult to agree to this conclusion completely. At present the global society has already begun searching a new approach to humanism which is understood traditionally nowadays, clarifying transformations of social values and meaning of human life and the importance of traditional gender relations in the perspective of their development, studying new cultural stereotypes. This work will undoubtedly give some positive results assisting the mankind to avoid the ecological catastrophe and keeping gender relations as a basis of life continuation on Earth.

Nanotechnologies should be explored as a qualitatively new transdisciplinary and transtechnological sphere of man's creative and constructive activities. The approach of constructive realism is considered as the most adequate to the stage of science development and new relationships among the human civilization, nature and space which characterize the period of nanotechnologies' formation and progress. Let's characterize this approach shortly.

According to it, a scientist, especially a naturalist, always specializes in a definite field and uses special tools. The main attention isn't paid to circumstances being used to comprehend this field in the interdisciplinary context, but technical opportunities of essential relations helping to answer a raised question. It's offered to apply to interdisciplinary methods which are called 'alienation'. A scientist calls for 'alienation' if his theory has another structure than the existing methodic potential and is inserted into an absolutely strange context (e.g., physical theory into sociological context). It's possible to conclude from constructive realism's theory that a scientist understands constructive and cognitive features in accordance with definite methods and the initial relevant context of natural scientific theory (Wallner, 1990, p.15).

J. Gibson's research of human perception influenced the formation of the above position in epistemology and social sciences (Gibson, 1988). Its importance is in the author's consideration of perception not as a consciousness phenomenon, but as an event of the reality, a necessary component of life. According to him, the sharp opposition of 'inner' and 'outer' appeared after Descartes disappears. So, cognition together with its constructions begins dealing with the reality.

In the era of nanotechnologies the mankind enters the epoch of synergetic co-evolution with itself. It's possible to suppose that multi-disciplinary communities will start to perform a special part and they will be united not by a narrow community of qualification directions, but the unity of research and constructive interests. As the press points out nowadays, a deviation from the principle of labor differentiation will occur in such communities in favor of new norms and principles of creative scientific communication.

There is a position in Russian philosophical literature stated by R.S. Karpinskaya, I.K. Liseev and A.P. Ogurtsov that "mixed" concepts "demonstrating transitions from philosophical thinking about nature to generalizing judgments about human nature,

and vice versa" (Moscow 1995, p.94) mainly appear in natural sciences (they mention synergy, sociobiology, biopolitics, etc.). The authors introduce the term "biocentrism" (Moscow 1995, p.98) expressing the tendency of unification of natural and humanitarian "cultures" with the category of life as a crossing point. From the position of nanotechnologies it means that there appear some models of the "mixed" reality. They use the concept "group" for its description. As a result, the basic ideas of Russian representatives of this direction can be formed the following way:

1. What man takes to be experience of the world does not in itself dictate the terms by which the world is understood. What man takes to be knowledge of the world is not a product of induction, or of the building and testing of general hypotheses.
2. The terms in which the world is understood are social artifacts, products of historically situated interchanges among people.
3. The degree to which a given form of understanding prevails or is sustained across time is not fundamentally dependent on the empirical validity of the perspective in question, but on the vicissitudes of social processes (e.g., communication, negotiation, conflict, rhetoric).
4. Forms of negotiated understanding are of critical significance in social life, as they are integrally connected with many other activities in which people are engaged.

It becomes clear from the above that subject of cognition doesn't construct the world in his individual consciousness, but it is a result of some joint activity. Thus, technologies can't be developed and used in vacuum therefore a significant portion of the social effect of the given technology is connected with its application by a person or a group of people in a definite social situation. It means taking into consideration a number of political, economical and social aspects in which the network technology is applied. There appears some construction, "the virtual reality", and man isn't able to overcome its limitations. According to modern Russian philosopher A.P. Ogurtsov, man lives in "an imaginary sign system establishing fictitious connections among people and substituting the real world with its problems and difficulties by itself" (Samara 2006, p.21). This concept is becoming one of the most actual nowadays.

Thus, it's possible to conclude that constructivism helps to establish subject's control over the reality perceived by him when eliminating any deviations or resentments from his preferable target condition. The model of the world cognized will contain only the aspects which are relevant to his purposes and actions. At the same time subject doesn't take care of the model cognized, but thinks only about compensation of deviations moving on the way to the achievement of his target. It means that subject is able to adjust to changing circumstances. Any border between 'inner' (i.e. taking place inside subject of cognition) and 'outer' (i.e. its environment) is removed under the influence of nanotechnologies. This idea means the reality isn't just subject's construction. Nowadays it's supposed that subject of rational and cognitive activities acts on the basis of theoretical schemes and models, methodological rules, empiric information, logic norms of reasoning. They are used as a material to take a decision concerning a mode of action for the current problem. Such a choice from a number of alternatives and a range of possibilities is stipulated by subject's constructive thinking and open for future revision. As a result, subject isn't a closed system, but supposes openness to the world. Therefore, a scientific model of the reality becomes a result of interaction of subject's activity with the reality.

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