

MODERN SCIENCE IS BASED ON IGNORANCE SAVREMENA NAUKA SE OSLANJA NA IGNORISANJE

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ABSTRACT

The scientific population considers that spectacularly changing happened in the year 1687, when Isaac Newton published the book under the title "The Mathematical Principles of Natural Philosophy". The most magnificence of this publication is that almost all physical changing's on our planet were determined by three simply equations. Everything's were explained by mathematics language. This was revolutionary approach to science. Today, the situation is diametrically different, all human and physical sciences used mathematics and statistics methods like economics, medicine philosophy, sociology and political sciences. During last five centuries the human kinds believe that the situation can be changes in the sense of increasing man power. If the Scientific Revolution is not exists, the man would never walking on the Moon, an atom would never be analyzed, and the microorganisms never be introduced to Earth population. Other benefit of revolution is organized a scientific community on one single place, en example is project CERN.

Key words: Cognitive revolution, ignorance, human power.

REZIME

Populacija naučnika u državama Evrope, Severne i Južne Amerike smatra da se spektakularna promena u ovoj oblasti istraživačkog rada dogodila 1687. godine, kada je Ser Isak Njtn objavio svoje kapitalno delo pod nazivom "Matematički principi prirodne filozofije". Knjiga je postavila temelje takozvane njutnovske mehanike, koja opisuje zakone kretanja i univerzalnu gravitaciju. Sve u knjizi je prezentovano matematičkim jezikom, te je ovo bila revolucionarna promena u poređenju sa predhodnom istorijom. U poslednji pet vekova ljudska vrsta na planeti Zemlji je doživela ogromne promene u pogledu kvaliteta života i time je povećala moć da upravlja svojom sudbinom. Da se ovakva promena nije desila, čovek nikada ne bi šetao na površini Meseca, atom ne bi bio razbijen i analiziran, i nikada se ne bi upoznali sa mikroorganizmima. Ogroman značaj saznanje revolucije je stvaranje mogućnosti za povezivanje naučnika iz celog sveta i to čak na jednom jedinom mestu, kao što je sličaj sa projektom CERN.

Ključne reči: Saznajna revolucija, ignorisanje, snaga čoveka.

COGNITIVE REVOLUTION

Before 500 years only a few cities on the planet had more than 100.000 inhabitants. Most buildings were constructed of mud, wood and straw, a three-storey building was a skyscraper (Yuval Harari Noah, 2011). The streets were dusty in summer and muddy in winter, besides people full with horses, goats, chickens and a few carts. The humans were absolutely sure that an earth is flat surface. Prior to this century nobody had a different opinion, because the religions affirmed so. This changed in 1522, when Magellan's expedition returned to Spain after a journey of 72,000 kilometers around the globe (Pigafeta, 2013). It took three years and cost the lives of almost all the crew members, between them Magellan too. During the previous 4 billion years of evolution, this adventure was a miracle.

This spectacular event was introduction to other great event. In the year 1687, Isaac Newton published "The Mathematical Principles of Natural Philosophy", arguably the most important book in modern history (Vajt, 2010). Newton presented a general theory of movement and change. The greatness of Newton's theory was its ability to explain and predict the movements of all bodies in the universe, from falling apples to shooting stars, using three very simple mathematical laws (Yuval Harari Noah, 2011):

$$\sum \vec{F} = 0 ; \quad \sum \vec{F} = m\vec{a} ; \quad \vec{F}_{1,2} = \vec{F}_{2,1}$$

Anyone who wished to understand and predict the movement of a cannonball or a planet simply had to make measurements of the object's mass, direction and acceleration, and the forces acting on it. By inserting these numbers into Newton's equations, the future position of the object could be predicted.

Newton showed that the book of nature is written in the language of mathematics. That was actually a real revolutionary stroke, something like that never happened before. Some chapters (for example) boil down to a clear-cut equation; but scholars who attempted to reduce biology, economics and psychology to neat Newtonian equations have discovered that these fields have a level of complexity that makes such an aspiration futile. This did not mean, however, that they gave up on mathematics. A new branch of mathematics was developed over the last 200 years to deal with the more complex aspects of reality - statistics.

It is important to look at the history of education to realize how far this process has taken human mankind. Throughout the history, mathematics was an esoteric field that even educated people rarely studied seriously. In medieval Europe, logic, grammar and rhetoric formed the educational core, while the teaching of mathematics did not went beyond simple arithmetic and geometry. Nobody studied statistics. The undisputed monarch of all sciences was theology.

At nowadays, a few students study rhetoric, logic is restricted to philosophy departments and theology to seminaries. Nowadays the students are motivated to study mathematics. There is an irresistible drift towards the exact sciences – defined as 'exact' by their use of mathematical tools. Even fields of study that were traditionally part of the humanities, such as the study of human language (linguistics) and the human psyche (psychology), rely increasingly on mathematics and seek to present themselves as exact sciences. Statistics courses are now part of the basic requirements not just in physics and biology, but also in psychology, sociology, economics and political

science. There were many other discoveries in this period of human beings, for instance, microorganisms. In the year 1674 the human eye first saw a microorganism, when Anton van Leeuwenhoek took a peek through his home-made microscope (ppt/www.ucmp.berkeley.edu/history/leeuwenhoek.html) and was startled to see an entire world of tiny creatures milling about in a drop of water. That was the crucial moment for medicine; much later the people discovered that they are either our best friends or deadliest enemies.

During that period of history, generally speaking, all human environmental happenings were explained by Bible or Curran. The God or the wise people were those who tell people some unimportant facts of life. Christianity did not forbid observation or doing some tests. If somebody wanted to know something not written in Bible, it was pointless to ask the priest. This information was of no importance in everyday life, otherwise God would have included an adequate answer in the Bible. That was the system based on dogma, where everything was already explain, and no further questions should be put on the table.

But Homo sapiens were desired for extra knowledge. In the next 500 years the discovery of many mysteries will happened. Most remarkable events in these 500 years will happen at 5:29:45 on July 16th when American scientists detonated the first atomic bomb at Alamogordo, New Mexico (*Yuval Noah Harari, 2011*). At that very moments humen beings got a power not only to chage the history of planet, but also to end it. This process is the starting point, key stone which open the door of Scientific Revolution.

HUMAN IGNORANCE AND UNCERTAINTY

The origin of the word ignorance lays down in Latin *ignoramus* means - we or I do not know. It assumes that we do not know everything. Even more, we accept that the things we think to know should be proven. This statement is the fundamental in new science concept. The whole concept means that no idea or theory are sacred and beyond challenge. The new science of 21st century is no dogma any more.

In many languages the word *ignorance* has many bad connotations, especially in common usage. One kind of ignorance is willful stupidity; worse than simple stupidity, it means indifference to facts or logic. Usually that is a stubborn devotion to uninformed opinions, ignoring contrary ideas, opinions or data. The ignorant are unaware and uninformed (*Firestein, 2012*). According to Firestein Stuart, who is a head of a laboratory and Professor of Neuroscience at Columbia University, ignorance is the most important resource the scientists have, and using it correctly is the most important thing that scientists do. Professor Firstein emphasizes that human ignorance and uncertainty are valuable states of mind — perhaps even necessary for the true progress of science. His famous joke about ignorance is:

“It is very difficult to find a black cat
in a dark room,” warns an old proverb and Firestein Stuart
added:
“Especially when there is no cat.”

Many other wisdom people through history were occupied by the truly meaning of this word, like

George Bernard Shaw:

Where there is no knowledge, ignorance calls itself science.

Bertrand Russell:

People are born ignorant, not stupid; they are made stupid by education, or

Marie Curie:

One never notices what has been done; one can only see what remains to be done.

Daniel J. Boorstin:

The greatest enemy of knowledge is not ignorance; it is the illusion of knowledge.

Matthias Gross and Lindsey McGoey (2015) wrote that ignorance and surprise belong together, those are often a window to new and unexpected knowledge.

The modern science differs from all previous traditions of knowledge in three critical ways (*Yuval Noah Harari, 2011*):

1. The sciences are willing to admit ignorance,
2. The centrality of observation and involve the mathematics,
3. The acquisition of new powers.

The Scientific Revolution has not been a revolution of knowledge. It has been above all a revolution of ignorance. The great discovery that launched the Scientific Revolution was actually the discovery that humans do not know the answers to their most important questions. Ancient traditions of knowledge in fifth century BC, especially in Athens state admitted two kinds of ignorance: individual and entire traditional. The best example is the sentence of Socrates philosophy (*Jaspers Karl, 2008*): „The only true wisdom is to know that you know nothing”.

There are some other great people with similar opinions. Abu Ali al Hussein ibn Sina, Latin name Avicenna, (980-1037) had been leading Persian Islamic philosopher and scientist versatile (<http://www.sciencemuseum.org.uk/broughttolife/people/ibnsina>). He had been done research about medicine, alchemy, astronomy, psychology, ethics, politics, theology, metaphysics, physics, logic, mathematics and poetry. Great philosophical encyclopedia, Avicenna's capital manuscript, was divided into logic, physics, mathematics and metaphysics. By order of the Caliph the book was burned in 1160 in Baghdad. Giordano Bruno (1548-1600) had even worse destiny (<http://www.historytoday.com/richard-cavendish/giordano-bruno-executed>). He was an Italian philosopher, astronomer and occultist executed as a heretic, because his ideas were contrary to the doctrine of the Catholic Church. He accepts the Copernican heliocentric system. Capture by fraud came to Venice where he was arrested by Inquisition and burned alive in the year 1600. In the final paragraph of the judgment to Giordano Bruno was written down: "Punish the brother Giordano gently, without bloodshed.

The scientists of now days admit the collective ignorance regarding the most important questions. After centuries of extensive scientific research, biologists admit that they still don't have any good explanation for how brains produce consciousness. Physicists admit that they don't know what caused the Big Bang, or how to reconcile quantum mechanics with the theory of general relativity.

One should put a question who is those people with extremely ignorance in order to make extraordinary discoveries. Those people were geni. Maybe an answer is somewhere in the past. One of them was Leonardo di ser da Vinci (1452-1519), who believed that studying science should make him better artist (<http://www.leonardoda-vinci.org/>). Around the year 1480s, this man ahead of his time, da Vinci appeared to prophesize the future with his sketches of machines like: resembling a bicycle, helicopter and a flying machine based on the physiology of a bat (Fig. 1).

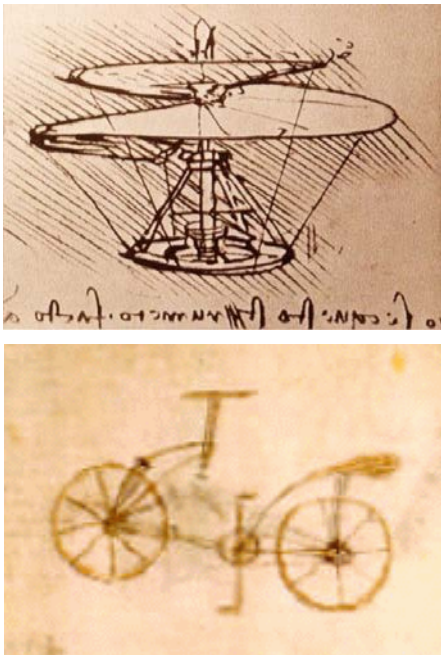


Fig. 1. Leonardo da Vinci sketches

Or it should be Nikola Tesla (1856–1943). In the year 1891, he started with electric discharges study driven by high frequency electric fields (Dimitrijević, 2006). In this pre-historic era of plasma physics, Tesla was found that gas discharges involved the motion of electrons and positive ions, which represents the electric current flowing in a gas (Fig. 2). An electron which circled on certain path around the core of atom was discovered and named by Joseph John Tomsona in the year 1897, six years after Tesla done his tests with electricity. The discovery of collective phenomena in gas discharges, which define the modern concept of plasma and their proper explanation by mathematical models, was left to the 20th century.



Fig. 2. Discharge of gaseous matter driven by high frequency electric fields (wireless energy transmission)

POWER OF HUMANKIND

Scientific Revolution has obtained new powers by investing resources in scientific research. It is a revolution, because until 15th to now days humans create such ability to obtain new medical, military and economic powers. In the past, government and wealthy patrons allocated funds to education and scholarship, the aim was, in general, to preserve existing capabilities rather than acquire new ones. The typical pre modern ruler gave money to priests, philosophers and poets in the hope that they would legitimize his rule and maintain the social order. They did not expect of scholars to discover new medications, invent new weapons or stimulate economic growth.

During the last five centuries, humans increasingly came to believe that they could increase their capabilities by investing in scientific research. The more proofs that are possible, the more resources from wealthy people and governments were address to into science. If something like that was not happened, the man would never have been able to walk on the moon, engineer microorganisms and split the atom without such investments. Many governments, for example, have in recent decades allocated billions of dollars to the study of nuclear physics.

Those studies demand a large number of researchers and a huge budget. The typical example is European Organization for Nuclear Research, commonly known as CERN (<http://www.home.cern>). Between the years 1998 and 2008 were employed over 10,000 scientists and engineers from over 100 countries in the world. The installation has large Hadron Collider which is used to discover a particle that's consistent with that of the Higgs boson. This is an important discovery because it verifies the Standard Model of Particle Physics. Only Hadron Collider took about a decade to construct, for a total cost of about \$4.75 billion (www.forbes.com). There are several different experiments going which cost in total of about \$5.5 billion a year. Computing power is also a significant part of the cost, about \$286 million annually; electricity alone is \$23.5 million.

Whereas modern states call their scientists to provide solutions in almost every area of national policy, from energy to health or waste disposal, ancient kingdoms seldom did so. The contrast between then and now is most pronounced in weaponry. Many powerful countries organized military-industrial-scientific complex, because today's wars are scientific productions. The military is support with large funds therefore a significant part of humanity's scientific research as well as technological development are happened over there.

Science, industry and military technology intertwined only with the advent of the capitalist system and the Industrial Revolution. Once this relationship was established, however, it quickly transformed the world. This is because; the science is not just about offensive weapons.

When modern culture admitted that there were many important things that it still did not know, and when that admission of ignorance was married to the idea that scientific discoveries could give us new powers, people began suspecting that real progress might be possible after all. As science began to solve one unsolvable problem after another, many became convinced that humankind could overcome any and every problem by acquiring and applying new knowledge. Poverty, sickness, wars, famines, old age and death itself were not the inevitable fate of humankind. They were simply the fruits of our ignorance.

KNOWLEDGE IS POWER

Today, the most people of the planet are not so familiar with modern science because of mathematical language. In their minds science enjoys enormous prestige because of the new power it gives to all of us. Philosopher Francis Bacon published the scientific manifesto „The New Instrument” in the year 1620. The most important statement in the book is that „knowledge is power”. Francis Bacon argued that real test of knowledge is not the accuracy of some theorem, the real test is availability. In that time it was revolutionary idea. In last three century sciences has offered many new tools, like mental and technological tools. The relationship between technology and sciences is very strong at nowadays, so many people do not understand the differences. Before the Cognitive revolution almost the whole population did not believe in progress. An opinion was established that is was impossible, even the religions had no answer how to abolish famine, diseases, poverty and the wars all around the globe. Scientific revolution admitted that there were many important things to do. The scientific community began to solve one unsolvable problem after another's, so offer a solution how to overcome problems by applying new knowledge. It is well known that there are two kinds of poverty, social and biological. Maybe social poverty can never be eradicated, but in many countries around the world biological poverty is a thing of the past.

WHAT ARE THE BENEFITS OF COGNITIVE REVOLUTION FOR HUMAN BEINGS

Can you even recall a time when there was no Google? The past 10 years have given us countless innovations that improve and confuse our daily lives. From Internet technology to finance, genetics and beyond, advances in science and technology have changed the way we communicate, relate to one another and think about what it means to be a modern human being. During last century, the first general-purpose computer was established, the nearly 30-ton ENIAC (1947), contains 18,000 vacuum tubes, 70,000 resistors and 10,000 capacitors. IBM (1981) promoted the synonymous with the term "PC," (www.popularmechanics.com/technology) unveils its personal computer, polio vaccine appeared in 1955, as well as microwave oven, while the first airliner in the year 1958, industrial robot was invented in 1961. First communication satellite was launched in 1962, coronary bypass surgery operation was possible in the 1967, cell phone in 1973, hybrid electrical car was presented by Toyota in the 1997, genetic engineering research began in 1978 as well as GPS. Molecular biologist Alec Jeffreys devises a way to make the analysis of more than 3 billion units in the human DNA sequence much more manageable by comparing only the parts of the sequence that shows the greatest variation among people. His method quickly finds its way into the courts, where it is used to exonerate people wrongly accused of crimes. Genetic sequencing is the process of determining the precise order of nucleotides within a DNA molecule. It includes any method or technology that is used to determine the order of the four bases—adenine, guanine, cytosine, and thymine—in a strand of DNA. The advent of rapid DNA sequencing methods has greatly accelerated biological and medical research and discovery.

In May 2000. GPS goes mainstream, the United States intentionally degraded GPS signals available to the public for national security reasons. Originally developed by the Department of Defense to aid the military, the satellite-based system provides location and time data to users. The White

House said in a statement that civilian users of GPS would be able to pinpoint locations up to 10 times more accurately than before. In January 2001, Wikipedia, the free user-generated online encyclopedia, came online and quickly became the reference site of choice for Internet users. But that was just the beginning of a new era of user-generated content. In February 2005, the video-sharing Web site YouTube launched and rapidly became a pop culture mainstay. Many of the innovations capitalize on existing technology to flourish. In some cases, the results not only demonstrate measured success now among select innovations, but also focus on categories that promise even greater success in future. (www.forbes.com/2009/02/19/innovation-internet-health-technology). Most of the scientific selections, including drug developments, surgical advancements and new diagnostic tools, have the potential to spur greater innovation within the next few years to extend life and cure disease. Within the top 10 alone, DNA testing and sequencing, human genome mapping, Magnetic Resonance Imaging (MRI) and non-invasive laser and robotic surgery (laparoscopy) are included.

Allocate millions more to brain research, and every airport could be equipped with ultra-sophisticated fMRI scanners that could immediately recognize angry and hateful thoughts in people's brains. Will it really work? Who knows? Is it wise to develop bionic flies and thought-reading scanners? The US Department of Defense is transferring millions of dollars to nanotechnology and brain laboratories for work on these and other such ideas. Science, industry and military technology intertwined only with the advent of the capitalist system and the Industrial Revolution. Once this relationship was established, however, it quickly transformed the world.

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