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LOOKING FORWARD TO THE FUTURE: ARE WE READY TO UPGRAD OUR MINDS?

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Nowadays, scientific and technical progress is becoming faster and faster. Every year scientific community presents new developments in each branch of industry: nanotechnologies, robotic, artificial intelligence, genetic engineering and neurotechnologies. Some scientists insist that this accelerating progress may even lead to technological singularity – an event or phase that will radically change human civilization, and, perhaps, even human nature itself [2. P.1], and it could happen in the first half of XXI century.

Some people are afraid of singularity and the progress itself. They are always followers of the «pessimistic» scenario, in which machines take control on humanity or some kind of super weapon destroys all life on the Earth. Others are adherents of a radically different scenario, which suggests progress in enchantment technologies, which will improve human capabilities and lead humanity to the emergence of a «posthuman» race [2. P.2].

Neurotechnologies is one of the most perspective branches of science and technologies of current and future world. People have different views on it, and it is important to know society's attitude to this part of their probable future.

In the beginning, we should introduce the subject of our investigation: neurotechnologies. Generally, we can describe a neurotechnology as any technology which has an influence on understanding the brain and different parts of consciousness, thought, and other activities in the brain. In addition, any technology that is developed to improve or repair brain functions.

Brain-Computer Interfaces (BCIs) are neurotechnologies. BCIs are devices that can enable communication or control without movement. The BCI detects specific patterns of user's brain activity that reflect different messages or commands that a user wants to send [5. P.1].

BCIs are used in various spheres. First is medicine – BCIs are equipment to real-time mapping of patient's CNS state, a way of making communication with disable people possible, to make the process of rehabilitation faster and more effective and even to control advanced mechanic prosthetic limbs (Brain-machine interfaces). Second is science – different apparatus aimed at realization of data transmission from the brain to the computer and vice versa. Third is entertainment and sphere of consumption: brain-internet conception and different gadgets in either event connected to BCIs.

On the other hand, there are some issues that should be noted. The most urgent problems rely on physical and psychological safety of a patient. For instance, intracranial surgery has risks, for instance, infection or hemorrhage. In addition, using BCIs can also cause psychological harm when the subject's desires and intentions to produce actions fail to be realized [3]. Other problems are connected to different kinds of responsibility, started from personal and finishing with responsibility of BCI companies. Finally, some sub science fiction troubles as blurring of the division between human and machine, mind reading, privacy, and even mind control.

Another exhilarating and ambiguous theme, connected to above described technologies is Whole Brain Emulation conception. The basic idea is to take a particular brain, scan its structure in detail, and design a software model of it that is so faithful to the original that when run on appropriate hardware it will behave in essentially the same way as the original brain [6. P.7].

WBE may find applications in medicine to locate diseases or to discover what could happen under the influence of medicines, in science to investigate the brain on a radically new level, in industry to make independent equipment or some robotic-autonomic factories. In the same way, there is also a conception of an «Uploaded astronaut». Eventually, it may be a key to immortality – information and mind processes would not be tied to the biological body and all its limits including lifespan.

Per contra, WBE is just a conception and to bring it to life we do not have such developed hardware and there are many biological, biophysical, technical and even social, ethical and legal troubles. Some issues connected to what would happen to the emulated brain. Not only in humanistic case, but also regarding the legal personhood of a «computer brain». Others are about animal welfare. Developing WBE could require animal experiments, so scientists could critically harm them through the process.

In order to evaluate and understand people's attitude to neurotechnologies, we should primarily learn reasons of this kind of relations.

People always have different reactions on changing in the world. In 1970 Alvin Toffler wrote a book, called «Future shock». His ideas made up a foundation of Elizer Yudkowsky's «Levels of future shock» and Douglas Rushkoff's «Present shock» conceptions, which lucidly interprets human perception of novelty. A. Toffler says that a human under pressure of developments, flows of knowledge, science, technics and information could feel disappointed, thrilled, lost and estranged from reality – in other words shocked by the future. E. Yudkowsky singled out five levels of future shock: 0, 1, 2, 3 and 4. Each level describes what developments or scientific achievements do not shock people. Zero level is for common people, the first level is for progressively-minded people, the second is for science fiction amateurs, the third is for transhumanists, and the fourth is for singularists. In addition, he claims that level of shock can be improved and developed.

So, we designed a social investigation to learn how our society treats brain-computer interfaces and whole brain emulation conception. Likewise, we expect to learn their level of shock and connect it to their age, sex, occupation and ideology.

270 people participated in our survey. Most of the participants were students of universities, school students, employees, and less than five percent were people of other occupations. Overwhelming majority of attenders were 16–22 years old, whole coverage is from 14 to 57 years old, mostly engaged in education, science and arts. According to our expectation, most of the people have the first level of shock (about 40%), slightly less have zero (about 30%), and about 6% have the second. We were pleasantly surprised that about 11% have the third level of shock and 13% – the fourth. The half of attenders said that BCIs are perspective, a third has neutral attitude, and little less than a quarter are frightened; 50% said that WBE is interesting, but currently is impossible, a quarter considers WBE is perspective and possible, and about 20% are scared by this conception.

Given the above, we can conclude that neurotechnologies are being implemented in our life more and more often. Some of them, like BCI now is used in important

spheres like medicine and continue to develop. There are some issues of BCIs, but scientific community is able to solve them and they, in most cases, successfully do it. So someday, BCIs will be as common as ECG or X-ray machine. WBE conception, other way, is more complicated and «fantastic». There are too many troubles to realize such technologies. For now, we do not have equipment that is developed well enough. Also, we might have no advanced knowledge in neurobiology and computer science that we need. Eventually, WBE could be impracticable at all.

I am a transhumanist, and I expect that soon we will be able to realize a plenty of various technologies, and many of them will be based on neurotechnologies. Moreover, I believe that most of future apparats will improve our brains and intelligence. However, we should be ready to accept and understand them, in other words, we need to upgrade our minds.

The opinion poll shows a full picture of our community perception of novelty and its attitude to neurotechnologies – a probable part of our future. We got promising results, but there are also people, who cannot accept innovations. Ultimately, the main idea is that people are able to learn, unlearn, and relearn, and change their perception, develop it, and adapt to changing in the world.

«To survive, to avert what we have termed future shock, the individual must become infinitely more adaptive and capable than ever before» © Alvin Toffler.

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