SCIENCE, ART AND EDUCATION – THE NEW PARADIGM

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Abstract

Contemporary world is global, interdependent, rapidly changing generating uncertainties compounded by bankrupting nature, destroying human and social capitals. In addition, some sovereign countries possess weapons of mass destruction. It is obvious that the current world is not sustainable, and reduction of threats cannot be achieved within the current paradigm. A new social, economic and political paradigm is required and that can be achieved not by violence, but by more knowledge. Power has shifted from military force to wealth and now to knowledge. Power shift does not merely transfer power, it transforms it. New paradigm is a continuous change, where scientific research, art and education play a dominant role.

Keywords: Science, new paradigm

Introduction

Recent studies determined the age of our universe to be 13.798±0.037 billion years[1)]. Claimed accuracy of less than 40 million years is amazing, particularly when compared with Kelvin's wrong calculation of the age of our Earth somewhat more than hundred years earlier, when he obtained that the age of our Earth is less than 100 million years. From the beginning of our universe until about 380,000 years there was only physics – only elementary particle, atoms did not exist, and there was no light, it could not pass through ionized space. Chemistry began about 380,000 years after the Big Bang. The age of our Earth is determined to be 4.54±0.05 billion years. There is evidence for life on our Earth as early as 4.4 billion years ago[2)], suggesting that if life arose so quickly on the Earth, then life should be fairly common in our universe. Discovery and use of fire dates 800,000 years ago. Culture, language and what we could term cognitive revolution dates about 70,000 (and possibly 160,000) years ago[3)], and Neolithic Agricultural Revolution was 12,000 years ago. Inquisitive human mind asked numerous questions:

"How and from what is the world made?" (Thales), "Where do we come from? What are we? Where are we going?" (as expressed in Paul Gauguin's painting) and „What should we do?". These questions were also expressed through art in numerous cave paintings as Altamira and Lascaux. Science progressed when instead of general questions, it focused on specific questions and that is the birth of scientific disciplines. Sometimes it seems that additional scientific research cannot bring anything novel: all essential is known – end of science[4]. The opposite is true. When physicists thought they understood everything and only two minor clouds dimmed the bright sky, they discovered quantum physics and theory of relativity. When Standard model ruled particle physics, it turned out that it accounts only for 4.9% of our universe, while 26.8% is dark matter and 68.3% is dark energy, and we do understand neither what dark matter is, nor dark energy. Though Higgs boson has been recently discovered, we still need to understand why the electron has the mass it has. Our inadequate understanding is much greater as one turns from simple issues as our universe (which is determined just by six numbers!) to more complex problems: consciousness, economy and politics. More than two century ago F. Schiller wrote prophetically "Our century has given birth to a great epoch, but the great moment finds Keynote talk, September 2015, Oxford, UK stunned generation and even more stunned politicians"[5], and more recently Y. Dror wrote "It is absurd to believe that everything is going to change, but politics will and can remain the same."[6] , and John Avery wrote the book "Space-age Science and Stone-age Politics"[7] forgetting that politics also achieved remarkable successes (UN system, end of colonialism, many successful treaties, etc), but that the progress of science and technologies is so fast that it overwhelms the rate of political achievements. Contemporary world is not sustainable. There is a need for a new economic and political paradigm.

Two cultures, three cultures, one culture. In 1959 C.P. Snow gave the Rede lecture entitled „The Two Cultures and The Scientific Revolution" emphasizing a widening gap between natural science and humanities and art[8]. Less than 50 years later Jerome Kagan argued that there are three cultures: natural sciences, social sciences (including economic and political sciences) and the humanities/art[8]. Real world is complex and complexity manifests in an inability of any formalism to adequately capture all its properties. It requires that we find distinctly different ways of interacting with systems. "Distinctly different" in a sense that when we make successful models, the formal systems needed to describe each distinct aspect are not derivable from each other.

A meeting of scientists and artists "Signature of the Invisible" was organized in 1999 at CERN. Scientists and artists have been interacting always, sometimes in a single person, e.g. Leonardo. One can draw parallels

between lives of Einstein and Picasso. Stephen Pile wrote: “What would C.P. Snow make of all this. It is 42 years since he observed that art and science are two different cultures, but suddenly they are getting along just fine.” Keith Tyson wrote “Richness is always at the frontiers. Science and art are way of exploring the same thing, one culture with two fascinating abilities… Society suffers from reduction and compartmentalization, leading to social autism…. Like good artists, good scientists are simple in their explanations, open-minded, humbled by experience.” Steve Miller was fascinated by x-rays, Rorschach test and DNA and he produced a series of paintings Neolithic Quark. Miller said: “Art is useful to present complicated information such as Michael Frayn play Copenhagen”.

In his Nichomachean Ethics Aristotle calls politics master science. Edward Shils, founding editor of journal Minerva, wrote “After WWII scientists became politicians. Politics was always part of science but now relationship between science and politics became more explicit and prominent. It manifested itself in science advisory capacities but also in Pugwash Movement[10)]. Scientific research did not produce only better understanding of nature and society, but also provided new forms of organization and leadership. For instance, CERN experiments at LHC cost several billion euros and include thousands of researchers from several hundred institutions from several hundred countries without a special chief executive officer, and without strict hierarchy. This leads to holocracy - a democratic distribution of leadership, the new management system for a rapidly changing world leading to more agile team that turns everyone into leader. Scientific research is an example of holocracy! Nobody in charge → all in charge → all responsible! Can politics be organized in such a way? Should it be?

Education for the 21st Century

Spoiling youth has been considered one of three most deplorable sins in ancient China. Bertrand Russell optimistically said in his Nobel Prize acceptance speech: "The main thing needed to make the world happy is intelligence. This is an optimistic conclusion, because intelligence can be fostered by known means of education." However, in 1937 Sigmund Freud wrote that “psychoanalysis is the third impossible profession following two much older: bringing up the children and governing of nations.”. Education is broader than “bringing-up the children” and even more impossible. Who should be educated and how, and for what goal? In a global world the answer to the first question is clearly *everybody - all human beings*. Since knowledge now increases exponentially with a doubling time of 5-10 years, education cannot be time limited, but it has to be *life-long*.

Global education in the 21st century for a changing human being and for a rapidly changing world in order of achieving global knowledge-based society has to encompass specialized, disciplinary education and paradigmatically different holistic approaches. The universities have a mission and a responsibility which goes far beyond the task of providing industry with efficient employees, marketable ideas or science-based solutions. Their mission is to produce mature, independent, critical and responsible personalities, who are not tools in anybody's service. Many different forms of higher education are developing, just to mention a few: massive-on-line-open courses (MOOC), Future University, Singularity University and University of Everywhere.

Employment and Retirement

Words retirement and employment were not in use 150 years ago. In 19th century permanent manufacturing establishment meant a radical separation in time and space from family and leisure time. Now, there is an erosion of traditional employment through part-time work, fixed-contracts, temp-agency work, fractional employment, self-employment and multiple jobs. Robots, automation and ICT make and will make many jobs obsolete, e.g. 47% of all jobs in the USA are in the high-risk category, i.e. potentially automatable in the next decade: office and administration, sales, service and taxi drivers. Low risk jobs are health care, education, arts and media[11)].

Increase in the life expectancy which almost doubled in about a century and now reaching about 8o years make the retirement at 65 years impossible. Nevertheless, there are numerous jobs that cannot be done at age over 60, e.g. miners and ballerinas. This requires that we should change jobs, likely several times during our lifetimes.

Power-shift and Paradigm Change

Contemporary world can be compared with Neolithic Agricultural Revolution. Then humans started their cohabitation with animals and plants. Now we are cohabitating with robots, automation and new technologies. However, there is a profound difference. While our ancestors could continue being hunter-gatherers, our contemporary world is not sustainable. A new socio-economic-political paradigm is needed since we bankrupted nature, in an Anthropocene Epoch we are destroying human and social capital and we have means – weapons – that can destroy our civilization and we cannot repair or even decrease these threats within present paradigm.

In his book Power-shift[12)] Alvin Toffler argues that throughout history power has shifted from violence and military force to wealth and now to knowledge. A new paradigm has to be based on knowledge. Knowledge is a very broad term encompassing all sciences and the humanities, as well as

arts and political decision-making. While old forms of power: violence and wealth are limited, knowledge is inexhaustible, it is increased by sharing. Powershift does not merely transfer power, it transforms it. New paradigm is a continuous change, future full of surprises, augmented by creative activities: scientific research and art, as Turkish poet Nazim Hikmet Ran (1902-1963) wrote:

"The most beautiful sea: hasn´t been crossed yet. The most beautiful child: hasn´t grown up yet. Our most beautiful days: we haven´t seen yet. And the most beautiful words I wanted to tell you I haven´t said yet..." (1945)

References:

www.cosmos.esa.int/web/planck/publications

Bell, Elizabeth A.; Boehnike, Patrick; Harrison, T. Mark; et al. (19 October 2015). "Potentially biogenic carbon preserved in a 4.1 billion-year-old zircon" (PDF). Proc. Natl. Acad. Sci. U.S.A. (Washington, D.C.: National Academy of Sciences). doi:10.1073/pnas.1517557112. ISSN 1091-6490.

E.g. Stringer, C. 2011. *The Origin of Our Species.* London: Allen Lane; Erin Wayman, Smithsonian.com, June 25, 2012; for apleolithic art see, e.g. Tedesco, Laura Anne. "Lascaux (ca. 15,000 B.C.)". In Heilbrunn Timeline of Art History. New York: The Metropolitan Museum of Art, 2000. http://www.metmuseum.org/toah/hd/lasc/hd_lasc.htm (October 2000)

Horgan, John (1996), *The End of Science: Facing the Limits of Science in the Twilight of the Scientific Age.* New York: Broadway Books.

F. Schiller, The Present Moment 1796

Y. Dror, Avant-garde politician, 2014, Westphalia Press

John Avery, Space-age Science and Stone-age Politics, Danish Pugwash Group, Amazon

C.P. Snow, The Two Cultures and The Scientific Revolution, Cambridge University Press, 1961

Jerome Kagan, The Three Cultures: Natural Sciences, Social Sciences and the Humanities in the 21st Century, Cambridge University Press, 2009

E. Shils, Minerva editorial, 1 (1962)

The Economist,18 Jan, 2014, The Future of Jobs, The Onrushing Wave

Alvin Toffler, Powershift: knowledge, wealth and violence at the edge of the 21st century, 1990 Bantam Books